National Lung Screening Trial / Lung Screening Study

Manual of Operations and Procedures

Version 9.0 Final
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A project of the National Cancer Institute

National Lung Screening Trial / Lung Screening Study

MANUAL OF OPERATIONS AND PROCEDURES

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1. INTRODUCTION

This chapter presents an overview of the Lung Screening Study (LSS) component of the National Lung Screening Trial (NLST), and an introduction to this document, the Manual of Operations and Procedures (MOOP). Although the NLST is comprised of two component studies (ACRIN [the American College of Radiology Imaging Network] and LSS), this MOOP only addresses operations and procedures for the LSS portion of NLST.

1.1 Background of the National Lung Screening Trial and Lung Screening Study

Lung cancer is the leading cause of cancer-related death in the United States among men and women, afflicting about 215,020 and killing about 161,840 each year. There has been considerable disagreement over spiral computed tomography's (CT) place in lung cancer screening. Considering results from the Early Lung Cancer Action Project (ELCAP), some proponents advocated that the technology could be the single most important advance in decades, claiming that it could increase lung cancer five-year survival to 80 percent. Others argued that the exact benefits and risks were yet to be determined and asked for more research. The argument appeared to reflect a much larger divide over what evidence was required and how it should be obtained before an emerging lung cancer early detection technology would be adopted. While spiral CT represented one of the most exciting new imaging techniques, it needed to be studied appropriately before the technology could be translated into an effective screening tool.

Uncertainty regarding the efficacy of spiral CT in reducing lung cancer mortality resulted in conflicting positions in the medical community. A large randomized trial would be required to fully evaluate the efficacy of spiral CT in reducing lung cancer mortality. To assess the usefulness of annual lung cancer screening with spiral CT, the National Cancer Institute (NCI), in collaboration with the American College of Radiology Imaging Network (ACRIN), conducted the NLST. Two component studies comprised the NLST: (1) the Lung Screening Study (LSS), a special study of the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial, and (2) a trial conducted under an NCI-funded grant to ACRIN.

The feasibility of the NLST was assessed during the feasibility phase of the LSS. During the two and a half month recruitment period (September – November 2000) and five-month screening period (September 2000 – January 2001), a total of 3,409 participants were randomized, with 3,188 participants screened. Approximately one year from its start, the feasibility phase of LSS was extended and participants were invited to receive an additional screening examination and to provide follow-up information. This extension of the feasibility phase occurred between October 2001 and April 2002. Following the extension phase, participants did not receive additional screens or provide follow-up information; however, information from feasibility study participants was submitted to the National Death Index (NDI) in 2007 for ascertainment of vital status.

Due to the success of the first year of the LSS feasibility phase, the NLST was approved by NCI's Board of Scientific Advisors in November 2001. In the LSS component of the NLST, ten screening centers (SCs) from the PLCO Trial randomized a total of 34,614 men and women at elevated risk of lung cancer. NLST recruitment and randomization lasted approximately one and a half years beginning in September 2002 and ending in April 2004. Participants received a total of three annual screening examinations and were followed for at least five years from the date of enrollment. Screening was completed in January 2007 and follow-up ended in 2010. Diagnostic evaluation information was obtained for participants with positive screening examination results and participants with reported lung cancers. Treatment information and information on cancer progression was obtained for participants with a confirmed primary lung cancer diagnosis. Cause of death information was collected for all deceased participants. Lung cancer mortality rates were calculated and compared between spiral CT and chest x-ray groups. See Figure 1-1 for a timeline of study activities.

LSS Feasibility Phase	**Extension of LSS Feasibility Phase**	**NLST**				
9/00 - 1/01	**10/01 - 4/02**	**9/02 – 8/03**	**9/03 - 4/04**	**5/04 - 1/07**	**2/07 – 12/10**	**1/11 – 9/11**
Enrollment & Screening	Screening & Follow-up	Enrollment & Screening	Enrollment, Screening & Follow-up	Screening & Follow-up	Follow-up	Data cleaning, Final results, & Closeout

Figure 1-1 Timeline of Study Activities

1.2 Objectives of the National Lung Screening Trial

The primary objective of the NLST was to determine whether, in persons at elevated risk of lung cancer, screening with spiral CT is associated with a greater reduction in lung cancer mortality than screening with conventional chest x-ray. The NLST addressed the following objectives:

Primary objective:

- To determine whether screening with low-radiation-dose spiral CT, as compared with single-view chest x-ray, reduces lung cancer mortality among high-risk individuals.

Secondary objectives:

- To assess screening parameters, including sensitivity, specificity, and positive predictive value, for both screening modalities.
- To assess incidence, stage, and survival experience of lung cancer cases for both screening modalities.

Additional information regarding the design and objectives of the NLST/LSS is provided in the NLST/LSS Protocol Overview (Appendix 1-1).

1.3 Organizational Structure

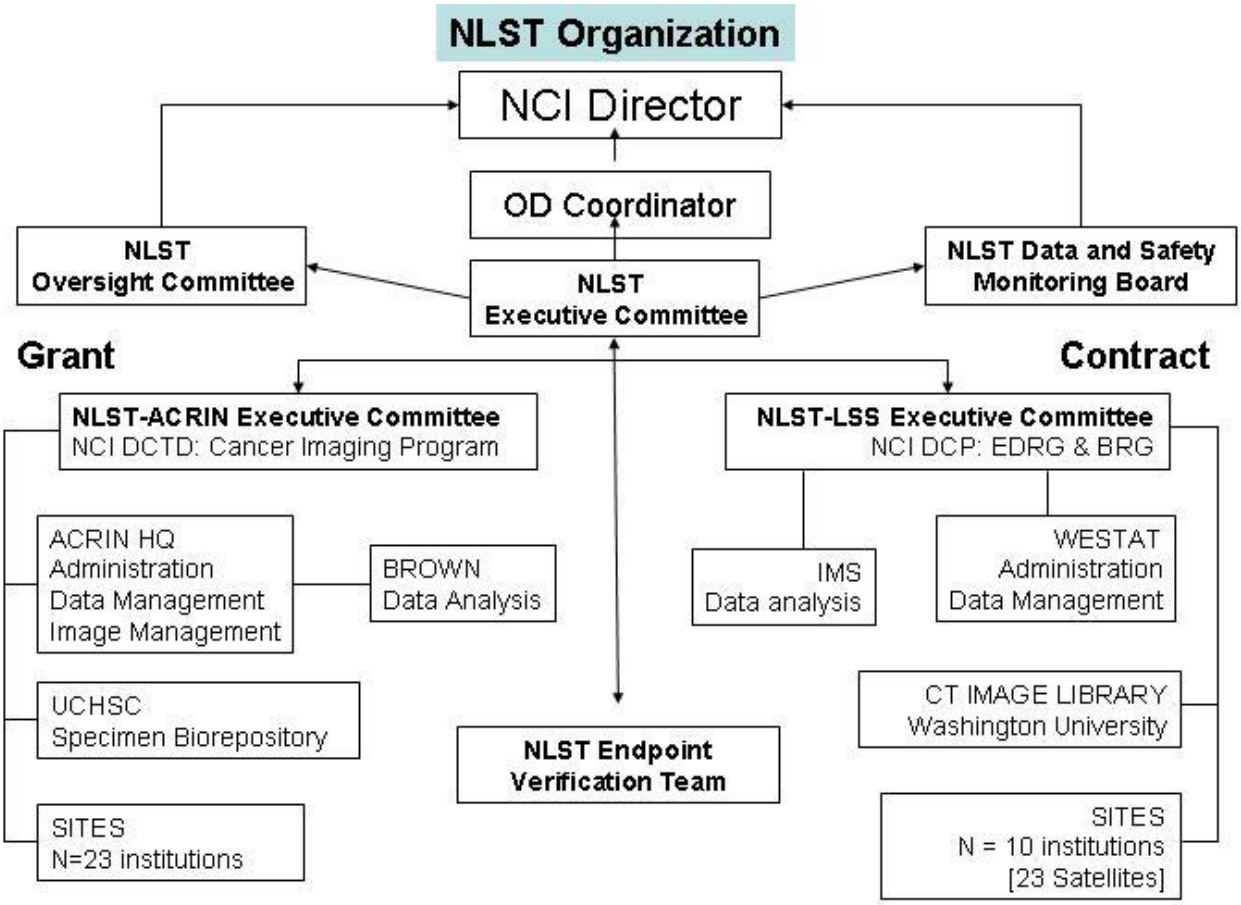
The organizational structure of the NLST is shown in Figure 1-2. The groups involved in designing, conducting, and monitoring the NLST/LSS included the NCI, the NLST Data and Safety Monitoring Board (DSMB), the NLST Oversight Committee, the NLST Executive Committee, the Coordinating Center (CC), Screening Centers (SCs), and Information Management Services, Inc. (IMS). The roles and responsibilities of each group are described below. Unless otherwise noted, the remainder of this chapter and manual refer to the NLST/LSS.

1.3.1 National Cancer Institute

The NLST Project Officer, Dr. Christine Berg, and the Associate Project Officer, Dr. Philip Prorok, were responsible for the oversight of all aspects of the NLST/LSS. The NLST/LSS Assistant Project Officers, Dr. Richard Fagerstrom and Dr. Pamela Marcus were responsible for the day-to-day operations. Dr. Richard Fagerstrom was the Chief Statistician for NLST/LSS. Dorothy Sullivan served as the Communications Officer for NLST/LSS. The NCI Project Officers worked directly with the CC in the development and implementation of the study protocol. They also worked with the SCs to ensure that the technical aspects of the study were carried out to meet rigorous scientific standards, and to review and approve documentation regarding SC plans and procedures. The NCI Project Officers also were responsible for assuring harmonization of the study protocol with ACRIN.

The NCI Contracts Officers were responsible for all contractual matters with the CC and each of the SCs.

Figure 1-2



1.3.2 Data and Safety Monitoring Board (DSMB)

One Data and Safety Monitoring Board (DSMB) was assembled for the NLST; neither LSS nor ACRIN had a separate DSMB. The DSMB was an independent advisory board composed of outside experts in thoracic radiology, pulmonology, surgery, medical ethics, biostatistics, epidemiology, oncology, and other relevant disciplines, as well as a lung cancer patient advocate, who met semi-annually to review study progress. The DSMB members were chosen by the NLST Executive Committee (see Section 1.3.4) with approval from the Director of the NCI. The DSMB addressed issues of study integrity and participant safety. The DSMB also reviewed suggested protocol changes and recommended changes as needed. As the study progressed, the DSMB reviewed the interim data analyses to determine whether significant benefit or harm had been demonstrated for either of the screening modalities, ultimately reaching a conclusion at the October 20, 2010 meeting and advising trial leadership to terminate the study and report results. Prior to the release of final results, the DSMB also reviewed submitted publications, presentations, and associated studies for appropriateness of publication (see Section 1.6.2).

1.3.3 Oversight Committee

The Oversight Committee was comprised of experts in the fields of oncology, radiology, and biostatistics. The role of the Oversight Committee was to act as an interface between the NLST Executive Committee and the NCI Director.

1.3.4 Executive Committee

The NLST Executive Committee was established to facilitate the decision-making process with regards to the harmonization of protocols and procedures. The committee addressed issues concerning protocol changes, publications, presentations, and associated studies. The NLST Executive Committee was composed of members from NLST/LSS and NLST/ACRIN. The NLST/LSS members included Christine Berg, Timothy Church, Richard Fagerstrom, Barnett Kramer, David Lynch, Pamela Marcus, Dorothy Sullivan, and Carl Zylak. The NLST/ACRIN members included Denise Aberle, William Black, Barbara Galen, Ilana Gareen, Constantine Gatsonis, Jonathan Goldin, and Mitchell

Schnall. The committee initially conducted semi-monthly conference calls, then monthly conference calls and an annual in-person meeting.

1.3.5 Coordinating Center (CC)

The CC, Westat, worked closely with the NCI and the SCs to ensure the success of the NLST/LSS. The CC coordinated activities related to the development of the study protocol, arranged and documented meetings, and produced standardized study materials, including this Manual of Operations and Procedures. The CC also was responsible for training the SC Coordinators, Medical Record Abstractors, and Radiologists on study procedures. The CC monitored the work completed at the SCs through receipt of reports and data, and established regular telephone contact with each of the SC Coordinators. In addition, the CC disseminated monthly reports to the NCI during the screening phase, including the status of recruitment, randomization, screening, and follow-up. The CC disseminated quarterly reports to the NCI during the follow-up phase. The CC conducted site visits to each SC annually, or more often as necessary.

The CC was responsible for developing and implementing procedures for receipt of data forms, data entry, and editing of data. From September 2002 to February 2004, data processing activities were centralized at the CC. The CC developed a computerized central Study Management System (SMS) to support central data entry, editing, and management. The computer system also supported receipt control of data forms and tracking and monitoring of study participants both at the SCs and at the CC. Data collection forms were shipped to the CC where they were receipted, and the data edited and keyed. The CC reported data retrieval needs to the SCs and monitored data retrieval progress.

During the first quarter of 2004, the CC developed and transitioned SCs to a computerized distributed study management system

A more detailed discussion of is found in Chapter 11, Section 11.2. Training on the use of was conducted by CC staff. The CC provided written documentation for in the With data entry and editing occurred at the SCs rather than at the CC, and electronic data was automatically transmitted to the CC on a nightly basis. The CC performed quality assurance checks on all data and reported results to the NCI, and center-specific results to the SCs. The CC tracked and monitored study participants through monitoring reports created on a

monthly basis, or as needed. In April 2007, the CC deployed a Web-based data cleaning system to complement The CC and SCs utilized the system to identify and track data edits and overrides.

During the recruitment and enrollment phase of the trial, the CC provided a mechanism for SCs to randomize participants into the study. The system was available to the SCs for randomizing participants using either the Interactive Voice Response (IVR) component by telephone or through submission of electronic files by computer. Instructions on how participants were randomized using the system are included in the

To support the Endpoint Verification Process (EVP), the CC developed the Web-based was available to the SCs for viewing the status of participants for whom death certificates were submitted to the CC, and was available to the members of the Endpoint Verification Team (EVT) for completing required forms for cases under review. was utilized by the CC to monitor the progress of the EVP. See Chapter 9 for more information on the EVP.

1.3.6 Screening Centers

Ten PLCO SCs participated in the NLST/LSS. The Screening Centers were as follows:

- University of Colorado
  Health Sciences Center
  Denver, CO
- Georgetown University Medical Center, Lombardi Cancer Research Center
  Washington, D.C.
- Pacific Health Research and Education Institute
  Honolulu, HI
- Henry Ford Health System
  Detroit, MI
- University of Minnesota School of Public Health/Virginia L. Piper Cancer Institute
  Minneapolis, MN
- Washington University School of Medicine
  St. Louis, MO

- University of Pittsburgh Medical Center
  Pittsburgh, PA

- University of Utah Health Sciences Center
  Salt Lake City, UT
  AND
  St. Luke's Meridian Medical Center
  Meridian, ID

- Marshfield Clinic Research Foundation
  Marshfield, WI

- The University of Alabama at Birmingham
  Birmingham, AL

SCs were responsible for designing procedures necessary to implement the NLST/LSS at their particular institution and for carrying out data collection activities as required by the study protocol and documented in the MOOP. A list of the SC Principal Investigators is provided in Appendix 1-2. SCs also were responsible for data entry and editing in

1.3.7 Information Management Services, Inc. (IMS)

Information Management Services, Inc. (IMS), located in Rockville, Maryland, provided support for statistical analysis for the NLST/LSS. IMS staff worked closely with the senior statisticians from the NCI to perform analyses and develop data reports using data sets provided by the CC. Following the release of the final results, IMS also worked with the NCI and the CC to assemble comprehensive data sets for use by NLST investigators and ultimately the broader research community.

1.4 Overview of Data Collection Activities

Figure 1-3 presents a schematic overview of the data collection activities of the NLST/LSS. These activities are briefly outlined below. The remaining chapters of this manual provide detailed information regarding the standardized forms and procedures involved in each of these activities.

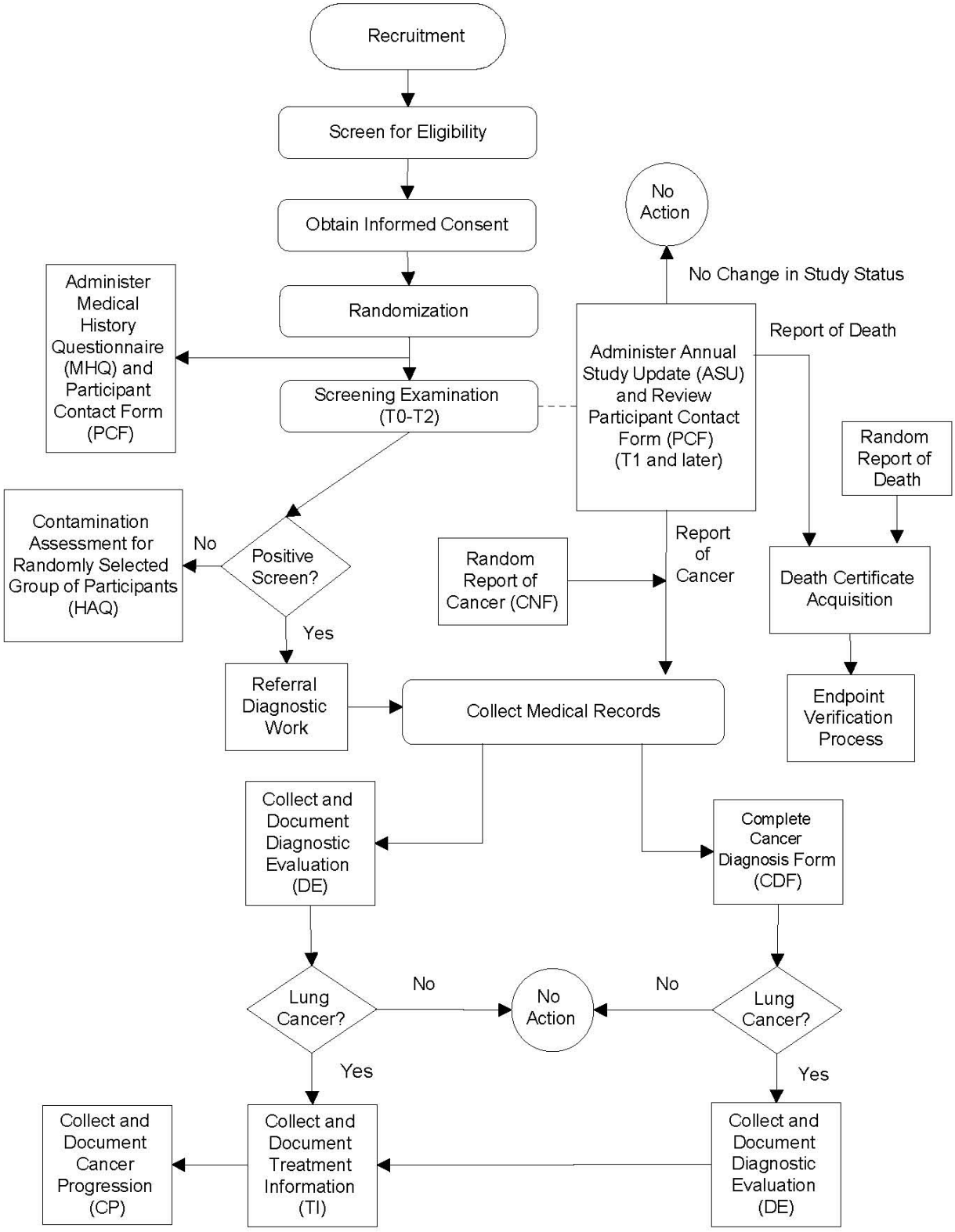
Potential participants (men and women between the ages of 55 and 74) were identified using the recruitment methods outlined in Chapter 2 and screened for eligibility and interest. Those fulfilling the eligibility criteria and interested were recruited into the study and provided written consent.

Participants were randomly assigned to one of two study arms: one arm receiving three annual spiral CT screens; the other arm receiving three annual chest x-ray screens. Participants in both arms of the trial completed a questionnaire collecting information on basic demographics, lung cancer risk factors, and other medical conditions. At the screening visits, participants received the screening examination to which they were randomized (spiral CT or chest x-ray) and were asked to provide contact information and information about their health care provider. A questionnaire was administered to all participants annually to obtain information on cancer diagnosis and smoking habits; additionally, the questionnaire served to maintain contact with participants and assess vital status. Contamination, defined as receiving lung cancer screening exams outside of the study, was assessed in a randomly selected group of participants each study year.

Participants with positive screening examination results were referred to their health care providers for follow-up. SC radiologists provided common strategies for diagnostic evaluation to these participants. Medical records for these participants were then collected, reviewed, and abstracted for diagnostic evaluation. If lung cancer was diagnosed, medical records were collected and abstracted for information on treatment and cancer progression. Participants diagnosed with lung cancer or other cancers that metastasized to the lung were not offered screening exams in subsequent years of the study.

Cancer incidence and mortality were tracked for all participants through 2010 for events that occurred through 2009. A death certificate was obtained by the SCs for all participants who were reported to be deceased, both to confirm the death and to establish the cause of death. The Endpoint Verification Process (EVP) included a thorough review of cause of death information from multiple sources by a central committee, the Endpoint Verification Team (EVT), and involved the collection of supporting documentation by the SCs.

Figure 1-3. NLST/LSS Flow of Data Collection Activities



1.5 Time Schedule of the NLST/LSS

Date	Major Activities
Year 1: September 2002 – August 2003	Randomize and screen about 20,000 new participants (T_0). Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, and cause of death information.
Year 2: September 2003 – August 2004	Randomize and screen about 20,000 new participants (T_0). Re-contact T_1 participants to identify cancer diagnoses and ascertain vital status. Re-screen up to 20,000 participants (T_1). Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination.
Year 3: September 2004 – August 2005	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Re-screen about 40,000 participants. Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination.
Year 4: September 2005 – August 2006	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Re-screen about 20,000 participants (T_2). Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. First interim analysis for mortality reduction and risk/benefit comparison.
Year 5: September 2006 – August 2007	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Complete T_2 screening. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Begin data cleaning. Second interim analysis for mortality reduction and risk/benefit comparison.
Year 6: September 2007 – August 2008	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Continue data cleaning. Third interim analysis for mortality reduction and risk/benefit comparison.
Year 7: September 2008 – August 2009	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Continue data cleaning. Fourth interim analysis for mortality reduction and risk/benefit comparison.
Year 8: September 2009 – August 2010	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Continue data cleaning. Fifth interim analysis for mortality reduction and risk/benefit comparison.
Year 9: September 2010 – September 2011	Follow-up through December 2010 for events through December 2009. Final interim analysis for mortality reduction and risk/benefit comparison. Data cleaning, analysis of final results, and study closeout.

1.6 Study Policy Guidelines

1.6.1 Guidelines for Describing NLST Sponsorship

Certain guidelines were established to apply to materials produced for distribution to study participants, health care providers, and others who may have been contacted regarding the study. These materials included letters, brochures, and similar items. Guidelines were as follows:

- The sponsorship of the NLST should always be stated in such a way that the NCI is primary; and
- The SCs should use SC stationery for all study materials.

1.6.2 Publications, Presentations, and Associated Studies

All data collected and stored according to the statements of work contained in SC contracts with the NCI for the NLST/LSS are the property of the NCI. However, Principal Investigators and other persons could request to use NLST/LSS data or collect additional data on NLST participants for their research purposes. The NCI assembled the NLST/LSS Publications, Presentations, and Associated Studies (PPA) Working Group to review the submission of associated study proposals, publications, presentations, and abstracts utilizing LSS data collected as part of the NLST/LSS. This working group was co-chaired by Principal Investigators from two SCs, David Lynch (University of Colorado) and Timothy Church (University of Minnesota), and included scientists from the Early Detection Research Group and the Biometry Research Group at NCI, with support from the CC. See Appendix 1-3 for the NLST/LSS Publications, Presentations, and Associated Studies Procedures and Authorship Guidelines.

In addition to the PPA Working Group, the NLST Executive Committee assembled the NLST Publications and Presentations Committee (PPC) as the approving body for data requests and proposed associated studies, publications, presentations, and abstracts that utilized NLST (joint ACRIN and LSS) data. This committee was co-chaired by William Black (Dartmouth-Hitchcock Medical Center) and Barnett Kramer (National Institutes of Health), and included representatives from both ACRIN and LSS. Data requests were evaluated in accordance with the trial-wide NLST Data Release Categories and approval by the NLST Chief Statisticians was required. The PPC Co-Chairs also were involved in the NLST/LSS PPA review process. See Appendix 1-4 for the NLST PPC Policies and Review Procedures.

The CC was responsible for forwarding all submitted materials and monitoring progress of submissions through the PPA and PPC review processes, which was accomplished through the use of the NLST (See Section 1.6.3.) The review processes, which varied according to the type of application submitted, involved the PPA Working Group, the NLST Chief Statisticians, the PPC, and the DSMB. Following release of the initial study results in November 2010, review by the DSMB was discontinued.

1.6.2.1 Requests to Use NLST/LSS Data

All investigators who requested access to NLST/LSS data or images prior to October 2011 were required to adhere to the policies and process described in the NLST/LSS Policies and Procedures for Data and Image Access and Use, Appendix 1-5. Data requests were submitted using the appropriate application in and were reviewed according to the approved procedures for the particular application type. The NCI NLST/LSS Chief Statistician rendered the approval decision according to the categories for data release found in the NLST/LSS Policies and Procedures for Data and Image Access and Use.

As of October 2011, investigators wishing to access NLST data were required to adhere to the policy, NLST Investigator Access and Use of Joint Data and Images, Appendix 1-6.

1.6.2.2 Associated Study Policy

An associated study is defined as any research that required either (1) supplemental observations or procedures to be performed on all or a subgroup of NLST/LSS participants according to a set protocol; or (2) additional work to be completed by or information obtained from the CC. To protect the integrity of the trial, all such associated studies were reviewed and approved by the PPA Working Group, the NCI NLST/LSS Chief Statistician, the PPC Co-Chairs, and the DSMB before they could be initiated.

Associated studies were required to:

- Not interfere with the implementation/operation of NLST/LSS activities;
- Not adversely affect cooperation or compliance of NLST/LSS participants;
- Not divert NLST/LSS funds;
- Not jeopardize the public reputation of the NLST/LSS;
- Not lead to premature publication of any NLST/LSS results;
- Not complicate the interpretation of any NLST/LSS results;
- Not violate the rights of NLST/LSS participants;
- Not present methodological or ethical problems, and
- Not jeopardize the NLST/LSS in any way.

In addition, investigators were required to:

- Obtain IRB approval from their institution;
- Protect confidentiality of all NLST/LSS data;
- Allow review of manuscripts by the NLST/LSS prior to submission in order to ensure accuracy of statements and data related to the NLST/LSS, and
- Ensure that all NLST/LSS data remain under the direct management of the NLST/LSS principal investigator.

Investigators were required to provide a brief description of the objectives, methods, and significance of the study. Full details were provided concerning any procedures to be carried out on participants.

1.6.2.3 Publications, Presentations, and Abstracts

Publications, presentations, and abstracts emanating from approved associated studies were reviewed by the PPA Working Group. Approval was required prior to publication or presentation. A publication or presentation was not approved if the NCI, PPC, or DSMB judged the release of the data to be inappropriate. The CC maintained an archive of publications and presentations submitted for review, as well as a list of all final publications and presentations.

Presentations and publications were required to adhere to the terms stated in the NLST/LSS Data Transfer Agreement; that is, they were not to contain data that were confidential or information that would jeopardize the integrity of NLST/LSS in any way. The Data Transfer Agreement is included as part of the NLST/LSS Policies and Procedures for Data and Image Access and Use.

1.6.3

The is a Web-based system that centralized all of the administrative activities related to proposals that used trial data or images. Applications for data and image requests and proposed associated studies, publications, presentations, and abstracts were completed by investigators and submitted for review using Registration was required for accessing and submitting applications for data requests, associated study proposals, publications, presentations, or abstracts.

NLST/LSS was located on the Web at NLST/LSS was used to facilitate the submission and review of proposals that utilized LSS data. Background information about the NLST/LSS was available on the public page. Reference materials, including NLST/LSS policies and procedures, details of the PPA review process, and instructions for completing the applications also were available.

The NLST Joint ACRIN/LSS Web site, also located on the Web at was used to facilitate the submission and review of proposals that utilized joint NLST (ACRIN and LSS) data. Background information on NLST, as well as NLST policies and procedures, details of the PPC review process, and instructions for completing the applications also were available.

1.6.4 Research Working Groups

In September 2006, NCI, with input from the SC Principal Investigators and Radiologists, identified five research areas as the focus for the development of working groups in order to promote the generation of associated studies and scientific papers. The five working groups were: Clinical Issues, Electronic Imaging, Epidemiology, Medical Physics, and Methods and Operations. The groups met at least semi-annually and held regular teleconferences. The groups maintained a list of active and potential projects, and used meetings to discuss the merit of potential projects, details of project development, and progress of active studies. While it was not a requirement to have the approval of a working group for a proposed research project, it was expected that a potential project would be discussed with the appropriate working group for feedback prior to submission of a proposal application. Contacting a working group chair or the CC Lead with a proposal concept was suggested to enable discussion of the new project on a call or during a meeting. See Appendix 1-7 for a list of the working group chairs, NCI Leads, and CC Leads.

1.7 Purpose and Organization of the Manual of Operations and Procedures

1.7.1 Purpose of the Manual

The purpose of this manual is to document the study procedures that were implemented at all SCs. These procedures enabled each SC to carry out the study requirements as outlined in the protocol. It was expected that the Manual of Operations and Procedures would be reviewed at each SC by the Principal Investigator, the SC Coordinator, Lead Radiologist, and other staff prior to the start of the study activities.

The manual was updated as necessary throughout the course of the study. Each page was identified with a version date. Replacement pages were identified with a new version date. The SC Coordinator was responsible for ensuring that replacement pages were distributed to each individual at the SC with a copy of the manual.

The NLST/LSS Decision Logs were used in conjunction with the MOOP. These documents presented the NCI's decisions and resolutions regarding all protocol, procedural, and forms questions; suggestions for changes; and SC administrative and management issues. Each decision log was assigned

a number and dated, and was distributed to all SC Principal Investigators and Coordinators. Study Radiologists received an abbreviated version of each decision log containing only the information that pertained to the procedures that involved them.

1.7.2 Organization of the Chapters of the Manual

Recruitment and eligibility determination of study participants, including informed consent, randomization, and enrollment procedures, are covered in Chapter 2. Chapter 3 details the procedures for scheduling and conducting the screening visits and annual activities. Chapters 4 and 5 detail the spiral CT and chest x-ray screening examination protocols. Chapter 6 provides procedures for reporting results of screening examinations to participants and their health care providers. Chapter 7 discusses the procedures for the follow-up of positive results from screening examinations and other reported lung cancers. Chapter 8 discusses the procedures for cancer ascertainment. Chapter 9 details the process of vital status ascertainment and the endpoint verification process. Chapter 10 discusses assessment of contamination in both arms of the study. Chapter 11 describes administrative procedures to be conducted at the SCs, including registration of staff, record keeping, data management, and other management functions. Chapter 12 describes the procedures for collecting pathology specimens from participants with confirmed lung cancer. Chapter 13 describes the SC closeout timeline and procedures.

Appendices for Chapter 1

NATIONAL LUNG SCREENING TRIAL/LUNG SCREENING STUDY

PROTOCOL OVERVIEW

Study Overview

To assess the usefulness of annual lung cancer screening with spiral CT, the National Cancer Institute (NCI), in collaboration with the American College of Radiology Imaging Network (ACRIN), is conducting the National Lung Screening Trial (NLST), a randomized controlled trial (RCT).

The primary objective of the NLST is:

- To determine whether screening with low-radiation-dose spiral CT, as compared with single-view chest x-ray, reduces lung cancer mortality among high-risk individuals.

Secondary objectives include the following:

- To assess screening parameters, including sensitivity, specificity, and positive predictive value, for both screening modalities.
- To assess incidence, stage, and survival experience of lung cancer cases for both screening modalities.

Two component studies comprise the NLST – an RCT conducted under contract to the NCI as a special study of the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial (hereafter known as NLST/LSS) and an RCT conducted under an NCI-funded grant to ACRIN. The two component studies will collect the NLST outcome data in the same manner so as to allow for sound data pooling. The remainder of this protocol overview addresses NLST/LSS activities only.

The feasibility of the NLST was assessed during the feasibility phase of the LSS [1]. During the two and a half month recruitment period (September – November 2000) and five-month screening period (September 2000 – January 2001), a total of 3,409 participants were randomized, with 3,188 participants being screened. Approximately one year from its start, the LSS feasibility phase was extended and participants were invited to receive an additional screening examination and to provide follow-up information. This extension of the feasibility phase occurred between October 2001 and April 2002. The feasibility phase is now complete. Participants will not receive additional screens and will no

longer provide follow-up information; however, in the spring of 2007, information from feasibility study participants was submitted to the National Death Index (NDI) for ascertainment of vital status.

Due to the success of the first year of the LSS feasibility phase, the NLST was approved by NCI's Board of Scientific Advisors in November 2001. In the LSS component of the NLST, ten screening centers (SCs) from the PLCO Trial randomized a total of 34,614 men and women at elevated risk of lung cancer, with 34,570 participants eligible to participate. Participants are expected to have received a total of three annual screening examinations as well as follow-up for at least five years from the date of enrollment. Diagnostic evaluation information is obtained for participants with positive screening examination results and participants with reported lung cancers. Treatment information and information on cancer progression is obtained for participants with a confirmed primary lung cancer diagnosis. Lung cancer mortality rates will be determined and compared between spiral CT and chest x-ray groups.

Scientific Background

Lung cancer is the leading cause of cancer-related death in the United States [2]. It is estimated that there will be 161,840 deaths due to lung cancer in 2008 [2]. Although the most straightforward way to reduce lung cancer risk is to stop smoking, smoking cessation programs have had limited success. Furthermore, an elevation in lung cancer risk is believed to remain, at least in the short-term, for former smokers. Because symptoms of lung cancer often do not appear before the disease is advanced, secondary prevention is an appealing option.

Attempts to evaluate lung cancer screening modalities began over 50 years ago. Early studies, including the Philadelphia Pulmonary Neoplasm Research Project [3], the Veterans Administration Study [4], the South London Lung Cancer Study [5], the North London Cancer Study [6], and the Kaiser Foundation Health Plan Multiphasic Screening Trial [7], observed no significant impact of screening. Many of these studies had serious design limitations and consequently, the NCI sponsored, in the 1970s and 1980s, three RCTs to assess lung cancer screening modalities. Two trials, one conducted at Johns Hopkins [8] and the other conducted at Memorial Sloan-Kettering [9], observed no reduction in lung cancer mortality with a regimen of annual chest x-ray and sputum cytology every four months versus annual chest x-ray alone, indicating that sputum cytology as an addition to chest x-ray was not useful. The third trial, the Mayo Lung Project (MLP) [10], observed no reduction in lung cancer mortality with chest x-ray and sputum cytology every four months versus usual care (with participants in the usual care

arm receiving only a recommendation to receive the two tests annually). As no benefit of sputum cytology was observed in the Hopkins and Memorial Sloan-Kettering trials, the results of the MLP were interpreted to indicate that screening chest x-ray does not reduce lung cancer mortality. Over the last 15 years, these findings have played a central role in policy decisions concerning lung cancer screening.

The conclusions of the MLP have been questioned, however, because the trial did not have sufficient statistical power to identify the small but clinically important reduction in lung cancer mortality that may be possible with annual chest x-ray screening. The NCI is currently revisiting this issue in PLCO [11]. The intervention arm in PLCO is receiving an annual chest x-ray while the control arm is receiving nothing. Unlike the MLP, PLCO has ample statistical power to detect a 20 percent reduction in lung cancer mortality. Chest x-ray screening in PLCO is complete.

Since the onset of PLCO, other possible lung cancer screening modalities have been suggested. The most promising modality is a modified version of helical computed tomography. Helical computed tomography, commonly referred to as "spiral CT," is an established lung cancer diagnostic tool that can generate, with excellent resolution, three-dimensional images of lung cancer lesions, including very small lesions. A spiral CT exam that utilizes a lower radiation dose (60 milliamperes as compared with 200 milliamperes received for a diagnostic CT) has been suggested as a lung cancer screening modality, and although the imaging capabilities of a low-radiation-dose spiral CT are inferior to those of a full-dose exam, they are still superior to those of a traditional chest x-ray.

The earliest results regarding the usefulness of low-radiation-dose spiral CT as a lung cancer screening modality come from the Early Lung Cancer Action Project (ELCAP) [12]. ELCAP recruited 1,000 volunteers at elevated risk of lung cancer (at least 10 pack-years of smoking) and screened them with both chest x-ray and low-dose spiral CT. In this study population, spiral CT detected noncalcified nodules in 233 participants (malignant disease confirmed in 27), while chest x-ray detected noncalcified nodules in only 68 participants (malignant disease confirmed in 7). The findings of ELCAP left important questions regarding the usefulness of low-dose spiral CT unanswered. Most importantly, it is uncertain whether every lesion detected by spiral CT in ELCAP would have been diagnosed in the absence of screening.

Although detection of lung cancer lesions at an early stage is intuitively appealing, mass screening of asymptomatic individuals does not necessarily reduce the number of lung cancer deaths that would have been observed had no screening occurred. Viable treatment options are of course critical to the success of any screening program, but another aspect – that screening can indirectly result in harm and

thus negate any potential benefit – also must be considered. In addition to the harm that results from false positive and false negative tests, harm may also result from "over diagnosis," that is, the detection of malignant lesions that would not have been diagnosed in the absence of screening. In this situation, treatment occurs but is actually unnecessary; treatment, however, can result in reduced quality-of-life (due to chemotherapy treatments, for example) as well as morbidity and mortality (including death due to thoracotomy). The existence of a non-lethal lung cancer lesion is challenged by some researchers, but a recent follow-up analysis of MLP participants indicates that such lesions are likely to exist. Such lesions may have been detected in ELCAP, but lack of a randomized control arm and a mortality endpoint precludes further investigation of this possibility. Therefore the identification of more lesions on spiral CT as compared with chest x-ray in ELCAP does not guarantee that screening spiral CT saves lives.

The NCI's Division of Cancer Prevention (DCP) recognizes the need for further study of screening spiral CT prior to establishment of mass screening programs. To this end, plans for a large RCT with statistical power to detect a modest reduction in lung cancer mortality were developed in early 2000. Concerns regarding the acceptability of randomization and extent of spiral CT utilization among the potential study population were raised, however. To assess the feasibility of conducting a large RCT, the LSS, a special study conducted under the auspices of the PLCO Screening Trial, was undertaken in 2000 [1].

The LSS established the feasibility of conducting an RCT of spiral CT versus chest x-ray in the targeted high-risk population. During September, October, and November of 2000, six PLCO Screening Centers enrolled over 3,400 newly-recruited participants to the LSS. Individuals were randomized to a single screening spiral CT or a single screening chest x-ray, with chest x-ray chosen as a control exam to reflect the fact that it may become standard of care if a lung cancer mortality reduction is observed in PLCO. The LSS screening was completed on January 31, 2001 and all medical record abstracting was completed on June 15, 2001. Data regarding detection rates and diagnostic evaluation became available during the summer of 2001.

The feasibility phase was highly successful and assuaged concerns regarding the feasibility of a larger trial. This led to approval of the NLST in November, 2001 by the NCI Board of Scientific Advisors. The NLST will have 90% statistical power to detect a 20% reduction in lung cancer mortality with screening spiral CT, should one exist.

Recruitment

The ten NLST/LSS SCs primarily used mass mailings to enroll participants. Other recruitment methods included posters in medical facilities, recommendations from clinical practitioners, and advertisements in newspapers or magazines. The information package was mass-mailed or supplied to interested persons and contained a cover letter, a fact sheet, a toll-free phone number to call if the potential participant had questions, and a reply card for the participant to return if s/he was interested in participating.

Once a call or a reply card from an interested person was received, the SC determined eligibility by administering the Eligibility Screener (ES), a standard study form. The ES queried the participant as to age, smoking history, and lung cancer history, as well as other eligibility criteria. If the person was eligible, interested, and willing to sign the consent form, an appointment was made either for an orientation session or screening, depending on SC procedures. Eligibility and exclusion criteria were applied as follows:

Eligibility criteria:

- Ages 55-74 on date of randomization;
- Current smoker or former smoker who has quit within 15 years of randomization, and
- Cigarette smoking history of at least 30 pack-years.

Exclusion criteria:

- Spiral CT exam of the lungs, heart, or chest in the 18 months prior to randomization;
- Participation in another cancer screening study, including PLCO;
- Participation in a cancer prevention study other than a study of smoking cessation;
- Previous history of lung cancer;
- Previous removal of any portion of the lungs, except through needle biopsy;
- Evidence of or treatment for cancer (excluding non-melanoma skin cancer and carcinoma in situ other than bladder carcinoma in situ and transitional cell carcinoma in situ) in the past five years;
- Inability to lie flat on his/her back with arms raised over the head;

- Metallic implants in the chest or back (e.g. pacemakers, Harrington fixation rods);
- Requirement for home oxygen supplementation;
- Unexplained weight loss of over 15 pounds in the past 12 months or recent hemoptysis;
- Pneumonia or acute respiratory infection treated with antibiotics by a physician in the past twelve (12) weeks, or
- Unwillingness or inability to sign the consent form.

Informed Consent

Each interested participant was asked to sign a consent form prior to randomization. This was generally in advance of or at the first visit to the SC. The consent form described the study, study procedures, potential benefits and risks, alternatives to participation, the randomization process, the person's rights, potential costs, and procedures to maintain confidentiality. The name of at least one person in the SC to contact and a phone number to call were provided in the consent form. An SC staff member was made available by telephone and in person at the SC to answer questions about the consent form.

Randomization

Randomization occurred via computer or telephone using the system. The system was available 24 hours a day, seven days a week. Randomization was stratified by gender and age group within each SC. Randomization procedures resulted in roughly equal numbers of participants in the study arms (spiral CT and chest x-ray).

Medical History Questionnaire

A Medical History Questionnaire was administered to all eligible participants enrolled in the study. The purpose of this questionnaire was to collect information on demographics, lung cancer risk factors, and current and past medical conditions.

Screening

Participants randomized to the spiral CT arm received three low-radiation-dose spiral CT scans spaced one year apart; participants randomized to the chest x-ray arm received three postero-anterior (PA) chest x-rays according to the same schedule. The initial screening tests were scheduled to occur within three months of randomization. Most follow up screening tests occurred between one month prior to and three months after the randomization anniversary. Board certified radiologists, who are approved to work on the study, reviewed the chest x-rays and the CT scans. Findings were noted on standardized screening results forms.

Results Reporting

Test results were sent by mail to participants and their physicians within three weeks of exams. If a screening test was suspicious for lung cancer (positive) or negative for lung cancer but had other clinically significant abnormalities, the SC staff also notified the participant by telephone. If the participant was unavailable by telephone, results were sent via certified mail. Positive screening results and negative screening results with clinically significant abnormalities were transmitted to physicians either via telephone, fax, or certified mail. If the fax method was chosen, the physician's office was telephoned and advised of the fax transmittal in advance. The letters to the participant and his/her physician accompanying the screening results report encouraged appropriate diagnostic work-up. If the participant did not have a physician, s/he was offered a list from which to choose a referral physician.

Work-up for Positive Screens

SC Radiologists provided common strategies for diagnostic evaluation to participants with positive screens. Strategies were chosen at the discretion of the reading radiologists and did not represent NLST recommendations. Such strategies were presented in results letters as follows: *"Among physicians, it is agreed that this abnormality requires a follow-up evaluation. The exact follow-up time interval and method have not been scientifically established, but common methods may include*: (list all that apply). *Your physician may have alternative methods of evaluation within the range of current practice."*

If it was determined that diagnostic work-up was declined by a participant, this fact was recorded and dated, and any supporting information included in the participant's file.

Pathology Tissue Collection

Pathology tissue blocks will be collected for a subset of NLST/LSS participants with resected lung cancer and used for the creation of tissue microarrays (TMAs). The TMAs will be stored and used for additional research related to lung cancer etiology as approved by NCI.

Long-term Follow up

Cancer incidence and mortality will be tracked for all participants through December 2009. For those reported to have lung cancer, medical records are reviewed and abstracted for diagnostic evaluation. For those with confirmed lung cancer, treatment information and information on cancer progression is abstracted.

Death certificates are obtained by the SCs for all participants reported as deceased, both as confirmation of death and to establish cause of death. The Endpoint Verification Process, including the Endpoint Verification Team (EVT), has been implemented in the study. This process will include a thorough review of cause of death information, and will involve, where necessary, collection of supporting documentation and review by the SC and the EVT.

Organizational Structure

NCI Project Officers provide oversight for the NLST/LSS, with input from the NLST Data and Safety Monitoring Board (DSMB). Screening is carried out at ten Screening Centers nationwide. Coordination and data management activities are performed by Westat (Rockville, Maryland), the Coordinating Center.

Screening Center Responsibilities

Screening Center responsibilities will include:

- Recruitment;
- Eligibility assessment;
- Administration of informed consent;
- Randomization;
- Participant retention;
- Administration of Medical History Questionnaire;
- Screening;
- Accurate and timely results reporting to participants and physicians;
- Tracking diagnostic follow-up of positive screens;
- Cancer and vital status ascertainment through administration of Annual Study Update;
- Medical record abstracting;
- Keying and editing of data forms into the
- Data processing and data management;
- Transmitting electronic data to the CC on a monthly basis;
- Shipment of the Medical History Questionnaire (MHQ), Health Assessment Questionnaire (HAQ), Report of Adverse Events (RAE), and copies of the Protocol and HIPAA Violation Form (PHVF) to the CC;
- Collection and shipment of tissue blocks;
- Collection of death certificates and death documentation;
- Maintenance of current, complete, and secure participant files, and
- Assessment of compliance and contamination.

Coordinating Center Responsibilities

Administrative:

- Preparation of OMB exemption package;
- Preparation and approval of IRB package;
- Organization of bi-weekly meetings with NCI;
- Documentation of all meetings;
- Coordination and documentation for all conference calls;
- Support and documentation of all working groups (e.g. Clinical Issues, Electronic Image, Epidemiology, Medical Physicist, Methods and Operations, Screening QA, and Publications, Presentations, and Associated Studies Working Groups);
- Development and maintenance of an NLST/LSS Manual of Operations and Procedures (MOOP), including Decision Logs and annual updates;
- Development and printing of all study forms;
- Training of staff on all procedures and study forms;
- Review and monitoring of experience, credentials, and training for certain NLST/LSS personnel;
- Monitoring progress and protocol adherence at Screening Centers;
- Liaison between Screening Centers and the NCI;
- Preparation of a monthly status report for the NCI;
- QA of all aspects of the study, including screening exams and the MRA process;
- Site visits to Screening Centers;
- Coordination of the Endpoint Verification Process;
- Coordination of the Pathology Tissue Collection effort, and
- Maintenance of a central records file.

Data Management:

- Development and maintenance of a centralized randomization system;

- Development and maintenance of a decentralized
- Development and maintenance of the Web-based to support the Endpoint Verification Process;
- Development and maintenance of documentation;
- Receiving, keying, and editing of Medical History Questionnaire (MHQ) and Health Assessment Questionnaire (HAQ) data;
- Centralized data processing, data management, and preparation of reports;
- Data delivery, and
- Data quality assurance.

Data Transmittal

A data extraction module in automatically transmits data to the CC server on a nightly basis.

TIMELINE

Date	Major Activities
Year 1: September 2002 – August 2003	Randomize and screen about 20,000 new participants (T_0). Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, and cause of death information.
Year 2: September 2003 – August 2004	Randomize and screen about 20,000 new participants (T_0). Re-contact T_1 participants to identify cancer diagnoses and ascertain vital status. Re-screen: at least 20,000 participants (T_1). Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination.
Year 3: September 2004 – August 2005	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Re-screen about 40,000 participants. Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination.
Year 4: September 2005 – August 2006	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Re-screen: about 20,000 participants (T_2). Follow up all positive screens. Assess positivity rates and lung cancer detection rates. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. First interim analysis for mortality reduction and risk/benefit comparison.
Year 5: September 2006 – August 2007	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Complete T_2 screening. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Begin data cleaning. Second interim analysis for mortality reduction and risk/benefit comparison.
Year 6: September 2007 – August 2008	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Continue data cleaning. Third interim analysis for mortality reduction and risk/benefit comparison.
Year 7: September 2008 – August 2009	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Continue data cleaning. Fourth interim analysis for mortality reduction and risk/benefit comparison.
Year 8: September 2009 – August 2010	Re-contact all participants to identify cancer diagnoses and ascertain vital status. Collect and abstract diagnostic, treatment, cancer progression, and cause of death information. Assess contamination. Continue data cleaning. Fifth interim analysis for mortality reduction and risk/benefit comparison.
Year 9: September 2010 – September 2011	Follow-up through December 2010 for events through December 2009. Final interim analysis for mortality reduction and risk/benefit comparison. Data cleaning, analysis of final results, and study closeout.

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Appendix 1-2 List of Screening Center Principal Investigators

SCREENING CENTER PRINCIPAL INVESTIGATORS

E. David Crawford, M.D.
Kavita Garg, M.D., Co-Investigator
University of Colorado
Health Sciences Center
Denver, CO

Claudine Isaacs, M.D.
Matthew Freedman, M.D., MBA, Co-Investigator
Georgetown University Medical Center
Lombardi Cancer Research Center
Washington, DC

Lance Yokochi, M.D., MPH
Peter Balkin, M.D., Co-Investigator
Pacific Health Research and Education Institute
Honolulu, HI

Paul A. Kvale, M.D.
Christine Cole-Johnson, Ph.D., MPH, Co-Investigator
Henry Ford Health System
Detroit, MI

Timothy R. Church, Ph.D.
Martin Oken, M.D., Co-Investigator
School of Public Health/Virginia Piper Cancer Institute
University of Minnesota
Minneapolis, MN

Gerald Andriole, M.D.
David Gierada, M.D., Co-Investigator
Washington University School of Medicine
St. Louis, MO

Joel L. Weissfeld, M.D., M.P.H.
University of Pittsburgh Medical Center
Pittsburgh, PA

Saundra Buys, M.D.
University of Utah
Salt Lake City, UT
AND
Thomas Beck, M.D., Co-Investigator
St. Luke's Mountain States Tumor Institute
Boise, ID

Douglas Reding, M.D., M.P.H., F.A.C.P.
William Hocking, M.D., Co-Investigator
Marshfield Clinic Research Foundation
Marshfield, WI

Mona Fouad, M.D., MPH
William Bailey, M.D., Co-Investigator
The University of Alabama at Birmingham
Birmingham, AL

NLST/LSS
Publications, Presentations, and Associated Study Working Group Review Procedures and Authorship Guidelines

These policies were in effect through September 2011.

This document summarizes the procedures for submitting and reviewing proposals using data collected as part of the Lung Screening Study (LSS) of the National Lung Screening Trial (NLST) for exploratory projects, associated studies, addenda for associated studies, publications, presentations, and abstracts. This document also addresses authorship guidelines and responsibilities of the lead author for PPA-approved projects. This document includes the following sections:

- Background Information
- Review Procedures
- Reviewer Responsibilities
- Authorship Guidelines and Acknowledgement Requirements
- Post-review Responsibilities of the Lead or Corresponding Author
- Contact Information

The information in this document is complemented by the *Policies and Procedures for NLST/LSS Data Access and Use*, which explains different types of data requests and the proper use of NLST/LSS data; in addition, it contains the NLST Data Release Categories. It may be obtained by contacting

BACKGROUND INFORMATION

The Publications, Presentations, and Associated Studies Working Group

NCI has assembled a subcommittee to review publications, presentations, abstracts, and associated study proposals for LSS data collected as part of the NLST, to be known as the Publications, Presentations, and Associated Studies (PPA) Working Group. The mission of the PPA Working Group is to ensure that publications, presentations, abstracts, and associated studies will not jeopardize the integrity of the NLST or harm its public reputation, and to ensure a high scientific standard for proposals emanating from the trial. The PPA Working Group:

- Reviews proposals that request NLST/LSS data for publications, presentations, abstracts, and associated studies
- Provides oversight and guidance to the LSS working groups and individual investigators for proposal development
- Monitors and evaluates the progress of approved studies
- Maintains an archive of publications and presentations

The PPA Working Group is co-chaired by two NLST/LSS principal investigators, Timothy Church and David Lynch. Members are NLST/LSS investigators and NCI project officers. Westat, the Coordinating Center, provides administrative support.

Appendix 1-3 NLST/LSS Publications, Presentations, and Associated Studies Procedures and Authorship Guidelines

General Proposal Review Information

Proposal review is a multi-step process involving the PPA Working Group, NCI, the Co-chairs of the NLST Publications and Presentations Committee (PPC), and the NLST Data and Safety Monitoring Board (DSMB)*. The focus of the PPA Working Group review is on the scientific content, methodology, and statistical analysis of the proposal. The role of the NCI Chief Statistician is to evaluate the statistical component of each proposal and, in the case of data requests, to render a decision on the permissibility of the requested data release. The decision of the Chief Statistician is guided by the NLST Data Release Categories, which are developed in conjunction with the NLST DSMB* and updated as the trial progresses.

In compliance with the *NLST PPC Policies and Review Procedures*, all research proposals must be reviewed by both the Co-chairs of the NLST PPC, whose primary purpose is to ensure that the ACRIN and LSS reviews identified and remedied issues inherent in the proposal that may negatively affect the integrity of the trial. If the review reveals an issue of concern, the PPC Co-chair may request consideration by the full PPC.

Proposals must be approved by the NLST DSMB*, whose scope of review is confined to issues related to the integrity of the trial, confidentiality of the data, and protection of trial endpoints. The DSMB* may also provide comment on the scientific content and/or the analyses to be performed.

ACRIN and Combined ACRIN and LSS Data

Investigators may request access to data from the American College of Radiology Imaging Network (ACRIN) component of NLST by following the data request procedures outlined in the *ACRIN NLST Policies on Data Access and Publications* for investigators outside of NLST. This document may be obtained by contacting Proposals for projects that use or seek to use data from both ACRIN and the LSS, will be reviewed according to the procedures outlined in the *NLST PPC Policies and Review Procedures*, available by contacting

Responding to Issues of Concern

At each step in the review process, a reviewer may suggest or require changes to a proposal. If changes are suggested, the investigator will be informed, and the proposal can proceed to the next step without a revision. If the reviewer notes an issue of concern, particularly one that might affect the integrity of the trial, he/she may indicate that changes are mandatory. The investigator may address the concern in a response, make appropriate revisions, or withdraw the proposal from further consideration. Proposals that have been rejected may be revised and re-submitted.

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

Appendix 1-3 NLST/LSS Publications, Presentations, and Associated Studies Procedures and Authorship Guidelines

Applications for data requests, associated studies, publications, presentations, and abstracts must be completed and submitted using the NLST Access to NLST requires registration on the Web site

REVIEW PROCEDURES

Review Procedures for NLST/LSS Limited Data and Image Requests

An investigator may request data for an exploratory project that would be limited in scope and analyzed with the intent to formulate a proposal for an associated study and not for the purposes of presentation or publication. The review of requests for NLST/LSS data and/or images follows these steps:

1. The investigator completes and submits the NLST/LSS Data and Image Request Application form via

2. The Westat PPA Coordinator reviews the application for completeness, and forwards the application to the Westat Data Manager.

3. The Westat Data Manager reviews the data and image request to ensure that the data requested are available, and to clarify requests for data that do not conform to the variables found on the NLST/LSS data collection forms, or that do not seem to correspond to the specific aims of the study.

4. After the Westat Data Manager has cleared the data and image request, the Westat PPA Coordinator forwards the Data Manager's comments and the application to the NCI Chief Statistician.

5. The NCI Chief Statistician has two weeks to complete his review of the proposal, and notify the Westat PPA Coordinator of his decision. He may indicate:
   - Approval: the PPA Coordinator sends notification of the approval to the investigator, the Westat Data Manager, and the Washington University Computer Tomography Image Library (CTIL) staff when appropriate, or
   - No approval: the PPA Coordinator notifies the investigator.

Review Procedures for Associated Studies:

The review of associated study proposals follows these steps:

1. Investigator completes and submits the NLST/LSS Associated Studies application form via

   - If the associated study proposal <u>includes</u> a data and/or an image request, the investigator must complete and submit the Associated Studies with Data Request Application form

The Westat PPA Coordinator will forward the data/image request to the Westat Data Manager, who reviews the data/image request, and then forwards the form and comments to the NCI Preliminary Reviewer.

- If the associated study proposal does not include a data request and/or an image request, upon submission, the Westat PPA Coordinator will forward the application to the NCI Preliminary Reviewer.

2. The NCI Preliminary Reviewer examines the proposal to determine whether the study will jeopardize the integrity of the trial, or harm its public reputation and to ensure that it contains enough details to allow for adequate review. The NCI Preliminary Reviewer may:
   - Assign two reviewers to each proposal, one subject area reviewer and one statistical reviewer, and forward the proposal to the Westat PPA Coordinator for tracking through the approval process, or
   - Return the proposal to the PI, and recommend that the PI clarify or modify the proposal before re-submitting it for formal review.

3. The Westat PPA Coordinator sends the proposal and the NLST/LSS Associated Study Review form to the reviewers who have two weeks to review the proposal and submit the completed review forms to the Westat PPA Coordinator. The reviewers may recommend:
   - Revisions: the Westat PPA Coordinator forwards the information to the investigator. The investigator returns responses and revisions to the Westat PPA Coordinator, who forwards them to the reviewers with an updated review form. Responses from the investigator are sent to both reviewers. Reviewers have one week to respond to the revised proposal. This process continues until the reviewers have no further questions for the investigator.
   - Approval: the Westat PPA Coordinator sends the proposal materials to the PPA Working Group members for discussion on the next scheduled PPA conference call.

4. The proposed study and all review materials are discussed during the PPA Working Group call; reviewers are asked to be present during the call. The PPA Working Group may choose:
   - Approval: the Westat PPA Coordinator sends all proposal materials to the NLST/LSS Chief Statistician for review, or
   - No approval: the Westat PPA Coordinator notifies the investigator of the PPA Working Group decision.

5. The Chief Statistician has two weeks to complete his review of the proposal and notify the Westat PPA Coordinator of the action he chooses:
   - Approval: the Westat PPA Coordinator sends all proposal materials to the Co-chairs of the NLST PPC for review, or
   - No approval: the Westat PPA Coordinator notifies the investigator of the Chief Statistician's decision.

6. The DSMB* Chair has two weeks to notify Westat of the action of the DSMB*. The Chair may choose:
   - Approval.
   - No approval.
   - Electronic review by all DSMB* members.
   - Discussion of the proposal by all DSMB* members during the next regularly scheduled meeting of the DSMB*. Note that as the DSMB* meets every six months, this last option may result in a significant delay in the approval process.

The Westat PPA Coordinator notifies the investigator of the DSMB* decision and official approval. It is anticipated that the review process will take at least two months.

Review Procedures for an Addendum to an Approved Associated Study

Investigators of approved associated studies wishing to request new or additional LSS data or images must complete the PPA Associated Study Addendum application on The following steps document the abbreviated review of the addendum:

1. Investigator completes and sends the PPA associated study addendum to the Westat PPA Coordinator.
   - If the addendum <u>includes</u> a data request and/or image request, the Westat PPA Coordinator forwards the data/image request to the Westat Data Manager. The Westat Data Manager reviews the data/image request, and then forwards the form and comments to the NCI Preliminary Reviewer.
   - If the addendum <u>does not include</u> a data request and/or image request, the PPA Coordinator forwards the addendum to the NCI Preliminary Reviewer.

2. The NCI Preliminary Reviewer has one week to complete the review of the addendum. The NCI Preliminary Reviewer may choose to:
   - Approve the addendum and forward it to the Westat PPA Coordinator for tracking through the review process, or
   - Return the addendum to the investigator with requests for revisions that must be made in order to obtain approval.

3. The Westat PPA Coordinator forwards the addendum and the initial review to the NLST/LSS Chief Statistician. The Chief Statistician has one week to complete his review of the addendum and notify the Westat PPA Coordinator of the action he chooses:
   - Approval: the Westat PPA Coordinator sends the addendum and all reviews to the Chair of the NLST Data and Safety Monitoring Board* for review, or

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

- No approval: the Westat PPA Coordinator notifies the investigator of the Chief Statistician's decision.

4. The DSMB* Chair has two weeks to notify Westat of the action of the DSMB*. The Chair may choose:
   - Approval.
   - No approval.
   - Electronic review by all DSMB* members.
   - Discussion of the addendum by all DSMB* members during the next regularly scheduled meeting of the DSMB*. Note that as the DSMB* meets every six months, this last option may result in a significant delay in the approval process.
5. The Westat PPA Coordinator notifies the investigator of the DSMB* decision.

Review Procedures for Publications

Investigators may discuss a proposal for a publication with Timothy Church and David Lynch, or hold discussions with the chair of one of the LSS working groups about the feasibility of such an undertaking. Data requests will not be filled if the NCI Chief Statistician judges release of data to be inappropriate.

Authors are reminded to pay close attention to submission deadlines, so that the PPA Working Group, NCI Chief Statistician, the Co-chairs of the NLST PPC, and the DSMB* have enough time to complete their reviews.

The review of manuscripts will follow these steps:

1. If the manuscript requires a data request and/or image request, the Westat PPA Coordinator forwards the data/image request to the Westat Data Manager. The Westat Data Manager reviews the data/image request, and then forwards the form and comments to the NCI Chief Statistician. The Chief Statistician may choose:
   - Approval: the data and/or images are sent to the investigator for preparation of the manuscript.
   - No approval: the Westat PPA Coordinator notifies the author of the Chief Statistician's decision.
2. The PPA Coordinator will notify the lead reviewer of the manuscript for review. The lead reviewer will assign (at least) two reviewers. Reviewers may be drawn from the PPA Working Group or from outside the Working Group if additional expertise is needed.

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* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

3. Manuscripts will also be sent to all members of the PPA Working Group for their critique and also to inform the Working Group of potential publications.

4. Reviewers have two weeks to review the proposal, and return their comments to the PPA Coordinator. The lead reviewer will choose to:

   - Recommend revisions that need to be made prior to approval: the Westat PPA Coordinator sends the revisions to the author. The author returns responses and revisions to the Westat PPA Coordinator, who forwards them to the reviewers. Responses from the investigator are sent to all reviewers. Reviewers have one week to respond to the revised manuscript. This process continues until the reviewers have no further questions for the author.
   - Request the discussion of the manuscript during a PPA Working Group conference call (for any manuscript deemed exceptionally controversial or problematic). The Westat PPA Coordinator sends the manuscript and any comments/reviews received to all members of the PPA Working Group in preparation for the call.
   - Approve: the Westat PPA Coordinator sends the manuscript to the NLST/LSS Chief Statistician for review.
   - Not approve: the Westat PPA Coordinator notifies the author of the PPA Working Group decision.

5. The Chief Statistician has two weeks to complete his review of the manuscript and notify the Westat PPA Coordinator of the action he chooses:

   - Approval: the Westat PPA Coordinator sends the manuscript to the Co-chairs of the NLST PPC for review, or
   - No approval: the Westat PPA Coordinator notifies the author of the Chief Statistician's decision.

6. The Co-chairs of the NLST PPC have two weeks to perform their review to notify Westat of the action they choose to take. The NLST PPC Co-chairs may choose:

   - The NLST/LSS review is sufficient. The NLST PPC Co-chairs may accept the review decisions made by the LSS PPA Working Group. The Westat PPA Coordinator sends the manuscript to the Chair of the NLST/LSS Data and Safety Monitoring Board (DSMB*) for review.
   - Review by the NLST PPC is necessary. The Westat PPA Coordinator notifies the author of the NLST PPC Co-chairs' decision. It is anticipated that this review may take up to three weeks.

7. The DSMB* Chair has four weeks to notify Westat of the action of the DSMB*. Manuscripts approved by the PPA Working Group and the NCI Chief Statistician may be submitted while awaiting DSMB* approval; any manuscript later denied by the DSMB* must be retracted. Manuscripts MUST receive the approval of the DSMB* prior to publication. The DSMB* Chair may choose:

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

- Approval.
- No approval.
- Electronic review by all DSMB* members.
- Discussion of the manuscript by all DSMB* members during the next regularly scheduled meeting of the DSMB*. Note that as the DSMB* meets every six months, this last option may result in a significant delay in the approval process.

8. The Westat PPA Coordinator notifies the author of the DSMB* decision.

9. It is anticipated that the review process will take at least six weeks.

Review Procedures for Slide Presentations or Posters

Authors are reminded to pay close attention to submission deadlines, so that the PPA Working Group, NCI Chief Statistician, the Co-chairs of the NLST PPC, and the DSMB* have enough time to complete their reviews.

The review of presentations/posters will follow these steps:

1. If the presentation/poster requires a data request and/or image request, the Westat PPA Coordinator forwards the data/image request to the Westat Data Manager. The Westat Data Manager reviews the data/image request, and then forwards the form and comments to the NCI Chief Statistician. The Chief Statistician may choose:
   - Approval: the data and/or images are sent to the investigator for preparation of the presentation/poster.
   - No approval: the Westat PPA Coordinator notifies the investigator of the Chief Statistician's decision.

2. The Westat PPA Coordinator notifies the lead reviewer of the presentation/poster for review. The lead reviewer will determine if additional PPA Working Group reviewers are needed. Reviewers may be drawn from the PPA Working Group or from outside the Working Group if additional expertise is needed. The lead reviewer or the PPA reviewers may choose to circulate the presentation/poster to the entire Working Group for review if they determine the presentation/poster to be of interest to the entire group or that it needs review by the entire group.

3. The lead reviewer (or the PPA Working Group) has one week to review the presentation/poster and notify Westat of the decision:
   - Approval: the Westat PPA Coordinator sends the slides or poster to the NLST/LSS Chief Statistician for review, or
   - No approval: the Westat PPA Coordinator notifies the author of the PPA Working Group decision.

4. The Chief Statistician has one week to complete his review of the presentation/poster and notify the Westat PPA Coordinator of the action he chooses:
   - Approval: the Westat PPA Coordinator sends the presentation/poster to the Co-chairs of the NLST PPC for review, or
   - No approval: the Westat PPA Coordinator notifies the author of the Chief Statistician's decision.

5. The Co-chairs of the NLST PPC have one week to perform their review and notify Westat of the action they choose to take. The NLST PPC Co-chairs may decide that:
   - The NLST/LSS review is sufficient: the NLST PPC Co-chairs may accept the review decisions made by the LSS PPA Working Group. The Westat PPA Coordinator sends the presentation/poster to the Chair of the NLST/LSS Data and Safety Monitoring Board (DSMB*) for review.
   - Review by the NLST PPC is necessary. The Westat PPA Coordinator notifies the author of the NLST PPC Co-chairs' decision. It is anticipated that this review may take up to three weeks.

6. The DSMB* Chair has two weeks to notify Westat of the action of the DSMB*. The DSMB* Chair may choose:
   - Approval.
   - No approval.
   - Electronic review by all DSMB* members.
   - Discussion of the presentation/poster by all DSMB* members during the next regularly scheduled meeting of the DSMB*. Note that as the DSMB* meets every six months, this last option may result in a significant delay in the approval process.

7. The Westat PPA Coordinator notifies the author of the DSMB* decision.

8. It is anticipated that the review process will take at least three weeks, not including the DSMB* review.

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

Appendix 1-3 NLST/LSS Publications, Presentations, and Associated Studies Procedures and Authorship Guidelines

Review Procedures for Abstracts

Authors are reminded to pay close attention to submission deadlines, so that the PPA Working Group, NCI Chief Statistician, the Co-chairs of the NLST PPC, and the DSMB[†] members have enough time to complete their reviews.

The review of abstracts will follow these steps:

1. If the application for the abstract requires a data request and/or image request, the Westat PPA Coordinator forwards the data/image request to the Westat Data Manager. The Westat Data Manager reviews the data/image request, and then forwards the form and comments to the NCI Chief Statistician. The Chief Statistician may choose:
   - Approval: the data and/or images are sent to the investigator for preparation of the abstract, or
   - No approval: the Westat PPA Coordinator notifies the author of the Chief Statistician's decision.

2. If the application for the abstract is complete and does not contain a data or image request, the Westat PPA Coordinator will notify the lead reviewer.

3. The lead reviewer will determine if additional PPA Working Group reviewers are needed for the abstract. Reviewers may be drawn from the PPA Working Group or from outside the Working Group if additional expertise is needed. The lead reviewer or the PPA reviewers may choose to circulate the abstract to the entire Working Group for review, if they determine the abstract to be of interest to the entire group or that it needs review by the entire group.

4. The lead reviewer (or the PPA Working Group) has one week to review the proposal and notify Westat of the decision:
   - Approval: the Westat PPA Coordinator sends the abstract to the NLST/LSS Chief Statistician for review, or
   - No approval: the Westat PPA Coordinator notifies the author of the PPA Working Group decision.

5. The Chief Statistician has one week to complete his review of the abstract and notify the Westat PPA Coordinator of the decision:
   - Approval: the Westat PPA Coordinator sends the abstract to the Co-chairs of the NLST PPC for review, or
   - No approval: the Westat PPA Coordinator notifies the author of the Chief Statistician's decision.

[†] As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

6. The Co-chairs of the NLST PPC have one week to notify Westat of the action they choose to take. Co-chairs may choose:
   - The NLST/LSS review is sufficient: The NLST PPC Co-chairs may accept the review decisions made by the LSS PPA Working Group. The Westat PPA Coordinator sends the abstract to the Chair of the NLST/LSS Data and Safety Monitoring Board (DSMB*) for review.
   - Review by the NLST PPC is necessary. The Westat PPA Coordinator notifies the author of the NLST PPC Co-chairs' decision. It is anticipated that this review may take up to three weeks.

7. The DSMB* Chair has two weeks to notify Westat of the action of the DSMB*. Abstracts approved by the PPA Working Group and the NCI Chief Statistician may be submitted while awaiting DSMB* approval; any abstract later denied by the DSMB* must be retracted. The DSMB* Chair may choose:
   - Approval.
   - No approval.
   - Electronic review by all DSMB* members.
   - Discussion of the abstract by all DSMB* members during the next regularly scheduled meeting of the DSMB*. Note that as the DSMB* meets every six months, this last option may result in a significant delay in the approval process.

8. The Westat PPA Coordinator notifies the author of the DSMB* decision.

9. It is anticipated that the review process will take at least four weeks.

REVIEWER RESPONSIBILITIES

This section will provide guidance to investigators asked to perform a review for the LSS PPA Working Group. The overall objectives of a PPA review for publications, presentations, abstracts, and associated studies are to ensure that the integrity of the trial is protected, and that the NLST/LSS is accurately described. The requirement for approval is based upon whether the proposal satisfies these two objectives. In addition, reviewers should be guided by the checklist found in the Manual of Operations for NLST/LSS. Proposals should:

- Not interfere with the implementation/operation of NLST/LSS activities;
- Not adversely affect cooperation or compliance of NLST/LSS participants;
- Not divert NLST/LSS funds;
- Not jeopardize the public reputation of the NLST/LSS;
- Not lead to premature publication of any NLST/LSS results;

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

- Not complicate the interpretation of any NLST/LSS results;
- Not violate the rights of NLST/LSS participants;
- Obtain IRB approval from their institution;
- Not jeopardize the confidentiality of NLST/LSS data;
- Allow review of manuscripts by the NLST/LSS prior to submission in order to ensure accuracy of statements and data related to the NLST/LSS;
- Include the relevant NLST/LSS SC principal investigator as a co-investigator, when appropriate;
- Ensure that all NLST/LSS data remain under the direct management of the NLST/LSS principal investigator;
- Not present methodological or ethical problems, and
- Not jeopardize the NLST/LSS in any way.

In general, ancillary studies, particularly those that require use of NLST/LSS data, require a thorough evaluation of the study methodology and data analysis plan to ensure a high level of scientific validity. Manuscripts, presentations, and abstracts may undergo a more limited review, in anticipation of an extensive review by the journal or society to which they have been submitted.

Reviewers are reminded that they must adhere to standards of ethical peer review; the duty of confidentiality in the assessment of presentations and posters must be maintained by all reviewers. The submitted material should not be retained, and must be deleted from reviewer's computer once the review is complete. Any printed copies of the material must be shredded. Reviewers may not make use of any of the data, arguments, or interpretations contained in the presentation or poster without permission from the authors.

AUTHORSHIP GUIDELINES AND ACKNOWLEDGEMENT REQUIREMENTS

Authorship Guidelines

It is the responsibility of the PI on any associated study to ensure that all authors have made contributions to any manuscript proposed for publication. The NLST Executive Committee has adopted the following authorship guidelines for the NLST:

Authorship on NLST publications will follow the general guidelines of the International Committee of Medical Journal Editors (ICMJE) (http://www.icmje.org/). Authors should have made substantial contributions to all three categories established by the ICMJE:

- Conception or design, or acquisition of data, or analysis and interpretation of data, and
- Drafting the article or revising it critically for important intellectual content, and
- Final approval of the version to be published.

Appendix 1-3 NLST/LSS Publications, Presentations, and Associated Studies Procedures and Authorship Guidelines

The following guidelines for publications have been established to satisfy scientific integrity in authorship as well as to enable appropriate recognition of the efforts of individuals and collective groups in the execution, analysis, and publication of content of the NLST. In all instances, additional persons whose contributions warrant authorship may be included with the permission of the Executive Committee.

1. The publication of the primary and secondary endpoints of the NLST will typically be attributed to "The NLST Research Group." The NLST Research Group consists of NLST institutional Principal Investigators and members of the Executive Committee who meet the ICMJE Criteria for authorship. Members of the NLST Research Group will be noted in an appendix, where the names will be grouped by trial role (Principal Investigator or Executive Committee member) and listed alphabetically. The contributions of the institutional Study Coordinators will be noted in an acknowledgement at the end of these manuscripts, with coordinators grouped by institution. The primary endpoint of the NLST is lung cancer mortality. Secondary endpoints are those that relate to screening, influence the primary outcome, and are collected on all NLST participants. Test sensitivity, stage distribution, and all-cause mortality are examples of secondary outcomes.

2. The publication of results from NLST sub-studies (studies that utilize data collected on a subset of NLST participants, such as impact of screening/positive screening tests on quality of life and smoking behaviors, health care utilization, and radiation dosimetry) will be attributed to the appropriate group according to ICMJE guidelines for authorship. In this instance, the decision as to whether individual authors or a specific group will be listed as authors should be a joint decision of the authors, determined prior to initiating the manuscript.

3. The publication of other aspects of the NLST not directly related to study endpoints should be determined by the ICMJE guidelines for authorship. The order of authors should be the joint decision of the authors and contributors should be prepared to explain the order of the authors.

Acknowledgement Requirements

1. Individuals who have made substantial contributions to a manuscript, but who do not qualify for authorship should be listed, with their permission, in the acknowledgements or in an appendix.

   For presentations, authorship can be limited to the presenter, with acknowledgement of the NLST collaborators as part of the presentation.

2. The following standard acknowledgement language has been approved and should be included in the acknowledgement section of every manuscript when submitted to a journal for publication:

   > "This research was supported by contracts from the Division of Cancer Prevention, National Cancer Institute, NIH, DHHS. The authors thank Drs. Christine Berg, Richard Fagerstrom, and Pamela Marcus, Division of Cancer Prevention, National Cancer Institute, the Screening Center investigators and staff of the National Lung Screening

Trial (NLST), and staff, Information Management Services, Inc., and staff, Westat. Online staff listing at:

Most importantly, we acknowledge the study participants, whose contributions made this study possible."

Any modifications to the standard acknowledgement language due to journal restrictions must be approved by trial leadership.

The PPA Coordinator will check to see that names of listed authors have been removed from the above standard language, when applicable. For posters and presentations, the above language can be abbreviated, but should always include the source of funding.

POST REVIEW RESPONSIBILITIES OF THE LEAD OR CORRESPONDING AUTHOR

Reporting of Manuscript Submission

1. Prior to submission to a journal, the lead or corresponding author of a manuscript will forward a copy of the manuscript version intended for journal submission to the Westat PPA Coordinator The Westat PPA Coordinator will review the manuscript for inclusion of the standard acknowledgement language and notify NCI of the impending submission.

2. When a manuscript is accepted by a journal, the lead or corresponding author will notify the Westat PPA Coordinator and provide a copy of the accepted version of the manuscript. The Westat PPA Coordinator will notify NCI of the acceptance and final citation.

Semi-annual and Annual Reports

The lead author is required to complete annual progress reports for associated studies and semi-annual progress reports for manuscripts and presentations. Requests for these reports will be automatically solicited by The lead or corresponding author will provide the update information and citation of the publication when solicited by

CONTACT INFORMATION

Title	Name	Phone	Fax	E-mail
PPA Co-chair	Tim Church			
PPA Co-chair	David Lynch			
Westat PPA Coordinator				

NLST Publications and Presentations Committee Policies and Review Procedures

These policies were in effect through September 2011.

The NLST leadership has assembled a committee to review all proposed associated studies, publications, presentations, and abstracts that use data from both ACRIN and NLST. This committee will be known as the NLST Publications and Presentations Committee (PPC). The *NLST Publications and Presentations Committee Policies and Review Procedures* document sets forth the policies and procedures for review of proposals that use data collected as part of or derived from the NLST, including images, operations, and methodology, (referred to as "NLST data" in the remainder of this document). All institutional Principal Investigators, NCI Project Officers, American College of Radiology Imaging Network (ACRIN) Project Managers, and NCI Program Directors involved in the Lung Screening Study (LSS) and ACRIN components of the NLST will adhere to these policies and are responsible for ensuring that collaborators and researchers approved to work with NLST data will also adhere to these policies.

1. Responsibilities and Membership of the PPC

The PPC responsibilities are as follows:

- To review proposals for joint ACRIN-LSS ancillary studies, publications, presentations, and abstracts to ensure that:
    - the release of NLST data for ancillary studies and related publications and presentations does not jeopardize the primary or secondary endpoints of the trial, and
    - publications and presentations by NLST investigators are of high scientific quality.
- To maintain an archive of completed studies, publications, presentations, and abstracts.

The PPC is composed of two co-chairs, eight regular members, and ad hoc members who will be invited as their participation is needed. The co-chairs, one representing each component of the trial, oversee all PPC activities and are also members of the NLST Executive Committee. The eight regular PPC members, represented equally from each component of the trial, are NLST investigators who do not also serve on the NLST Executive Committee. The NLST Executive Committee may modify the composition of the PPC at any time. The NLST PPC members are listed in Attachment I.

2. Central Review Policies

The NLST Executive Committee has set two policies pertaining to the review of proposed associated studies, publications, presentations, and abstracts that use any subset of NLST data.

All associated studies, publications, presentations, and abstract proposals that use, or seek to use, NLST data will be reviewed by the appropriate review committee, determined by the source of the data to be used in the project.

The policy for the review of research proposals that use ACRIN-only or LSS-only data recognizes the primacy of the individual ACRIN and LSS review procedures in the review of proposed projects or emanating works using ACRIN-specific and LSS-specific data, and provides a mechanism for reciprocal notification and approval. Review will proceed according to the steps described in the *ACRIN Policies on Data Access and Publications* or the *NLST/LSS Publications, Presentations, and Associated Studies Working Group Review Procedures and Authorship Guidelines.* The individual review procedures must make provision for the participation of both PPC co-chairs, whose primary purpose is to ensure that the ACRIN and LSS reviews identified and remedied issues inherent in the project that may negatively affect the integrity of the trial. The review of the PPC co-chairs should therefore be performed after the initial ACRIN Media and Publications Committee review or LSS Publications, Presentations, and Associated Studies (PPA) Working Group review, but prior to the DSMB* review. If the review reveals an issue of concern, the co-chair may request consideration by the full PPC. The co-chairs may also exercise discretionary authority to request review by the full PPC for issues that deserve such attention. Each co-chair will use the attached review form (Attachment II), and inform the other co-chair of his decision.

Research proposals that use both ACRIN and LSS data will be reviewed according to the PPC procedures outlined in Section 4.

All research proposals must be approved by the NLST Data and Safety Monitoring Board (DSMB)*, whose scope of review for approval is confined to issues related to the integrity of the trial, confidentiality of the data, and protection of trial endpoints. The DSMB* may also provide comment on the scientific content and the analyses performed. See Attachment III for the DSMB* Chair Proposed Associated Study, Publications, Presentations, and Abstracts Review Form.

3. Development of Associated Studies

The chief purpose of the NLST Research Working Groups is to facilitate collaborative efforts by providing a forum for the exchange and development of research ideas. It is expected that investigators will present a research protocol on a joint working group call or meeting for feedback prior to submission for review to the PPC through the

4. Review Process for Associated Studies, Publications, Abstracts, Presentations, and Posters that Use both ACRIN and LSS Data

The steps in the review process for research proposals that use both ACRIN and LSS data are outlined below; the process is estimated to require at least **eight weeks** for associated studies, and **six weeks** for publications, presentations, and abstracts. See Attachment IV for a diagram of the PPC review process for associated studies, publications, presentations, and abstracts.

Step 1: The Preliminary Review of a Data Request

When an associated study application has an accompanying data request, the investigator will send the application and data request to the PPC Coordinator, who will forward the application materials to the ACRIN and LSS Data Managers for a preliminary review of the data request. The purpose is to ensure that the data are collected and available, and that the requested data

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

items conform to the specific aims of the study.

Step 2: The NLST PPC Review

The PPC coordinator will assign the application to two reviewers: one from ACRIN and one from LSS. One of the two reviewers must be a statistician, epidemiologist, or person with expertise in study design. The other reviewer will be selected to ensure appropriate subject area expertise. (See Attachments V and VI for the subject area and statistical review forms.) The co-chairs or the PPC coordinator may appoint ad hoc reviewers if members of the PPC do not have the necessary scientific expertise for proper review.

Reviewers will have **two weeks** from the receipt of the application to complete their review. The reviewers will provide a brief summary of their review in standardized format, and make an approval recommendation. The reviewers will forward their completed reviews to the PPC coordinator.

In addition to the review step outlined above, each proposed associated study will be required to undergo a review by the entire PPC. A discussion will be held by teleconference to render an approval decision and to use the collective expertise of the group to enhance the scientific value of the proposed research design. It is anticipated that this additional step will add several weeks to the PPC review process.

For publications, presentations, and abstracts, the PPC co-chairs render an approval decision informed by the recommendation of the two preliminary reviewers, as well as a judgment concerning the potential impact on trial endpoints. While a review by the full PPC is normally not conducted for these proposals, the PPC co-chairs may request that a publication, presentation, or abstract with issues of concern be brought to the attention of the entire PPC.

Step 3: The NLST Chief Statistician Review

Following the PPC review, the PPC coordinator will send the proposal to the NLST Chief Statistician who represents the side of the trial not represented by the affiliation of the statistician of the PPC preliminary review. The NLST Chief Statistician will have two weeks to complete his review. The purpose of the statistical review is to evaluate the statistical component of the proposal. Approval must be granted to continue to Step 4 in the review process.

When a data request accompanies an associated study application, both Chief Statisticians must review and render an approval decision for the application to proceed.

Step 4: The ACRIN Media and Publications Committee Review/Notification and the LSS Publications, Presentations and Associated Studies (PPA) Working Group Notification

The PPC coordinator will forward proposals approved by the NLST PPC to The ACRIN Media and Publications Committee (MPC) and the LSS PPA Working Group. Distribution to the ACRIN MPC will be coordinated by the ACRIN Publications Assistant,
Associated study proposals are provided to the ACRIN MPC for information purposes only. Publications, presentations, and abstracts, however, require the approval of the ACRIN MPC (comments must be returned to the PPC coordinator within **one week**) in order to continue the review process. The LSS PPA WG coordinator, , will forward proposals for associated studies, publications, presentations, and abstracts to the LSS PPA WG members for their information only (approval is not required).

Step 5: The NLST Data and Safety Monitoring Board (DSMB)*

The PPC coordinator will send the proposal to the Chair of the NLST DSMB* for review and final approval. The DSMB* Chair has **two weeks** to conduct his review. He may request review by the entire DSMB*, a step which will lengthen the time required by an additional two weeks, if performed electronically.

5. **Review Process for Limited Data Requests**

An investigator may request data for an exploratory project, or to determine the feasibility of a project, that would be limited in scope and analyzed with the intent to formulate a proposal for an associated study and not for the purposes of publication. The review of this type of request follows these steps:

Step 1: Application Completion

The investigator completes and submits the NLST Limited Data and Image Request Application form to the PPC Coordinator, who reviews the application for completeness, and forwards the application to the ACRIN and Westat Data Managers.

Step 2: Review by ACRIN and LSS Data Managers

The ACRIN and LSS Data Managers review the data and image request to ensure that the data requested are available, and to clarify requests for data that do not conform to the variables found on the NLST data collection forms, or that do not seem to correspond to the specific aims of the study.

Step 3: Review by the NLST Chief Statisticians

After the Data Managers have cleared the data and image request, the PPC Coordinator forwards the Data Manager's comments and the application to the Chief Statisticians. The Chief Statisticians have two weeks to complete their review of the proposed data request. They must reach an approval consensus for data to be released. The PPC Coordinator will send notification of the decision to the investigator and Data Managers.

6. **Review Procedures for an Addendum to an Approved Associated Study**

Investigators of approved associated studies wishing to request new or additional NLST data or images, or modify their study protocol, must submit a PPC Associated Study Addendum application. The following steps outline the review process:

Step 1: Preliminary Review of Addenda Applications with Data Requests

Investigator completes and sends the PPC Associated Study Addendum with Data Request application to the PPC Coordinator. The PPC Coordinator forwards the application to the Brown and Westat Data Managers. The purpose of this review is to ensure that the data are available, and that the requested data items conform to the specific aims of the study. The Data Managers

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

review the data and/or image request, and comments are forwarded to the PPC Coordinator, who will share them with the next reviewer.

Step 2: PPC Co-Chair Review (all addenda applications, with or without data requests)

Addenda applications without data requests begin review with the PPC Co-chair review. The PPC Coordinator assigns the review to one PPC Co-chair, on an alternating basis. The second PPC Co-chair is informed of the application and may provide optional comments.

The PPC Co-chair has one week to complete the review of the addendum application. He may choose:

- Approval. The PPC Co-chair may suggest or request revisions. If the changes are required, the investigator must address these to the satisfaction of the PPC Co-chair in order for the addendum to continue through the review process.
- Rejection.

Step 3: Chief Statistician Review

If the addendum includes a data request, the PPC Coordinator forwards the addendum and the initial review to both NLST Chief Statisticians. The Chief Statisticians have one week to complete their review of the addendum and notify the PPC Coordinator of the action they wish to take:

- Approval. The Chief Statisticians may suggest or request revisions. If revisions are required, the investigator must address these to the satisfaction of the Chief Statisticians. Following a satisfactory re-review, the PPC Coordinator sends the addendum to the Chair of the NLST Data and Safety Monitoring Board for review.
- Rejection.

If the addendum does not include a data request, Step 3 will be followed with the PPC Coordinator assigning the review to one Chief Statistician, on an alternating basis. The other Chief Statistician will be informed of the application and may provide optional comments.

Step 4: The NLST DSMB*

The DSMB* Chair has two weeks to notify the PPC Coordinator of the action of the DSMB*. The Chair may choose:

- Approval. Suggestions or requests for revisions may be made.
- Rejection.
- Electronic review by all DSMB* members.
- Discussion of the addendum by all DSMB* members during the next regularly scheduled meeting of the DSMB*. Note that as the DSMB* meets every six months, this last option may result in a significant delay in the approval process.

The PPC Coordinator notifies the investigator of the DSMB* decision.

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

7. Submission Process for Review by the PPC

Applications for data requests, associated studies, publications, presentations, and abstracts must be completed and submitted using the Joint ACRIN-LSS .
Access to the Joint ACRIN-LSS requires registration on the Website
Publications, presentations, and abstracts submitted to PPC should be in final form, that is, ready for consideration by a journal or scientific meeting.

8. Abstract Submissions

As noted above, approved associated studies, presentations, publications, and abstracts must be submitted to the NLST DSMB*, but abstracts need not be submitted to the DSMB* prior to their submission to conference organizers. Abstracts submitted without DSMB* review must be withdrawn if ultimately they are not approved by the DSMB*.

9. Post-Review Responsibilities of the Lead or Corresponding Author

- Prior to submission to a journal, the lead or corresponding author of a manuscript will forward a copy of the manuscript version intended for journal submission to the Westat PPC Coordinator The Westat PPC Coordinator will review the document for inclusion of the standard acknowledgment language and notify NCI of the impending submission.
- When a manuscript is accepted by a journal, the lead or corresponding author will notify the Westat PPC Coordinator and provide a copy of the accepted version of the manuscript. The Westat PPC Coordinator will notify NCI of the acceptance for entry into the Pub Med Central database.
- The lead author is required to complete annual progress reports for associated studies and semi-annual progress reports for manuscripts and presentations. Requests for these reports will be automatically solicited by The lead or corresponding author will provide the update information and citation of the publication when solicited by

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

Attachment I

NLST Publications and Presentations Committee Members

PPC Co-chairs

William C. Black, Dartmouth
Barnett Kramer, NCI

ACRIN members

Fenghai Duan, Brown
Ella Kazerooni, University of Michigan
James Ravenel, MUSC
Phil Boiselle, Beth Israel

LSS members

Paul Pinsky, NCI
Paul Kvale, Henry Ford Health System
Bobby Nath, University of Alabama at Birmingham
David Gierada, Washington University

Ad hoc members

Jon Goldin, UCLA
Caroline Chiles, Wake Forest
Randell Kruger, Marshfield Research Clinic
Tim Church, University of Minnesota
Mona Fouad, University of Alabama at Birmingham

PPC Coordinator

Attachment II

National Lung Screening Trial
NLST Publications and Presentations Committee Co-Chair Review Form for Proposed Associated Studies, Publications, Presentations, and Abstracts

This form serves to document comments or concerns of the NLST Publications and Presentations Committee Co-chairs regarding a proposed release of trial data.

Date sent for review:	Proposal ID:	NLST Data Used in Proposal: ACRIN ☐ LSS ☐
Sponsor/Investigator:		
Institution:		
Target Journal/Conference/date:		
Reviewer:		Date:
Request review to be performed by:		

I. Trial Integrity and Recommendation

- ☐ **Does Not** jeopardize the public reputation of the NLST.
- ☐ **Does Not** lead to premature publication of NLST results.
- ☐ **Does Not** complicate the interpretation of NLST results.
- ☐ **Does Not** violate the rights of NLST participants.
- ☐ **Does Not** jeopardize the confidentiality of NLST data.
- ☐ **Does Not** present ethical problems.
- ☐ **Does Not** jeopardize the NLST in any way.

Approval Decision:

_____Full PPC Working Group Review Required
_____Review by Additional PPC Working Group
_____Approve
_____Approve with Changes Suggested
_____Approve with Changes Required
_____Approve with Changes to Data Request Required
_____Reject

II. Scientific Content and Methodology (optional)

General Comments**:**
Study Strengths**:**
Study Weaknesses**:**
Questions for Investigators:

Attachment III

National Lung Screening Trial
Data and Safety Monitoring Board Review Form for Proposed Associated Studies, Publications, Presentations, and Abstracts

This form serves to document comments or concerns of the NLST DSMB regarding a proposed release of trial data.

Date sent for review:	Proposal ID:	NLST Data Used in Proposal: ACRIN ☐ LSS ☐ Joint ☐
Sponsor/Investigator:		
Institution:		
Title:		
Target Journal/Conference/date:		
Reviewer:		Date:
Request review to be performed by: (DSMB member)		

I. Trial Integrity and Recommendation

☐ **Does Not** jeopardize the public reputation of the NLST.
☐ **Does Not** lead to premature publication of NLST results.
☐ **Does Not** complicate the interpretation of NLST results.
☐ **Does Not** violate the rights of NLST participants.
☐ **Does Not** jeopardize the confidentiality of NLST data.
☐ **Does Not** present ethical problems.
☐ **Does Not** jeopardize the NLST in any way.

Recommendation:

_____Full DSMB Review Required (_____Electronic _____Meeting _____Call)
_____Approve
_____Approve with Changes Suggested
_____Approve with Changes Required
_____Reject

II. Scientific Content and Methodology (optional)

General Comments**:**

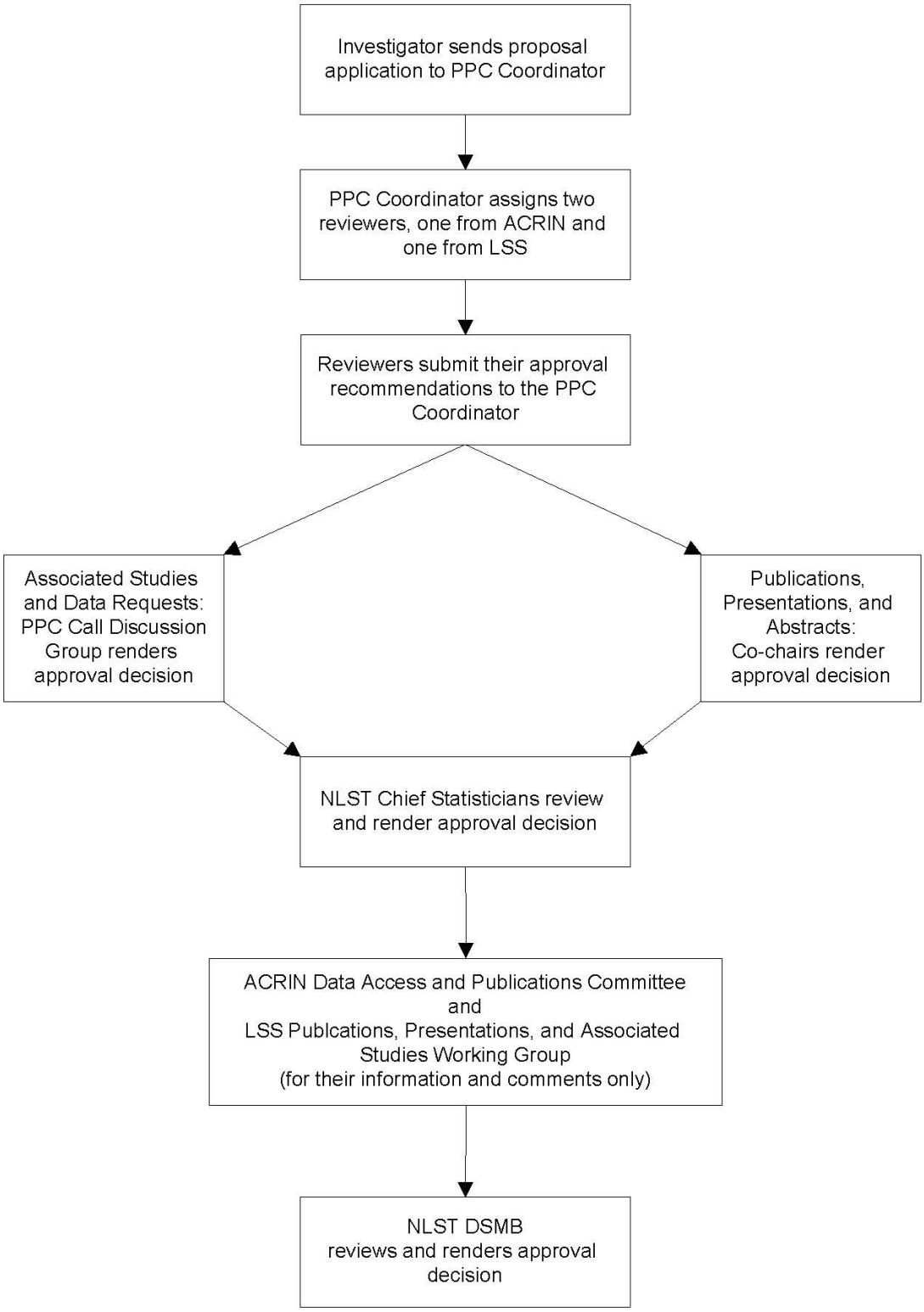
Study Strengths**:**

Study Weaknesses**:**

Questions for Investigators:

Attachment IV

NLST Publications and Presentations Committee
Proposed Review Diagram



Attachment V

National Lung Screening Trial
NLST Publications and Presentations Committee
Subject Area Review Form
Proposed Associated Studies, Publications, Presentations, and Abstracts

This form serves to document comments or concerns of the NLST Publications and Presentations Committee Subject Area Reviewers regarding a proposed release of trial data.

Date sent for review:	Proposal ID:	Working Group Affiliation:
Sponsor/Investigator:		
Project Title:		
Institution:		
Target Journal/Conference/date:		
Reviewer:		Date:

I. Trial Integrity

- ☐ **Does Not** jeopardize the public reputation of the NLST.
- ☐ **Does Not** lead to premature publication of NLST results.
- ☐ **Does Not** complicate the interpretation of NLST results.
- ☐ **Does Not** violate the rights of NLST participants.
- ☐ **Does Not** jeopardize the confidentiality of NLST data.
- ☐ **Does Not** present ethical problems.
- ☐ **Does Not** jeopardize the NLST in any way.

II. Evaluation of Scientific Content

Scientific Merit	Specific Aims	Study Design
___ Excellent ___ Good ___ Fair ___ Poor	___ Excellent ___ Good ___ Fair ___ Poor	___ Excellent ___ Good ___ Fair ___ Poor

III. Recommendation

- ____ Approve
- ____ Approve with Changes Suggested
- ____ Approve with Changes Required
- ____ Reject

IV. Additional Comments

Study strengths/ Study weaknesses/Questions for investigators

Attachment VI

National Lung Screening Trial
Publications and Presentations Committee
Statistical Review Form for
Proposed Associated Studies, Publications, Presentations and Abstracts

This form serves to document comments or concerns of the NLST Publications and Presentations Committee Statistical Reviewers regarding a proposed presentation or release of trial data.

Date sent for review:	Proposal ID:	Working Group Affiliation:
Sponsor/Investigator:		
Project Title:		
Institution:		
Target Journal/Conference/date:		
Reviewer:		Date:

I. Trial Integrity

- ☐ **Does Not** jeopardize the public reputation of the NLST.
- ☐ **Does Not** lead to premature publication of NLST results.
- ☐ **Does Not** complicate the interpretation of NLST results.
- ☐ **Does Not** violate the rights of NLST participants.
- ☐ **Does Not** jeopardize the confidentiality of NLST data.
- ☐ **Does Not** present ethical problems.
- ☐ **Does Not** jeopardize the NLST in any way.

II. Evaluation of Study Design and Statistical Plan

Study Design	Sample Size	Data Analysis Plan
___ Excellent ___ Good ___ Fair ___ Poor	___ Adequate ___ Inadequate ___ Insufficient information/Not addressed	___ Adequate ___ Inadequate ___ Insufficient information/ Not addressed

III. Recommendation

____ Approve
____ Approve with Changes Suggested
____ Approve with Changes Required
____ Reject

IV. Additional Comments

Proposed project's strengths/Proposed project's weaknesses/Questions for investigators.

NLST/LSS Policies and Procedures for Data and Image Access and Use

These policies were in effect through September 2011.

Overview

The National Lung Screening Trial (NLST) is a large randomized trial to determine if screening with low-dose helical computerized tomography (LDCT), as compared with single view postero-anterior chest x-ray, reduces lung cancer mortality among high-risk individuals. The NLST comprises two research efforts: The American College of Radiology Imaging Network (ACRIN) component and the Lung Screening Study (LSS) component, a special study of the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial.

The NLST/LSS is carried out by the National Cancer Institute (NCI) under contract with investigators at ten clinical centers in the United States. Between 2002 and 2004, the ten centers enrolled 34,614 volunteers at elevated risk of lung cancer and randomized the individuals to receive three annual screening exams with either LDCT or chest x-ray. Among other information, the NLST/LSS collects and archives:

- Baseline demographic, smoking history and other lung cancer risk factors, and medical history information on all participants;
- Lung screening images (hard copy film and/or digital chest x-ray images and LDCT images);
- Diagnostic follow-up data from all positive screening exams;
- Cancer diagnosis, treatment, and cancer progression information for all confirmed lung cancers;
- Cancer diagnosis information for all cancers other than lung, and
- Dates and causes of death for all participants who die, regardless of cause.

The purpose of this document is to set forth the policies pertaining to the access and use of data and images collected as part of the NLST/LSS, and the process for requesting NLST/LSS data and/or images. This document is complemented by information in the *NLST/LSS Publications, Presentations, and Associated Studies (PPA) Review Procedures and Authorship Guidelines*.

1.0 General Policies

1.1 All data and image requests will be reviewed through the PPA review process and tracked through the a Web-based system developed and maintained by Westat. This Web site can be accessed at

1.2 All requests for NLST/LSS data and/or images must originate from an NLST/LSS working group. Investigators not affiliated with the NLST/LSS must obtain approval from the NCI Project Officer to join a working group and must collaborate with an NLST/LSS investigator for a specific project. Investigators can join a working group by notifying a Westat Working Group Lead or a Working Group Chair.

1.3 The NCI reserves the right to assign an expert collaborator to any project.

1.4 The Working Group Lead or Chair, in consultation with the NCI as needed, may recommend transfer of responsibility for studies that are not progressing within a reasonable timeframe.

1.5 Investigators are required to:

- obtain IRB approval from their institution as needed;
- protect confidentiality of NLST/LSS data and/or images;
- ensure that all NLST/LSS data and images remain under the direct management of the primary investigator and are kept secure; and
- obtain PPA approval.

1.6 Investigators must ensure that their associated studies do not:

- interfere with the implementation/operation of NLST/LSS activities;
- adversely affect cooperation or compliance of NLST/LSS participants;
- divert NLST/LSS funds;
- jeopardize the public reputation of the NLST/LSS;
- lead to premature publication of any NLST/LSS results;
- complicate the interpretation of NLST/LSS results;
- violate the rights or safety of NLST/LSS participants;
- present any other methodological or ethical problems; or
- jeopardize the NLST/LSS in any other way.

1.7 Investigators are expected to provide statistical support for approved associated studies. If such support is not available, the investigator may petition Dr. Philip Prorok, Chief, Biometry Research Group at the NCI, who will determine whether such support can be provided.

2.0 Data and Image Request Policies

Data and images may be requested for use in an NLST/LSS associated study, publication, presentation, abstract, or for exploratory purposes. Please note that each publication, presentation, or abstract resulting from an approved associated study must also be reviewed under a separate application. See *NLST/LSS PPA Review Procedures and Authorship Guidelines.*

2.1 All requests for data and/or images must be submitted through Applications must include the objectives of the request and the specific data elements/images being requested. PPA Coordinator, will provide assistance to

investigators with accessing and using applications are available: The following types of proposal

- Limited Data Requests (LDR) – Investigators may request a limited amount of data and/or images by submitting an LDR application. Typically LDRs are submitted for an exploratory project that is limited in scope to determine the feasibility of a larger associated study.

- Associated Study – This application is used for research that requires either supplemental observations; procedures to be performed on either all or a subgroup of NLST/LSS participants according to a proposed protocol; or additional data analyses to be conducted outside the scope of the primary or secondary aims of the trial. A request for data and/or images may accompany this application.

- Addendum to an Associated Study – Requests for updates and significant expansions of previously approved associated studies must be made by submitting an application for an Addendum to an Associated Study.

- Abstract or Presentation – This application is used for reviews of abstracts and presentations. Abstracts should be reviewed prior to the submission deadline for professional organization conferences. In addition, any posters or oral presentations to be presented to audiences other than NLST/LSS affiliates must be reviewed through this application prior to presentation.

- Publication – This application is used for reviews of publications to be submitted to a professional journal. The review process must be completed prior to submission to a journal for publication.

3.0 Data Release Policies

3.1 Identifying information will not be provided in any datasets (e.g., NLST participant identification number, name, address, social security number, birth date, medical record number, etc.). Records will be given a unique study identification number, distinct from the NLST participant identification number. CTIL images have undergone the process of de-identification as part of routine processing.

3.2 Upon final approval of a data and/or image request, the investigator will be notified by e-mail, and the PPA Coordinator will provide the investigator with an estimate of the time necessary to process the data request. This estimate will be based upon the order of the data request relative to other requests in the queue and the involvement of Westat staff in other NLST projects determined by the NCI to be of a higher priority.

3.3 For each approved release of data, investigators must sign an NLST/LSS Data Transfer Agreement (Appendix 1) prohibiting the use of NLST/LSS data and/or images for other than the pre-specified uses. A copy of the Agreement and instructions for its completion will be provided by the PPA Coordinator at the time of approval.

3.4 The PPA Coordinator will initiate the process for release of the requested data files for approved requests. The Westat Data Manager will provide data files and accompanying documentation, and CTIL staff will provide image files. Data and images are not available for direct download from either the central database at Westat or the CTIL.

3.5 Questions regarding data should be directed to the Westat Data Manager. Questions regarding images should be directed to the CTIL staff.

4.0 Data Use Policies

In order to protect the integrity of the NLST/LSS, the NLST Data and Safety Monitoring Board (DSMB)* permits only certain categories of data to be released for use prior to publication of the primary outcomes. Appendix 2, Categories for Data and Image Release, outlines data currently acceptable for use in NLST associated studies, publications, presentations, and abstracts. NLST/LSS Chief Statistician will periodically evaluate this policy in conjunction with the DSMB* and update accordingly.

4.1 For approved associated studies, investigators must use data from the central database at Westat. Data collected as part of the NLST/LSS and stored at individual SCs may only be used for the purpose of feasibility testing.

4.2 The investigator who signs the DTA is responsible for protecting the confidentiality of any released data or images, as outlined in the DTA. This responsibility is not transferable to another investigator without prior authorization from the NCI. In addition, data and/or images may be shared only with co-investigators and those under their direct supervision. Furthermore, investigators should notify Working Group Leads for NCI authorization prior to sharing data and/or images with non-NLST investigators.

4.3 The NCI may request that data analyses be repeated by an NCI-appointed designee, if circumstances warrant validation of an investigator's analysis of NLST/LSS data.

* As of the November 2010 release of preliminary primary endpoints, DSMB review is no longer required.

Appendix 1

NLST/LSS DATA TRANSFER AGREEMENT

The National Lung Screening Trial (NLST) is a large randomized trial to determine if screening with low-radiation-dose helical CT, as compared with single view chest x-ray, reduces lung cancer mortality among high-risk individuals. The NLST comprises two component studies, ACRIN (the American College of Radiology Imaging Network) and LSS (the Lung Screening Study), a special study of the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial. Unless otherwise noted, this document addresses policies and procedures to ensure the confidentiality and appropriate use of data and images collected as part of the LSS component of the NLST (i.e. NLST/LSS).

The NLST/LSS is carried out by the National Cancer Institute (NCI) under contract with investigators at ten clinical centers in the United States. Between 2002 and 2004, the ten centers enrolled 34,614 volunteers at elevated risk of lung cancer and randomized these individuals to receive three annual chest screens with either spiral CT or chest x-ray.

Several organizations, under contract to NCI, provide data and/or images to the NLST/LSS research community on behalf of NCI: Washington University at St. Louis, has compiled and oversees an archival CT image library with all available NLST/LSS CT images. Westat, the Coordinating Center, stores and manages study data, and generates data output for ancillary research and exploratory data requests. Information Management Systems, Inc. creates datasets and provides analytic support.

This Agreement is made by and between the National Cancer Institute, an agency of the United States Government, (hereinafter referred to as "NCI "), and _____ (hereinafter referred to as "Entity"). Collectively or individually, the NCI and Entity shall also be referred to as “Parties” or “Party.”

WHEREAS, NCI desires to share with Entity NLST clinical trial data (“Data”) and CT/x-ray Images (“Images”) from the NLST/LSS;

WHEREAS, Entity will use the above referenced Data and Images in furtherance of approved NLST/LSS proposal(s);

NOW, THEREFORE, the Parties agree as follows:

I. Data and Images

NCI shall provide Data and/or Images to Entity as noted to facilitate the described Research Plan. The Data and/or Images will only be used by Entity approved by the NCI for purposes set forth in Entity’s proposed exploratory data requests, ancillary studies, publications, presentations, and abstracts, and for no other purpose.

1. DATA AND IMAGES MAY NOT BE USED IN HUMAN SUBJECTS. Entity agrees to comply with all U.S. Federal rules and regulations applicable to the Research Plan and in accordance with 45 CFR Part 46, “Protection of Human Subjects.” The Data and Images have been collected under an IRB approved protocol in accordance with Federal guidelines for the protection of

human subjects. No patient identifiable information shall be provided with the Data and/or Images.

2. The Data and Images represent a significant investment on the part of the NCI and NCI retains title to the Data and/or Images in Entity's possession. Entity's investigator therefore agrees to retain control over the Data and/or Images and further agrees not to transfer them to other people not under her or his direct supervision without advance written approval of the NCI. Entity agrees to share with the NCI all data generated using the Data and/or Images (Results).

II. Confidential Information

1. For the purposes of this Agreement, "Confidential Information" includes any information in a signed Confidential Disclosure Agreement (CDA) herein incorporated by reference, scientific or business data relating to the Data and/or Images and any Results that a Party asserts are confidential and proprietary, except for data that:

   1.1 have been published or otherwise publicly available at the time of disclosure to the receiving Party; or
   1.2 were in the possession of or were readily available to the receiving Party from another source prior to the disclosure; or
   1.3 become publicly known, by publication or otherwise, not due to any unauthorized act by the receiving Party; or
   1.4 the receiving Party can demonstrate it developed independently, or it acquired without reference to or reliance upon such Confidential Information, or
   1.5 are required to be disclosed by law.

2. All information to be deemed confidential under this Agreement shall be clearly marked "**CONFIDENTIAL**" by the disclosing Party. Any Confidential Information that is orally disclosed must be reduced to writing and marked "**CONFIDENTIAL**" by the disclosing Party, and such notice must be provided to the receiving Party within thirty (30) days of the oral disclosure.

3. Each Party agrees to accept the Confidential Information and employ all reasonable efforts to maintain the Confidential Information of the other Party secret and confidential, such efforts to be no less than the degree of care employed by each Party to preserve and safeguard its own confidential information. The Confidential Information of the disclosing Party shall not be disclosed, revealed, or given to anyone by the receiving Party, except employees of the receiving Party who have a need for the Confidential Information in connection with the receiving Party's evaluation, and such employees shall be advised by the receiving Party of the confidential nature of the Confidential Information and that the Confidential Information shall be treated accordingly. This obligation shall continue until the earlier of 1) five (5) years after the execution of this Agreement, or 2) publication of the primary outcomes of the NLST (so as to prevent fragmentary publication of the results of this clinical study).

4. The Parties agree to work together to make the Results publicly available. Should Entity desire to publish Results, Entity agrees to coordinate activities with the NCI prior to Entity's submission of a paper or abstract for publication, or presentation of NLST/LSS data. Such coordination can be accommodated with the Entity's agreement to comply with the *NLST/LSS Policies and Procedures for Data and Image Access and Use*, and review procedures outlined in the

NLST/LSS *Publications, Presentations, and Authorship Guidelines*` and abide by the decisions rendered pertaining to the Entity's proposal. Entity understands that the purpose of this coordination is to ensure the integrity of trial endpoints so as to protect the primary objective of the NLST/LSS study, and to likewise ensure that the confidentiality obligations enumerated above are appropriately addressed in any proposed publication or presentation. Results will be kept confidential by Entity and the NCI until published, presented, or a corresponding patent application has been filed, when applicable.

III. General Terms

1. This Agreement shall remain in force for two (2) years. The term may be extended and the provisions of this Agreement may be modified only by amendment signed by the duly authorized signatory for each Party. The Agreement may be terminated by either Party for any reason by providing written notice at least thirty (30) days prior to the desired termination date.

2. Each Party shall retain title to any intellectual property rights in inventions and works of authorship made by its employees through the use of Data and/or Images. The parties shall agree to use their best reasonable efforts in cooperation with one another to investigate, evaluate, and determine (a) whether and where any joint patent applications are to be prepared and filed and (b) which party shall be responsible for the preparation, filing, and prosecution of any such joint applications. Determination of inventorship will be made in accordance with prevailing U.S. patent laws and the contribution of the parties. Apart from patent and copyright, neither Party shall claim property rights over raw data contained within the Results. The Parties understand that nothing herein shall be deemed to constitute, by implication or otherwise, the grant to either Party by the other of any license or other rights under any patent, patent application, or other intellectual property right or interest. In no instance shall Entity make claim to having an ownership right to Data and/or Images.

3. The exchange of Data, Images, Results, and other related Confidential Information is offered as a service to the research community. THE NCI OFFERS NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANT-ABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The NCI makes no representations that the use of Data and/or Images will not infringe any patent or proprietary rights of third parties. Likewise Entity makes no representations that the use of Results will not infringe any patent or proprietary rights of third parties. No indemnification for any loss, claim, or liability is intended or provided by either Party under this Agreement.

4. Entity agrees not to claim, infer, or imply endorsement by the Government of the United States of America, the Department of Health and Human Services, the National Institutes of Health, the NCI, or any employee or subunit, of the research, the Entity, or any of Entity's products or services. Each Party will be given thirty (30) days to review and provide comments on any press releases or abstracts concerning this Agreement or the research that makes use of Data and/or Images.

5. This Agreement constitutes the entire understanding between the Parties concerning the subject matter of this collaboration and supersedes any prior understanding or written or oral agreement. The illegality or invalidity of any provision of this Agreement shall not impair, affect, or

invalidate the other provisions of this Agreement. Each Party shall maintain sole and exclusive control over its personnel and operations.

6. Each Party expressly certifies and affirms that the contents of any statements made herein are truthful and accurate to the best of knowledge and belief, and each official signing this Agreement on behalf of a Party further certifies and affirms that the official has the authority to do so.

ACCEPTED AND AGREED

FOR THE NATIONAL CANCER INSTITUTE

_____ _____
Date

Technology Transfer Specialist
Technology Transfer Center
National Cancer Institute, NIH
6120 Executive Blvd.
Rockville, MD 20852

FOR THE ENTITY

_____ _____
(Authorized Signatory for Entity) Date

_____
(Printed Name)

_____
(Title of Signatory)

Address:

Acknowledged by Entity Recipient Investigator:

_____ _____
Name Date

Appendix 2

Categories for NLST/LSS Data and Image Release

The purpose of this document is to list the categories of NLST/LSS data and images that are available for release to NLST investigators. The content of this document will be periodically reviewed by the Chief Statistician and may change over time. All data elements not appearing on this list will fall into Category II (Data that may be Acceptable for Release). In addition, investigators must comply with the policies set forth in the *NLST/LSS Policies and Procedures for Data and Image Access and Use*.

A. Category I – Data Acceptable for Release

- Enrollment, compliance, retention
- Baseline characteristics

B. Category II – Data that may be Acceptable for Release

- T_0 screening exam data
- T_1 screening exam data
- T_2 screening exam data
- T_0 diagnostic evaluation procedures
- T_0 lung cancer characteristics (no comparison between arms)
- Limited data sets for specific projects

C. Category III – Data Not Acceptable for Release

- Diagnostic evaluation procedures after T_0
- Lung cancer characteristics after T_0
- Lung cancer treatment data
- Lung cancer incidence
- Lung cancer survival
- Lung cancer mortality
- Other cancer incidence, survival, mortality
- Complications from screening
- Contamination data

D. Category IV – Images

- De-identified images only

Data categories revised and accepted by the NCI, September 2009.

NLST Investigator Access and Use of Joint Data and Images

Overview

These policies govern NLST investigator access to NLST data and images for ancillary research through **September 30, 2012**.

On October 1, 2011, a **Phase 1 NLST Investigator Data Set** will be available upon request to NLST investigators. The data set will include harmonized data elements collected through December 31, 2010 and cleaned through January 31, 2011. The Phase 1 NLST Investigator Data Set may be updated at a later date. In March 2012, a **Phase 2 NLST Investigator Data Set** will be available upon request, and will include an expanded list of harmonized data elements. **A Research Data Set** will be available to the broader research community after October 1, 2012.

All NLST joint (ACRIN and LSS) proposals using the Phase 1 or Phase 2 NLST Investigator Data Sets are subject to these policies. The policies are intended to promote broad collaboration between NLST investigators and to ensure transparency of ancillary research projects, particularly separate projects on similar topics that could reach differing conclusions.

A list of all currently known ancillary research projects will be maintained as the **NLST Master Project List**, available through the NLST website This list will be updated regularly by Westat based on submissions of concept proposals. Interested investigators can refer to the Master Project List to identify projects on which they would like to collaborate. New concepts should be processed as below.

Time Period October 1, 2011 through September 30, 2012

- NLST investigators should continue to collaborate within the **NLST Joint Working Groups** to include the broader NLST community, conducting ancillary research projects jointly when possible. It is strongly encouraged that proposals utilizing joint data involve collaboration by both ACRIN and LSS investigators. Non-NLST investigators who request data must work with an NLST investigator.
- For joint and group (ACRIN or LSS)-specific proposals, NLST investigators should submit a **Concept Proposal Form** by e-mail to both:

Group-specific submissions that do not pertain to joint projects will be used only for tracking purposes by the non-participating group.

Concept Proposal Forms for joint proposals will be reviewed by both NLST Chief Statisticians and, upon approval, will be forwarded to the statistical support group specified in the proposal. Review by members of the NLST Publications and Presentations Committee (PPC) will be discontinued.

- Proposals requesting ACRIN- or LSS-specific data will be reviewed and approved following the guidelines of their respective groups.
- Joint data and image requests will be managed as follows:
  - NLST Investigator Data Set requests: IMS via secure portal
  - LSS-specific additional data requests: IMS via secure portal
  - LSS image requests: Westat and Washington University via The Cancer Imaging Archive (TCIA);
  - ACRIN-specific additional data and/or image requests: ACRIN Headquarters
- Access to joint data requires completion of the **NLST LSS Data Transfer Agreement**, in which the investigator(s) agree to use the released data only for purposes of the approved concept proposal. A completed ACRIN Data Access Agreement is not required. ACRIN-only or LSS-only data requests will require completion of the appropriate data transfer agreement (NLST LSS Data Transfer Agreement or ACRIN Data Access Agreement).
- Abstracts, presentations, and publications that utilize joint data no longer require review by the PPC. In addition, LSS-specific abstracts, presentations, and publications no longer require review.
- Abstracts, presentations, and publications that utilize joint or ACRIN-specific data must be submitted to for review by the ACRIN Publications Committee prior to submission to scientific journals or societies.
- NLST investigators should notify for tracking purposes, when any joint or group-specific manuscript or presentation has been accepted.
- Westat will continue its support of the NLST Joint Working Groups through September 2012. ACRIN will continue its support of the ACRIN Data Access Committee.

Time Period following October 1, 2012 (remains in draft form)

- The broader research community will have access, upon request, to a Research Data Set that will consist of selected elements from the Phase 1 and Phase 2 Investigator Data Sets.

- Researchers will be required to submit a request for the data set and provide identification and affiliation. The submission should also provide a brief paragraph describing the objectives of the project.

  - The request will be submitted via the NCI/NLST website http://www.cancer.gov/clinicaltrials/noteworthy-trials/nlst and maintained on file for tracking purposes only.
  - Researchers must sign a Data Use Agreement (to be developed) to neither re-identify nor re-contact the NLST participants.

- Joint data and image requests will be managed as follows:

  - Research Data Set requests: IMS via secure portal
  - LSS Image requests: The Cancer Imaging Archive (TCIA).
  - ACRIN data and/or image requests: ACRIN Imaging Core Lab; ACRIN headquarters.

Appendix 1-7 List of Research Working Group Chairs and CC Leads

NLST/LSS Research Working Groups
Chairs, NCI Leads, and CC Leads

Clinical Issues

Co-chairs: Paul Kvale
David Lynch
NCI lead: C. Berg

Electronic Imaging

Co-chairs: David Gierada
K. Ty Bae
NCI lead: Guillermo Márquez

Epidemiology

Co-chairs: Tim Church
Mona Fouad
NCI lead: Paul Pinsky

Medical Physics

Co-chair: Fred Larke
NCI lead: Guillermo Márquez

Methods and Operations

Co-chairs: Julie Varner
Bonita Wohlers
NCI lead: Pam Marcus

2. RECRUITMENT, ELIGIBILITY DETERMINATION, INFORMED CONSENT, AND RANDOMIZATION

2.1 Overview

Each Screening Center (SC) was responsible for identifying and recruiting participants into the study. Once potential participants were identified, the SC collected information about them to make a determination of their eligibility for the study. Potential participants who were eligible for and interested in the study were asked to sign a consent form and subsequently enrolled into the study. The SC tracked each potential participant from the time s/he was identified until s/he was enrolled or not enrolled. Each SC documented and reported a summary of recruitment and enrollment progress. These activities are discussed in more detail in the sections that follow.

2.2 Recruitment Materials

To aid in the recruitment process, the Coordinating Center (CC) provided the following recruitment materials to the SCs for distribution to potential participants: an introductory letter, the "Who Can Participate" sheet, a Fact Sheet, and a Reply Card. An NLST brochure developed by the NCI was distributed to the SCs for use with the CC-provided recruitment materials. The purpose of these materials was to provide potential participants with enough information to allow them to determine if they were eligible for, and interested in, the study.

The introductory letter and the "Who Can Participate" sheet are presented in Appendix 2-1. The introductory letter was copied onto SC stationery and signed by the SC Principal Investigator. The Fact Sheet, which described the study and the key eligibility criteria, is presented in Appendix 2-2. The Reply Card allowed potential participants to indicate their interest in the study. The card is presented in Appendix 2-3. The brochure contained general information about the purpose of the trial and the eligibility criteria. The brochure can be found in Appendix 2-4.

To provide potential participants with a better understanding of the study, the following topics were explained in one or more of the introductory materials (letters, fact sheets, etc):

- Purpose of the study;
- Voluntary nature of any response;
- Randomization;
- Extent of confidentiality of information;
- Time period for maintenance of records;
- Disposal of records, and
- Assurances regarding continued care for non-responders.

Appendix 2-5 contains answers to typical questions that potential participants or other persons may have asked about the NLST/LSS. These questions and answers were an additional resource to be utilized in recruitment efforts. **These materials were solely for the use of SC staff and were not to be distributed to participants.**

SCs were expected to use the recruitment materials as presented in Appendices 2-1 to 2-4. Any modifications to recruitment materials, as well as additional recruitment materials that the SC developed, had to be approved by the NCI in advance of use.

2.3 Identifying Potential Participants

To identify potential participants, the SCs conducted mass mailings of the recruitment materials. The SC were permitted to mail to PLCO ineligible participants but were advised not to rely on these as the sole target of their mailings. Mass mailings may have utilized, but were not limited to, the following address lists: Department of Motor Vehicle listings, local hospital and HMO databases, voter registration lists, and the Centers for Medicare and Medicaid Services (CMS) database. It was anticipated that the enrollment yield from a mass mailing would be approximately 0.5 percent.

The eligibility criteria for the NLST/LSS targeted a retirement age population. In geographic areas where these individuals spend prolonged periods away from their local residences, it may have been necessary to increase the mailing size to achieve recruitment goals.

During the recruitment phase, the SC may also have utilized public service announcements with local TV and radio stations. The content of all such public service announcements was required to be approved by the NCI in advance of their use.

2.4 Eligibility Determination

Potential participants indicated interest by returning the reply card or contacting the SC by telephone. When potential participants contacted the SC by telephone, the Eligibility Screener (ES) was administered. When potential participants contacted the SC by reply card, the SC called each individual to administer the ES by telephone. A copy of the ES is presented in Appendix 2-6. The ES asked potential participants for information related to all the eligibility criteria listed below.

A potential participant was considered eligible for the NLST/LSS if s/he met all of the following eligibility criteria and did not meet any of the following exclusion criteria:

Eligibility Criteria:

- At least 55 years of age but no more than 74 years of age on the date of randomization;
- Current smoker or former smoker who has quit smoking within the last 15 years, and
- Cigarette smoking history of at least 30 pack-years (equivalent to an average of at least 20 cigarettes per day for 30 years).

Exclusion Criteria:

- Spiral CT scan of the lungs, or chest within the 18 months prior to randomization;
- Concurrent participation in another cancer screening study, including PLCO;
- Concurrent participation in a cancer prevention study other than a study of smoking cessation;
- Previous diagnosis of lung cancer;
- History of surgical removal of any portion of either lung (excluding needle biopsy);
- Treatment for, or evidence of, any cancer other than non-melanoma skin cancer or carcinoma in situ (except bladder CIS or transitional cell CIS) in the past five years;
- Inability to lie flat on his/her back with arms raised over the head;
- Metallic implants in the chest or back (e.g., pacemakers, Harrington fixation rods);
- Requirement for home oxygen supplementation;

- Unexplained weight loss of more than 15 pounds in the past 12 months or recent hemoptysis;
- Pneumonia or an acute respiratory infection that was treated with antibiotics by a physician in the past 12 weeks, and
- Unwillingness or inability to sign the consent form.

Once eligibility status was determined and the participant was informed of his or her ineligibility, the responses to the Eligibility Screener could not be changed; the exception being, potential participants who did not meet the eligibility criteria or who met one or more of the exclusion criteria for reasons that may change over time (such as pneumonia or acute respiratory infection in the past 12 weeks) could be contacted in the future to reassess eligibility.

SCs were advised to request that participants not enroll in any other cancer screening or prevention study, except for smoking cessation studies. Enrolling in such studies would have increased the potential for contamination of NLST data. In addition, the added time and effort of participating in multiple studies could have caused "burn-out" among those participants, resulting in greater loss to follow-up and possible attrition bias. However, although enrollment in a cancer screening or prevention study did exclude potential participants from enrolling in NLST, enrolling in such a study after enrolling in NLST did not preclude further participation in NLST. NLST participants who enrolled in another cancer screening or prevention study were eligible to continue in NLST.

Specifications for Completion of the ES are given in Appendix 2-7. All apparently eligible participants were matched against the SC's PLCO roster to verify non-participation in PLCO and were matched against the SC's NLST/LSS roster in order to eliminate the potential for duplicate randomization. The roster checks were performed using a computer pre-processing program provided by the CC. Refer to the for detailed instructions on the randomization pre-processing system.

The SC administered the ES to each individual that expressed interest in the trial. If, prior to the formal administration of the ES, a potential participant volunteered information that indicated ineligibility, the SC recorded the participant's name and then answered the question on the ES that addressed the applicable criterion. No other information was to be collected. Administration of the ES was to be stopped once a potential participant was identified as ineligible. No further questions were to be asked.

When the ES was completed, the SC staff performed the following tasks:

- The ES was reviewed to determine whether the potential participant met the eligibility criteria. If an individual did not know whether s/he met one or more of the eligibility criteria, s/he was asked to contact his or her health care provider to obtain the information. If the individual refused or did not have a health care provider, or if after contacting the health care provider, s/he still did not know whether s/he met the eligibility criteria, s/he was not eligible for the study.
- The potential participant's tracking information was updated (see Section 2.8 for information on maintaining tracking records).
- If the potential participant was determined to be ineligible based on one or more of the eligibility criteria, the SC staff recorded the potential participant's status as "ineligible" on the tracking record.
- ES forms for potential participants who were not enrolled in the study were kept on file at the SC until directed by the NCI. ES forms for enrolled participants were kept in the participant study file.

If a potential participant was not randomized within one month of eligibility determination, the SC made a second determination of eligibility before randomizing the participant. When a potential participant was determined to be eligible, the next step was to obtain a signed consent form.

2.5 General Procedures for Obtaining Participant Consent

Human research subjects are protected through informed consent procedures. The signing of a consent form was required for eligibility to participate in the NLST/LSS. Each SC was required to obtain written consent for eligible participants before enrollment.

The informed consent process addressed the following important points:

- Each participant must be fully informed of all study procedures and requirements in order to be considered a "knowing" participant; and
- Participation is voluntary and all information provided by participants will be kept confidential.

The SC Coordinator was fully responsible for obtaining written consent from each participant. Each SC developed a consent form that was approved by the NCI.

The Institutional Review Board (IRB) at each SC and the NCI approved the consent form. SCs that recruited individuals with very little or no knowledge of the English language were required to submit documentation of IRB approval to the NCI to administer an English language NLST/LSS consent form to non-English speaking individuals.

In the development of the consent form, each SC was to use the template provided by the CC as a guide. The prototype consent form and accompanying cover letter are found in Appendices 2-8 and 2-9, respectively.

All information in the prototype consent form was required to be included in the SC consent form. Additional information may have been added based on individual IRB requirements, but information in the prototype could not be excluded. Any changes made by the IRB were to be submitted to the NCI for review. The participant was to be given a copy of the consent form after it was signed. The signed original was kept in the participant's file at the SC.

Administration of the consent form involved providing the participant with background information about the study and its requirements. The implications of randomization and the necessity for completing the required procedures were emphasized to each potential participant. When the consent form was provided to the potential participant, s/he was offered sufficient time to carefully read the document and then given sufficient opportunity to have all questions regarding the study answered before s/he was asked to make a decision regarding participation.

Methods for obtaining informed consent are described below.

2.5.1 Obtaining Informed Consent

The method of administration of the consent form varied by SC. The SC obtained a signed consent form by one of the two following methods:

Method A – After completing the ES by telephone, the SC mailed a copy of the consent form with a cover letter to eligible participants. Participant questions regarding the content of this document were clarified via telephone. Once the potential participant returned a signed consent form, the SC completed an Eligibility Verification Form (EVF), (Appendix 2-10) and enrolled the participant into the study. See Section 2.6 for more information on completing the EVF. The SC then contacted the participant and scheduled the baseline screening visit (T_0).

Method B – After completing the ES by telephone, the SC invited interested and eligible participants for a clinic visit. The SC scheduled the visits for small groups. At the visit, the SC provided additional information about the study and the consent form, and answered questions. The SC completed an EVF and enrolled those individuals who signed a consent form into the study. Depending on his/her individual schedule, the participant either completed the T_0 screening examination at that time or scheduled a screening visit for a later date.

The Privacy Rule of the Health Insurance Portability and Accountability Act (HIPAA), which says that any health information that would enable someone to identify the patient is protected under federal law, went into effect on April 14, 2001 with a compliance date of April 14, 2003. Some of the SC's were required by their IRB's to ask study participants who had completed a consent form prior to this date to sign an additional form explaining this new legislation.

2.6 Verification of Eligibility

The eligibility of potential participants was verified using the Eligibility Verification Form (EVF), presented in Appendix 2-10. The SC used information from the ES, the consent form, and the pre-processing program to complete the EVF. The EVF was required to be completed and retained at the SC for all participants randomized into the study, but did not need to be completed for individuals who were found to be ineligible for the study.

Parts A and B of the EVF were completed prior to randomization. In Part A of the form, the SC Coordinator recorded the SC and the identifying information of the potential participant. In Part B, the SC Coordinator confirmed eligibility criteria for smoking status and pack-year history, then confirmed additional eligibility criteria by checking "Yes" or "No" in response to questions 3 through 14. Refer to Appendix 2-11 for Specifications for Completion of the EVF. In order for a participant to be successfully

randomized, the answers to questions 3 through 14 in Part B of the EVF had to be "No." If any "Yes" boxes were marked, the potential participant was not eligible for the study and could not be randomized. If it was discovered at the time of EVF completion that the potential participant was ineligible, the EVF was to be filed with the ES and maintained at the SC until otherwise directed by the NCI.

Prior to randomizing a participant through the system, the SC was required to perform randomization pre-processing to verify that the potential participant was not a PLCO participant and was not already enrolled in the NLST/LSS. To identify such participants, the pre-processing system provided by the CC compared potential participant information to a list of PLCO participants and a list of NLST/LSS participants. If the potential participant was not matched to the list of PLCO or NLST/LSS participants, a pre-processing number was provided and the participant could be randomized.

2.7 Randomizing and Enrolling the Participant

Once the EVF was completed, the potential participant was ready to be randomized to either the spiral CT or the chest x-ray study arm. Randomization (assignment of the study arm and assignment of a participant identification number) was completed using the system. For more detailed instructions on using the system for randomization, see Appendix 2-12,
and Appendix 2-16, Specifications for Randomization Using the IVRS.

The SC randomized participants by entering information from the EVF over the telephone or through submission of a batch file by computer. The system calculated age and smoking pack-years to verify age and smoking eligibility and it verified that all responses to eligibility criteria on the EVF had been marked as "No." If the system confirmed eligibility, the participant was randomly assigned to one of two study groups (spiral CT or chest x-ray) in a 1:1 ratio, stratifying on gender and age group within SC. A participant identification number (PID) was assigned.

During the randomization process, if any of the checks indicated that an individual was not eligible, the system offered the SC an opportunity to correct the data. A randomization confirmation report was e-mailed to the SC's dedicated e-mail address within two hours following randomization. Each SC was required to set up a separate e-mail account for receiving randomization confirmation reports. The confirmation report included the PID, study arm assignment, randomization date, user ID number of the staff member who performed the randomization, pre-processing number, date

of birth, smoking history, and gender. The SC reviewed the report to ensure that no errors in data entry occurred for gender, date of birth, or smoking history. This report was to be placed in the participant's study file with the EVF.

The system and User Support hotline was available 24 hours a day, seven days a week. If the SC was not able to access the system because of disruption to telephone service, the SC was advised to call the to ensure that the problem was related to service disruption rather than user error. These steps are detailed in the

Each participant was assigned a unique PID. The PID was a unique eight-digit number used throughout the study period to link all data associated with an individual. It was part of a common system for reporting to the CC and was used by all SCs. No PID, once assigned, was changed, deleted, or reassigned to another participant. In the event that a participant moved to a location in proximity to another SC, s/he retained the original PID assigned. This policy assured that data associated with a participant would not be lost or inadvertently attributed to another participant. SCs generated PID labels using

2.7.1 Batch Randomization

The SC could randomize a "batch" of participants by e-mailing an appropriately prepared data file to the designated e-mail address If e-mail was unavailable, the batch file could be faxed tc The specifications for the data file structure are outlined in the SCs could prepare their own data file (subject to the file specifications), or use to prepare the file. The data file served as input to the centralized randomization system, where the entire "batch" of participants was randomized and enrolled into the trial. Individual randomization assignments were e-mailed to the originating SC. If the system was unable to randomize one or more participants in the "batch" file, a rejection report for that participant was e-mailed to the SC.

2.7.2 Manual Randomization

During brief periods of planned system maintenance and unplanned system outages, certain components of may have been unavailable to SC staff for randomization by either the IVRS or "batch" methods of randomization, or both. Manual randomization procedures, described in the were intended for situations in which a component (IVRS or batch randomization) of the system was unavailable and immediate randomization was necessary. SCs would have been notified of the outage immediately upon detection by support staff. SCs would have then received an e-mail advising them of the possible options for manual randomization. In the event the e-mail services were unavailable, the SC was advised to contact the for further instruction.

2.7.3 Notifying Participants of Study Arm Assignment

After a participant was randomized, the SC was notified of his/her study arm assignment by mail, by telephone, or in person. Each participant randomized with the system was confirmed via electronic mail. A randomization confirmation was automatically generated and sent to the SC when a potential participant was successfully randomized regardless of method.

2.7.4 Changes in Data Used for Randomization

The randomization process carried the potential for errors. These may have included randomizing a participant more than once or randomizing a participant who was not eligible for the study. Certain randomization errors resulted in protocol violations and were to be documented appropriately on a Protocol and HIPAA Violation Form (PHVF) (Appendix 11-9) as described in Section 11.5.2. In addition, the CC was contacted to make corrections in

On occasion study documents such as the MHQ may have contained a date of birth that did not match the birth date written on the EVF. If this occurred the participant was to be contacted and asked to verify his or her date of birth. The SC completed a SC Edit Form including an explanation of the type of error (transcription, keying, transposition) as well as any corrective action taken (e.g., correct birth date verified by participant). The date of birth was not changed unless it was verified

by the participant. If the participant provided a date of birth that did not match either the EVF or the document on which the discrepancy was discovered (e.g., MHQ) the SC Coordinator was advised to ask for a legal document such as a driver's license or birth certificate to verify the date of birth.

2.7.5 Correcting Randomization Errors Using the SC Edit Form

The randomization system had many data quality checks. They were performed in real-time on data submitted through the batch randomization process and entered through the IVRS module. These checks contributed to assuring that erroneous data did not enter and reside within the system. However, it was possible that data could have been improperly keyed, transposed, or transcribed, but still be within valid ranges to enter the system. Erroneous data entry could have had a magnified, on-going, negative impact on randomization functions if not corrected at the earliest stage possible.

When SC personnel discovered that a data entry error had occurred, the SC Edit Form was completed. The SC Coordinator or designee completed the form found in Appendix 2-17 and documented the known details of the event. Specifications for Completion of the SC Edit Form can be found in Appendix 2-18, as well as in the In addition to completing the form, SC staff manually corrected any corresponding documentation in the participant folder that was impacted by the error (e.g. EVF, ES, etc.). The form was sent to for appropriate resolution, either electronically, via fax at , or hardcopy. If sending via fax or hardcopy, a notification e-mail was to be sent in advance. A copy of the form was to be placed in the participant folder. Once CC support staff verified and approved the data change it was implemented within

It is important to note that requests were considered on a case-by-case basis and that some change requests may have had wide-ranging implications and therefore required NCI approval before implementation. The CC may have required additional documentation from the SC Coordinator prior to implementing the change. Not all data change requests through the SC Edit Form were guaranteed to be honored.

2.8 Tracking Potential Participants and Enrollees

The SCs tracked each potential participant from identification through recruitment and randomization to document either his/her entry into the study or his/her reason for non-participation. Tracking of potential participants was critical for the management of the recruitment process and was useful as a tool for the evaluation of the recruitment effort. Each SC recorded recruitment data in a manner that allowed for easy retrieval for weekly recruitment reports.

Each SC was to have a system, manual or automated, for tracking potential participants. This system included, at a minimum, a tracking record for each potential participant for whom the SC completed or attempted to complete an ES. Summary totals of potential participants to whom recruitment packets were mailed were maintained. When an individual responded to the ES, a tracking record was created for that individual in the SC's active recruitment system. The following information, some of which would be required in reports of recruitment efforts, was included in the tracking record:

- Full name,
- Address (including ZIP code),
- Telephone numbers,
- Date of birth,
- Gender,
- Date of ES completion, and
- Eligibility status.

Eligibility status was assigned as follows:

Eligible (E): A potential participant was classified as "eligible" if s/he met all of the eligibility criteria but had not yet been randomized.

Ineligible (I): A potential participant was classified as "ineligible" if s/he failed to meet one or more of the eligibility criteria.

Randomized (R): A potential participant was classified as "randomized" if a participant met all the eligibility criteria and was randomized into the study.

Tracking records were required to be maintained either individually or as part of a log. A Sample Potential Participant Tracking Log is included as Appendix 2-13. Such a log may have been maintained manually or in a computerized tracking system. Summary information regarding potential

participants to whom recruitment packages were mailed was also to be maintained manually or on a computerized tracking system. The tracking log was for use by each SC to aid its tracking of participants. Completed copies were not sent to the CC.

2.9 Summarizing, Reporting, and Monitoring Recruitment and Enrollment Efforts

Each SC summarized and reported the status of its recruitment efforts. The purpose of reporting summary recruitment data was to enable the NCI to monitor recruitment. The SC Coordinator also monitored recruitment, which enabled him/her to identify any problems with recruitment and to redirect recruitment resources, if necessary. The following recruitment data were summarized on the SC Cumulative Recruitment Summary Form (Appendix 2-14) and entered by the SC into a Web-based form located at on a weekly basis by close of business on Fridays. The Specifications for Completion of the SC Cumulative Recruitment Summary Form can be found in Appendix 2-15.

- **Targets:**

  This represented the recruitment goals established by the SCs in their contracts for the NLST/LSS.

- **Recruitment Packets Mailed:**

  This represented the total number of potential participants mailed recruitment materials to date.

- **Eligible Participants Pending Randomization:**

  This represented the total number of potential participants who had been determined to be eligible for participation in the study, but had not yet been randomized. Once a participant was randomized s/he was no longer counted in this category.

- **Ineligible Participants:**

  This represented the total number of potential participants who had been determined to be ineligible for participation in the study.

- **Number Randomized:**

  This represented the total number of participants who had been randomized into each arm of the study.

- **Screening Exams Scheduled But Not Yet Complete:**

  This represented the number of screening exams scheduled for randomized participants, but not yet completed, for each arm of the study.

- **Number Screened:**

  This represented the number of screening exams that had been completed for each arm of the study regardless of whether the exam(s) had been read by a radiologist.

- **Percent Screened:**

  This represented the percent of participants in each arm of the study that had been screened. This number was calculated by

- **Screened Plus Scheduled:**

  This represented the number of screening exams the SC had completed in addition to the number of screening exams the SC had scheduled for randomized participants.

- **Percent Screened Plus Scheduled:**

  This represented the percent of screening exams that were completed plus the number of screening exams scheduled for randomized participants divided by the number of randomized participants.

The SC Cumulative Recruitment Summary Report (Appendix 11-16) was produced by the CC and was based on the information entered by the SC from the Cumulative Recruitment Summary Form. This report was posted weekly on Mondays on the designated CC Web site. The report showed the following summary totals for the project through the current week.

- Recruitment Packets Mailed
- Eligible Participants Pending Randomization
- Ineligible Participants
- Number Randomized

  Spiral CT _____

  Chest x-ray _____
- Screening Exams Scheduled but not yet Complete

  Spiral CT _____

  Chest x-ray _____
- Number Screened

  Spiral CT _____

  Chest x-ray _____

- Percent Screened
  - Spiral CT _____
  - Chest x-ray _____
- Screened + Scheduled
- Percent Screened + Scheduled

The SC Cumulative Recruitment Summary Report enabled the SC Coordinator to monitor recruitment and randomization activities. The SC could compare the report posted on the Web site to the previous week's report to monitor and track recruitment data.

Appendices for Chapter 2

2-1 Sample Introductory Letter/"Who Can Participate" Sheet

2-2 Fact Sheet

2-3 Sample Reply Card

2-4 NLST Brochure

2-5 Answers to Potential Participant Questions

2-6 Eligibility Screener (ES)

2-7 Specifications for the Completion of the Eligibility Screener

2-8 Prototype Consent Form

2-9 Sample Consent Form Cover Letter

2-10 Eligibility Verification Form (EVF)

2-11 Specifications for the Completion of the Eligibility Verification Form

2-12

2-13 Sample Potential Participant Tracking Log

2-14 SC Cumulative Recruitment Summary Form

2-15 Specifications for Completion of the SC Cumulative Recruitment Summary Form

2-16 Specifications for Randomization Using the IVRS

2-17 SC Edit Form

2-18 Specifications for Completion of the SC Edit Form

Appendix 2-1 Sample Introductory Letter/"Who Can Participate" Sheet

National Lung Screening Trial (NLST)

(Participant Name) *(Date)*
(Participant Address)
(City, State, ZIP Code)

Dear *(Participant Name)*:

The National Cancer Institute (NCI) and *Screening Center (Local SC)* are seeking volunteers to participate in the National Lung Screening Trial (NLST), a nationwide study of Americans aged 55 to 74 who have a history of long-time and/or heavy cigarette smoking. The purpose of the NLST is to compare screening with spiral CT (low-radiation-dose computed tomography) and screening with chest x-ray for effectiveness in reducing the number of deaths due to lung cancer. The NLST is seeking to enroll 50,000 participants in the study.

If you have ever smoked, you may be eligible to participate in the NLST. The enclosed page entitled "Who Can Participate" provides more information on who is eligible for this study. We also have included a Fact Sheet that may answer some of your questions.

Your participation in the NLST is voluntary, and if you choose to participate, there are no penalties for withdrawing from the study at any time. Your decision regarding participation will not influence your relationship with *(Local SC)*, its staff, or with any Federal program such as Social Security or Medicare. Furthermore, all information you provide as part of the study will be kept confidential and will not be disclosed to anyone but the researchers conducting this study, except as otherwise required by law. Your name and other information capable of identifying you will not appear in any study documents, as only statistical summaries will be reported. For your information, this study is authorized by the Public Health Service Act, Section 412 [42 USC 285 a-1], and your rights as a study participant are protected by the Privacy Act of 1974.

If you have never smoked, please accept our apologies for contacting you. We do not have personal information about individuals or their smoking habits. Therefore, it was necessary to send this letter to the general public.

If you are interested in participating in the NLST, please return the enclosed reply card. Feel free to contact me or our Coordinator, *(Name of SC Coordinator)* at *(Telephone Number)*, if you have any questions.

We hope you will consider participating in this important study.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

WHO CAN PARTICIPATE?

You may be eligible to participate in NLST if you meet all the eligibility criteria below:

- You are between the ages of 55 and 74 years.
- You are a current smoker or have quit smoking within the last 15 years.
- You have a history of long-time and/or heavy cigarette smoking.
- You have NOT had a spiral CT scan of your lungs or chest within the past 18 months.
- You are NOT participating in another cancer screening study, including the PLCO Cancer Screening Trial.
- You are NOT participating in a cancer prevention study, other than a study to help you stop smoking.
- You have NEVER been diagnosed with lung cancer.
- You do NOT have a history of surgical removal of any portion of your lungs (excluding a needle biopsy).
- You have NOT undergone treatment for, or had evidence of, any cancer other than non-melanoma skin cancer and carcinoma in situ (except bladder carcinoma in situ and transitional cell carcinoma in situ) in the past 5 years.
- You ARE able to lie on your back with your arms raised over your head.
- You do NOT have metallic implants in your chest or back (such as a pacemaker or Harrington fixation rods).
- You do NOT have a requirement for home oxygen supplementation.
- You have NOT experienced unexplained weight loss of more than 15 pounds in the past 12 months, and have NOT experienced recent coughing up blood (hemoptysis).
- You have NOT had pneumonia or an acute respiratory infection that required treatment with antibiotics in the past 12 weeks.

If you think you may be eligible to participate in this study, please return the enclosed reply card or contact us at *(SC telephone number)*.

National Lung Screening Trial (NLST)
National Institutes of Health, National Cancer Institute

FACT SHEET

What is the National Lung Screening Trial?

The National Lung Screening Trial (NLST), a cancer screening clinical trial, will compare two ways of detecting lung cancer: spiral computed tomography (CT) and standard chest x-ray. Both chest x-rays and spiral CT scans have been used to find lung cancer early. So far, neither chest x-rays nor spiral CT scans has been shown to reduce a person's chance of dying from lung cancer. This study will aim to show if either test is better at reducing deaths from this disease. The trial also will examine the risks and benefits of spiral CT scans compared to chest x-rays. The NLST will enroll 50,000 current or former smokers and take place at 30 study sites throughout the United States. The study is funded by the National Cancer Institute.

This trial is a randomized, controlled study – the "gold standard" of research studies – and is large enough to determine if there is a 20 percent or greater drop in lung cancer mortality from using spiral CT compared to chest x-ray.

Why is this study needed?

Lung cancer, which is most frequently caused by cigarette smoking, is the leading cause of cancer-related deaths in the United States. It is expected to claim nearly 155,000 lives in 2002. Lung cancer kills more people than cancers of the breast, prostate, colon, and pancreas combined. There are more than 20 million current and former smokers in the United States, all of whom are at high risk for lung cancer.

Currently, when lung cancer is detected, the disease has already spread outside the lung in 15 percent to 30 percent of cases. Spiral CT, a technology introduced in the 1990s, can pick up tumors well under one centimeter (cm) in size, while chest x-rays detect tumors about one to two cm in size. Conventional wisdom suggests that the smaller the tumor, the more likely the chance of survival. But no scientific evidence to date has shown that screening or early detection of lung cancer actually saves lives. The NLST, because of the number of individuals participating and because it is a randomized, controlled trial, will be able to provide the evidence needed to determine whether spiral CT scans are better than chest x-rays at reducing a person's chances of dying from lung cancer.

How does spiral CT work?

Spiral CT, also called helical CT, uses x-rays to scan the entire chest in about 15 to 25 seconds, during a single, large breath-hold. Throughout the procedure, the participant lies still on a table. The table and patient pass through the CT scanner, which is shaped like a donut with a large hole. The scanner rotates around the participant and a computer creates images from the scan, assembling them into a 3-D model of the lungs.

How is spiral CT used in hospitals now?

More than half of the hospitals in the United States own a spiral CT machine. These machines are routinely used for staging lung and other cancers – that is, determining how advanced the cancer is after diagnosis. Recently some hospitals have begun performing spiral CT scans as a new way to find early lung cancer in smokers and former smokers.

What are the possible benefits of participating in this trial?

All participants will receive a free lung cancer screening exam. It is also possible that if lung cancer is detected, it may be caught at an early stage. Early detection of lung cancer may reduce symptoms from cancer, result in milder treatment with fewer side effects, or prolong life, but scientists do not know these things will happen for sure. Data gathered from the NLST will help to clarify some of these uncertainties.

What are some of the possible risks of screening for lung cancer?

Recent studies indicate that 25 percent to 60 percent, or more, of screening CT scans of smokers and former smokers will show abnormalities. Most of these abnormalities are not lung cancer. However, these abnormalities – scars from smoking, areas of inflammation, or other non-cancerous conditions – can mimic lung cancer on scans and may require additional testing. These tests may cause anxiety for the participant or may lead to unnecessary biopsy or surgery.

Lung biopsy, a potentially risky procedure, involves the removal of a small amount of tissue, either through a scope fed down the windpipe (called bronchoscopy) or with a needle through the chest wall (called percutaneous lung biopsy). Though they happen infrequently, possible complications from biopsies include partial collapse of the lung, bleeding, infection, pain, and discomfort.

Depending upon the size and location of the abnormality detected, chest surgery (called thoracotomy or thoracoscopy) to obtain a larger biopsy specimen may be required. Thoracotomy is major surgery that removes substantial amounts of lung tissue. The procedure can damage nerves in the chest, and is more dangerous in people with underlying lung or heart conditions, which tend to be common in current or former smokers.

In addition, studies suggest that screening for lung cancer may detect small tumors that would never become life threatening. This phenomenon, called over-diagnosis, puts some screening recipients at risk from unnecessary biopsies or surgeries as well as unnecessary treatments for cancer, such as chemotherapy or radiation.

How long will the trial last? What will happen during the study?

The study will open for enrollment in fall 2002 and is slated to last eight years. The researchers plan to enroll the 50,000 people needed for the trial study within two years. When people enter the study, they will be randomized – assigned by chance – to receive either a spiral CT scan or a chest x-ray. They will have the same screening procedure again one and two years later. Until 2009, researchers will contact participants at least yearly to monitor their health.

In the future, some NLST centers will collect blood, urine, or sputum (phlegm). These samples will be used for future research to test biomarkers that may someday help doctors better diagnose lung cancer.

During the trial, if participants want to quit smoking, they will be referred to smoking cessation resources. But they do not have to quit to take part in the study.

What is a randomized, controlled study?

A randomized, controlled trial is the most reliable method of determining what medical interventions work best and are safest. Participants are assigned by chance – randomized – to one of two groups, where one group receives one intervention and the other group receives another. One of the groups serves as a comparison group, or "control," for the other.

With a randomized trial, the goal is to determine if there are differences in outcomes between the two groups at the end to the study. The process of randomization aims to evenly distribute between the study groups all factors, such as health histories, that can influence outcome other than the interventions being studied.

If the participants in each group have the same make-up, then any differences seen in outcome between the two groups can be attributed to the intervention. In this screening study, participants will have an equal chance of being assigned to a group that is screened with spiral CT or to a group that is screened with chest x-ray.

Who is eligible to join the NLST?

Current or former smokers, who have smoked heavily or for many years and are between 55 and 74 years of age, may be eligible for this study. The screening tests will be evaluated in current or former smokers who have a high risk of developing lung cancer and who may benefit from early disease detection. All potential participants will be asked a series of questions to ensure that they are eligible to participate.

Potential participants should be in general good health, must not be receiving treatment for any type of cancer other than non-melanoma skin cancer or carcinoma in situ, and must not have a history of lung cancer. Potential participants cannot be enrolled in any other cancer screening or cancer prevention trial and must not have had a CT scan of the chest or lungs within the prior 18 months.

Have current and former smokers participated in studies like this before?

To determine the willingness of participants to join a study like the NLST, NCI launched a small trial, called the Lung Screening Study, to recruit 3,000 current and former smokers in late 2000. Within two months, all the necessary participants agreed to join the study and to be assigned by chance to receive either a spiral CT scan or a chest x-ray. The success of this study's recruitment led NCI to undertake NLST, which will be large enough to answer the important public health question of whether spiral CT reduces lung cancer deaths.

What happens if lung cancer is found during the study?

For participants with positive screening tests, meaning that the screening test reveals an abnormality that might be cancer, the study centers will notify the participants and their primary care physicians and encourage a consultation with a cancer expert. Names of cancer experts will be provided upon request, but decisions regarding further evaluation will be made by participants and their physicians. Any tests performed to follow-up on a positive screening result may be performed at the study center, if participants and their physicians so choose.

Will participating in NLST cost anything?

People participating in the trial will be screened free of charge with either spiral CT or chest x-ray. However, costs for any diagnostic evaluation or treatment for lung cancer or other medical conditions will be charged to the participants in the same way as if they were not part of the trial. A participant's medical insurance will pay for diagnosis and treatment according to the plan's policies. If the participant has no insurance, aid may be available at the local level to pay for biopsies and treatment.

How can a potential participant or a physician get more information about lung cancer or NLST?

People can call the NCI's Cancer Information Service toll-free Monday through Friday, 9 a.m. to 4:30 p.m., at 1-800-4-CANCER (1-800-422-6237) for information about the trial in English or Spanish. The number for callers with TTY equipment is 1-800-332-8615.

Appendix 2-3 Sample Reply Card

NATIONAL LUNG SCREENING TRIAL (NLST)

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO 2926
<<CITY, STATE>>
POSTAGE WILL BE PAID BY ADDRESSEE

National Lung Screening Trial (NLST)
SCREENING CENTER
<<Address>>
<<City, State Zip>>

I am interested in learning more about participation in the National Lung Screening Trial (NLST). Please contact me:

Name: _____

Address: _____

City:_____State:_____Zip:_____

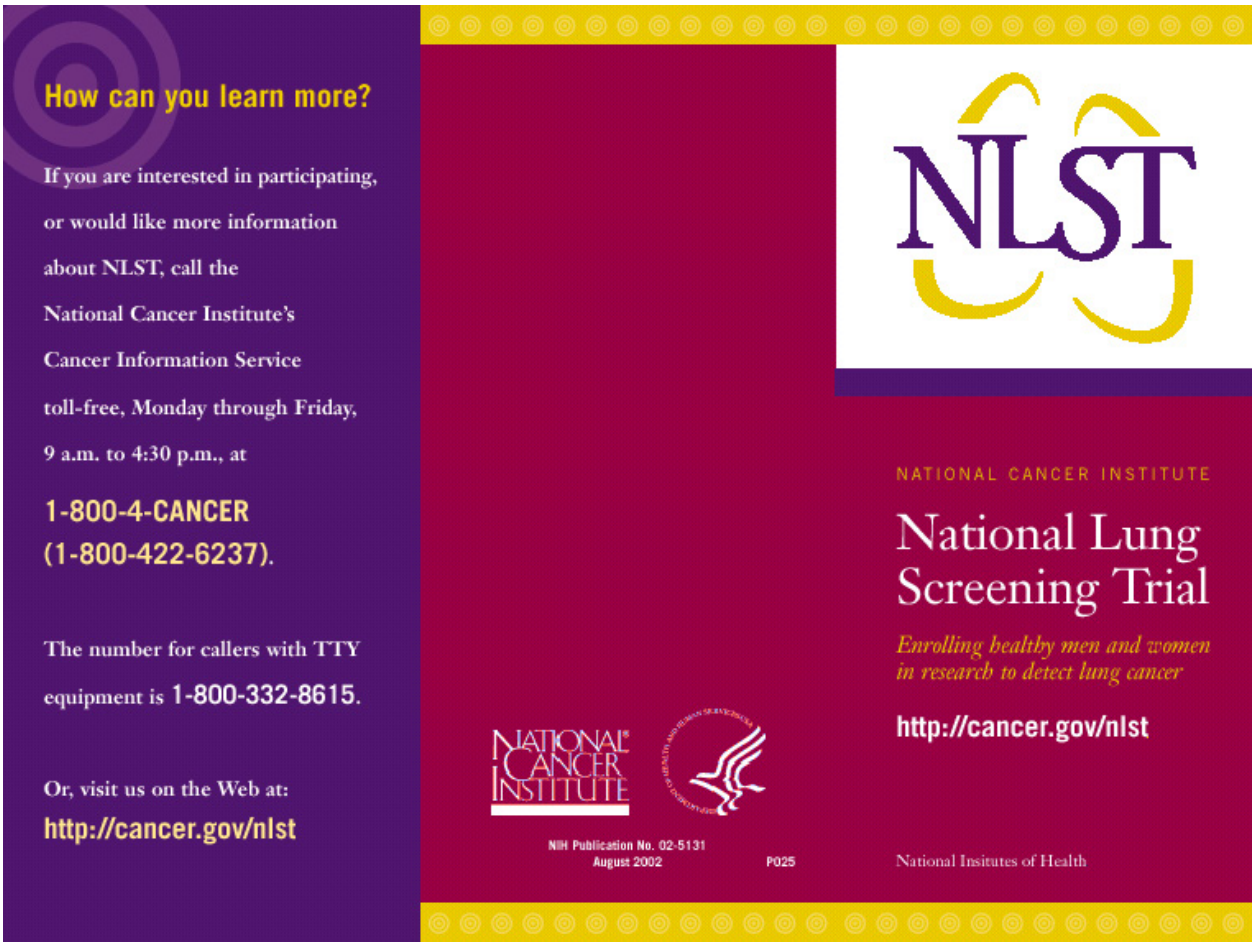
Daytime phone:_____

Evening phone:_____

Best time to call: _____

Remember, you must be a current or former smoker between the ages of 55 and 74.

National Lung Screening Trial (NLST) Brochure – Front



National Lung Screening Trial (NLST) Brochure – Back

What is NLST?

NLST, the National Lung Screening Trial, is a research study sponsored by the National Cancer Institute for men and women at risk for lung cancer.

Could you be at risk for lung cancer?

If you've smoked heavily or have smoked for many years, the answer is "yes." Smoking puts you at risk even if you no longer smoke or do not have any symptoms.

What's the connection between smoking and cancer?

There's no doubt about it—cigarette smoking can cause lung cancer. In fact, cigarette smoking is the leading cause of lung cancer. Every year, more than 169,000 people in the United States get lung cancer, and nearly 155,000 people die from this disease. Lung cancer is the leading cause of cancer death for both men and women.

Your risk of lung cancer depends on how many cigarettes and how long you've smoked. Quitting reduces the risk, but half of all lung cancers occur in former smokers.

What's the purpose of this study?

NLST is a lung cancer screening trial. *Screening* means testing people to detect a disease before it causes symptoms.

The purpose of NLST is to compare two ways of detecting lung cancer: standard chest x-ray and spiral computed tomography (CT) scan. Both chest x-rays and spiral CT scans are used in an effort to find lung cancer early. So far, neither chest x-rays nor spiral CT scans have been shown to reduce a person's chance of dying from lung cancer. This study aims to show which test is better at reducing deaths from this disease.

Lung cancer research is a high priority for the National Cancer Institute. NCI is supporting NLST at more than 30 locations throughout the United States. NLST is a vital part of the effort to reduce the toll of lung cancer.

Who can join NLST?

You may be eligible to join if:

- You are a healthy man or woman aged 55 to 74, and
- You are a current or former smoker who has smoked heavily, or for many years, and
- You have never had lung cancer, and
- You have not had any cancer (except some skin cancers or in situ cancers) within the last 5 years.

Why should you consider participating?

NLST offers participants:

- The *possibility* of detecting a small lung cancer that may still be curable
- The chance to contribute to medical research and to help others and future generations
- Referrals to smoking cessation resources if you want to quit

What will happen if you join NLST?

If you join this study:

- You will meet with NLST staff to discuss the study, and they will determine your eligibility.
- You will read and sign a consent form that explains NLST in detail.
- You will be assigned by chance (randomized) to have either chest X-rays or spiral CT scans. You will visit the NLST site to have the same test each year for three years.
- Expert radiologists will review your X-ray or spiral CT scan.
- Your test results will be mailed to you and your doctor, who will determine if follow-up tests are needed.
- Periodically, for several years, the study staff will contact you by phone or by mail to update information about your health.
- Some NLST centers may ask to collect your blood, urine, or sputum (phlegm) for future lung cancer studies.

National Lung Screening Trial (NLST)

ANSWERS TO POTENTIAL PARTICIPANT QUESTIONS

Participation:

1. Why should I participate?

You will make an important contribution to lung cancer research. Lung cancer remains the chief cause of cancer death in American men and women.

2. Why should I participate if I don't get the Spiral CT screening test?

Regardless of which exam you receive, you will make an important contribution to lung cancer research. We don't know whether spiral CT screening can reduce lung cancer mortality, relative to chest x-ray screening. To determine whether it does, it is important to compare the participants who receive the spiral CT to a very similar group of study participants who receive chest x-rays. Therefore, persons who receive chest x-rays play a critical role in this study.

3. What does randomly assigned mean?

Random assignment means that a computer will assign the screening test you will receive in an impartial manner. Neither you nor the study staff can choose the type of exam you will receive. You will have an equal chance of being assigned to the spiral CT or chest x-ray exams.

4. What other hospitals are in the study?

Up to 30 Screening Centers from different areas in the country will participate in the study. The NLST/LSS SCs currently involved include the following:

- University of Colorado
  Health Sciences Center
  Denver, CO
- Georgetown University Medical Center/Lombardi Cancer Research Center
  Washington, D.C.
- Pacific Health Research and Education Institute
  Honolulu, HI
- Henry Ford Health System
  Detroit, Michigan
- University of Minnesota School of Public Health/Virginia L. Piper Cancer Institute
  Minneapolis, Minnesota
- Washington University School of Medicine
  St. Louis, Missouri
- University of Pittsburgh Medical Center
  Pittsburgh, PA

- University of Utah Health Sciences Center
  Salt Lake City, UT
  AND
  St. Luke's Meridian Medical Center
  Meridian, ID

- Marshfield Clinic Research Foundation
  Marshfield, Wisconsin

- The University of Alabama at Birmingham
  Birmingham, Alabama

5. I had a bad experience with the hospital/the government lately, why should I help them?

I'm sorry that your experience was not good. However, this is a special research study sponsored by the National Cancer Institute. We are committed to making your participation in this study a positive experience. By participating in the study you are helping us to learn more about the ability of spiral CT to reduce lung cancer mortality.

6. How will I benefit from the study?

We don't know if you will personally benefit but if the study shows that the spiral CT screening exam is effective, then this type of screening for lung cancer may become common practice in the future. If this study shows that spiral CT does not reduce lung cancer mortality, health care providers will know not to use it as a screening test, saving you and others unnecessary inconvenience and expense.

7. Are there any downsides to participating?

There are certain risks that might be associated with the screening procedures. A small amount of radiation, (100-300 mrem) is received as part of the low-dose spiral CT exam. This amount of radiation is less than the recommended limit of radiation received by each person in the United States from natural sources (300 mrem exclusive of medical procedures). A small amount of radiation (3 mrem) is received as part of the NLST chest x-ray exam. This is less than the amount of radiation received from a normal chest x-ray (8-12 mrem). These levels of radiation pose no measurable risk.

Although the actual screening exams pose very little risk, it is possible that the screening spiral CT or chest x-ray will not detect a lung cancer that is present and falsely suggest that you do not have the disease. In this instance, you may miss an opportunity for cure. It also is possible that your screening spiral CT or chest x-ray will suggest that you have lung cancer when in fact you do not. In that case, your health care provider may ask you to undergo additional tests or procedures, such as a biopsy or surgery. These additional tests or procedures may cause pain, anxiety, expense, or medical complications that could have been avoided if you had never undergone the screening test. Additionally, it is possible that the screening spiral CT or chest x-ray will detect a lung cancer, but that the diagnosis and treatment of this cancer may not prolong your life. In this case, you may experience unnecessary pain, anxiety, expense, or medical complications from the diagnosis and treatment of cancer.

Appendix 2-5 Answers to Potential Participant Questions

Eligibility:

1. **Am I eligible to participate in this study even though I have _____ (another serious medical problem that is not an exclusion criteria)?**

   If the medical problem would not interfere with your ability to participate in the screening exam, and if it were acceptable to your health care provider and to *(PI)* here at *(Local SC)* who is directing the study, you would be eligible to participate.

2. **If I have _____ (symptom) am I still eligible for the study?**

   [If a potential participant reports a symptom, s/he should be advised to make an appointment with a health care provider so that the symptom can be evaluated. The potential participant should be asked to contact the SC after the medical evaluation so that eligibility may be determined.]

3. **You mentioned that I cannot be in the study because I have _____ (symptom). Should I be worried?**

   Certain symptoms (unexplained weight loss or hemoptysis) can be signs of a serious health problem. We recommend that you contact your health care provider for a complete evaluation of your symptoms.

4. **If I recently had _____ (lung examination), am I still eligible for the study?**

   [If the screening exam was a spiral CT performed in the last 18 months, then explain to the potential participant that s/he is not eligible for the study. If it was some other test, the SC staff should ask what was the result. If the exam result was normal, s/he may be eligible. If result was abnormal and s/he is currently undergoing diagnostic work-up for lung cancer, s/he should contact the SC when results of the work-up are known.]

5. **I'm (younger than 54 years/older than 75 years old). Why can't I be in the study?**

   We are sorry that you cannot participate. The eligibility criteria are determined by the National Cancer Institute and I cannot change them.

6. **I am not a smoker, or have only lightly smoked in my lifetime, why can't I be in the study?**

   We are sorry that you cannot participate. The eligibility criteria are determined by the National Cancer Institute and I cannot change them. The best way to conduct a study like the NLST is to examine people with an elevated risk of lung cancer. Heavy smokers or long-term smokers have an elevated risk.

Screening:

1. **Who will be conducting these screening exams? Are they qualified?**

   The exams will be conducted by qualified health care providers and x-ray technologists. These individuals have been trained and have experience conducting these tests.

2. Is the spiral CT or chest x-ray painful?

Most people do not find these exams to be painful or uncomfortable. A trained medical professional will tell you exactly what to expect before the exam is given and will work with you to eliminate discomforts.

3. Will you screen my husband/wife/relative/friend?

If your husband/wife/relative/friend is interested in participating in the study, s/he should call the recruitment coordinator *(appropriate person at SC)* to determine if s/he is eligible. Remember that an eligible participant has an equal chance of being assigned to either the spiral CT group or the chest x-ray group. If assigned to the spiral CT group, your husband/wife/relative/friend would only receive the spiral CT exam; if assigned to the chest x-ray group, your husband/wife/relative/friend would only receive the chest x-ray exam.

Screening Exam Results:

1. If my exam results are abnormal, does that mean I have cancer?

Not necessarily. An abnormal screening exam means that further information is needed before a diagnosis can be made. Screening exams do identify cancer, but they also identify other conditions, some of which are harmless. All participants with exam results that are suspicious for cancer will be referred to their health care providers for diagnostic evaluation.

2. I don't have a doctor. Who will get my exam results?

If you do not have a health care provider and you have an abnormal exam result, we will be happy to refer you to a health care provider here at *(SC associated hospital).*

3. Can I have the results of my screening exam?

Yes. Your exam results will be sent to you within three weeks of your screening examination.

4. If something abnormal is found, do I have to go to a doctor here, or can I go to my own doctor?

You may go to the health care provider of your choice. All exam results will be sent to your health care provider. If you would like to be referred to a health care provider here at *(Local SC),* we will be happy to give you a referral list of health care providers.

5. Who will see the results of my screening exam?

You and the health care provider of your choice will be notified by letter of the results of your exam. Your health care provider also will receive a copy of the results. All study personnel conform to the hospital rules and Federal regulations regarding confidentiality. They must keep all information provided by study participants and all exam results confidential. Your results will not be shared with your employer or your insurance company without your signed consent.

Appendix 2-5 Answers to Potential Participant Questions

Diagnostic Evaluation:

1. Will you recommend specific diagnostic examinations if abnormalities are detected on the screening examinations?

If abnormalities are detected on your screening exam, we *(Local SC)* will send a letter notifying you and your health care provider as to the results of the examination. The letter will include common strategies for diagnostic evaluation. These strategies will be recommendations from the radiologist at *(Local SC)* and not from the NLST. The letter will state that we recommend that you make an appointment to discuss these findings with your health care provider. Your health care provider may recommend the same or alternative diagnostic examinations, or refer you to a specialist who can evaluate the abnormality found on the screening exam.

If you do not have a health care provider and would like us *(Local SC)* to provide you with a list of recommended health care providers, we will be happy to do so.

2. If my screening examination detects abnormalities, will you recommend specific doctors, if I ask, to perform a diagnostic work-up?

If the screening exam detects abnormalities and you would like us *(Local SC)* to give you a list of recommended health care providers, we will be happy to do so.

3. Will the *(Local SC)* recommend specific surgeons if I ask?

If you would like us *(Local SC)* to give you a list of recommended surgeons, we will be happy to do so.

Tumor Tissue Slide:

1. When will a tumor tissue slide be collected?

Following a positive screening examination, your health care provider may remove a piece of your lung to determine if you have lung cancer. Likewise, lung tissue may be removed as a part of treatment for lung cancer. If you have a diagnosis of lung cancer, a small piece of what was removed (tumor tissue) will be collected for the NLST.

2. What will be done with my tumor tissue slide?

Your tumor tissue slide will be reviewed to confirm the cancer diagnosis. Your tumor tissue slide may be used by the study investigators for medical research about genetic factors and chemical changes that lead to the development of cancer and other diseases. Your tumor tissue slide will be stored at an NCI-designated location for up to 25 years.

Appendix 2-5 Answers to Potential Participant Questions

General Questions About Cancer:

1. What can I do to lower my risk of lung cancer?

I'll be happy to {make an appointment/give you the telephone number} so you can speak with the Health Education/Risk Reduction clinic here at *(SC associated medical center).* Clinic staff are very knowledgeable in this area, and can answer your questions. Or you can call 1-800-4-CANCER, the Cancer Information Service of the National Cancer Institute and speak with a Cancer Information Specialist who can answer your questions.

2. If I have already been diagnosed with lung cancer, do I have an increased risk of developing other types of cancer?

I'll be happy to [make an appointment/give you the telephone number] so you can speak with the Health Education/Risk Reduction clinic here at *(SC associated medical center).* Clinic staff are very knowledgeable in this area, and can answer your questions. Or you can call 1-800-4-CANCER, the Cancer Information Service of the National Cancer Institute and speak with a Cancer Information Specialist who can answer your questions.

3. Do you have additional information on lung cancer?

I'll be happy to [make an appointment/give you the telephone number] so you can speak with the Health Education/Risk Reduction clinic here at *(SC associated medical center).* Clinic staff are very knowledgeable in this area, and can answer your questions. Or you can call 1-800-4-CANCER, the Cancer Information Service of the National Cancer Institute, and speak with a Cancer Information Specialist who can answer your questions.

4. My relative had lung cancer. Does that mean I'll get it too?

I'll be happy to [make an appointment/give you the telephone number] so you can speak with the Health Education/Risk Reduction clinic here at *(SC associated medical center).* Clinic staff are very knowledgeable in this area, and can answer your questions. Or you can call 1-800-4-CANCER, the Cancer Information Service of the National Cancer Institute, and speak with a Cancer Information Specialist who can answer your questions.

5. There's a lot of cancer in my family, that worries me.

I'll be happy to [make an appointment/give you the telephone number] so you can speak with the Health Education/Risk Reduction clinic here at *(SC associated medical center).* Clinic staff are very knowledgeable in this area, and can answer your questions. Or you can call 1-800-4-CANCER, the Cancer Information Service of the National Cancer Institute, and speak with a Cancer Information Specialist who can answer your questions.

6. My relative was recently diagnosed with lung cancer. I wonder if s/he's getting the right treatment?

I'll be happy to [make an appointment/give you the telephone number] so you can speak with the Health Education/Risk Reduction clinic here at *(SC associated medical center).* Clinic staff are very knowledgeable in this area, and can answer your questions. Or you can call 1-800-4-CANCER, the Cancer Information Service of the National Cancer Institute, and speak with a Cancer Information Specialist who can answer your questions.

7. Do you have a support group for individuals who have lung cancer?

[Yes, I'll be happy to give you the name and telephone number of the contact person] [I'm not sure, so I will give you the telephone number of _____ here at *(SC associated medical center)* who will know what support groups are available/give you the telephone number of Cancer Information Service of the National Cancer Institute, 1-800-4-CANCER. Either one can tell you what support groups are available.]

8. I think I am at high risk for cancer and I should be in the group that receives the spiral CT examination.

Please remember that at this time, it is not known whether screening with spiral CT is beneficial for individuals at high-risk of lung cancer. For scientific reasons, assignments need to be made at random. If you choose to participate, you will have an equal chance of being assigned to either the spiral CT or to the chest-x-ray group.

National Lung Screening Trial (NLST)

ELIGIBILITY SCREENER (ES)

Administrative Section

Date Completed: |__|__|/|__|__|/|__|__|__|__|

Screening Center ID: |___|___|

Screening Center Staff ID: |__|__|__|__|

Initials Complete: _____

Initials QC: _____

Participant ID Label

NAME: DR./MR./MRS./MISS/MS.	FIRST	MIDDLE	LAST	(JR., SR., etc.)
CURRENT STREET ADDRESS:				APT. NO.
CITY	STATE			ZIP
TELEPHONE NUMBER: HOME: ( )	WORK: ( )		OTHER: ( )	

1. What is your date of birth?

Month Day Year

CALCULATE AGE: _____

END INTERVIEW IF AGE < = 54 or > = 75.

2. What is your gender?

☐ Male
☐ Female

3. Are you a current or former smoker?

☐ Current smoker
☐ Former smoker
→ How long ago did you quit?
☐ More than 15 years ago (END INTERVIEW)
☐ 15 or fewer years ago
☐ Never smoked (END INTERVIEW)

4. At what age did you begin to smoke?

|___|___|
Age

5. During the times that you've smoked, how many cigarettes did you usually smoke per day?

|___|___|___|
Cigarettes per day

CURRENT SMOKERS GO TO 7

FORMER SMOKERS GO TO 6

6. At what age did you quit smoking for the last time?

|___|___|
Age

7. In the years you have smoked, was there ever a period of one or more years in which you did not smoke cigarettes?

☐ Yes
☐ No (IF NO, GO TO QUESTION 9.)

8. a. (Current smokers) Between when you started smoking and now, for how many years in total did you not smoke cigarettes?
b. (Former smokers) Between when you started smoking and finally quit smoking, for how many years in total did you not smoke cigarettes?

|___|___|
Years

9. Have you had a spiral CT scan of your lungs or chest within the past 18 months?

☐ Yes (END INTERVIEW.)
☐ No

10. Are you currently participating in any other cancer screening study? (This includes the PLCO Cancer Screening Trial.)

☐ Yes (END INTERVIEW.)
☐ No

11. Are you currently participating in a cancer prevention study other than a study to help you stop smoking?

☐ Yes (END INTERVIEW.)
☐ No

12. Have you ever been told by a physician that you have lung cancer?

☐ Yes (END INTERVIEW.)
☐ No

13. Have you ever had any portion of your lungs surgically removed (not including a needle biopsy)?

☐ Yes (END INTERVIEW.)
☐ No

14. Other than non-melanoma skin cancer and carcinoma in situ (except transitional cell carcinoma in situ, or bladder carcinoma in situ), have you, in the past 5 years, been treated for cancer or been told by a doctor that you have evidence of cancer?

☐ Yes (END INTERVIEW.)
☐ No

15. Are you able to lie on your back with your arms raised over your head?

☐ Yes
☐ No (END INTERVIEW.)

16. Do you have any metallic implants in your chest or back (such as a pacemaker or Harrington fixation rods)?

☐ Yes (END INTERVIEW.)
☐ No

17. Do you have a requirement for home oxygen supplementation?

☐ Yes (END INTERVIEW.)
☐ No

18. Have you experienced either of the following:

a. Unexplained weight loss of more than 15 pounds in the past 12 months?

☐ Yes (END INTERVIEW.)
☐ No

b. Recent coughing up blood (hemoptysis)?

☐ Yes (END INTERVIEW.)
☐ No

19. In the past 12 weeks, have you had pneumonia or an acute respiratory infection that was treated with antibiotics by a physician?

☐ Yes (END INTERVIEW.)
☐ No

Appendix 2-6 Eligibility Screener (ES)

READ: Thank you. Those are all the questions I have for now. Please give me a few minutes to review your answers and tell you if you are eligible for the study.

- COMPLETE THE **ELIGIBILITY WORKSHEET** (next page).

- IF PERSON IS **INELIGIBLE** READ: I'm afraid you do not meet the eligibility requirements. Thank you very much for your interest in the study.

- IF PERSON IS **ELIGIBLE** READ: You are eligible to participate in this study. If you are interested in participating, I will mail you information about the study as well as a consent form for you to read, sign and return to us. For your convenience, there will be a prepaid and preaddressed envelope for you to return the consent form. Meanwhile, if you have any questions, please feel free to call our study coordinator, [NAME] at [NUMBER]. Once again, thank you very much for your interest in this study.

COMMENTS:

ELIGIBILITY WORKSHEET

A. CALCULATE AGE ELIGIBILITY.

1. IF MONTH AND DAY OF BIRTH (IN Q1) IS **ON OR BEFORE** TODAY'S MONTH AND DAY, CALCULATE AGE:

   a. Current Year ..... |__|__|__|__|

   b. MINUS Year of Birth (Q1) ..... |__|__|__|__|

   c. EQUALS ..... [ ]

2. IF MONTH AND DAY OF BIRTH (IN Q1) IS **AFTER** TODAY'S MONTH AND DAY, CALCULATE AGE:

   a. Current Year ..... |__|__|__|__|

   b. MINUS Year of Birth (Q1) ..... |__|__|__|__|

   c. MINUS **1** ..... |__|__|__|1|

   d. EQUALS Age [ ]

IF AGE LESS THAN 55 OR GREATER THAN 74, THE PERSON IS **INELIGIBLE** (RETURN TO SCREENER).
IF AGE BETWEEN 55 AND 74, THE PERSON IS **ELIGIBLE** (CONTINUE BELOW)

B. CALCULATE DURATION OF SMOKING HISTORY IN PACK YEARS.

1. ENTER *Age* (Part A Above For Current Smokers) or *Age Quit* (ES-Q6 for Former Smokers) ..... _____
2. MINUS *Age Started Smoking* (ES-Q4) ..... _____
3. EQUALS *Years Since Start Of Smoking* ..... _____
4. MINUS *Years Not Smoked* (ES-Q8) ..... _____
5. EQUALS **TOTAL YEARS SMOKED** ..... [ ]
6. MULTIPLY**:**

$$\frac{\text{TOTAL YEARS SMOKED [B.5] X CIGARETTES PER DAY (ES-Q5)}}{20} = \text{PACK YEARS}$$

$$\frac{\text{PACK YEARS}}{20} \times 20 = \text{_____}$$

ROUND PACK-YEARS TO ONE DECIMAL PLACE (E.G., 45.7, 29.8).
If the second decimal place is <5, round down. If the second decimal place is = or >5, round up.
IF PACK-YEARS IS LESS THAN 30.0, THE PERSON IS **INELIGIBLE.**
IF PACK-YEARS IS EQUAL TO OR GREATER THAN 30.0, THE PERSON IS **ELIGIBLE**.
(RETURN TO SCREENER)

National Lung Screening Trial (NLST)

Specifications for the Completion of the Eligibility Screener (ES)

The Eligibility Screener will be administered by telephone by an SC staff member. The following are specifications for the administration of the form by telephone with a sample script for introducing the screener. These specifications may also be used as a reference document for answering questions from potential participants.

Administrative Section:

- **Participant ID Label:** The PID is assigned during the randomization process. Therefore, the PID label can only be attached to the form of eligible, randomized participants after the Eligibility Screener is completed.
- **Date Completed:** Record the month, day, and year the Eligibility Screener is completed. Zero-fill month, day, and year, if applicable.
- **Screening Center ID:** Record the two-digit SC ID number.
- **Screening Center Staff ID**: Record the four-digit staff ID number of the staff member completing the Eligibility Screener.
- **Name and Address:** If desired, the SC may affix a mailing label showing the potential participant's name and address in the space provided. Alternatively, the SC may hand write the name and address information.
- **Telephone Number(s):** Record the telephone number(s) that have been provided by the potential participant, including a home number, work number, or other number if provided.

Sample Script for Introduction of Screener:

"Hello, my name is _____ and I'm calling on behalf of (LOCAL SC). Recently, we received a postcard from you requesting information about the National Lung Screening Trial being conducted by the National Cancer Institute. I'd like to tell you more about the study. Is now a good time to talk?"

If no: Find out a good time and make a note of the appropriate time to re-contact the potential participant in the Potential Participant Tracking Log (Appendix 2-13).

If yes: "NLST is an NCI-sponsored nationwide study of Americans aged 55 to 74 who have a history of long-time and/or heavy cigarette smoking. The purpose of NLST is to compare screening with spiral CT (low-radiation-dose computed tomography) and screening with chest x-ray for effectiveness in reducing the number of deaths due to lung cancer. Since health care providers are not sure which screening test is more effective in screening for lung cancer, some of the study participants will receive screening spiral CT examinations, others will receive screening chest x-ray examinations, and the two groups will be compared. Participants will be notified of the results of the screening examination as soon as possible. We will also send the results to participants' health care providers.

"We would like to ask for your participation in the study. The study will provide invaluable information that may help save lives, and we hope you will agree to help. Your participation, however, is voluntary. Are you interested in participating?"

YES.....	(CONTINUE BELOW)
NO	(END INTERVIEW)

"*In order to participate in the trial, you must meet certain eligibility criteria. To determine whether you are eligible to participate in the trial, I would like to ask you a few questions. Before I begin, I must inform you of the following:*

"Collection of this information is authorized by the Public Health Service Act, Section 412 (42 USC 285 a-1). Rights of study participants are protected by the Privacy Act of 1974. Participation is voluntary and there are no penalties for not participating or withdrawing from the study at any time. Participation will not influence a person's relationship with any provider of medical care or any Federal program such as Social Security or Medicare. The information collected in this study will be kept confidential, and will not be disclosed to anyone but the researchers conducting this study, except as otherwise required by law. Names and other identifiers will be separated from information provided and will not appear in any report of the study. Information provided will be combined for all study participants and reported as statistical summaries. Study records will be kept for approximately 10 years past the end of the study, and then destroyed."

(CONTINUE WITH NAME AND ADDRESS VERIFICATION.)

Name and Address:

Complete this section to collect the potential participant's name, address, and telephone number(s). If the reply card containing name and address information is available, the information should be verified and name, address, and phone number(s) should be recorded in the spaces provided on the ES. If there are no changes to the information on the reply card, it may simply be stapled to the ES.

The sample script below may be used in cases where the reply card is available.

"First, I would like to verify your name, address, and telephone number."

NAME *"I have your name listed as (FULL NAME FROM REPLY CARD). Is that correct?"*

If there is a correction, record the corrected name in the space provided. Include title and suffix (such as Jr., Sr., etc.), if applicable. Verify all spelling.

ADDRESS *"I have your address listed as (ADDRESS FROM REPLY CARD). Is that correct?"*

If there is a correction, record the corrected address in the space provided. Verify all spelling.

PHONE NUMBER

"*I have your evening phone number listed as (EVENING PHONE NUMBER FROM REPLY CARD). Is that your correct home phone number?"*

If there is a correction, record the corrected evening phone number, including the area code, in the space provided for home phone number. This should be the number that corresponds to the home address.

"I have your daytime phone number listed as (DAYTIME PHONE NUMBER FROM REPLY CARD). Is that your correct work number?"

If there is a correction, record the corrected daytime phone number, including the area code, in the space provided for the work phone number.

"Do you have another contact phone number such as a beeper or cell phone number?"

Record the number, including the area code, in the space provided.

Eligibility Questions:

Administer the ES for each individual expressing interest in NLST. If, before formal administration of the ES, a potential participant volunteers information indicating that s/he is ineligible, record the participant's name and then answer the question on the ES that addresses the applicable criterion. No other information should be collected in this instance. Administration of the ES should be stopped once a potential participant is identified as ineligible. No further questions should be asked.

Read each question in the order listed. Read each question exactly as it is written to the potential participant and record his/her response. Do not attempt to elicit a "Don't Know" response to any question; however, if the potential participant indicates that s/he does not know the answer, record "DK" in the white space next to the question.

Specifications for each question are given below.

Q1. What is your date of birth? This question asks about the individual's birthdate. Record the month, day, and year of the participant's birthdate. Zero-fill the month and day, if applicable.

Age may be calculated using the eligibility worksheet. Record the age in the space provided. Age may be calculated at the point of asking the question or at the end of administering the ES.

Final age eligibility for a potential participant is based on the date of randomization. However, when filling out the ES, age will be calculated based on the date of administration. This will not be a problem unless the participant is not quite 55 or is nearing his/her 75th birthday. If the participant is nearly 55, the SC can opt to delay randomization to a date when the participant will be 55 as long as this delay is no longer than one month. If the participant is nearly 75, the SC may expedite randomization so that the participant is 74 on the date randomization is done.

Q2. What is your gender? This question asks whether the respondent is male or female. Record a response to this question without asking the respondent, unless you are unable to determine the gender.

Q3. Are you a current or former smoker? This question asks whether the potential participant is a current or former smoker. Note that this question refers to tobacco cigarette smoking, not pipe or cigar smoking. If a potential participant asks for clarification on who is a current smoker, answer that a current smoker is someone who smokes cigarettes on a regular basis.

If the potential participant is a current smoker, mark the "current smoker" box.

If the potential participant is a former smoker, mark the "former smoker" box. The follow-up question must be asked as indicated by the arrow.

If the potential participant was a smoker in the past, but no longer smokes and quit more than 15 years ago, mark "former smoker—more than 15 years ago" box. The individual is ineligible for the study and the interview should be ended.

If the potential participant was a smoker in the past, but no longer smokes and quit 15 or fewer years ago, mark "former smoker—15 or fewer years ago" box.

If the potential participant has never smoked in his/her life, mark "Never smoked" box. The individual is ineligible for the study and the interview should be ended.

Q4. At what age did you begin to smoke? This question asks the age at which the potential participant began to smoke. If the potential participant is unsure of the age, probe to obtain an estimated age.

Q5. During the times that you've smoked, how many cigarettes did you usually smoke per day? This question asks the potential participant how many cigarettes did/does s/he smoke per day during the times s/he has smoked. Remind the potential participant to provide this information as an average for the entire period of time s/he smoked.

NOTE: CURRENT SMOKERS (Q3) should skip Question #6 and continue with Question #7. Question #6 should only be answered for potential participants identified as former smokers.

Q6. At what age did you quit smoking for the last time? To be answered by former smokers (Q3) only. This question asks the potential participant the age at which s/he quit smoking for the last time. If the participant quit smoking at one time, but started again and quit again, probe for the most recent age at which s/he stopped smoking. If, contrary to Q3, the response to Q6 suggests that the potential participant quit more than 15 years ago, query the participant about this discrepancy. If the answer to Q3 was inaccurate, correct it and end interview.

Q7. In the years you have smoked, was there ever a period of one or more years in which you did not smoke cigarettes? This question asks the potential participant whether there was a period of one year or more in which s/he did not smoke cigarettes. If the participant answers "No," skip to Question 9.

Q8. a. (Current smokers) Between when you started smoking and now, for how many years in total did you not smoke cigarettes?
b. (Former smokers) Between when you started smoking and finally quit smoking, for how many years in total did you not smoke cigarettes?

This question is specific to whether the person is a current smoker or a former smoker. If the person is a current smoker, read the question as stated in 8a. If the person is a former smoker, read the question as stated in 8b.

This question asks the potential participant for the number of years in total in which s/he did not smoke cigarettes between the time when s/he started smoking and when s/he quit smoking or now. If a fraction of a year is given, ask the participant to estimate it to the nearest year. Let the participant determine whether to round up or down to the nearest year.

Q9. Have you had a spiral CT scan of your lungs or chest within the past 18 months? This question asks whether the potential participant has had a spiral CT scan of the lungs or chest within the past 18 months (1.5 years). As part of asking the question, the potential participant should be told that a CT scan of the heart, also called a cardiac CT or coronary calcium scan, is considered a CT scan of the chest. Potential participants who have had a CT scan of the lungs or chest within the past 18 months are ineligible for this study. CT scans of other portions of the body, such as the neck or abdomen, do not exclude an individual from participation in the study.

If the potential participant does not know whether or not s/he has had a CT scan of the lungs or chest within the last 18 months, record "DK" (Don't Know) in the white space next to the question. S/he should be asked to contact his/her health care provider to obtain the information. The ES should be placed in a pending file and the potential participant should be recontacted at a later date to complete eligibility determination. If, after contacting the health care provider, s/he still does not know, s/he is not eligible for the trial.

Q10. Are you currently participating in any other cancer screening study? (This includes the PLCO Cancer Screening Trial.) If the potential participant is currently enrolled in a cancer screening study,***** including PLCO, then s/he is ineligible. Verification that a potential participant is not a PLCO participant will be done using the CC-provided randomization pre-processing program. If the potential participant is unsure of the nature of the study, probe for the name of the study or any other information the potential participant can provide about the study, such as the name of the health care provider associated with the study, the location where screening exams take place, etc. Record this information in the space near the "Yes" response category and continue the interview.

After the interview is completed, the SC should investigate the nature of the study to determine whether or not the potential participant is eligible for NLST. If no further information can be obtained, the individual is ineligible.

****** *A cancer screening study/trial is a study that enrolls persons who are asymptomatic for a specific disease and then administers a test to determine whether they are likely to have that disease. The test can either involve machinery (e.g., spiral CT scan) or collection of a biologic sample (e.g., PSA blood test). If you are unsure of whether a study is a cancer screening study/trial, contact the CC or the NCI.*

Q11. Are you currently participating in a cancer prevention study other than a study to help you stop smoking? This question asks about whether the potential participant is currently participating in a cancer prevention study*, other than a smoking cessation study. If the potential participant is unsure of the nature of the study, probe for the name of the study or any other information the potential participant can provide about the study, such as the name of the health care provider associated with the study, the location where study activities take place, etc. Record this information in the space near the "Yes" response category and continue the interview. If the potential participant is currently enrolled in a cancer prevention study other than a study of smoking cessation, then s/he is ineligible for the study.

After the interview is completed, the SC should investigate the nature of the study to determine whether or not the potential participant is eligible for NLST. If no further information can be obtained, the individual is ineligible.

*A cancer prevention study involves individuals who have never had the cancer of interest but are at elevated risk of developing that disease. The purpose of the study is to examine whether cancer risk can be reduced. A cancer prevention trial may administer a chemopreventive agent (e.g., a drug or a vitamin) or may require participants to behave in a specific manner (e.g., reducing their fat intake). Large ongoing cancer prevention studies include STAR (Study of Tamoxifen and Raloxifine), SELECT (Selenium and Vitamin E Clinical Trial – for prostate cancer), and PCPT (Prostate Cancer Prevention Trial). Women participating in the Women's Health Initiative (WHI) are eligible for NLST. If you are unsure of whether a study is a cancer prevention study, please call the CC.

Q12. Have you ever been told by a physician that you have lung cancer? This question asks about a history of lung cancer. Potential participants who have been diagnosed with lung cancer are ineligible for this study.

- If the potential participant has been told by a physician that s/he has/had lung cancer, mark "Yes." Include both metastatic and primary lung cancer, and lung cancers that are in remission.
- If the potential participant says s/he had lung "tumor," probe to find out whether it was "malignant" or "cancerous." If so, mark "Yes."
- If the potential participant says s/he has a pre-cancerous lesion, mark "No." This includes conditions described as carcinoma in situ and atypical adenomatous hyperplasia.
- If the potential participant does not know whether or not s/he has been diagnosed with lung cancer, s/he should be asked to contact his/her physician to obtain the information. The ES should be placed in a pending file and the potential participant should be recontacted at a later date to complete eligibility determination. If, after contacting the physician, the potential participant still does not know whether or not lung cancer was diagnosed, s/he is not eligible for the trial.

Q13. Have you ever had any portion of your lungs surgically removed (not including a needle biopsy)? This question asks about surgery to remove any portion of the lungs or an entire lung. Other terms for removal of a lung are "pneumonectomy" or "lobectomy." If the potential participant had an <u>entire</u> lung removed, mark "Yes." If the potential participant had a <u>partial</u> lobectomy, that is only part of a lung removed, also mark "Yes." If the potential participant reports a history of having any portion of

the lung(s) removed, other than for a needle biopsy, then s/he is ineligible for this study.

Q14. Other than non-melanoma skin cancer and carcinoma in situ (except transitional cell carcinoma in situ, and bladder carcinoma in situ), have you, in the past 5 years, been treated for any cancer or been told by a doctor that you have evidence of cancer? This question asks whether the potential participant has undergone treatment, or has been told by a doctor that s/he has had evidence of any cancer, other than non-melanoma skin cancer and carcinoma in situ, in the past five years. If the potential participant has undergone treatment for, or has had evidence of, any cancer other than non-melanoma skin cancer and carcinoma in situ in the past five years, then s/he is ineligible for this study. Basal cell or squamous cell skin cancers are considered non-melanoma skin cancers. Carcinoma in situ (CIS) is a precancerous condition and is not considered to be cancer. Therefore, persons who have undergone treatment for, or have had evidence of pre-cancerous lesions or carcinoma in situ, are eligible. However, two exceptions should be noted. If a potential participant has undergone treatment for, or has had evidence of transitional cell carcinoma in situ or bladder carcinoma in situ in the past five years, then s/he is ineligible for this study.

If the potential participant does not know whether s/he has undergone treatment for cancer in the past five years, or does not know whether s/he has had evidence of cancer in the past five years, s/he should be asked to contact his/her physician to obtain the information. The ES should be placed in a pending file and the potential participant should be recontacted at a later date to complete eligibility determination. If, after contacting the physician, the potential participant still does not know, s/he is not eligible for the trial.

Q15. Are you able to lie on your back with your arms raised over your head? This question asks the potential participant if s/he believes that s/he would be able to lie on his/her back with arms raised over his or her head. If the potential participant asks how long s/he must be able to hold this position, tell him/her three minutes. If the potential participant feels that s/he would be physically able to do so, mark the box for "Yes." If a potential participant feels that s/he would be physically unable to do so, mark the box for "No." If "No" is marked, the potential participant is not eligible for participation in the study.

Q16. Do you have any metallic implants in your chest or back (such as a pacemaker or Harrington fixation rods)? This question asks if the potential participant has metallic implants in his/her chest or back. If the potential participant answers "Yes," mark the appropriate box. If the potential participant answers "No," mark the box for "No." This question concerns metallic implants that would obscure a scan of the lungs. Metallic implants or metal objects that do not make the participant ineligible would include: coronary artery bypass markers, sternotomy sutures, metallic heart valves, vascular stents, angioplasty stents, or small amounts of shrapnel or bullet fragments. If the potential participant reports any of these items, mark the box for "No." If "Yes" is marked, the potential participant is not eligible for participation.

Q17. Do you have a requirement for home oxygen supplementation? This question asks if the potential participant has a requirement for home oxygen supplementation. Mark the appropriate box to record the potential participant's response. If "Yes" is marked, the potential participant is not eligible for participation.

Q18. Have you experienced either of the following:

a. Unexplained weight loss of more than 15 pounds in the past 12 months? This question asks the potential participant if s/he has had unexplained weight loss of more than 15 pounds in the past year. Mark the box that corresponds to the potential participant's response. If "Yes" is marked, the potential participant is not eligible.

b. Recent coughing up blood (hemoptysis)? This question asks the potential participant if s/he has recently experienced hemoptysis, or coughing up blood. Blood-tinted sputum is not considered hemoptysis. Mark the box that corresponds to the potential participant's response. If the potential participant reports experiencing recent hemoptysis, mark the "Yes" box; if the potential participant has experienced hemoptysis in the past, mark the "No" box. If "Yes" is marked, the potential participant is not eligible. Please note hemoptysis, or coughing up blood, is not the same as bloody emesis (vomiting blood).

If the potential participant asks for clarification of the word "recent," tell him or her that recent hemoptysis refers to hemoptysis occurring in the past month.

If the potential participant has experienced either of these symptoms and expresses concern, the SC staff member should advise the potential participant that one or both of these symptoms could be a sign of a serious health problem. The participant should be encouraged to contact his/her health care provider for a complete evaluation.

Q19. In the past 12 weeks, have you had pneumonia or an acute respiratory infection that was treated with antibiotics by a physician? This question asks the potential participant if s/he has had pneumonia or an acute respiratory infection that was treated with antibiotics by a physician in the past 12 weeks. If the participant has had pneumonia or an acute respiratory infection that was treated with antibiotics in the past 12 weeks, mark the box for "Yes." If the participant has not had pneumonia or an acute respiratory infection in the past 12 weeks, or has had such an infection but it was not treated with antibiotics, mark the box for "No." If "Yes" is marked, the potential participant is not eligible. If "Yes" is marked, the SC may contact the potential participant in the future to reassess eligibility.

READ: *"Thank you. Those are all the questions I have for now. Please give me a few minutes to review your answers and tell you if you are eligible for the study."*

(Note: If participant is eligible, randomized and then develops pneumonia or an acute respiratory infection between randomization and screening, then inform the participant that the screening exam will be scheduled 12 weeks after he/she completes treatment with antibiotics. The SC should document this situation in the participant's study record. The SC should contact the participant approximately two months following his/her treatment with antibiotics, to schedule a screening examination.)

National Lung Screening Trial (NLST)

PROTOTYPE CONSENT FORM

(Name of Local SC)

DESCRIPTION OF STUDY

I have been invited to take part in the National Lung Screening Trial (NLST), sponsored by the National Cancer Institute, *(Local SC)*, and other centers across the country. The purpose of NLST is to compare screening with spiral CT (low-radiation-dose computed tomography) and screening with chest x-ray for effectiveness in reducing the number of deaths due to lung cancer. There is disagreement among medical experts over the effectiveness of these screening methods for lung cancer. NLST is carefully designed to resolve this controversy.

NLST will enroll approximately 50,000 men and women between the ages of 55 and 74 who are former or current heavy smokers, recruited from centers across the nation. Half of the participants will receive three annual spiral CT exams. The other half will receive three annual chest x-ray exams.

SCREENING EXAM PROCEDURES

By agreeing to receive these exams, I agree to be assigned by a random process to either the spiral CT exam group or the x-ray exam group. I understand that I have an equal chance of being assigned to either group. I will receive the exam once a year for a total of three exams. I agree to have the screening exams performed as recommended.

If I am assigned to the spiral CT exam group, I will receive the spiral CT exam at *(Local SC)*. I will lie very still on a table that moves through the middle of a doughnut-shaped machine. The machine will take a series of x-rays and create a three-dimensional ("3-D") picture of my lungs. It will be necessary for me to hold my breath for about 20 seconds while the x-rays are being taken.

If I am assigned to the x-ray exam group, I will receive a single-view chest x-ray at *(Local SC)*. This type of x-ray is commonly used to view the organs inside the chest. It will be necessary for me to hold my breath for a few seconds while the x-ray is taken.

Both spiral CT and chest x-ray are radiologic exams that doctors use to help diagnose lung cancer and other lung conditions in people with symptoms. I understand that I can receive a chest x-ray exam outside of NLST, and that I may be able to receive a spiral CT exam outside of NLST, depending on where I live. Neither exam, however, has been scientifically established as standard of care for early detection of lung cancer in people without symptoms. The value of chest x-ray as a screening exam for lung cancer is being assessed in another study sponsored by the National Cancer Institute. The value of spiral CT as a screening exam, compared to chest x-ray, will be assessed by NLST.

If NLST shows that screening with low-dose spiral CT is more effective than chest x-ray in reducing the chance of dying from lung cancer, then this exam may become common practice in the future. If NLST shows that screening with low-dose spiral CT is not more effective than chest x-ray in reducing the chance of dying from lung cancer, doctors will know to avoid this procedure as a screening test, thus preventing unnecessary inconvenience and expense.

QUESTIONNAIRES

I agree to complete a questionnaire that asks for information about my medical history, factors related to my health, and my family's history of lung cancer. I also agree to complete a questionnaire regarding my recent health annually for at least four years. I understand that I may be randomly selected to complete an additional health questionnaire after I receive my screening exam each year.

NOTIFICATION OF RESULTS

I understand that results of my screening exam will be sent to me as soon as they become available. If I have provided the name of a doctor or other health care provider, he or she will receive the results also.

If the results indicate a potential medical problem, *(Local SC)* will provide me, if I so choose, with the names of physician specialists from whom I can receive further medical evaluation.

If I am diagnosed with cancer, *(Local SC)* will provide me, if I so choose, with the names of cancer specialists from whom I can receive further medical evaluation.

COLLECTION OF TISSUE

If I am diagnosed with lung cancer, it is possible that my physician will perform surgery to diagnose or treat the lung cancer. During this surgery, I may have some of my tissue removed for the hospital's pathology department to test. After that process is complete, the remaining tissue will be stored in the hospital's pathology department. I agree to have a small amount of that tissue specimen, if available, sent to the National Cancer Institute for review. I understand that since the tissue is removed at the time of surgery or biopsy, this will not lead to any additional procedures or expense.

I understand that part of the tissue specimen may be used by the study investigators for medical research about genetic (both acquired and inherited) factors and chemical changes that lead to the development of cancer and other diseases that occur in my age group. The tissue specimen will be stored at a National Cancer Institute research storage facility for up to 25 years and used to help scientists learn what causes cancer and how to prevent its progression. It is believed that cancer may be caused by both environmental and genetic factors. Therefore, the samples that I contribute may be used in biochemical and genetic studies to identify these causes. The samples collected for these additional studies are for medical research only and the research results are not suitable for use as clinical tests for my medical care. Therefore, the results of these additional studies will not be available to me.

BENEFITS

I understand that I will receive free lung cancer screening exams. I further understand that if I have lung cancer, it is possible that the cancer may be detected at an early stage. Early detection of lung cancer may prolong my life; however, this has not been demonstrated scientifically.

Appendix 2-8 Prototype Consent Form

RISKS

I understand that there are certain risks that might be associated with the screening procedures. A small amount of radiation (100-300 mrem) is received as part of the low-dose spiral CT exam. This amount of radiation is less than the recommended limit of radiation received by each person in the United States from natural sources each year (300 mrem exclusive of medical procedures). A small amount of radiation (3 mrem) is received as part of the NLST chest x-ray exam. This is less than the amount of radiation received from a normal chest x-ray (8-12 mrem). These levels of radiation pose no measurable risk.

Although the actual screening exams pose very little risk, it is possible that the screening spiral CT or chest x-ray will not detect a lung cancer that is present and falsely suggest that I do not have the disease. In this case, I may miss an opportunity for cure. It also is possible that my screening spiral CT or chest x-ray will suggest that I have lung cancer when in fact I do not. In this case, I may be asked by my health care provider to undergo additional tests or procedures, such as a biopsy or surgery. These additional tests or procedures may cause pain, anxiety, expense, or medical complications that could have been avoided if I had never undergone the screening test.

Additionally, it is possible that the screening spiral CT or chest x-ray will detect a lung cancer, but that the diagnosis and treatment of this cancer may not actually prolong my life. In this case, I may experience unnecessary pain, anxiety, expense, or medical complications from the diagnosis and treatment of the cancer.

COSTS

All study screening exams are free. No other costs will be covered by NLST.

The costs of diagnostic tests beyond screening will not be covered by the study and must come from insurance or other sources.

The costs of cancer treatment will not be covered by this study.

COMPENSATION FOR RESEARCH-RELATED INJURIES

In the unlikely event of physical injury resulting from my participation in this study, I will be provided with immediate medical treatment. I understand, however, that NLST will not cover the costs of immediate medical treatment and will not cover the costs of any additional treatment that is necessary.

EXCLUDED PROCEDURES

This study includes only the screening exams listed above. Other medical procedures are not part of this study. The exams received in this study are screening exams for lung cancer only and are not intended to be a substitute for routine medical care.

Appendix 2-8 Prototype Consent Form

STORAGE OF STUDY MATERIALS

I understand that all materials relating to my study participation, including questionnaires and images from screening examinations, will be stored at *(Local SC)* for at least ten years after the end of the trial and then destroyed.

INFORMATION ON NEW FINDINGS

I understand that any significant new findings about screening for lung cancer discovered during the term of the study will be given to me if that information will make a difference in my willingness to continue in the study.

CONFIDENTIALITY

All information I provide as part of the study will be kept confidential and will be used only for scientific purposes, in accordance with applicable state and Federal laws. Only groups or organizations that have a role in NLST will have access to this information. My name and other information capable of identifying me will not appear in any study documents. Only group summaries, not individual data, will be reported. Personal identifying information such as name, address, and Social Security Number may be used to locate me in future years or may be used to determine, through state cancer registries, if I have been diagnosed with cancer. According to the Health Insurance Portability and Accountability Act (HIPAA) any health information that would allow you to be identified is protected under federal law.

RIGHT TO WITHDRAW

I understand that my participation in NLST is voluntary. I may refuse to participate at any time without penalty or loss of benefits to which I am otherwise entitled. My decision regarding participation will not influence my relationship with *(Local SC)* or its staff, or with any Federal program such as Social Security or Medicare.

PERMISSION TO REVIEW MEDICAL RECORDS

By agreeing to participate, I give permission for my health care providers and hospitals where I have been seen to release my medical records to the study investigators.

CERTIFICATION

I have read this form or it has been read to me and I understand its contents. Any questions concerning the research or the rights of the participants involved have been and will be answered by *(Names, Titles, Phone Numbers)*.

Appendix 2-8 Prototype Consent Form

A copy of this consent form has been given to me. My signature below means that I freely agree to participate in NLST.

_____
PARTICIPANT'S NAME (PRINT)

_____
PARTICIPANT'S SIGNATURE DATE

_____
WITNESS SIGNATURE

Appendix 2-9 Sample Consent Form Cover Letter

National Lung Screening Trial (NLST)

(Date)

(Participant Name)
(Participant Address)
(City, State, ZIP Code)

Dear *(Participant Name)*:

Thank you for answering questions regarding your eligibility for the National Lung Screening Trial (NLST). Your response is very valuable to us and your effort is greatly appreciated.

As explained to you on the telephone, by signing the enclosed consent form and returning it in the postage-paid envelope, you will be giving us your permission to enroll you in the NLST. The purpose of this study is to compare screening with spiral CT (low-radiation-dose computed tomography) and screening with chest x-ray for effectiveness in reducing the number of deaths due to lung cancer. Your participation is important to the success of the study.

Please be assured that all information you give will be kept confidential and will not be disclosed to anyone but the researchers conducting this study, except as otherwise required by law. No identifying information will be released.

Thank you again for your support of this important research effort. If you have any questions regarding this study, please contact me or my colleague, *(Name of SC Coordinator)* at *(Telephone Number)*.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

National Lung Screening Trial (NLST)

ELIGIBILITY VERIFICATION FORM (EVF)

PART A: ADMINISTRATIVE SECTION

Name:

_____
Last First Middle

Date of Birth: .....|___|___| - |___|___| - |___|___|
MO DAY YR

Gender (M = 1 / F = 3) |___|

Screening Center ID: |___|___|

Screening Center Staff ID: ..... |___|___|___|___|

Pre-processing # .....|___|___|___|___|___| - |___|

Participant ID Label

PART B: ELIGIBILITY VERIFICATION

SMOKING ELIGIBILITY CRITERIA

1. Smoking status (ES-Q3)

- ☐ **1 = Current smoker**
- ☐ **3 = Former smoker** → How long ago did s/he quit?
  - ☐ **1 = More than 15 years ago**
  - ☐ **3 = 15 or fewer years ago**
- ☐ **4 = Never smoked**

2. Pack-year tobacco exposure

At what age did this individual begin to smoke? (ES-Q4)

|___|___| YEARS OLD

During the times that this individual smoked, how many cigarettes did s/he usually smoke per day? (ES-Q5)

|___|___|___| # PER DAY

At what age did this individual quit smoking for the last time? (ES-Q6)

|___|___| YEARS OLD

In the years this individual smoked, was there ever a period of one year or more years in which s/he did not smoke cigarettes? (ES-Q7)

- ☐ 1 = **YES** → If Yes, for how many years in total did s/he not smoke cigarettes? (ES-Q8)
  |___|___| YEARS
- ☐ 3 = **NO**

Total pack-year tobacco exposure

|___|___|___| . |___| YEARS

ELIGIBILITY CRITERIA - CONTINUED	CHECK YES OR NO. IF YES IS CHECKED, STOP. IF NO IS CHECKED, CONTINUE.
3. Has this individual had a spiral CT scan of the lungs or chest in the past 18 months? (ES-Q9)	☐ YES ☐ NO
4. Is this individual currently participating in another cancer screening study, including the PLCO Cancer Screening Trial? (ES-Q10)	☐ YES ☐ NO
5. Is this individual currently participating in a cancer prevention study other than a study to help him/her stop smoking? (ES-Q11)	☐ YES ☐ NO
6. Has this individual ever been diagnosed with lung cancer? (ES-Q12)	☐ YES ☐ NO
7. Has this individual ever had any portion of the lungs surgically removed (not including a needle biopsy)? (ES-Q13)	☐ YES ☐ NO
8. Has this individual undergone treatment for, or had evidence of, any cancer other than non-melanoma skin cancer and carcinoma in situ (except bladder carcinoma in situ and transitional cell carcinoma in situ) in the past 5 years? (ES-Q14)	☐ YES ☐ NO
9. Is this individual **unable** to lie on the back with arms raised over the head? (ES-Q15)	☐ YES ☐ NO
10. Does this individual have metallic implants in the chest or back? (ES-Q16)	☐ YES ☐ NO
11. Does this individual have a requirement for home oxygen supplementation? (ES-Q17)	☐ YES ☐ NO
12. Has this individual had either unexplained weight loss of more than 15 pounds in the past 12 months or recent hemoptysis? (ES-Q18)	☐ YES ☐ NO
13. Has this individual had pneumonia or an acute respiratory infection that was treated with antibiotics by a physician in the past 12 weeks? (ES-Q19)	☐ YES ☐ NO
14. Is this individual unwilling or unable to sign the study consent form?	☐ YES ☐ NO
15. Is YES marked for any of the questions above (Q3 to Q14)?	MARK 1 FOR YES, 3 FOR NO ☐ 1=YES ☐ 3=NO

PART C: RANDOMIZATION AND ENROLLMENT

This individual can **only** be randomized and enrolled into the National Lung Screening Trial if s/he meets the age, smoking status and pack-year requirements AND "No" is marked for each of the questions above.

After randomization is complete, the Participant ID number and randomization group will be specified by the telephone randomization system. Please write the information in the space below. When the e-mail confirmation report is received, please verify the information against what is written below, then file the confirmation in the participant's study file.

Date of Randomization/Enrollment: |___|___| - |___|___| - |___|___|___|___|
MO DAY YR

Participant ID: |___|___| - |___|___|___|___|___| - |___|

Randomization Group (MARK ONE): ☐ Spiral CT
☐ Chest x-ray

Specifications for the Completion of the Eligibility Verification Form (EVF)

This form is to be completed after completing the ES and prior to randomization by the SC Coordinator or a staff member who has been approved to perform the eligibility verification procedures and to use the Interactive Voice Response System (IVRS). Use the ES and the Consent Form as sources of information when completing the EVF. Each of the eligibility criteria listed must be satisfied if the potential participant is to be randomized and enrolled in the NLST.

Part A: Administrative Section:

Name: Record the last and first names, and middle name or initials of the potential participant on the line provided. If the potential participant does not have a middle name, record the second letter of his/her first name in the space provided for the middle initial and record "no middle name" in the margin of the form.

Date of Birth: Record two digits each for the month and day and two digits for the year of the potential participant's date of birth. Zero-fill month and day of birth, if applicable.

Gender: Record a "1" if the potential participant is male or "3" if female.

Screening Center ID: Record the two-digit SC ID.

Screening Center Staff ID: Record the four-digit staff ID number of the staff member completing the form.

Pre-processing #: SCs must verify that the potential participant is neither enrolled in PLCO nor already enrolled in the NLST/LSS. Check each potential participant's name against a list of PLCO and NLST/LSS participants using the pre-processing program in See the for a detailed description of how to use the pre-processing program. Once the pre-processing is complete for each participant, will provide a unique six-digit pre-processing number. Record this number on the EVF. If the potential participant is part of PLCO or is a duplicate, stop; s/he is not eligible for randomization.

Participant ID Label: After randomizing the participant, affix the assigned PID label to the front of the form in the space provided.

Part B: Eligibility Verification:

SMOKING ELIGIBILITY CRITERIA

1. **Smoking status.** This question asks about the smoking history of the potential participant. Check the box that corresponds to the smoking history of this individual (i.e. "Current smoker," "Former smoker," or "Never smoked") as reported on the ES, Question 3. NOTE: the numbers after each response are for your reference when completing the telephone randomization.

If this individual is a former smoker, please check the box that corresponds to how long ago the individual stopped smoking. In order to be eligible, an individual must have a history of smoking, and that smoking habit must have continued to within 15 years of the date the ES was completed.

2. **Pack-year tobacco exposure.** This section asks about total tobacco exposure, as measured in pack-years. Pack-years is the product of duration of exposure (measured in years), and intensity of exposure (measured in packs of cigarettes per day). The formula for calculating pack-years is on the Eligibility Worksheet (Part B.6) that is part of the ES. Enter the components of the formula as follows.

   - **At what age did this individual begin to smoke?** Enter the age exactly as it appears on the ES, Question 4.
   - **During the times that this individual smoked, how many cigarettes did s/he usually smoke per day?** Enter the number of cigarettes exactly as it appears on the ES, Question 5.
   - **At what age did this individual quit smoking for the last time?** Enter the age exactly as it appears on the ES, Question 6.
   - **In the years this individual smoked, was there ever a period of one year or more years in which s/he did not smoke cigarettes?** Check the box for "Yes" or "No," as specified on the ES, Question 7.
   - **If yes, for how many years in total did s/he <u>not</u> smoke cigarettes?** Enter the number of years exactly as it appears on the ES, Question 8.
   - **Total pack-year tobacco exposure.** Enter the total pack-year tobacco exposure for this individual. This number should be copied from the ES Worksheet and will be verified by the telephone randomization system. In order to be eligible, a potential participant must have no less than 30.0 pack-years of tobacco exposure.

ELIGIBILITY CRITERIA - CONTINUED

For each of the remaining eligibility verification questions, check the box for a yes or no answer. Copy the responses as they appear on the ES. The corresponding question from the ES is indicated in the specifications below. If "Yes" is marked, the potential participant is <u>not</u> eligible to be enrolled in the NLST.

3. **Has this individual had a spiral CT scan of the lungs or chest in the past 18 months?** (ES-Q9)

4. **Is this individual currently participating in another cancer screening study, including the PLCO Cancer Screening Trial?** (ES-Q10)

5. **Is this individual currently participating in a cancer prevention study other than a study to help him/her stop smoking?** (ES-Q11)

6. **Has this individual ever been diagnosed with lung cancer?** (ES-Q12)

7. **Has this individual ever had any portion of the lungs surgically removed (not including a biopsy)?** (ES-Q13)

8. **Has this individual undergone treatment for, or had evidence of, any cancer other than non-melanoma skin cancer and carcinoma in situ (except transitional cell carcinoma in situ or bladder carcinoma in situ) in the past 5 years?** (ES-Q14)

9. **Is this individual unable to lie on the back with arms raised over the head?** Please note that this question is worded differently from the ES. If the participant answered "Yes" to being able to lie on his/her back with arms raised over the head on the ES, then this question on the EVF should be marked "No." (ES-Q15)

10. **Does this individual have metallic implants in the chest or back?** This question asks whether the individual has metallic implants in the chest or back (such as a pacemaker or Harrington fixation rod). (ES-Q16)

11. **Does this individual have a requirement for home oxygen supplementation?** (ES-Q17)

12. **Has this individual had either unexplained weight loss of more than 15 pounds in the past 12 months, or recent hemoptysis?** (ES-Q18)

13. **Has this individual had pneumonia or an acute respiratory infection that was treated with antibiotics by a physician in the past 12 weeks?** (ES-Q19)

14. **Is this individual unwilling or unable to sign the study consent form?** This question asks about the potential participant's willingness/ability to sign the consent form for the study. This information should be obtained through in-person or mail contact with the potential participant. If the individual does not sign the consent form for any reason, s/he is not eligible to participate in the study. The SC must have a signed consent form on file in order to mark "No" for this question.

After completing Parts A and B of the EVF, the SC staff member must review the questions to confirm participant eligibility. If the potential participant is a current smoker, or former smoker that quit smoking less than 15 years ago, has a pack-year history of at least 30 years, and Questions 3 through 14 are marked "No," s/he is eligible for randomization. The SC staff member must access the Interactive Voice Response System (IVRS) to randomize the participant. See Appendix 2-12 for the .

After Completing Randomization:

- Complete the Date of Randomization in Part C of the EVF. Record two digits each for the month, day, and year. Zero-fill month and day, if applicable.
- Fill in the assigned Participant ID number and randomization group in Part C of the EVF, using the information received from the IVRS.
- Attach the e-mail confirmation report to the corresponding completed EVF.
- File the original EVF and the confirmation report in the participant's study file.

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Appendix 2-13 Sample Potential Participant Tracking Log

National Lung Screening Trial (NLST)

SAMPLE POTENTIAL PARTICIPANT TRACKING LOG

SC _____ SC Coordinator _____

Full Name	Address (incl. ZIP code)	Home Telephone	Work Telephone	Other Telephone	Date of Birth	Sex (M or F)	Date ES Completed	Eligibility Status (E, I, or R)
					/ /		/ /	
					/ /		/ /	
					/ /		/ /	
					/ /		/ /	
					/ /		/ /	
					/ /		/ /	
					/ /		/ /	
					/ /		/ /	
					/ /		/ /	

CODES

Sex:
M = Male
F = Female

Eligibility Status:
E = Eligible
I = Ineligible
R = Randomized

National Lung Screening Trial (NLST)

SC CUMULATIVE RECRUITMENT SUMMARY FORM

Recruitment Activity	SC										TOTAL
	01	02	03	04	05	06	08	09	10	11	
Recruitment packets mailed											
Eligible participants pending randomization											
Ineligible participants											
Number randomized											
Spiral CT											
Chest x-ray											
Screening exams scheduled, but not yet complete											
Spiral CT											
Chest x-ray											
Number screened*											
Spiral CT											
Chest x-ray											
Percent screened**											
Spiral CT											
Chest x-ray											
Screened+Scheduled											
Percent Screened+Scheduled											
Week ending											

*Number screened = Number of screening exams completed regardless of whether or not radiologist has read

**Percent screened = Number screened /number randomized

National Lung Screening Trial (NLST)

Specifications for Completion of the SC Cumulative Recruitment Summary Form

This web-based form is to be completed by the SC by the close of business every Friday or by close of business on the proceeding business day, if Friday is a holiday. The form can be accessed at . The purpose of the form is to provide an overview of recruitment efforts to the NCI on behalf of the screening centers.

Specifications for completing each item of the form are given below.

Completing the Recruitment Activity Table:

Enter all information in the column, which represents your screening center.

Recruitment packets mailed: Enter the cumulative number of recruitment packets mailed to date. New packets mailed this week should be added to the total mailed from previous weeks, therefore the number entered will increase each week.

Eligible participants pending randomization: Enter the total number of eligible participants pending randomization. This includes all those who were pending randomization last week that have not been randomized to date. The number of those pending randomization will change weekly since some participants pending randomization from last week will be removed from the total once randomized and new participants who are pending randomization will be added.

Ineligible participants: Enter the cumulative number of ineligible participants to date. This number will increase weekly as more ineligible participants are identified.

Number randomized: Enter the cumulative number of participants randomized to date. This number will increase weekly as the number of randomized participants increases.

Spiral CT: Enter the cumulative number of participants randomized to the spiral CT study arm. This number will increase weekly as the number of participants randomized to spiral CT increases.

Chest x-ray: Enter the cumulative number of participants randomized to the chest x-ray study arm. This number will increase weekly as the number of participants randomized to chest x-ray increases.

Screening exams scheduled, but not yet complete: Enter the cumulative number of screening exams scheduled for those participants already randomized, but not yet completed. This number will change weekly since some screening exams from the previous week will still be pending, and new screening exam appointments will be added.

Spiral CT: Enter the cumulative number of spiral CT screening exams scheduled for randomized participants, but not yet completed. This number will change weekly since some screening exams from the previous week will still be pending, and new screening exam appointments will be added.

Chest x-ray: Enter the cumulative number of chest x-ray screening exams scheduled for randomized participants, but not yet completed. This number will change weekly since some screening exams from the previous week will still be pending, and new screening exam appointments will be added.

Number screened: Enter the cumulative number of screening exams completed regardless of whether the radiologist has read the exam.

Spiral CT: Enter the cumulative total of participants screened by spiral CT. This number will increase each week as more participants are screened.

Chest x-ray: Enter the cumulative total of participants screened by chest x-ray. This number will increase each week as more participants are screened.

Percent screened: The percent screened represents the number of randomized participants that also have been screened. This is calculated by the number screened divided by the number randomized. This field will be calculated automatically.

Spiral CT: This is the percent of participants randomized to spiral CT that have been screened (the number screened with spiral CT divided by the number randomized to spiral CT). This field will be calculated automatically.

Chest x-ray: This is the percent of participants randomized to chest x-ray that have been screened (the number screened with chest x-ray divided by the number randomized to chest x-ray). This field will be calculated automatically.

Screened plus scheduled: This represents the number of screening exams the SC has completed in addition to the number of screening exams the SC has scheduled for randomized participants. This field will be calculated automatically.

Percent Screened Plus Scheduled: This represents the percent of screening exams that are complete plus the number of screening exams scheduled for randomized participants divided by the number of randomized participants. This field will be calculated automatically.

Week ending: Enter this week's end date (usually a Friday unless there is a holiday).

Totals will be calculated for all screening centers. Please only enter information in your screening center column.

National Lung Screening Trial (NLST)

Specifications for Randomization Using the IVRS

Once the potential participant is eligible and the EVF is completed and the SC is in receipt of a signed informed consent, s/he is ready to be randomized. Randomization is completed by telephone using the Interactive Voice Response System (IVRS). Each SC staff member approved to use the randomization system must register via the CC in advance to be allowed access to the system. Each registered person will have a unique user identification number (his/her two-digit site number + four-digit staff ID) and personal identification number (PIN) to use when accessing the system. The IVRS can be accessed by dialing and is available 24 hours a day, seven days a week. Following is a script of what will be heard on the telephone randomization system and instructions for completing each step of the randomization.

Instructions:

LOGON/SET UP

"For English, press 01."
- Press the numbers 01 on your telephone.

"Please enter your assigned user identification number followed by the pound or hash key."
- Please enter your user ID number (two-digit site code + four-digit staff ID), then press the # key.

"Please enter your personal identification number or PIN followed by the pound or hash key."
- Please enter your PIN, then press the # key.

"Welcome to the Interactive Voice Response System for the Lung Screening Study. Before continuing, please verify that every question on the EVF has been completed. At any time, you can press the pound key to return to the main menu or the star key to return to the previous question."

"Main menu. To randomize a new participant, press 1." "To listen to the randomization group of a previously randomized participant, press 2." "To hear these options again, press 3." "To exit, press 0."
- If you would like to randomize a new participant, press 1. If you would like to hear the randomization group assignment of a previously randomized participant, press 2. If you would like to hear the main menu options again, press 3. If you would like to exit the system, press 0.

PARTICIPANT DATA (EVF PART A: ADMINISTRATIVE SECTION):

If you press 1 on the main menu to randomize a new participant, the call will continue as follows.

"Please enter the individual's date of birth. Enter two digits for the month, two digits for the day, and four digits for the year."
- Enter the individual's date of birth as recorded on the EVF.

"You entered (MO/DAY/YEAR). If this is correct, press 1. If incorrect, press 3."

- If the individual's date of birth was entered correctly, press 1. If the individual's date of birth was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

The system will calculate the individual's age. If the individual is not between the ages of 55 and 74, the randomization will be ended as follows.

"This participant is not eligible for randomization."
You will automatically be returned to the main menu.

If the individual is between the ages of 55 and 74, you will be given the next instruction.

"Please enter the gender of the individual. Enter 1 for male or 3 for female."
- If the individual is male, press 1. If the individual is female, press 3.

"You entered (male / female). If this is correct, press 1. If incorrect, press 3."
- If the individual's gender was entered correctly, press 1. If the individual's gender was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

"Please enter the pre-processing number followed by the pound key."
- Enter the pre-processing number followed by the # key.

"The pre-processing number is (PRE-PROCESSING #). If this is correct, press 1. If incorrect, press 3."
- If the pre-processing number was entered correctly, press 1. If not, press 3. If you press 1 the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

SMOKING INFORMATION (EVF PART B: ELIGIBILITY VERIFICATION, Q1 - 2)

"Please enter the individual's smoking status. For current smoker, press 1, for former smoker, press 3, if he or she never smoked, press 4."
- If the individual is a current smoker, press 1. If the individual is a former smoker, press 3. If the individual never smoked, press 4.

"You entered that this individual (is a current smoker/is a former smoker/never smoked). If this is correct, press 1. If incorrect, press 3."
- If the individual's smoking status was entered correctly, press 1. If the individual's smoking status was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

If the individual never smoked, the randomization will be ended as follows.

"This participant is not eligible for randomization."
You will automatically be returned to the main menu.

If the individual is a former smoker, you will be asked to enter whether the individual quit smoking more than 15 years ago, or 15 years or fewer years ago.

"How long ago did the individual quit smoking? If he or she quit smoking more than 15 years ago, press 1. If he or she quit smoking 15 or fewer years ago, press 3."

- If the individual quit smoking more than 15 years ago, press 1. If the individual quit smoking 15 or less years ago, press 3.

"You entered that he or she quit smoking (more than 15 years ago /15 or fewer years ago). If this is correct, press 1. If incorrect, press 3."

- If the number of years was entered correctly, press 1. If the number of years was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

If the individual quit smoking more than 15 years ago, the randomization will be ended as follows.

"This individual is not eligible for randomization."
You will automatically be returned to the main menu.

If the individual is a former smoker and quit smoking 15 or less years ago, or if the individual is a current smoker, you will be given the next instruction.

"The following questions are needed to calculate the individual's pack-year tobacco exposure. Using two digits, please enter the age at which the individual began smoking."

- Enter the age this individual began smoking, using two digits, as recorded on the EVF. Zero fill if necessary.

"You entered (AGE STARTED) years of age. If this is correct, press 1. If incorrect, press 3."

- If the age was entered correctly, press 1. If the age was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

"Using three digits, enter the number of cigarettes the individual usually smoked per day."

- Enter the number of cigarettes smoked per day, using three digits, as recorded on the EVF. If the number of cigarettes smoked per day is less than 100, the number entered must be zero filled. For example, 20 cigarettes would be entered by pressing 020.

"You entered (# CIGARETTES) cigarettes per day. If this is correct, press 1. If incorrect, press 3."

- If the number of cigarettes was entered correctly, press 1. If the number of cigarettes was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

If the individual is a former smoker, you will be asked to enter the age at which the individual quit smoking for the last time.

"Using two digits, enter the age at which this individual quit smoking for the last time."

- Enter the age this individual quit smoking for the last time, using two digits, as recorded on the EVF.

"You entered (AGE QUIT) years of age. If this is correct, press 1. If incorrect, press 3."

- If the age was entered correctly, press 1. If the age was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

"Did this individual ever quit smoking for a period of one or more years? Press 1 for Yes or 3 for No."

- If this individual ever quit smoking for a period of one or more years, press 1. If not, press 3.

"You entered (yes/no). If this is correct, press 1. If incorrect, press 3."

- If the response was entered correctly, press 1. If the response was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

If you pressed 1 for Yes, you will be given the following instruction.

"Using two digits, enter the number of years in total that he or she did not smoke."

- Enter the number of years the individual did not smoke, using two digits, as recorded on the EVF. If the number of years not smoking is less than 10, the number entered must be zero filled. For example, 5 years would be entered by pressing 05.

"You entered (# OF YEARS) years. If this is correct, press 1. If incorrect, press 3."

- If the number of years was entered correctly, press 1. If the number of years was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

When all of the information is entered correctly, the system will calculate the pack-years of tobacco exposure.

"This individual has a total pack-year history of (XX.X)."

- Record the number of pack-years in the space provided on the EVF.

If the number of pack-years is less than 30.0, the randomization will be ended as follows.

"This participant is not eligible for randomization."
You will automatically be returned to the main menu.

If the number of pack-years is 30.0 or more, the call will continue as follows.

ELIGIBILITY CRITERIA - CONTINUED (EVF PART A: ELIGIBILITY VERIFICATION, Q15)

"Looking at question 15 on the EVF, are any of the questions number 3 through 14 marked Yes? If Yes, press 1. If No, press 3."

- Refer to questions 3 through 14 on the EVF. If any questions are marked Yes, press 1. If all questions are marked No, press 3.

"You entered that (one or more/none) of the questions 3 to 14 are marked Yes. If this is correct, press 1. If incorrect, press 3."

- If the response was entered correctly, press 1. If the response was entered incorrectly, press 3. If you press 1, the call will continue with the next instruction. If you press 3, the previous instruction will be repeated.

If you pressed 1 for Yes, the randomization will be ended as follows.

"This participant is not eligible for randomization."

You will automatically be returned to the main menu.

RANDOMIZATION INFORMATION (EVF PART C: RANDOMIZATION AND ENROLLMENT)

After answering all of the questions, the individual will be randomized and the PID number and randomization group will be assigned.

"This participant has been assigned participant ID number (##-#####-#). This participant has been assigned to the (spiral CT/chest x-ray) randomization group."

- Record the date of randomization/enrollment, the Participant ID, and the randomization group assignment on Part C of the EVF.

"To hear this information again press 1. To continue, press 3."

- If you would like to hear the PID and assigned randomization group again press 1. If you would like to perform another activity, press 3. If not, you may disconnect.

"This randomization was successful. Thank you."
You will automatically be returned to the main menu.

After randomization is complete you will receive an email confirmation report within 2 hours. The confirmation report will include the unique pre-processing number so that you can match it to the appropriate EVF and participant. Review the information recorded on the EVF for accuracy and file the confirmation report and the EVF in the participant's study file.

VERIFYING INFORMATION ON PREVIOUSLY RANDOMIZED PARTICIPANTS (OPTIONAL):

If you press 2 on the main menu to listen to the randomization group assignment of a previously randomized participant, the call will continue as follows.

"Please enter the eight digit participant identification number followed by the pound key for the participant for whom you would like to hear randomization information."

- Enter the PID for the participant in question followed by the # key.

"You entered (PID number). If this is correct, press 1. If incorrect, press 3."

- If the PID number was entered correctly, press 1. If the PID was entered incorrectly, press 3. If you press 1, the call will continue with the information requested. If you press 3, the previous instruction will be repeated.

"This participant was randomized on (date) to the (spiral CT/chest x-ray) randomization group. If you need a confirmation e-mail of this information, please contact

You will automatically be returned to the main menu.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Randomization Program) SC EDIT FORM

ADMINISTRATIVE SECTION

Completion Date: |___|___|-|___|___|-|__|__|__|__|
Month Day Year

Screening Center ID: |___|___|

Screening Center Staff ID: |___|___|___|___|

SC staff member telephone number (____) _____

SC staff member fax number (____)_____

Participant ID Label

Date of Randomization: |__|__|-|__|__|-|__|__|__|__|
Month Day Year

PART A. DATA UPDATE SECTION

INSTRUCTIONS: Circle EVF Item, complete incorrect data, corrected data and a description of the error in Part B below for each item to be updated. *Note: Upon correction of asterisked items it may be necessary to submit a Protocol Violation Form (PVF) if it is determined that the participant is a randomized ineligible

EVF Item	Variable Name (Office Use Only)	Incorrect Data	Corrected Data
1. Date of Birth*	*DOB** (Age at DOR < 55 or Age at DOR > 74 = ineligible)		
2. Gender	*Gender*		
3. SC Staff ID	*ScreenerID*		
4. Smoking Status	*SmokerType*		
5. Former-Quit*	*FormerQuit** (>15 = ineligible)		
6. Age started smoking	*AgeBeganSmoking*		
7. Cigarettes per day	*CigsPerDay*		
8. Age stopped smoking	*AgeQuitSmoking*		
9. One + years stopped smoking	*OneOrMoreYearsNS*		
10. Years did not smoke	*TotalYearsNS*		
11. Total Pack Years*	*PackYears** (≤29.95 = ineligible)		
12. Any 'Yes' to Q3-Q14*	*Q15** (Yes = ineligible)		

PART B. COMMENTS

EVF Item #	Description of the Error

Fax the completed SC Edit Form to the Help center at.
Include the original document in the weekly shipment of forms to the CC.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the SC Edit Form

This form is to be completed by an SC staff member to document changes to data after a study participant has been successfully randomized and the SC has received a confirmation.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label to the space provided in the upper right corner of the form. **Do NOT** write the participant ID in this space.

Completion Date: Record the date the SC Edit Form was completed. Month and day should be zero-filled, and the last two digits of the year should be recorded (02/07/2002).

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID number of the person completing the form.

SC staff member telephone number: Record the telephone number of the person completing the form.

SC staff member fax number: Record the fax number of the person completing the form.

Part A. Data Update Section:

One SC Edit Form should be completed for each participant. For each EVF item requiring a data correction, circle the item number requiring the change, enter the incorrect data value and the corrected data value along with a description of the error. Multiple changes to one EVF form can be listed. However, once the form has been submitted to the CC, subsequent edits should be noted on another SC Edit Form.

On occasion study documents such as the MHQ may contain a date of birth (DOB) that does not match the DOB written on the EVF. If this occurs the participant should be contacted and asked to verify his or her DOB. The DOB will not be changed unless it is verified by the participant. The SC should complete a SC Edit Form including an explanation of the type of error as well as any corrective measures taken. If the participant provides a date of birth that does not match either the EVF or the document on which the discrepancy was discovered (e.g., MHQ), the SC Coordinator should ask for a legal document such as a driver's license or birth certificate to verify the DOB.

EVF Item: Circle the item from the Eligibility Verification Form that requires correction. In some cases multiple items will need to be corrected as a result of one error e.g. (Date of birth errors would affect both the age of the participant at the time of randomization and the total pack years that the participant smoked).

Variable Name: ****For Administrative Use Only****

Incorrect Data: Enter the incorrect data value in this field on the form. Be sure to consider other values that may have been affected by this error and make corrections appropriately.

Corrected Data: Enter the correct value corresponding to the incorrect data value in this form field.

Part B. Comments:

EVF Item #: Record the EVF Item # from the above section that corresponds with the comment. For example, if providing a comment about an error to the Date of Birth, record "1" as the EVF Item #. Only record the EVF Item # once per comment, even if the Description of the Error continues for more than one line.

Description of the Error: Provide a brief, but detailed description of each error. Details should include the date of discovery, the type of error (transcription, keying, transposing) as well as any corrective actions taken to reduce the potential for the error to occur in the future.

As an example of completing the SC Edit Form, suppose there is a change to the date of birth due to a transposing error by a staff member keying information into the IVRS during a randomization phone call. It might be recorded as follows:

EVF Item	Variable Name	Incorrect Data	Corrected Data
1. Date of Birth*	*DOB** (Age at DOR < 55 or Age at DOR > 74 = ineligible)	03/21/1942	03/12/1942

PART B. COMMENTS	
EVF Item #	**Description of the Error**
1	Transposing error was discovered after receipt of randomization confirmation on 3/31/03. Discussed the error with data entry
	personnel to reduce potential for future occurrences. The following error affects pack year calculation; see correction below.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member should review the form and make certain that no additional variables will be affected by the requested data change; if additional variables will be affected then this should be appropriately indicated on the form.
- Fax the completed form to and file the original SC Edit form in the participant's study file.

3. SCHEDULING, CONDUCTING, AND REPORTING BASELINE SCREENING EXAMINATIONS AND ANNUAL PARTICIPANT FOLLOW-UP ACTIVITIES

3.1 Overview

Over the course of the study, Screening Centers (SCs) scheduled and conducted baseline and annual screening visits, administered annual study questionnaires, and collected necessary participant follow-up information. Lung cancer screening exams occurred at baseline (T_0) and annually for two years (T_1 and T_2). At these screening visits, participants completed forms that collected contact information, health status information, and consent to request medical records. Concurrent with annual screening visits and through 2009, SCs contacted the participants by mail or telephone annually to complete the Annual Study Update (ASU) or the Annual Study Update – Post Screening (ASU-PS), the Participant Contact Form (PCF) or the Participant Contact Update Form (PCUF), and the Medical Records Release Authorization Form. An accelerated ASU-PS completion schedule, described in Section 3.6.1, was employed in 2010. SCs also contacted a random sample of participants each year to complete the Health Assessment Questionnaire (HAQ) and some SCs chose to administer a satisfaction survey to selected participants. The HAQ is discussed in Chapter 10. The scheduling, conducting, monitoring, and reporting of the remaining activities are described in detail in the following sections.

3.2 Activities During the Baseline Year

The following section discusses the activities that took place during the participant's first year in the study, the baseline year (T_0). The timeline for these events was based upon the date the participant was randomized into the study. The SC Coordinator was responsible for overseeing the completion of these activities according to the established study timeline.

Prior to a participant completing his/her baseline screening visit (T_0), the SC ensured that the following study tasks were completed.

- Written consent was obtained from participants prior to randomization. See Chapter 2 for detailed procedures for obtaining participant consent.
- The Participant Contact Form (PCF) was completed between eligibility assessment and the screening visit or at the screening visit. See Section 3.2.1.3.

- Authorization to collect medical records was obtained during the screening visit. See Section 3.2.1.4.
- The Medical History Questionnaire (MHQ) was completed. See Section 3.2.1.5.

The T_0 screening visit was to take place as soon as possible after the participant's randomization. The screening examinations were conducted according to the protocols described in Chapters 4 and 5. The SC Coordinator monitored the completion of all required examinations and study forms. The results of all screening exams were recorded on the designated form, entered into and reported to the participant and health care provider within three weeks of the examination. The SC Coordinator also oversaw the process of reporting screening exam results to participants and their health care providers.

After the completion of the baseline visit (T_0) but prior to the T_1 screening visit, the SC may have chosen to administer a satisfaction survey to a random sample of participants. See Section 3.2.2.

The scheduling, conducting, monitoring, and reporting of the above activities are described in detail in the following sections (3.2.1 to 3.2.2). Figure 3-1 outlines the timing of these events.

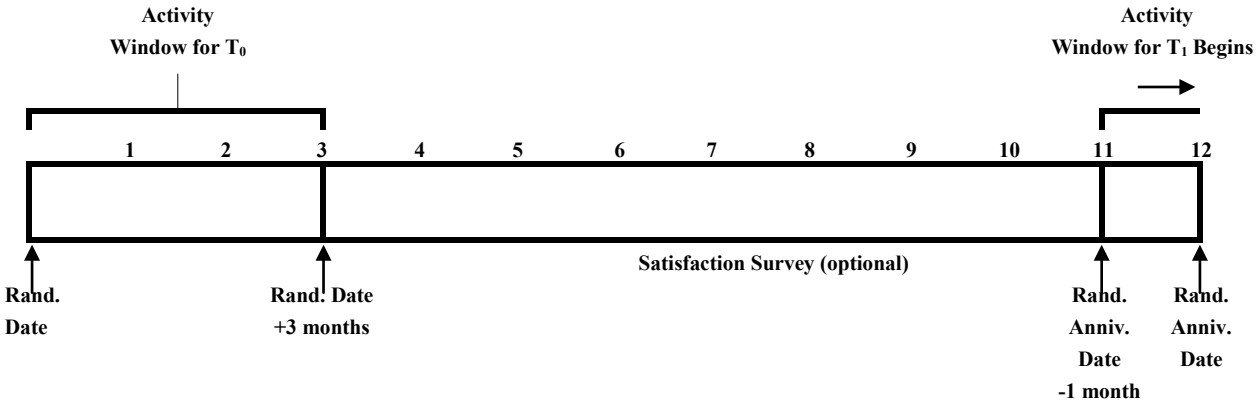

Figure 3-1. Baseline Study Year (T_0)

3.2.1 Scheduling the Baseline Screening Visit

The SC was asked to make every effort to complete the T_0 screening visit at either the time of the participant's randomization or during the activity window, which was within three months of

randomization (see Figure 3-1). The SC attempted to schedule appointments based upon participants' availability. This was especially relevant in areas where older adults may travel for long periods during the winter months. The activity window for follow-up activities in subsequent study years was built around the randomization anniversary date.

All randomized participants, including randomized ineligibles, were to receive a T_0 screen. If scheduling the baseline screening exam did not occur at randomization, the SC was required to identify and contact participants by mail or telephone to schedule the screening visit. It was recommended that each participant be re-contacted in advance of the appointment date either by telephone or mail and given a reminder of the appointment time and place. Maps and parking instructions, as appropriate, and a written or verbal description of the screening examinations were to be provided. To provide this information in a standardized format, the SC may have developed participant information sheets. Such information sheets were to be approved by the NCI prior to distribution to participants.

Appointments were recorded in a scheduling system. Each SC developed its own manual or automated scheduling system for tracking participant contact and appointment times. If a participant did not show up for his/her baseline screening visit, s/he was re-contacted and rescheduled as soon as possible. Methods for rescheduling screening visits were outlined by each SC. The SC Coordinator was asked to aggressively attempt to reschedule no-shows and cancellations within the activity window.

If the SC was unable to schedule a participant in the activity window, the SC could schedule a screening exam and/or collect data collection forms until the next activity window begins. Appropriate T_0 data collection forms or Missing Data Forms (MDFs) (Appendix 11-1), if necessary, were to be entered into before the beginning of the next activity window.

3.2.1.1 Preparing for the T_0 Screening Visit

Before the T_0 screening visit, the SC Coordinator was advised to prepare the following study forms for the visit:

- Participant Contact Form (PCF);
- Medical Record Release Authorization Form;

- Chest X-ray Screening Examination Form (XRY) or Spiral CT Screening Examination Form (SCT), and
- Medical History Questionnaire (MHQ).

The SC staff prepared the data collection forms in advance of the visit by affixing PID labels and completing the administrative section at the top of each form. Only the administrative section of the data collection forms could be completed in advance of the visit. A folder that contained all forms that needed to be completed at the study visit was to be prepared for each participant and used in the screening clinic. The other study forms, such as enrollment documents, correspondence, and medical record abstracts were not to be sent to the screening clinic.

3.2.1.2 Explaining Procedures for the T_0 Screening Visit

When the participant arrived for the screening examination, s/he was to be greeted and given a verbal description of what will happen during the visit. Written materials describing the procedures could also have been provided at the time. The participant was told that the examination was a screening test for lung cancer and was not intended to be a complete physical exam or a substitute for a visit to a health care provider. The participant was told that s/he would receive written documentation of the results of the screening examination within three weeks and that s/he would be contacted by telephone and/or certified mail if there was a positive result, or a negative result with a clinically significant abnormality. After explaining the procedures and answering participant questions, the SC Coordinator reviewed the participant's file to determine which forms needed to be completed. Once a screening visit began, forms could be completed in any order.

Questions that participants might have asked about the NLST and suggested answers are found in Appendix 2-5. It was suggested that SC staff become familiar with these potential questions and answers.

3.2.1.3 Administering the PCF

The SC asked the participant to complete a Participant Contact Form (PCF) (Appendix 3-1). The PCF was used to collect information to help the SC contact the participant in the future, including

name, Social Security Number (if the participant was willing to provide it), the names of two persons who lived in the participant's household, and the names of two persons who would know how to contact the participant. This form also would be used to document the name, address, and telephone number of the participant's health care provider. Appendix 3-2 contains the Specifications for Completion and Review of the PCF. This form may have been completed at the time of the visit or mailed in advance. If it was sent in advance, the participant was reminded to bring the PCF to the screening examination appointment. SCs that preferred to mail the PCF to potential participants with the consent form (before randomization) were required to obtain local IRB approval for this procedure in order to meet OMB requirements.

SC staff was asked to make every effort to obtain health care provider information on the PCF. If the participant refused to provide this information, this was to be documented on the PCF. If the participant provided this information but requested that the health care provider not receive study information, such as screening exam results, the health care provider information was recorded on the PCF and the participant was asked to read and sign the Results Withheld Statement (Appendix 3-3). A copy of the signed statement was given to the participant and the original placed in the participant's study file.

The SC Coordinator or staff reviewed the PCF for legibility and completeness. If completed during a screening visit, the participant was asked to complete any missing items before proceeding to the screening exam. If completed and returned by mail, the participant would have been telephoned to complete any missing items. The completed form was kept in the participant's study file.

3.2.1.4 Obtaining Authorization to Collect Medical Records

The SC asked the participant to complete a Medical Record Release Authorization Form. The Medical Record Release Authorization Form is located in Appendix 3-4. This form served as consent from the participant for SCs to request medical records in the event of a positive screen or a report of a cancer diagnosis.

3.2.1.5 Administering the MHQ

The MHQ was used to collect information on demographics, lung cancer risk factors, and medical conditions. It was recommended that the SC administer the MHQ during the T_0 screening visit, but this information could be collected any time during the activity window. The MHQ was administered by SC staff as an in-person interview during a screening visit, by SC staff as a telephone interview, or by mail for participant self-administration. The MHQ and Specifications for Completion of the MHQ are located in Appendices 3-5 and 3-6.

SC staff reviewed all completed MHQs for legibility and consistency. If an MHQ had illegible or inconsistent information, the participant was queried before the end of the screening visit or contacted by telephone to obtain the information. **Critical data items** (race and cancer diagnosis) required data retrieval.

A response rate of 90 percent was expected for the MHQ. To reach this rate, follow-up was required for those participants who had not returned the MHQ within three weeks or who submitted an incomplete or illegible MHQ (see manual editing guidelines, Section 11.6.1). Each non-respondent was contacted once by telephone to remind him/her to complete the MHQ and to determine if a second MHQ needed to be sent. If the participant was willing, the MHQ could be administered by telephone. At a minimum, the follow-up efforts, as described in Section 3.9.1, were made when following up with non-respondents. If the MHQ was lost or misplaced, the SC provided one more complete mailing to the participant. If more than one MHQ was received, the form that was completed first was used. If a participant refused to complete the MHQ, the SC entered a Missing Data Form (MDF) (Appendix 11-1) for the MHQ.

The MHQ was copied and the original, except the cover page with identifying information, was sent to the CC. The copy of the MHQ was placed in the participant's study file.

3.2.1.6 Conducting, Documenting, and Reporting Results of the T_0 Screening Examinations

The procedures for conducting and documenting the screening examinations are described in Chapters 4 and 5. Detailed procedures for reporting the results of screening examinations are provided in Chapter 6.

3.2.1.7 Follow-up for Inadequate Examinations

If it was determined during the visit that a participant's chest x-ray or spiral CT was inadequate, the screening examination needed to be repeated. If the participant was unable to repeat the screen at the visit or the screen was determined to be inadequate after the conclusion of the visit, a second screen was scheduled. The second screen was to be scheduled as soon as possible after the initial screening examination. A maximum of three exams was allowed per visit and a maximum of two visits was allowed per study year.

3.2.1.8 Concluding the T_0 Screening Visit

At the conclusion of the screening visit, the SC Coordinator reviewed the participant's study file to make sure that all required forms were complete. If a screening examination needed to be rescheduled, the SC was asked to make every effort to reschedule the exam within the activity window (i.e., within three months of the randomization date). The rescheduled date was to be noted in the SC's appointment scheduling system. The SC Coordinator reminded the participant that results of the screening examination would be sent within three weeks and that s/he would be contacted by telephone or certified mail in the event of a positive result or a negative result with clinically significant abnormalities. SC staff thanked the participant for participating in the study and provided a card containing the name and telephone number of a contact person at the SC who could respond to any study-related questions or problems.

3.2.2 Administering the Satisfaction Survey

In an effort to maximize participant retention, the SC may have chosen to contact a random sample of participants to complete a satisfaction survey. This survey was to be developed individually by each SC and was to focus on ways to increase participant satisfaction and retention. The maximum length of the survey was two pages, and the completion time was no more than three minutes. The survey was submitted to the CC for NCI approval prior to implementation. Data collected in these surveys was for the SC use only and was not transmitted to the CC. Each SC also developed its own system to track

the completion of this survey. Details concerning the administration of such a survey were left to the discretion of the SC.

3.3 Annual Study Activities

Annual study activities were conducted for each participant through 2009. The purpose of these follow-up activities was to perform screenings on participants in years T_1 and T_2, to obtain information regarding recent health and smoking status by the ASU or ASU Post Screening (ASU-PS), and to update participant contact information utilizing the PCF (Appendix 3-1) or the Participant Contact Update Form (PCUF) (Appendix 3-7). As part of annual study activities, the SC:

- Conducted screening examinations in study years T_1 and T_2. See Section 3.4.1 and refer to detailed procedures in Chapters 4 and 5.

- Obtained authorization to collect medical records. Authorization was to be obtained at the screening visit for T_1 and T_2 study years. The Medical Record Release Authorization Form was mailed to participants after the T_2 study year, possibly with the ASU, PCF, or PCUF.

- Administered the ASU or ASU-PS to obtain information on participant cancer and recent smoking status. The ASU was to be mailed to the participants or completed by telephone in advance of the screening visit or administered in person at the screening visit for the T_1 and T_2 study years. The ASU-PS was to be mailed to participants or completed by telephone annually after the T_2 study year. allowed for a "smart" ASU or ASU-PS which could be pre-printed with the date of the previously completed ASU, ASU-PS, or the randomization date, whichever was most recent, and mailed to the participant or administered by telephone. Instructions for generating a directive in for the "smart" ASU or ASU-PS can be found in the The "smart" ASU and ASU-PS allowed for consistent collection of data from participants for a defined period throughout all study years.

- Requested a participant review of the PCF to update contact information. The PCF was to be mailed to the participants in advance of the screening visit or reviewed in person at the screening visit for the T_1 and T_2 study years. The PCF was mailed to participants after the T study year. The PCF also could be reviewed by telephone in all study years. allowed for a "smart" PCF which could be pre-printed with the previously entered data from the PCF on an generated PCUF. Instructions for generating a PCUF can be found in the A PCF or PCUF was required to be receipted into each study year, whether or not there were any changes from the previous year.

- Administered a satisfaction survey to a random sample of participants (optional).

- Administered the HAQ to randomly selected participants in April and May (for detailed procedures see Chapter 10).

Participants who had a reported or a confirmed lung cancer or cancer that metastasized to the lung were not eligible to receive screening examinations. All annual study activities listed above, except for the screening examination, was performed for these participants. Randomized ineligible participants, however, continued to receive screening examinations.

The activity window for all annual activities, with the exception of the HAQ and satisfaction survey, was designated as one-month prior through three-months past the participant's randomization anniversary date. The SC was asked to be aggressive about completing annual activities during the activity window. If all of the required data were not collected by the end of the four-month activity window, data collection efforts, including scheduling of screening examinations, were continued until the next annual activity window opened, i.e. one-month prior to the next randomization anniversary date (see Figure 3-2).

The SC Coordinator monitored the completion of all required follow-up activities. The results of all data collection were transmitted to the CC on a weekly basis. The SC Coordinator also oversaw the process of reporting screening examination results to participants and their health care providers. The following sections (3.4 through 3.7) describe the annual study activities in more detail.

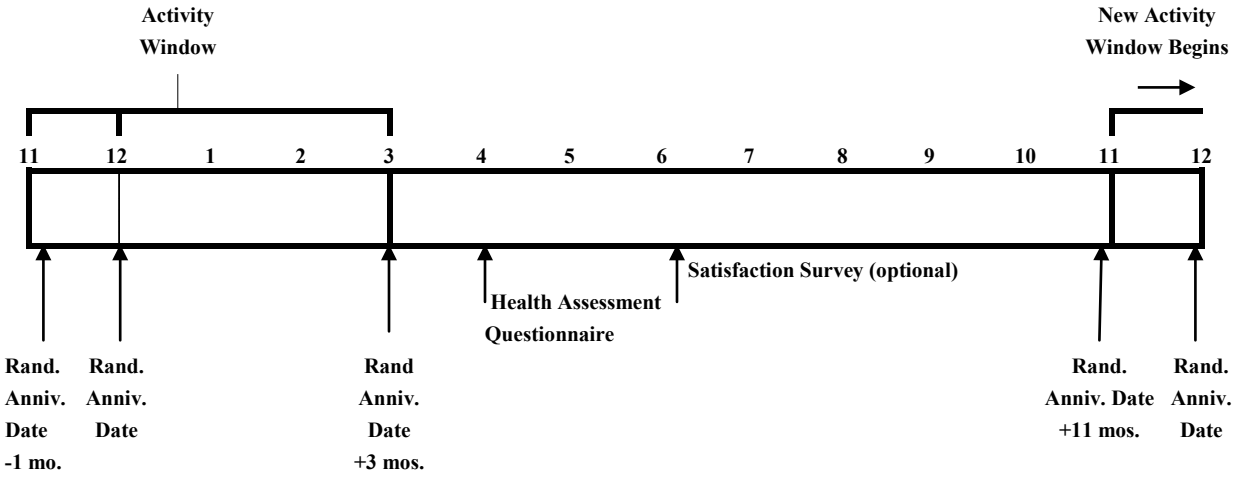

Figure 3-2. Follow-up Study Years (T_1 through T_2)

3.4 Scheduling the Annual Visit

Participants were scheduled for annual screening examinations in each of the two years following the T_0 visit, the T_1 and T_2 study years. At any point in the study, a report or diagnosis of lung cancer or cancer that metastasized to the lung immediately excluded a participant from all further study screening examinations; however, the SC was to continue other study activities. If the report of lung cancer was investigated and found to be erroneous, the participant became eligible for screening exams.

Appointments were scheduled for participants who were entering or were in their activity window and were recorded in the SC's scheduling system. The SC Coordinator contacted these participants and made every effort to schedule appointments for annual visits to take place any time within the activity window.

It was critical that participants be screened during their four month activity window. However, situations may have occurred that made administering the screening examination during the window impossible. Late screening at T_0 and T_1, while preferable to no screening, would create potential difficulties in scheduling future study exams, especially if the next screening window opened soon after the late screen. SCs were asked to refer to the following guidelines for performing screening exams outside the window:

- Ideally, each participant should have received three screens. If a participant had not been screened by the end of his or her screening window, the SC could continue attempts to bring that participant in for the screen. The participant could receive the screen as late as the day before the next screening window opened. No T_2 screening exams could be performed once the T_3 study window opened.
- If a late screening exam was obtained, the next screening exam should have occurred no earlier than eight months later than the previous screen. In other words, the SC was asked to space the screens at least eight months apart.
- On the rare occasion that screens could not be spaced at least eight months apart, the SC was required to contact the CC prior to scheduling screens. The CC would discuss the issue with NCI, who would then make a decision as to whether it was appropriate to screen using a shorter interval.

In order to maximize retention, it was strongly suggested that reminder phone calls be placed to participants in advance of their appointment date. During this contact, the participant would be given instructions on preparing for the screening visit and directions to the SC. In the event of a no-show or

cancellation, the SC Coordinator was asked to aggressively attempt to reschedule the participant within the activity window. Additional retention strategies are described in Appendix 3-9, NLST Retention Strategies.

3.4.1 Conducting the Annual Screening Visit

Prior to the annual visit, the SC Coordinator pulled the study files for all scheduled participants. The SC Coordinator ensured that a signed consent form was present in the participant's file prior to the beginning of the visit. The forms that were to be completed during each annual visit varied, depending on whether the participant was randomized to the spiral CT or the chest x-ray study arm, and whether the participant completed any form(s) in advance of the visit by mail or telephone. The SC Coordinator also ensured that all required study forms had PID labels affixed and that the administrative section at the top of each form was complete.

Two forms were to be prepared for each screening visit, regardless of the study arm or follow-up year. These were (1) the screening examination form (SCT or XRY), and (2) a Medical Record Release Authorization Form. If the ASU and the PCF or PCUF were not completed prior to the screening visit, these forms were also prepared for administration during the visit.

Upon arrival, the participant was greeted and given a verbal description of what would happen during the visit. Written materials describing the procedures may have been provided at this time. Once a visit began, follow-up activities could be performed in any order. The Medical Records Release Authorization Form (see Section 3.5), ASU, and PCF or PCUF if not completed in advance, (see Section 3.6) were administered during the screening visit.

The procedures for conducting the screening examinations and for reporting results of the screening examinations are described in Chapters 4, 5, and 6. The procedures for concluding an annual screening visit were identical to those for the T_0 screening visit and are described in Section 3.2.1.8.

Six months after the completion of the T_2 visit the SC Coordinator mailed to each participant a T_2 Retention letter (Appendix 3-10). This letter explained what was expected of the participant during the remainder of the study.

3.4.2 Follow-up for Inadequate Examinations

If it was determined during the visit that a participant's chest x-ray or spiral CT was inadequate, the screening examination was required to be repeated. If the participant was unable to repeat the screen at the visit or the screen was determined to be inadequate after the conclusion of the visit, a second screen was scheduled. The second screen was scheduled as soon as possible after the initial screening examination. A maximum of three exams was allowed per visit and a maximum of two visits was allowed per study year.

3.4.3 Concluding Screening Operations

SCs were asked to attempt to schedule outstanding T_2 screening exams up until the T_3 activity window opened for each participant. If the SC made substantial efforts to locate and/or schedule a participant but was not successful, SC staff could use their discretion when deciding whether to receipt a Missing Data Form (MDF) for the screening exam.

At each SC, when the last randomized participant entered his/her T_3 activity window, all screening ceased. Requests to cease screening prior to that time were forwarded to the CC and included a brief written justification for early cessation. The request was reviewed by the CC and forwarded to the NCI for approval. Once screening operations officially ended, the SC could not perform any additional screening exams. If a participant requested a screening exam after screening operations were closed, the SC was advised to inform the participant that screening was no longer provided by the NLST and refer the participant to his/her health care provider to discuss lung cancer screening. SCs continued to perform equipment QC as specified in Sections 4.9.1 and 5.9.1 until screening operations were closed, at which time equipment QC was no longer required.

3.5 Obtaining Authorization to Collect Medical Records

The Medical Record Release Authorization Form was to be administered every year. It could be administered during the screening visit at T_0, T_1, and T_2. In subsequent years, the SC mailed the

Medical Record Release Authorization Form to participants, potentially in conjunction with the ASU and the PCF or PCUF.

3.6 Administering the ASU or ASU-PS and the PCF or PCUF

The Annual Study Update (ASU) (Appendix 3-11) and the Annual Study Update – Post Screening (ASU-PS) (Appendix 3-13) were self-administered questionnaires that were used to collect information about the past year's medical history and recent smoking status from each participant on an annual basis.

The ASU was administered by mail or telephone in advance of the screening visit during the T_1 and T_2 years, or administered during the screening visit. Mailing or telephone administration of the ASU during this time was necessary for participants who did not complete annual screens. Administration (including transmission) of the ASU through electronic mail was not permitted. The following information was collected on the ASU:

- Cancer diagnoses since enrollment or the last annual study activity;
- Type of cancer and date of diagnosis;
- Recent smoking status, and
- Recent pneumonia or respiratory infection treated with antibiotics.

For subsequent years of the study (T_3 and beyond), the ASU-PS was mailed or completed by telephone. Administration (including transmission) of the ASU-PS through electronic mail was not permitted unless prior approval was granted by NCI. The ASU-PS collected the same information as the ASU with the exception of recent pneumonia or respiratory infection treated with antibiotics. In addition, the ASU-PS included information for current smokers on how to access resources to help quit smoking.

The Specifications for Completion of the ASU are given in Appendix 3-12. The Specifications for Completion of the ASU-PS are given in Appendix 3-14. These specifications may have been used by the SC Coordinator to answer participant questions regarding the completion of the form.

All participants were also asked to confirm or update their contact information on the PCF or PCUF annually. The purpose of the PCF or PCUF was to provide the SC with information that could be used to trace the participant if s/he became lost to follow-up. During the T_0 study year, a blank PCF was to be administered in advance of the screening visit or during the screening visit. During subsequent study years, a blank PCF was to be attached to a copy of the previous PCF, or a pre-printed PCUF was used. The participant was instructed to review the previous PCF or the pre-printed PCUF and mark any necessary revisions on the form or in the spaces provided. The PCF was not permitted to be transmitted by the SC through electronic mail unless prior approval was granted by NCI. The PCUF should never have been transmitted by the SC through electronic mail since it contained personal identifying information. The PCF and Specifications for Completion and Review of the form can be found in Appendices 3-1 and 3-2. The PCUF and Specifications for Completion and Review of the form can be found in Appendices 3-7 and 3-8. These specifications may also have been used by the SC Coordinator to answer participant questions about the completion of the forms.

Any mailed ASU, ASU-PS, PCF, or PCUF was required to be accompanied by a cover letter that introduced the forms and instructed household members to contact the SC if the participant was unable to complete them (due to death, illness, etc.). A sample cover letter for the annual forms is included as Appendix 3-15. This letter may have been customized for individual SC use.

A response rate of 90 percent was expected for the ASU and ASU-PS. To reach this rate, follow-up was required for those participants who had not returned an ASU or ASU-PS within three weeks, or who submitted an incomplete or illegible form. Non-respondents and participants who submitted incomplete forms were contacted by telephone and reminded to complete the form or to obtain missing information. Follow-up for non-respondents was to be conducted as outlined in Section 3.9.1. If the forms were lost or misplaced by either the participant or the SC, the SC mailed an additional set to the participant or collected the information by telephone.

In special circumstances when the participant could not be contacted by mail or telephone, the SC could request permission from NCI to administer the ASU-PS or PCF by electronic mail. Such requests were required to include the PID, an explanation of why electronic administration was necessary, and whether the request applied to the current study year or all future study years. Requests were required to be submitted in writing to the CC for review by NCI and were considered on an individual basis. If NCI approval was granted, the SC obtained from the CC a specially created ASU-PS and/or PCF file that was suitable for electronic transmission. The SC also was required to inform the participant at

the time of transmission that electronic transmission of study forms and data does not comply with NIH security requirements, that the security of the data could not be guaranteed, and that s/he would be providing the information at his/her own risk. The SC was required to keep a copy of this notification in the participant's folder.

After the ASU or ASU-PS and PCF or PCUF were completed, they were manually edited for completeness and legibility. Item 1 on the ASU and ASU-PS (cancer diagnosed since the date of the last ASU or ASU-PS) was considered a **critical data item**. Critical data items required data retrieval if the response was incomplete, unclear, missing, or illegible. Once the ASU or ASU-PS was complete, a qualified medical record abstractor investigated all cancers reported to have been diagnosed on or before December 31, 2009. Cancers reported to have been diagnosed after December 31, 2009 were not investigated. See Chapter 8 for more information on documenting cancers diagnosed after December 31, 2009. If the participant indicated on the ASU or ASU-PS that a cancer was diagnosed, but the date of diagnosis was not within the time period covered by the ASU or ASU-PS and the cancer had previously been reported, the participant's response to Item 1 could be edited. If the participant indicated that a cancer was diagnosed within the time period covered by the ASU or ASU-PS, the response could not be edited, even if the cancer was previously reported or confirmed through another source.

If the participant failed to return the ASU or ASU-PS, or the SC was unable to collect information by telephone before the beginning of the next activity window, the SC Coordinator completed an MDF to indicate that the data were not collected for that year. Refer to Section 11.5.1 for detailed information on completing an MDF for non-response. If an ASU or ASU-PS form was lost before it was entered into and the form was less than one year old, it was to be re-administered to the participant. If the form was older than one year, re-administration was not attempted. Instead, an MDF was completed for this missing form. An MDF was not required for the PCF or PCUF.

3.6.1 Administering the Final ASU-PS and PCF or PCUF

From January 1, 2010 through June 30, 2010, final ASU-PSs were administered so that administration was complete by June 30, 2010. Although ASU-PSs could be receipted during the three-month period from July 1, 2010 through September 29, 2010, it was strongly recommended that as many forms as possible be receipted by June 30, 2010. SCs could prepare mailings in advance, but could not mail or administer any final ASU-PS before January 1, 2010. In anticipation of the accelerated ASU-PS

administration schedule in 2010, SCs were asked to delay administration of ASU-PSs due in November or December 2009. These ASU-PSs were prioritized during the accelerated effort.

In order to meet the goal of receipting all ASU-PSs by June 30, 2010, NCI suggested that SCs use the following strategy:

1. Mail or telephone-administer the final ASU-PS forms in order of the participants' randomization month, starting with November.
2. For ASU-PS forms administered through the mail: perform an initial mailing of as many ASU-PS forms as possible between January 1, 2010 and March 31, 2010. Between April 1, 2010 and June 30, 2010, mail remaining ASU-PS forms and re-mail any ASU-PS forms to participants with updated addresses.
3. For ASU-PS forms administered over the telephone: make phone calls and complete ASU-PS forms between January 1, 2010 and June 30, 2010.
4. Use the period from July 1, 2010 to September 29, 2010 to receipt "straggler" ASU-PS forms. Do not use this period to perform other tasks such as initial mailings.

In order to facilitate follow-up of cancers or deaths reported on the final ASU-PS, it was suggested that the PCF or PCUF be administered or mailed together with the ASU-PS; however, this decision was left to the discretion of the SC Coordinator who was required to ensure that the inclusion of the PCF or PCUF would not compromise the SC's ability to adhere to the accelerated ASU-PS schedule.

Any final ASU-PS that was administered by mail was to be accompanied by a cover letter. A sample cover letter for the final ASU-PS and PCF or PCUF is included as Appendix 3-16. This letter may have been customized by each SC.

It was important that cancers or deaths reported on the final ASU-PS were documented and, if necessary, followed up promptly. To facilitate timely follow-up, it was recommended that each SC implement procedures to immediately review all returned and completed final ASU-PS forms and prioritize processing for those forms with reported cancers diagnosed on or before December 31, 2009 or reported deaths occurring on or before December 31, 2009.

3.7 Administering the Satisfaction Survey

As discussed in Section 3.2.2, a satisfaction survey may have been administered to a random sample of study participants if the SC chose to implement such a survey. If developed, the survey was required to be submitted to the CC for NCI approval prior to implementation. Details concerning the administration of such a survey were left to the discretion of the SC.

3.8 Retaining Study Participants

Over the course of the study, the SCs engaged in a variety of activities designed to retain participants in the study. Some activities were required while others were optional. The SC Coordinator used his/her discretion when deciding which retention strategies to employ.

During the screening phase of the trial, SCs may have utilized the NLST Retention Strategies (Appendix 3-9) to respond to participant concerns about screening. SCs also may have administered a satisfaction survey as described in sections 3.2.2 and 3.7. To maximize compliance to screening exams, SCs were advised to offer convenient appointment times, such as evenings, weekends, or holidays, if at all possible. Appointment letters and reminder phone calls could also be utilized. Some SCs may have offered free parking, gas cards, or other transportation, food and/or lodging vouchers, or compensation for time.

Upon completion of screening, SCs were required to mail the T_2 retention letter (Appendix 3-10) as described in section 3.4.1. During the follow-up phase of the trial, it was important that SCs make concerted efforts to maintain participant involvement in the study. Examples of retention methods included mailing token gift items (e.g. calendars, pens, umbrellas, etc.), birthday cards, and/or sympathy cards. In addition, the NCI provided an NLST study-wide newsletter twice per year, which was required to be mailed to all participants. SCs were permitted to create SC-specific inserts for these newsletters or SC-specific newsletters to alternate with the study-wide newsletters.

To assist with SC retention activities, the CC worked with the SCs to draft retention materials and obtain NCI approval for use of these materials. The CC monitored participant retention through the use of study data and communicated regularly with the SCs and NCI to discuss progress and address any concerns.

3.9 Non-Response for Baseline and Annual Study Activities

On occasion, participants may have missed scheduled screening visits or may not have completed an ASU or ASU-PS, PCF or PCUF, MHQ, or satisfaction survey. As well, some participants, when contacted to schedule an appointment for the T_0, T_1, or T_2 visit, were unable or unwilling to participate in one or more of the study activities. Additionally, there may also have been situations in which the study protocol prohibited completion of a screening examination (e.g., when lung cancer was reported or confirmed). The following sections describe follow-up procedures for non-respondents and the procedures for documenting non-participation.

3.9.1 Follow-up for Non-Respondents

If a participant did not complete or inadequately completed a required study form, s/he was to be contacted by telephone. The telephone call would serve as a reminder to the participant to complete and return the form. It could also serve as an opportunity for the SC to administer the form by telephone. The following efforts, at a minimum, were to be used to contact participants:

1. Five attempts to contact a participant by telephone;
2. Each call placed on a different day of the week (Monday through Friday);
3. The calls made at a different time each day (morning, afternoon, evening), and
4. The first and last calls separated by at least one week.

The SC was advised to develop a strategy to ensure a high contact rate. If necessary, this may have included having staff available to make calls in the evenings or on weekends. These calls were to be tracked so that they would be made in a systematic way. A Sample Call Record is located in Appendix 11-13. If, after repeated attempts to reach a participant by telephone, the participant could not be contacted, the SC could contact the participant by electronic mail, if an address was provided. The SC was advised to use electronic mail to re-establish contact with the participant and to obtain a current telephone number and mailing address. The SC was not permitted to collect study data by electronic mail

and could not transmit study forms as attachments to electronic mail unless prior approval was granted by NCI.

3.9.2 Documenting Non-Participation

When a participant did not complete one or more study activities, the SC Coordinator completed a Missing Data Form (MDF) (Appendix 11-1) to indicate that the data form would not be collected for that year.

A participant may not have undergone one or more of the annual study activities for one of the following reasons:

- Refusal;
- Mental or physical illness;
- A reported or confirmed primary lung cancer or cancer that metastasized to the lung;
- Lost to follow-up;
- Out of the area, or
- Death.

The first four reasons listed above (refusal, mental or physical illness, reported or confirmed primary lung cancer or cancer that metastasized to the lung, and lost to follow-up) are described in the following sections (3.9.2.1, 3.9.2.2, 3.9.2.3, and 3.9.2.4) which also include procedures for resolving and documenting them.

3.9.2.1 Non-Participation Due to Refusal

If a participant refused screening, the SC was asked to determine the reason for refusal and make an effort to address the participant's concerns. Such efforts were to be made at the discretion of the SC Coordinator. If the participant refused to schedule an appointment for a screening examination, an MDF was completed with a reason code for the specific reason for refusal (see Appendix 11-2, Specifications for Completion of the MDF). The participant was still encouraged to complete the ASU

and the Medical Record Release Authorization Form, and to review the PCF or PCUF. See Section 11.5.1.1 for more information regarding handling participant refusals.

3.9.2.2 Non-Participation Due to Mental or Physical Illness

If a participant was declared mentally incompetent and a legal guardian was appointed, the SC could request that the guardian complete the ASU or ASU-PS. The participant's legal guardian, in consultation with the SC staff and the participant's health care provider, decided whether the participant was able to engage in the activities necessary to complete the screening examination. If not, an MDF was to be completed with a reason code "10 – Physical illness/cognitive impairment." If a participant was physically unable to complete the screening examination, the SC staff encouraged the participant to complete any other study activities.

3.9.2.3 Non-Participation Due to Lung Cancer

Notification of the diagnosis of lung cancer could have occurred at any time during the study. Forms that captured this information include the ASU and ASU-PS, completed annually by the participant, and the Cancer Notification Form (CNF, Appendix 8-1), completed by the SC when a cancer was reported by a source other than the ASU or ASU-PS. A participant who reported having a primary or metastatic lung cancer was considered ineligible for further study screening examinations at the time of the report. It was necessary to follow up with medical record abstraction to confirm and document the diagnosis of the reported lung cancer in a timely manner. If a reported lung cancer was investigated and determined to be erroneous, the participant once again became eligible for further screening examinations. If a primary or metastatic lung cancer was confirmed, further screening visits were not to be scheduled.

3.9.2.4 Non-Participation Due to Lost to Follow-up

During the course of the study, a participant may have become lost to follow-up. For these participants, the SC was asked to attempt tracing (as described in Section 9.2.3). Beginning in 2006, each SC submitted data files of participants who were lost to follow-up to the National Center for Health

Statistics for a search of the National Death Index (NDI) database. This submission was coordinated by the CC and was conducted annually from 2006 to 2010. Refer to Chapter 9 for more information on the procedures for NDI submissions.

3.10 Protocol Violations Associated with Screening Visits

The most frequently encountered protocol violations associated with screening visits were duplicating a screening visit in an activity window, administering the wrong screening examination, using incorrect technical parameters, not performing the comparison read of the screening exams at T_1 or T_2, and failing to maintain original and/or backup screening exam images. These protocol violations required a Protocol and HIPAA Violation Form (PHVF) to be completed. The PHVF and Specifications for Completion of the PHVF can be found in Appendices 11-9 and 11-10. The following is a brief review of procedures that needed to be followed when these protocol violations occurred.

3.10.1 Protocol Violation Due to Duplicate Screening Visit

If a participant was inadvertently screened more than once in the same study year, the examination form from the first visit was considered the official study examination for that year. The following steps were taken to document the situation:

1. The form for the second visit was not processed;
2. The hardcopy examination form(s) from the second visit was kept in the participant's study file with a note (initialed and dated) documenting the situation;
3. The participant and his/her health care provider were informed of the error and given the results of all exams (from both the first and second visit), and
4. A PHVF was completed and sent to the CC, noting the date of the second screening examination. A copy of the examination form(s) from the second visit was sent to the CC with the PHVF.

If an erroneous screening exam was performed that resulted in a positive screen, a Diagnostic Evaluation (DE) form was required to be completed and kept in the participant's study file. The DE form for an erroneous screening exam was not entered into

3.10.2 Protocol Violation Due to Incorrect Screening Examination

If a participant received the screening exam to which s/he was not randomized, s/he was not to be re-screened during the activity window. If the error occurred at the T_0 or T_1 screening visit, the participant underwent the screen s/he was randomized to receive during the subsequent year's activity window. The following steps were taken to document the situation:

1. The examination form for the visit was not processed;
2. The hardcopy examination form from the visit was kept in the participant's study file with a note (initialed and dated) documenting the situation;
3. The participant and his/her health care provider were informed of the error and given the results of the exam;
4. An MDF was completed for the expected exam form. Code 88 "Other (SPECIFY)" was used for the MDF and the reason was documented as "Incorrect exam performed," and
5. A PHVF was completed, documenting the error, and noting the date of the incorrect screening examination.

If an erroneous screening exam was performed that resulted in a positive screen, a Diagnostic Evaluation (DE) form was required to be completed and kept in the participant's study file. The DE form for an erroneous screening exam was not entered into

3.10.3 Protocol Violation Due to Incorrect Technical Parameters

If a screening exam was performed using technical parameters that were outside the ranges specified in MOOP section 4.4 and Appendix 4-1 for spiral CT, and MOOP section 5.4 and Appendix 5-1 for chest x-ray, the error was noted on a PHVF.

For spiral CT exams, the mAs and effective mAs were permitted to be below minimum values if an adequate reason was documented on the SCT form (e.g., higher kVp, less filtration, etc.) in the Comments section (Part A.6). The maximum effective mAs was also permitted to be exceeded to achieve acceptable image quality for very large patients, as needed, and was required to be documented in

the Comments section (Part A.6). These above exceptions were not considered protocol violations therefore a PHVF did not need to be completed.

3.10.4 Protocol Violation Due to Not Performing Comparison Read

As described in sections 4.7 and 5.7, T_1 screening exams were required to be compared with T_0 screening exams and T_2 screening exams were required to be compared with T_0 and T_1 exams. If the screening examinations from all three study years were negative, then the T_2 screening examination may have been compared with either the T_0 or T_1. If the T_0 and T_1 exams were lost or otherwise unavailable and the comparison read could not be performed, it was considered a protocol violation and the SC completed a PHVF. If either the T_0 or T_1 screening exam was not completed, then the T_2 exam was to be compared to the existing previous exam and no PHVF was required. It was not acceptable to complete a PHVF because it was inconvenient to do a comparison read.

3.10.5 Protocol Violation Due to Failure to Maintain Original and/or Backup Screening Exam Images

As described in sections 4.6.2 and 5.6.2, screening exam images were required to be stored as photo documentation of the exam and were required to be retrievable at any time. If the original hard copy or digital screening exam could not be accessed (due to loss, corruption, or irreversible modification such that the image could no longer be read according to study protocol) and a backup copy did not exist, this was considered a protocol violation and was documented on a PHVF. If the image was lost or corrupted before it was read, so that the participant never received results from the exam, s/he was informed and invited for another screen.

Appendices for Chapter 3

3-1 Participant Contact Form (PCF)

3-2 Specifications for Completion and Review of the Participant Contact Form

3-3 Sample Results Withheld Statement

3-4 Medical Record Release Authorization Form

3-5 Medical History Questionnaire (MHQ)

3-6 Specifications for Completion of the Medical History Questionnaire

3-7 Participant Contact Update Form (PCUF)

3-8 Specifications for Completion and Review of the Participant Contact Update Form

3-9 NLST Retention Strategies

3-10 T_2 Retention Letter

3-11 Annual Study Update (ASU)

3-12 Specifications for Completion of the Annual Study Update

3-13 Annual Study Update – Post Screening (ASU-PS)

3-14 Specifications for Completion of the Annual Study Update – Post Screening

3-15 Sample Cover Letter for the Annual Study Update and Participant Contact Form

3-16 Sample Cover Letter for the Final Annual Study Update – Post Screening and Participant Contact Form

National Lung Screening Trial (NLST)

PARTICIPANT CONTACT FORM (PCF)

For Office Use Only

Screening Center ID: |__|__|

Screening Center Staff ID: |__|__|__|__|__|

Study Year: T|__|

Initials Complete: _____

Initials QC: _____

Participant ID Label

Returning participants only: If your contact information has not changed since you last completed this form, mark this box. |__|

1. What is today's date? |___|___| / |___|___| / |__|__|__|__|
MONTH DAY YEAR

2. What is your full name and contact information?

NAME: MR./MRS./MISS/MS./DR. FIRST MIDDLE LAST (JR., SR., etc.)

STREET ADDRESS 1 | STREET ADDRESS 2

CITY STATE ZIP

HOME TELEPHONE NUMBER: ( ) | WORK TELEPHONE NUMBER: ( )

CELL PHONE NUMBER: ( ) | FAX NUMBER: ( )

E-MAIL ADDRESS

3. What other last names have you had? (Please include your maiden name and any names from previous marriages)

MAIDEN NAME OTHER LAST NAME(S)

4. What is your Social Security Number?

|___|___|___| - |___|___| - |___|___|___|___|

The National Institutes of Health is requesting your Social Security number under Public Health Service Act 42 USC 285a. The primary use of this information is for researchers to locate you in the future if they are unable to locate you at your home address, and to search vital records in a follow-up study conducted in the future. Additional disclosures of information may be: to HHS contractors, grantees, and collaborating researchers and their staff in order to accomplish the research purpose for which the records are collected; to a congressional office from the record of an individual in response to an inquiry from the congressional office made at the request of the individual; and as otherwise required by Law. **Furnishing your Social Security number is voluntary, and you will not be denied any federal right, benefit, or privilege by your refusal to disclose it.**

PCF (over)

5. Do you currently have a physician/health care provider?

☐ No, I currently do not have a physician/health care provider. → Please skip to Question 7.

☐ Yes, I have a physician/health care provider. → Please provide the name, address, and telephone number of your physician/health care provider below:

FULL NAME OF PROVIDER OR CLINIC		
STREET ADDRESS 1	STREET ADDRESS 2	SUITE OR OFFICE NO
CITY	STATE	ZIP
TELEPHONE NUMBER: ( )		

6. **Question Discontinued**

7. Please list the names of two adults who live in your household and their relationship to you. (Include your spouse, partner, children, relatives, and/or roommates.) (IF NOT APPLICABLE, CHECK HERE AND GO TO QUESTION 8. ☐ → Not applicable

NAME: MR./MRS./MISS/MS./DR.	FIRST	MIDDLE	LAST	(JR., SR., ETC.)	RELATIONSHIP TO YOU
NAME: MR./MRS./MISS/MS./DR.	FIRST	MIDDLE	LAST	(JR., SR., ETC.)	RELATIONSHIP TO YOU

8. Will you please provide us with the names and addresses of **two** people who could give us your new address should you move? We would only contact these people if we were unable to reach you at your home address. It would be helpful to get the names of people who <u>do not</u> live with you.

☐ → Yes, please provide the contact information below. ☐ → No, please skip to Question 9.

NAME: MR./MRS./MISS/MS./DR.	FIRST	MIDDLE	LAST	(JR., SR., ETC.)	RELATIONSHIP TO YOU
STREET ADDRESS 1		STREET ADDRESS 2			TELEPHONE NUMBER
CITY			STATE	ZIP	( )
NAME: MR./MRS./MISS/MS./DR.	FIRST	MIDDLE	LAST	(JR., SR., ETC.)	RELATIONSHIP TO YOU
STREET ADDRESS 1		STREET ADDRESS 2			TELEPHONE NUMBER
CITY			STATE	ZIP	( )

9. Do you spend a significant part of the year at another location? ☐ YES ☐ NO

If YES, please provide that information below. If NO, we will assume that you can be reached at the address and telephone numbers that you listed in Question 2 throughout the year.

STREET ADDRESS 1	STREET ADDRESS 2
CITY STATE ZIP	
HOME TELEPHONE NUMBER: ( )	WORK TELEPHONE NUMBER: ( )
CELL PHONE NUMBER: ( )	FAX NUMBER: ( )
E-MAIL ADDRESS	
DATES AT THIS ADDRESS |___|__|/|___|___| TO |___|___|/|___|___| MO DAY MO DAY	

National Lung Screening Trial (NLST)

Specifications for Completion and Review of the Participant Contact Form (PCF)

This form is self-administered. It is to be completed at the time of randomization and updated, if necessary, each subsequent year of the study by all participants. The SC staff should compare the new PCF with the one completed for the previous study year and confirm any changes with the participant. If the initial PCF is mailed to the participant along with the consent form, the SC must receive approval from its IRB of this process. The PCF may be administered with the final ASU-PS, though it is not required. Specifications for completing each item of the form are given below:

For Office Use Only:

This section should be completed by SC staff prior to the screening visit or prior to mailing:

Participant ID Label: Affix a PID label to the space provided at the top of the form.

Screening Center ID: Enter the two-digit SC ID number.

Screening Center Staff ID: Enter the four-digit SC staff ID number.

Study Year: Enter the current study year for the participant.

Completed by Participant:

Please complete any information that has changed since your last National Lung Screening Trial screening exam. If no information has changed, please mark the box.

1. **What is today's date?** This is the date the form is completed. Instruct the participant to enter the month, day, and year. Month and day should be zero filled, if applicable.

2. **What is your full name and contact information?** Instruct the participant to record his/her title (Dr., Mr., Ms., Mrs., Miss); first, middle, last name, and suffix (Jr., Sr., III, Esq.); street address, city, state, ZIP code; home telephone number, and, if applicable, work telephone number, cell phone number, fax number, and e-mail address.

3. **What other last names have you had? (Please include your maiden name and any names from previous marriages)** Instruct the participant to record any other last names such as a maiden name or any previous married names.

4. **What is your Social Security Number?** Instruct the participant to record his/her Social Security Number in the boxes provided.

   If the participant does not wish to provide his or her Social Security Number, the coordinator should ask if s/he would be willing to provide the last four digits.

   Box explaining request for Social Security Number: If the form is administered by SC staff, this statement should be read to the participant.

5. **Do you currently have a physician/health care provider?** Instruct the participant to record whether s/he has a physician or health care provider. If s/he does not have a

physician or health care provider, s/he should mark "No" and go to Question 7. If s/he has a physician or health care provider, s/he should mark "Yes" and provide the name and contact information for the provider in the designated spaces. If s/he has a physician or health care provider but refuses to provide this information, this should be documented on the PCF.

6. **Question Discontinued.** The question "Do you currently have any type of health insurance, such as group health insurance (either through your employer or another organization such as AARP), Medicaid, Medicare, or some other type of health insurance?" has been discontinued and no longer appears on the form.

7. **Please list the names of two adults who live in your household and their relationship to you. (Include your spouse, partner, children, relatives, and/or roommates.)** Instruct the participant to record the names of two adults living in the same home as the participant and their relationship to the participant. If only one other adult is living with the participant, s/he should record that person's name and their relationship to the participant. If no adults aside from the participant live in the participant's household, instruct the participant to place a check in the box next to "Not applicable."

8. **Will you please provide us with the names and addresses of two people who could give us your new address should you move?** This information will be used by the SCs to trace a participant if s/he cannot be contacted at his/her residential address(es). If "Yes," instruct the participant to provide the names of two people who do not live with the participant and who could provide the new address if the participant were to move. Instruct the participant to record the full name, street address (including apartment number, city, state, ZIP code), and telephone number including area code of each contact in the space provided. Instruct the participant to record the relationship of each contact to him/her in the space provided. If "No," contact information will not be provided by the participant.

9. **Do you spend a significant part of the year at another location?** If "Yes," instruct the participant to record this address, including city, state, and ZIP code, telephone number at this address, and, if applicable, work telephone number, cell phone number, fax number, and e-mail address, as well as the months spent at this address each year. If "No," the SC will assume that the participant can be reached at their primary residence throughout the year.

After completing the form:

- Thank the participant for completing the form.
- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labels "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.
- Compare the form to the previous year's form (if applicable).
- Confirm any changes in information with the participant.

- File the form in the participant's folder.

For the follow-up years, each participant will be asked to update the PCF. The SCs can choose to utilize the Participant Contact Update Form (PCUF) or administer the original PCF, although the PCUF does have the advantage of allowing a participant to verify existing information on the pre-printed PCUF form. Instructions for generating a directive in that will pre-print previously entered data from the PCF onto an -generated PCUF can be found in the The participant should be instructed to review the previously completed PCF or the information provided on the PCUF and mark any changes on either the blank PCF or the right side of the PCUF. SC staff should compare information from the new PCF or PCUF with the PCF or PCUF completed for the previous study year and confirm any changes with the participant. All copies of PCFs and PCUFs should be kept in the participant's file.

National Lung Screening Trial (NLST)

As a participant in the National Lung Screening Trial (NLST), I am writing to request that my health care provider NOT be notified of the results of any screening examinations I receive while participating in the study. I realize that I will be responsible for contacting my health care provider in the event that I receive an abnormal screening examination and that the *Screening Center* will not notify my health care provider of such a result.

If, at any time during the study, I decide that I would like for my health care provider to begin receiving the results of my NLST screening examinations, I realize that I must contact the *Screening Center* in writing to request this change. The address for contacting the *Screening Center* is:

Screening Center
SC Address
City, State, Zip Code

If I have any questions regarding my screening examination results, or any other aspect of the National Lung Screening Trial, I can contact the study coordinator, *SC Coordinator*, at *SC phone number*.

Signature of Participant

Print Name

Date

For Office Use Only

Study Year: T|___|

Participant ID Label

Appendix 3-4 Medical Record Release Authorization Form

National Lung Screening Trial (NLST)

(Letterhead of Screening Center)

ASSURANCE OF CONFIDENTIALITY - All information which would provide identification of the individual will be held in confidence, will be used only for study purposes, and will not be disclosed or released to anyone other than the study team, unless required by law.

AUTHORIZATION TO OBTAIN INFORMATION

FROM MEDICAL RECORDS

I, _____, hereby authorize the release of information from medical records and staff of a health care facility where I have been seen. This information will be used for the National Lung Screening Trial being conducted by (*Name of Screening Center)* and the National Cancer Institute. I understand that I may revoke this consent at any time except to the extent that action has already been taken. I also understand that this authorization expires one year from the date of signature. I further understand that all information obtained will be held confidential, and will not be disclosed to anyone but the researchers conducting this study, except as otherwise required by law.

_____
Signature of Participant

_____
Print Name

_____
Date

For Office Use Only
Study Year: T|___|
Participant ID Label

National Lung Screening Trial (NLST)

MEDICAL HISTORY QUESTIONNAIRE FOR PARTICIPANTS (MHQ)

Participant ID Label

Thank you for participating in the National Lung Screening Trial (NLST). Your participation is helping to answer some very important questions about the effects of lung cancer screening on overall health. As a part of the study, we would like to obtain some baseline information about your personal medical history. Please take a few minutes to answer the following questions and then return this questionnaire to the Screening Center.

General Instructions:

Print your answers in the spaces provided, or place a “check” or “X” in the boxes where appropriate.

Please provide the following information and then proceed to page 2, beginning with "Today's Date," to complete the remainder of the questionnaire:

Your Name: _____
First Middle Initial Last

Your Date of Birth: MO DAY YEAR

Your Telephone Number: (_____)-_____
Area Code

MEDICAL HISTORY QUESTIONNAIRE (MHQ)

For Office Use Only

Screening Center ID: |___|___|

Screening Center Staff ID: |___|___|___|___|

Study Year: T|__|

Initials Complete: _____

Initials QC: _____

Participant ID Label

Today's Date: |___|___| |___|___| |___|___|___|___|
MO DAY YEAR

Who is completing this questionnaire?

☐ Study participant

☐ Someone else (Specify relationship to study participant)

_____

General Information about You

1. Are you of Hispanic or Latino origin?

   ☐ Yes ☐ No

2. Which of these groups describe you? (Check all that apply.)

   ☐ White
   ☐ Black or African-American
   ☐ Asian
   ☐ American Indian or Alaska Native
   ☐ Native Hawaiian or Other Pacific Islander

3. What is the highest grade or level of schooling you completed?

   ☐ 8th grade or less
   ☐ 9th-11th grade
   ☐ High school graduate/GED
   ☐ Post high school training, other than college (for example, vocational or technical school)
   ☐ Associate degree/some college
   ☐ Bachelor's degree
   ☐ Graduate school
   ☐ Other, specify:_____

4. What is your current marital status?

   ☐ Married or living as married
   ☐ Widowed
   ☐ Divorced
   ☐ Separated
   ☐ Never married

5. What is your current weight?

   Pounds: _____

6. How tall are you?

   Feet: _____ Inches: _____

Your Work Experience

7. Did you ever work for 12 months or more in any of the following industries or occupations?

Asbestos work	Cotton or jute processing	Hard rock mining
Baking	Farming	Painting
Butchering or meat packing	Fire fighting	Sandblasting
Chemicals or plastics manufacturing	Flour, feed, or grain milling	Welding
Coal mining	Foundry or steel milling	

☐ Yes ☐ No (***If No, check box for "No" and please skip to question 9.)***

8. Please fill in the appropriate information for **each** industry or occupation.

Industry or Occupation	Do you or did you work in this industry or occupation for 12 months or more? Please check the appropriate box for each industry or occupation listed. If you mark Yes for any industry or occupation, answer → → →	Write the total number of years you worked in this industry or occupation in the space provided, answer → → →	Do you or did you usually wear a facemask or other equipment to protect your lungs while working?
Asbestos work	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Baking	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Butchering or meat packing	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Chemicals or plastics manufacturing	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Coal mining	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Cotton or jute processing	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Farming	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Fire fighting	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Flour, feed, or grain milling	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Foundry or steel milling	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Hard rock mining	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Painting	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Sandblasting	☐Yes ☐No	No. of years _____	☐ Yes ☐ No
Welding	☐Yes ☐No	No. of years _____	☐ Yes ☐ No

Your Smoking Habits (Other than Cigarettes)

9. Has there ever been a time in your life when you regularly smoked at least one cigar a month?

☐ Yes ☐ No ***(If No, check box for "No" and please skip to question 12.)***

10. For how many years did you regularly smoke at least one cigar a month?

___ # of years (If less than 1 year, please enter 0.)

11. During these years, how many cigars did you smoke in a typical month?

___Number of cigars smoked in a typical month

12. Has there ever been a time in your life when you regularly smoked at least one pipeful of tobacco a month?

☐ Yes ☐ No ***(If No, check box for "No" and please skip to question 15.)***

13. For how many years did you regularly smoke at least one pipeful of tobacco a month?

___ # of years (If less than 1 year, please enter 0.)

14. During these years, how many pipesful of tobacco did you smoke in a typical month?

___ Number of pipesful of tobacco smoked in a typical month

Your Passive Smoke Exposure

15. Have you ever lived with a smoker?

☐ Yes
☐ No

16. Have you ever worked in a room or closed space where people were often smoking?

☐ Yes
☐ No

Your Alcohol Habits (Questions 17-18 refer to your recent drinking behavior.)

17. How often do you have a drink containing alcohol?

☐ Never ***(If Never, check box for "Never" and please skip to question 19.)***
☐ Monthly or less often
☐ Two to four times a month
☐ Two to three times a week
☐ Four or more times a week

18. How many drinks containing alcohol do you have on a typical day when you are drinking? *(One drink is defined as a 12-ounce beer, a 5-ounce glass of wine, or a 1.5-ounce shot of liquor, either alone or in mixed drinks)*

☐ 1
☐ 2-3
☐ 4
☐ 5-7
☐ 8 or more

Your Medical History

19. Has a doctor ever told you that you had or have any of the conditions or illnesses listed below? Please mark all that apply and indicate the age at which you were diagnosed. If you have had the same illness or condition more than once, please record your age the first time you were diagnosed.

☐ Yes ☐ No ***(If No, check box for "No" and skip to question 20.)***

↓

☐ Asbestosis	|__|__| Age at diagnosis
☐ Asthma - first diagnosed as a *child*	|__|__| Age at diagnosis
☐ Asthma - first diagnosed as an *adult*	|__|__| Age at diagnosis
☐ Bronchiectasis	|__|__| Age at diagnosis
☐ Chronic Bronchitis	|__|__| Age at diagnosis
☐ Chronic Obstructive Pulmonary Disease (COPD)	|__|__| Age at diagnosis
☐ Diabetes	|__|__| Age at diagnosis
☐ Emphysema	|__|__| Age at diagnosis
☐ Fibrosis of the lung	|__|__| Age at diagnosis
☐ Heart Disease or Heart Attack	|__|__| Age at diagnosis
☐ Pneumonia	|__|__| Age at diagnosis
☐ Sarcoidosis	|__|__| Age at diagnosis
☐ Silicosis	|__|__| Age at diagnosis
☐ Tuberculosis (TB)	|__|__| Age at diagnosis
☐ High Blood Pressure (Hypertension)	|__|__| Age at diagnosis
☐ Stroke	|__|__| Age at diagnosis

20. Have you ever had a chest x-ray? (Not including a chest x-ray for NLST.)

☐ Yes ☐ No ***(If No, check box for "No" and please skip to question 23.)***

21. What was the year of your last chest x-ray?

|___|___|___|___|
Year

22. What was the reason for your last chest x-ray? (***Please mark only one.****)*

☐ Because of a specific health problem
☐ Follow-up to a previous health problem
☐ Part of a routine physical exam or as a screening exam *(A screening exam is a medical test used to detect disease before symptoms have occurred.)*

23. Have you ever had a "whole body" CT exam or a CT exam of your chest or lungs? (Not including a CT exam for NLST.)

☐ Yes ☐ No **(*If No, check box for "No" and please skip to question 26.*)**

24. In what year did you have your last "whole body" CT exam, or CT exam of your chest or lungs?

|___|___|___|___|
Year

25. What was the reason for your last "whole body" CT exam, or CT exam of your chest or lungs? (***Please mark only one.***)

☐ Because of a specific health problem
☐ Follow-up to a previous health problem
☐ Part of a routine physical exam or as a screening exam *(A screening exam is a medical test used to detect disease before symptoms have occurred.)*

26. Have you ever been diagnosed as having any of the cancers listed below?

☐ Yes ☐ No ***(If No, check box for "No" and then skip to question 27.)***

↓

Please mark all that apply and indicate the age at which you were diagnosed. If you have had the same type of cancer more than once, please record your age the first time you were diagnosed.

☐ Bladder cancer	|__|__| Age at diagnosis
☐ Breast cancer	|__|__| Age at diagnosis
☐ Cervical cancer	|__|__| Age at diagnosis
☐ Colorectal cancer	|__|__| Age at diagnosis
☐ Cancer of the esophagus	|__|__| Age at diagnosis
☐ Kidney cancer	|__|__| Age at diagnosis
☐ Cancer of the larynx	|__|__| Age at diagnosis
☐ Lung cancer	|__|__| Age at diagnosis
☐ Mouth (oral) cancer	|__|__| Age at diagnosis
☐ Nasal cancer	|__|__| Age at diagnosis
☐ Pancreatic cancer	|__|__| Age at diagnosis
☐ Cancer of the pharynx	|__|__| Age at diagnosis
☐ Stomach cancer	|__|__| Age at diagnosis
☐ Thyroid cancer	|__|__| Age at diagnosis
☐ Transitional cell cancer	|__|__| Age at diagnosis

27. Have any of the following blood relatives ever had lung cancer? ***(Please write the appropriate response code in the space provided next to each relative.)***

01 No
02 Yes
98 Does not apply
99 Unknown / I prefer not to answer

|__|__| Father

|__|__| Mother

|__|__| Brother(s), including half-brothers

|__|__| Sister(s), including half-sisters

|__|__| Child (biological)

Thank you for taking the time to fill out this questionnaire.

National Lung Screening Trial (NLST)

Specifications for Completion of the Medical History Questionnaire (MHQ)

This form is to be completed by all participants. If the participant has difficulty in the completion of the form, an SC staff member may either assist the participant in its completion or administer the questionnaire as an interview (in-person or by telephone).

The specifications provide guidelines for the completion of each question on the form. The specifications also include specific guidelines for the SC staff on editing or data retrieval, as appropriate. The "For Office Use Only" sections must always be completed by the SC staff according to the guidelines provided for those specific question. Personal identifying information (page 1) should be removed from the MHQ prior to submitting it to the CC.

An asterisk (*) in these specifications indicates a critical data item. These are race (Item # 2), and whether the participant has ever been diagnosed with cancer (Item # 26). The SC should perform data retrieval on all critical data items.

General instructions for editing and data retrieval:

An attempt should be made to collect any outstanding information and correct all errors or discrepant data on the questionnaire before the participant leaves the SC. Once the participant has left the SC, an attempt should be made to collect any outstanding information and correct all errors or discrepant data on the questionnaire without contacting the participant. Any data items that are incomplete or unclear may be clarified with the participant through data retrieval at the discretion of the SC Coordinator. If a data item cannot be completed either with or without data retrieval, it should remain as it was recorded by the participant and not changed. All original responses, editing, and recording must be clearly documented on the form.

Specifications for completing the form are given below:

Cover Page:

- **Participant ID Label:** Affix a PID label in the space provided.
- **Participant Name:** Enter the full name (first, middle initial, and last) of the participant. Include any titles or suffixes.
- **Participant Date of Birth:** Enter the month, day, and year of the participant's date of birth. Month and day should be zero filled, and the last two digits should be recorded for the year (e.g., 03/01/1930).
- **Participant Telephone Number:** Enter the participant's telephone number, including area code. This should be the number at which the participant would like to be contacted.

NOTE: This page should be removed prior to sending the MHQ to the CC.

Appendix 3-6 Specifications for Completion of the Medical History Questionnaire (MHQ)

For Office Use Only:

This section should be completed by the SC staff **prior to giving the MHQ to the participant.**

Participant ID Label: Affix a PID label in the space provided.

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID number.

Study Year: Enter the current study year for the participant.

Preliminary Information:

This section is to be completed by the participant.

- **Today's date:** Enter the date the questionnaire (MHQ) is being completed using the month, day, and year format. Month and day should be zero filled, and the last two digits should be recorded for the year (e.g., 03/01/2002).

- **Who is completing this questionnaire?** Check the box that corresponds to the person who is completing the questionnaire, which will be either the study participant or another individual. If someone other than the participant is completing the questionnaire, then that information should be recorded in the space provided, noting the relationship to the participant.

General Information about You:

This section of the questionnaire is concerned with the participant's general background.

1. Are you of Hispanic or Latino origin?

The following definitions are to be used for determining ethnic background.

- **Hispanic or Latino:** A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.

2.* Which of these groups describe you?

The following definitions are to be used for determining race or ethnic background. The participant is asked to check all the groups that apply.

- **White:** A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

- **Black or African-American:** A person having origins in any of the black racial groups of Africa.

- **Asian:** A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

- **American Indian or Alaska Native:** A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.

- **Native Hawaiian or Other Pacific Islander:** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

SC Instructions: This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink, and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

3. What is the highest grade or level of schooling you completed?

Record the highest grade completed, regardless of skipped or repeated grades. If the participant attended school in a foreign country, in an ungraded school, under a tutor, or under special circumstances, ask the participant to give the nearest equivalent of years in a regular U.S. school. The following guidelines should be used for determining the highest grade completed.

- **8th grade or less:** The participant completed 1 to 8 years of school (elementary and junior high/middle school).

- **9th through 11th grade:** The participant completed 9 to 11 years of school (some high school).

- **High school graduate/GED:** The participant completed 12 years of school or completed high school. If the participant received a Graduate Equivalency Degree (GED), s/he would also check this box.

- **Post high school training, other than college (for example, vocational or technical school):** The participant completed training other than college following high school. This includes secretarial school, mechanical or computer training, nursing school where only a diploma is offered, other vocational trades, and business schools outside the regular school system and attended by the participant after completion of high school.

- **Associate degree/some college:** The participant completed some college but did not attain a four-year college degree. An Associate of Arts (AA) degree from a community college or a junior college is included in this category.

- **Bachelor's degree:** The participant obtained a bachelor's degree from a college, university, nursing school, or seminary.

- **Graduate school:** The participant has had some graduate training or completed graduate work. Receiving a degree is not a necessary criterion for this category. This category includes Masters and Doctoral programs, as well as professional schooling (e.g. medical, dental, law, or veterinary school).

- **Other (specify):** Schooling cannot be classified by the categories above.

SC Instructions: If the participant has marked more than one response, the highest level of education should be kept; the remaining responses should be deleted.

4. What is your current marital status?

"Current" is at the time the participant completes the questionnaire (i.e., a woman or man who was widowed but has remarried is considered married). Separated refers to living apart because of marital discord, not circumstantial separation (such as a spouse living in a nursing home).

5. What is your current weight?

Current weight is the participant's weight, in pounds, at the time when the questionnaire is being completed.

6. How tall are you?

This question asks for current height of the participant. Height should be recorded in feet and inches. If the participant reports his/her height to the half-inch, round up to the nearest inch.

Your Work Experience:

This section of the questionnaire is concerned with the participant's work history. "Working" is working for pay (wages, salary, commission, or pay-in-kind), or working without pay in a business or farm operated by a household member. Volunteer or other unpaid work for a church, charity, or similar organization is not included. Individuals who have "retired" from their usual occupation but are currently working either full or part-time for pay are considered working unless they work less than 20 hours per week.

7. Did you ever work for 12 months or more in any of the following industries or occupations?

This question asks about experience working in specific industries or occupations. If the participant has no previous work experience in these types of jobs, s/he should mark "No" and skip to Question 9.

8. Please fill in the appropriate information for each industry or occupation.

This table asks for more specific information about work experience in the industries or occupations listed in Question 7. The participant should mark a response in the second column for each industry or occupation listed. If "Yes" is marked for any industry or occupation, additional information should be recorded in the third and fourth columns.

- **Write the total number of years you worked in this industry or occupation:** This information should be provided in years, if possible. If periods of time have elapsed during which the participant did not or could not work in this occupation, record the total number of years excluding the time not spent in the industry or occupation.

- **Do you or did you usually wear a facemask or other equipment to protect your lungs while working?** The participant should mark "Yes" if s/he used any protective equipment for his/her lungs while working in these industries or occupations.

Your Smoking Habits (Other than Cigarettes):

This section of the questionnaire is concerned with the participant's history of smoking cigars or pipes. Current smokers of cigars or pipes are to reply in regard to their current habits. Ex-smokers are to reply in regard to their usual habits when they smoked cigars or pipes.

9. Has there ever been a time in your life when you regularly smoked at least one cigar a month?

This question asks about the participant's habits regarding cigar smoking. If no, skip to Question 12.

10. For how many years did you regularly smoke at least one cigar a month?

This question asks the length of time in which the participant had a cigar-smoking habit of one cigar or more per month. If less than a year, enter 0.

11. During these years, how many cigars did you smoke in a typical month?

This question asks the number of cigars typically smoked in a month by the participant during the time in which the participant had a cigar-smoking habit of one cigar or more per month.

12. Has there ever been a time in your life when you regularly smoked at least one pipeful of tobacco a month?

This question asks about the participant's habits regarding pipe smoking. If no, skip to Question 15.

13. For how many years did you regularly smoke at least one pipeful of tobacco a month?

This question asks the length of time in which the participant had a pipe-smoking habit of one pipeful of tobacco or more per month. If less than a year, enter 0.

14. During these years, how many pipesful of tobacco did you smoke in a typical month?

This question asks the number of pipesful of tobacco typically smoked in a month by the participant during the time in which the participant had a pipe-smoking habit of one pipeful of tobacco or more per month.

Your Passive Smoke Exposure:

This section of the questionnaire is concerned with the participant's exposure to tobacco smoke of others.

15. Have you ever lived with a smoker?

This question asks whether the participant has ever lived in the same household as a regular smoker.

16. Have you ever worked in a room or closed space where people were often smoking?

This question asks whether the participant has ever worked in close proximity to persons who often smoked.

Your Alcohol Habits:

This section of the questionnaire is concerned with the participant's recent drinking behavior.

17. How often do you have a drink containing alcohol?

This question asks the frequency that the participant consumes any beverage containing alcohol. If never, skip to Question 19.

18. How many drinks containing alcohol do you have on a typical day when you are drinking?

This question asks the number of alcoholic drinks that the participant consumes in a typical drinking day. *(One drink is defined as a 12-ounce beer, a 5-ounce glass of wine, or a 1.5-ounce shot of liquor, either alone or in mixed drinks)*

Your Medical History:

This section of the questionnaire is concerned with the participant's personal medical history.

19. Has a doctor ever told you that you had or have any of the conditions or illnesses listed below?

The condition must be diagnosed by a doctor; we are not interested in self-diagnosed conditions. Place a mark next to any condition that the participant has been told that s/he has or had. The participant should mark all conditions or illnesses that apply and indicate at which age s/he was diagnosed with that illness or condition. In the instance of multiple diagnoses of the same illness or condition, the participant should report the age at which the first diagnosis of an illness or condition was made.

If no is marked for all conditions listed, then skip to Question 20.

SC Instructions: Definitions should not be provided for any of the conditions. Allow the participant to record his/her response based on her understanding of the condition.

20. Have you ever had a chest x-ray?

If "Yes," Questions 21 and 22 must be completed. If "No," go to Question 23.

21. What was the year of your last chest x-ray?

This question records the date of the participant's most recent chest x-ray. Enter the year of the participant's most recent x-ray. Four digits should be recorded for the year (e.g., 2001).

22. What was the reason for your last chest x-ray?

This question asks for the reason that the chest x-ray was performed. Please make sure to mark only one response.

23. Have you ever had a "whole body" CT exam, or a CT exam of your chest or lungs?

If "Yes," Questions 24 and 25 must be completed. If "No," go to Question 26.

24. In what year did you have your last "whole body" CT exam, or CT exam of your chest or lungs?

This question records the date of the participant's most recent "whole body" CT exam, or CT exam of the chest or lungs. Enter the year of the participant's most recent "whole body" CT exam, or CT exam of the chest or lungs. Four digits should be recorded for the year (e.g., 2001).

25. What was the reason for your last "whole body" CT exam, or CT exam or your chest or lungs?

This question asks for the reason that the "whole body" CT exam, or CT exam of the chest or lungs was performed. Please make sure to mark only one response.

26.* Have you ever been diagnosed as having any of the cancers listed below?

This question records previous cancer diagnoses for specific types of cancer, and the participant's age at the time of diagnosis. A doctor must diagnose the cancer. We are interested in only the cancers listed. The participant should mark all cancer diagnoses that apply and indicate at which age s/he was diagnosed with that cancer. In the instance of multiple diagnoses of the same cancer, the participant should report the age at which the first diagnosis was made.

SC Instructions: This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink, and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

27. Have any of the following blood relatives ever had lung cancer?

Lung cancer in non-blood relatives, such as spouse, adopted, or step-children, should not be recorded. The cancer must be diagnosed by a doctor; we are not interested in a self-diagnosed cancer.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.

- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.
- Receipt the form into
- Remove the cover page (page 1).
- Copy the form.
- Send the original form to the CC in the weekly shipment.
- File a copy of the form in the participant's study file.

National Lung Screening Trial (NLST)

PARTICIPANT CONTACT UPDATE FORM (PCUF)

For Office Use Only		
Screening Center ID: |__|__| Screening Center Staff ID: |__|__|__|__| Study Year: T|__|	Initials Complete: _____ Initials QC: _____	Participant ID Label

1. What is today's date? |___|___| / |___|___| / |__|__|__|__|
MONTH DAY YEAR

Please review the information printed in the left column of each section below. If the information in that section is correct, place a check mark in the box labeled **No Changes Needed**. If the information in the left column is not correct, leave the check box blank and record the correct information in the column on the right **only** for the information that has changed.

2. Please verify your full name and contact information and indicate any changes in the right column of the form. ☐ **No Changes Needed**

Full Name:	**Full Name:**
Current Home Address:	**Current Home Address:**
Home Telephone: **Work Telephone:**	**Home Telephone:** (_____) _____-_____ **Work Telephone:** (_____) _____-_____
Cell Phone: **Fax Number:** **E-mail address:**	**Cell Phone:** (_____) _____-_____ **Fax Number:** (_____) _____-_____ **E-mail address:** _____

3. Please verify other last names you provided in the past and indicate any changes in the right hand column of the form. ☐ **No Changes Needed**

Other Names **Maiden Name:** **Other Last Name(s):**	**Other Names** **Maiden Name:** _____ **Other Last Name(s):** _____

4.	Social Security Number:	☐ **No Changes Needed**
	| X | X | X | - | X | X | - |___|___|___|___|	|___|___|___| - |___|___| - |___|___|___|___|

The National Institutes of Health is requesting your Social Security number under Public Health Service Act 42 USC 285a. The primary use of this information is for researchers to locate you in the future if they are unable to locate you at your home address, and to search vital records in a follow-up study conducted in the future. Additional disclosures of information may be: to HHS contractors, grantees, and collaborating researchers and their staff in order to accomplish the research purpose for which the records are collected; to a Congressional office from the record of an individual in response to an inquiry from the Congressional office made at the request of the individual; and as otherwise required by Law. **Furnishing your Social Security number is voluntary, and you will not be denied any federal right, benefit, or privilege by your refusal to disclose it.**

5.	Please verify the contact information for your physician/health care provider(s). ☐ **No Changes Needed**	
	Full Name of Provider or Clinic # 1:	**Full Name of Provider or Clinic # 1:**
	Address:	**Address:**
	Telephone 1: **Telephone 2:**	**Telephone 1:** (_____) _____-_____ **Telephone 2:** (_____) _____-_____
	Fax Number:	**Fax Number:** (_____) _____-_____
	Full Name of Provider or Clinic # 2:	**Full Name of Provider or Clinic # 2:**
	Address:	**Address:**
	Telephone 1: **Telephone 2:**	**Telephone 1:** (_____) _____-_____ **Telephone 2:** (_____) _____-_____
	Fax Number:	**Fax Number:** (_____) _____-_____

6.	**Question Discontinued**

7.	Please verify the name and relationship of the adult(s) listed as living in the same household as you. ☐ **No Changes Needed**		
Full Name:	**Relationship:**	**Full Name:**	**Relationship:**

8.	In the past you provided us with the names and addresses of the following people who could give us your new address should you move. Please confirm that the people listed are still the best contacts for you. ☐ **No Changes Needed**		
Full Name:	**Relationship:**	**Full Name:**	**Relationship:**
Address:		**Address:**	
Telephone:		**Telephone:** (_____) _____-_____	
Full Name:	**Relationship:**	**Full Name:**	**Relationship:**
Address:		**Address:**	
Telephone:		**Telephone:** (_____) _____-_____	

9.	In the past you may have indicated that you spend a part of the year at another location. Please verify this information and make any necessary changes. ☐ **No Changes Needed**
Other Location Address:	**Other Location Address:**
Home Telephone: **Work Telephone:**	**Home Telephone:** (_____) _____-_____ **Work Telephone:** (_____) _____-_____
Cell Phone: **Fax Number:** **E-mail address:**	**Cell Phone:** (_____) _____-_____ **Fax Number:** (_____) _____-_____ **E-mail address:** _____
Dates at this Address:	**Dates at this Address:** |___|___|/|___|___| TO |___|___|/|___|___| MONTH DAY MONTH DAY

National Lung Screening Trial (NLST)

Specifications for Completion and Review of the Participant Contact Update Form (PCUF)

This form is to be completed annually and can be administered one month prior to the opening of, or during the participant's study window. The PCUF may also be administered with the final ASU-PS, though it is not required. The SCs will be able to generate a directive in that will pre-print previously entered data from the PCF on an -generated PCUF. The pre-filled data will include information for each item from the previously entered PCF or PCUF with the exception of Social Security Number. The PCUF will only show the last four digits of the Social Security Number when they are available. This will ensure participant privacy while allowing for the possibility of capturing previously unrecorded Social Security Numbers.

The SCs can choose to utilize the PCUF or administer the original PCF, although the PCUF does have the advantage of allowing a participant to verify existing information on the pre-printed PCUF form. The PCF or the PCUF should be mailed to the participants in advance of the screening visit or completed in-person at the screening visit for the T_1 and T_2 study years. Either form should be mailed to participants after the T_2 study year. The PCF or PCUF can also be completed by telephone in all study years. The PCUF can be administered electronically, whereby the information is directly entered into during a participant interview, or the information can be entered onto a hard copy of the PCUF by the SC or the participant, and then later entered into Instructions for generating a directive in for the PCUF and additional information on data entry of the PCUF can be found in the

The SC staff should compare information from the new PCUF with the PCF or PCUF completed for the previous study year and confirm any changes with the participant. Specifications for completing each item of the form are given below:

For Office Use Only:

This section should be completed by SC staff or pre-printed from an directive for the PCUF prior to the screening visit or prior to mailing:

Participant ID Label: Pre-printed from

Screening Center ID: Pre-printed from

Screening Center Staff ID: Enter the four-digit SC staff ID number.

Study Year: Enter the current study year for the participant.

Completed by Participant:

1. **What is today's date?** This is the date the form is completed. Instruct the participant to enter the month, day, and year. Month and day should be zero filled, if applicable.

The following sections will be pre-printed from The participant should be instructed to review the information displayed on the left hand side of the PCUF. For each section, if the information is correct, then instruct the participant to place a check mark in the box labeled "No Changes Needed." If the information has changed or is incorrect, instruct the participant to complete the corresponding section

on the right hand side of the PCUF. Instruct the participant that it is only necessary to complete the items where the information has changed or is incorrect.

2. **Please verify your full name and contact information.** Instruct the participant to verify his/her title (Dr., Mr., Ms., Mrs., Miss), first, middle, last name, and suffix (Jr., Sr., III, Esq.), street address, city, state, ZIP code, home telephone number, and, if applicable, work telephone number, cell phone number, fax number, and e-mail address. If no changes are needed, then the participant should check the box "No Changes Needed." If the information has changed or is incorrect, instruct the participant to complete the corresponding sections on the right hand side of the form only for those items where the information has changed or is incorrect.

3. **Please verify other last names you provided in the past.** Instruct the participant to verify other last names such as a maiden name or any previous married names s/he provided in the past. If no changes are needed, then the participant should check the box "No Changes Needed." If the information has changed or is incorrect, instruct the participant to complete the corresponding sections on the right hand side of the form only for those items where the information has changed or is incorrect.

4. **Social Security Number.** For privacy reasons, will only pre-print the last four digits of the participant's Social Security Number when available. If the information is unavailable (i.e., the participant chose not to complete the information previously), this section will be blank. Instruct the participant to verify the last four digits of his/her Social Security Number. If no changes are needed, then the participant should check the box "No Changes Needed." If the information is incorrect, or if the participant decides to list his/her Social Security Number, instruct the participant to complete the corresponding sections on the right hand side of the form.

   Box explaining request for Social Security Number: If the form is administered by SC staff, this statement should be read to the participant.

5. **Please verify the contact information for your physician/health care provider(s).** Instruct the participant to verify the information regarding his/her primary care physician or health care provider. If the information is unavailable (i.e., the participant does not have a primary care physician or health care provider previously listed), this section will be blank. If no changes are needed, then the participant should check the box "No Changes needed." If the information has changed or is incorrect, instruct the participant to complete the corresponding sections on the right hand side of the form only for those items where the information has changed or is incorrect. If s/he has a physician or health care provider but refuses to provide this information, this should be documented on the PCF.

6. **Question Discontinued.** The question "Do you currently have any type of health insurance, such as group health insurance (either through your employer or another organization such as AARP), Medicaid, Medicare, or some other type of health insurance?" has been discontinued and no longer appears on the form.

7. **Please verify the name and relationship of the adult(s) listed as living in the same household as you.** Instruct the participant to verify the names of two adults living in the same home as the participant and their relationship to the participant. If no changes are needed, then the participant should check the box "No Changes Needed." If the information has changed or is incorrect, instruct the participant to complete the corresponding sections

on the right hand side of the form only for those items where the information has changed or is incorrect.

8. **In the past you have provided us with the names and addresses of the following people who could give us your new address should you move. Please confirm that the people listed are still the best contacts for you.** This information will be used by the SCs to trace a participant if s/he cannot be contacted at his/her residential address(es). If the information is unavailable (i.e., the participant did not previously list any names), this section will be blank. Instruct the participant to verify the names of the people listed who do not live with the participant and who could provide the new address if the participant were to move. Instruct the participant to verify the full name, street address (including apartment number, city, state, ZIP code), and telephone number including area code of each contact. If no changes are needed, then the participant should check the box "No Changes Needed." If the information has changed or is incorrect, instruct the participant to complete the corresponding sections on the right hand side of the form only for those items where the information has changed or is incorrect.

9. **In the past you may have indicated that you spend a significant part of the year at another location. Please verify this information.** If this information is unavailable (i.e., the participant did not previously indicate that s/he spent a significant part of the year at another location), this section will be blank. Instruct the participant to verify this address, including city, state, and ZIP code, telephone number at this address, and, if applicable, work telephone number, cell phone number, fax number, and email address, as well as the months spent at this address each year. If no changes are needed, then the participant should check the box "No Changes Needed." If the information has changed or is incorrect, instruct the participant to complete the corresponding sections on the right hand side of the form only for those items where the information has changed or is incorrect. If the information is left blank, the SC will assume that the participant can be reached at their primary residence throughout the year.

After completing the form:

- Thank the participant for completing the form.
- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled, "Initials Complete" in the box at the top of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labels "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.
- File the form in the participant's folder.

All copies of previous and current PCUFs should be kept in the participant's file.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

NLST Retention Strategies

Issues:

1. **Participant does not want to come in because he or she feels it is inconvenient or a waste of time:**

   Strategy: Focus on the fact that the success of NLST depends on persons receiving their three screens. Query the participant to see if there is anything that can be done (money, transportation, etc.) to facilitate attendance.

   Sample response to participant: It is crucial for the success of NLST for study participants to receive their three screening exams. If people do not come in for their study exams, NLST may not be able to answer important questions about lung cancer screening. We hope you will reconsider and come in for your exam. If there is anything I can do to make it easier for you to come in, please tell me and I'll see what I can do.

2. **Participant does not want to come in because he or she had a negative screen last year:**

   Strategy: Focus on the fact that a negative screen one year does not guarantee that future screens will be negative or that participant is free of lung cancer.

   Sample response to participant: We understand that you may no longer be very concerned about lung cancer because your first screening exam did not show abnormalities. Please be aware, however, that a negative result on your first screening exam does not guarantee that you are free of lung cancer a year later. Very small abnormalities that were not visible a year ago may have grown and may now be detectable through screening. We hope that you will reconsider and come in for your screening exam.

3. **Participant does not want to come in because he or she is disappointed that his or her screening assignment was chest x-ray:**

   Strategy: Focus on the fact that it is unknown if spiral CT is better than chest x-ray at reducing lung cancer death, and that participants in the chest x-ray arm are an important part of NLST

   Sample response to participant: At this point in time, we do not know that spiral CT is a better lung cancer screening exam than chest x-ray. We are conducting NLST to determine which screening exam, if either, is better. Although spiral CT is better than chest x-ray at detecting very small abnormalities, it is not known if this means it will be able to save more lives. NLST participants who are assigned to chest x-ray are of equal importance as those assigned to spiral CT. We hope that you will reconsider and come in for your screening exam.

4. **Participant had extensive work-up following a positive NLST screen and is concerned that he or she will need to undergo the same work-up if his or her second screen is positive:**

   Strategy: Tell the participant that it is unlikely that he or she will need to undergo extensive work-up if the abnormality has not changed. Also, mention that their second screening exam will be compared to the first screening exam by NLST radiologists, which in some instances will suffice for follow-up of a second positive screen.

   Sample response to participant: If the abnormality observed on your first exam is observed on your second screening exam but has not changed, it is unlikely that you will need to undergo the same follow-up. As part of the NLST, a radiologist will compare your two (three) screening exams and will make a recommendation based on both (all) exams. If nothing has changed, it is very likely that he or she will recommend no additional follow-up.

5. **Participant has undergone extensive work-up following a positive NLST screen and feels that he or she has been fully evaluated and therefore does not need a screening exam:**

   Strategy: Focus on the fact that the success of NLST depends on persons receiving their three screens. Acknowledge that having a screening exam soon after extensive diagnostic work-up may appear to be unnecessary, but that we need the participant's help to make NLST a success.

   Sample response to participant: We recognize that having a screening exam soon after extensive diagnostic work-up may appear to be unnecessary. However, it is crucial for the success of NLST for study participants to receive their three screening exams, regardless of the exams or medical procedures they have in between NLST exams. If people do not come in for their study exams, NLST may not be able to answer important question about lung cancer screening. We hope you will reconsider and come in for your exam.

6. **Participant is concerned about radiation exposure:**

   Strategy: Focus on the fact that radiation exposure is minimal.

   Sample response to participant: Minimizing radiation exposure is of particular interest in NLST, and measures have been taken that assure that study images are taken at the lowest radiation dose possible. It's a good idea to minimize radiation exposure, but in the instance of screening exams, it is generally believed that the small amount of radiation exposure does not outweigh the possible benefits of screening. The radiation exposure with screening exams is small, in fact, the dose with CT is similar to that of a mammogram, and the dose with chest x-ray is significantly less than that of a mammogram.

Appendix 3-10 T_2 Retention Letter

National Lung Screening Trial (NLST)

(Participant Name) *(Date)*
(Participant Address)
(City, State, ZIP Code)

The National Cancer Institute (NCI) and *(Local SC)* would like to thank you for participating in the initial phase of the National Lung Screening Trial (NLST). Your valuable participation in this study is an important contribution to winning the battle against lung cancer and is greatly appreciated.

Now that you have passed the screening phase of the trial, you have entered the second and equally important phase. During this follow-up phase, which is expected to last at least through 2009, you will receive periodic questionnaires that assess changes in your health. The questionnaires will take just a few minutes of your time, but will provide valuable information for NLST. Additionally, please continue to keep us aware of your contact information by completing and returning the Participant Contact Form that is mailed to you annually. Should you relocate or have any changes to your personal contact information, call or write *(Local SC)*.

As a result of your smoking history, you continue to be at an increased risk for lung cancer. Therefore, during the remainder of NLST and beyond, we encourage you to continue with your usual health care. If you currently smoke, we would encourage you to consider quitting. If you wish, you may contact *(SC Coordinator)* at *(Local SC),* who can assist you in getting information or support to help you stop smoking.

If you have any questions regarding the follow-up phase of the trial, please call your local NLST Coordinator *(Name of SC Coordinator)* at *(telephone)*. Again, the National Cancer Institute and *(Local SC)* thank you for your time and effort in helping us complete this landmark study.

Sincerely,

(Signature NCI Project Officer)
NCI Project Officer
National Lung Screening Trial

(Signature SC Principal Investigator)
SC Principal Investigator
National Lung Screening Trial

National Lung Screening Trial (NLST)

ANNUAL STUDY UPDATE (ASU)

For Office Use Only	
Screening Center ID: |___|___| Screening Center Staff ID: |__|__|__|__| Study Year: T|__|	Initials Complete: _____ Initials QC: _____ Participant ID Label

We need to find out about all health care visits you have had in the period from (_____/_____/_____) to the present. Please answer the following questions as best you can. ***If you cannot remember an exact date, please provide an approximate date.***
Date

1. In the period from (_____/_____/_____) to the present, have you been diagnosed with cancer by a health care provider?
Date
(Do not include basal-cell or squamous-cell skin cancers.)

☐ Yes
☐ No (If no, go to Item 4)

2. What type of cancer was diagnosed? (Please record all cancers diagnosed during this period except basal-cell and squamous-cell skin cancers.)

Type/Site of Cancer (breast, lung, etc)	Date of Diagnosis	Hospital or Clinic Where the Cancer was Diagnosed
A. _____	_____/_____/_____	_____
B. _____	_____/_____/_____	_____
C. _____	_____/_____/_____	_____

3. What is the name, phone number and address of the health care provider who diagnosed the most recent cancer?

FULL NAME OF PROVIDER OR CLINIC

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1 ( ) | TELEPHONE 2 ( ) | FAX NUMBER: ( )

4. Have you smoked any cigarettes, even a puff, in the last seven days?

☐ Yes
☐ No

5. In the past 12 weeks, have you had pneumonia or an acute respiratory infection that was treated with antibiotics by a physician?

☐ Yes
☐ No

6. Who completed this questionnaire? (Please mark one)

☐ Study Participant ☐ Spouse ☐ If someone else provided this information, please specify their name and relationship:

Name and Relationship: _____

7. What is today's date? |___|___| |___|___| |_2_|_0_|___|___|
MO DAY YEAR

8. Comments: _____

_____

_____

_____

_____

_____

_____

_____

Thank you for completing this questionnaire. Please return this form in the enclosed envelope.

(SC Name)
(Address)

National Lung Screening Trial (NLST)

Specifications for Completion of the Annual Study Update (ASU)

The ASU is to be completed annually by all participants for each year of follow-up, starting with T_1. In situations where the participant is unable to complete the form, the form may be completed by someone else such as a spouse, other family member, or friend. The form may also be administered by an SC staff member.

allows for a "smart" ASU which can be pre-printed with the date of the previously completed ASU and mailed to the participant or administered via the telephone. Instructions for generating a directive in for the "smart" ASU can be found in the
If the SC chooses not to use the "smart" ASU then the date when the ASU was previously completed or the anniversary date of randomization, whichever is most recent, must be manually entered in the space provided.

The ASU can be administered as part of the screening visit during the T_1 and T_2 years. It can also be administered by mail or by telephone in advance of the screening visit. For subsequent years of the study, the ASU should be mailed or completed by telephone during the participant's activity window. Only one ASU should be receipted for each participant per study year.

For Office Use Only:

This section should be completed by the SC Coordinator prior to the screening visit.

Participant ID Label: Affix a PID label in the space provided.

Participant's Name: Write the participant's name in the designated space in the upper right corner of the sheet. (This is also the space where the PID label will be placed once the ASU is completed and returned.)

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Enter the four-digit SC staff ID number.

Study Year: Enter the current study year for the participant.

Specifications for completion of the form are given below. This section may be completed by the participant or administered by an SC staff member.

1.* In the period from (date) to the present, have you been diagnosed with cancer by a health care provider? (Do not include basal-cell or squamous-cell skin cancers.)

Instruct the participant to mark "Yes" or "No" depending on whether or not s/he was diagnosed with cancer during this time period. This does not include self-diagnosed cancer. The participant must have been told by a health care provider (health care provider, nurse, etc.) that s/he has cancer. The date on this question will either be pre-filled by an directive or must be manually filled in by the SC. The date should be the date the last ASU was completed or the randomization anniversary date, whichever is most recent.

**This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink,*

and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

2. What type of cancer was diagnosed? (Please record all cancers diagnosed during this period except basal-cell and squamous-cell skin cancers):

Instruct the participant to list each cancer that was diagnosed during the period of time outlined in Question 1 (i.e., "from your last screening examination to the present"). As noted in the question, basal-cell and squamous-cell skin cancers should not be recorded on the form. Also instruct the participant to complete the month, day, and year of the diagnosis and the hospital or clinic where the cancer was diagnosed. If the exact day is unknown, the participant should record the correct month or year and record "99" for the day.

The following instructions apply to the ASU:

A. If Q.1 = Yes and no cancer is listed in Q.2 or if Q.1 = No or is blank and cancer is listed in Q.2, data retrieval needs to be performed.

B. If Q.1 = Yes and cancer is listed in Q.2, regardless of the type of cancer, a Cancer Diagnosis Form (CDF) must be completed. If the reported cancer is lung cancer, the CDF will trigger the expectation of a Diagnostic Evaluation Form (DE).

C. If Q.1 = Yes but the date in Q.2 is not within the time period covered by the ASU and the cancer has been previously reported, data retrieval can be performed by editing the participant's response (i.e. Q.1 = No). If the cancer has not previously been reported (regardless of the diagnosis date) or if it was diagnosed within the time period covered by the ASU, even if it has been reported or confirmed by another source, the participant's response to Q.1 cannot be edited and a CDF must be completed.

3. What is the name, phone number, and address of the health care provider who diagnosed the most recent cancer?

Instruct the participant to list the health care provider's name, phone number, and address.

4. Have you smoked any cigarettes, even a puff, in the last seven days?

Instruct the participant to mark yes or no to indicate if s/he has smoked any cigarettes in the past seven days.

5. In the past 12 weeks, have you had pneumonia or an acute respiratory infection that was treated with antibiotics by a physician?

Instruct the participant to mark yes or no to indicate if s/he has had pneumonia or an acute respiratory infection that was treated by antibiotics by a physician in the past 12 weeks.

If the participant has had pneumonia or an acute respiratory infection that was treated with antibiotics in the past 12 weeks, the box for "Yes" should be marked. If "Yes" is marked then the SC should inform the participant that the screening exam will be scheduled 12 weeks after s/he has completed treatment with antibiotics. The SC should document this

situation in the participant's study record and ensure that the screening exam is scheduled in the appropriate timeframe.

If the participant has not had pneumonia or an acute respiratory infection in the past 12 weeks, or has had such an infection but it was not treated with antibiotics, the box for "No" should be marked.

6. Who completed this questionnaire?

If the participant completed the form himself/herself, s/he should mark the box next to "Study Participant."

If the participant's spouse completed the form for the participant, s/he should mark the box next to "Spouse."

If the person who completed this form is not the participant or his/her spouse (e.g., brother, friend, neighbor, SC staff member), the respondent mark the box next to "Someone else" and specify the relationship to the participant on the line provided.

7. What is today's date?

The participant should write the month, day and year s/he completed this questionnaire in the space provided.

- If the participant left all parts of the date blank (month, day, and year), replace the blanks with the full receipt date (month, day, and year). Record this date in another color ink in the space provided.

- If the participant wrote a partial date (e.g., month, day only) or a partially incorrect date (e.g., month and day fall prior to date questionnaire was completed), replace what the participant wrote with the full receipt date (month, day, and year). Record this date in another color ink in the space provided. Do not replace part(s) of the completion date with part(s) of the receipt date.

- In the white space next to the question, record the fact that the date is the receipt date and your initials.

8. Comments:

The participant may use this space to record any other information or comments that s/he would like to communicate to the SC staff.

Upon receiving the form at the SC:

- If this form was administered by SC staff, thank the participant for answering the questions.
- If completed by the participant at the SC, instruct him/her to return it to the designated SC staff member or location. Thank the participant for completing the form.

- If the form is to be completed by the participant at home, instruct him/her to mail the form to the SC address at the bottom of the form. The SC should provide a self-addressed envelope for this purpose.
- Black out the participant's name in the PID label spot in the upper right corner of the form. Black out the name on both sides of the form. Affix a PID label in this space. Place it over the participant's name. **DO NOT** write the PID in.
- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.
- If cancers were reported, complete a CDF for each cancer.

National Lung Screening Trial (NLST)

ANNUAL STUDY UPDATE – POST SCREENING (ASU-PS)

For Office Use Only	
Screening Center ID: |___|___| Screening Center Staff ID: |__|__|__|__| Study Year: T|__|	Initials Complete: _____ Initials QC: _____ Participant ID Label

Please answer the following questions as best you can. ***If you cannot remember an exact date, please provide an approximate date.***

1. In the period from (_____/_____/_____) to the present, have you been diagnosed with cancer by a health care provider?
(Do not include basal-cell or squamous-cell skin cancers.)
Date

☐ Yes
☐ No (If no, go to Item 4)

2. What type of cancer was diagnosed? (Please record all cancers diagnosed during this period except basal-cell and squamous-cell skin cancers.)

Type/Site of Cancer (breast, lung, etc)	Date of Diagnosis	Hospital or Clinic Where the Cancer was Diagnosed
A. _____	_____/_____/_____	_____
B. _____	_____/_____/_____	_____
C. _____	_____/_____/_____	_____

3. What is the name, phone number and address of the health care provider who diagnosed the most recent cancer?

FULL NAME OF PROVIDER OR CLINIC

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1 ( ) | TELEPHONE 2 ( ) | FAX NUMBER: ( )

(OVER)

4. Have you smoked any cigarettes, even a puff, in the last seven days?

☐ Yes*

☐ No

***If you are a smoker and would like to quit smoking, we would like you to know that FREE information about quitting is available by calling 1-800/QUIT-NOW (1-800/784-8669) or by accessing www.smokefree.gov. They can provide information to you by mail or by telephone. They have helped many smokers, and, again, their services are free.**

5. Who completed this questionnaire? (Please mark one)

☐ Study Participant ☐ Spouse ☐ If someone else provided this information, please specify their name and relationship:

Name and Relationship: _____

6. What is today's date? |___|___| |___|___| |___|___|___|___|
MONTH DAY YEAR

7. Comments: _____

_____

_____

_____

_____

_____

_____

_____

Thank you for completing this questionnaire. Please return this form in the enclosed envelope.

(SC Name)
(Address)

National Lung Screening Trial (NLST)

Specifications for Completion of the Annual Study Update – Post Screening Form (ASU-PS)

The ASU-PS is to be completed annually through 2009 by all participants in the T_3 study year and beyond. In situations where the participant is unable to complete the form, the form may be completed by someone else such as a spouse, other family member, or friend. The form may also be administered by an SC staff member.

allows for a "smart" ASU-PS which can be pre-printed with the date of the previously completed ASU or ASU-PS and mailed to the participant or administered via the telephone. Instructions for generating a directive in for the "smart" ASU-PS can be found in the

If the SC chooses not to use the "smart" ASU-PS then the date when the ASU or ASU-PS was previously completed or the anniversary date of randomization, whichever is most recent, must be manually entered in the space provided.

The ASU-PS can be administered by mail or completed by telephone during the participant's activity window. The final ASU-PS will be administered to all participants using an accelerated schedule in 2010. See MOOP Section 3.6.1 for the timeline for administration of the 2010 ASU-PS.

For Office Use Only:

This section should be completed by the SC Coordinator prior to the screening visit.

Participant ID Label: Affix a PID label in the space provided.

Participant's Name: Write the participant's name in the designated space in the upper right corner of the sheet. (This is also the space where the PID label will be placed once the ASU is completed and returned.)

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Enter the four-digit SC staff ID number.

Study Year: Enter the current study year for the participant.

Specifications for completion of the form are given below. This section may be completed by the participant or administered by an SC staff member.

1.* In the period from (date) to the present, have you been diagnosed with cancer by a health care provider? (Do not include basal-cell or squamous-cell skin cancers.)

Instruct the participant to mark "Yes" or "No" depending on whether or not s/he was diagnosed with cancer during this time period. This does not include self-diagnosed cancer. The participant must have been told by a health care provider (health care provider, nurse, etc.) that s/he has cancer. The date on this question will either be pre-filled by an directive or must be manually filled in by the SC. The date should be the date the last ASU or ASU-PS was completed or the randomization anniversary date, whichever is most recent.

**This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink,*

and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

2. What type of cancer was diagnosed? (Please record all cancers diagnosed during this period except basal-cell and squamous-cell skin cancers):

Instruct the participant to list each cancer that was diagnosed during the period of time outlined in Question 1. As noted in the question, basal-cell and squamous-cell skin cancers should not be recorded on the form. Also instruct the participant to complete the month, day, and year of the diagnosis and the hospital or clinic where the cancer was diagnosed. If the exact day is unknown, the participant should record the correct month or year and record "99" for the day.

The following instructions apply to the ASU-PS:

A. If Q.1 = Yes and no cancer is listed in Q.2 or if Q.1 = No or is blank and cancer is listed in Q.2, data retrieval needs to be performed.

B. If Q.1 = Yes and cancer is listed in Q.2, regardless of the type of cancer, a Cancer Diagnosis Form (CDF) must be completed. If the reported cancer is lung cancer, the CDF will trigger the expectation of a Diagnostic Evaluation Form (DE).

C. If Q.1 = Yes but the date in Q.2 is not within the time period covered by the ASU and the cancer has been previously reported, data retrieval can be performed by editing the participant's response (i.e. Q.1 = No). If the cancer has not previously been reported (regardless of the diagnosis date) or if it was diagnosed within the time period covered by the ASU, even if it has been reported or confirmed by another source, the participant's response to Q.1 cannot be edited and a CDF must be completed.

3. What is the name, phone number, and address of the health care provider who diagnosed the most recent cancer?

Instruct the participant to list the health care provider's name, phone number, and address.

4. Have you smoked any cigarettes, even a puff, in the last seven days?

Instruct the participant to mark yes or no to indicate if s/he has smoked any cigarettes in the past seven days.

When administering the ASU-PS via telephone, if the participant's response to Q.4 is "Yes", read the following information to the participant:

If you would like to quit smoking, we would like you to know that FREE information about quitting is available by calling 1-800/QUIT-NOW (1-800/784-8669) or by accessing www.smokefree.gov. They can provide information to you by mail or by telephone. They have helped many smokers, and, again, their services are free.

5. Who completed this questionnaire?

If the participant completed the form himself/herself, s/he should mark the box next to "Study Participant."

If the participant's spouse completed the form for the participant, s/he should mark the box next to "Spouse."

If the person who completed this form is not the participant or his/her spouse (e.g., brother, friend, neighbor, SC staff member), the respondent mark the box next to "Someone else" and specify the relationship to the participant on the line provided.

6. What is today's date?

The participant should write the month, day and year s/he completed this questionnaire in the space provided.

- If the participant left all parts of the date blank (month, day, and year), replace the blanks with the full receipt date (month, day, and year). Record this date in another color ink in the space provided.
- If the participant wrote a partial date (e.g., month, day only) or a partially incorrect date (e.g., month and day fall prior to date questionnaire was completed), replace what the participant wrote with the full receipt date (month, day, and year). Record this date in another color ink in the space provided. Do not replace part(s) of the completion date with part(s) of the receipt date.
- In the white space next to the question, record the fact that the date is the receipt date and your initials.

7. Comments:

The participant may use this space to record any other information or comments that s/he would like to communicate to the SC staff.

Upon receiving the form at the SC:

- If this form was administered by SC staff, thank the participant for answering the questions.
- If completed by the participant at the SC, instruct him/her to return it to the designated SC staff member or location. Thank the participant for completing the form.
- If the form is to be completed by the participant at home, instruct him/her to mail the form to the SC address at the bottom of the form. The SC should provide a self-addressed envelope for this purpose.
- Black out the participant's name in the PID label spot in the upper right corner of the form. Black out the name on both sides of the form. Affix a PID label in this space. Place it over the participant's name. **DO NOT** write the PID in.
- The form should be checked to make sure it is accurate, legible, and complete.

- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.
- If cancers were reported, complete a CDF for each cancer. Cancers reported to have been diagnosed on or before December 31, 2009 must be investigated by a medical record abstractor and the outcome documented on the CDF. Cancers reported to have been diagnosed on or after January 1, 2010 must be documented on a CDF with the estimated diagnosis date; however, the diagnosis does not need to be investigated and confirmed.

National Lung Screening Trial (NLST)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear *(Participant Name)*:

Thank you for your participation in the National Lung Screening Trial (NLST). As you may recall, NLST participants are requested, on an annual basis, to inform study researchers of their medical history and to update their contact information.

Enclosed are two questionnaires: an **Annual Study Update** and a **Participant Contact Form**. The Annual Study Update requests information regarding your health, and the Participant Contact Form requests updates to the information we use to contact you, including your address and phone number, as well as your doctor's name. Please take a few moments to complete the Annual Study Update. Please review the Participant Contact Form and mark any necessary changes. Please return both the Annual Study Update and the Participant Contact Form (regardless of whether or not changes were made) in the postage-paid envelope provided. If you are unable to complete these forms, please contact the *(Local SC)* or have a member of your household contact the *(Local SC)* to advise us of your situation. Please be assured that all information you give will be kept confidential and will not be disclosed to anyone but the researchers conducting this study, except as otherwise required by law.

Again, we thank you for your cooperation. Your participation represents a valuable contribution to the study, and ultimately may help reduce the number of deaths each year from lung cancer.

If you have any questions about these forms or about any aspect of the National Lung Screening Trial, please do not hesitate to contact me or *(Name of SC Coordinator)* at (*Telephone Number*).

Sincerely yours,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 3-16 Sample Cover Letter for the Final Annual Study Update – Post Screening and Participant Contact Form

National Lung Screening Trial (NLST)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear *(Participant Name)*:

Thank you for your participation in the National Lung Screening Trial (NLST). As you may recall, NLST participants are requested, on an annual basis, to inform study researchers of their medical history and to update their contact information. Enclosed are your final **Annual Study Update** and **Participant Contact Form**. Although it may have been less than one year since you completed your last Annual Study Update and Participant Contact Form, we are requesting the information at this time because we are nearing the end of the study.

The Annual Study Update requests information regarding your health, and the Participant Contact Form requests updates to the information we use to contact you, including your address and phone number, as well as your doctor's name. Please take a few moments to complete the Annual Study Update. Please review the Participant Contact Form and mark any necessary changes. Please return both the Annual Study Update and the Participant Contact Form (regardless of whether or not changes were made) in the postage-paid envelope provided. If you are unable to complete these forms, please contact the *(Local SC)* or have a member of your household contact the (Local SC) to advise us of your situation. Please be assured that the contact information you provide will be kept confidential and the medical information you provide will be shared only with study researchers. The information you provide may be shared with others, however, if required by law.[1]

Again, we thank you for your cooperation. Your participation represents a valuable contribution to the study, and ultimately may help reduce the number of deaths each year from lung cancer.

If you have any questions about this form or about any aspect of the National Lung Screening Trial, please do not hesitate to contact me or *(Name of SC Coordinator)* at (*Telephone Number*).

Sincerely yours,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

[1] Decision Log #29

4. SPIRAL CT SCREENING EXAMINATION

4.1 Overview

Each participant in the spiral CT arm received three annual spiral CT screening examinations spaced one year apart. Screening Centers (SCs) were responsible for performing the spiral CT, having the spiral CT interpreted by a radiologist, and documenting the results of the spiral CT. This chapter describes these procedures. It also provides the NLST/LSS requirements for examiner training and certification and quality assurance procedures for this examination.

4.2 Participant Preparation

The following steps in the process of participant preparation were standardized across all SCs. The participant was told that the examination was a screening examination for lung cancer, not a complete physical examination, and that s/he should consult his/her health care provider for evaluation of any symptoms and for routine medical care. In addition, the participant was told that s/he would receive written documentation of the results of the screening examination within three weeks, and would be contacted by telephone in the event of a positive screen or a negative screen with clinically significant abnormalities. The participant was told that if s/he had a positive screen and did not have a health care provider, the SC would offer a list from which s/he may choose a health care provider. The participant was given a brief description of the screening examination.

Participants who received a pacemaker or internal defibrillator after randomization were eligible to receive CT scans with approval from their health care provider.

4.3 Examination Procedures

The participant was asked to disrobe above the waist. Hospital gowns were provided in accordance with standard procedures at the SC. The technologist explained the procedure and positioned the participant. The participant was instructed to hyperventilate for 20 seconds, and then to inhale deeply and to hold his/her breath while the spiral CT was taken. The entire lung region was scanned in a single

breath-hold of approximately 20 seconds. If this was not possible, "cluster" helical scans may have been obtained (ten seconds of scanning followed by a ten-second breathing break).

The technologist performing the spiral CT scan made the initial judgment about the quality of the scan before the participant left the SC. The quality should have been such that both lungs were completely scanned from apex through the lung bases, including both costophrenic angles. If the spiral CT scan was determined to be inadequate, the full scan was repeated. If only part of the exam was inadequate, however, it was allowable to perform a partial repeat scan covering only the inadequate area. In this instance, the final adequate screening exam was comprised of the two images and they were to be read in conjunction. The fact that a partial repeat scan was performed and the reason was recorded in the Comments section of the Spiral CT Screening Examination Form. Reasons for inadequacy are listed in Section 4.7.2. When a repeat spiral CT was necessary, it was to be taken during the same visit. However, no more than three CT scan attempts should have been made in one visit. It may have been necessary to arrange another screening visit to obtain an adequate spiral CT scan. This visit should have occurred as close to the initial visit as possible. No more than two visits were allowed to obtain a CT scan.

CT scans were then sent to the study radiologist for interpretation. If the radiologist determined that the CT scan examination was inadequate, the participant was asked to return for a repeat examination. CT scans were to be read by the study radiologist in a timely manner, so that the results could be reported to the participant within three weeks of the exam.

4.4 Equipment Specifications

The spiral CT scan was to be obtained with a multi-channel helical CT scanner (minimum of four channels) with the capability of producing CT scans at 120-140 kVp with a range of 40 - 80 mAs and 20 - 60 effective mAs, and a scan time of at most one second using 2.5 mm collimation (maximum effective slice thickness 3.2), pitch of 1.25 – 2.0 or equivalent (dependent on model/type of scanner), and contiguous reconstructions. The display FOV was to be the smallest diameter of the chest wall that would completely contain the lung parenchyma as measured from the widest point of outer rib to outer rib. In cases where the participant was obese, the radiologic technologist should have used the lowest possible machine setting to obtain an adequate screen, and documented the reason in the Comments section (Item A.6) of the SCT form. The Low Dose Chest CT Protocol Specifications are listed in Appendix 4-1.

Each technical parameter should have been set to allow for all technical parameters to fall within their specified ranges. For example, the highest allowable mAs (80) could not be used with the lowest allowable pitch (1.25), because it would result in an effective mAs of 64, which is outside of the specified range. The CT dose should have been as low as reasonably achievable while maintaining acceptable image quality. It was suggested that each site tailor the CT dose to the size of the patient, with at least three preset protocols for small, medium, and large participants. For spiral CT exams, the mAs and effective mAs may have operated below minimums if an adequate reason (e.g., higher kVp, less filtration, etc.) was documented in the Comments section of the Spiral CT Screening Examination Form. The maximum effective mAs may also have been exceeded to achieve acceptable image quality for very large patients, as needed, and was documented in the Comments section of the form.

Images were obtained using a standard algorithm or reconstructed using a high-resolution bone algorithm. The GE Lung and other lung algorithms were not allowed, as they could lead to difficulties in determining the presence or absence of calcification in a nodule. The reconstruction slice thickness was between 1-2.5 mm, and the reconstruction interval was 1-2.5 mm as well. Lung windows (standard width 1500, standard level -650) and mediastinal windows (standard width 400-500, standard level 10-30) were provided for review. The standard width and level setting may have been adjusted to optimize viewing. Filters may also have been used. Image review was conducted on soft copy display with a maximum of one on one for viewing and measuring. Magnification was encouraged for measuring.

In addition to these parameters, all equipment used on the NLST/LSS was required to meet the guidelines of the American College of Radiology (ACR). See Appendix 4-2 for the current ACR Guidelines. These guidelines can also be found at www.acr.org.

The SC was required to send documentation of equipment specifications to the CC. All documentation was also to be maintained in the SC NLST/LSS files. The CC forwarded all equipment specifications to the NCI for approval. The NCI was responsible for reviewing equipment specifications from each SC and making the final approval decision. Equipment specifications were also reviewed by an NCI designated medical physicist who made manufacturer specific recommendations for the dosing parameters to be used on each machine. This was done before screening began and whenever equipment was replaced during the course of the study.

4.5 Examiner Qualifications, Training, and Certification

The spiral CT examination required three radiologic personnel: the radiologic technologist, the medical physicist, and the radiologist. The minimum qualifications for these individuals and the NLST/LSS training protocol are discussed in this section.

4.5.1 Minimum Qualifications for Examiners

Technologists were American Registry of Radiologic Technologists (ARRT) certified radiologic technologists. The radiologists (interpreters and QA examiners) were American Board of Radiology (ABR) certified or board-eligible (chest) with a valid active medical license in the state in which screening was performed. Radiologists at Federal sites were required to have an unrestricted active license to practice medicine in their clinical specialty, issued by one of the states, the District of Columbia, or a possession of the United States. Medical physicists were certified by the American Board of Radiology in the subfield of Diagnostic Radiological Physics or the subfield of Radiological Physics. In addition to being appropriately certified, technologists, radiologists, and physicists were required to meet additional guidelines outlined by the American College of Radiology (ACR). See Appendix 4-2 or www.acr.org for current ACR Guidelines.

The SC was required to report the qualifications of each examiner by submitting a completed Record of Experience, Credentials, and Training (ECT, Appendix 11-5) to the CC. In lieu of submitting copies of diplomas and certificates, the SC may have attached a letter from the department chairman stating that the technologist was an ARRT certified radiologic technologist, the physicist was ABR certified or board-eligible, or that the radiologist was ABR certified or board-eligible and held a valid active medical license, and that additional ACR Guidelines were met. For any technologist who was not ARRT certified or any physicist or radiologist who was not ABR certified, or for any technologist, physicist, or radiologist who did not meet the remaining ACR Guidelines, the SC Principal Investigator was required to document and certify adequate training and experience in a letter submitted with a completed ECT to the CC. The CC reviewed all ECTs and, if the qualifications met the criteria, the CC recommended approval to the NCI. If the qualifications did not match the requirements, the CC requested an exception approval from the NCI on a case-by-case basis. **The ECT was required to be approved by the NCI prior to the initiation of screening activities.**

4.5.2 Training Protocol

One radiologist from each SC attended a central training session. The radiologists' training utilized a training CD containing a variety of images designed to help standardize the interpretation of images across NLST/LSS sites. The radiologist used the training CD to review the same interpretation guidelines with the remaining radiologists at the SC. Additionally, the radiologist used the CD to train technologists at his/her SC on the correct procedures for conducting the screening exams for the NLST/LSS. The radiologists also were trained on the screening exam forms. The SC Coordinator was responsible for training the technologist on the use of the study forms and SC administrative procedures.

4.5.3 Examiner Certification

No additional qualifications for the technologist, physicist, or radiologist were necessary for this examination. Certification through ARRT (for technologists) and ABR (for physicists and radiologists), plus an active valid medical license (for radiologists) and adherence to additional ACR Guidelines (Appendix 4-2) served as the qualification for these examiners.

4.5.4 Updates to Qualifications for Radiologic Personnel

On an annual basis, SCs were asked to submit updated qualifications for all radiologic personnel who continued to work on the NLST/LSS. For technologists, if an ARRT certification was submitted in the previous year, an updated and valid ARRT certification was required to be submitted. If a letter from the chair of the Radiology Department of the SC was sent to certify that the technologist was ARRT certified, then an updated letter, signed by the chair of the Radiology Department was required to be submitted. If updated credentials or a letter of certification was not submitted for annual review, the technologist was unable to continue working on the NLST/LSS. Once screening operations officially ended, as described in Section 3.4.3, updates to qualifications for radiologic personnel were no longer required.

4.6 Documentation of the Examination

Information documenting that the CT scan was taken and the interpretation was made by the radiologist was recorded on the Spiral CT Screening Examination Form (SCT, Appendix 4-3). In addition to the examination result, the NLST/LSS images were stored.

4.6.1 The Spiral CT Screening Examination Form (SCT)

The SCT form was used to document the results and findings of the examination. Every screening visit was required to be documented, regardless of outcome. The form provided documentation that the examination was completed, whether the results were normal or abnormal, and a description of abnormal findings. The SC Coordinator or staff member completed the Administrative Section on the first page of the form and the radiologic technologist completed Part A. If adequate images were obtained, Parts B through E of the form were completed by the radiologist. If the technologist did not obtain adequate images, Parts B and C were left blank and the radiologist completed Items D.1, D.3, and E.6. The radiologist did not complete a comparison review (Item E.3) if the image read in isolation was inadequate. If documentation of the exam, including exam images, was lost and could not be recreated, Parts A and B and Items D.3 and E.6 were required to be completed. A Protocol and HIPAA Violation Form (PHVF) also was required. Specifications for Completion of the SCT Form are provided in Appendix 4-4. It was the responsibility of the SC Coordinator to train the technologists and radiologists in the use of the form.

After the form was completed, the SC Coordinator reviewed it to ensure that it had been filled out completely, including items in the Administrative Section. The SCT form was edited as necessary. Any data retrieval involving the examiner was to be performed as expeditiously as possible since results reports were required to be sent to the participant and to his/her health care provider within three weeks of the screening visit. The SCT form was entered into and filed in the participant's study file.

4.6.2 Storage of Lung Screening Study Spiral CT Images

The spiral CT images were labeled with the participant's name and PID number. The SC was responsible for storing the images for each of the participant's spiral CT screening examinations for

the duration of the study. Inadequate images were to be retained at the SC until adequate images were obtained. Upon collection of an adequate image, inadequate images could be discarded. Spiral CT images for the NLST/LSS were required to be stored in a manner that was consistent with the confidentiality agreement for the study. It was recommended that a participant's images not be stored with the participant's medical record or with other images that were not related to the NLST/LSS. If an SC wanted to store NLST/LSS data in the regular medical record, the SC was required to submit to the NCI (via the CC) documentation of the methods that would be used to maintain confidentiality of the data.

The spiral CT images were the photo documentation of the exam. It was acceptable for SCs to utilize digital storage of images (as in CR systems), but the capability to retrieve the images at any time was required. If digital storage was used, a backup digital copy of the images also was required to be maintained. SC methods for utilizing digital storage were required to comply with participant confidentiality standards. If the SC failed to maintain the original screening exam image (due to loss, corruption, or irreversible modification such that the image could no longer be read according to study protocol) and no backup copy existed, this was considered a protocol violation and a PHVF was completed.

4.7 Interpretation of Findings

Each examination was reviewed by a board certified or board-eligible chest radiologist who met current ACR guidelines and held a valid active medical license and the results of the review, including any abnormalities, were recorded. The interpretation of findings was recorded in two distinct steps on the SCT form. The Spiral CT Interpretation Results section (Part D) reflected the current spiral CT examination findings only. The participant's prior medical history, prior radiologic examinations, or prior NLST/LSS screens were not to be considered when assigning the examination result recorded in Part D of the SCT form. The Spiral CT Comparison Results section (Part E) reflected the comparison of the current spiral CT examination with historical images for that participant, including NLST/LSS screens, any available non-NLST/LSS images, as well as any accompanying radiologic reports. At T_1 and T_2, the current examination was required to be compared to prior NLST/LSS screens, as well as any other available studies as described below. The result of the comparison read recorded in Item E.3a was considered to be the final result of the screening examination, and this was the result that was communicated to both the participant and the participant's physician.

To complete Part E, T_1 screening exams were compared with T_0 screening exams. T_2 screening exams were compared with T_0 and T_1 exams. However, if the screening examinations from all three study years were negative, then the T_2 screening examination could be compared with either the T_0 or T_1 screen, or both screens, at the radiologist's discretion. If the T_0 and T_1 exams were lost or otherwise unavailable, the radiologist marked "No Image Available" in Item E.1 and stated the reason in the Comments section, Item E.5. In addition, a Protocol and HIPAA Violation Form was completed. The type of protocol violation was marked as "Other" and described in the space provided, indicating that the comparison read was not performed and providing the reason. For example, "T_1 comparison read not performed, T_0 exam was lost." The date the protocol violation occurred was the date that the current screening exam was read. If either the T_0 or T_1 screening exam was not completed, then the T_2 exam was compared to the existing previous exam and no PHVF was required.

In the event that a screening exam was inadequate and a repeat screen was performed, the inadequate screen could be used as the comparison image for the repeat screen at the radiologist's discretion. For example, if a T_1 screen was inadequate and a repeat T_1 screen was performed, then both the T_0 and the inadequate T_1 screens could be used as comparison images for the repeat T_1 screen. An inadequate screen could also be used for comparison in later study years. In this instance, the use of the inadequate screen was noted in the Comments section of the SCT form.

The following definitions of normal, abnormal, and inadequate findings are provided. These definitions were used by the radiologist in recording his/her findings on the SCT form.

4.7.1 Classification and Definition of Abnormal Examination Results

Definitions of lung screening results are given below:

- **Positive Screen – Abnormalities suspicious for lung cancer:**

  The following abnormality was always considered a positive screen:

  - Non-calcified nodule/mass $\geq$ 4.0 mm

  Other abnormalities, or constellations of abnormalities, may have been suggestive of lung cancer, but there was no absolute rule for coding other findings as suspicious for lung cancer. In these instances, the classification of a screening exam result as positive was left up to the radiologist.

If, at the T_1 or T_2 study year, the current screen was positive and the abnormality identified appeared not to have changed when compared to previous images at the comparison reading (Part E), the radiologist recorded the result in the Spiral CT Comparison Results section (Item E.3a) as B – "Abnormalities suspicious for lung cancer, no significant change."

When previous images from two successive study years had not changed and the third screen was positive and appeared unchanged from the previous images, the radiologist was permitted to code that result as D – "Minor abnormalities not suspicious for lung cancer" at his/her discretion, rather than coding the image as suspicious for lung cancer. Additionally, the radiologist specified in the Comments section (Item E.5) why the result was coded as D.

- **Negative Screen – Clinically significant abnormalities not suspicious for lung cancer:**

  The review of the scan revealed that an abnormality was present and required further evaluation, but was not suggestive of lung malignancy. It was up to the radiologist to determine whether an abnormality was clinically significant. If after baseline screening a clinically significant abnormality remained stable and unchanged on subsequent screening examinations, the abnormality could be coded as D – "Minor abnormalities not suspicious for lung cancer" at the discretion of the radiologist, rather than coding the image as a clinically significant abnormality. Additionally, the radiologist specified in the Comments section (Item E.5) why the result was coded as a D.

- **Negative Screen – Minor abnormalities not suspicious for lung cancer:**

  The review of the scan revealed a minor abnormality that was not suspicious for lung cancer. It was up to the radiologist to determine whether an abnormality was minor.

4.7.2 Criteria for Determination of a Negative or an Inadequate Spiral CT

- **Negative Screen – No significant abnormalities:**

  The review of the scan revealed no significant abnormalities.

- **Inadequate:**

  A spiral CT was judged to be inadequate if the image did not include both lungs from apex through the lung bases, including both costophrenic angles. Reasons for inadequacy may have included, but were not limited to:

  - Participant refusal;
  - Equipment malfunction;

- Poor image quality, including:
  - Motion or processing artifact;
  - Incomplete evaluation of the thorax;
  - Inappropriate CT technique, and
  - Excessive noise.

If the image was considered inadequate, but based on what was visible on the image there was an overt suspicion of lung cancer, the result of the screening exam was recorded as positive.

4.8 Reporting Results to Participants and Health Care Providers

The SC reported results of a spiral CT screening examination in writing to the participant and to the participant's health care provider **within three weeks of the screening visit**. Results were sent with a cover letter on SC letterhead. The SC may have incorporated results into the cover letter, attached a copy of the radiologist's dictated report, or produced a customized report of results. The SCT form was not sent to the participant to report the results of the screening exam. The combination of documents sent was required to reflect the results of the examination. In addition to written notification, positive screens and negative screens with clinically significant abnormalities were reported to participants by telephone. If the participant was unreachable by telephone, the results were sent by certified mail with return receipt requested. Positive screens and negative screens with clinically significant abnormalities were reported to the health care provider either by telephone, fax, or certified mail. If the fax method was chosen, it was recommended that the health care provider's office be telephoned and advised of the fax transmittal in advance. Other negative screens were reported to the participant and his/her health care provider according to standard radiologic practice at the SC.

The guidelines provided above for reporting results to participants and health care providers were the minimum acceptable procedures, as set by the NCI. Individual institutional policies may have required some SCs to take additional measures for reporting results. See Chapter 6 for additional information regarding reporting results of screening examinations.

Participants with a result of "Positive Screen" were referred to their health care provider for further evaluation. If a participant did not have a health care provider, the SC offered a list from which the participant could choose a health care provider to receive the results. In all cases where there was a

positive spiral CT screen, referral was recommended as outlined in Section 4.8.1. The SC continued to monitor and follow up with all participants who had a positive screening result.

4.8.1 Diagnostic Follow-up Recommendations

Participants with positive spiral CT screens were referred to their health care providers. They and their health care providers were also provided with general recommendations that the radiologist felt were appropriate for the findings from the screening examination. The status of the participant referral (e.g., saw health care provider; has not seen health care provider but appointment has been scheduled; plans to schedule appointment; has no plans for follow-up) was monitored by the SC. If requested, the SC Coordinator offered the participant a list from which s/he could choose a specialist.

The NCI did not provide recommendations for diagnostic follow-up of positive screens to the participant or to his/her health care provider. The recommended diagnostic options listed on the SCT form reflected typical options for follow-up in accordance with standard practices at the SC. In all communications it was required to be clear that the recommendations did not arise from and were not endorsed by the NCI. The SC could refer inquiries to providers that were considered to be experts in the field and could provide the 1-800-4-CANCER hotline number as an additional source of information. It was expected that diagnostic evaluation would adhere to current medical standards of practice.

4.8.2 Lung Cancer Diagnosis

The final diagnosis of lung cancer was made by histopathology or cytopathology, or in rare cases, by clinical examination only. Pathology reports that supported the cancer diagnosis were to be obtained for all participants. The cancer was coded according to ICD-O-3 codes by a certified tumor registrar (CTR) at the SC. The diagnosis was documented by the SC on the DE form (Appendix 7-2) and submitted to the CC.

4.8.3 Treatment Recommendations for Individuals Diagnosed with Lung Cancer

The NLST/LSS did not make specific treatment recommendations for individuals diagnosed with lung cancer. Participation in the NLST/LSS did not preclude a participant from involvement in any treatment protocol.

4.9 Examination Standardization and Quality Control

NLST/LSS implemented a three-pronged approach to quality assurance and control to ensure standardization throughout the screening process. The quality assurance (QA) measures included equipment and personnel quality control (QC), image QA, and image interpretation QA. The NLST/LSS Screening QA Working Group developed and implemented the QA protocol. The Mallinckrodt Institute of Radiology at Washington University, the Quality Assurance Coordinating Center (QACC), directed the administration of the QA protocol with support from the CC.

4.9.1 Quality Control of Equipment

Quality control (QC) of the equipment was assured by the individual institution according to the guidelines for equipment quality control developed by the NLST/LSS Screening QA Working Group and the NLST Medical Physicist Working Group. The equipment quality control guidelines were based upon the guidelines outlined by the American College of Radiology (ACR) for ongoing equipment QC measures. Each SC designated a qualified medical physicist to oversee the equipment QC and to ensure that ACR guidelines are met. The medical physicist was required to complete and submit an ECT (Appendix 11-5) to the CC. It was the primary responsibility of the medical physicist at each site to implement and document the equipment QC protocol. The SC was required to maintain records of equipment maintenance and QC activities that were readily available for auditing during site visits.

The quality control guidelines consisted of the Low Dose Chest CT Protocol Specifications listed in Appendix 4-1, the CT Quality Assurance Information listed in Appendix 4-5, and the forms found in Appendices 4-6 through 4-9, which were completed by the medical physicist at each SC and returned to the Screening QA Working Group to provide documentation of adherence to the CT protocol specifications and equipment testing requirements. Documentation of equipment characteristics was provided once for each piece of equipment and was updated as necessary. Attestation to performance

testing and documentation of CT dosimetry measurements were provided annually and documentation of water phantom measurement was provided bi-monthly. Once screening operations officially ended, as described in Section 3.4.3, completion of equipment QC tests and forms was no longer required.

4.9.2 Quality Control of Technologists

The CC maintained a complete list of the radiologic technologists working at all SCs. The radiologic technologists were required to complete and submit an ECT (Appendix 11-5) to the CC. For each radiologic technologist, the CC monitored the number of and reasons for inadequate screening examinations. The CC considered the final result as inadequate if the screening examination could not be repeated to obtain an adequate examination.

4.9.3 Image Quality Assurance

The goal of image QA was to establish consistency across the SCs in the adequacy of the screening images obtained and the appropriateness of the acquisition parameters. It was not the purpose of image QA to comment on the interpretation of the images by the radiologists. Information derived from image QA was used to report on the adequacy of screening images and for educational and training purposes. The process of image QA is outlined below.

4.9.3.1 Image QA System Overview

Image QA was performed using a Web-based system developed by the QACC. The QACC distributed a to each SC for use with image QA. The consisted of PC compatible hardware and software developed to assist with image anonymization and image collection for clinical trials. The QACC developed and distributed the (Appendix 4-10) to the SCs to aid in the installation, use, and maintenance of the The SCs transmitted images from the to the QACC using a Virtual Private Network (VPN) over the Internet. The QACC then copied the images to a Web-based system that was used by the radiologists for image review. A detailed overview of the image transmittal process can be found in Section 2 of the

4.9.3.2 Image QA Radiologists

The image QA review process was conducted by four NLST/LSS radiologists, all members of the NLST/LSS Screening QA Working Group. The QA radiologists were designated by the NLST/LSS Screening QA Working Group with approval by NCI. Each QA radiologist reviewed approximately six to seven electronic image sets per week and performed quarterly visits to those SCs that used screen film for chest x-ray images (refer to section 5.9.3.1 for details). The QA radiologists received separate training on the for image transmittal and review. QA radiologists also accompanied NCI and the CC on annual site visits to the SCs. As part of the annual site visits, QA radiologists observed screening exams, verified technical parameters being used for screening, met with the SC lead radiologist, participated in the exit interview, and wrote a QA site visit report.

4.9.3.3 Selection of Images for QA

The number of images reviewed for image quality and correctness of image parameters was driven by two quantities: the acceptable percentage of inadequate images and the percentage of truly inadequate images that were detected as inadequate. An image set was considered to be inadequate if it was of substandard quality (i.e., did not include a clear view of the entire lung field) or its acquisition parameters were outside the ranges set forth by the NLST protocol. The number of image sets chosen for image QA was 430 for each screening arm (for a total of 860), which was calculated assuming a 1% acceptable inadequate rate and assuming that 3% of truly inadequate exams would not be detected as inadequate.

The CC randomly selected 72 image sets for QA review (36 SCT/36 XRY) on a monthly basis. Each of the image sets selected was assigned to one of the four QA radiologists. QA radiologists did not review image sets from their own screening center. Image sets were selected from exams recorded as being of adequate diagnostic quality on the SCT or XRY form and for which data had been received at the CC the month prior to the selection process. Repeat screening exams (due to the first exam failing image QA) were eligible for future selection as a QA image set. Screen films were identified from the XRY form and included in the selection process although the films were not sent to the QACC. Screen films were reviewed separately at site visits, as described in section 5.9.3.1.

The CC sent by e-mail the PID, type of image (digital vs. screen film), screening date, and ID number of the assigned reviewer to the QACC on the 15th day of every month (or closest business day). The CC also sent each SC a list of PIDs, type of image, and screening dates for selected images on the 15th day of every month. The SCs only saw their list of images selected for QA. After receiving the monthly list, each SC had one week to transmit the requested image sets to the QACC.

4.9.3.4 Transmitting Images

The (Appendix 4-10) gives detailed instruction on transmitting image sets between the SC and the QACC. Depending on local protocol, these images were most likely stored on a Picture Archive and Communications System (PACS) in the Radiology Department or on a single-purpose storage device under the control of the screening center.

Once the CC e-mailed the list of image sets selected for review, a designated staff member at the SC transmitted those images to the at the SC. After the images were received at the a staff member removed the personal identifiers and transmitted the image sets from the to the QACC using a VPN over the Internet. While the PID remained on the image sets, no personal identifying information was included in the transmission.

A check-in process was performed as the image sets were received at the QACC, which included assigning a unique accession number to each image set to replace the PID. Only the QACC had the key to cross-reference the PID and the accession number. The images were then copied to a Web-based system that was used by the radiologists for image quality review. At the same time, a second Web-based system was updated to give the QA radiologist a list of studies to review. The QA radiologist performing reviews used a Web browser (Internet Explorer) and connected to the QACC through the same VPN software used by the SCs to transmit images. Once the connection was made, the Web browser could connect to the Web server and provide images for review.

Although the CC generated and sent a list of images selected for QA review to the QACC and the SCs on a monthly basis, the QACC submitted a subset of the selected images to the four QA radiologists on a weekly basis for review (approximately six to seven images per week per QA radiologist). This helped the QA radiologists avoid a backlog of images needing review. It was the responsibility of the QACC to track images submitted to the QACC from the SCs, to track images sent to

the QA radiologists for review, and to track those images for which the review process was complete. The CC assisted the QACC in contacting SCs if image transmittal was delinquent.

4.9.3.5 Completing the Image Quality Review

Detailed instructions for the QA radiologists to complete the review process are outlined in Section 8 of the QA review involved the use of two desktop windows, the and After logging on the QA radiologist could see the image sets scheduled for his or her review and could then launch the image review application called The QA radiologist was blinded to the PID number and its SC, and could only see an accession number provided by the QACC.

The QA radiologist completed a simple, single-screen table for each selected image set. The table asked the QA radiologist to review the image in terms of appropriate acquisition parameters used and acceptable image quality. The QA radiologist also stated whether in his or her opinion a re-screen was necessary for the participant.

If a discrepancy existed between the QA radiologist and the screening radiologist as to the adequacy of the image set, or the acquisition parameters were found to be outside the range specified by the NLST protocol, the image set was considered inadequate. Image sets that were found to be inadequate by initial review of the QA radiologist were sent to the remaining QA radiologists for adjudication. The QA radiologists were blind to the adjudication process; they did not know that the image set had previously "failed" the QA review. The majority opinion on the QA review dictated the disposition of the image set.

If the acquisition parameters were outside the range set forth in the NLST protocol, the QACC contacted the CC to obtain a PHVF from the SC where the image set was obtained. The QA radiologist decided whether the participant needed to be re-screened when the image set was adequate yet the acquisition parameters were outside the specified range. An image set was considered unsatisfactory if the image set was inadequate, the acquisition parameters were out of range, or both.

It was the responsibility of the QACC to track unsatisfactory image sets sent to the QA radiologists for subsequent review. In the event an image set "failed" the QA review process (two or more of the QA radiologists deemed the image quality or acquisition parameters unsatisfactory), then the

QACC notified the CC with the PID of the unsatisfactory image set as soon as it was identified. The CC then notified the SC regarding scheduling a repeat screening examination for the participant. The SC contacted the participant and scheduled a repeat screening examination as soon as possible. The SC tracked those participants requiring a repeat screening examination due to image QA and documented such on the screening exam form.

4.9.3.6 Ensuring Participant Anonymization

Section 10 of the outlines the participant anonymization process. At the SCs imaging studies were sent directly from the CT or CR scanners, or PACS to the The stored the image sets with no modifications on the local disk system. The software presented the participant's name to the SC user to help ensure that the proper studies were forwarded to the QACC.

When the user transmitted a study to the QACC, the workstation software automatically removed the participant identifiers from the DICOM headers. Before transmitting the image sets the user specified the PIDs of the images being transmitted. The PID was required by the QACC to identify the proper study for QA. The system used a commercial VPN solution to connect the workstation to computer systems at the QACC behind a firewall. The VPN used 128 bit encryption software on the workstation and a firewall system at the QACC.

The QACC had only the PID to identify the image sets transmitted by the SCs. The QACC had no mechanism to link these images to the participant. It was assumed that the SCs would have some means of linking PIDs with participant identifiers. Steps to ensure anonymization of images were designed to satisfy IRB or HIPAA requirements. The QACC worked with the SCs to ensure that their anonymization needs were met and that the proper documentation was available for IRB review.

4.9.3.7 Data Transmission, Management, and Reporting

The QACC sent data to the CC on a quarterly basis. The QACC and the CC agreed to the type and format of the image QA data that were sent. The CC created a separate QA database to manage all NLST/LSS QA activities, including tracking, scheduling, and reporting. The database was used in conjunction with the QACC database and The NCI and the NLST/LSS Screening QA Working

Group designated type, substance, and frequency of reports that were generated from the image QA data. The CC generated regular reports from the image QA review process.

4.9.4 Image Interpretation QA

The NLST/LSS Reader Variability Study (RVS) assessed Quality Control (QC) of spiral CT interpretation by determining the level of association between the results coded by the study radiologists at T_0. The study was coordinated by the Quality Assurance Coordinating Center (QACC) in association with the CC. All NLST/LSS radiologists were asked to participate in the study, which was conducted during the first year of NLST.

The CC randomly selected PID numbers for images in the following categories and submitted them to the SC Coordinators:

- 51 (non-calcified nodule/mass>/= 4mm)
- 52 (non-calcified nodule<4mm)
- 53 (benign lung nodule(s) (benign calcification)
- Cases coded >/= 54 (all other abnormal cases)

The SCs were asked to forward the selected images to the QACC in the same manner in which they submitted QA images. The QACC compiled all of the images on one CD and sent it to the lead radiologist at each site. Reporting sheets were also designed by the QACC and sent to the SC.

Radiologists were asked to view all the images and classify them into one of the above categories. Images were read using the built-in reader functions on the
provided by NLST/LSS to ensure standard monitor resolution and image quality. The radiologists were also asked to measure the size of the nodule using tools built into the reader. The data were anonymously submitted on the QA Web site using the form described above.

The QACC gathered and analyzed the data and presented it at an NLST/LSS Steering Committee Meeting. The results of the study were intended to guide future NLST/LSS study activities including possible training and further research.

Appendices for Chapter 4

4-1 Low Dose Chest CT Protocol Specifications

4-2 American College of Radiology (ACR) Guidelines

4-3 Spiral CT Screening Examination Form (SCT)

4-4 Specifications for Completion of the Spiral CT Screening Examination Form

4-5 CT Quality Assurance Information

4-6 CT Equipment Characteristics Form

4-7 Attestation to CT Performance Testing Form

4-8 Bi-Monthly CT Water Phantom Measurement Form

4-9 CT Dosimetry Measurements Form

4-10

4-11 NLST/LSS Screening Exam Form Data Handling Guidelines

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

LOW DOSE CHEST CT PROTOCOL SPECIFICATIONS

NLST CT Specifications:

(agreed to at joint LSS/ACRIN NLST Medical Physicist Working Group Meeting (MPWG), June 6, 2003)

1. Only multi detector CT scanners with a minimum of four channels shall be used.

2. The CT kVp range shall be 120 – 140; 120 is preferred.

3. Reconstructed slice thickness may range from 1.0 – 2.5 mm.

4. Effective slice thickness (if known) may not exceed 3.2 mm.

5. CT pitch (i.e., table movement per rotation / total collimation) may range from 1.25 – 2.00.

6. The mAs (i.e., mA x scan rotation time) may range from 40*- 80.

7. The effective mAs (i.e., mAs / pitch) may range from 20*- 60, with the following stipulations pertaining to the dose / image quality balance.

* may operate below minimums if reason documented (e.g., higher kVp, less filtration, etc.)

- Sites should use the lowest effective mAs that achieves acceptable image quality.
- The effective mAs specification shall be reviewed by the MPWG in six months.

8. The specification of a maximum reference dose shall be reviewed after all sites have completed consistent dose (CTDI) measurements using NLST protocol techniques.

The MPWG recommends ancillary studies to address the question of maximum acceptable noise level at minimum dose.

9. The topogram "scout" view(s) technique should reflect the following:

- The initial scout view may be LAT or PA (not AP, to spare breast dose).
- A second scout view, PA or LAT, may be done if desired.
- Allowable scout techniques should be reviewed, and set as low as possible to minimize patient dose.

10. The total CT scan time should be kept to a maximum of 25 seconds to facilitate reasonable breath holds (LSS specification; not discussed at joint meeting).

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ACR PRACTICE GUIDELINE FOR COMMUNICATION: DIAGNOSTIC RADIOLOGY

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

Communication is a critical component of the art and science of medicine and is especially important in diagnostic radiology. An official interpretation[1] shall be generated following any examination, procedure, or officially requested consultation. In addition, the interpreting physician and the referring physician or other health care provider have other opportunities to communicate directly with each other during the course of a patient's case management. Such communication should be encouraged because it promotes optimal patient

[1]The ACR Medical Legal Committee defines official interpretation as that written report (and any supplements or amendments thereto) that attach to the patient's permanent record. In healthcare facilities with a privilege delineation system, such a written report is prepared only by a qualified physician who has been granted specific delineated clinical privileges for that purpose by the facility's governing body upon the recommendation of the medical staff.

care and focuses attention on selection of appropriate and cost-effective imaging studies, clinical efficacy, and radiation exposure.

Diagnostic radiology practice is primarily a consultative physician service. The interests of both patients and their referring physicians are well served when the following are among the elements of the radiologic consultation and are completed in all practice settings: a) pre-examination evaluation of the patient by the referring physician; and b) a request for radiologic consultation that includes pertinent clinical findings, a working diagnosis, presenting signs or symptoms, and specific question to be answered by the radiology study. Such information assists both in promoting optimal patient care through interpretation of images based on appropriate clinical information and in enhancing the cost-effectiveness of diagnostic examinations by obtaining the optimal images.

Communication of patient information must be in accordance with federal and state privacy requirements.

II. THE DIAGNOSTIC RADIOLOGY REPORT

An official interpretation (final written report) shall be provided with all radiologic studies regardless of the site of performance (hospital, imaging center, physician office, mobile unit, etc.). The report should include the following items as a minimum:

A. Demographics

1. Name of patient and another identifier, such as social security number or hospital or office identification number.
2. Name of any referring physician(s) or other health care provider(s).
3. Name or type of examination.
4. Date of the examination.
5. Time of the examination, if relevant (e.g., for patients who are likely to have more than one of a given examination per day).
6. Inclusion of the following additional items is encouraged:
   a. Date of dictation
   b. Date of transcription
   c. Birth date or age
   d. Gender

B. Relevant clinical information and ICD-9 code as available

C. Body of the Report

1. Procedures and materials
   The report should include a description of the studies and/or procedures performed and any contrast media (including concentration and volume when applicable), medications, catheters, or devices used, if not recorded elsewhere. Any known significant patient reaction or complication should be recorded.
2. Findings
   The report should use precise anatomic**,** pathologic, and radiologic terminology to describe the findings accurately.
3. Potential limitations
   The report should, when appropriate, identify factors that may limit the sensitivity and specificity of the examination.
4. Clinical issues
   The report should address or answer any pertinent clinical issues raised in the request for the imaging examination.
5. Comparative data
   Comparison with relevant previous examinations and reports should be part of the radiologic consultation and report when appropriate and available.

D. Impression (Conclusion or Diagnosis)

1. Unless the report is brief, each report should contain an “impression” section.
2. A precise diagnosis should be given whenever possible.
3. A differential diagnosis should be given when appropriate.
4. Follow-up or additional diagnostic studies to clarify or confirm the impression should be suggested when appropriate.
5. Any significant patient reaction should be reported in the impression.

III. OFFICIAL INTERPRETATION (FINAL WRITTEN REPORT)

A. The final written report is considered to be the definitive means of communicating the results of an imaging examination or procedure to the referring physician. Other methods for direct or personal communication of results are encouraged in certain situations. The timeliness of reporting any radiologic examination varies with the nature and urgency of the clinical problem.

B. The final report should be proofread to minimize typographical errors, deleted words, and confusing or conflicting statements.

C. The final report should be completed in accordance with appropriate state and federal requirements (see the Final Regulations, Mammography Quality Standards Act for Mammography Reporting). Electronic or rubber-stamp signature devices, instead of a written signature, are acceptable if access to them is secure.

D. The final report should be sent to the referring physician or health care provider providing the clinical follow-up. It should be noted that the referring physician or health care provider also shares in the responsibility of obtaining results of imaging studies they have ordered.

E. When feasible, a copy of the final report should accompany the transmittal of relevant images to other health care professionals.

F. A copy of the final report should be kept as part of the patient's medical record (paper or electronic) and be retrievable for future reference. Retention of these records should be in accordance with state and federal regulations and facility policies.

IV. OTHER INTERPRETATIONS

A. If requested to render an interpretation of an imaging study obtained at another facility, radiologists are encouraged to document their interpretations either by means of a formal report or other written documentation.

B. If requested to render an interpretation of an imaging study obtained at the same facility and previously reported, and a discrepancy is noted, an addendum should be rendered.

V. COMMUNICATION

A. Direct communication is accomplished in person or by telephone to the referring physician or an appropriate representative. Documentation of direct communication is recommended. In those situations in which the interpreting physician feels that immediate patient treatment is indicated (e.g., tension pneumothorax), the interpreting physician should communicate directly with the referring physician, other health care provider, or an appropriate representative. If that individual cannot be reached, the interpreting physician should directly communicate the need for emergent care to the patient or responsible guardian, if possible.

B. Under some circumstances, practice constraints may dictate the necessity of a preliminary report before the final report is prepared. A significant change between the preliminary and final interpretation should be reported directly to the referring physician.

C. In those situations in which the interpreting physician feels that the findings do not warrant immediate treatment but constitute significant unexpected findings, the interpreting physician or his/her designee should communicate the findings to the referring physician, other healthcare provider, or an appropriate individual in a manner that reasonably insures receipt of the findings.

VI. SELF-REFERRED PATIENTS

Radiologists should recognize the potential obligations of assuming the care and treatment of patients who present themselves for imaging studies on a self-referred basis. Such obligations may include communicating the results of the imaging studies to the patient and the necessity of appropriate follow-up.

ACKNOWLEDGEMENTS

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Michael C. Beachley, MD, Chair
Kimberly Applegate, MD
Anthony Bruzzese, MD
Eric N. Faerber, MD
Edmund A. Franken, MD
Sam Kottamasu, MD
Paul A. Larson, MD
William H. McAlister, MD
William R. Reinus, MD
Arvin E. Robinson, MD
Edward Weinberger, MD

J. Bruce Hauser, MD, Chair, Commission
Richard Mintzer, MD, CSC

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ACR PRACTICE GUIDELINE FOR GENERAL RADIOGRAPHY

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

Radiography is a proven and useful procedure that utilizes differences in X-ray attenuation to evaluate human anatomy and pathology. The goal of radiography is to establish the presence or absence and nature of disease by demonstration of the disease process itself or the effects of the disease process on the normal anatomy. The study should be done with the minimal radiation dose necessary to achieve an optimal study.

If an American College of Radiology (ACR) guideline or standard exists for the specific type of radiographic examination being performed, that guideline or standard as well as the general guidelines below would apply.

II. INDICATIONS AND CONTRAINDICATIONS

A. There are many indications for radiography, and these are dependent on the patient's clinical history and the disease processes that affect the anatomic area to be

studied. There should be a sufficient clinical indication to warrant performance of a study, and a reasonable anticipation that the results of the radiograph, normal or abnormal, will influence the treatment course of the patient. The indications should be communicated to the facility and the physician responsible for performance and interpretation of the radiographic study. The ACR Appropriateness Criteria™ should be considered when making these communications.

B. All imaging facilities should have policies and procedures to reasonably attempt to identify pregnant patients prior to the performance of any diagnostic examination involving ionizing radiation. If the patient is known to be pregnant, the potential radiation risks to the fetus and clinical benefits of the procedure should be considered before proceeding with the study (Res. 24, 1995).

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

A. Physician

Radiographs must be obtained under the supervision of, and interpreted by, a licensed physician with the following qualifications:

1. Certification in Radiology or Diagnostic Radiology by the American Board of Radiology, the American Osteopathic Board of Radiology, the Royal College of Physicians and Surgeons of Canada, or Le College des Medecins du Quebec.

or

2. The physician shall have documented a minimum of 6 months of formal dedicated training in the interpretation and formal reporting of general radiographs, including patients of all ages, in an Accreditation Council for Graduate Medical Education (ACGME) approved residency program including radiographic training on all body areas.

and

3. The physician should have documented training and understanding of the physics of diagnostic radiography and experience with the equipment needed to safely produce the images. This should include general radiography, screen-film combinations, conventional image processing, and, where applicable, digital image processing.

and

4. The physician must be familiar with the principles of radiation protection, the hazards of radiation exposure to both patients and radiologic personnel, and radiation monitoring requirement.

and

5. The physician shall have documented training and understanding of other medical imaging modalities (fluoroscopy, computed tomography, ultrasound, magnetic resonance imaging, nuclear medicine, etc.) and their value relative to general radiography in order to best evaluate the patient's clinical symptoms.

B. Maintenance of Competence

All physicians performing general radiography examinations should demonstrate evidence of continuing competence in the interpretation and reporting of those examinations. If competence is assured primarily based on continuing experience, a minimum of 200 examinations per year is recommended in order to maintain the physician's skills. Because a physician's practice or location may preclude this method, continued competency can also be assured through monitoring and evaluation that indicates acceptable technical success, accuracy of interpretation, and appropriateness of evaluation.

Continuing Medical Education

The physician's continuing medical education should be in accordance with the ACR Practice Guideline for Continuing Medical Education (CME) and should include CME in general radiography as is appropriate to his/her practice.

C. Medical Physicist

A Qualified Medical Physicist is an individual who is competent to practice independently one or more of the subfields in medical physics. The ACR considers that certification and continuing education in the appropriate subfield(s) demonstrate that an individual is competent to practice one or more of the subfields in medical physics, and to be a Qualified Medical Physicist. The ACR recommends that the individual be certified in the appropriate subfield(s) by the American Board of Radiology (ABR).

The appropriate subfields of medical physics for this guideline are Therapeutic Radiological Physics, Diagnostic Radiological Physics, Medical Nuclear Physics, and Radiological Physics.

The continuing education of a Qualified Medical Physicist should be in accordance with the ACR Practice Guideline for Continuing Medical Education (CME).

D. Radiologic Technologist

Certification by the American Registry of Radiologic Technologists (ARRT) or an unrestricted state license is required.

IV. SPECIFICATIONS OF THE EXAMINATION

The written request for a radiographic examination should contain appropriate clinical history and the reason for the examination. This request should be completed under the supervision of the referring physician or other allied healthcare professional for whom this activity is within the scope of practice.

Technique

1. All radiographic studies should be permanently labeled with patient identification and date of the examination. The time of the examination should be included, if relevant. The side (right or left) of the anatomic site radiographed should be permanently labeled.

2. All facilities performing radiography should have protocols for standard views of each anatomic area that will be radiographed. These should be designed to optimize diagnostic information while minimizing radiation exposure.

3. Appropriate collimation should be used to limit exposure to the anatomic area of interest.

4. All facilities performing radiography should have technique charts listing exposure factors that will reliably produce diagnostic radiographs of anatomic parts of patients of different sizes to minimize the need for repeat exposures. Repeat rates should be part of the routine quality control process.

5. All radiographs should be reviewed for positioning and diagnostic quality at the facility before the patient is released. Repeat radiographs should be performed when necessary for diagnostic quality.

6. All facilities producing radiographs should have policies and procedures for appropriate shielding of patients.

7. Immobilization and assistance procedures appropriate for the age and size range of patients to be imaged should be available to ensure that images of diagnostic quality can be obtained in patients who are unable to cooperate, or unable to be positioned in the usual manner due to age or physical limitations, and without unnecessary irradiation of healthcare workers.

V. DOCUMENTATION

Reporting should be in accordance with the ACR Practice Guideline for Communication: Diagnostic Radiology.

VI. EQUIPMENT SPECIFICATIONS

A. The diagnostic radiographic equipment and facility should meet all applicable federal and state radiation standards.

B. Where an analog film system is used, appropriate screen-film and grid combinations should be available to obtain diagnostic radiographs of all anatomic areas to be imaged.

C. Where digital imaging is used, the equipment should meet the specifications described in the ACR Technical Standard for Digital Image Data Management.

D. Automated processing is preferred. Carefully controlled temperature and regular processor maintenance should be included in a quality control program. A constant time and temperature shall be maintained for manual processing.

VII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION CONCERNS

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education Concerns appearing elsewhere in the ACR Practice Guidelines and Technical Standards book.

Equipment performance monitoring should be in accordance with the ACR Technical Standard for Diagnostic Medical Physics Performance Monitoring of Radiologic and Fluoroscopic Equipment.

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Arvin E. Robinson, MD
Edward Weinberger, MD

J. Bruce Hauser, MD, Chair, Commission

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ACR PRACTICE GUIDELINE FOR PERFORMING AND INTERPRETING DIAGNOSTIC COMPUTED TOMOGRAPHY (CT)

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

Computed tomography (CT) is a proven radiologic modality that provides clinical information in the detection, differentiation, and demarcation of disease. CT is the primary diagnostic modality for a variety of presenting problems and is widely accepted as a supplement to other imaging techniques.

CT is a form of medical imaging that involves the exposure of patients to ionizing radiation. It should only be performed under the supervision of a physician with the necessary training in radiation protection to optimize examination safety. Radiation physicists and trained technical staff must be available.

CT examinations should be performed only for a valid medical reason and with the minimum exposure that provides the image quality necessary for adequate diagnostic information.

This guideline applies to all CT examinations performed in all settings.

(For pediatric considerations see Section IV.)

II. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

Physicians who supervise, perform, and interpret CT examinations should be licensed medical practitioners who have a thorough understanding of the indications for CT as well as a familiarity with the basic physical principles and limitations of the technology of computed tomography imaging. They should be familiar with alternative and complementary imaging and diagnostic procedures and should be capable of correlating the results of these with CT findings. The physicians should have a thorough understanding of CT technology and instrumentation as well as radiation safety. Physicians responsible for CT examinations should be able to demonstrate familiarity with the anatomy, physiology, and pathophysiology of those organs or anatomic areas that are being examined. These physicians should provide evidence of training and requisite competence needed to perform CT examinations successfully.

A. Physician

All examinations must be performed under the supervision of and interpreted by a physician who has the following qualifications:

1. Certification in Radiology or Diagnostic Radiology by the American Board of Radiology, American Osteopathic Board of Radiology, the Royal College of Physicians and Surgeons of Canada, or Le College des Medecins du Quebec, and involvement with the supervision and/or performance of, as well as interpretation (and/or review) and reporting of, 300 CT examinations in the past 36 months.[1]

   or

   Completion of an accredited diagnostic radiology residency and involvement with the performance of, as well as interpretation and reporting of, 500 CT examinations in the past 36 months.[1]

   or

   For non-radiologists, the completion of an accredited residency in the specialty practiced plus 200 hours of Category I CME in the performance and interpretation of CT in the subspecialty where CT reading occurs, and 500 cases interpreted and reported during the past 36 months in a supervised situation.

   and

2. The physician shall have documented training in the physics of diagnostic radiology. Additionally, the physician must demonstrate training in the principles of radiation protection, the hazards of radiation exposure to both patients and radiologic personnel, and appropriate monitoring requirements.

   and

3. The physician should be thoroughly acquainted with the many morphologic and patho-physiologic manifestations and artifacts demonstrated on CT. Additionally, supervising physicians should have appropriate knowledge of alternative imaging methods, including the use and indications for general radiography and specialized studies such as angiography, ultra-sonography, magnetic resonance imaging, and nuclear medicine studies.

   and

4. The physician should be familiar with patient preparation for the examination. The physician must have had training in the recognition and treatment of adverse effects of contrast materials[2] used for these studies.

   and

5. The physician shall have the responsibility for reviewing all indications for the examination; specifying the use, dosage, and rate of administration of contrast agents[2]; specifying the imaging technique, including appropriate windowing and leveling; interpreting images; generating written reports; and maintaining the quality of both the images and interpretations.

Maintenance of Competence

All physicians performing CT examinations should demonstrate evidence of continuing competence in the interpretation and reporting of those examinations. If competence is assured primarily based on continuing experience, a minimum of 100 examinations per year is recommended in order to maintain the physician's skills. Because a physician's practice or location may preclude this method, continued competency can also be assured through monitoring and evaluation that indicates acceptable technical success, accuracy of interpretation, and appropriateness of evaluation.

Continuing Medical Education

The physician's continuing education should be in accordance with the ACR Practice Guideline for Continuing Medical Education (CME) and should include CME in CT as is appropriate to the physician's practice needs.

[1] Completion of an accredited radiology residency in the past 24 months will be presumed to be satisfactory experience for the reporting and interpreting requirement.

[2] See the ACR Practice Guideline for the Use of Intravascular Contrast Media.

B. Qualified Medical Physicist

A Qualified Medical Physicist is an individual who is competent to practice independently one or more of the subfields in medical physics. The ACR considers certification and continuing education in the appropriate subfield(s) to demonstrate that an individual is competent to practice one or more of the subfield(s) in medical physics and to be a Qualified Medical Physicist. The ACR recommends that the individual be certified in the appropriate subfield(s) by the American Board of Radiology (ABR).

The appropriate subfields of medical physics for computed tomography are Radiological Physics and Diagnostic Radiological Physics.

A Qualified Medical Physicist's continuing education should be in accordance with the ACR Practice Guideline for Continuing Education (CME).

C. Radiologic Technologist

The technologist should have the responsibility for patient comfort, preparing and positioning the patient for the CT examination, monitoring the patient during the examination, and obtaining the CT data in a manner prescribed by the supervising physician. If intravenous contrast material is to be administered, qualifications for technologists performing intravenous injections should be in compliance with current ACR policy statements[3,4] and existing operating procedures or manuals at the imaging facility. The technologist should also perform the regular quality control testing of the CT system under the supervision of a Qualified Medical Physicist.

Technologists performing CT examinations should be certified by the American Registry of Radiologic Technologists (ARRT) or have an unrestricted state license with documented training and experience in CT.

[3]See the ACR Practice Guideline for the Use of Intravascular Contrast Media.

[4]The American College of Radiology approves of the injection of contrast material and diagnostic levels of radio-pharmaceuticals by certified and/or licensed radiologic technologists and radiologic nurses under the direction of a radiologist or his or her physician designee who is personally and immediately available, if the practice is in compliance with institutional and state regulations. There must be prior written approval by the medical director of the radiology department/ service of such individuals; such approval process having followed established policies and procedures, and the radiologic technologists and radiologic nurses who have been so approved maintain documentation of continuing medical education related to the materials being injected and to the procedures being performed; 1987, 1997 (Res. 1-H).

III. EQUIPMENT SPECIFICATIONS

See the various anatomic CT procedure standards for definitive equipment specifications.

IV. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION CONCERNS

Policies and procedures related to quality, patient education, infection control and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education Concerns elsewhere in the ACR Practice Guidelines and Technical Standards book.

A comprehensive CT quality-control program should be documented and maintained at the CT facility. The program should help to minimize radiation risk to the patient, facility personnel, and the public, and to maximize the quality of diagnostic information. CT facility personnel must adhere to radiation safety regulations when inside the scanner room. Overall program responsibility should remain with the physician, but specific program implementation should be supervised by the medical physicist or service engineer in compliance with local and state regulations as well as manufacturer specifications. The facility should maintain a record of quality control tests, frequency of performance, and description of procedures, as well as a list of individuals or groups performing each test. Moreover, the parameters of technique, equipment testing, and acceptability of limits for each test should also be maintained, along with sample records for each test. Quantitative dose determination should be conducted periodically, in addition to equipment performance monitoring.

The supervising physician should review all practices and policies at least annually. Policies with respect to contrast and sedation must be administered in accordance with institutional policy as well as state and federal regulations. A physician should be available on-site whenever intravenous or intrathecal contrast or intravenous sedation is administered.

The lowest possible radiation dose consistent with acceptable image quality should be used in CT examinations of children. Radiation exposure levels and doses should be measured routinely using a reasonable sample of pediatric examinations performed. In all instances, the lowest possible exposure factors should be chosen that would produce images of diagnostic quality. Such factors should be appropriate for the size and age of the child to be examined. These factors may include

mAs, kVp, slice thickness, helical pitch, organs in the radiation field, and lead shielding, among others. Guides to technical factors that can be used effectively in children can be found in the published radiological literature.

All imaging facilities should have policies and procedures to reasonably attempt to identify pregnant patients prior to the performance of any diagnostic examination involving ionizing radiation. If the patient is known to be pregnant, the potential radiation risks to the fetus and clinical benefits of the procedure should be considered before proceeding with the study (Res. 24, 1995).

Equipment performance monitoring should be in accordance with the ACR Technical Standard for the Diagnostic Medical Performance Monitoring of Computed Tomography (CT) Equipment.

ACKNOWLEDGEMENTS

This guideline was developed according to the process described in the ACR Practice Guidelines and Technical Standards book by the Guidelines and Standards Committee of the General and Pediatric Radiology Commission.

Principal Drafter: Michael C. Beachley, MD
Spencer B. Gay, MD

Michael C. Beachley, MD, Chair
Kimberly Applegate, MD
Anthony Bruzzese, MD
Eric N. Faerber, MD
Edmund A. Franken, MD
Sam Kottamasu, MD
Paul A. Larson, MD
William H. McAlister, MD
William R. Reinus, MD
Arvin E. Robinson, MD
Edward Weinberger, MD

J. Bruce Hauser, MD, Chair, Commission
Paul Ellenbogen, MD, CSC

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The American College of Radiology, with more than 30,000 members, is the principal organization of radiologists, radiation oncologists, and clinical medical physicists in the United States. The College is a nonprofit professional society whose primary purposes are to advance the science of radiology, improve radiologic services to the patient, study the socioeconomic aspects of the practice of radiology, and encourage continuing education for radiologists, radiation oncologists, medical physicists, and persons practicing in allied professional fields.

The American College of Radiology will periodically define new practice guidelines and technical standards for radiologic practice to help advance the science of radiology and to improve the quality of service to patients throughout the United States. Existing practice guidelines and technical standards will be reviewed for revision or renewal, as appropriate, on their fifth anniversary or sooner, if indicated.

Each practice guideline and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review, requiring the approval of the Commission on Quality and Safety as well as the ACR Board of Chancellors, the ACR Council Steering Committee, and the ACR Council. The practice guidelines and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice guideline and technical standard by those entities not providing these services is not authorized.

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ACR PRACTICE GUIDELINE FOR THE PERFORMANCE OF PEDIATRIC AND ADULT CHEST RADIOGRAPHY

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

Chest radiography is a proven and useful procedure for evaluation of the airways, pulmonary parenchyma and vessels**,** mediastinum, heart, pleura, and chest wall. The common and accepted practice consists of posteroanterior (PA) and left lateral radiographs obtained in the upright position. Under certain clinical circumstances and in certain patient populations (e.g., critically ill, postoperative, newborn), bedside (portable) chest radiography may be indicated and should be performed in accordance with the ACR Practice Guideline for the Performance of Pediatric and Adult Bedside Chest Radiography (Portable Chest Radiography).

(For pediatric considerations, see Section V.C.2.)

II. GOAL

The goal of the chest radiographic examination is to help establish the presence or absence and nature of disease involving the thorax or to follow its course.

III. INDICATIONS AND CONTRAINDICATIONS

Indications for chest radiography include, but are not limited to:

A. Signs and symptoms potentially related to the respiratory, cardiovascular, and upper gastrointestinal systems, and the musculoskeletal system of the thorax. The chest radiograph may also be helpful in evaluating disease**s** involving the thorax, including systemic and extrathoracic diseases that secondarily involve the thorax. Because the lungs are frequent sites of metastases, chest radiography is usually indicated in the staging of extrathoracic as well as intrathoracic tumors.

B. Follow-up of already diagnosed thoracic disease processes for the evaluation of improvement, resolution, or progression.

C. Monitoring of patients with life-support devices and patients who have undergone cardiac or thoracic surgery or other interventional procedures.

D. Compliance with government regulations that may mandate chest radiography. Examples include immigration chest films, chest films for coal miners, or other surveillance studies required by public health law.

E. Preoperative radiographic evaluation is indicated if cardiac or respiratory symptoms are present or if there is a significant potential for thoracic pathology that may compromise the surgical result or lead to increased perioperative morbidity or mortality.

All imaging facilities should have policies and procedures to reasonably attempt to identify pregnant patients prior to the performance of any diagnostic examination involving ionizing radiation. If the patient is known to be pregnant, the potential radiation risks to the fetus and clinical benefits of the procedure should be considered before proceeding with the study (Res. 24, 1995).

IV. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

A. Physician

The examination must be performed under the supervision of and interpreted by a licensed physician(s) who has the following qualifications:

1. Certification in Radiology or Diagnostic Radiology by the American Board of Radiology, the American Osteopathic Board of Radiology, the Royal College of Physicians and Surgeons of Canada, or Le College des Medecins du Quebec.

   or

2. The physician shall have spent a minimum of 3 months in documented formal training in the interpretation and formal reporting of chest radiography in an approved residency program**.** If pediatric chest radiographs are to be interpreted, the physician should also have had 3 months of documented formal training in pediatric radiology, including interpretation and formal reporting of pediatric chest radiographs**.**

   or

3. Physicians whose residency or fellowship training did not include the above may still be considered qualified to interpret chest radiographs providing the following can be demonstrated:
   a. At least 2 years during which the physician supervised and interpreted chest radiographs.
   b. Generation of a written report for each study performed.

   and

4. The physician should have documented training and understanding of the physics of diagnostic radiology and the equipment needed to produce the images. These include conventional radiography, screen-film combinations, conventional image processing, and, where applicable, digital image processing.

   and

5. The supervising and interpreting physician must be familiar with the principles of radiation protection, the hazards of radiation exposure to both patients and radiographic personnel, and the monitoring requirements.

   and

6. The supervising and interpreting physician must be familiar with the disease processes for which the patient is being evaluated and must understand the many anatomic and physiologic manifestations of these diseases that may be reflected in the chest radiograph, as well as anatomic variants that may mimic disease.

   and

7. The physician supervising and interpreting the chest radiograph should have knowledge of complementary imaging techniques such as ultrasonography, computed tomography, nuclear medicine, magnetic resonance, and angiography, as well as other specialized procedures, in order to fulfill a consultative role.

Continuing Medical Education

The physician s continuing medical education should be in accordance with the ACR Practice Guideline for Continuing Medical Education (CME).

B. Radiologic Technologist

1. Certification by the American Registry of Radiologic Technologists or unrestricted state licensure is required.
2. Qualifications and performance of technologists should comply with procedure manuals at the imaging facility. CME programs and on-the-job training under the supervision of a qualified physician should be available.
3. If pediatric chest radiography is to be performed, documented training in pediatric chest radiography is required.

V. SPECIFICATIONS OF THE EXAMINATION

The written request for the chest radiographic examination should contain appropriate clinical history and the reason for the examination. This request should be completed under the supervision of the referring physician or other allied professionals for whom this activity is within their scope of practice.

A. A standard chest examination should include an erect PA and left lateral projection made during full inspiration (total lung capacity). The examination may be modified by the physician or qualified technologist depending on the clinical circumstances. Other techniques that may be used at times include supine, prone, oblique, decubitus, lordotic, expiratory, or views with nipple markers.

B. The chest radiograph should include both lung apices and both costophrenic angles. There should be appropriate definition of the vertebral bodies, and the left retrocardiac vascular pattern should be visible. The scapulae should be positioned outside the lung fields on the PA view and the arms elevated for the lateral view. The vertebral column should be centered between the clavicles. The radiographic beam should be appropriately collimated to include the structures listed while limiting exposure of the remainder of the patient and should not exceed the geometry of the image receptor.

C. Technical Factors

1. Adults: For a PA chest radiograph, the mean dose at skin entrance should not exceed 0.3 mGy per exposure, and the exposure time should not exceed 40 msec. A high-kilovoltage technique (120-150) should be employed. An anti-scatter technique (e.g., grid or air gap) should be used that reduces scatter at least as much as a 10:1 grid. Technique charts should be posted for use by technologists in the examination room. An optimally exposed radiograph presents the lung at a mid-gray level.

2. Newborns, infants, and children: In newborns and infants, a supine chest radiograph is preferred. For an AP/PA chest radiograph, the mean dose at skin entrance should range from 0.05 to 0.3 mGy per exposure, respectively, for a 1-year-old to adult-sized patient using a 200-speed image receptor. The kVp should be selected to provide adequate contrast; it should range from as low as 60 for infants to as high as 150 for adult-size patients. When using high-kVp techniques on larger patients, an anti-scatter technique (e.g., grid or air gap) should be selected to provide scatter reduction equivalent to that of a 10:1 grid. After establishing the correct kVp as a function of patient size, a tube current should be selected which minimizes patient motion during the exposure. The exposure time should be as short as feasible for fixed radiographic units. The selected mAs and kVp should produce a radiograph that presents the lung at a mid-gray level.

D. The following quality control procedures should be applied to all chest radiography:

1. When the examination is completed, the images should be checked either by a qualified physician or a qualified technologist.
2. Films not of diagnostic quality should be repeated as necessary.
3. Each film or image should be permanently marked with the patient s name, identification number, right or left side, patient position, and the date and time of the examination.

VI. DOCUMENTATION

It is important that new films be compared with prior chest examinations and/or other pertinent studies that may be available.

Reporting should be in accordance with the ACR Practice Guideline for Communication: Diagnostic Radiology.

VII. EQUIPMENT SPECIFICATIONS

The equipment required includes a diagnostic machine having a rotating anode tube with a tube filtration sufficient to achieve a half-value layer (HVL) greater than

3 mm of aluminum at 100 kVp. A grid should be used for adult radiography. At least a 10:1 grid with a minimum of 103 lines per in. (stationary) or 80 lines per in. (reciprocity) is recommended.

Radiographs shall be exposed only with equipment having a beam-limiting device that provides rectangular collimation.

There should be at least a 72-in. source-image distance (SID) to minimize magnification for routine upright imaging. A 40-in. SID may be used if clinically necessary (e.g., supine, stretcher, infants and young children, etc.).

The nominal source (focal spot) shall not exceed 2.0 mm; 0.6-1.2 mm is the recommended range.

For analog studies, intensifying screens shall be used. Any screen-film combination may be used that has a speed of at least 200**.**

Automatic processing is preferable with carefully controlled temperature and maintenance. A constant time and temperature shall be employed for manual processing.

Photostimulable plates or digital imaging techniques are an acceptable alternative to film-screen radiography, but require careful quality control**.**

VIII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION CONCERNS

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education Concerns appearing elsewhere in the ACR Practice Guidelines and Technical Standards book.

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This guideline was revised according to the process described in the ACR Practice Guidelines and Technical Standards book by the Guidelines and Standards Committee of the General and Pediatric Radiology Commission.

Michael C. Beachley, MD, Chair
Kimberly Applegate, MD
Anthony Bruzzese, MD
Eric N. Faerber, MD
Edmund A. Franken, MD
Sam Kottamasu, MD
Paul A. Larson, MD
William H. McAlister, MD
William R. Reinus, MD
Arvin E. Robinson, MD
Edward Weinberger, MD

J. Bruce Hauser, MD, Chair, Commission

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ACR PRACTICE GUIDELINE FOR THE PERFORMANCE OF PEDIATRIC AND ADULT THORACIC COMPUTED TOMOGRAPHY (CT)

PREAMBLE

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The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

Computed tomography is a frequently used imaging modality for the evaluation of many thoracic diseases. Optimal performance of thoracic CT requires knowledge of normal anatomy, anatomic variants, pathophysiology, and CT techniques. This guideline outlines the principles for the performance of high-quality thoracic CT in adults and children.

(For pediatric thoracic CT specifically, refer to Sections IV, V. G, and V. H.)

II. GOAL

The goal of thoracic CT is to demonstrate normal and pathologic anatomy and physiology within the chest.

III. INDICATIONS AND CONTRAINDICATIONS

Chest CT may be a complementary examination to other imaging studies such as chest radiography (see the ACR Practice Guideline for the Performance of Pediatric and Adult Chest Radiography) or a stand-alone procedure. Indications for the use of thoracic CT include, but are not limited to:

A. Evaluation of abnormalities discovered on chest radiographs.
B. Evaluation of clinically suspected occult thoracic pathology.
C. Staging and follow-up of lung and other primary or secondary thoracic malignancies.
D. Evaluation for thoracic manifestations of known extrathoracic diseases.
E. Evaluation of known or suspected thoracic vascular abnormalities (congenital or acquired).
F. Evaluation of known or suspected congenital thoracic anomalies.
G. Evaluation and follow-up of pulmonary parenchymal and airway disease.
H. Evaluation of trauma.
I. Performance of CT-guided interventional procedures.

Computed tomography, using specialized techniques that are beyond the scope of this standard, can also be used for other thoracic applications such as evaluation for pulmonary embolus (See the ACR Practice Guideline for the Performance of Computed Tomography for the Detection of Pulmonary Embolism in Adults) and for more precise evaluation of a variety of pulmonary diseases (See the ACR Practice Guideline for the Performance of High-Resolution Computed Tomography (HRCT) of the Lungs in Adults).

There are no absolute contraindications to thoracic CT. As with all procedures, the relative benefits and risks of the procedure should be evaluated prior to the performance of thoracic CT with use of intravenous iodinated contrast. Appropriate precautions should be taken to minimize patient risks.

All imaging facilities should have policies and procedures to reasonably attempt to identify pregnant patients prior to the performance of any diagnostic examination involving ionizing radiation. If the patient is known to be pregnant, the potential radiation risks to the fetus and clinical benefits of the procedure should be considered before proceeding with the study (Res. 24, 1995).

IV. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

See the ACR Practice Guideline for Performing and Interpreting Diagnostic Computed Tomography (CT).

V. SPECIFICATIONS OF THE EXAMINATION

A. A typical CT of the thorax should include axial images from the lung apices to the costophrenic sulci usually with 3 to 10 mm slice thickness and table increment or reconstruction interval equal to or less than the slice thickness. The examination may be tailored to specific clinical circumstances, to include 1-2 mm thin sections through focal areas of pathology, such as nodules. An adequate study may be performed with sequential single-slice technique, single detector helical (spiral) technique, or multidetector helical (spiral) technique.

B. During any single examination, all scans should be obtained in the same suspended state of respiration when possible. Scans should be obtained through the entire area of interest. The field of view should be optimized for each patient.

C. The examination may be conducted with or without contrast as clinically indicated.

D. Appropriate window and level settings should be used to view the lung parenchyma and the mediastinal structures. When skeletal pathology is suspected, window settings appropriate to visualize osseous structures should be used. In selected cases, soft copy review may facilitate evaluation of large data sets.

E. Although many of the operations of a CT scanner are automated, a number of technical parameters remain operator dependent and may significantly affect the diagnostic value of the CT examination. It is necessary for the supervising physician to acquire familiarity with the following:

1. Exposure factors.
2. Collimation and slice thickness.
3. Slice spacing, table increment, and pitch as appropriate.
4. Field of view.
5. Window and level settings.
6. Reconstruction algorithms.
7. Image reconstruction interval.

F. Optimization of the CT examination requires the supervising physician to develop appropriate CT protocols based on clinical indications.

G. Protocols should be prepared by organ system of interest and medical indication. Techniques should provide diagnostic image quality as well as acceptably low patient radiation exposure. For each study, the protocol should indicate at least the following:

1. Use of helical (spiral) or incremental slice acquisition.
2. If intravenous and/or oral contrast is used, the volume, rates of administration, and time delay between administration of contrast material and initiation of scan.
3. Collimation and slice thickness.
4. Slice spacing, table increment, and pitch as appropriate.
5. kVp and mAs per slice for small, medium, and large patients.
6. Superior and inferior extent of the area of interest to be imaged.
7. Reconstruction algorithm and level and window settings of permanent images.
8. Reconstruction interval (for helical exams).

These protocols should be reviewed and updated periodically.

H. For pediatric patients, efforts should be directed to:

1. Limit radiation dose when diagnostically feasible with increased table increment or pitch, use of low mA, and partial scans.
2. Minimize motion artifact with short scan times, partial scans, and appropriate sedation.

I. When sedation is used, it should be done in accordance with the ACR Practice Guideline for Adult Sedation/Analgesia or the ACR Practice Guideline for Pediatric Sedation/Analgesia.

VI. DOCUMENTATION

Reporting should be in accordance with the ACR Practice Guideline for Communication: Diagnostic Radiology.

VII. EQUIPMENT SPECIFICATIONS

A. Performance Standards

To achieve acceptable clinical CT scans of the thorax, a CT scanner should meet or exceed the following capabilities:

1. Scan times: $\leq$ 2 sec.
2. Slice thickness: $\leq$ 5 mm ($\leq$ 2 mm is preferred).
3. Interscan delay: $\leq$ 5 sec ($\leq$ 2 sec is preferred, but may be longer if no intravascular contrast used).
4. Limiting spatial resolution: $\geq$ 8 lp/cm for $\geq$ 32 cm display field of view (DFOV) and $\geq$ 10 lp/cm for < 24 cm DFOV.
5. Table pitch: no greater than 2:1 for single-row-detector helical scanners.

B. Emergency supplies, including appropriate medications and resuscitation equipment, must be immediately available to treat adverse reactions. If pediatric patients are examined, these supplies should include appropriate pediatric emergency devices and medication dosages. Policies and procedures should be in place for the regular review for currentness of emergency supplies.

VIII. EQUIPMENT QUALITY CONTROL

The quality control program for CT equipment should be designed to minimize patient, personnel, and public radiation risks and to maximize the diagnostic quality of the examination. The program should be supervised by a Qualified Medical Physicist. Each imaging facility should have documented policies and procedures that include:

1. A list of quality control tests and the frequency of performance.
2. A list of individuals or groups who will perform each test.
3. A written description of each testing procedure, to include technique factors, the equipment used, and the acceptability limits of and sample records from each test.

IX. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION CONCERNS

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education Concerns appearing elsewhere in the ACR Practice Guidelines and Technical Standards book.

For specific issues regarding CT quality control, see the ACR Practice Guideline for Performing and Interpreting Computed Tomography (CT).

Equipment performance monitoring should be in accordance with the ACR Technical Standard for Diagnostic Medical Physics Performance Monitoring of Computed Tomography (CT) Equipment.

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Michael C. Beachley, MD, Chair
Kimberly E. Applegate, MD
Richard A. Carlson, MD
Kevin M. Cawley, MD
Ronald E. Cordell, MD
Eric N. Faerber, MD
Edmund A. Franken, Jr., MD
Bob W. Gayler, MD
Sam Kottamasu, MD
William R. Reinus, MD
Arvin E. Robinson, MD
Edward Weinbergber, MD

J. Bruce Hauser, MD, Chair, Commission
Bibb Allen, MD, CSC
Roma Gumbs, CSC

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ACR PRACTICE GUIDELINE FOR THE PERFORMANCE OF HIGH-RESOLUTION COMPUTED TOMOGRAPHY (HRCT) OF THE LUNGS IN ADULTS

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

High-resolution computed tomography (HRCT) of the lungs is a well-established imaging method for the evaluation of many pulmonary diseases. Optimal performance of HRCT requires knowledge of anatomy and pathophysiology, as well as familiarity with the basic physics and techniques of computed tomography. This guideline outlines the principles for performance of high-quality thoracic HRCT.

II. INDICATIONS

Indications for the use of thoracic HRCT include, but are not limited to the following:

1. Evaluation of diffuse pulmonary disease discovered on chest radiographs**,** including selection of the appropriate site for biopsy of diffuse lung disease.

2. Evaluation of the lungs in patients with clinically suspected pulmonary disorders that have normal or equivocal chest radiographs.
3. Evaluation of suspected small airway disease.
4. Evaluation of suspected bronchiectasis.
5. Quantification of the extent of diffuse lung disease for purposes of judging effectiveness of treatment.

There are no absolute contraindications to thoracic HRCT. Intravenous iodinated contrast is not used for routine HRCT but may be helpful in some cases for problem solving.

All imaging facilities should have policies and procedures to reasonably attempt to identify pregnant patients prior to the performance of any diagnostic examination involving ionizing radiation. If the patient is known to be pregnant, the potential radiation risks to the fetus and clinical benefits of the procedure should be considered before proceeding with the study (Res. 24, 1995).

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

See the ACR Practice Guideline for Performing and Interpreting Diagnostic Computed Tomography (CT).

The physician shall have the responsibility for reviewing all indications for the examination; specifying the precise technical factors to be used for the HRCT study; generating written report; and monitoring and maintaining the quality of images and interpretation.

The physician should be thoroughly acquainted with the many anatomic and physiologic manifestations of intrathoracic disease. Additionally, supervising physicians should have appropriate knowledge of alternative imaging modalities, including available techniques for performing routine chest radiography and applications and indications for the use of specialized studies, such as standard thoracic computed tomography, angiography, ultrasonography, magnetic resonance imaging, and nuclear medicine studies.

IV. SPECIFICATIONS AND PERFORMANCE OF THE EXAMINATION

A. Although many of the operations of a CT scanner are automated, a number of technical parameters remain operator-dependent. As these factors can significantly affect the diagnostic value of the HRCT examination, it is necessary for the supervising physician to acquire familiarity with the following:

1. Radiation exposure factors.
2. Collimation (slice thickness).
3. Slice spacing (table increment).
4. Field of view.
5. Level and window settings.
6. Reconstruction algorithm.

B. Optimization of the CT examination requires the supervising physician to develop an appropriate CT protocol based on careful review of relevant patient history and clinical indications as well as all prior available imaging studies.

1. Protocols should be prepared according to the specific medical indication. Techniques should be selected that provide image quality consistent with the diagnostic needs of the exam at acceptably low radiation dose levels to the patient. For each indication, the protocol should include at least the following:
   a. Bone or high-spatial-frequency reconstruction algorithm.
   b. Collimation (slice thickness) $\leq$ 2 mm.
   c. Slice spacing (table increment).
   d. Field of view (FOV) for small, medium, and large patients.
   e. kVp and mAs per slice (120-140 kVp and approximately 240 mAs, although lower doses may be used with small patients or those receiving serial HRCT scans).
   f. Superior and inferior extent of the region of interest to be imaged.
   g. Level and window settings of hard-copy images.
   h. Patient positioning (supine and/or prone).
   i. State of respiration (inspiration and/or expiration).

2. These protocols should be reviewed and updated periodically.

V. DOCUMENTATION

Reporting should be in accordance with the ACR Practice Guideline for Communication: Diagnostic Radiology.

VI. EQUIPMENT SPECIFICATIONS

To achieve acceptable clinical HRCT scans of the thorax, a CT scanner should meet or exceed the following capabilities:

1. Scan times: $\leq$ 2 sec.
2. Slice thickness: $\leq$ 2 mm.
3. Algorithm available: bone or high-spatial frequency.
4. Spatial resolution should meet or exceed manufacturer's specifications.

VII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION CONCERNS

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education Concerns appearing elsewhere in the ACR Practice Guidelines and Technical Standards book.

Equipment performance monitoring should be in accordance with the ACR Technical Standard for Diagnostic Medical Physics Performance Monitoring of Computed Tomography (CT) Equipment.

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Principal Drafter: Suzanne Aquino, MD
Philip Cascade, MD

Michael C. Beachley, MD, Chair
Kimberly Applegate, MD
Anthony Bruzzese, MD
Eric N. Faerber, MD
Edmund A. Franken, MD
Paul A. Larson, MD
Sam Kottamasu, MD
Vincent Mascatello, MD
William H. McAlister, MD
William R. Reinus, MD
Arvin E. Robinson, MD
Edward Weinberger, MD

J. Bruce Hauser, MD, Chair, Commission
Arthur J. Segal, MD, CSC

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The American College of Radiology will periodically define new practice guidelines and technical standards for radiologic practice to help advance the science of radiology and to improve the quality of service to patients throughout the United States. Existing practice guidelines and technical standards will be reviewed for revision or renewal, as appropriate, on their fifth anniversary or sooner, if indicated.

Each practice guideline and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review, requiring the approval of the Commission on Quality and Safety as well as the ACR Board of Chancellors, the ACR Council Steering Committee, and the ACR Council. The practice guidelines and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice guideline and technical standard by those entities not providing these services is not authorized.

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ACR TECHNICAL STANDARD FOR DIAGNOSTIC MEDICAL PHYSICS PERFORMANCE MONITORING OF RADIOGRAPHIC AND FLUOROSCOPIC EQUIPMENT

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

The performance of all radiographic and fluoroscopic equipment shall be evaluated upon installation and monitored at least annually by a Qualified Medical Physicist to ensure that the equipment is functioning properly and that patients are not exposed to unnecessary doses of radiation. Additional or more frequent monitoring may be necessary after repairs that might change the radiation exposure to patients or personnel or the imaging performance of the equipment. Although it is not possible to consider all possible variations of equipment performance to be monitored, adherence to this standard will assist in maximizing image quality and in

reducing patient radiation doses. Key points to consider are: performance characteristics to be monitored, patient radiation dose, qualifications of the personnel, and follow-up procedures.

II. GOAL

The goals are to produce the highest quality diagnostic image at the lowest reasonable radiation dose consistent with the clinical use of the equipment and the information requirement of the examination and to establish and maintain performance standards.

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

A Qualified Medical Physicist is an individual who is competent to practice independently one or more of the subfields in medical physics. The American College of Radiology (ACR) considers that certification and continuing education in the appropriate subfield(s) demonstrate that an individual is competent to practice one or more of the subfields in medical physics, and to be a Qualified Medical Physicist. The ACR recommends that the individual be certified in the appropriate subfield(s) by the American Board of Radiology (ABR).

The appropriate subfields for this standard are Diagnostic Radiological Physics and Radiological Physics.

The continuing education of a Qualified Medical Physicist should be in accordance with the ACR Practice Guideline for Continuing Medical Education.

Understanding of the relationship between image quality and patient radiation dose is essential to proper monitoring of equipment performance. The medical physicist must be familiar with the principles of imaging physics and of radiation protection; the current guidelines of the National Council on Radiation Protection and Measurements (NCRP); laws pertaining to the performance of the equipment being tested; the function, clinical uses, and performance specifications of the imaging equipment; and calibration processes and limitations of the instruments used for testing performance.

The Qualified Medical Physicist may be assisted by other properly trained individuals in obtaining test data for performance monitoring. These individuals must be properly trained and approved by the Qualified Medical Physicist in the techniques of performing the tests, the function and limitations of the imaging equipment and test instruments, the reasons for the tests, and the importance of the test results. The Qualified Medical Physicist must be available at the facility during initial and annual surveys and must review**,** interpret**,** and approve all data measurements and provide a signed report.

IV. SPECIFICATIONS OF THE MONITORING PROCESS

A. Equipment Characteristics To Be Monitored

The following characteristics shall be evaluated for the equipment to which they apply:

1. Integrity of unit assembly
2. Collimation and radiation beam alignment
3. Fluoroscopic system resolution
4. Automatic exposure control system performance
5. Image artifacts
6. Fluoroscopic phantom image quality
7. KVp accuracy and reproducibility
8. Linearity of exposure vs. mA
9. Exposure reproducibility
10. Timer accuracy
11. Beam quality assessment (half-value layer)
12. Fluoroscopic exposure rates
13. Image receptor entrance exposure
14. Fluoroscopic alignment test
15. Equipment radiation safety functions
16. Patient dose monitoring system calibration, if present
17. Video and digital monitor performance
18. Digital image receptor performance.

B. Monitoring of Technologist's Quality Control Program

The following aspects of a technologist's quality control program shall be reviewed as deemed applicable:

1. Appropriateness of technique factors
2. Dark-room and screen cleanliness
3. Processor quality control
4. Film-screen speed matching
5. Viewboxes and viewing conditions
6. Phantom images
7. Visual equipment checklists
8. Repeat analysis
9. Analysis of fixer retention
10. Darkroom fog
11. Screen-film contact
12. Laser film printer quality control
13. Personnel radiation monitoring.

C. Radiation Dose and Patient Safety

Patient radiation dose shall be evaluated for radiographic and fluoroscopic equipment at least annually. Tables of patient radiation exposure for representative examinations shall be prepared and supplied to the facility. These tables

shall be prepared using measured radiation output data and imaging techniques provided by the facility. These results shall be compared with appropriate guidelines or recommendations when they are available. The Qualified Medical Physicist should assist facilities in developing policies and procedures to evaluate patient, personnel, and physician risk from studies and interventions requiring prolonged radiation exposure. Electrical safety of the equipment should be tested by appropriate personnel prior to initial clinical use and periodically thereafter.

D. Acceptance Testing

Acceptance testing shall be performed upon installation and should be completed before clinical use. This testing shall be more comprehensive than periodic performance and compliance testing and shall be consistent with current acceptance testing practices.

E. Follow-up Procedures

The Qualified Medical Physicist shall report the findings to the responsible professional in charge of obtaining or providing necessary service to the equipment and, if appropriate, initiate the required service. Action shall be taken immediately by verbal communication if there is imminent danger to patients or staff using the equipment due to either unsafe conditions or unacceptably poor image quality. Written reports shall be provided in a timely manner consistent with the importance of any adverse findings. The Qualified Medical Physicist shall confirm that the unit is performing in a safe or acceptable fashion as soon as possible after the required service has been performed.

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Nicholas Detorie, PhD, Chair
Robert L. Dixon, PhD
Laurie Elizabeth Gaspar, MD
Richard A. Geise, PhD
Michael T. Gillin, PhD
John S. Kent, MS
Paul A. Larson, MD
Sandra B. McIntosh, PhD
Tariq A. Mian, PhD
Thomas G. Ruckdeschel, MS
Guy H. Simmons, PhD

Richard L. Morin, PhD, Chair, Commission
Michael T. Gillin, PhD, CSC

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Each practice guideline and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review, requiring the approval of the Commission on Quality and Safety as well as the ACR Board of Chancellors, the ACR Council Steering Committee, and the ACR Council. The practice guidelines and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice guideline and technical standard by those entities not providing these services is not authorized.

1998 (Res. 14)
Revised 2002 (Res. 21)
Effective 1/1/03

ACR TECHNICAL STANDARD FOR DIAGNOSTIC MEDICAL PHYSICS PERFORMANCE MONITORING OF COMPUTED TOMOGRAPHY (CT) EQUIPMENT

PREAMBLE

These guidelines are an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. They are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care. For these reasons and those set forth below, the American College of Radiology cautions against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the physician or medical physicist in light of all the circumstances presented. Thus, an approach that differs from the guidelines, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in the guidelines when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations on available resources or advances in knowledge or technology subsequent to publication of the guidelines. However, a practitioner who employs an approach substantially different from these guidelines is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. It should be recognized, therefore, that adherence to these guidelines will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of these guidelines is to assist practitioners in achieving this objective.

I. INTRODUCTION

All computed tomography (CT) equipment shall be evaluated upon installation and subsequently monitored at least annually, or as required by state or local regulatory agencies, by a Qualified Medical Physicist to ensure that it is functioning properly. Additional or more frequent performance monitoring may be necessary after any service that may change the radiation exposure to patients or personnel or the image quality. Although it is not possible to consider all possible variations of equipment performance to be monitored, adherence to this standard will assist in maximizing image quality and in reducing patient radiation dose(s). Key points to consider are: performance characteristics to be monitored, patient radiation dose, qualifications of personnel, and follow-up procedures.

II. GOAL

The goal is to produce the highest quality diagnostic image at the lowest reasonable dose consistent with the clinical use of the equipment and the information requirement of the examination, and to establish performance standards.

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

A Qualified Medical Physicist is an individual who is competent to practice independently in one or more of the subfields in medical physics. The American College of Radiology (ACR) considers that certification and continuing education in the appropriate subfield(s) demonstrate that an individual is competent to practice in one or more of the subfields in medical physics and to be a Qualified Medical Physicist. The ACR recommends that the individual be certified in the appropriate subfield(s) by the American Board of Radiology (ABR).

The appropriate subfields of medical physics for this standard are Diagnostic Radiological Physics and Radiological Physics.

The continuing education of a Qualified Medical Physicist should be in accordance with the ACR Practice Guideline for Continuing Medical Education (CME).

The Qualified Medical Physicist must be familiar with the principles of imaging physics and of radiation protection; the guidelines of the National Council on Radiation Protection and Measurements (NCRP); laws and regulations pertaining to the performance of the equipment being tested; the function, clinical uses, and performance specifications of the imaging equipment; and calibration processes and limitations of the instruments used for testing performance.

The Qualified Medical Physicist may be assisted by properly trained individuals in obtaining data. These individuals must be approved by the Qualified Medical Physicist in the techniques of performing tests, the function and limitations of the imaging equipment and test instruments, the reason for the tests, and the importance of the test results. The Qualified Medical Physicist is responsible for and must be present during initial and annual surveys and must review, interpret, and approve all data as well as provide a signed report of conclusions.

IV. PERFORMANCE CHARACTERISTICS TO BE MONITORED

A. Characteristics to be Monitored

Performance monitoring must be performed on each CT unit at least annually. This evaluation should include, but not be limited to, the following:

1. Alignment light accuracy
2. Alignment of table to gantry
3. Table/gantry tilt
4. Slice localization from scanned projection radiograph (localization image)
5. Table incrementation accuracy
6. Slice thickness
7. Image quality
   a. High-contrast (spatial) resolution
   b. Low-contrast sensitivity/resolution
   c. Image uniformity
   d. Noise
   e. Artifact evaluation
8. CT number accuracy and linearity
9. Display devices
   a. Image display monitor(s)
   b. Hard-copy display unit(s), if available
10. Dosimetry
    a. CT dose index (CTDI)
    b. Patient radiation dose for representative examinations
11. Safety evaluation
    a. Visual inspection
    b. Work load assessment
    c. Scatter and stray radiation measurements (if work load and other related parameters have changed since acceptance testing)
    d. Audible/visual signals
    e. Posting requirements
12. Other tests as required by state and/or local regulations.

B. Patient Radiation Dose

Patient radiation dose for CT equipment shall be evaluated at least annually. Tables of patient radiation absorbed dose for representative examinations (e.g., head, thorax, abdomen, and pelvis) shall be prepared and supplied to the facility. These results shall be compared with appropriate guidelines or recommendations when they are available.

V. QUALITY CONTROL PROGRAM

A continuous quality control (QC) program shall be established for all CT units with the assistance of a Qualified Medical Physicist. The Qualified Medical Physicist should determine the frequency of each test and who should perform each test based upon the facility and CT usage. An on-site radiologic technologist shall be identified to be responsible for conducting routine QC.

The QC program should include, but not be limited to, the following:

1. Alignment light accuracy
2. Slice thickness
3. Image quality
   a. High contrast (spatial) resolution
   b. Low-contrast sensitivity/resolution
   c. Image uniformity
   d. Noise
   e. Artifact evaluation
4. CT number accuracy and linearity
5. Display devices.

The result of the QC program shall be monitored annually by the Qualified Medical Physicist. If measured values of QC parameters fall outside the control limits, the physicist shall initiate appropriate investigative or corrective actions. A Qualified Medical Physicist should be available to assist in prescribing corrective actions for unresolved problems.

VI. ACCEPTANCE TESTING

Initial performance testing shall be performed upon installation and should be completed before clinical use. This testing shall be more comprehensive than periodic performance and compliance testing and should be consistent with current acceptance testing practices.

VII. FOLLOW-UP PROCEDURES/WRITTEN SURVEY REPORTS

The Qualified Medical Physicist shall report the findings to the physician(s), to the responsible professional(s) in charge of obtaining or providing necessary service to the equipment, and, in the case of the consulting physicist(s), to the representative of the hiring party, and, if appropriate, initiate the required service. Action shall be taken immediately by verbal communication, if there is imminent danger to patients or staff using the equipment due to unsafe conditions. Written survey reports shall be provided in a timely manner consistent with the importance of any adverse findings.

ACKNOWLEDGEMENTS

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Nicholas Detorie, PhD, Chair
Robert L. Dixon, PhD
Laurie Elizabeth Gaspar, MD
Richard A. Geise, PhD
Michael T. Gillin, PhD
John S. Kent, MS
Sandra B.McIntosh, PhD
Tariq A. Mian, PhD
Thomas G. Ruckdeschel, MS
Guy H. Simmons, PhD
Cynthia H. McCollough, PhD, Consultant

Richard L. Morin, PhD, Chair, Commission
James M. Hevezi, PhD, CSC

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Appendix 4-3 Spiral CT Screening Examination Form (SCT)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

SPIRAL CT SCREENING EXAMINATION FORM (SCT)

Administrative Section

Screening Center ID: |___|___|

Date of Examination: |___|___| / |___|___| / |__|__|___|___|
Month Day Year

Study Year (T_0 - T_2): T |___|

Visit Number: ☐ One ☐ Two

Reason for repeat visit _____

Interval Follow Up Information:

Has the participant had any imaging studies since the previous screening exam that may be useful for the radiologist to review if needed? ☐ Yes ☐ No ☐ N/A

If YES, dates obtained (Month /Year): |___|___| / |___|___|___|___|

Initials Complete: _____

Initials QC: _____

Participant ID Label

PART A. SPIRAL CT EXAMINATION FINDINGS (COMPLETED BY TECHNOLOGIST)

1. Number of Attempts:
- ☐ None (GO TO A.3)
- ☐ One
- ☐ Two
- ☐ Three

2. Adequate Scan Obtained:
- ☐ No
- ☐ Yes (GO TO A.4)

3. Reason for Inadequate or No Scan: (MARK ALL THAT APPLY)
- ☐ Participant refusal
- ☐ Equipment malfunction
- ☐ Poor image quality
- ☐ Other (SPECIFY) _____

4. Technical Parameters:
- A. |___|___|___| kVp
- B. |___|___|___| mAs
- C. |___|___|___| mA
- D. |___|___| Display FOV
- E. |___|___| Effective mAs
- F. |___|.|___|___| Pitch

5. Indicate CT reconstruction algorithm/filter:

☐ GE Bone	☐ Philips D	☐ Siemens B50F	☐ Toshiba FC10
☐ GE Standard	☐ Philips C	☐ Siemens B30	☐ Toshiba FC51
☐ GE, other: _____	☐ Philips, other: _____	☐ Siemens, other: _____	☐ Toshiba, other: _____

6. Comments: ☐ No ☐ Yes

_____

☐ Continued

7. Tech ID:

|___|___|___|___| **Signature:** _____

Appendix 4-3 Spiral CT Screening Examination Form (SCT)

PARTS B, C, D AND E COMPLETED BY RADIOLOGIST

PART B. SPIRAL CT OVERALL DIAGNOSTIC QUALITY (COMPLETED BY RADIOLOGIST)

1. Indicate the overall diagnostic quality of the CT image acquisition sequence:

- ☐ A. Diagnostic CT (GO TO C.1)
- ☐ B. Limited CT, but interpretable (COMPLETE B.2 AND GO TO C.1)
- ☐ C. Non-diagnostic CT exam, reschedule CT (COMPLETE B.2 AND GO TO D.1)
- ☐ D. No image available (GO TO D.3, COMMENTS)

2. Which of the following affected the quality of the limited or non-diagnostic CT? (MARK ALL THAT APPLY)

- ☐ Submaximal inspiratory breath-hold
- ☐ Motion artifact
- ☐ Respiratory misregistration
- ☐ Incorrect technical parameter(s)
- ☐ Lungs not completely imaged
- ☐ Severe beam hardening artifact
- ☐ Excessive quantum mottle or graininess
- ☐ Other (SPECIFY)_____

PART C. SPIRAL CT EXAMINATION FINDINGS (COMPLETED BY RADIOLOGIST)

1. Radiologic Abnormality Noted:

- ☐ No (GO TO D.1 AND MARK RESULT "E")
- ☐ Yes (COMPLETE C.2. RECORD INFORMATION FOR EACH ABNORMALITY)

2. Record Information for Each Abnormality:

Abn #	Description of Abnormality		Complete for Code 51 Only: CT Slice	Location of Epicenter	Longest Diameter (mm)	Longest Perpendicular Diameter (mm)	Margins	Predominant Attenuation
	51 = Non-calcified nodule/mass ≥ 4 mm (MUST MARK "A" IN D.1) 52 = Non-calcified nodule < 4 mm 53 = Benign lung nodule(s) (benign calcification) 54 = Atelectasis, segmental or greater 55 = Pleural thickening or effusion 56 = Non-calcified hilar/mediastinal adenopathy/mass ≥ 10 mm short axis 57 = Chest wall abnormality (e.g. bone destruction, metastasis) 58 = Consolidation 59 = Reticular/reticulonodular opacities, honeycombing, fibrosis, scar 62 = 6 or more nodules, not suspicious for cancer (opacities ≥ 4mm) (ANY SUSPICIOUS NODULES MUST BE CODED AS 51) 63 = Emphysema 64 = Significant cardiovascular abnormality (SPECIFY) 70 = Other significant abnormality above the diaphragm (SPECIFY) 71 = Other significant abnormality at/below the diaphragm (SPECIFY) 72 = Other minor abnormality noted (SPECIFY IF DESIRED)		Record slice number containing abnormality's greatest diameter	1 = RUL 2 = RML 3 = RLL 4 = LUL 5 = Lingula 6 = LLL 8 = Other, SPECIFY (in Comments section)	999 = Unable to determine	999 = Unable to determine (same CT slice)	1 = Spiculated (Stellate) 3 = Smooth 4 = Poorly defined 9 = Unable to determine	1 = Soft tissue 2 = Ground glass 3 = Mixed 4 = Fluid/ water 6 = Fat 7 = Other 9 = Unable to determine
	CHECK BOX IF IDENTIFIED AFTER COMPARISON WITH HISTORICAL IMAGES:							
1	|___|___|	☐	|___|___|___|	|___|	|___|___|___|	|___|___|___|	|___|	|___|
2	|___|___|	☐	|___|___|___|	|___|	|___|___|___|	|___|___|___|	|___|	|___|
3	|___|___|	☐	|___|___|___|	|___|	|___|___|___|	|___|___|___|	|___|	|___|
4	|___|___|	☐	|___|___|___|	|___|	|___|___|___|	|___|___|___|	|___|	|___|
5	|___|___|	☐	|___|___|___|	|___|	|___|___|___|	|___|___|___|	|___|	|___|
6	|___|___|	☐	|___|___|___|	|___|	|___|___|___|	|___|___|___|	|___|	|___|

Appendix 4-3 Spiral CT Screening Examination Form (SCT)

PART D. SPIRAL CT INTERPRETATION RESULTS (COMPLETED BY RADIOLOGIST)

1. Lung Screening Result:

- ☐ A. **Positive Screen – Abnormalities suspicious for lung cancer**
- ☐ C. **Negative Screen** – Clinically significant abnormalities not suspicious for lung cancer (GO TO D.3)
- ☐ D. **Negative Screen** – Minor abnormalities not suspicious for lung cancer (GO TO D.3)
- ☐ E. **Negative Screen** – No significant abnormalities (GO TO D.3)
- ☐ F. **Inadequate** (COMPLETE PART D.3 AND GO TO E.6)

2. Other Significant Abnormalities (in addition to lung screening results) that need to be reported:

☐ No ☐ Yes (SPECIFY IN D.3)

3. Comments: ☐ No ☐ Yes

____

____ ☐ Continued

PART E. SPIRAL CT COMPARISON RESULTS – COMPLETE FOR ALL LUNG SCREENING RESULTS (COMPLETED BY RADIOLOGIST)

1. Comparison Image: (MARK ALL THAT APPLY)

- ☐ No image available (GO TO E.4)
- ☐ T_0
- ☐ T_1
- ☐ T_2 Inadequate scan
- ☐ Previous scan not completed as part of NLST (RECORD SCAN TYPE AND DATES FOR UP TO 3 PREVIOUS SCANS)

Scan Types
1 = CT
2 = CXR
3 = MRI

Previous Scan Type(s):	**Date(s) of Previous Scan(s) (MONTH/DAY/YEAR)**
|___|	|___|___| / |___|___| / |___|___|___|___|
|___|	|___|___| / |___|___| / |___|___|___|___|
|___|	|___|___| / |___|___| / |___|___|___|___|

2. Enter abnormality number and code for <u>all</u> Code 51 abnormalities AND other significant abnormalities seen on this screening exam. (IF NONE, GO TO E.3)

		Was Abnormality Pre-existing?		**COMPLETE FOR CODE 51 ABNORMALITIES ONLY**		**COMPLETE FOR OTHER SIGNIFICANT ABNORMALITIES ONLY**
Abn. # (FROM ITEM C.2.)	**Abn.Code (FROM ITEM C.2)**	1 = No 2 = Yes 9 = Unable to determine	**Earliest Date Visible** (COMPLETE ONLY FOR PRE-EXISTING ABNORMALITIES) **(Month/Day/Year)** 99/99/9999 = Unable to determine	**Interval Growth of Abnormality?** 1 = No 2 = Yes 9 = Unable to determine	**Interval suspicious change in attenuation?** 1 = No 2 = Yes 9 = Unable to determine	**Interval change warrants further investigation?** 1 = No 2 = Yes 9 = Unable to determine
|___|	|___|___|	|___|	|___|___| / |___|___| / |___|___|___|___|	|___|	|___|	|___|
|___|	|___|___|	|___|	|___|___| / |___|___| / |___|___|___|___|	|___|	|___|	|___|
|___|	|___|___|	|___|	|___|___| / |___|___| / |___|___|___|___|	|___|	|___|	|___|
|___|	|___|___|	|___|	|___|___| / |___|___| / |___|___|___|___|	|___|	|___|	|___|
|___|	|___|___|	|___|	|___|___| / |___|___| / |___|___|___|___|	|___|	|___|	|___|
|___|	|___|___|	|___|	|___|___| / |___|___| / |___|___|___|___|	|___|	|___|	|___|

3a. Lung Screening Comparison Result:

- ☐ A. **Positive Screen –** Abnormalities suspicious for lung cancer
- ☐ B. **Positive Screen –** Abnormalities suspicious for lung cancer, no significant change
- ☐ C. **Negative Screen** – Clinically significant abnormalities not suspicious for lung cancer (GO TO E.4)
- ☐ D. **Negative Screen** – Minor abnormalities not suspicious for lung cancer (GO TO E.4)
- ☐ E. **Negative Screen** – No significant abnormalities (GO TO E.4)

3b. Other Significant Abnormalities (in addition to lung screening results) that need to be reported:

☐ No ☐ Yes (SPECIFY IN E.5)

4. Which of the following diagnostic procedures for screening examination results should the screening result letter include?

(MARK ALL THAT APPLY)

- ☐ No diagnostic intervention necessary
- ☐ Continue NLST screening CT
- ☐ Comparison with historical images (NOTE: CHECK OTHER PROCEDURES IN CASE HISTORICAL IMAGES UNAVAILABLE)
- ☐ Low dose CT with NLST parameters at:

  (MARK ALL THAT APPLY)
  - ☐ 3 months
  - ☐ 6 months
  - ☐ 3-6 months
  - ☐ 12 months
  - ☐ 24 months

  (MARK AN AREA OF FOCUS)
  - ☐ Limited
  - ☐ Entire chest
- ☐ Diagnostic chest CT
- ☐ Contrast-enhanced CT nodule densitometry
- ☐ FDG-PET
- ☐ Tech 99m depreotide scintigraphy
- ☐ Biopsy (percutaneous, thoracoscopic, open, etc.)
- ☐ Other (SPECIFY)_____

5. Comments: ☐ No ☐ Yes

_____

_____

☐ Continued

6. Radiologist ID: |___|___|___|___|

Date: |___|___| / |___|___| / |__|__|___|___|
MO DAY YEAR

_____
Signature

National Lung Screening Trial (NLST)

Specifications for Completion of the Spiral CT Screening Examination Form (SCT)

This form is to be completed by the SC Coordinator or staff member, and the examiners (technologist and radiologist). The SC Coordinator or staff member will complete the Administrative Section, the technologist will complete Part A, and the radiologist will complete Parts B through E of the form. This form should be completed in black or blue ink. An SCT form must be completed for every screening visit by a participant, regardless of the outcome. If documentation of the exam, including exam images, is lost and cannot be recreated, Parts A and B, and Items D.3 and E.6 must be completed.

Please refer to the NLST/LSS Screening Exam Data Handling Guidelines in Appendix 4-11 for details about making changes to data on the screening exam forms. Items pertaining to technical parameters must be changed by the technologist who performed the screening exam and items pertaining to exam results must be changed by the radiologist who read the screening exam. The remaining items may be changed by the SC Coordinator or other designated staff member. All data changes must be initialed and dated in pen on the screening exam form by the staff member making the change. Cross out erroneous data with one line, do not black out or use correction fluid to conceal the original data.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label in the space provided in the upper right-hand corner of the form.

Screening Center ID: Record the two-digit SC ID number.

Date of Examination: Record the date of the examination. The month, day, and the last two digits of the year should be recorded (e.g., 02/07/2002). The date of examination should not be recorded in advance of the participant's study visit.

Study Year ($T_0 - T_2$): Record the participant's study year (T_0, T_1, or T_2).

Visit Number: Record the number of times the participant visited the SC to complete this examination in the current study year. There should be no more than two visits to the SC to complete the spiral CT examination in any one study year. If an exam form is completed for visit two, there must also be a completed form for visit one.

Reason for Repeat Visit: If this is a repeat visit, record the reason for the repeat visit. Refer to the examination form from the previous visit(s) for this information. The purpose of this item is to provide potentially useful information to the examiner regarding why the participant is returning for a repeat visit. Some example reasons:

"Prior scan was of poor quality."

This might be entered if the participant's prior scan was of poor quality during the previous visit, but s/he was willing to return to the SC for a repeat scan. This information will alert the examiner to explore the reasons for this problem.

"Participant out of time. Unable to complete spiral CT exam."

This might be entered if the participant's schedule did not allow him/her to remain at the SC to complete the spiral CT screening examination during a previous visit, and the examination was rescheduled.

Interval Follow-Up Information: This section indicates whether the participant has had any imaging studies since the previous screening exam. This section is intended to be a tool for the SCs to collect interval follow-up information and transmit it easily to the radiologists. However, some SCs may have alternate internal methods for obtaining and transmitting interval follow-up information.

The SC may complete this section using information received during the DE process, contact with the participant during the year, or questioning the participant when s/he comes to the clinic for the current screening exam. This information may be referenced by the radiologist if needed when completing Part E of the form.

Has the participant had any imaging studies since the previous screening exam that may be useful for the radiologist to review if needed?

- **Yes:** The SC should mark this box to indicate that the participant has had at least one imaging study since his or her previous screening exam.
- **No:** The SC should mark this box to indicate that the participant has not had at least one imaging study since his or her previous screening exam.
- **N/A:** For SCs where interval follow-up information is collected and transmitted to the radiologists through an alternate method, the SC should mark this box to indicate that the question is not applicable.

  For SCs using this question to capture interval follow-up information, the SC should mark this box to indicate that interval follow-up information is not available.

If YES, dates obtained (month and year): Record the date that any interval images were obtained. The month and the last two digits of the year should be recorded (e.g., 02/2002). If the date is unknown, enter 99/9999. If no interval images were obtained or if N/A is marked, the dates may be left blank.

Part A. Spiral CT Examination Findings (Completed by Technologist):

1. **Number of Attempts:** Mark the box corresponding to the number of attempts made to complete the spiral CT. Three attempts are allowed per visit.

   - **None:** This might apply if the participant entered the dressing room to prepare for the examination, but for some reason there was no attempt to obtain the spiral CT image (participant became ill, could not wait, etc.). (Go to Item A.3.)

     If the participant never prepared for the examination in any way, the examination is considered "Not Done." The SCT form would not be filled out in such cases.

- **One:** The spiral CT is attempted once, regardless of whether it is successfully completed.
- **Two:** The spiral CT is attempted twice, regardless of whether it is successfully completed.
- **Three:** The spiral CT is attempted three times, regardless of whether it is successfully completed.

2. **Adequate Scan Obtained:** Before the participant leaves the SC, the technologist will evaluate the spiral CT for quality. All scans are then sent to the study radiologist, who will also judge their adequacy. A scan will be considered to be adequate if both lungs are completely scanned, from apex through the lung bases, including both costophrenic angles. Responses are explained below:

- **No:** The scan is judged to be inadequate. (The technologist should complete Part A. Parts B and C should be skipped and the radiologist should complete Items D.1, D.3, and E.6.)
- **Yes:** The scan is judged to be adequate. (The technologist should complete Part A. The radiologist should complete Parts B through E.)

3. **Reason for Inadequate or No Scan:** This item is completed only if the answer to Item A.1 is "None," or the answer to Item A.2 is "No." Mark one or more boxes to indicate the reason(s) for not obtaining the scan or for obtaining inadequate scans. An explanation of each reason for inadequate scans is given below:

- **Participant Refusal:** The participant is unwilling to cooperate, i.e., lie in the proper position, hold breath, etc.
- **Equipment Malfunction:** This includes any problem with the equipment that prevents the successful completion of the spiral CT scan.
- **Poor Image Quality:** An image is obtained, but it is not adequate for interpretation. Poor image quality may be due to motion artifact, incomplete evaluation of the thorax, inappropriate CT technique, or excessive noise.
- **Other (SPECIFY):** In the space provided, describe any other situation in which adequate scans could not be obtained.

4. **Technical Parameters**: Record the parameters used to complete the spiral CT scan. If any of the parameters are lower or higher than the acceptable range, provide a comment to explain in Item A.6 and complete a PHVF. A PHVF is not required if the mAs or effective mAs is lower than the acceptable range when 1) a lower dose is desired due to patient size, or 2) higher kVp, less filtration, etc. are used along with the lower mAs or effective mAs to attain adequate image quality. Refer to MOOP Sections 3.9.3, 4.4, and Appendix 4-1 for further details. If documentation of the exam, including exam images, has been lost and cannot be recovered or recreated, "9"s can be recorded for the missing technical parameter values.

A. kVp: Record the kVp at which the image was obtained. The kVp must always be recorded; it is **not** acceptable to fill with "999" unless documentation of the exam has been lost and cannot be recreated. The acceptable range is 120-140 kVp.

B. mAs: Record the mAs for the image obtained. For two-digit doses, zero-fill the first digit (i.e., 018). If the mAs is not available, record 999. The acceptable range is 40-80 mAs. A setting of 40 mAs should be used for non-obese participants. If the participant is obese, a higher mAs setting may be used. Either the mAs and pitch or effective mAs must be recorded; if effective mAs is blank then mAs and pitch must be recorded.

C. mA: Record the mA for the image obtained. For two-digit doses, zero-fill the first digit (i.e., 018). If the mA is not available, record 999. The mA setting should allow for the mAs to fall within the exposure range and times specified in the protocol.

D. Display FOV: Record the display field of view, in centimeters. The dFOV should be the smallest diameter of the chest wall that will completely contain the lung parenchyma as measured from the widest point of outer rib to outer rib. If the dFOV is unknown or not available, record 99.

E. Effective mAs: Record the effective mAs for the image obtained. If effective mAs is not available, record 99. Effective mAs may be calculated by dividing mAs by the pitch. The allowable range for effective mAs is 20-60. Either the mAs and pitch or effective mAs must be recorded; if mAs is blank then effective mAs must be recorded.

F. Pitch: Record the pitch for the image obtained. If the pitch is not available, record 9.99. The allowable range for pitch is 1.25-2.0. If mAs is recorded, then pitch must also be recorded.

4. Indicate CT reconstruction algorithm/filter: Check the box that corresponds to the manufacturer of the spiral CT machine used and the reconstruction algorithm used to obtain the image. Images may be obtained using a standard algorithm or reconstructed using a high-resolution bone algorithm. The GE Lung and other lung algorithms are <u>not</u> acceptable for NLST/LSS spiral CT scan because they lead to difficulties with determining the calcification of a nodule.

5. Comments: The comments box should be used to record information that may help clarify a situation, provide further information for an item in another part of the form, and to record additional "Other (SPECIFY)" information, if needed.

If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes." Enter the item number to which the comments are related. The item number should include a letter indicating the part of the form, and a number indicating the item within that part (e.g., A.3). If the comment is not related to a specific item in Part A of the form, use the item number for the Comments section itself (A.6). Then enter the comments in the space provided to the right of the item number.

6. Tech ID: The technologist should enter his/her four-digit staff ID number and sign the form in the space provided.

Part B. Spiral CT Overall Diagnostic Quality (Completed by Radiologist)

Part B is to be completed by the radiologist. At some SCs, the SC staff will complete this section using the radiologist's written report. Also, the SC staff may complete Item B.1 if the answer is D, "No images available." If Item A.2 is answered, "No," Parts B and C should be left blank, and Items D.1, D.3, and E.6 should be completed.

1. **Indicate the overall diagnostic quality of the CT image acquisition sequence:**

   A. Diagnostic CT: The spiral CT image is of diagnostic quality. Go to C.1 to record examination findings.

   B. Limited CT, but interpretable: The spiral CT image is of limited diagnostic quality, but it can be interpreted. The radiologist should record the factors affecting the quality of the spiral CT in B.2, and should complete C.1 to record the examination findings. If an abnormality suspicious for lung cancer or a clinically significant abnormality is noted, the result in D.1 should be recorded as A or C. The result in D.1 may not be recorded as F.

   C. Non-diagnostic CT exam, reschedule CT: The spiral CT image is not acceptable for interpretation, and must be repeated. Record the factors affecting the quality of the image in B.2. Then complete D.1 (record Result F) and D.3, and go to Item E.6. No abnormalities may be recorded for a screening exam of non-diagnostic image quality. If the exam is not of diagnostic quality but an abnormality suspicious for lung cancer or a clinically significant abnormality is noted, then select "B. Limited CT, but interpretable" and record the abnormality in C.1 as described above. However, if a minor non-suspicious abnormality is noted, the diagnostic quality should be recorded as "C. Non-diagnostic CT exam, reschedule CT" and the minor abnormality should not be recorded in C.1.

   D. No image available: The spiral CT image is not available for review. Instances in which the participant underwent a screening examination but the image sets were either lost or inadvertently destroyed and not available for review by the radiologist should be recorded as "No image available." Record the reason that images are not available for review in Item D.3 (Comments). After detailing the reason the images were not available, complete Item E.6. Having no images available for review is considered a protocol violation, therefore a Protocol and HIPAA Violation Form (PHVF) must be completed and submitted to the CC.

2. **Which of the following affected the quality of the limited or non-diagnostic CT?** Mark the box(es) to indicate the factor(s) that contributed to the limited diagnostic quality spiral CT. Mark all that apply.

   - ■ Submaximal inspiratory breath-hold
   - ■ Motion artifact
   - ■ Respiratory misregistration
   - ■ Incorrect technical parameter(s)
   - ■ Lungs not completely imaged
   - ■ Severe beam hardening artifact
   - ■ Excessive quantum mottle or graininess

- Other (SPECIFY)

Part C. Spiral CT Examination Findings (Completed by Radiologist):

Part C is to be completed by the radiologist. Any finding that could impact follow-up (i.e. result codes "A," "B," and "C") must be in the dictated report and recorded in Part C of the screening exam form. Minor abnormalities that do not require follow-up may be included in the dictated report but do not need to be recorded on the screening exam form. Any abnormality recorded on the screening exam form must be noted in the dictated report. If item A.2 is answered "No," Parts B and C should be left blank and Items D.1, D.3, and E.6 should be completed.

1. **Radiologic Abnormality Noted:**

   - **No:** No abnormality was seen. Go to Item D.1 and mark Result "E."

   - **Yes:** An abnormality (either suspicious for lung cancer or abnormal for any other reason) was seen. Record information for each (up to six) abnormality in the chart (C.2).

2. **Record Information for Each Abnormality:** Complete this item for up to six abnormalities. If more than six are identified, record the six most serious abnormalities. Complete the chart by recording the appropriate number(s) in the designated spot. Enter information about the most serious abnormality in the row labeled "1," the second most serious abnormality in the row labeled "2," and so on.

   Description of Abnormality: For each abnormality, mark **one** number that corresponds to it from the list below. Please note that **code 51 (in bold) is considered to be a positive screen for lung cancer and always should be listed first if multiple abnormalities are identified**. For this abnormality, the examination result in Item D.1 must be coded "Positive Screen – Abnormalities suspicious for lung cancer." If, however, the non-calcified nodule/mass ≥ 4 mm is not discovered until the comparison exam, it is possible that code 51 will not be listed first and that the examination result in Item D.1 will not be "Positive Screen – Abnormalities suspicious for lung cancer."

   Code 52, "Non-calcified nodules < 4 mm," should be used to document nodules present at T_0 as well as incident nodules at T_1 and T_2. If the nodule is noted at T_2, the radiologist may wish to recommend that the participant receive an annual CT until no further change is observed, however no study-wide recommendations have been established.

   Please note that codes 70 and 71, "Other significant abnormality (SPECIFY)" should be used to designate all other significant abnormalities not listed below, including, but not limited to, any other abnormalities suspicious for malignancy. Code 72, "Other minor abnormality noted" should be used to designate all other minor abnormalities noted. Specifying the minor abnormalities designated by code 72 is optional.

   51 = Non-calcified nodule/mass ≥ 4 mm (MUST MARK "A" IN D.1)
   For this abnormality, the examination result in Item D.1 must be coded "Positive Screen – Abnormalities suspicious for lung cancer."

   52 = Non-calcified nodule < 4 mm
   New, small nodules observed at T_1 or T_2 are to be coded as "D – Negative Screen, Minor abnormalities not suspicious for lung cancer."

   53 = Benign lung nodule(s) (benign calcification)

54 = Atelectasis, segmental or greater
55 = Pleural thickening or effusion
56 = Non-calcified hilar/mediastinal adenopathy/mass ≥ 10 mm short axis
57 = Chest wall abnormality (e.g. bone destruction, metastasis)
58 = Consolidation
59 = Reticular/reticulonodular opacities, honeycombing, fibrosis, scar
62 = 6 or more nodules, not suspicious for cancer (opacities ≥ 4 mm) (ANY SUSPICIOUS NODULES MUST BE CODED AS 51)

Code 62 should be used in cases where there are at least six nodules not suspicious for cancer. "Not suspicious for cancer" is defined as round, well-defined, and similar in size. Any nodules that are suspicious MUST be coded as 51; should this leave a total of fewer than six non-suspicious nodules, each nodule must be individually recorded.

63 = Emphysema
64 = Significant cardiovascular abnormality (SPECIFY)

Code 64 should be used to record a significant cardiovascular abnormality, such as a thoracic aortic aneurysm, aortic dissection, marked cardiomegaly, pulmonary hypertension, coronary artery calcifications, or valvular calcifications (exclude mitral annular calcification). The abnormality should be specified in the space provided to the right of the two-digit box for the abnormality code.

70 = Other significant abnormality above the diaphragm (SPECIFY)

The abnormality should be specified in the space provided to the right of the two-digit box for the abnormality code.

71 = Other significant abnormality at or below the diaphragm (SPECIFY)

The abnormality should be specified in the space provided to the right of the two-digit box for the abnormality code.

72 = Other minor abnormality noted (SPECIFY IF DESIRED)

The abnormality may be specified in the space provided to the right of the two-digit box for the abnormality code, if desired.

Check box if identified after comparison with historical images: This box indicates when the abnormality listed in the table was identified. Check the box for any abnormality that was found on the current spiral CT only after comparing it with any historical image. If an abnormality was identified during the initial (isolated) review of the current spiral CT, this box is left blank.

The remaining information under Description of Abnormality (CT Slice, Location of Epicenter, Longest Diameter, Longest Perpendicular Diameter, Margins, and Predominant Attenuation) must be recorded for abnormalities coded as 51 only.

- **CT Slice:** Record the slice number that contains the greatest diameter of the abnormality or identify a representative slice. This will be used primarily to identify the location of the abnormality for follow-up. The CT slice number where an abnormality is seen must be recorded.
- **Location of Epicenter:** Record the code that corresponds to the approximate center of the location of the abnormality in the appropriate lobe. Select one location for each abnormality.

- **RUL (Right Upper Lobe):** The abnormality was found in the upper 1/3 of the right lobe.
- **RML (Right Middle Lobe):** The abnormality was found in the middle 1/3 of the right lobe.
- **RLL (Right Lower Lobe):** The abnormality was found in the lower 1/3 of the right lobe.
- **LUL (Left Upper Lobe, excluding lingula):** The abnormality was found in the upper 1/3 of the left lobe, excluding the lingula.
- **Lingula:** The abnormality was found in the lingula.
- **LLL (Left Lower Lobe):** The abnormality was found in the lower 1/3 of the left lobe.
- **Other (SPECIFY):** This choice is used when it is difficult to identify the lung section containing the epicenter. If the lung section containing the epicenter cannot be identified, specify a more general location (i.e., upper lobe).

- **Longest Diameter (mm):** Record the length of the abnormality's maximum dimension in millimeters using whole integers. Zero-fill all measurements (e.g., 005). If dimensions are not available, record 999.
- **Longest Perpendicular Diameter (mm):** Record the length of the maximum perpendicular dimension (that is, the longest length that is perpendicular to the maximum dimension) in millimeters using whole integers. Zero-fill all measurements (e.g., 005). If dimensions are not available, record 999.
- **Margins**: Record the code that corresponds to whether the lesion is spiculated (stellate), smooth, or poorly defined. If the morphology cannot be determined, code "unable to determine."
- **Predominant Attenuation**: The radiologist will categorize, when possible, the appearance of the abnormality by recording the code that corresponds to the attenuation. *(Note: "Mixed attenuation" refers to nodules of mixed soft tissue (solid) and ground glass attenuation, also referred to as "semi-solid.")*

Part D. Spiral CT Interpretation Results (Completed by Radiologist):

Part D is to be completed by the radiologist. At some SCs, the SC staff will complete this section using the radiologist's written report. In cases where an adequate scan was not obtained (A.2 = No), Items D.1 and D.3 must be completed by the radiologist.

Part D documents the results of the current screening examination only. The participant's prior medical history, prior radiologic examinations, or prior NLST/LSS screens should not be considered when assigning the lung screening result in Part D. The result of comparing the current spiral CT image with historical images will be recorded in Part E.

Note: The focus of the screening examination is to identify abnormalities that are suspicious for lung cancer. Although other clinically significant findings may be found incidentally during the screening, the Results section is meant to reflect a hierarchy of examination findings in regard to lung cancer. Result

categories A, C, D, E, and F in Part D, Item 1 are in hierarchical order. Thus, a positive screen is at the highest end of findings, a clinically significant abnormality is at the next level, and so on, throughout the results category.

1. **Lung Screening Result:** Mark the box corresponding to the result of the current spiral CT examination. Definitions of lung screening results are given below:

   A. Positive Screen – Abnormalities suspicious for lung cancer:

   The following abnormality (C.2, #51) is always considered a positive screen and Item D.1 must always be marked "A":

   - Non-calcified nodule/mass $\geq$ 4.0 mm

   Other abnormalities, or constellations of abnormalities, may be suggestive of lung cancer, but there is no absolute rule for coding other findings as suspicious for lung cancer. In these instances, the classification of a screening exam result as positive is left up to the radiologist. Any other clinically significant abnormalities may be reported in Item D.2.

   C. Negative Screen – Clinically significant abnormalities not suspicious for lung cancer:

   The review of the scan reveals that an abnormality is present and requires further evaluation, but is not suggestive of lung malignancy. It is up to the radiologist to determine whether an abnormality is clinically significant. Complete Item D.3 and then go to Part E.

   D. Negative Screen – Minor abnormalities not suspicious for lung cancer:

   The review of the scan reveals minor abnormalities that are not suspicious for lung cancer. It is up to the radiologist to determine whether an abnormality is minor. Complete Item D.3 and then go to Part E. In the instance of a nodule(s) < 4mm, the result must be coded a "D" – "Negative Screen, Minor abnormalities not suspicious for lung cancer."

   E. Negative Screen – No significant abnormalities:

   The review of the scan reveals no significant abnormalities. Complete Item D.3 and then go to Part E.

   F. Inadequate:

   The spiral CT scans were inadequate and sufficient information could not be obtained to determine the examination result. Complete Item D.3 and then go to E.6.

   If the image is considered inadequate, but based on what is visible on the image, there is an overt suspicion of lung cancer, the result of the screening exam should be recorded as positive. The radiologist should record that the image is positive in Item D.1 of the SCT. The radiologist must comment in Item D.3 that although the result is positive, the overall quality of the image is inadequate. Part E should be completed as outlined below.

2. **Other Significant Abnormalities (in addition to lung screening results) that need to be reported:** Complete D.2 only if the Lung Screening Result in D.1 was "A. Positive Screen."

   No: The spiral CT did not reveal other significant abnormalities other than the lung screening result.

   Yes: The spiral CT revealed a significant abnormality in addition to the positive lung screening result; for example, a breast mass was seen in addition to nodules that are suspicious for lung cancer.

3. **Comments:** The comments box should be used to record information from Parts B, C, and D that may help clarify a situation, provide further information for an item in another part of the form, and to record additional "Other (SPECIFY)" information, if needed.

   If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes." Enter the item number to which the comments are related. The item number should include a letter indicating the part of the form, and a number indicating the item within that part (e.g., B.2). If the comment is not related to a specific item in Parts B, C, or D of the form, use the item number for the Comments section itself (D.3). Then enter the comments in the space provided to the right of the item number.

   Note that if a dictated report is not provided, the Comments section should be used to describe significant and minor abnormalities occurring with a negative screen.

   If Item D.2 is marked "Yes," the Comments section should be used to describe the other clinically significant abnormality.

Part E. Spiral CT Comparison Results – Complete for All Lung Screening Results (Completed by Radiologist)

Part E is to be completed by the radiologist and must be completed for ALL screening examinations.

Part E documents the comparison of the current spiral CT with any available historical images for the participant. Comparison to previous images may or may not lead to a change in the lung screening result. Historical images for the T_0 prevalence screen will be obtained according to local practice at the SC. Cases where a participant does not have an historical image to be used for a comparison read should be recorded in "E.5. Comments." If a previous screening exam was not performed, then not doing the comparison is not considered a protocol violation. For example, not performing the comparison read at T_1 is not considered a protocol violation if the T_0 exam was never obtained and an MDF was submitted for the T_0 SCT or form. However, if the previous screening exam was performed but the images are not compared to the current screening exam, a Protocol and HIPAA Violation Form must be completed.

If historical images can be obtained, they should be used to conduct a comparison review for the T_0 prevalence screen. For T_1 screening examinations, the comparison image is the T_0 screen. For T_2 screening examinations the comparison images are the T_0 and T_1 screens. However, if the screening examinations from all three study years are negative, then the T_2 screening examination may be compared with either the T_0 or T_1 screen, or both screens, at the radiologist's discretion.

In the event that a screen is inadequate and a repeat screen is performed, the inadequate screen may be used as the comparison image for the repeat screen at the radiologist's discretion. In this instance, check the box for the current study year in Item E.1. If an inadequate screen is used for comparison in later study years, that fact should be noted in the Comments section. A comment is not required if using an

inadequate screen for comparison in the same study year. For example, if a T_1 screen is inadequate and a repeat T_1 screen is performed, then both the T_0 and the inadequate T_1 screens may be used as comparison images for the repeat T_1 screen. If the inadequate screen is used as a comparison image at T_2, then it should be noted in the Comments section. Once the comparison has been made and the data recorded, the results of the comparison are recorded in Item E.3a.

Should the comparison with historical images lead to a change in the lung screening result, the radiologist should record the new result in Part E. For example, a minor abnormality documented in Part C may lead to the Lung Screening Result "D" in Item D.1. However, upon comparison with historical images, the radiologist may decide that there has been a significant change in the abnormality. In this instance, the radiologist would complete Part E, recording the information concerning the abnormality in Table E.2, and record the Lung Screening Comparison Result "C" in E.3a.

Should the comparison with historical images identify an abnormality that was not previously seen on the image read in isolation, the abnormality should be recorded in Item C.2, and the box which reads "Check Box If Identified After Comparison With Historical Images" should be checked. If the abnormality is coded as a "51" or other significant abnormality, then these newly identified abnormalities should be recorded in Item E.2.

Likewise, should the comparison with historical images result in an abnormality that differs (more severe or less severe) from what was seen on the image read in isolation, the abnormality should be coded according to the comparison image and recorded in Item C.2. For example, an abnormality is coded as a "72 – Other minor abnormality noted" for the image read in isolation. But in comparison with the historical image, the abnormality now appears to be a "71 – Other significant abnormality at/below the diaphragm." The abnormality should be recorded as a "71" in Item C.2, and the box which reads "Check Box If Identified After Comparison With Historical Images" should be checked. The change in the abnormality as a result of the comparison with historical images should be documented in the Comments section of Part E (Item E.5). Item E.2 should then be completed according to the guidelines outlined below. Any findings from historical images used as comparisons that are <u>not present at the current screening exam</u> (i.e. a 51 present at T_0 but not at T_1) should be noted as a comment in E.5.

1. **Comparison Image:** Check the box to indicate the source of the comparison image. Mark all boxes for which a comparison image is available.

   No image available – There is no historical image available. If checked, this should be the only box checked. Go to E.4.

   T_0 – The comparison image is the NLST/LSS T_0 exam. The current spiral CT scan is the T_1 or T_2 examination. In instances where the T_0 screen is inadequate and a repeat screen is performed, the inadequate T_0 screen may be used as the comparison image for the repeat T_0 screen at the radiologist's discretion. If the inadequate T_0 screen is used as a comparison image at the T_1 or T_2 examination, record that fact in the Comments section.

   T_1 – The comparison image is the NLST/LSS T_1 exam. The current spiral CT scan is the T_2 examination. In instances where the T_1 screen is inadequate and a repeat screen is performed, the inadequate T_1 screen may be used as the comparison image for the repeat T_1 screen at the radiologist's discretion. If the inadequate T_1 screen is used as a comparison image at the T_2 examination, record that fact in the Comments section.

   T_2 Inadequate scan – The comparison image is the NLST/LSS T_2 inadequate scan. The current spiral CT exam is the T_2 repeat examination.

Previous scan not completed as part of NLST – The comparison image was not done as part of the NLST/LSS. Record the code that corresponds to the type of scan for which the images are available, and the date of the scan. A total of three non-NLST/LSS scans may be recorded.

2. Enter abnormality number and code for all Code 51 abnormalities AND other significant abnormalities seen on this screening exam. This chart records the result of the comparison of each abnormality seen on the current spiral CT with any available historical images. Transfer the abnormality number and code from Item C.2 for each code 51 abnormality and/or other significant abnormality, including any abnormalities that have been determined to be significant only after comparison with historical images. Any new abnormality that is identified during the comparison must be recorded in Item C.2. Complete the following:

Was abnormality pre-existing? Record the single-digit code to indicate whether or not the abnormality was seen on any historical image.

1 = No: The abnormality is not visible on any previous image. Do not complete the rest of the table; go to E.3.

2 = Yes: The abnormality can be seen on a previous image. The remainder of Item E.2 should be completed.

9 = Unable to determine: It cannot be determined whether or not the abnormality can be seen on a previous image. Do not complete the rest of the table; go to E.3.

Earliest date visible: Record the month, day, and year of the earliest historical image which shows the abnormality listed.

Complete for Code 51 Abnormalities Only: If the abnormality was recorded as code 51, complete the following:

Interval Growth of Abnormality?: Record the single digit code that indicates if the abnormality has grown since its appearance on the previous image.

Interval suspicious change in attenuation?: Record the single digit code that indicates if there has been a suspicious change in attenuation between the historical image and the current one. A suspicious change in attenuation is an increase in attenuation from ground glass to a combination of ground glass and soft tissue or to pure soft tissue attenuation.

Interval change warrants further investigation?: If the abnormality was recorded as any other significant abnormality or is being re-classified as a significant abnormality due to the comparison with historical images, record the single digit code that indicates if there has been a significant change that warrants further investigation.

3a. Lung Screening Comparison Result: Check the box to indicate the result of comparison of the current spiral CT exam with the historical images available. This is the result that will be reported to the participant and the participant's health care provider, and should take into

account the radiologist's assessment of the current scan in the context of the participant's available historical images.

If the current screen is positive and the abnormality identified appears not to have changed when compared to previous images at the comparison reading (Part E), the radiologist should record the result in Item E.3a as B – "Abnormalities suspicious for lung cancer, no significant change."

However, when previous images from two successive study years have not changed and the third image is positive and appears unchanged from the previous images, the radiologist may code that result as D – "Minor abnormalities not suspicious for lung cancer" at his/her discretion as described below, rather than using result code B. Additionally, the radiologist should specify in the Comments section (Item E.5) why the result was coded as D. Likewise, if after baseline screening a clinically significant abnormality remains stable and unchanged on subsequent screening examinations, the abnormality may be coded at T_2 as D - "Minor abnormalities not suspicious for lung cancer" at the discretion of the radiologist, rather than coding the image as a clinically significant abnormality. Additionally, the radiologist should specify in the Comments section (Item E.5) why the result was coded as a D.

Any new nodules less than 4 mm that are identified on the T_1 or T_2 screening exam are to be recorded as "D" in Item E.3a as "Negative Screen, Minor abnormalities not suspicious for lung cancer." If other abnormalities are present which are suspicious for lung cancer either on their own or in conjunction with the new nodule, a result of "A – Positive screen-Abnormalities suspicious for lung cancer" should be recorded in section E.3a.

3b. Other Significant Abnormalities (in addition to lung screening results) that need to be reported: Complete E.3b only if the Lung Screening Result in E.3a was "A. Positive Screen" or "B. Positive Screen, no significant change."

No: The spiral CT did not reveal other significant abnormalities other than the lung screening result.

Yes: The spiral CT revealed a significant abnormality in addition to the positive lung screening result; for example, a breast mass was seen in addition to nodules that are suspicious for lung cancer.

4. Which of the following diagnostic procedures for screening examination results should the screening result letter include? Mark the box to indicate recommended follow-up options for this participant. More than one item may be marked. If the participant reported previous chest images but those images were not immediately available for comparison, "Comparison with historical images" may be marked, indicating that the comparison should still be attempted. If "Comparison with historical images" is marked, other follow-up diagnostic procedures MUST be indicated as well, in case the historical images cannot be obtained. If "Low dose CT with NLST parameters" is marked, the radiologist must indicate when the follow-up CT should be performed by marking one or more time intervals from the list below. The radiologist must also select the area of focus, applicable to any time period chosen. Only one box may be marked for area of focus; both may not be marked and both may not be blank. "Limited" focus refers to the abnormal region only, as opposed to the entire chest. There are no study-wide recommendations for T_2 nodules that have been stable for two years; however radiologists may make recommendations at their own discretion.

New nodules identified at T_2 will be documented on a DE Form and followed for 24 months as described in section 7.2 of the MOOP.

5. **Comments:** This comments box should be used to record comments for any item in Part E that may help clarify a situation, provide further information for an item in another part of the form, and to record additional "Other (SPECIFY)" information, if needed.

   If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes." Enter the item number to which the comments are related. The item number should include a letter indicating the part of the form, and a number indicating the item within that part (e.g., E.2). If the comment is not related to a specific item in Part E of the form, use the item number for the Comments section itself (E.5). Then enter the comments in the space provided to the right of the item number.

6. **Radiologist ID:** This item should be completed by the radiologist. The radiologist should enter his/her four-digit staff ID number, record the date the form was completed, and sign the form in the space provided. If this section was completed by a member of the SC staff using the radiologist's written report, the SC staff member should enter the radiologist's name and staff ID number, then sign his/her own name below the name of the radiologist.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.
- Enter the form into the
- File the form in the participant's study file.

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

CT QUALITY ASSURANCE INFORMATION

The following information is required for CT quality assurance.

1. **LSS protocol CT specifications.**
2. **Confirmation of screening site adherence to CT specifications.**
3. **CT equipment characteristics.**
4. **Physicist attestation to ongoing performance testing (annual).**
5. **CT water phantom image quality scan (bi-monthly).**
6. **CT dosimetry measurements (annual, and after tube change).**

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

CT EQUIPMENT CHARACTERISTICS

Site physicist: Please provide the following information, as possible, for each CT scanner being used in this study.

LSS SCREENING CENTER NAME: _____ Site #: _____

SITE MAILING ADDRESS: _____

I. PI (Radiologist) : _____

ID#: _____ Tel#: _____ Email: _____

II. Chief CT Technologist: _____

ID#: _____ Tel#: _____ Email: _____

III. Medical Physicist: _____

ID#: _____ Tel#: _____ Email: _____

	CT EQUIPMENT LOCATION:
1.	Manufacturer:
2.	Model Name:
3.	Date of Manufacture:
4.	Detector Type: __Solid State Xenon Gas
5.	Available kVp's:
6.	Maximum Available Channels (#) :
7.	Minimum Available Channel Collimation (MM):
8.	Minimum Tube Rotation Time (sec)_____

AVAILABLE DOSE REDUCTION OPTIONS: _____

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

ATTESTATION TO CT PERFORMANCE TESTING

Site physicist: For each CT Scanner being used in this study, please provide the following information regarding performance testing. Copies of your reports should be available for site inspectors.

I SITE NAME: _____

II CT SCANNER: _____**MACHINE #:** _____**VENDOR:** _____**MODEL#:** _____

III LOCATION OF INSTALLATION: _____

IV DATE OF INSTALLATION: _____

	PERFORMANCE TEST	TESTED AT INSTALLATION	LAST DATE TESTED	TEST NOT DONE
1.	Laser Accuracy	☐ Yes ☐ No ☐ Unknown	__/__/____	
2.	Table Movement	☐ Yes ☐ No ☐ Unknown	__/__/____	
3.	Gantry Tilt	☐ Yes ☐ No ☐ Unknown	__/__/____	
4.	Slice Thickness	☐ Yes ☐ No ☐ Unknown	__/__/____	
5.	Dose Profile	☐ Yes ☐ No ☐ Unknown	__/__/____	
6.	Scout Accuracy	☐ Yes ☐ No ☐ Unknown	__/__/____	
7.	Tube Output & Linearity	☐ Yes ☐ No ☐ Unknown	__/__/____	
8.	Half Value Layer	☐ Yes ☐ No ☐ Unknown	__/__/____	
9.	Patient Dosimetry (CTDI)	☐ Yes ☐ No ☐ Unknown	__/__/____	
10.	Geometric Distortion	☐ Yes ☐ No ☐ Unknown	__/__/____	
11.	CT# Uniformity & Nose	☐ Yes ☐ No ☐ Unknown	__/__/____	
12.	CT# Linearity	☐ Yes ☐ No ☐ Unknown	__/__/____	
13.	Spatial Resolution	☐ Yes ☐ No ☐ Unknown	__/__/____	
14.	Low Contrast Detectability	☐ Yes ☐ No ☐ Unknown	__/__/____	
15.	Artifact Evaluation	☐ Yes ☐ No ☐ Unknown	__/__/____	
16.	Display Devices	☐ Yes ☐ No ☐ Unknown	__/__/____	
17.	Scatter Exposure	☐ Yes ☐ No ☐ Unknown	__/__/____	

PLEASE INDICATE BELOW THE TYPE AND FREQUENCY OF ANY ONGOING QC PROCEDURES.

ATTESTED TO:

_____**(Physicist)** _____**(Date)**

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

BI-MONTHLY CT WATER PHANTOM MEASUREMENT

SITE PHYSICIST: PLEASE COMPLETE ONE COPY OF THIS FORM, EVERY TWO MONTHS, FOR EACH CT SCANNER USED IN THE LSS-NLST STUDY.

1. **DATE:** _____
2. **LSS SITE NAME :** _____ **SITE #**_____
3. **CT SCANNER ID# AND LOCATION:** _____
4. **CT VENDOR & MODEL:** _____
5. **PERSON PERFORMING TESTS:** _____ **ID#**_____
6. **TITLE:** _____ **TEL#:** _____ **E-MAIL:** _____

PURPOSE:

Bi-monthly water phantom tests will be performed on all CT scanners used in the LSS-NLST study.

This is done to ensure that the scanner is operating optimally at the acquisition parameters being used for the low dose CT protocol, and that any degradations in performance can be recognized and corrected in a timely manner.

These water phantom tests will monitor CT# calibration, field uniformity, noise, and artifacts.

SETUP:

The standard (approx. 20 cm diameter) water phantom supplied by your vendor for routine quality control will be used for these tests.

Using the CT alignment lights, and the vendor supplied phantom holder (if available), align and center the phantom in the gantry. Align the axial light, indicating slice position zero, to the mid thickness point of the phantom. If you must rest the phantom on the table (i.e., no holder), avoid placing it over any metal in the table, and be sure that the phantom is secured with tape or velcro.

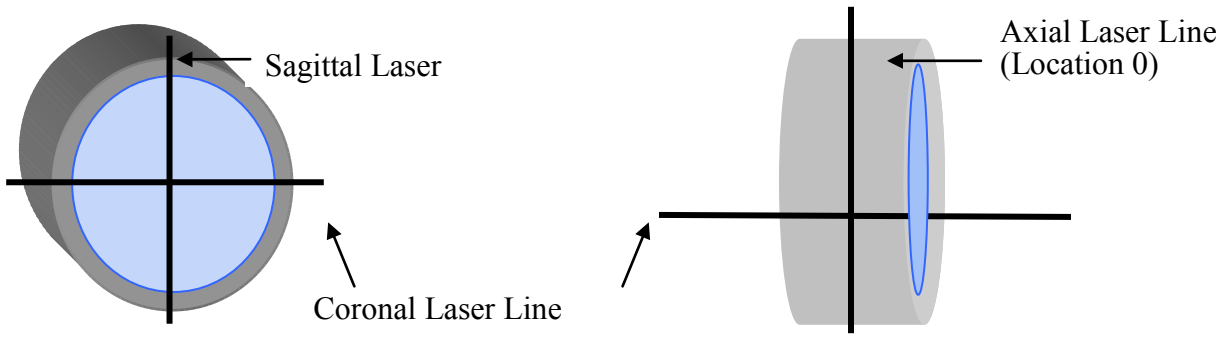


Figure 1. Front and side views of water phantom. Note that the axial laser line is located directly over the center of the water phantom.

SCANNING THE PHANTOM:

- Prescribe a short helical scan that covers the entire thickness of the water phantom.
- Use your LSS acquisition parameters for an average size patient, and reconstruct with a non-sharp algorithm.
- Use a display field of view close to, but not smaller than the diameter of the water phantom.

CT WATER PHANTOM MEASUREMENT

MEASUREMENTS OF WATER CT#, UNIFORMITY, AND NOISE; ARTIFACT EVALUATION:

- Select one reconstructed image that represents the center of the water phantom (axial location "0").
- View the image with window width = 100, and window level = 0.
- Place an ROI of approximately 400 mm^2 at the center, 12:00, and 3:00 positions.
- Make sure that the peripheral ROI's are approximately 2 cm from the edge, and fully within the water (avoid air bubble at 12:00).

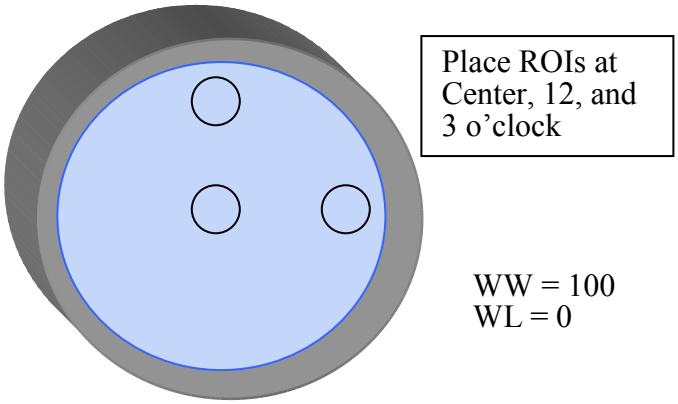


Figure 2. Measurement of CT# and Noise; Artifact evaluation.

- Record the mean CT# and standard deviation for each ROI on the attached data sheet. With room lights lowered, carefully examine the image for artifacts, and note the results.

SAVING WATER PHANTOM IMAGES:

- Image data from all slices of the water phantom should be saved and made available on request for future inclusion in the image archive library.

- When acquiring the study use the following:

  Last Name: PHANTOM
  First Name: WATER
  MRN: Site #-99999 (ie. 04-99999 for Henry Ford)

CT WATER PHANTOM MEASUREMENT

PLEASE ENTER YOUR ACQUISITION PARAMETERS HERE:

WATER PHANTOM TEST

	PARAMETER*	(EXAMPLE)	YOUR TEST
A	LSS Site	Univ of Colorado	
B	Test Date	09/28/03	
C	Tester		
D	CT Scanner	Siemens Vol Zoom	
E	KVP	120	
F	Gantry Rotation Time	0.5	
G	MA		
H	MAS		
I	Effective MAS	30	
J	Number of Channels Used	4	
K	Channel Collimation (MM)	1.0	
L	Table Movement (MM Per Rotation)	8.0	
M	Pitch		
N	Reconstructed Slice Width (MM)	2.0	
O	Reconstruction Interval (MM)	2.0	
P	Reconstruction Algorithm (Filter)	b30f med smooth	
Q	Display Field Of View (MM)	250	

*** RECORD WHICHEVER PARAMETERS APPEAR ON YOUR CONTROL CONSOLE.**

PLEASE ENTER YOUR TEST RESULTS HERE:

EXAMPLE:

PARAMETER	CT#	STD DEV	CT# DIFF*	LIMITS		LSS REVIEW
CENTER ROI	-1.1	21.8		0 +/- 4; 15-40	OK?	ACTION REQ'D?
12:00 ROI	-1.5		0.4	</= 7	OK?	ACTION REQ'D?
3:00 ROI	-2.3		1.2	</= 7	OK?	ACTION REQ'D?
ARTIFACTS	RING?	STREAK?	OTHER?			
OBSERVED?	NO	NO	NO	NO ARTIFACTS	OK?	ACTION REQ'D?

*** = ABS (CT#edge - CT#center)**

YOUR TEST:

PARAMETER	CT#	STD DEV	CT# DIFF*	LIMITS		LSS REVIEW
CENTER ROI				0 +/- 4; 15-40	OK?	ACTION REQ'D?
12:00 ROI				</= 7	OK?	ACTION REQ'D?
3:00 ROI				</= 7	OK?	ACTION REQ'D?
ARTIFACTS	RING?	STREAK?	OTHER?			
OBSERVED?				NO ARTIFACTS	OK?	ACTION REQ'D?

*** = ABS (CT#edge - CT#center)**

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

CT DOSIMETRY MEASUREMENTS

SITE PHYSICIST: PLEASE COMPLETE ONE COPY OF THIS FORM ANNUALLY, AND AFTER ANY X-RAY TUBE, OR MAJOR COMPONENT CHANGE, FOR EACH CT SCANNER USED IN THE LSS-NLST STUDY.

1. **DATE:** _____
2. **LSS SITE NAME:** _____
3. **CT SCANNER ID# AND LOCATION:** _____
4. **CT VENDOR & MODEL:** _____
5. **PHYSICIST PERFORMING TESTS:** _____
6. **TITLE:** _____ **TEL#:** _____ **E-MAIL:** _____

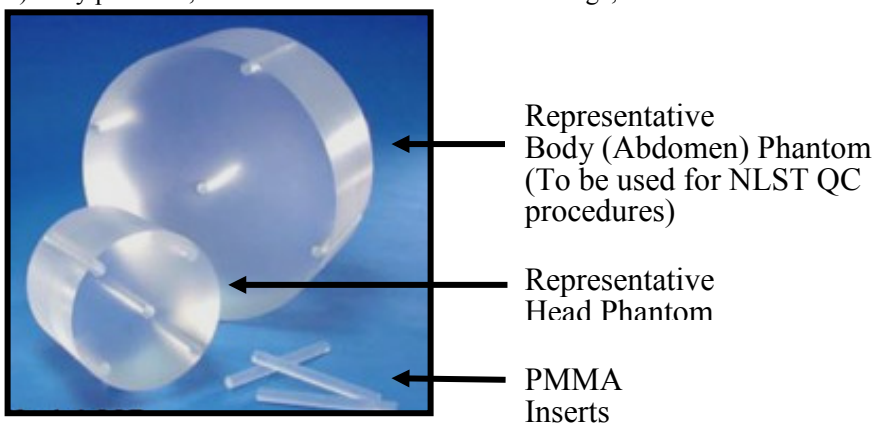
PURPOSE:

- Annual, and post tube or major component change, dose measurements will be performed by a qualified medical physicist on all CT scanners used in the LSS-NLST study, using the acquisition parameters of the low dose CT protocol. This will ensure consistent and accurate measurement of dose across all LSS sites, allowing valid comparisons, and pinpointing possible problem areas**.**
- Measurements shall be made using the technique factors employed for screening examinations.
- The appropriate equations, and a dosimetry form are provided to facilitate consistent calculations.

SETUP:

CT DOSE INDEX (CTDI):

- The standard procedure for measuring CTDI should be utilized.
- A calibrated CT pencil ionization chamber, and associated electrometer are required.
- The 32 cm diameter (PMMA) body phantom, with chamber holes at center and edge, will be used.



- All tube warm-up, and daily calibration and QC scans should be done prior to scanning the body phantom.
- Remove the table pad, and use the scanner alignment lights to center the body phantom in the gantry.
- Align the axial light, indicating slice position zero, to the mid thickness point of the phantom**.**
- Be sure the phantom is secured from rolling**.** Avoid any metal in the table.
- Connect the pencil ionization chamber to the electrometer, and fully insert the chamber into the center hole of the phantom.
- Place the PMMA acrylic rods into the other holes.

Appendix 4-9 CT Dosimetry Measurements Form

CT DOSIMETRY MEASUREMENTS

SCANNING THE PHANTOM AND ACQUIRING DOSE INFORMATION:

- CTDI dose information must be acquired using single axial scan acquisitions.
- Acquire one axial scan at the center of the phantom, with no table movement, using your LSS low dose technique factors for an average size patient; i.e., kVp, mA, rotation time, # of channels, and channel collimation. (Note: Siemens users may wish to use the service mode for this.)

IMPORTANT NOTE:

- The mA and time should reflect the actual mAs (mA x rotation time), NOT an effective mAs that includes the effect of pitch , (i.e., eff mAs = mAs / pitch).
- The effect of "pitch" on dose in a helical scan will be accounted for on the dosimetry form in the calculation of
- "CTDIvol" = CTDIw / pitch.
- Also, it is imperative that the detector configuration (i.e., # of channels and individual channel collimation - 4x1.0, 16x1.5, 4x2.5, etc), be the same as in the low dose protocol, as it will affect dose.

ON THE FORM PROVIDED:

- Record your technique factors and average exposure reading (i.e., avg. of three rdgs).
- Move the chamber to the 12:00 position, replacing the acrylic rod in the center position, and repeat the above procedure for an average exposure reading.
- Adjust your technique (mAs) to reflect a large patient, and repeat the above scans. (this is done as a dose verification and mAs linearity check.)

For each LSS technique (avg. and large), please record the vendor specified dose and units, for comparison.

Appendix 4-9 CT Dosimetry Measurements Form

CT DOSIMETRY MEASUREMENTS					
PLEASE ENTER YOUR CTDI SCAN PARAMETERS AND RESULTS HERE: **LSS MAS RANGE IN USE AT YOUR SITE:** (40 – 80) **Your Scanner: ( )**					
	Single Scan Axial CTDI:		**Example**	**Average Patient**	**Large Patient**
	LSS Screening Site / #		Univ of Colo / 01		
	Date		09/28/03		
	Tester				
	CT Scanner		Siemens Vol Zoom		
	Location / Room Number		AOP1241		
	X-ray tube Identifier #		CT3		
	kVp		120		
	mA		120		
	Exposure time per rotation (sec)		0.5		
	mAs		60		
	Number of data channels used (= N)		4		
	Nominal collimation per channel (mm) (= T)		1.0		
	Pencil Ionization Chamber Active Length (mm) (=ACL)		100		
	Chamber correction factor at stp (mR/rdg) (=CF) *		1.02		
	Temperature and Pressure Correction, (=Ctp)		1.22		
	32 cm Phantom Center Position:				
	Average of 3 meter readings (=AVGRDG)		11.8		
	$CTDI_{tissue}$ at phantom center (mGy)**		3.5		
	32 cm Phantom 12 o'clock position:				
	Average of 3 meter readings (=AVGRDG)		26.0		
	$CTDI_{tissue}$ at phantom surface (mGy)**		7.7		
Average Tissue Dose:					
	CTDIw (mGy) (= 1/3 CENTER + 2/3 SURFACE)		6.3		
Clinical Exam Dose Estimates:					
	Table Increment per rotation (mm) (= I) used in LSS Protocol		8.0		
	Calculated Pitch (= I/NT) used in LSS Protocol		2.0		
	Effective mAs (= mAs / Pitch) used in LSS Protocol		30.0		
Average Tissue Dose - LSS Protocol:					
	CTDIvol (mGy)	=CTDIw / Pitch	3.2		
	Vendor specified protocol dose (mGy)	(incl pitch)	3.4		
	DLP (mGy-cm) for 40 cm scan	=CTDIvol*40	128.0		
	Effective Whole Body Dose (mSv)	=DLP*0.017	2.2		
*** CF is the correction factor needed to convert your meter reading to mR at standard temperature & pressure.**					
****($CTDI_{tissue}$ (mGy) = (AVGRDG * CF(mR/RDG @ stp) * Ctp * (ACL / NT) * .0094 mGy/mR)**					

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Appendix 4-11 NLST/LSS Screening Exam Form Data Handling Guidelines

Item No.	Item Name	Personnel Required to Approve Edit	Additional Guidelines and Exceptions
	Administrative Section	SCC*	
A1	Number of Attempts	Tech	
A2	Adequate Scan Obtained	Tech	If A2 is blank but A3 is completed, SCC may mark A2 as "No."
A3	Reason for Inadequate or No Scan	Tech	
A4	Technical Parameters	Tech	If technical parameters are out of range, a comment is required. If no comment is recorded, the confirmation of the value must be obtained from the tech and a comment added that it has been confirmed.
A5	CT Reconstruction Algorithm/Filter (SCT) OR CXR System Used (XRY)	Tech	
A6	Comments	SCC	If comments are provided, SCC may check "Yes." If comments are blank, SCC may check "No" if other items in Part A are unremarkable. If there was more than one attempt or technical parameters are out of range, then the SCC should ask the tech whether a comment is required.
A7	Tech ID and Signature	Tech	If signature is present and legible, the SCC may enter the Tech ID.
B1	Diagnostic Quality of CT or CXR Image	Radiologist	
B2	Items that Affected Image Quality	Radiologist	
C1	Radiologic Abnormality Noted	SCC	If C1 is blank and abnormalities are recorded in C2, the SCC may check the box for "Yes" in C1. If no abnormalities are recorded in C2 and the SC has the dictated report which confirms that no abnormalities were noted on the exam, the SCC may check "No" in C1. If the SCC does not have the dictated report, or if the dictated report indicates that abnormalities were noted, then item C1 must be corrected by the radiologist.
C2	Abnormality Information	Radiologist	The SCC may not use information in the dictated report to record abnormality information in C2. If discrepancies are noted between the dictated report and C.2, the data must be verified by the radiologist.

Appendix 4-11 NLST/LSS Screening Exam Form Data Handling Guidelines

D1	Lung Screening Result	Radiologist	
D2	Other Significant Abnormalities to be Reported	Radiologist	If D2 is blank and a clinically significant abnormality is recorded in C2, the SCC may mark D2 as "Yes." If no clinically significant abnormalities are recorded, the SCC may mark D2 as "No."
D3	Comments	SCC	If comments are provided, SCC may check "Yes." If comments are blank, and D2 is marked "No," SCC may check "No" in D3. However, if D2 is marked "Yes" then the SCC must request a comment from the radiologist. If A2 is marked "No" and D1 is marked "A," the SCC must request a comment from the radiologist regarding the overall quality of the image.
E1	Comparison Image	Radiologist	
E2	Abnormality Information	Radiologist	The SCC may not use information in the dictated report to record abnormality information in E2. If discrepancies are noted between the dictated report and E.2, the data must be verified by the radiologist.
E3a	Lung Screening Comparison Result	Radiologist	
E3b	Other Significant Abnormalities to be Reported	Radiologist	If E3b is blank and a clinically significant abnormality is recorded in E2, the SCC may mark E3b as "Yes." If no clinically significant abnormalities are recorded, the SCC may mark E3b as "No."
E4	Recommended Follow-up Procedures	Radiologist	If "Low Dose CT with NLST parameters" is not checked, but a time interval (months) and an area of focus is checked on the SCT form or an area of focus is checked on the XRY form, then the SCC may check the box for "Low Dose CT with NLST parameters." Also, if "Other" is not checked but follow-up is specified in the line provided, the SCC may check the box for "Other."
E5	Comments	SCC	If comments are provided, SCC may check "Yes." If comments are blank, and E3b is marked "No," SCC may check "No" in E5. However, if E3b is marked "Yes," then the SCC must request a comment from the radiologist.
E6	Radiologist ID, Date, and Signature	Radiologist	If signature is present and legible, the SCC may enter the Radiologist ID. Date and signature must be recorded by the radiologist.

5. CHEST X-RAY SCREENING EXAMINATION

5.1 Overview

Each participant in the chest x-ray arm received three annual chest x-ray screening examinations spaced one year apart. Screening Centers (SCs) were responsible for taking the x-ray, having the x-ray interpreted by a radiologist, and documenting the results of the x-ray. This chapter describes these procedures. It also provides the NLST/LSS requirements for examiner training and certification and quality assurance procedures for this examination.

5.2 Participant Preparation

The following steps in the process of participant preparation were standardized across all SCs. The participant was told that the examination was a screening examination for lung cancer, not a complete physical examination, and that s/he should consult his/her health care provider for evaluation of any symptoms and for routine medical care. In addition, the participant was told that s/he would receive written documentation of the results of the screening examination within three weeks, and would be contacted by telephone in the event of a positive screen or a negative screen with clinically significant abnormalities. The participant was told that if s/he had a positive screen and did not have a health care provider, the SC would offer a list from which s/he may choose a health care provider. The participant was given a brief description of the screening examination.

5.3 Examination Procedures

A postero-anterior (PA) x-ray was taken at a tube-to-receiver distance of six to ten feet. The participant was asked to disrobe above the waist. Hospital gowns were provided in accordance with standard procedures at the SC. The technologist explained the procedure and positioned the participant. The participant was instructed to inhale deeply and to hold his/her breath while the x-ray was taken. If a participant had a condition such as severe kyphosis that precluded a PA view of the lung, it was acceptable to do an antero-posterior (AP) view of the lung. The fact that an AP film was taken and the reason for it was recorded in the Comments section of the Chest X-ray Screening Examination Form.

The technologist performing the x-ray made the initial judgment about the quality of the x-ray before the participant left the SC. The quality should have been such that the lung vessels were clearly visible and the mediastinal structures were sufficiently penetrated to allow for adequate visualization. The image should have included both lung apices and costophrenic angles, adequate definition of the vertebral bodies, the left retrocardiac pulmonary vessels, lateral wall of descending aorta, and left hemidiaphragm. If the entire chest of a large participant could not be viewed with one chest x-ray, then two chest x-rays may have been taken in order to view the entire chest. In this case, the two views counted as one attempt and two exposures. The fact that two chest x-rays were taken and the reason was recorded in the Comments section of the Chest X-ray Screening Examination Form. If the x-ray was determined to be inadequate, it was repeated. In the case of two views for large participants as described above, the repeat x-ray would count as a second attempt and two additional exposures, for a total of four exposures in two attempts. Reasons for inadequacy are described in Section 5.7.2. When a repeat x-ray was necessary, it was to be taken during the same visit. However, no more than three x-ray attempts should have been made in one visit. It may have been necessary to arrange another screening visit to obtain an adequate x-ray. This visit should have occurred as close to the initial visit as possible. No more than two visits were allowed to obtain an x-ray.

X-rays examinations were then sent to the study radiologist for interpretation. If the radiologist determined that the x-ray examination was inadequate, the participant was asked to return for a repeat examination. X-rays were to be read by the study radiologist in a timely manner, so that the results could be reported to the participant within three weeks of the exam.

5.4 Equipment Specifications

The chest x-ray was to be obtained using high-kVp equipment (100-150 kVp) at a tube-to-receiver distance of six to ten feet. Vendor machines that did not comply were reviewed on a case by case basis. Film were to be wide latitude type with a ten to one standard grid or higher. Computed radiography (CR), or digital radiography (DR) chest x-ray systems may have been used in addition to screen-film systems. The image was obtained at 0.1-20 mAs. The maximum of 20 mAs may have been exceeded for very large patients to achieve acceptable image quality as long as the reason was documented in the Comments section (Item A.6) of the XRY Form. While there was no upper bound for the mAs for larger participants the lowest mAs with acceptable image quality should have been used. The

maximum exposure time was 40 msec. Exposure indicators associated with digital systems (e.g., Fuji S#) were recorded, however, no ranges were set. The Chest X-ray Protocol Specifications are listed in Appendix 5-1.

The image review was done with soft copy images if available, otherwise hard copy images were acceptable. If a soft copy image was used, a maximum of one on one image display was to be used for viewing and measuring. Magnification was encouraged for measuring.

In addition to these parameters, all equipment used on the NLST/LSS was required to meet the guidelines of the American College of Radiology (ACR). See Appendix 4-2 for the current ACR Guidelines. These guidelines can also be found at www.acr.org.

The SC was required to send documentation of equipment specifications, including information on film type (e.g., symmetric or asymmetric film screen combination) to the CC. All documentation was also to be maintained in the SC NLST/LSS files. The CC forwarded all equipment specifications to the NCI for approval. The NCI was responsible for reviewing equipment specifications from each SC and making the final approval decision. Equipment specifications were also reviewed by an NCI designated medical physicist who made manufacturer specific recommendations for the parameters to be used on each machine. This was done before screening began and whenever equipment was replaced during the course of the study.

5.5 Examiner Qualifications, Training, and Certification

The chest x-ray examination required three radiologic personnel: the radiologic technologist, the medical physicist, and the radiologist. The minimum qualifications for these individuals and the NLST/LSS training protocol are discussed in this section.

5.5.1 Minimum Qualifications for Examiners

Technologists were American Registry of Radiologic Technologists (ARRT) certified radiologic technologists. The radiologists (interpreters and QA examiners) were American Board of Radiology (ABR) certified or board-eligible (chest) with a valid active medical license in the state in

which screening was performed. Radiologists at Federal sites were required to have an unrestricted active license to practice medicine in their clinical specialty, issued by one of the states, the District of Columbia, or a possession of the United States. Medical physicists were certified by the American Board of Radiology in the subfield of Diagnostic Radiological Physics or the subfield of Radiological Physics. In addition to being appropriately certified, technologists, radiologists, and physicists were required to meet additional guidelines outlined by the American College of Radiology (ACR). See Appendix 4-2 or www.acr.org for current ACR Guidelines.

The SC was required to report the qualifications of each examiner by submitting a completed Record of Experience, Credentials, and Training (ECT, Appendix 11-5) to the CC. In lieu of submitting copies of diplomas and certificates, the SC may have attached a letter from the department chairman stating that the technologist was an ARRT certified radiologic technologist, the physicist was ABR certified or board-eligible, or that the radiologist was ABR certified or board-eligible and held a valid active medical license, and that additional ACR guidelines were met. For any technologist who was not ARRT certified or any physicist or radiologist who was not ABR certified, or for any technologist, physicist, or radiologist who did not meet the remaining ACR guidelines, the SC Principal Investigator was required to document and certify adequate training and experience in a letter submitted with a completed ECT to the CC. The CC reviewed all ECTs and, if the qualifications met the CC criteria, the CC recommended approval to the NCI. If the qualifications did not match the requirements, the CC requested an exception approval from the NCI on a case-by-case basis. **The ECT was required to be approved by the NCI prior to the initiation of screening activities.**

5.5.2 Training Protocol

One radiologist from each SC attended a central training session. The radiologists' training utilized a training CD containing a variety of images designed to help standardize the interpretation of images across NLST/LSS sites. The radiologist used the training CD to review the same interpretation guidelines with the remaining radiologists at the SC. Additionally, the radiologist used the CD to train technologists at his/her SC on the correct procedures for conducting the screening exams for the NLST/LSS. The radiologists also were trained on the screening exam forms. The SC Coordinator was responsible for training the technologist on the use of the study forms and SC administrative procedures.

5.5.3 Examiner Certification

No additional qualifications for the technologist, physicist, or radiologist were necessary for this examination. Certification through ARRT (for technologists) and ABR (for physicists and radiologists), plus an active valid medical license (for radiologists) and adherence to additional ACR guidelines (Appendix 4-2) served as the qualification for these examiners.

5.5.4 Updates to Qualifications for Radiologic Personnel

On an annual basis, SCs were asked to submit updated qualifications for all radiologic personnel who continued to work on the NLST/LSS. For technologists, if an ARRT certification was submitted in the previous year, an updated and valid ARRT certification was required to be submitted. If a letter from the chair of the Radiology Department of the SC was sent to certify that the technologist was ARRT certified, then an updated letter, signed by the chair of the Radiology Department was required to be submitted. If updated credentials or a letter of certification was not submitted for annual review, the technologist was unable to continue working on the NLST/LSS. Once screening operations officially ended, as described in Section 3.4.3, updates to qualifications for radiologic personnel were no longer required.

5.6 Documentation of the Examination

Information documenting that the chest x-ray was taken and the interpretation was made by the radiologist was recorded on the Chest X-ray Screening Examination Form (XRY, Appendix 5-2). In addition to the examination result, the NLST/LSS images were stored.

5.6.1 Chest X-ray Screening Examination Form (XRY)

The XRY form was used to document the results and findings of the examination. Every screening visit was required to be documented, regardless of outcome. The form provided documentation that the examination was completed, whether the results were normal or abnormal, and a description of abnormal findings. The SC Coordinator or staff member completed the Administrative Section on the

first page of the form and the radiologic technologist completed Part A. If adequate images were obtained, Parts B through E of the form were completed by the radiologist. If the technologist did not obtain adequate images, Parts B and C were left blank and the radiologist completed Items D.1, D.3, and E.6. The radiologist did not complete a comparison review (Item E.3) if the image read in isolation was inadequate. CR or DR chest x-ray systems (including Thoravision) may have been used in addition to conventional systems. The type of chest x-ray system used was noted on the form. For CR and DR systems, the x-ray machines (or x-ray examination rooms) at each SC were assigned a two-digit number that was recorded on the XRY form for every examination. This linked the recorded technical parameters to the machine used to obtain the image, thus enabling verification that proper technical parameters were used for the examination. SCs were required to maintain a link between the machine number and the manufacturer/model information. If documentation of the exam, including exam images, was lost and could not be recreated, Parts A and B and Items D.3 and E.6 were required to be completed. A Protocol and HIPAA Violation Form (PHVF) also was required. Specifications for Completion of the XRY Form are provided in Appendix 5-3. It was the responsibility of the SC Coordinator to train the technologists and radiologists in the use of the form.

After the form was completed, the SC Coordinator reviewed it to ensure that it had been filled out completely, including the items in the Administrative Section. The XRY form was edited as necessary. Any data retrieval involving the examiner was to be performed as expeditiously as possible since results reports were required to be sent to the participant and to his/her health care provider within three weeks of the screening visit. The XRY form was entered into and filed in the participant's study file.

5.6.2 Storage of Lung Screening Study Chest X-ray Images

The x-ray images were labeled with the participant's name and PID number. The SC was responsible for storing the images for each of the participant's chest x-ray screening examinations for the duration of the study. Inadequate images were to be retained at the SC until adequate images were obtained. Upon collection of an adequate image, inadequate images could be discarded. Chest x-ray images for the NLST/LSS were required to be stored in a manner that was consistent with the confidentiality agreement for the study. It was recommended that a participant's images not be stored with the participant's medical record or with other images that were not related to the NLST/LSS. If an SC wanted to store NLST/LSS data in the regular medical record, the SC was required to submit to the

NCI (through the CC) documentation of the methods that would be used to maintain confidentiality of the data.

The chest x-ray images were the photo documentation of the exam. It was acceptable for SCs to utilize digital storage of images (as in CR and DR systems), but the capability to retrieve the images at any time was required. If digital storage was used, a backup digital copy of the images also was required to be maintained. SC methods for utilizing digital storage were required to comply with participant confidentiality standards. If the SC failed to maintain the original screening exam image (due to loss, corruption, or irreversible modification such that the image could no longer be read according to study protocol) and no backup copy existed, this was considered a protocol violation and a PHVF was completed.

5.7 Interpretation of Findings

Each examination was reviewed by a board certified or board-eligible chest radiologist who met current ACR guidelines and held a valid active medical license and the results of the review, including any abnormalities, were recorded. The interpretation of findings was recorded in two distinct steps on the XRY form. The Chest X-ray Interpretation Results Section (Part D) reflected the current chest x-ray examination findings only. The participant's prior medical history, prior radiologic examinations, or prior NLST/LSS screens were not to be considered when assigning the examination result recorded in Part D of the XRY form. The Chest X-ray Comparison Results Section (Part E) reflected the comparison of the current chest x-ray examination with historical images for that participant, including NLST/LSS screens, any available non-NLST/LSS images, as well as any accompanying radiologic reports. At T_1 and T_2, the current examination was required to be compared to prior NLST/LSS screens, as well as any other available studies, as described below. The result of the comparison read recorded in Item E.3a was considered to be the final result of the screening examination, and this was the result that was communicated to both the participant and the participant's physician.

To complete Part E, T_1 screening exams were compared with T_0 screening exams. T_2 screening exams were compared with T_0 and T_1 exams. However, if the screening examinations from all three study years were negative, then the T_2 screening examination could be compared with either the T_0 or T_1 screen, or both screens, at the radiologist's discretion. If the T_0 and T_1 exams were lost or otherwise unavailable, the radiologist marked "No Image Available" in Item E.1 and stated the reason in the

Comments section, Item E.5. In addition, a Protocol and HIPAA Violation Form was completed. The type of protocol violation was marked as "Other" and described in the space provided, indicating that the comparison read was not performed and providing the reason. For example, "T_1 comparison read not performed, T_0 exam was lost." The date the protocol violation occurred was the date that the current screening exam was read. If either the T_0 or T_1 screening exam was not completed, then the T_2 exam was compared to the existing previous exam and no PHVF was required.

In the event that a screening exam was inadequate and a repeat screen was performed, the inadequate screen could be used as the comparison image for the repeat screen at the radiologist's discretion. For example, if a T_1 screen was inadequate and a repeat T_1 screen was performed, then both the T_0 and the inadequate T_1 screens could be used as comparison images for the repeat T_1 screen. An inadequate screen could also be used for comparison in later study years. In this instance, the use of the inadequate screen was noted in the Comments section of the XRY form.

The following definitions of normal, abnormal, and inadequate findings are provided. These definitions were used by the radiologist in recording his/her findings on the XRY form.

5.7.1 Classification and Definition of Abnormal Examination Results

Definitions of lung screening results are given below:

- **Positive Screen – Abnormalities suspicious for lung cancer:**

  The following abnormality was always considered a positive screen:

  - Non-calcified visible nodule/mass

  Other abnormalities, or constellations of abnormalities, may have been suggestive of lung cancer, but there was no absolute rule for coding other findings as suspicious for lung cancer. In these instances, the classification of a screening exam result as positive was left up to the radiologist.

  If, at the T_1 or T_2 study year, the current screen was positive and the abnormality identified appeared not to have changed when compared to previous images at the comparison reading (Part E), the radiologist recorded the result in the Chest X-ray Comparison Result section (Item E.3a) as B – "Abnormalities suspicious for lung cancer, no significant change."

When previous images from two successive study years had not changed and the third screen was positive and appeared unchanged from the previous images, the radiologist was permitted to code that result as D – "Minor abnormalities not suspicious for lung cancer" at his/her discretion, rather than coding the image as suspicious for lung cancer. Additionally, the radiologist specified in the Comments section (Item E.5) why the result was coded as D.

- **Negative Screen – Clinically significant abnormalities not suspicious for lung cancer:**

  The review of the film revealed that an abnormality was present and required further evaluation, but was not suggestive of lung malignancy. It was up to the radiologist to determine whether an abnormality was clinically significant. If after baseline screening the clinically significant abnormality remained stable and unchanged on subsequent screening examinations, the abnormality could be coded as D – "Minor abnormalities not suspicious for lung cancer" at the discretion of the radiologist, rather than coding the image as a clinically significant abnormality. Additionally, the radiologist specified in the Comments section (Item E.5) why the result was coded as a D.

- **Negative Screen – Minor abnormalities not suspicious for lung cancer:**

  The review of the film revealed a minor abnormality that was not suspicious for lung cancer. It was up to the radiologist to determine whether an abnormality was minor.

5.7.2 Criteria for Determination of a Negative or an Inadequate Chest X-ray

- **Negative Screen – No significant abnormalities:**

  The review of the film revealed no significant abnormalities.

- **Inadequate:**

  A chest x-ray image should have displayed adequate definition of vertebral bodies, the left retrocardiac pulmonary vessels, the lateral wall of the descending aorta, and the left hemidiaphragm. The image quality should have been such that the lung vessels were clearly visible and the mediastinal structures were sufficiently penetrated to allow for adequate visualization. The image should have included both lung apices and costophrenic angles, adequate definition of the vertebral bodies, the left retrocardiac pulmonary vessels, lateral wall of descending aorta, and left hemidiaphragm. Reasons for inadequacy may have included, but were not limited to:

  - Participant refusal;
  - Equipment malfunction;
  - Poor film quality, including:

- Motion or processing artifact;
- Inadequate inspiration;
- Excessive rotation, and
- Over or under penetration.

If the image was considered inadequate, but based on what was visible on the image, there was an overt suspicion of lung cancer, the result of the screening exam was recorded as positive.

5.8 Reporting Results to Participants and Health Care Providers

The SC reported results of a chest x-ray screening examination in writing to the participant and to the participant's health care provider **within three weeks of the screening visit**. Results were sent with a cover letter on SC letterhead. The SC may have incorporated results into the cover letter, attached a copy of the radiologist's dictated report, or produced a customized report of results. The XRY form was not sent to the participant to report the results of the screening exam. The combination of documents sent was required to reflect the results of the examination. In addition to written notification, positive screens and negative screens with clinically significant abnormalities were reported to participants by telephone. If the participant was unreachable by telephone, the results were sent by certified mail with return receipt requested. Positive screens and negative screens with clinically significant abnormalities were reported to the health care provider either by telephone, fax, or certified mail. If the fax method was chosen, it was recommended that the health care provider's office be telephoned and advised of the fax transmittal in advance. Other negative screens were reported to the participant and his/her health care provider according to standard radiologic practice at the SC.

The guidelines provided above for reporting results to participants and health care providers were the minimum acceptable procedures, as set by the NCI. Individual institutional policies may have required some SCs to take additional measures for reporting results. See Chapter 6 for additional information regarding reporting results of screening examinations.

Participants with a result of "Positive Screen" were referred to their health care provider for further evaluation. If a participant did not have a health care provider, the SC offered a list from which the participant could choose a health care provider to receive the results. In all cases where there was a

positive chest x-ray screen, referral was recommended as outlined in Section 5.8.1. The SC continued to monitor and follow up with all participants who had a positive screening result.

5.8.1 Diagnostic Follow-up Recommendations

Participants with positive chest x-ray screens were referred to their health care providers. They and their health care providers were also provided with general recommendations that the radiologist felt were appropriate for the findings from the screening examination. The status of the participant referral (e.g., saw health care provider; has not seen health care provider but appointment has been scheduled; plans to schedule appointment; has no plans for follow-up) was monitored by the SC. If requested, the SC Coordinator offered the participant a list from which s/he could choose a specialist.

The NCI did not provide recommendations for diagnostic follow-up of positive screens to the participant or to his/her health care provider. The recommended diagnostic options listed on the XRY form reflected typical options for follow-up in accordance with standard practices at the SC. In all communications it was required to be clear that the recommendations did not arise from and were not endorsed by the NCI. The SC could refer inquiries to providers that were considered to be experts in the field and could provide the 1-800-4-CANCER hotline number as an additional source of information. It was expected that diagnostic evaluation would adhere to current medical standards of practice.

5.8.2 Lung Cancer Diagnosis

The final diagnosis of lung cancer was made by histopathology or cytopathology, or in rare cases, by clinical examination only. Pathology reports that supported the cancer diagnosis were to be obtained for all participants. The cancer was coded according to ICD-O-3 codes by a certified tumor registrar (CTR) at the SC. The diagnosis was documented by the SC on the DE form (Appendix 7-2) and submitted to the CC.

5.8.3 Treatment Recommendations for Individuals Diagnosed with Lung Cancer

The NLST/LSS did not make specific treatment recommendations for individuals diagnosed with lung cancer. Participation in the NLST/LSS did not preclude a participant from involvement in any treatment protocol.

5.9 Examination Standardization and Quality Control

NLST/LSS implemented a three-pronged approach to quality assurance and control to ensure standardization throughout the screening process. The quality assurance (QA) measures included equipment and personnel quality control (QC), image QA, and image interpretation QA. The NLST/LSS Screening QA Working Group developed and implemented the QA protocol. The Mallinckrodt Institute of Radiology at Washington University, the Quality Assurance Coordinating Center (QACC), directed the administration of the QA protocol with support from the CC.

5.9.1 Quality Control of Equipment

Quality control (QC) of the equipment was assured by the individual institution according to the guidelines for equipment quality control developed by the NLST/LSS Screening QA Working Group and the NLST Medical Physicist Working Group. The equipment quality control guidelines were based upon the guidelines outlined by the American College of Radiology (ACR) for ongoing equipment QC measures. Each SC designated a qualified medical physicist to oversee the equipment QC and to ensure that ACR guidelines were met. The medical physicist was required to complete and submit an ECT (Appendix 11-5) to the CC. It was the primary responsibility of the medical physicist at each site to implement and document the equipment QC protocol. The SC was required to maintain records of equipment maintenance and QC activities that were readily available for auditing during site visits.

The quality control guidelines consisted of the Chest X-ray Protocol Specifications listed in Appendix 5-1, the Chest X-ray Quality Assurance Information listed in Appendix 5-4, and the forms found in Appendices 5-5 through 5-7, which were completed by the medical physicist at each SC and returned to the Screening QA Working Group to provide documentation of adherence to the chest x-ray protocol specifications and equipment testing requirements. Documentation of equipment characteristics

was provided once for each piece of equipment and was updated as necessary. Attestation to performance testing and documentation of chest x-ray exposure measurements were provided annually. Once screening operations officially ended, as described in Section 3.4.3, completion of equipment QC tests and forms was no longer required.

5.9.2 Quality Control of Technologists

The CC maintained a complete list of the radiologic technologists working at all SCs. The radiologic technologists were required to complete and submit an ECT (Appendix 11-5) to the CC. For each radiologic technologist, the CC monitored the number of and reasons for inadequate screening examinations. The CC considered the final result to be inadequate if the screening examination could not be repeated to obtain an adequate examination.

5.9.3 Image Quality Assurance

The image quality QA process was the same for the soft copy chest x-ray and spiral CT images. These processes are described in section 4.9.3, Image Quality Assurance, and subsections. Image quality QA processes for hard copy screen films are described below, when they differ from the image quality QA process described in Chapter 4.

5.9.3.1 Image Quality Assurance of Screen Films

Chest x-ray screen films underwent a comparable quality assurance process as the digital chest x-ray images and the spiral CT image sets. Since screen films could not be distributed to the QA radiologists for review, the QA radiologists visited each SC that utilized screen films three or four times per year, depending on volume. For each SC, one visit coincided with the SC's annual NCI/CC site visit, and the remaining visits occurred every three to four months solely for image QA purposes. The QA radiologist was responsible for submitting a brief site visit report to NCI and the CC summarizing the findings of each visit. When attending annual NCI/CC site visits, the QA radiologist presented the QA findings and any recommendations during the NCI exit interview.

Before each QA visit, the CC sent to the SC a list of the hard copy images that were randomly selected for QA review. This list was given to the QA radiologist when s/he performed the QA review. The SC acquired the selected images and ensured that they were adequately de-identified before the arrival of the QA radiologist. The SC ensured that the lead radiologist was available for some portion of the QA visit to meet with the QA radiologist.

At each visit, the QA radiologist observed spiral CT and chest x-ray screening exams, and ensured that the technical parameter settings were appropriate. The QA radiologist was then brought to a workstation to view screen films. A Chest X-ray Image QA Form (XQA) (Appendix 5-8) was completed for each image reviewed. Any technical parameter settings used to obtain the image that were not printed on the image were available on the listing of images selected for QA that was sent to the SC by the QACC. When the QA review was completed, the QA radiologist sent the XQA forms to the CC for data entry at the following address:

In the event that a QA radiologist disagreed with the image quality as documented by the initial reading by the radiologist at the SC, whether adequate or inadequate, the QA radiologist documented such differences of opinion in the site visit report. These images were then reviewed by a third radiologist for adjudication. Since original hard copy images could not be sent to another QA radiologist, the third radiologist was internal to the SC. This tie-breaker review may have occurred at the time of the QA visit, or after the visit was complete. The resolution to the discrepant readings was submitted to NCI in writing by the lead radiologist or PI. The letter noted the result of the third review, described whether the participant would be re-screened, and provided reasons for not re-screening if applicable. If the third review occurred during the QA visit, and if that review resolved all discrepancies, then documentation in the QA radiologist's site visit report was adequate.

When the image QA process resulted in a change to data previously submitted on the XRY form (from "adequate" exam to "inadequate" exam or vice versa), the CC generated a CC Edit Form. The CC Edit Form was sent to the SC requesting the change to the XRY form.

Appendices for Chapter 5

5-1 Chest X-ray Protocol Specifications

5-2 Chest X-ray Screening Examination Form (XRY)

5-3 Specifications for Completion of the Chest X-ray Screening Examination Form (XRY)

5-4 Chest X-ray Quality Assurance Information

5-5 Chest X-ray Equipment Characteristics

5-6 Attestation to Chest X-ray Performance Testing

5-7 Annual Chest X-ray Exposure Measurements

5-8 Chest X-ray Image QA Form (XQA)

NATIONAL LUNG SCREENING TRIAL / LUNG SCREENING STUDY (NLST/LSS)

EQUIPMENT QUALITY CONTROL

CHEST X-RAY PROTOCOL SPECIFICATIONS

NLST CXR Specifications:

1. The chest x-ray kVp range shall be 100 – 150.

2. The Source to Image Distance (SID) may range from 6 to 10 feet. A vendor machine with a SID outside this range shall be reviewed on a case by case basis.

3. The maximum exposure time shall be 40 msec, consistent with ACR guidelines.

4. Anti scatter grids shall have a minimum grid ratio of 10:1.

5. The mAs may range from 0.1 to 20. The maximum of 20 may be exceeded for very large patients to achieve acceptable image quality. While there is no upper bound for the mAs for larger participants, the lowest mAs with acceptable image quality should be used.

6. The specification of maximum reference dose(s) will be reviewed after all sites have completed consistent dose measurements and/or estimates.

7. Exposure indicators associated with digital systems (e.g., Fuji S#) shall be recorded. However, no ranges will be set at this time.

8. No specification for chest film optical density or measurement will be set at this time. Sites are expected to provide films of adequate density and contrast, and are subject to reviewer feedback if density is deemed inadequate.

Appendix 5-2 Chest X-Ray Screening Examination Form (XRY)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

CHEST X-RAY SCREENING EXAMINATION FORM (XRY)

Administrative Section

Screening Center ID: |___|___|

Date of Examination: |___|___| / |___|___| / |__|__|__|__|
Month Day Year

Study Year (T_0 - T_2): T |___|

Visit Number: ☐ One ☐ Two

Reason for repeat visit _____

Interval Follow Up Information:

Has the participant had any imaging studies since the previous screening exam that may be useful for the radiologist to review if needed? ☐ Yes ☐ No ☐ N/A

If YES, dates obtained (Month /Year): |___|___| / |__|__|__|__|
|___|___| / |___|___|___|___|

Initials Complete: _____

Initials QC: _____

Participant ID Label

PART A. CHEST X-RAY EXAMINATION FINDINGS (COMPLETED BY TECHNOLOGIST)

1. Number of Attempts:

☐ None (GO TO A.3)
☐ One
☐ Two
☐ Three

2. Adequate Image Obtained:

☐ No
☐ Yes (GO TO A.4)

3. Reason for Inadequate or No Image:

(MARK ALL THAT APPLY)

☐ Participant refusal
☐ Equipment malfunction
☐ Poor film quality
☐ Other (SPECIFY)
_____

4. Technical Parameters:

A. |___|___|___| kVp

B. |___|___|.|___| mAs

C. |___|___|___| mA

D. |___|___| Time (msec)

E. |___|___|___|___|
Exposure Value

5. CXR system used:

☐ Screen-Film (SF)
|___|___| Machine Number

☐ Computed Radiography (CR)
|___|___| Machine Number

☐ Direct Digital Radiography (DR)
|___|___| Machine Number

6. Comments: ☐ No ☐ Yes
_____ ☐ Continued

7. Tech ID: |___|___|___|___| **Signature:** _____

Appendix 5-2 Chest X-Ray Screening Examination Form (XRY)

PARTS B, C, D AND E COMPLETED BY RADIOLOGIST

PART B. CHEST X-RAY OVERALL DIAGNOSTIC QUALITY (COMPLETED BY RADIOLOGIST)

1. Indicate the overall diagnostic quality of CXR:

- ☐ A. Diagnostic CXR (GO TO C.1)
- ☐ B. Limited CXR, but interpretable (COMPLETE B.2 AND GO TO C.1)
- ☐ C. Non-diagnostic CXR, reschedule CXR (COMPLETE B.2 AND GO TO D.1)
- ☐ D. No image available (GO TO D.3, COMMENTS)

2. Which of the following affected the quality of the limited or non-diagnostic CXR? (MARK ALL THAT APPLY)

- ☐ Low lung volumes
- ☐ Lungs incompletely imaged
- ☐ Poor positioning
- ☐ Motion degradation
- ☐ Incorrect exposure or other technical parameter
- ☐ Artifacts obscure anatomy
- ☐ Incorrect processing algorithm
- ☐ High image noise
- ☐ Other (SPECIFY) _____

PART C. CHEST X-RAY EXAMINATION FINDINGS (COMPLETED BY RADIOLOGIST)

1. Radiologic Abnormality Noted:

- ☐ No (GO TO D.1 AND MARK RESULT "E")
- ☐ Yes (COMPLETE C.2. RECORD INFORMATION FOR EACH ABNORMALITY)

2. Record Information for Each Abnormality:

Abn #	Description of Abnormality		Complete for Code 51 Only: Location of Epicenter	Nodule /mass dimensions: Longest Diameter (mm)	Nodule /mass dimensions: Longest Perpendicular Diameter (mm)	Nodule/Mass Margins
	51 = Non-calcified visible nodule/mass (MUST MARK "A" IN D.1) 53 = Benign lung nodule(s) (benign calcification) 54 = Atelectasis, segmental or greater 55 = Pleural thickening or effusion 56 = Non-calcified hilar/mediastinal adenopathy/mass ≥ 10 mm short axis 57 = Chest wall abnormality (e.g. bone destruction, metastasis) 58 = Consolidation 59 = Reticular/reticulonodular opacities, honeycombing, fibrosis, scar 62 = 6 or more nodules, not suspicious for cancer (opacities ≥ 4mm) (ANY SUSPICIOUS NODULES MUST BE CODED AS 51) 63 = Emphysema 64 = Significant cardiovascular abnormality (SPECIFY) 70 = Other significant abnormality above the diaphragm (SPECIFY) 71 = Other significant abnormality at/below the diaphragm (SPECIFY) 72 = Other minor abnormality noted (SPECIFY IF DESIRED)		1 = Rt upper zone 2 = Rt middle zone 3 = Rt lower zone 4 = Lt upper zone 5 = Lt middle zone 6 = Lt lower zone 8 = Other, SPECIFY (in Comments section)	999 - Unable to determine	999 - Unable to determine	1 = Spiculated (Stellate) 2 = Smooth 3 = Poorly defined 9 = Unable to determine
	CHECK BOX IF IDENTIFIED AFTER COMPARISON WITH HISTORICAL IMAGES:					
1	|___|___|	☐	|___|	|___|___|___|	|___|___|___|	|___|
2	|___|___|	☐	|___|	|___|___|___|	|___|___|___|	|___|
3	|___|___|	☐	|___|	|___|___|___|	|___|___|___|	|___|
4	|___|___|	☐	|___|	|___|___|___|	|___|___|___|	|___|
5	|___|___|	☐	|___|	|___|___|___|	|___|___|___|	|___|
6	|___|___|	☐	|___|	|___|___|___|	|___|___|___|	|___|

Appendix 5-2 Chest X-Ray Screening Examination Form (XRY)

PART D. CHEST X-RAY INTERPRETATION RESULTS (COMPLETED BY RADIOLOGIST)

1. Lung Screening Result:

- ☐ A. **Positive Screen – Abnormalities suspicious for lung cancer**
- ☐ C. **Negative Screen** – Clinically significant abnormalities not suspicious for lung cancer (GO TO D.3)
- ☐ D. **Negative Screen** – Minor abnormalities not suspicious for lung cancer (GO TO D.3)
- ☐ E. **Negative Screen** – No significant abnormalities (GO TO D.3)
- ☐ F. **Inadequate** (COMPLETE PART D.3 AND GO TO E.6)

2. Other Significant Abnormalities (in addition to lung screening results) that need to be reported:

☐ No ☐ Yes (SPECIFY IN D.3)

3. Comments: ☐ No ☐ Yes

____

____ ☐ Continued

PART E. CHEST X-RAY COMPARISON RESULTS – COMPLETE FOR ALL LUNG SCREENING RESULTS (COMPLETED BY RADIOLOGIST)

1. Comparison Image: (MARK ALL THAT APPLY)

- ☐ No image available (GO TO E.4)
- ☐ T_0
- ☐ T_1
- ☐ T_2 Inadequate scan
- ☐ Previous scan not completed as part of NLST (RECORD SCAN TYPE AND DATES FOR UP TO 3 PREVIOUS SCANS)

Scan Types
1 = CT
2 = CXR
3 = MRI

Previous Scan Type(s):	**Date(s) of Previous Scan(s) (MONTH/DAY/YEAR)**
___	___ ___ / ___ ___ / ___ ___ ___ ___
___	___ ___ / ___ ___ / ___ ___ ___ ___
___	___ ___ / ___ ___ / ___ ___ ___ ___

2. Enter abnormality number and code for <u>all</u> Code 51 abnormalities AND other significant abnormalities seen on this screening exam. (IF NONE, GO TO E.3)

Abn. # (FROM PART C.2.)	**Abn.Code (FROM PART C.2)**	**Was Abnormality Pre-existing?** 1 = No, 2 = Yes, 9 = Unable to determine	**Earliest Date Visible** (COMPLETE ONLY FOR PRE-EXISTING ABNORMALITIES) **(Month/Day/Year)** 99/99/9999 = Unable to determine	**COMPLETE FOR CODE 51 ABNORMALITIES ONLY** — **Interval Growth of Abnormality?** 1 = No, 2 = Yes, 9 = Unable to determine	**Interval suspicious change in attenuation?** 1 = No, 2 = Yes, 9 = Unable to determine	**COMPLETE FOR OTHER SIGNIFICANT ABNORMALITIES ONLY** — **Interval change warrants further investigation?** 1 = No, 2 = Yes, 9 = Unable to determine
___	___ ___	___	___ ___ / ___ ___ / ___ ___ ___ ___	___	___	___
___	___ ___	___	___ ___ / ___ ___ / ___ ___ ___ ___	___	___	___
___	___ ___	___	___ ___ / ___ ___ / ___ ___ ___ ___	___	___	___
___	___ ___	___	___ ___ / ___ ___ / ___ ___ ___ ___	___	___	___
___	___ ___	___	___ ___ / ___ ___ / ___ ___ ___ ___	___	___	___
___	___ ___	___	___ ___ / ___ ___ / ___ ___ ___ ___	___	___	___

Appendix 5-2 Chest X-Ray Screening Examination Form (XRY)

3a. Lung Screening Comparison Result:

- ☐ A. **Positive Screen** – Abnormalities suspicious for lung cancer
- ☐ B. **Positive Screen** – Abnormalities suspicious for lung cancer, no significant change
- ☐ C. **Negative Screen** – Clinically significant abnormalities not suspicious for lung cancer (GO TO E.4)
- ☐ D. **Negative Screen** – Minor abnormalities not suspicious for lung cancer (GO TO E.4)
- ☐ E. **Negative Screen** – No significant abnormalities (GO TO E.4)

3b. Other Significant Abnormalities (in addition to lung screening results) that need to be reported:

☐ No ☐ Yes (SPECIFY IN E.5)

4. Which of the following diagnostic procedures for screening examination results should the screening result letter include?

(MARK ALL THAT APPLY)

- ☐ No diagnostic intervention necessary
- ☐ Comparison with historical images (NOTE: CHECK OTHER PROCEDURES IN CASE HISTORICAL IMAGES UNAVAILABLE)
- ☐ Chest X-ray, with or without additional views to confirm abnormality and location
- ☐ Chest fluoroscopy to confirm abnormality and location
- ☐ Low kVp chest X-ray to determine abnormality calcification
- ☐ Chest X-ray in 3 months
- ☐ Low dose CT with NLST parameters:
  (MARK AN AREA OF FOCUS)
  - ☐ Limited
  - ☐ Entire chest
- ☐ Diagnostic CT
- ☐ FDG-PET
- ☐ Tech 99m depreotide scintigraphy
- ☐ Biopsy (percutaneous, thoracoscopic, open, etc.)
- ☐ Other (SPECIFY)_____

5. Comments: ☐ No ☐ Yes

_____

_____

_____

☐ Continued

6. Radiologist ID: |___|___|___|___| **Date:** |___|___| / |___|___| / |___|___|___|___|
MO DAY YEAR

_____
Signature

National Lung Screening Trial (NLST)

Specifications for Completion of the Chest X-ray Screening Examination Form (XRY)

This form is to be completed by the SC Coordinator or staff member, and the examiners (technologist and radiologist). The SC Coordinator or staff member will complete the Administrative Section, the technologist will complete Part A, and the radiologist will complete Parts B through E. This form should be completed in black or blue ink. An XRY form must be completed for every screening visit by a participant, regardless of the outcome. If documentation of the exam, including exam images, is lost and cannot be recreated, Parts A and B and Items D.3 and E.6 must be completed.

Please refer to the NLST/LSS Screening Exam Data Handling Guidelines in Appendix 4-11 for details about making changes to data on the screening exam forms. Items pertaining to technical parameters must be changed by the technologist who performed the screening exam and items pertaining to exam results must be changed by the radiologist who read the screening exam. The remaining items may be changed by the SC Coordinator or other designated staff member. All data changes must be initialed and dated in pen on the screening exam form by the staff member making the change. Cross out erroneous data with one line, do not black out or use correction fluid to conceal the original data.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label in the space provided in the upper right-hand corner of the form.

Screening Center ID: Record the two-digit SC ID number.

Date of Examination: Record the date of the examination. The month, day, and the last two digits of the year should be recorded (e.g., 02/07/2002). The date of examination should not be recorded in advance of the participant's study visit.

Study Year (T_0 - T_2): Record the participant's study year (T_0, T_1, or T_2)

Visit Number: Record the number of times the participant visited the SC to complete this examination in the current study year. There should be no more than two visits to the SC to complete the chest x-ray examination in any one study year. If an exam form is completed for visit two, there must also be a completed form for visit one.

Reason for Repeat Visit: If this is a repeat visit, record the reason for the repeat visit. Refer to the examination form from the previous visit(s) for this information. The purpose of this item is to provide potentially useful information to the examiner regarding why the participant is returning for a repeat visit. Some example reasons:

"Prior image was of poor quality."

This might be entered if the participant's prior image was of poor quality during the previous visit, but s/he was willing to return to the SC for a repeat image. This information will alert the examiner to explore the reasons for this problem.

"Participant out of time. Unable to complete chest x-ray exam."

This might be entered if the participant's schedule did not allow him/her to remain at the SC to complete the chest x-ray screening examination during a previous visit, and the examination was rescheduled.

Interval Follow-up Information: This section indicates whether the participant has had any imaging studies since the previous screening exam. This section is intended to be a tool for the SCs to collect interval follow-up information and transmit it easily to the radiologists. However, some SCs may have alternate internal methods for obtaining and transmitting interval follow-up information.

The SC may complete this section using information received during the DE process, contact with the participant during the year, or questioning the participant when s/he comes to the clinic for the current screening exam. This information may be referenced by the radiologist if needed when completing Part E of the form.

Has the participant had any imaging studies since the previous screening exam that may be useful for the radiologist to review if needed?

- **Yes:** The SC should mark this box to indicate that the participant has had at least one imaging study since his or her previous screening exam.
- **No:** The SC should mark this box to indicate that the participant has not had at least one imaging study since his or her previous screening exam.
- **N/A:** For SCs where interval follow-up information is collected and transmitted to the radiologists through an alternate method, the SC should mark this box to indicate that the question is not applicable.

  For SCs using this question to capture interval follow-up information, the SC should mark this box to indicate that interval follow-up information is not available.

If YES, dates obtained (month and year): Record the date that any interval images were obtained. The month and the last two digits of the year should be recorded (e.g., 02/2002). If the date is unknown, enter 99/9999. If no interval images were obtained or if N/A is marked, the dates may be left blank.

Part A. Chest X-ray Examination Findings (Completed by Technologist):

1. **Number of Attempts:** Mark the box corresponding to the number of attempts made to complete the chest x-ray. Three attempts are allowed per visit. If the entire chest of a large participant cannot be viewed with one chest x-ray, then two chest x-rays may be taken in order to view the entire chest. In this case, the two views count as one attempt and two exposures. The fact that two chest x-rays were taken and the reason must be recorded in the Comments section.

- **None:** This might apply if the participant entered the dressing room to prepare for the examination, but for some reason there was no attempt to obtain the chest x-ray image (participant became ill, could not wait, etc.). (Go to Item A.3.)

  If the participant never prepared for the examination in any way, the examination is considered "Not Done." The XRY form would not be filled out in such cases.

- **One:** The chest x-ray is attempted once, regardless of whether it is successfully completed.

- **Two:** The chest x-ray is attempted twice, regardless of whether it is successfully completed.

- **Three:** The chest x-ray is attempted three times, regardless of whether it is successfully completed.

2. **Adequate Image Obtained:** Before the participant leaves the SC, the technologist will evaluate the chest x-ray for quality. All images are then sent to the study radiologist, who will also judge their adequacy. An image will be considered adequate if the lung vessels are clearly visible, and the mediastinal structures are sufficiently penetrated to allow for adequate visualization. Responses are explained below:

   - **No:** The image is judged to be inadequate. (The technologist should complete Part A. Parts B and C should be skipped and the radiologist should complete Items D.1, D.3, and E.6).

   - **Yes:** The image is judged to be adequate. (The technologist should complete Part A. The radiologist should complete Parts B through E.)

3. **Reason for Inadequate or No Image:** This item is completed only if the answer to Item A.1 is "None," or the answer to Item A.2 is "No." Mark one or more boxes to indicate the reason(s) for not obtaining the images or for obtaining inadequate images. An explanation of each reason for inadequate images is given below:

   - **Participant Refusal:** The participant is unwilling to cooperate, i.e., stand in the proper position, hold breath, etc.

   - **Equipment Malfunction:** This includes any problem with the equipment that prevents the successful completion of the chest x-ray exam.

   - **Poor Film Quality:** An image is obtained, but it is not adequate for interpretation. Poor image quality may be due to excessive rotation, inadequate inspiration, motion or processing artifact, over or under penetration, or exclusion of parts of the lung and mediastinal structures from the image.

   - **Other (SPECIFY):** In the space provided, describe any other situation in which adequate images could not be obtained.

4. **Technical Parameters:** Record the technical parameters used for obtaining the x-ray image. If any of the parameters are lower or higher than the acceptable range, provide a comment to explain in Item A.6 and complete a PHVF. If documentation of the exam, including exam

images, has been lost and cannot be recovered or recreated, "9"s can be recorded for the missing technical parameter values.

A. kVp: Record the kVp at which the image was obtained. The acceptable range is 100-150 kVp.

B. mAs: Record the mAs for the image obtained. Zero-fill the boxes (i.e., 02.2). If however, the mAs are not available, record 99.9. The acceptable range for mAs is 0.1-20 mAs. The maximum of 20 mAs may be exceeded for very large patients to achieve acceptable image quality. While there is no upper bound for the mAs for larger participants, the lowest mAs with acceptable image quality should be used.

C. mA: Record the mA for the image obtained. For two-digit doses, zero-fill the first digit (i.e., 020). If the mA is not available, record 999. The mA setting should allow for the mAs to fall within the exposure range and times specified in the protocol.

D. Time: Record the time for the image obtained in milliseconds. If unavailable, enter 99. The maximum exposure time is 40 msec.

E. Exposure Value: Record the exposure value for the image obtained. Depending on the manufacturer and model of the x-ray equipment used to obtain the image, the exposure value may be either the S-value or an exposure index value. If the Exposure Value is not available, enter 9999.

5. CXR system used: Mark the box corresponding to the type of x-ray system used for the specific chest x-ray. For all systems, record the two-digit machine number used for this participant's x-ray exam. If the SC has designated room numbers instead of machine numbers for the chest x-ray, record the room number in the boxes labeled "machine number." Zero-fill all boxes.

6. Comments: The comments box should be used to record information that may help clarify a situation, provide further information for an item in another part of the form, and to record additional "Other (SPECIFY)" information, if needed.

If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes." Enter the item number to which the comments are related. The item number should include a letter indicating the part of the form, and a number indicating the item within that part (e.g., A.3). If the comment is not related to a specific item in Part A of the form, use the item number for the Comments section itself (A.6). Then enter the comments in the space provided to the right of the item number.

7. Tech ID: The technologist should enter his/her four-digit staff ID number and sign the form in the space provided.

Part B. Chest X-ray Overall Diagnostic Quality (Completed by Radiologist)

Part B is to be completed by the radiologist. At some SCs, the SC staff will complete this section using the radiologist's written report. Also, the SC staff may complete Item B.1 if the answer is D, "No images available." If Item A.2 is answered, "No," Parts B and C should be left blank, and Items D.1, D.3, and E.6 should be completed.

Appendix 5-3 Specifications for Completion of the Chest X-ray Screening Examination Form (XRY)

1. Indicate the overall diagnostic quality of CXR:

A. Diagnostic CXR: The chest x-ray image is of diagnostic quality. Go to C.1 to record examination findings.

B. Limited CXR, but interpretable: The chest x-ray image is of limited diagnostic quality, but it can be interpreted. The radiologist should record the factors affecting the quality of the chest x-ray in B.2, and should complete C.1 to record the examination findings. If an abnormality suspicious for lung cancer or a clinically significant abnormality is noted, the result in D.1 should be recorded as A or C. The result in D.1 may not be recorded as F.

C. Non-diagnostic CXR, reschedule CXR: The chest x-ray image is not acceptable for interpretation, and must be repeated. Record the factors affecting the quality of the image in B.2. Then complete D.1 (record Result "F") and D.3, and go to Item E.6. No abnormalities may be recorded for a screening exam of non-diagnostic image quality. If the exam is not of diagnostic quality but an abnormality suspicious for lung cancer or a clinically significant abnormality is noted, then select "B. Limited CXR, but interpretable" and record the abnormality in C.1 as described above. However, if a minor non-suspicious abnormality is noted, the diagnostic quality should be recorded as "C. Non-diagnostic CXR exam, reschedule CXR" and the minor abnormality should not be recorded in C.1.

D. No image available: The chest x-ray image is not available for review. Instances in which the participant underwent a screening examination but the image sets were either lost or inadvertently destroyed and not available for review by the radiologist should be recorded as "No image available." Record the reason that images are not available for review in Item D.3 (Comments). After detailing the reason the images were not available, complete Item E.6. Having no images available for review is considered a protocol violation, therefore a Protocol and HIPAA Violation Form (PHVF) must be completed and submitted to the CC.

2. Which of the following affected the quality of the limited or non-diagnostic CXR? Mark the box(es) to indicate the factor(s) that contributed to the limited diagnostic quality of the chest x-ray. Mark all that apply.

- ■ Low lung volumes
- ■ Lungs incompletely imaged
- ■ Poor positioning
- ■ Motion degradation
- ■ Incorrect exposure or other technical parameter
- ■ Artifacts obscure anatomy
- ■ Incorrect processing algorithm
- ■ High image noise
- ■ Other (SPECIFY)

Part C. Chest X-ray Examination Findings (Completed by Radiologist):

Part C is to be completed by the radiologist. Any finding that could impact follow-up (i.e. result codes "A," "B," and "C") must be in the dictated report and recorded in Part C of the screening exam form. Minor abnormalities that do not require follow-up may be included in the dictated report but do not need to be recorded on the screening exam form. Any abnormality recorded on the screening exam form must be noted in the dictated report. If Item A.2 is answered "No," Part C should be left blank and Items D.1, D.3, and E.6 should be completed.

1. **Radiologic Abnormality Noted:**

   - **No:** No abnormality was seen. Go to Item D.1 and mark Result "E."
   - **Yes:** An abnormality (either suspicious for lung cancer or abnormal for any other reason) was seen. Record information for each (up to six) abnormality in the chart (C.2).

2. **Record Information for Each Abnormality:** Complete this item for up to six abnormalities. If more than six are identified, record the six most serious abnormalities. Complete the chart by recording the appropriate number(s) in the designated spot. Enter information about the most serious abnormality in the row labeled "1," the second most serious abnormality in the row labeled "2," and so on.

   Description of Abnormality: For each abnormality, mark **one** number that corresponds to it from the list below. Please note that **code 51 (in bold) is considered to be a positive screen for lung cancer and always should be listed first if multiple abnormalities are identified**. For this abnormality, the examination result in Item D.1 must be coded "Positive Screen – Abnormalities suspicious for lung cancer." If, however, the non-calcified visible nodule/mass is not discovered until the comparison exam, it is possible the code 51 will not be listed first and that the examination result in Item D.1 will not be "Positive Screen – Abnormalities suspicious for lung cancer."

   Please note that codes 70 and 71 – "Other significant abnormality (SPECIFY)" should be used to designate all other significant abnormalities not listed below, including, but not limited to, any other abnormalities suspicious for malignancy. Code 72 "Other minor abnormality noted" should be used to designate all other minor abnormalities noted. Specifying the minor abnormalities designated by code 72 is optional.

   51 = Non-calcified visible nodule/mass (MUST MARK "A" IN D.1)
   For this abnormality, the examination result in item D.1 must be coded "Positive Screen – Abnormalities suspicious for lung cancer."
   53 = Benign lung nodule(s) (benign calcification)
   54 = Atelectasis, segmental or greater
   55 = Pleural thickening or effusion
   56 = Non-calcified hilar/mediastinal adenopathy/mass ≥ 10 mm short axis
   57 = Chest wall abnormality (e.g. bone destruction, metastasis)
   58 = Consolidation
   59 = Reticular/reticulonodular opacities, honeycombing, fibrosis, scar

62 = 6 or more nodules, not suspicious for cancer (opacities ≥ 4 mm) (ANY SUSPICIOUS NODULES MUST BE CODED AS 51)

Code 62 should be used in cases where there are at least six nodules not suspicious for cancer. "Not suspicious for cancer" is defined as round, well-defined, and similar in size. Any nodules that are suspicious MUST be coded as 51; should this leave a total of fewer than six non-suspicious nodules, each nodule must be individually recorded.

63 = Emphysema

64 = Significant cardiovascular abnormality (SPECIFY)

Code 64 should be used to record a significant cardiovascular abnormality, such as a thoracic aortic aneurysm, aortic dissection, marked cardiomegaly, pulmonary hypertension, coronary artery calcifications, or valvular calcifications (exclude mitral annular calcification). The abnormality should be specified in the space provided to the right of the two-digit box for the abnormality code.

70 = Other significant abnormality above the diaphragm (SPECIFY)

The abnormality should be specified in the space provided to the right of the two-digit box for the abnormality code. (**Note:** Abnormalities identified on chest x-ray that are suspicious for lung cancer but cannot be recorded using codes 51-59, such as ground glass opacities, may be coded as a 70 with an "A – Positive Screen – Abnormalities suspicious for lung cancer" at the discretion of the radiologist. In such cases the SC must contact User Support at the CC to implement a manual override in since abnormality code 70 normally cannot be entered as a positive screen in

71 = Other significant abnormality at or below the diaphragm (SPECIFY)

The abnormality should be specified in the space provided to the right of the two-digit box for the abnormality code.

72 = Other minor abnormality noted (SPECIFY IF DESIRED)

The abnormality may be specified in the space provided to the right of the two-digit box for the abnormality code, if desired.

Check box if identified after comparison with historical images: This box indicates when the abnormality listed in the table was identified. Check the box for any abnormality that was found on the current chest x-ray only after comparing it with any historical image. If an abnormality was identified during the initial (isolated) review of the current chest x-ray image, this box is left blank.

The remaining information under Description of Abnormality (Location of Epicenter, Longest Diameter, Longest Perpendicular Diameter, and Nodule/Mass Margins) must be recorded for abnormalities coded as 51 only.

- **Location of Epicenter**: Record the code that corresponds to the approximate center of the location of the abnormality in the appropriate zone or lung field. For simplicity, the lungs are divided into thirds, with upper, middle, and lower zones. Select one location for each abnormality.

  - **Rt Upper Zone**: The abnormality was found in the upper 1/3 of the right lung field.

- **Rt Middle Zone:** The abnormality was found in the middle 1/3 of the right lung field.
- **Rt Lower Zone**: The abnormality was found in the lower 1/3 of the right lung field.
- **Lt Upper Zone**: The abnormality was found in the upper 1/3 of the left lung field.
- **Lt Middle Zone**: The abnormality was found in the middle 1/3 of the left lung field.
- **Lt Lower Zone**: The abnormality was found in the lower 1/3 of the left lung field.
- **Other (SPECIFY)**: This choice is used when it is difficult to identify the lung section containing the epicenter. If the lung section containing the epicenter cannot be identified, specify a more general location (i.e., upper lobe).

- **Longest Diameter (mm):** Record the length of the abnormality's maximum dimension in millimeters. If dimensions are not available or are not applicable, record 999. Zero-fill all measurements (e.g., 005). Use whole numbers only.

- **Longest Perpendicular Diameter (mm):** Record the length of the maximum perpendicular dimension (that is, the longest length that is perpendicular to the maximum dimension) in millimeters. If dimensions are not available or not applicable, record 999. Zero-fill all measurements (e.g., 005). Use whole numbers only.

- **Nodule/Mass Margins:** Record the code that corresponds to whether the lesion is spiculated (stellate), smooth, or poorly defined. If the morphology cannot be determined, code "unable to determine."

Part D: Chest X-ray Interpretation Results (Completed by Radiologist):

Part D is to be completed by the radiologist. At some SCs, the SC staff will complete this section using the radiologist's written report. In cases where an adequate scan was not obtained (A.2 = No), Items D.1 and D.3 must be completed by the radiologist.

Part D documents the results of the current screening examination only. The participant's prior medical history, prior radiologic examinations, or prior NLST/LSS screens should not be considered when assigning the lung screening result in Part D. The result of comparing the current chest x-ray with historical images will be recorded in Part E.

Note: The focus of the screening examination is to identify abnormalities that are suspicious for lung cancer. Although other clinically significant findings may be found incidentally during the screening, the Results section is meant to reflect a hierarchy of examination findings in regard to lung cancer. Result categories A, C, D, E, and F in Part D, Item 1 are in hierarchical order. Thus, a positive screen is at the highest end of findings, a clinically significant abnormality is at the next level, and so on, throughout the results category.

Appendix 5-3 Specifications for Completion of the Chest X-ray Screening Examination Form (XRY)

1. Lung Screening Result: Mark the box corresponding to the result of the current chest x-ray examination. Definitions of lung screening results are given below:

A. Positive Screen – Abnormalities suspicious for lung cancer:

The following abnormality (C.2, #51) is always considered a positive screen and Item D.1 must always be marked "A:"

- Non-calcified visible nodule/mass

Other abnormalities, or constellations of abnormalities, may be suggestive of lung cancer, but there is no absolute rule for coding other findings as suspicious for lung cancer. In these instances, the classification of a screening exam result as positive is left up to the radiologist. Any other clinically significant abnormalities may be reported in Item D.2.

C. Negative Screen – Clinically significant abnormalities not suspicious for lung cancer:

The review of the image reveals that an abnormality is present and requires further evaluation, but is not suggestive of lung malignancy. It is up to the radiologist to determine whether an abnormality is clinically significant. Complete Item D.3, then go to Part E.

D. Negative Screen – Minor abnormalities not suspicious for lung cancer:

The review of the image reveals minor abnormalities that are not suspicious for lung cancer. It is up to the radiologist to determine whether an abnormality is minor. Complete Item D.3, then go to Part E.

E. Negative Screen – No significant abnormalities:

The review of the image reveals no significant abnormalities. Complete Item D.3 and then go to Part E.

F. Inadequate:

The chest x-ray images were inadequate and sufficient information could not be obtained to determine the examination result. Complete Item D.3 and then go to E.6.

If the image is considered inadequate, but based on what is visible on the image, there is an overt suspicion of lung cancer, the result of the screening exam should be recorded as positive. The radiologist should record that the image is positive in Item D.1 of the XRY. The radiologist must comment in Item D.3 that although the result is positive, the overall quality of the image is inadequate. Part E should be completed as outlined below.

2. Other Significant Abnormalities (in addition to lung screening results) that need to be reported: Complete D.2 only if the Lung Screening Result in D.1 was "A. Positive Screen."

No: The chest x-ray did not reveal other significant abnormalities other than the lung screening result.

Yes: The chest x-ray revealed a significant abnormality in addition to the positive lung screening result; for example, a breast mass was seen in addition to nodules that are suspicious for lung cancer.

3. **Comments:** The comments box should be used to record information from Parts B, C, and D that may help clarify a situation, provide further information for an item in another part of the form, and to record additional "Other (SPECIFY)" information, if needed.

   If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes." Enter the item number to which the comments are related. The item number should include a letter indicating the part of the form, and a number indicating the item within that part (e.g., B.2). If the comment is not related to a specific item in Parts B, C, or D of the form, use the item number for the Comments section itself (D.3). Then enter the comments in the space provided to the right of the item number.

   Note that if a dictated report is not provided, the Comments section should be used to describe significant and minor abnormalities occurring with a negative screen.

   If Item D.2 is marked "Yes," the Comments section should be used to describe the other clinically significant abnormality.

Part E. Chest X-ray Comparison Results – Complete for All Lung Screening Results (Completed by Radiologist)

Part E is to be completed by the radiologist. Part E is to be completed for ALL screening examinations.

Part E documents the comparison of the current chest x-ray with any available historical images for the participant. Comparison to previous images may or may not lead to a change in the lung screening result. Historical images for the T_0 prevalence screen will be obtained according to local practice at the SC. Cases where a participant does not have an historical image to be used for a comparison read should be recorded in "E.5. Comments." If a previous screening exam was not performed, then not doing the comparison is not considered a protocol violation. For example, not performing the comparison read at T_1 is not considered a protocol violation if the T_0 exam was never obtained and an MDF was submitted for the T_0 XRY form. However, if the previous screening exam was performed but the images are not compared to the current screening exam, a Protocol and HIPAA Violation Form must be completed.

If historical images can be obtained, they should be used to conduct a comparison review for the T_0 prevalence screen. For T_1 screening examinations, the comparison image is the T_0 screen. For T_2 screening examinations the comparison images are the T_0 and T_1 screens. However, if the screening examinations from all three study years are negative, then the T_2 screening examination may be compared with either the T_0 or T_1 screen, or both screens, at the radiologist's discretion.

In the event that a screen is inadequate and a repeat screen is performed, the inadequate screen may be used as the comparison image for the repeat screen at the radiologist's discretion. In this instance, check the box for the current study year in Item E.1. If an inadequate screen is used for comparison in later study years, that fact should be noted in the Comments section. A comment is not required if using an

inadequate screen for comparison in the same study year. For example, if a T_1 screen is inadequate and a repeat T_1 screen is performed, then both the T_0 and the inadequate T_1 screens may be used as comparison images for the repeat T_1 screen. If the inadequate screen is used as a comparison image at T_2, then it should be noted in the Comments section. Once the comparison has been made and the data recorded, the results of the comparison are recorded in Item E.3a.

Should the comparison with historical images lead to a change in the lung screening result, the radiologist should record the new result in Part E. For example, a minor abnormality documented in Part C may lead to the Lung Screening Result "D" in Item D.1. However, upon comparison with historical images, the radiologist may decide that there has been a significant change in the abnormality. In this instance the radiologist would complete Part E, recording the information concerning the abnormality in Item E.2, and record the Lung Screening Comparison Result "C" in E.3a.

Should the comparison with historical images identify an abnormality that was not previously seen on the image read in isolation, the abnormality should be recorded in Item C.2, and the box which reads "Check Box If Identified After Comparison With Historical Images" should be checked. If the abnormality is coded as a "51" or other significant abnormality, then these newly identified abnormalities should be recorded in Item E.2.

Likewise, should the comparison with historical images result in an abnormality that differs (more severe or less severe) from what was seen on the image read in isolation, the abnormality should be coded according to the comparison image and recorded in Item C.2. For example, an abnormality is coded as a "72 – Other minor abnormality noted" for the image read in isolation. But in comparison with the historical image, the abnormality now appears to be a "71 – Other significant abnormality at/below the diaphragm." The abnormality should be recorded as a "71" in Item C.2, and the box which reads "Check Box If Identified After Comparison With Historical Images" should be checked. The change in the abnormality as a result of the comparison with historical image should be documented in the Comments section of Part E (Item E.5). Item E.2 should then be completed according to the guidelines outlined below. Any findings from historical images used as comparisons that are <u>not present at the current screening exam</u> (i.e. a 51 present at T_0 but not at T_1) should be noted as a comment in E.5.

1. **Comparison Image:** Check the box to indicate the source of the comparison image. Mark all boxes for which a comparison image is available.

   No image available – There is no historical image available. If checked, this should be the only box checked. Go to E.4.

   T_0 – The comparison image is the NLST/LSS T_0 exam. The current chest x-ray exam is the T_1 or T_2 examination. In instances where the T_0 screen is inadequate and a repeat screen is performed, the inadequate T_0 screen may be used as the comparison image for the repeat T_0 screen at the radiologist's discretion. If the inadequate T_0 screen is used as a comparison image at the T_1 or T_2 examination, record that fact in the Comments section.

   T_1 – The comparison image is the NLST/LSS T_1 exam. The current chest x-ray exam is the T_2 examination. In instances where the T_1 screen is inadequate and a repeat screen is performed, the inadequate T_1 screen may be used as the comparison image for the repeat T_1 screen at the radiologist's discretion. If the inadequate T_1 screen is used as a comparison image at the T_2 examination, record that fact in the Comments section.

   T_2 Inadequate scan – The comparison image is the NLST/LSS T_2 inadequate scan. The current chest x-ray exam is the T_2 repeat examination.

Previous scan not completed as part of NLST – The comparison image was not done as part of the NLST/LSS. Record the code that corresponds to the type of scan for the images available, and the date(s) of the scan(s). A total of three non-NLST/LSS scans may be recorded.

2. Enter abnormality number and code for <u>all</u> Code 51 abnormalities AND other significant abnormalities seen on this screening exam. This chart records the result of the comparison of each abnormality seen on the current chest x-ray with any available historical images. Transfer the abnormality number and code from Item C.2 for each code 51 abnormality and/or other significant abnormality, including any abnormalities that have been determined to be significant only after comparison with historical images. Any new abnormality that is identified during the comparison must be recorded in Item C.2. Complete the following:

Was abnormality pre-existing? Record the single-digit code to indicate whether or not the abnormality was seen on any historical image.

1 = No: The abnormality is not visible on any previous image. Do not complete the rest of the table; go to E.3.

2 = Yes: The abnormality can be seen on a previous image. The remainder of Item E.2 should be completed.

9 = Unable to determine: It cannot be determined whether or not the abnormality can be seen on a previous image. Do not complete the rest of the table; go to E.3.

Earliest date visible: Record the month, day, and year of the earliest historical image that shows the abnormality.

Complete for Code 51 Abnormalities Only: If the abnormality was recorded as code 51, complete the following:

Interval Growth of Abnormality: Record the single digit code that indicates if the abnormality has grown since its appearance on the previous image.

Interval suspicious change in attenuation: Record the single digit code that indicates if there has been a suspicious change in attenuation between the historical image and the current one. A suspicious change in attenuation is an increase in attenuation from ground glass to a combination of ground glass and soft tissue or to pure soft tissue attenuation.

Interval change warrants further investigation?: If the abnormality was coded as an other significant abnormality or is being re-classified as a significant abnormality due to the comparison with historical images, complete the following: record the single digit code that indicates if there has been a significant change that warrants further investigation.

3a. Lung Screening Comparison Result: Check the box to indicate the result of comparison of the current chest x-ray exam with the historical images available. This is the result that will be reported to the participant and the participant's health care provider, and should take into

account the radiologist's assessment of the current screen in the context of the participant's available historical images.

If the current screen is positive and the abnormality identified appears not to have changed when compared to previous images at the comparison reading (Part E), the radiologist should record the result in Item E.3a as B – "Abnormalities suspicious for lung cancer, no significant change."

However, when previous images from two successive study years have not changed and the third image is positive and appears unchanged from the previous images, the radiologist may code that result as D – "Minor abnormalities not suspicious for lung cancer" at his/her discretion as described below, rather than using result code B. Additionally, the radiologist should specify in the Comments section (Item E.5) why the result was coded as D. Likewise, if after baseline screening a clinically significant abnormality remains stable and unchanged on subsequent screening examinations, the abnormality may be coded as D – "Minor abnormalities not suspicious for lung cancer" at the discretion of the radiologist, rather than coding the image as a clinically significant abnormality. Additionally, the radiologist should specify in the Comments section (Item E.5) why the result was coded as a D.

3b. Other Significant Abnormalities (in addition to lung screening results) that need to be reported: Complete E.3b only if the Lung Screening Result in E.3a was "A. Positive Screen" or "B. Positive Screen, no significant change."

No: The chest x-ray did not reveal other significant abnormalities other than the lung screening result.

Yes: The chest x-ray revealed a significant abnormality in addition to the positive lung screening result; for example, a breast mass was seen in addition to nodules that are suspicious for lung cancer.

4. Which of the following diagnostic procedures for screening examination results should the screening result letter include? Mark the box to indicate recommended follow-up options for this participant. More than one item may be marked. If the participant reported previous chest images but those images were not immediately available for comparison, "Comparison with historical images" may be marked, indicating that the comparison should still be attempted. If "Comparison with historical images" is marked, other follow-up diagnostic procedures MUST be indicated as well, in case the historical images cannot be obtained. If "Low dose CT with NLST parameters" is marked, the radiologist must also select the area of focus. Only one box may be marked for area of focus; both may not be marked and both may not be blank. "Limited" focus refers to the abnormal region only, as opposed to the entire chest. There are no study-wide recommendations for T_2 nodules that have been stable for two years; however radiologists may make recommendations at their own discretion. New nodules identified at T_2 will be documented on a DE Form and followed for 24 months as described in section 7.2 of the MOOP.

5. Comments: This comments box should be used to record comments for any item in Part E that may help clarify a situation, provide further information for an item in another part of the form, and to record additional "Other (SPECIFY)" information, if needed.

If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes." Enter the item number to which the comments are related. The item number should include a letter indicating the part of the form, and a number indicating the item within that part (e.g., E.2). If the comment is not related to a specific item in Part E of the form, use the item number for the Comments section itself (E.5). Then enter the comments in the space provided to the right of the item number.

6. **Radiologist ID:** This item should be completed by the radiologist. The radiologist should enter his/her four-digit staff ID number, record the date the form was completed, and sign the form in the space provided. If this section was completed by a member of the SC staff using the radiologist's written report, the SC staff member should enter the radiologist's name and staff ID number, then sign his/her own name below the name of the radiologist.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the first page. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

CHEST X-RAY QUALITY ASSURANCE INFORMATION

The following information is required for CXR quality assurance.

1. **LSS protocol CXR specifications.**
2. **Confirmation of screening site adherence to CXR specifications.**
3. **CXR equipment characteristics.**
4. **Physicist attestation to ongoing performance testing (annual).**
5. **CXR exposure measurements (annual, and after tube change).**

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

CHEST X-RAY EQUIPMENT CHARACTERISTICS

PLEASE HAVE YOUR PHYSICIST PROVIDE THE FOLLOWING INFORMATION FOR EACH X-RAY UNIT.

LSS SITE NAME: _____

SITE MAILING ADDRESS: _____

I. PI (Radiologist) : _____

Tel#: _____ **Email:** _____

II. Chief CXR Technologist: _____

Tel#: _____ **Email:** _____

III. Medical Physicist: _____

Tel#: _____ **Email:** _____

	CXR EQUIPMENT			
1.	Manufacturer:			
2.	Model Name:			
3.	Date of Manufacture:			
4.	Detector Type:	☐ DR	☐ CR	☐ Screen/Film
5.	Dedicated chest unit:	☐ Yes	☐ No	
6.	SID:			
7.	Grid ratio:			
8.	Film/screen combination:			
9.	Processor manufacturer and model:			
10.	CR Reader manufacturer and model:			

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

ATTESTATION TO CHEST X-RAY PERFORMANCE TESTING

PLEASE HAVE YOUR PHYSICIST PROVIDE THE FOLLOWING INFORMATION REGARDING PERFORMANCE TESTING OF EACH OF YOUR CHEST X-RAY UNITS. A COPY OF THE PHYSICIST'S REPORT SHOULD BE KEPT ON SITE, AND BE AVAILABLE FOR SITE INSPECTORS.

I. SITE NAME: _____

II. CXR MACHINE #_____ **MAKE & MODEL:**_____

III. DATE OF INSTALLATION: _____

	PERFORMANCE TEST	TESTED AT INSTALLATION?	LATEST DATE TESTED	TEST NOT DONE?
1.	Collimation	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
2.	Linearity with mA	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
3.	kVp accuracy and repro.	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
4.	Exposure repro. and mR/mAs output	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
5.	AEC performance	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
6.	Entrance skin exposure	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
7.	Beam quality - HVL	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
8.	Artifact evaluation	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
9.	Focal spot size	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	
10.	CR reader (if applicable)	☐ Yes ☐ No	__|__|/|__|__|/|__|__|	

PLEASE INDICATE BELOW THE TYPE AND FREQUENCY OF ANY ONGOING QC PROCEDURES.

ATTESTED TO

_____ **(Physicist)**

_____ **(Physicist ID#)**

_____ **(Date)**

NATIONAL LUNG SCREENING TRIAL (NLST)
EQUIPMENT QUALITY CONTROL

ANNUAL CHEST X-RAY EXPOSURE MEASUREMENTS

DATE: _____

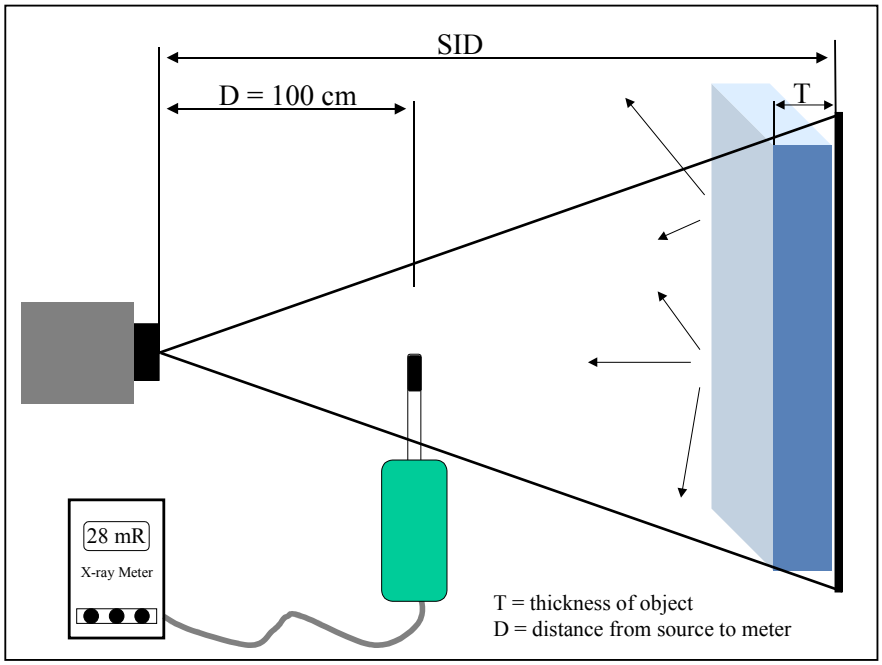
LSS SITE NAME: _____

CXR MANUFACTURER AND MODEL: _____

PHYSICIST PERFORMING TESTS: _____

TITLE: _____ **TEL#:** _____ **EMAIL:** _____

A.	**Exposure Output Instructions**
1.	Select focal spot, kVp, and mA station clinically used by this machine for PA chest
2.	Manually select an exposure time sufficient to produce reproducible exposures (at least 10 milliseconds - recommend 100 milliseconds).
3.	Place appropriate ion chamber 100 cm (40 inches) from tube focal spot.
4.	Collimate to an area sufficient to cover the ion chamber.
5.	Record exposure (mR) and mAs.



ANNUAL CXR EXPOSURE MEASUREMENTS (continued)

B.		(Example)	(Your site)
1.	LSS SITE	Wash. U.	
2.	TEST DATE	8/19/03	
3.	TESTER	G. Fletcher	
4.	CXR MACHINE	ThoraVision	
5.	SID (cm)	180	
6.	kVp	140	
7.	HVL at kVp in line #6	10.5	
8.	MA	500	
9.	TIME (mSEC)	20	
10.	mAs	10	
11.	OUTPUT AT 40 CM (MR)	200	
12.	mR/mAs	20	

Appendix 5-8 Chest X-ray Image QA Form (XQA)

National Lung Screening Trial (NLST)

CHEST X-RAY IMAGE QA FORM (XQA)

ADMINISTRATIVE SECTION

PID: |___|___| -|___|___|___|___|___| - |___|

Screening Date: **|__ __|__ __| / |__ __|__ __| / | 2 | 0 |__ __|__ __|**

Reviewer ID: **|___|___|___|___|** Reviewer:_____

Review Date: |__ __|__ __| / |__ __|__ __| / **| 2 | 0 |__ __|__ __|**

PART A. Technical Parameters		
Field	**Value**	**Adequate?**
kVp	|__ __|__ __|__ __|	☐Yes ☐No
mAs	|__ __|__ __|.|__ __|	☐Yes ☐No
mA	|__ __|__ __|__ __|	☐Yes ☐No
Time	|__ __|__ __| msec	☐Yes ☐No

PART C. Overall	
X-ray technical parameters adequate?	☐Yes ☐No
Image quality adequate?	☐Yes ☐No
Repeat screening exam suggested?	☐Yes ☐No

Comments (Include reason for suggested repeat screening exam):

PART B. Image Quality	
Review Item	**Adequate?**
Collimation	☐Yes ☐No
Vertebral body definition	☐Yes ☐No
Left retrocardiac pulmonary vessels	☐Yes ☐No
Lateral wall of descending aorta	☐Yes ☐No
Left hemidiaphragm	☐Yes ☐No
R/L marker present	☐Yes ☐No
Motion absent	☐Yes ☐No
Other artifact absent (technical, external)	☐Yes ☐No
Positioning (rotation, centering, scapulae, lordosis)	☐Yes ☐No
Inspiratory level adequate	☐Yes ☐No

6. REPORTING RESULTS OF SCREENING TESTS

6.1 Overview

The SC was responsible for reporting the results of all baseline and annual screening examinations to the participant and to the participant's health care provider within three weeks of the screening visit. Participants with abnormal results that were suspicious for lung malignancy (positive screens) were urged to speak with their health care provider regarding whether or not they needed to follow up with a specialist. A participant with abnormal findings that were *not* suspicious for lung malignancy was referred according to the standard practices of the SC. The SC was also responsible for reporting the results of follow-up of positive screens to the CC. To facilitate accurate results reporting, the CC provided a module in for generating screening examination results letters as well as documenting the screening examination results and the dates that results letters were mailed.

This chapter details the procedures for providing notification to participants and their health care providers, including creating cover letters; providing examination results reports; making referrals when necessary; and tracking, reporting, and monitoring notification tasks.

6.2 Notifying Participants and Health Care Providers

The SC reported all screening results in writing to the participant and to the participant's health care provider **within three weeks of the screening visit.** At the minimum, positive screens and negative screens with clinically significant abnormalities also were reported to participants by telephone. If the participant was unreachable by telephone, results were sent via certified mail with return receipt requested. Positive screens and negative screens with clinically significant abnormalities could be reported to the health care provider by telephone, fax, or certified mail. If the fax method was chosen, it was recommended that the health care provider's office be telephoned and advised of the fax transmittal in advance. If the participant did not wish to have a medical professional informed of his/her screening results and signed a Results Withheld Statement (Appendix 3-3), only the participant received the results. In this case, the participant's results letter indicated that the results were not sent to a health care provider. A copy of the participant results letter and the health care provider results letter, if sent, were kept in the participant's study file.

6.2.1 Documents for Reporting Results of the Screening Examinations

The SC was responsible for reporting results of the screening examinations. The SC sent the results to participants and their health care providers with a cover letter as described in the following section. The SC could either incorporate results into the cover letter, attach a copy of the radiologist's dictated report, or produce a customized report of results. The combination of documents sent was required to reflect the results of the examination. A copy of the exam form was not sent to the participant or the health care provider. The SC may have provided the participant with a copy of the screening examination image, upon his/her request, to take to his/her health care provider for follow-up.

6.2.2 Letters for Reporting Results of the Screening Examinations

The SC sent screening examination results to participants and their health care providers with a separate results letter. Each SC was responsible for drafting its own letters using SC letterhead. Sample participant results letters for each result type (positive screen, positive screen with small nodules [0.4 – 0.9 cm], positive screen with no significant change since the previous exam, negative screen with clinically significant abnormalities, negative screen with minor abnormalities, negative screen with no significant abnormalities, or an inadequate screen) are presented as Appendices 6-1 through 6-7. Sample health care provider results letters are presented as Appendices 6-8 through 6-14. The SC specific results letters for each type of result were required to be submitted to the CC and approved by the NCI prior to use at the SC. The letters were required to include the following elements.

The participant letter included:

- A disclaimer stating that the screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider;
- A statement providing the overall result of the screening examination ("positive screen with abnormalities suspicious for lung cancer," a "positive screen with abnormalities suspicious for lung cancer that have not changed significantly since the previous exam," a "negative screen with clinically significant abnormalities not suspicious for lung cancer," a "negative screen with minor abnormalities not suspicious for lung cancer," a "negative screen with no significant abnormalities," or

an "inadequate screen") with reference to any attached supplemental report for further details;

- For positive screening examination results, a statement indicating that the exact follow-up time intervals and methods had not been established and a list of common methods of follow-up;
- A statement stating the costs of diagnostic tests were not covered by the trial in the case of a positive screening exam or negative screening exam with clinically significant abnormalities;
- A statement urging the participant to see his/her health care provider and talk with him/her about whether to see a recognized specialist for further evaluation of exam results in the case of positive screening exam results;
- A statement recommending that the participant see his/her health care provider to discuss his/her examination results in the case of a negative screening exam with clinically significant abnormalities;
- A statement that the results had been sent to his/her health care provider or a statement that the results were not sent to a health care provider (if the participant did not have health care provider or did not want his/her health care provider notified of the results and had signed a Results Withheld Statement), and
- The SC telephone number and the SC Coordinator's and Principal Investigator's names for any questions or concerns the participant may have had.

The health care provider letter included:

- A statement that the NLST/LSS was a NCI-sponsored scientific study designed to evaluate screening exams for lung cancer;
- The name and date of birth of the participant for whom results were being reported;
- The date of the screening examination;
- A disclaimer stating that the screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider;
- A statement providing the overall result of the screening examination ("positive screen with abnormalities suspicious for lung cancer," a "positive screen with abnormalities suspicious for lung cancer that had not changed significantly since the previous exam," a "negative screen with clinically significant abnormalities not suspicious for lung cancer," a "negative screen with minor abnormalities not suspicious for lung cancer," a "negative screen with no significant abnormalities," or an "inadequate screen") with reference to any attached supplemental report for further details;

- For positive screening examination results, a statement indicating that the exact follow-up time intervals and methods had not been established and a list of common methods of follow-up;
- A statement indicating that the participant was urged to seek medical attention in the case of positive screening examination results;
- A statement encouraging the health care provider to see the participant for diagnostic follow-up of positive screening exams;
- A statement indicating that the participant received a recommendation to discuss his/her examination results with his/her health care provider in the case of a negative screen with clinically significant abnormalities;
- A statement stating the costs of diagnostic tests were not covered by the trial in the case of a positive screening exam or negative screening exam with clinically significant abnormalities;
- For positive screening examination results, a statement advising the health care provider to contact the SC if more information regarding the diagnosis and treatment of lung cancer was desired, and
- The SC telephone number and the SC Coordinator's and Principal Investigator's names for any questions or concerns the health care provider may have had.

When reporting the result of a positive screen from a spiral CT screening exam, the SC had the option of providing the health care provider with the low-dose CT scan technique that was used to obtain the screen. Use of these or similar settings may have facilitated comparison to the previous examination, and help limit cumulative radiation exposure to the participant. The template CT Scan Technique Information Sheet for Health Care Providers is found in Appendix 6-15. The template was customized by each SC to contain the actual settings that were used to obtain the participant's screening exam.

6.2.2.1 Support for the Production of Results Letters

provided two options for producing results letters. One option was to generate the results letters within itself, without the need to export data. Detailed information about this process is provided in the The second option was to use the export function to download the results of the screening examinations, participant data, and health care provider data from to the SC's own system. captured the date of the merge file download and the SC entered a mailing date for the letters. The mailing date was used to monitor the time elapsed

from screening to mailing of results letters. To generate results letters, the SC was required to download the exam results file(s) and use them directly (as in a mail-merge process) when preparing the results letters. Using the exam results file from allowed the SCs to transfer the examination data directly to the appropriate version of a results letter, thereby reducing the chance of sending incorrect results to both participants and their health care providers. Note that even if the SC developed its own mailing and reporting process, the SC was required to use the examination results from

6.3 Making Referrals for Screening Examinations

Each SC was responsible for referring participants to appropriate medical professionals in accordance with standards of practice at the SC. Each participant with a positive screening examination result was urged to speak with his/her health care provider regarding whether or not to see a specialist. In some cases, the SC may have reviewed a positive result with a medical professional associated with the SC. Participants with negative screening examination results but one or more significant abnormalities may have been referred for follow-up at the discretion of the SC.

6.4 Correcting an Erroneous Results Report

If it was discovered that erroneous results were sent to the participant or his/her health care provider, the correct results were required to be reported along with an explanation of the circumstances, regardless of the type of error (underestimate or overestimate of seriousness). The manner and timing of this reporting was handled on a case by case basis at the discretion of the SC. In addition to reporting the correct results, the SC also reported this error to the CC as a protocol violation, as described in Chapter 11, Section 11.5.2.

Errors in notification may also have been identified through quality assurance checks performed by the CC. Some of these efforts are described in Section 6.6. If errors were found through these checks, the SC was notified to perform data retrieval to correct any errors. Details regarding data retrieval procedures and follow-up are also described in Chapter 11, Section 11.6.1.

6.5 Ensuring Diagnostic Work-up for Positive Screens

The SC Coordinator was responsible for verifying that a participant followed up with his/her health care provider in the case of a positive screen. The SC contacted the participant within four weeks of the initial screening examination to determine whether a follow-up examination had been scheduled. If follow-up had not yet been scheduled, the SC contacted the participant four weeks later (eight weeks after the screening examination) to determine whether a follow-up appointment had been scheduled. The SC maintained a manual or automatic tracking system on the follow-up of these participants. Approximately four weeks after confirming with the participant that a follow-up appointment had been scheduled, the SC re-contacted the participant to determine if follow-up occurred and to assess the status of the work-up. When the work-up was complete, or at the three month intervals, whichever was first, the SC contacted the health care provider and/or hospital to obtain information regarding diagnostic tests (to be abstracted and recorded on a DE form, Appendix 7-2).

It was anticipated that up to 10% of participants would be under-insured or uninsured. Efforts were made wherever possible to ensure that diagnostic and therapeutic options were identified and that participants without other means to pay for necessary diagnostic evaluation and treatment were able to find resources for medical care.

6.6 Quality Assurance of Results Reporting

The CC performed quality assurance on the results reporting activities. The CC chose an initial random selection of results letters by PID, stratified by SC and result code. The CC requested from the SCs copies of these results letters with personal identifiers removed. The CC performed checks to ensure that there were no discrepancies in results reporting between the screening examination form and the results notification letters sent.

6.7 Tracking, Reporting, and Monitoring Notification Activities

The SC Coordinators were responsible for developing a system to track the mailings of written notifications of screening examination results. This ensured that the participant and his/her health care provider received the results of the screening examination within three weeks. The SC Coordinator was

required to keep all documentation concerning the certified mailings, including the original certified mail receipt with postmark and the return receipt cards signed by the addressee that were returned to the SC. If no receipt card was received after two weeks of the postmark of the mailing to a participant or health care provider, the SC Coordinator followed up to determine whether the notification was received. If the participant or health care provider confirmed that it was not received, the SC Coordinator resent the notification.

The Screening Exam Results Report (Appendix 11-19) was available to assist the SC in monitoring notification activities and identifying any problems with notification procedures.

Appendices for Chapter 6

Appendix 6-1 Sample Results Letter to Participants:
Positive Screen - Abnormalities suspicious for lung cancer

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear (*Participant Name)*:

Recently you received a lung cancer screening examination as part of the National Lung Screening Trial. **Your** *(chest x-ray/spiral CT)* **examination revealed abnormalities in your lungs. The possibility that these abnormalities represent lung cancer cannot be ruled out.** The attached report provides you with detailed results of your examination.

Among physicians, it is agreed that this abnormality requires a follow-up evaluation. The exact follow-up time interval and method have not been scientifically established, but common methods may include: *(list all that apply)*. Your physician may have alternative methods of evaluation within the range of current practice.

The costs for any diagnostic tests beyond the screening examination are not covered by the trial and must come from your insurance or other sources.

It is necessary for you to receive additional medical attention. I strongly recommend that you see your health care provider in a timely fashion. A copy of your test results has been mailed to your health care provider if you listed one at the time you started in the study. If you do not have a health care provider, or would like your records sent to another health care provider or a recognized specialist, please contact us and we will help you to identify health care providers and arrange to have your records sent.

The screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider.

If you have any questions about your examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Thank you for your participation in the National Lung Screening Trial.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-2 Sample Results Letter to Participants:
Positive Screen – Nodules 0.4 – 0.9 cm

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear (*Participant Name)*:

Recently you received a lung cancer screening examination as part of the National Lung Screening Trial. **Your Spiral CT examination revealed one or more small nodules in your lungs that require further monitoring. These nodules are usually benign (non-cancerous) but in a minority of people may be a lung cancer. A biopsy is not usually done on these small nodules, but if a subsequent exam shows they are growing then further evaluation would be recommended.**

This abnormality requires a follow-up evaluation. The exact follow-up time interval and method have not been scientifically established, but common methods may include: *(list all that apply)*. Your physician may have alternative methods of evaluation within the range of current practice.

The costs for any diagnostic tests beyond the screening examination are not covered by the trial and must come from your insurance or other sources.

It is important that you receive additional medical attention and I strongly recommend that you see your health care provider. A copy of your examination results has been mailed to your health care provider if you listed one at the time you enrolled in the study. If you do not have a health care provider, or would like your records sent to another health care provider or a specialist, please contact us and we will help you to identify a health care provider and arrange to have your records sent.

The screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider.

If you have any questions about your examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Thank you for your participation in the National Lung Screening Trial.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-3 Sample Results Letter to Participants:
Positive Screen – Abnormalities suspicious for lung cancer, no significant change

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear (*Participant Name)*:

Recently you received a lung cancer screening examination as part of the National Lung Screening Trial. The result of your *(chest x-ray/spiral CT)* examination reveals **an abnormality that has not changed significantly since your previous study exam. Although the possibility of lung cancer cannot be ruled out, lack of a change in the abnormality over one year does make it less likely.**

Because there is a chance that the abnormality represents lung cancer, it is important for you to discuss these findings with your primary care physician, who may recommend additional medical follow-up. The exact time interval and method for follow-up have not been scientifically established, but common methods may include: (*list all that apply*).

Your physician may have alternative methods of evaluation within the range of current practice. The costs for any diagnostic tests beyond the screening examination are not covered by the trial and must come from your insurance or other sources.

A copy of your examination results has been mailed to your health care provider if you listed one at the time you enrolled in the study. If you do not have a health care provider, or would like your records sent to another health care provider or a specialist, please contact us and we will help you to identify a health care provider and arrange to have your records sent.

The screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider.

If you have any questions about your examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator)*, Study Coordinator, at *(Telephone Number).*

Sincerely,

(Name of Principal Investigator)
Co-Principal Investigator
National Lung Screening Trial

Appendix 6-4 Sample Results Letter to Participants:
Negative Screen - Clinically significant abnormalities not suspicious for lung cancer

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear *(Participant Name)*:

Recently you received a lung cancer screening examination as part of the National Lung Screening Trial. The result of your *(chest x-ray/spiral CT)* examination was found to be negative for lung cancer; however, other abnormalities were found. The attached report provides you with detailed results of your examination. It is important that you see your physician to discuss follow-up of these abnormalities.

The costs for any diagnostic tests beyond the screening examination are not covered by the trial and must come from your insurance or other sources.

The screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider. We recommend that you make an appointment with your health care provider to have these results fully evaluated. A copy of the examination results has been mailed to your health care provider if you listed one at the time you started in the study. If you do not have a health care provider or would like us to recommend one, please contact us.

If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Thank you for your participation in the National Lung Screening Trial.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-5 Sample Results Letter to Participants:
Negative Screen - Minor abnormalities not suspicious for lung cancer

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear *(Participant Name)*:

Recently you received a lung cancer screening examination as part of the National Lung Screening Trial. The result of your *(chest x-ray/spiral CT)* examination was found to be negative for lung cancer although minor abnormalities were found. The attached report provides you with detailed results of your examination. Although you may want to discuss the abnormality with your health care provider at your next routine visit, there is no need for any immediate follow-up or evaluation.

The screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider. A copy of the examination results has been mailed to your health care provider if you listed one at the time you started in the study.

If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Thank you for your participation in the National Lung Screening Trial.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-6 Sample Results Letter to Participants:
Negative Screen - No significant abnormalities

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear *(Participant Name)*:

Recently you received a lung cancer screening examination as part of the National Lung Screening Trial. The result of your *(chest x-ray/spiral CT)* examination was found to be negative for lung cancer. No abnormal findings were seen.

The screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider. A copy of the examination results has been mailed to your health care provider if you listed one at the time you started in the study. No further follow-up or evaluation is necessary at this time.

If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Thank you for your participation in the National Lung Screening Trial.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-7 Sample Results Letter to Participants: Inadequate

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear *(Participant Name)*:

Recently you received a lung cancer screening examination as part of the National Lung Screening Trial. The results of your *(chest x-ray/spiral CT)* examination were uninterpretable. We will contact you shortly to attempt to reschedule a screening examination at a convenient time.

The screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider. A copy of the examination results has been mailed to your health care provider if you listed one at the time you started in the study.

If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Thank you for your participation in the National Lung Screening Trial.

Sincerely,

(Name of Principal Investigator)
Principal Investigator

Appendix 6-8 Sample Results Letter to Health Care Providers:
Positive Screen - Abnormalities suspicious for lung cancer

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Physician Name)
(Physician Address)
(City, State, Zip Code)

RE: Participant Name: (*Participant Name)*
Date of Birth: (*Date of Birth)*
Date of Examination: *(Date of Exam)*

Dear *(Health Care Provider's Name)*:

Recently (*Participant Name)* received a lung cancer screening examination as part of the National Lung Screening Trial. This is an NCI-sponsored scientific study designed to compare chest x-ray and spiral CT as potential screening tests for lung cancer.

(*Participant Name)*'s *(chest x-ray/spiral CT)* examination revealed **abnormal findings. The possibility that these findings represent lung cancer cannot be ruled out.** At the participant's request, we are sending you the attached report, documenting the results of the examination.

It is generally agreed that this abnormality requires a follow-up evaluation. The exact follow-up time interval and method have not been scientifically established, but common methods may include: *(list all that apply)*. You may have alternative methods of evaluation within the range of current practice.

We have contacted (*Participant Name)* and recommended that s/he contact you to discuss these findings. We encourage you to see him/her as soon as possible and discuss diagnostic follow-up options. You may wish to refer *(Participant Name)* to a recognized specialist.

Diagnostic tests that may be indicated for abnormal screening results are beyond the scope of the National Lung Screening Trial. Their costs are not covered by the trial and must come from the participant's insurance or other sources.

If you would like additional information regarding the diagnosis and treatment of lung cancer, including the names of specialists in your area, please contact the *Screening Center*. Since the participant is enrolled in an NCI-sponsored study, it is important that we receive follow-up information. We may be contacting your office at a later date to obtain information on the participant's health status.

We appreciate your cooperation in this important study. If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator)*, National Lung Screening Trial Study Coordinator, at *(Telephone Number)*.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-9 Sample Results Letter to Health Care Providers:
Positive Screen – Nodules 0.4 to 0.9 cm

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Physician Name)
(Physician Address)
(City, State, Zip Code)

RE: Participant Name: (*Participant Name)*
Date of Birth: (*Date of Birth)*
Date of Examination: *(Date of Exam)*

Dear *(Health Care Provider's Name)*:

Recently (*Participant Name)* received a lung cancer screening examination as part of the National Lung Screening Trial. This is an NCI-sponsored scientific study designed to compare chest x-ray and spiral CT as potential screening tests for lung cancer.

(*Participant Name)*'s spiral CT examination revealed **one or more small nodules in the lungs that require further monitoring. Although such small nodules are usually benign, the possibility that these findings represent lung cancer cannot be ruled out.** At the participant's request, we are sending you the attached report, documenting the results of the examination.

It is generally agreed that this abnormality requires a follow-up evaluation. The exact follow-up time interval and method have not been scientifically established, but common methods may include: *(list all that apply)*. You may have alternative methods of evaluation within the range of current practice.

We have contacted (*Participant Name)* and recommended that s/he contact you to discuss these findings. We encourage you to see him/her as soon as possible and discuss diagnostic follow-up options. You may wish to refer *(Participant Name)* to a recognized specialist.

Diagnostic tests that may be indicated for abnormal screening results are beyond the scope of the National Lung Screening Trial. Their costs are not covered by the trial and must come from the participant's insurance or other sources.

If you would like additional information regarding the diagnosis and treatment of lung cancer, including the names of specialists in your area, please contact the *Screening Center*. Since the participant is enrolled in an NCI-sponsored study, it is important that we receive follow-up information. We may be contacting your office at a later date to obtain information on the participant's health status.

We appreciate your cooperation in this important study. If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator)*, National Lung Screening Trial Study Coordinator, at *(Telephone Number)*.

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-10 Sample Results Letter to Health Care Providers:
Positive Screen – Abnormalities suspicious for lung cancer, no significant change

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Physician Name)
(Physician Address)
(City, State, Zip Code)

RE: Participant Name: *(Participant Name)*
Date of Birth: *(Date of Birth)*
Date of Examination: *(Date of Exam)*

Dear (*Health Care Provider's Name)*:

Recently *(Participant Name)* received a lung cancer screening examination as part of the National Lung Screening Trial. This is an NCI-sponsored scientific study designed to compare chest x-ray and spiral CT as potential screening tests for lung cancer.

(Participant Name)'s *(chest x-ray/spiral CT)* examination revealed **an abnormality that has not changed significantly since the previous study exam. Although the possibility of lung cancer cannot be ruled out, lack of a change in the abnormality over one year does make it less likely.** At the participant's request, we are sending you the attached report, documenting the results of the examination.

Because there is a chance that the abnormality represents lung cancer, it is generally agreed that this abnormality requires a follow-up evaluation. The exact time interval and method for follow-up have not been scientifically established, but common methods may include: *(list all that apply)*. You may have alternative methods of evaluation within the range of current practice.

We have contacted *(Participant Name)* and recommended that s/he contact you to discuss these findings. We encourage you to see him/her as soon as possible and discuss follow-up options. You may wish to refer *(Participant Name)* to a recognized specialist. The costs for any diagnostic tests beyond the screening examination are not covered by the trial and must come from the participant's insurance or other sources.

If you would like additional information regarding the diagnosis and treatment of lung cancer, including the names of specialists in your area, please contact the *Screening Center*. Since the participant is enrolled in an NCI-sponsored study, it is important that we receive follow-up information. We may be contacting your office at a later date to obtain information on the participant's health status.

We appreciate your cooperation in this important study. If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator)*, National Lung Screening Trial Study Coordinator, at *(Telephone Number)*.

Sincerely,

(Name of Principal Investigator)
Co-Principal Investigator
National Lung Screening Trial

Appendix 6-11 Sample Results Letter to Health Care Providers:
Negative Screen – Clinically significant abnormalities not suspicious for lung cancer

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Physician Name)
(Physician Address)
(City, State, Zip Code)

RE: Participant Name: (*Participant Name)*
Date of Birth: (*Date of Birth)*
Date of Examination: *(Date of Exam)*

Dear *(Health Care Provider's Name)*:

Recently (*Participant Name)* received a lung cancer screening examination as part of the National Lung Screening Trial. This is an NCI-sponsored scientific study designed to compare chest x-ray and spiral CT as potential screening tests for lung cancer.

(*Participant Name)*'s *(chest x-ray/spiral CT)* examination was found to be negative for lung cancer; however, other abnormalities were found. At the participant's request, we are sending you the attached report, documenting the results of the examination. We have recommended that *(Participant Name)* contact you to discuss follow-up of these abnormalities.

This screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider. We have contacted (*Participant Name)* and recommended that s/he contact you to discuss these findings and we encourage you to see (*Participant Name)* for any diagnostic follow-up you deem necessary.

Diagnostic tests that may be indicated for any abnormalities observed on the screening examination are beyond the scope of the National Lung Screening Trial. Their costs are not covered by the trial and must come from the participant's insurance or other sources.

We appreciate your cooperation in this important study. If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-12 Sample Results Letter to Health Care Providers:
Negative Screen - Minor abnormalities not suspicious for lung cancer

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Physician Name)
(Physician Address)
(City, State, Zip Code)

RE: Participant Name: (*Participant Name)*
Date of Birth: (*Date of Birth)*
Date of Examination: *(Date of Exam)*

Dear *(Health Care Provider's Name)*:

Recently (*Participant Name)* received a lung cancer screening examination as part of the National Lung Screening Trial. This is an NCI-sponsored scientific study designed to compare chest x-ray and spiral CT as potential screening tests for lung cancer.

(*Participant Name)*'s *(chest x-ray/spiral CT)* examination was found to be negative for lung cancer although minor abnormalities were found. At the participant's request, we are sending you the attached report, documenting the results of the examination. We have sent the results of this examination to (*Participant Name)*. We notified him/her that the findings require no immediate follow-up or evaluations, and suggested that s/he discuss these findings with you at his/her next routine visit, if so desired.

This screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider.

We appreciate your cooperation in this important study. If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-13 Sample Results Letter to Health Care Providers:
Negative Screen - No significant abnormalities

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Physician Name)
(Physician Address)
(City, State, Zip Code)

RE: Participant Name: (*Participant Name)*
Date of Birth: (*Date of Birth)*
Date of Examination: *(Date of Exam)*

Dear *(Health Care Provider's Name)*:

Recently (*Participant Name)* received a lung cancer screening examination as part of the National Lung Screening Trial. This is an NCI-sponsored scientific study designed to compare chest x-ray and spiral CT as potential screening tests for lung cancer.

(*Participant Name)*'s *(chest x-ray/spiral CT)* examination was found to be negative for lung cancer. No abnormal findings were seen. At the participant's request, we are sending you the attached report, documenting the results of the examination. We have written to (*Participant Name)* to notify him/her of these findings and that no further follow-up or evaluations are necessary at this time.

This screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider.

We appreciate your cooperation in this important study. If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

Appendix 6-14 Sample Results Letter to Health Care Providers: Inadequate

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Physician Name)
(Physician Address)
(City, State, Zip Code)

RE: Participant Name: (*Participant Name)*
Date of Birth: (*Date of Birth)*
Date of Examination: *(Date of Exam)*

Dear *(Health Care Provider's Name)*:

Recently (*Participant Name)* received a lung cancer screening examination as part of the National Lung Screening Trial. This is an NCI-sponsored scientific study designed to compare chest x-ray and spiral CT as potential screening tests for lung cancer.

(*Participant Name)*'s *(chest x-ray/spiral CT)* examination was uninterpretable. At the participant's request, we are sending you the attached report documenting the results of the examination. We have written to (*Participant Name)* to notify him/her of these findings and that we will attempt to reschedule the examination at his/her earliest convenience.

This screening examination was not intended to be a complete physical examination or a substitute for a visit to a health care provider.

We appreciate your cooperation in this important study. If you have any questions about the examination results or any other aspect of the National Lung Screening Trial, please do not hesitate to call *(Name of SC Coordinator),* National Lung Screening Trial Study Coordinator, at *(Telephone Number).*

Sincerely,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

CT Scan Technique Information Sheet for Health Care Providers

The CT scan settings below are used for low dose CT screening examinations performed in the NLST at *Screening Center (Local SC)*. If follow-up CT examinations are performed, this may be useful information for your local radiology department. Use of these or similar settings may facilitate comparison to the previous examination, and help limit cumulative radiation exposure. If other screen-detected abnormalities also need to be evaluated, different scanner settings or intravenous contrast may be needed.

Screening Center (Local SC) NLST personnel can be reached at *(Telephone Number)* for any questions or assistance.

Screening Center (Local SC) NLST CT Scan Technique

(Record the technical parameters used at the Local SC in the spaces provided below.)

Scanner type: *(Record number of channels.)* multislice

kVp: *(Record kVp.)*

mA: *(Record mA; if using more than one scanner type, specify mA for each.)*

Scan time: *(Number of seconds)*

mAs: *(Record mAs; if using more than one scanner type, specify mAs for each.)*

Detector collimation: *(Record collimation in mm; if using more than one scanner type, specify collimation for each.)*

Table increment: *(Record table increment in mm/rotation; if using more than one scanner type, specify table increment for each.)*

Pitch [table increment/(detector collimation x number of channels)]**:** *(Record pitch; if using more than one scanner type, specify pitch for each.)*

Effective mAs: *(Record effective mAs.)*

Intravenous contrast: None

Reconstructed slice thickness: *(Record reconstructed slice thickness in mm.)*

Slice reconstruction interval: *(Record slice reconstruction interval in mm.)* (contiguous)

7. FOLLOW-UP OF A POSITIVE SCREENING EXAMINATION AND OTHER REPORTED LUNG CANCERS

7.1 Overview of Diagnostic Evaluation and Treatment Information Procedures

Each SC implemented procedures to collect diagnostic evaluation information, including cancer diagnosis, on all participants who had a positive screening examination. This information was to be obtained in a timely manner following the screening visit. For each confirmed case of primary invasive lung cancer, treatment and cancer progression information was collected. Certified Tumor Registrars (CTRs) and Medical Record Abstractors (MRAs) from each SC reviewed the participant's medical records and abstracted all diagnostic information regarding follow-up of the positive screen onto the Diagnostic Evaluation (DE) form, all treatment information onto the Treatment Information (TI) form, and all information on progression of the cancer onto the Cancer Progression (CP) form. DE and TI forms also were completed for all cases of confirmed lung cancer diagnosed on or before December 31, 2009 that arose from sources other than a positive screening examination. CP forms were completed annually through 2009 for confirmed lung cancers. Additional information regarding these situations can be found in Chapter 8.

Primary cancers of the trachea were classified as primary lung cancers for medical record abstraction purposes. As such, DE, TI, and CP forms were completed for these diagnoses.

This chapter will present procedures for the collection and abstraction of the diagnostic evaluation and treatment information by SCs and the tracking of medical record acquisition. Quality assurance measures for medical record abstraction are discussed. In addition, this chapter describes the DE, TI, and CP forms and the letter to request medical records.

7.2 Timeframe for Collection of Medical Records

Medical records documenting diagnostic evaluation were collected for all participants with positive screening examinations. Documentation of diagnostic evaluation procedures that occurred after a positive T_0 or T_1 screen but prior to the earliest of three milestones listed below were collected. This also applied to participants with positive screens who were administered the incorrect screening examination. The three milestones were as follows:

- A conclusive diagnosis (either cancer or non-cancer) was made;
- Twelve months from the date of the positive screen, or
- The next screening examination.

Participants with a positive screening examination at T_2 were followed from the time of the positive screen and diagnostic evaluation information was collected until the first of the following situations:

- A conclusive diagnosis (either cancer or non-cancer) was made;
- Twelve months from the date of the positive screen, if the positive nodule was stable for at least one year (Comparison result code = B), or
- Twenty-four months from the date of the positive screen, if the positive nodule was newly discovered or had changed (Comparison result code = A). In these instances, a T_3 DE form was required to be completed in addition to the T_2 DE form. If, however, a conclusive diagnosis (either cancer or non-cancer) was recorded on the T_2 DE form, the T_3 DE form was not required.

In some instances, diagnostic evaluation procedures relating to a given study year's positive exam occurred in the next year's activity window. In these instances, the procedures for the study year in which the positive screen occurred were recorded on the DE form. For example, diagnostic evaluation procedures that occurred during the T_1 activity window but occurred as a result of a T_0 positive screen were recorded on the T_0 DE form. An exception to this occurred when a T_3 DE form was required for a T_2 positive screen with a result code "A," for which no conclusive diagnosis was made within twelve months. In this case, the T_3 DE form included any procedures that occurred after completion of the T_2 DE form and up to twenty-four months after the T_2 screening exam.

The completion of the DE was not limited to those with a positive screening exam. Participants with a confirmed report of lung cancer after screening was concluded, or those with a negative screening exam but with a confirmation of lung cancer had medical records collected from the time of the suspicion of cancer through staging procedures and treatment. This applied to confirmed lung cancers with a diagnosis date on or before December 31, 2009. Medical records were not collected for lung cancers diagnosed after December 31, 2009. See Chapter 8 for more information on documenting these cancers.

All staging information related to the initial diagnosis was collected, even if a staging procedure was performed after the date of the initial diagnosis or after the first definitive treatment.

Recorded staging procedures corresponded to the TNM or stage of disease classifications recorded in Part C of the DE form. Staging information on cancer recurrence was not collected.

In the instance of a confirmed primary invasive lung cancer, medical records were collected to complete the Treatment Information (TI) form. Medical records also were collected on an annual basis through 2009 in order to complete the Cancer Progression (CP) form.

The SC was asked to conduct a review of all cases with pending medical record requests on a regular basis. It was recommended that the SC check the status of diagnostic evaluation at least every three months. This review would allow adequate time before the window closed to request medical records either not received from an earlier request or inadvertently not requested earlier. In many cases, follow-up to a positive screen was completed within six months of the screen.

7.3 Procedures for Contacting Health Care Providers and Hospitals

Information regarding diagnostic procedures, treatment information, or cancer progression was obtained from a health care provider or hospital. Information could be obtained from the participant when other sources were unavailable, with at least verification of the procedures by reference in the medical records (or verbally) by a health care provider, if the original report of the procedure, treatment, or cancer progression was not available. An exception to this was Item A.1 on the DE form (Did participant undergo diagnostic procedures?), in which the response could be based on participant self-report without subsequent health care provider verbal or written verification. For additional details see the Specifications for Completion of the Diagnostic Evaluation (DE) Form, Appendix 7-3.

If the participant had a follow-up after a positive screen, the SC collected all records related to the evaluation.

The following lists the contact procedures for obtaining the participant's medical records by mail.

1. The SC contacted the participant four weeks after the result letter was sent to determine whether follow-up had begun (Section 6.5).

2. The SC confirmed the health care provider's name and office address and established a contact person at the office prior to mailing the letter requesting medical records. The SC also confirmed information regarding hospitals and their medical records departments.

3. A letter requesting the release of medical records, along with a signed Medical Record Release Authorization Form (Appendix 3-4), was sent to each health care provider four weeks after the SC confirmed with the participant that diagnostic follow-up had begun.

4. The SC re-contacted the participant to obtain a more recent Medical Record Release Authorization Form, if needed.

5. The SC checked the status of the request to the health care provider within three to five business days after the mailing.

6. The SC re-contacted the participant at least every three months to check the status of diagnostic evaluation, if incomplete, until the window of data collection closed.

7. If necessary, the SC made additional requests for information regarding diagnostic procedures and treatment information related to a positive screen in order to obtain the complete history of the participant's follow-up.

7.4 Letter to Request Medical Records

The CC provided the SCs with a sample letter to request the participant's medical records (Appendix 7-1). This letter was adapted by the SC, copied onto SC letterhead, and signed by the Principal Investigator at the SC. The participant's date of birth and the date of the screening visit were to be included in the letter to assist the health care provider in locating the correct medical records for the participant. The letter requested that the health care provider send photocopies of the patient's medical records dated from the time of the screening visit to the present. The initial request for medical records was sent approximately two months after the screening visit. This request may have been sent to multiple health care providers concurrently. In addition, some health care providers may have required multiple requests before the complete records were provided. Because of the possibility that the complete record could not be requested, certain key parts were identified that were needed to complete the DE, TI, and CP forms. These included (for each request):

- Admission history for diagnosis and initial treatment
- History and physical
- Treatment history or reports
- Discharge summary for all hospitalizations related to diagnosis and treatment
- Operative reports
- Radiology reports

- Pathology reports
- Lab reports
- Progress notes and reports of diagnostic work-up and treatment

The letter also contained the SC Coordinator's name and telephone number in case there were questions.

The SC was required to enclose a legible copy of the participant's Medical Record Release Authorization Form (Appendix 3-4) with the letter. The Medical Record Release Authorization Form also was on SC letterhead. The original Medical Record Release Authorization Form was required to be kept in the participant's study file at the SC. In some instances, the health care provider may not have accepted the Medical Record Release Authorization Form as sufficient for release of the records. Additional authorization may have been required to be requested from the participant or the participant's next of kin. In addition, some institutions may have required a recent authorization (within six months, for example) or may have required the original authorization form. In some cases, hospitals or insurance plans may have required the authorization in a specific format. In these special situations, the SC may have needed to re-contact the participant to obtain a new authorization form.

7.4.1 Collection of Medical Records

The collection of medical records to complete the DE form may have involved contacting the health care provider to determine the status of screening follow-up as well as collecting medical records to document the participant's cancer status. **A DE form was to be completed for participants who had a positive screening examination, even if cancer was not diagnosed**. If lung cancer was diagnosed, the SC MRA was to obtain diagnostic evaluation and staging information, including the pathology report, as well as lung cancer treatment information. Additionally, the SC MRA was to collect information on cancer progression for confirmed primary invasive lung cancers on an annual basis through 2009.

In some cases, the SC may have been charged a fee for obtaining copies of medical record documentation. Since the NLST was federally funded research, the SC may have been able to obtain a waiver of fees from some institutions.

All medical records collected were to be labeled with the PID and kept in the participant's study file. The SC was asked to maintain a telephone log on which SC staff could record comments from the health care provider, clinic, or participant, and the log was to be kept in the participant's study file with the medical records.

7.4.2 Tracking Medical Record Acquisition

Each SC was responsible for tracking the requests to participants for signed Medical Records Release Authorization Forms and to the health care providers for copies of the medical records. The tracking could be done manually using methods such as tickler files or using an automated system. The SC Coordinator determined the tracking method. The procedures used to obtain medical records and the timeliness with which these procedures were conducted were monitored by the CC during site visits.

7.5 Abstraction of the Medical Records

Once the records were obtained, the SC verified that they were in reference to the correct participant and were organized chronologically. A PID label was to be attached to each page of the records. Each document was to be reviewed for legibility and completeness. Consistency of information between documents was to be checked and, if necessary, the health care provider was contacted to resolve any problems. If the records were not complete, the SC may have needed to contact the diagnosing health care provider for additional information.

The medical record abstraction forms included the DE form (Appendix 7-2), the TI form (Appendix 7-4), and the CP form (Appendix 7-6). The DE form was developed to standardize the documentation of information concerning diagnostic evaluation and cancer diagnoses, including pathology, histology, and staging evaluation. The Specifications for Completion of the DE Form are provided in Appendix 7-3. The TI form was developed to document information concerning initial cancer treatments. The Specifications for Completion of the TI Form are provided in Appendix 7-5. The CP form was developed to document disease progression for all confirmed primary invasive lung cancers. The CP form was to be completed during the first two months of the study year following the study year with which the TI form was associated. For example, if the date of a positive T_0 screen was 02/01/03, the DE was completed on 10/15/03, and the TI was completed on 03/01/04 (T_1 study year), then the CP was expected to be completed during the first two months of the T_2 study year and during the first two months

of every following study year through 2009. No CP forms were expected in 2010. The Specifications for Completion of the CP are provided in Appendix 7-7.

A trained and approved medical record abstractor abstracted information regarding diagnostic evaluation, cancer confirmation, initial treatment, and cancer progression onto the appropriate medical record abstract forms. A nosologist coded non-cancer diagnoses. A certified tumor registrar (CTR), or CTR-eligible individual, was required for coding cancer diagnoses.

7.5.1 Diagnostic Evaluation of Positive Screens and Other Reported Lung Cancers

After organizing the medical records as described in Section 7.5, all diagnostic procedures were to be documented on the DE form. Information was abstracted about the procedures performed to make a diagnosis.

The Diagnostic Evaluation (DE) form was organized into five sections. These sections are described below.

- **Part A: Diagnostic Evaluation and Staging** - This section was used to document procedures performed for the evaluation of suspicion of lung cancer and staging for confirmed primary cancers. In Part A, the MRA documented the medical complications of the diagnostic evaluation and staging if primary invasive lung cancer was confirmed and was the final result of the diagnostic evaluation.

- **Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer** - This section was used to record the diagnosis of any abnormality other than primary invasive lung cancer, including date of diagnosis and the ICD-9-CM or ICD-O-3 classification. Diagnoses of cancers other than primary invasive lung cancer were coded with the appropriate ICD-O-3 code.

- **Part C: Primary Invasive Lung Cancer Diagnosis Information** - This section was used to document the source of the primary invasive lung cancer confirmation, the date and description of the primary invasive lung cancer diagnosis, the ICD-O-3 code, the histologic classification, and TNM staging.

- **Part D: Comments -** This section was used to document notes, comments, and any overflow information while abstracting from the participant's medical record.

- **Part E: Health Care Provider/Hospital Location Information -** This section was used to document all health care providers or hospitals where the participant received diagnostic evaluation for lung cancer.

In conducting medical record abstractions for lung cancer, the SC may have encountered some special situations:

- **When no follow-up procedures were performed based on a health care provider's decision that follow-up of a positive screening examination was not necessary:** In such cases, the SC completed a DE form and documented the result of the diagnostic evaluation as "No malignancy." The SC also recorded verbatim in Item D.18 (Comments) what the health care provider stated (whether written or verbal) regarding follow-up and the date the health care provider made the statement. In the situation where only a participant's report could be obtained that his/her health care provider decided not to conduct follow-up on a positive screening examination, this information was collected and the reason recorded in Item D.18 (Comments). Refer to the Specifications for Completion of the DE form (Appendix 7-3) for specific instructions for completing the form in such situations.

- **When the participant received an A result – "Abnormalities suspicious for lung cancer," or a B result – "Abnormalities suspicious for lung cancer, no significant change," and did not follow up further with his/her health care provider:** In such cases the SC encouraged the participant to follow up with his/her health care provider either in person or by telephone as recommended in the A and B results letters, the premise being that the decision for follow-up care ultimately lies with the participant's health care provider. If the participant ultimately chose to follow up with his/her health care provider by telephone or in person, the SC completed a DE form as outlined above. If the participant still did not follow up with his/her health care provider either by telephone or in person, then an MDF was completed for the DE form.

- **When the participant began diagnostic evaluation but then decided (against the recommendation of his/her health care provider) not to continue:** In such cases, the SC completed a DE form and documented the result of the diagnostic evaluation as "No information available" and provided an explanation of the situation. Refer to the Specifications for Completion of the DE form (Appendix 7-3) for specific instructions for completing the form in such situations.

- **When the decision of the health care provider was to not pursue a diagnostic work-up following a positive screen immediately, but to observe the participant for any change that might prompt an evaluation (i.e., "watchful waiting"):** In such cases, the SC waited to complete the DE form until twelve months following the screening examination or until the participant's next screening exam, whichever occurred first. The SC then determined if any work-up occurred in the interim, and, if so, obtained copies of the medical records. If no specific plan for follow-up occurred within twelve months of the screening examination or by the time of the next screening examination, the SC completed a DE form and documented the result of the diagnostic evaluation as "No malignancy, determined by clinical evaluation only – no pathologic proof."

- **When a participant was diagnosed with a cancer that was metastatic to the lung:** Only **primary invasive lung cancer** was recorded in the cancer section of the DE form. If the diagnostic evaluation for a suspected lung cancer revealed a lung malignancy that was a metastasis from another cancer site, the result of the diagnostic

evaluation was recorded as either "Malignancy other than primary invasive lung cancer, with or without lung metastasis, confirmed by histology or cytology," or "Malignancy other than primary invasive lung cancer, with or without lung metastasis, diagnosed by clinical evaluation only – no pathologic proof," and the primary cancer type was recorded in Part B of the DE form.

- **When the record indicated that an abnormality was identified and no conclusive diagnosis was made:** The health care provider indicated that it was necessary to re-evaluate the abnormality with a procedure that might make a conclusive diagnosis two to three months after the regular window of data collection ended for that study year. The result of the diagnostic evaluation was coded as "Further follow-up required." Use of this code required a heightened suspicion for the possibility of primary invasive lung cancer, but the evaluation was not completed prior to the close of the study year window. This code was not used when the record clearly indicated that follow-up, or "active surveillance," was scheduled on a regular basis, such as every six months, to ensure stability of an abnormality. The reasons for further follow-up were written in Item D.18 (Comments) of the DE form. In these instances, the SC continued to collect medical records and update the DE form as more information became available. A DE form with a result of "Further follow-up required" required was to be updated before the close of the next study year window (i.e. a T_1 DE form with "Further follow-up required" was required to be updated before the end of the T_2 study year.)

The DE form was required to be completed before the TI and CP forms because the TI and CP forms were only required when a primary invasive lung cancer was confirmed and documented on the DE form. The follow-up of positive screening examinations may have indicated that the participant had a non-malignant condition or other cancer. In such situations, the TI and CP forms were not to be completed.

Note: In the event that a participant was given an incorrect screening exam that yielded a positive result, a DE form was required to be completed. The SC did NOT enter this DE form into but rather held the DE form in the participant's file. The CC maintained an internal monitoring report to track DE forms of participants who were given incorrect screening examinations. It also was the responsibility of each SC to monitor these participants and ensure adequate follow-up for the positive screening examination.

7.5.2 Collection of Treatment Information for Confirmed Lung Cancers

The Treatment Information (TI) form was organized into three sections. These sections are described below.

- **Part A: Initial Treatment Information** - This section was used to document all **initial** treatment information for the primary invasive lung cancer diagnosis.
- **Part B: Comments** - This section was used to document notes, comments, and any overflow information while abstracting from the participant's medical record.
- **Part C: Health Care Provider/Hospital Location Information** - This section was used to document all health care providers or hospitals where the participant received treatment for lung cancer.

Initial treatment was defined as the first course of treatment for confirmed primary invasive lung cancer. Usually this was treatment that began within six months of diagnosis. If treatment began after six months, it was possible that this treatment was not related to the initial disease, but perhaps to a recurrence of the disease. Cases in which primary therapy was begun *after* the initial six-month period were to be referred to the SC Principal Investigator for adjudication. If it was unclear as to whether the treatment was primary therapy, photocopies of the appropriate information were to be sent to the MRA Coordinator at the CC, who would send the information to the NCI for final adjudication. NCI would decide with the CC the best way in which to handle each specific case.

7.5.3 Collection of Cancer Progression Information for Confirmed Lung Cancers

The Cancer Progression (CP) form was organized into two sections. These sections are described below.

- **Part A: Progressive Disease Following Treatment of First Primary Invasive Lung Cancer –** This section was used to document any progression of the confirmed primary invasive lung cancer in terms of enlargement of the original tumor, metastatic disease, or recurrence of the lung cancer.
- **Part B: Development of Second Primary Invasive Lung Cancer –** This section was used to document the occurrence of a second primary invasive lung cancer after the participant received treatment for the first primary invasive lung cancer.

Information on cancer progression for participants with confirmed primary invasive lung cancers was to be collected annually through 2009.

7.5.4 Timeframe for Abstraction of Medical Records

The SC was asked to complete and submit the DE form, and in the case of primary invasive lung cancer, the TI and CP forms, in a timely manner. For a DE form, for an abnormal suspicious nodule discovered at T_0 or T_1, the endpoint for data collection following a positive screen was when a conclusive diagnosis was made, twelve months from the date of the positive screening exam, or the date of the next screening exam, whichever occurred first. For an abnormal suspicious nodule newly discovered at T_2, the diagnostic information was to be collected until the first of the following situations: a conclusive diagnosis (either cancer or non-cancer) was made, or twenty-four months from the date of the positive screen, (Result code = A). For a TI form, the endpoint for data collection was one year from the date of cancer diagnosis. A TI form could usually be submitted much earlier than this, as data were collected on only the first course of treatment, which usually began within six months of the date of cancer diagnosis. The CP form was to be submitted on an annual basis through 2009 beginning in the study year immediately following the study year in which the TI form was submitted. The CP form was to be submitted within two months of the opening of the next study year window for the participant. It was suggested that the SCs get information regarding cancer progression at the time information for the ASU was obtained.

Information on medical complications was collected for twelve months after the start of diagnostic evaluation for cancer cases other than primary invasive lung cancer, and for six months after a diagnosis for primary invasive lung cancer cases. Any complications noted after the DE form was entered into were added to the DE form and entered into Medical complications that resulted from the treatment of a primary invasive lung cancer were not to be recorded on the DE form.

7.6 Missing Data Form

In some cases, the SC was not able to complete a DE, TI, or CP form. The following are the conditions under which an MDF was completed (refer to Chapter 11 for additional information on the completion of the MDF):

- When the participant received an A result – "Abnormalities suspicious for lung cancer," or a B result - "Abnormalities suspicious for lung cancer, no significant change," and the participant informed the SC that he/she did not intend to get follow-

up. In such cases the SC encouraged the participant to follow up with his/her health care provider either in person or by telephone as recommended in the A and B results letters. If the participant ultimately chose to follow up with his/her health care provider by telephone or in person, then the SC completed a DE form. However, if the participant still did not follow up with his/her health care provider either by telephone or in person, then an MDF was completed for the DE form. The reason why the participant did not receive follow-up was determined and the appropriate code recorded on the MDF. If no reason was given, code 19 (No reason given) was used. If the reason did not fall into one of the specified codes, code 88 (Other, SPECIFY) was used. If the participant explicitly stated that s/he refused to follow up, the MDF-DE could have been completed at the time of refusal. Otherwise, the MDF was completed when the SC determined that the lack of action on the participant's part indicates that s/he would not be obtaining diagnostic follow-up. An MDF was not to be completed for a participant who began diagnostic evaluation, but discontinued the evaluation before a diagnosis was made. In these cases, a DE form was completed with a result of "No information available."

- When the participant did not see the utility in following up with his or her health care provider by phone or in person following a positive screening exam. The reason code on the MDF was, "No perceived benefit," code 26.

- When a participant refused treatment following a diagnosis of primary invasive lung cancer, an MDF for the TI form was completed. If the reason why the participant did not receive treatment could be determined, the appropriate code on the MDF was selected. If there was no reason given, code 19 (No reason given) was used. If the reason did not fall into one of the specified codes, code 88 (Other, SPECIFY) was used.

- When the participant had no follow-up for a positive lung screen due to other, more critical illnesses, an MDF for the DE form was completed with a reason code of 10 (Physical illness/cognitive impairment).

- When the SC was unable to locate the participant to determine whether or not s/he had follow-up for a positive screen, code 02 (Can't locate) was recorded on the MDF, or when the SC was unable to locate the participant to obtain consent to collect medical records, code 02 (Can't locate) was recorded on the MDF.

- When the participant died before seeking follow-up for a positive lung screen, an MDF for the DE form was completed with a reason code of 03 (Deceased).

- When the participant sought follow-up attention but subsequently died and the SC was unable to contact the participant's family for consent to obtain medical records, or the participant's family was contacted, but refused to consent to the release of the participant's medical records, code 22 (Family refuses to release medical records) was recorded on the MDF.

- When the medical records necessary for the completion of the DE, TI, or CP forms were not available because the records could not be located, code 25 (Medical records lost) was recorded on the MDF.

- When the medical records necessary for the completion of the DE, TI, or CP forms were not available because of institutional refusal, or foreign or non-local institution, code 23 (Health care provider refuses to release medical records) or code 24 (Health care provider does not respond to record requests) was recorded on the MDF.

- When a participant refused to sign a Medical Record Release Authorization Form for the SC to obtain medical records to document diagnostic follow-up procedures, code 21 (Participant refuses to release medical records) was recorded on the MDF.

An MDF was not to be completed in place of the DE form if the SC or the participant consulted a health care provider for follow-up and the health care provider indicated, based on the screening examination result and/or a review of the participant's medical record, that no follow-up was necessary (see Section 7.5.1). In this situation, a DE form was required to be completed as described in the form completion specifications (Appendix 7-3).

7.7 Quality Assurance of Medical Record Abstraction

The quality assurance plan for medical record abstraction consisted of two components: the registration and training of SC staff and the central re-abstraction of lung cancer cases and a certain percentage of positive screens regardless of outcome by medical record abstractors at the CC. These components are described in detail in the following sections.

7.7.1 Registration and Training of SC Staff

Each abstractor and certified tumor registrar (CTR) was required to submit qualifications, training, and certification to the CC for review. The Record of Experience, Credentials, and Training Form (ECT, Appendix 11-5) was to be completed and sent to the CC for each abstractor and nosologist to document the abstractor's and nosologist's qualifications to perform competently for the NLST/LSS. The CC reviewed the ECTs. If the qualifications met the NLST/LSS criteria, the CC recommended approval to the NCI. If the qualifications did not meet the requirements, the CC requested an exception approval from the NCI if appropriate.

The medical record abstractor was required to have knowledge of medical record terminology, anatomy, physiology, and concepts of disease in addition to basic medical coding instruction. The abstractor was required to have a minimum of two years on-the-job experience

abstracting medical records. The nosologist was required to possess at least one of the following credentials from each list for ICD-9-CM and ICD-O-3 coding.

For ICD-9-CM coding (in order of desirability):

a. Certified Coding Specialist (CCS) - This individual has obtained sufficient coding expertise either through education, experience, or a combination of the two to pass an advanced coding examination and become certified.

b. Registered Health Information Technician (RHIT) - A RHIT has at least an associate's degree in Medical Record Science and has passed an accreditation examination. This individual must meet RHIT continuing education requirements to maintain accreditation.

c. Registered Health Information Administrator (RHIA) - A RHIA has at least a bachelor's degree in Medical Record Science and has passed a registration examination. This individual must meet RHIA continuing education requirements to maintain registration. If a person is a RHIA and is currently doing medical coding, then s/he may be qualified to conduct medical coding. If, however, a RHIA is doing supervisory work, then s/he may not be up-to-date on medical coding.

For ICD-O-3 coding and TNM staging:

a. Certified Tumor Registrar (CTR or CTR-eligible) - A CTR is an individual who has passed the Certification Examination for Cancer Registrars, which is offered by the National Cancer Registrars Association's (NCRA) Council on Certification. To maintain a certified status, a CTR must meet current continuing education requirements of the NCRA. To be eligible to take the Certification Examination, an individual must meet one of the following requirements as of the application deadline:

   - Two years full-time equivalent experience in the cancer registry field and a high school or GED diploma and two semesters/three quarters of college-level courses in human anatomy and/or physiology, one semester of medical science/biology and one semester of medical terminology.

   - Successful completion of an NCRA Accredited Formal Education Program curriculum, plus 160 hour practicum.

   - One year full-time equivalent experience in the cancer registry field and successful completion of a minimum of an Associate's degree or equivalent in an approved college level curriculum in a recognized allied health field as determined by NCRA's Council on Certification.

   - One year full-time equivalent experience in the cancer registry field and successful completion of a minimum of an Associate's degree or equivalent and license or certification in a recognized allied health field as determined by NCRA's Council on Certification.

- One year full-time equivalent experience in the cancer registry field and successful completion of a Master's degree or higher college level curriculum in a recognized allied health field as determined by NCRA's Council on Certification.

The staff person in charge of medical record abstraction at the CC facilitated regular communication between the SCs and the NCI on medical record abstraction issues and problem resolution as well as coordinated training. A staff person at each SC assisted the CC in monitoring internal quality assurance at their SC and provided input for resolution of medical record abstraction issues.

7.7.2 Central Re-abstraction of Selected Lung Cancer Cases

The goal of re-abstracting medical records at the CC was to provide feedback to the medical record abstractors, to standardize the abstracting process, and to ensure a high level of accuracy. Appendix 7-8 presents the Medical Records Abstraction Quality Assurance Plan that was followed at the CC.

For NLST/LSS, all SCs were asked to submit to the CC a copy of the medical records for the first ten cancer and the first ten non-cancer cases completed. For all SCs, one hundred percent (100%) of the cases with primary invasive lung cancer were re-abstracted. Five percent (5%) of all non-lung cancer cases following a positive screen were randomly selected for re-abstraction. In addition, each year a selected number of TI and CP forms were randomly selected for QA review. The CC MRA Coordinator identified cases for re-abstraction and requested copies of the medical records for each case. When requested, the SC MRA sent a legible, chronologically organized copy of the medical record, with all participant identifiers removed, including the date of birth. The medical record was to be submitted to the CC within two weeks of the request. The CC MRAs, who were also trained in the study protocol, re-abstracted the selected medical records. The CC MRA Coordinator reviewed the results, noted any discrepancies between the CC and SC forms, and provided the results to the SC and to the NCI. A CC Edit Form (see Appendix 11-7) was sent electronically to the SC to address any issues. The SC updated the hard copy form and the database as needed. If the SC MRA disagreed with the suggested changes, s/he could contact the CC to discuss the issue. The goal of the CC was to re-abstract the records and provide follow-up of any discrepancies within eight weeks of receipt. If recurrent errors with abstracting the medical records persisted despite feedback, the CC MRA Coordinator, after consultation with the NCI, could begin closer monitoring of the MRA efforts at the particular SC and consider the need for remedial training and/or additional review.

7.8 Tracking, Reporting, and Monitoring Medical Record Abstraction Activities

DE, TI, and CP forms were to be manually edited at the SC. See Chapter 11, Section 11.6.1 for information regarding editing of forms. Upon completion of the forms, they were entered into

The original DE, TI, and CP forms, as well as the medical records and CC Edit Forms, were to be filed in the participant's study file. If required, the medical records were copied, with the copy retained and the original returned to the health care provider or institution from which they were requested. The SC Coordinator could use the Expected Forms Report (Appendix 11-18) and/or the Medical Abstraction Report (Appendix 11-22) to track the completion of the DE, TI, and CP forms.

Appendices for Chapter 7

Appendix 7-1 Sample Letter to Request Medical Records

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Name of Institution)
(Address of Institution)
(City, State, Zip Code)

RE: *(Name of Participant)*
Date of Birth: *(Participant DOB)*
Date of Screening Visit: *(Date of Visit)*

Dear *(Physician/Head of Medical Records Department)*:

The person named above is a participant in the National Lung Screening Trial, an NCI-sponsored study of lung cancer screening, and has indicated that s/he was intending to be seen at your institution for follow-up of an abnormal *(chest x-ray/spiral CT exam)*.

We would appreciate receiving copies of medical records pertaining to the abnormal chest x-ray/ spiral CT screening exam. Please include all relevant records from the date of the screening exam to the present time. Enclosed you will find a copy of the consent form authorizing release of information. Please send the following information in regards to any diagnostic follow-up done after *(Date of spiral CT/chest x-ray exam)*.

- ____ Admission history
- ____ History and physical
- ____ Discharge summary for all hospitalizations related to diagnosis
- ____ Operative reports
- ____ Radiology reports
- ____ Pathology reports
- ____ Lab reports
- ____ Progress notes and reports of diagnostic work-up
- ____ Treatment records or summaries

If you have no records for this patient, please check here (___ we have no records) and return this letter.

Thank you for the time and effort involved in complying with our request. If you have any questions, please do not hesitate to call *(Name of SC Coordinator)* at *(Telephone Number)*.

Sincerely yours,

(Name of Principal Investigator)
Principal Investigator
National Lung Screening Trial

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

MEDICAL RECORD ABSTRACT DIAGNOSTIC EVALUATION FORM (DE)

Administrative Section

☐ Please mark box if another DE form has been submitted for this participant.

Date Abstracted: |__|__| / |__|__| / |__|__|__|__|

Abstractor ID: |___|___|___|___|

Screening Center ID: |___|___|

Study Year: T|___|

☐ Please mark box if T_3 completion is due to T_2 positive screen.

Date of Screening Exam or CDF Completion Date:
|__|__| / |__|__| / |__|__|__|__|

Purpose of Abstract:
- ☐ Initial Abstract
- ☐ Re-abstract for QA

Multiple DE #_____

Initials Complete: _____

Initials QC: _____

Participant ID Label

PART A: DIAGNOSTIC EVALUATION AND STAGING

1. Did participant undergo diagnostic procedures?
   - ☐ Yes
   - ☐ No, Physician Report **(GO TO A.5)**
   - ☐ No, Participant Self-Report **(GO TO A.5)**

2. Reason for initial visit for diagnostic evaluation: (Mark all that apply)
   - ☐ Symptomatic
   - ☐ Follow-up of positive NLST screen
   - ☐ Other (SPECIFY)_____

3. Diagnostic Evaluations **(DO NOT RECORD RESULTS OF SCREENING SPIRAL CT SCAN OR CHEST X-RAY EXAM)**

PROCEDURE #	DATE OF PROCEDURE (MO/DAY/YR)	TYPE OF PROCEDURE (USE PROCEDURE CODES ON THE NEXT PAGE)
1	|__|__|-|__|__|-|__|__|__|__|	|__|__|
2	|__|__|-|__|__|-|__|__|__|__|	|__|__|
3	|__|__|-|__|__|-|__|__|__|__|	|__|__|
4	|__|__|-|__|__|-|__|__|__|__|	|__|__|
5	|__|__|-|__|__|-|__|__|__|__|	|__|__|
6	|__|__|-|__|__|-|__|__|__|__|	|__|__|
7	|__|__|-|__|__|-|__|__|__|__|	|__|__|
8	|__|__|-|__|__|-|__|__|__|__|	|__|__|
9	|__|__|-|__|__|-|__|__|__|__|	|__|__|
10	|__|__|-|__|__|-|__|__|__|__|	|__|__|
11	|__|__|-|__|__|-|__|__|__|__|	|__|__|
12	|__|__|-|__|__|-|__|__|__|__|	|__|__|
13	|__|__|-|__|__|-|__|__|__|__|	|__|__|
14	|__|__|-|__|__|-|__|__|__|__|	|__|__|
15	|__|__|-|__|__|-|__|__|__|__|	|__|__|
16	|__|__|-|__|__|-|__|__|__|__|	|__|__|
17	|__|__|-|__|__|-|__|__|__|__|	|__|__|
18	|__|__|-|__|__|-|__|__|__|__|	|__|__|

Appendix 7-2 Medical Record Abstract Diagnostic Evaluation Form (DE)

PROCEDURE CODES	
01 = Biopsy – Endobronchial	29 = Lymphadenectomy/lymph node sampling
04 = Biopsy – Lymph node, scalene (supraclavicular) nodes	30 = Mediastinoscopy/Mediastinotomy
03 = Biopsy – Lymph node, other **(Specify)**	62 = MRI – Abdomen (or liver)
09 = Biopsy – Open surgical	31 = MRI – Bone
52 = Biopsy – Percutaneous adrenal	32 = MRI – Brain
02 = Biopsy – Percutaneous liver	33 = MRI – Chest
53 = Biopsy – Percutaneous transthoracic yielding histology	35 = MRI – Other **(Specify)**
50 = Biopsy – Thoracoscopic	39 = Pulmonary function tests/spirometry
10 = Biopsy – Transbronchial	11 = Radiograph – Bone
08 = Biopsy – Other **(Specify)**	13 = Radiograph – Chest
54 = Bronchoscopy without biopsy or cytology	15 = Radiograph – Comparison with historical images
14 = Clinical evaluation	37 = Radiograph – Other **(Specify)**
55 = CT – Abdomen (or liver)	40 = Radionuclide scan – Bone
17 = CT – Abdomen and pelvis	41 = Radionuclide scan – Brain
18 = CT – Brain	63 = Radionuclide scan – FDG-PET scan
56 = CT – Chest, plus contrast-enhanced nodule densitometry	68 = Radionuclide scan – Fusion PET/CT scan
57 = CT – Chest, diagnostic	64 = Radionuclide scan – Gallium
69 = CT – Chest, low dose spiral	42 = Radionuclide scan – Liver
23 = CT – Chest, limited thin section of nodule	65 = Radionuclide scan – Somatostatin receptor
70 = CT – Chest, limited thin section of entire lung	66 = Radionuclide scan – Ventilation/perfusion lung
71 = CT – Chest and abdomen	67 = Radionuclide scan - Other **(Specify)**
72 = CT – Chest, abdomen, and pelvis	43 = Resection
22 = CT – Other **(Specify)**	47 = Thoracentesis
58 = Cytology – Bronchoscopic	49 = Thoracoscopy
59 = Cytology – Percutaneous transthoracic	46 = Thoracotomy
25 = Cytology – Sputum	48 = Ultrasound **(Specify)**
60 = Cytology – Other **(Specify)**	36 = Other **(Specify)**
61 = Echocardiography	99 = Unknown
27 = Fluoroscopy	

COMPLICATION CODES	
01 = Acute respiratory failure	17 = Hospitalization post procedure
02 = Allergic reaction	37 = Infection requiring antibiotics
03 = Anaphylaxis	31 = Injury to vital organ or vessel
05 = Blood loss requiring transfusion	21 = Myocardial Infarction
06 = Bronchopulmonary fistula	22 = Pain requiring referral to a pain specialist
29 = Bronchial stump leak requiring tube thoracostomy or other drainage for >4 days	23 = Pneumothorax requiring tube placement
	32 = Prolonged mechanical ventilation over 48 hours post-operatively
07 = Bronchospasm	25 = Respiratory arrest
08 = Cardiac arrest	26 = Rib fracture(s)
09 = Cardiac arrhythmia requiring medical intervention	33 = Thromboembolic complications requiring intervention
10 = Cerebral vascular accident (CVA)/stroke	34 = Vaso-vagal reaction
11 = Congestive heart failure (CHF)	27 = Vocal cord immobility/paralysis
12 = Death	28 = Wound dehiscence
30 = Empyema	36 = Wound infection
14 = Fever requiring antibiotics	35 = Other (**Specify**)
16 = Hemothorax requiring tube placement	99 = Unknown

4. Were there any medical complications as a result of diagnostic evaluation and staging?

☐ No **(Go to A.5)** ☐ Yes **(COMPLETE TABLE BELOW)** ☐ Unknown

DATE OF COMPLICATION MO DAY YEAR	MEDICAL COMPLICATIONS (USE COMPLICATION CODES ON PREVIOUS PAGE; LIST MORE THAN ONE IF NEEDED.)
	|__|__|
	|__|__|
	|__|__|
	|__|__|
	|__|__|

5. Result of Diagnostic Evaluation for Primary Invasive Lung Cancer:

☐ No malignancy, confirmed by histology or cytology
☐ No malignancy, determined by clinical evaluation only-no pathologic proof
☐ Primary invasive lung malignancy confirmed histologically
☐ Primary invasive lung malignancy confirmed cytologically
☐ Primary invasive lung malignancy diagnosed by clinical examination only-no pathologic proof
☐ Malignancy other than primary invasive lung cancer, with or without lung metastasis, confirmed by histology or cytology
☐ Malignancy other than primary invasive lung cancer, with or without lung metastasis, diagnosed by clinical evaluation only – no pathologic proof
☐ Diffuse idiopathic pulmonary neuroendocrine hyperplasia
☐ Neoplasm of uncertain behavior
☐ Carcinoma in situ
☐ Squamous dysplasia
☐ Atypical adenomatous hyperplasia
☐ Further follow-up required **(Go to PART D)**
☐ No information available **(Go to PART D)**

PART B: DIAGNOSIS INFORMATION FOR ANY CONDITION OTHER THAN PRIMARY INVASIVE LUNG CANCER

6a. Non-Cancer Diagnosis ☐ Yes ☐ No

ICD-9-CM Classification:

|___|___|___| . |___|___|

Nosologist/Abstractor ID #:

|___|___|___|___|

6b. Date of Diagnosis:

|___|___| / |___|___|/ |___|___|___|___|

7a. Cancer Diagnosis, Site other than primary invasive lung ☐ Yes ☐ No

ICD-O-3 Cancer Classification: **(TO BE COMPLETED BY CTR OR CTR-ELIGIBLE STAFF)**

|_C_|___|___|___| - |___|___|___|___| - |___| - |___|

TOPOGRAPHY MORPHOLOGY BEHAVIOR GRADE

7b. |___|___| / |___|___|/ |___|___|___|___|

Date of Diagnosis

|___|___|___|___|

CTR ID #

7c. Is this Cancer Metastatic to Lung? ☐ Yes ☐ No

PART C: PRIMARY INVASIVE LUNG CANCER DIAGNOSIS INFORMATION

8. Date of Primary Invasive Lung Cancer Diagnosis (Mo/Day/Year):
|___|___| / |___|___|/ |___|___|___|___|

9. Photocopy of Report Confirming Primary Invasive Lung Cancer (**MARK ONE**):

- ☐ No Report/Clinical Examination **(COMPLETE C10)**
- ☐ Histology/Histopathology **(GO TO C11)**
- ☐ Cytology/Cytopathology **(GO TO C11)**
- ☐ Report exists but cannot be obtained **(COMPLETE C10)**

10. Verbatim Description of Primary Invasive Lung Cancer Diagnosis:
(COMPLETE ONLY WHEN ANSWER TO C9 IS "NO REPORT/CLINICAL EXAMINATION," or "REPORT EXISTS BUT CANNOT BE OBTAINED.")

11a. ICD-O-3 Cancer Classification: **(TO BE COMPLETED BY CTR OR CTR-ELIGIBLE STAFF)**

|_C_|___|___|___| - |___|___|___|___| - |___| - |___|
TOPOGRAPHY MORPHOLOGY BEHAVIOR GRADE

CTR ID #
(For Items C.11a, b, & C14-C17 only)
|___|___|___|___|

11b. Source: ☐ Cytology ☐ Histology ☐ Combined (CYTOLOGY and HISTOLOGY) ☐ Clinical
(IF COMBINED or CLINICAL, MUST COMMENT IN D.18)

12. Primary Tumor Location (**MARK ALL THAT APPLY**):

- ☐ Right upper lobe
- ☐ Right middle lobe
- ☐ Right lower lobe
- ☐ Left upper lobe
- ☐ Left lower lobe
- ☐ Lingula
- ☐ Right hilum
- ☐ Left hilum
- ☐ Right main stem bronchus
- ☐ Left main stem bronchus
- ☐ Carina
- ☐ Mediastinum
- ☐ Unknown
- ☐ Other: **(SPECIFY):**_____

13. Pathology Lesion Size (maximum dimension): |__|__|__| mm

14a. Pathologic Type for Primary Invasive Lung Cancer: **(TO BE COMPLETED BY CTR OR CTR-ELIGIBLE STAFF)**

|___|___|___|___|/|___|

14b. Date of Pathologic Confirmation: |___|___| / |___|___|/ |___|___|___|___|

15. Grade of Primary Invasive Lung Cancer: **(TO BE COMPLETED BY CTR OR CTR-ELIGIBLE STAFF)**

- ☐ Grade cannot be assessed (GX)
- ☐ Well differentiated (G1)
- ☐ Moderately differentiated (G2)
- ☐ Poorly differentiated (G3)
- ☐ Undifferentiated (G4)
- ☐ Unspecified in pathology report
- ☐ Unknown – Pathology report missing

16. TNM Staging for Primary Invasive Lung Cancer: **(TO BE COMPLETED BY CTR OR CTR-ELIGIBLE STAFF)**

16a. TNM Clinical Staging:
(**MARK ONE BOX ONLY IN EACH COLUMN.**)

☐ YES ☐ NO

16b. TNM Pathological Staging:
(**MARK ONE BOX ONLY IN EACH COLUMN.**)

☐ YES ☐ NO

Neoadjuvant therapy prior to staging?

☐ YES ☐ NO

Primary Tumor (T) Codes:	Nodal Involvement (N) Codes:	Distant Metastases (M) Codes:	Primary Tumor (T) Codes:	Nodal Involvement (N) Codes:	Distant Metastases (M) Codes:
☐ T_x	☐ N_x	☐ M_x	☐ T_x	☐ N_x	☐ M_x
☐ T_0	☐ N_0	☐ M_0	☐ T_1	☐ N_0	☐ M_0
☐ T_1	☐ N_1	☐ M_1	☐ T_2	☐ N_1	☐ M_1
☐ T_2	☐ N_2	☐Not available	☐ T_3	☐ N_2	☐Not available
☐ T_3	☐ N_3		☐ T_4	☐ N_3	
☐ T_4	☐Not available		☐Not available	☐Not available	
☐Not available					

17. Record Stage: **COMPLETE ONLY IF ANY PART OF THE TNM PATHOLOGICAL STAGING IS UNKNOWN.**
(TO BE COMPLETED BY CTR OR CTR-ELIGIBLE STAFF)

Stage Only:

- ☐ Occult Carcinoma
- ☐ IA
- ☐ IB
- ☐ IIA
- ☐ IIB
- ☐ IIIA
- ☐ IIIB
- ☐ IV
- ☐ Not available

VALCSG (Small Cell only):

- ☐ Limited
- ☐ Extensive
- ☐ Not available

Summary Staging:

- ☐ Localized
- ☐ Regional
- ☐ Distant
- ☐ Not available

PART D: COMMENTS

18. Comments: ☐ No ☐ Yes **(SPECIFY)**

☐ **Continued**

PART E: HEALTH CARE PROVIDER/HOSPITAL LOCATION INFORMATION

19. HEALTH CARE PROVIDER FOR DIAGNOSTIC EVALUATION:

a. NAME: MR./MRS./MISS/MS./DR. | FIRST | MIDDLE | LAST | (JR., SR., etc.)

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

Medical Record / Chart Number

b. NAME: MR./MRS./MISS/MS./DR. | FIRST | MIDDLE | LAST | (JR., SR., etc.)

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

Medical Record / Chart Number

20. HOSPITAL OR CLINIC FOR DIAGNOSTIC EVALUATION:

a. NAME OF HOSPITAL OR CLINIC

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

Medical Record / Chart Number

b. NAME OF HOSPITAL OR CLINIC

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

Medical Record / Chart Number

Specifications for Completion of the Medical Record Abstract Diagnostic Evaluation Form (DE)

This form is to be completed by the SC Coordinator, Medical Record Abstractor, and a Tumor (or Cancer) Registrar who is also a Certified Tumor Registrar (CTR) or CTR-eligible. Items that are to be completed by a nosologist, CTR, or CTR-eligible individual are specified. The abstractor should complete all other non-administrative items. The nosologist will be required to complete Items B.6a and B.6b. The CTR or CTR-eligible individual will be required to complete Items B.7a and B.7b and C.11a and C.11b (ICD-O-3 Cancer Classification and Source), C.14a & C.14b (Histopathologic Type for Primary Invasive Lung Cancer), C.15 (Histopathologic Grade for Primary Invasive Lung Cancer), C.16a & C.16b (TNM Staging for Primary Invasive Lung Cancer), and C.17 (Stage). The SC Coordinator should complete the Administrative Section. This form should be completed in black or blue ink.

Some guidelines for general abstracting are presented below:

- Sources of information for abstracting the variable items on the form should be used in priority order by best source. The preferred sources of information are a physician, hospital, or tumor registry; information should only be obtained from the participant when other sources are unavailable. Written documentation from the physician or the medical record is preferable to obtaining information verbally. An exception to this is Item A.1 (Did participant undergo diagnostic procedures?), in which the response may be based on participant self-report. Any information obtained verbally needs to be documented on a telephone log or memo with SC letterhead to provide details and serve as a record in lieu of medical records, and should be placed in the participant's file.

- Medical records documenting diagnostic evaluation and staging procedures should be collected for all positive screens and for all reported lung cancers confirmed by a Cancer Diagnosis Form (CDF). For positive screens at T_0 and T_1, records should be collected on all diagnostic and staging procedures until a conclusive diagnosis is made, the next screening exam is completed, or twelve months from the date of the positive screen, whichever comes first. For the time frame for DE's collected at T_2 see Chapter 7, Section 7.2. Medical records documenting complications of diagnostic evaluations or staging procedures should also be collected. These records should be collected for complications that occur up to twelve months from the time diagnostic procedures began for participants without a diagnosis of primary invasive lung cancer. In the event of a cancer diagnosis, medical complications related to the diagnostic or staging procedures should be collected for an additional six months after the diagnosis. Medical complications that result from treatment of a primary invasive lung cancer should not be recorded.

- Before beginning abstraction, the medical record documents should be placed in chronological order. The diagnostic/staging procedures should be abstracted chronologically. If, however, a diagnostic or staging procedure is identified and added after the form has been completed, it is not necessary to shift all of the data to maintain the chronological order; the new procedure may be added at the end of the appropriate item.

- This form includes items requiring that data be entered verbatim, such as recording "other (Specify)" and recording information in Item D.18 (Comments). The abstractor should be sure to use clear and legible handwriting when completing these items.

- If the medical record contains unclear, discrepant, or conflicting information for any item, the SC Coordinator and/or Principal Investigator should first be consulted for a resolution and for making an appropriate coding decision, prior to contacting the CC.

- When recording information in the Comments section (Item D.18), it is necessary to appropriately identify to which item the comment refers. Appropriate identification will aid in the analysis of Comments data. Throughout the specifications, identifying phrases have been suggested for use when recording information in Comments.

Below are some guidelines for the collection of diagnostic evaluation information:

- If the DE form is being completed as a result of a positive screen, the screening examination should not be recorded as a part of the diagnostic evaluation. In addition, the comparison read conducted as part of the NLST screening exam should not be recorded.

- If the DE form is being completed as a result of a positive screen, information regarding diagnostic procedures that occurred prior to the participant's screening date should not be recorded. If the DE form is being completed for a reported lung cancer that has been confirmed by a Cancer Diagnosis Form, all diagnostic evaluations and staging procedures should be recorded.

- If the diagnostic evaluation has not resulted in a final diagnosis of malignancy or a diagnosis of one of the specific lung conditions listed in A.5, record the result of the diagnostic evaluation as either "No malignancy, confirmed by histology or cytology" or "No malignancy, determined by clinical evaluation only -- no pathologic proof." There are two exceptions to this:

  - When the diagnostic evaluation procedures are discontinued by the participant and it cannot be determined conclusively whether the participant had a malignancy. In this situation it is not appropriate to record a conclusive diagnosis, but rather to record "No information available" and a verbatim description of the situation in Item D.18 (Comments).

  - When the diagnostic evaluation shows an abnormality (either new or present on the screening exam), and a definitive procedure is provided that could make the conclusive diagnosis in two to three months after the window for data collection closes. In this situation it is <u>not</u> appropriate to record "No malignancy, condition not listed above," but rather to record "Further follow-up required." The reason for further follow-up should be recorded in Item D.18 (Comments). The SC must continue to collect medical records and update the DE form when information becomes available.

- It is the SC's responsibility to encourage timely follow-up of positive screens. If, despite SC efforts, the participant does not initiate follow-up of a positive screen for

several months, the SC must still adhere to the timeline set forth above for acquisition of medical records.

- All staging information related to the initial diagnosis of primary invasive lung cancer should be collected (the staging procedures that resulted in the TNM or stage of disease classifications recorded in Part C of the DE form). Staging information on lung cancer recurrence or cancer progression should not be collected.

- If multiple primary invasive lung cancers are diagnosed at the same time (i.e., as part of the same diagnostic evaluation process and prior to the first definitive treatment), it is necessary to complete a separate DE for each primary. "Multiple DE # ___" in the Administrative Section of the DE allows the SC Coordinator to indicate to which multiple primary invasive lung cancer the DE refers.

- Primary cancers of the trachea are classified as primary lung cancers for medical record abstraction purposes. In the event of a diagnosis of primary cancer of the trachea, Item A.5, Result of Diagnostic Evaluation for Primary Invasive Lung Cancer, should be recorded as primary invasive lung malignancy. The ICD-O-3 code for cancer of the trachea should be recorded in Part C. Since there is no TNM staging schema for cancers of the trachea, only summary staging information should be recorded.

- In the event of a T_3 DE form being completed because of a T_2 screening exam comparison read result of "A" for which there was no definitive diagnosis recorded on the T_2 DE form, the SC Abstractor should use the following guidelines:

  - The abstractor should contact the participant approximately six months after the completion of the T_2 DE form. If the T_2 DE form was completed early in the T_2 study year so that six months later, the participant has not yet entered his/her T_3 study year, the abstractor should wait to contact the participant when the T_3 study year opens. Abstractors should contact these participants to obtain information about further follow-up but should not encourage such follow-up.

  - In the instance that follow-up occurred beyond what was recorded on the T_2 DE form, the abstractor should collect all available information until a diagnosis is made or until 24 months after the T_2 screening exam date, whichever occurs first.

  - In the instance that follow-up did not occur beyond what was recorded on the T_2 DE form because the participant's health care provider deemed it unnecessary, even if this decision occurred during the T_2 study year, the abstractor should make a note in the participant's folder and continue to follow up with the participant in six month intervals until the T_3 DE form is due (24 months after the date of the T_2 screening exam). If, at the end of this time period, no additional follow-up occurred, the abstractor should complete the T_3 DE form and should mark Item A.1 "No, physician report" if medical records or communications with the physician confirms the advice, or "No, participant self-report" if the participant relayed the physician's advice but no direct proof is provided.

A definitive diagnosis on the T_2 DE form is represented by all responses except "No malignancy, determined by clinical evaluation only – no pathologic proof," "Further follow-up required," or "No information available."

Specifications for completing each item of the form are as follows:

Administrative Section:

Participant ID Label: Affix a PID label in the box provided at the top of the form.

Please mark the box if another DE form(s) has been submitted to the CC for this participant.

Date Abstracted: Record the date the medical record was abstracted. This is the date the form was completed. Zero fill month and day, if necessary, and record the last two digits of the year (e.g., 02/07/2002).

Abstractor ID: Record the four-digit staff ID number assigned to the individual who is abstracting the medical record and completing the DE form. If more than one abstractor completes the DE form, the SC Coordinator should determine which abstractor is responsible for the content of the form – it is this abstractor's ID number that should be recorded here. If this abstract is for QA ("re-abstract for QA"), this should be the QA abstractor's ID number.

- The nosologist and CTR or CTR-eligible individual should not record his/her staff ID number in this item. There is space for the nosologist and CTR or CTR-eligible individual to record his/her staff ID number for the specific items which s/he completes in Items B.6a, b; B.7a, b, c; C.11a, b, and C.14 through C.17.

Screening Center ID: Record the two-digit SC ID number.

Study Year: Indicate the study year the participant was in when s/he received the positive screening exam being followed-up or enter the study year the participant was in when the lung cancer was reported. In the case of a T_3 DE form being completed for a T_2 positive screen with a comparison result "A," the study year should be entered as T_3.

Please mark box if T_3 completion is due to T_2 positive screen: Check this box if the T_3 DE form is being completed because the result of the T_2 screening exam was positive (suspicious for lung cancer).

Date of Screening Exam or CDF Completion Date: Indicate the date of the screening exam done in the study year described above. In the case of a T_3 DE form being completed for a T_2 positive screen with a comparison result "A," the date of the T_2 screening exam should be entered in this space. If the cancer was reported via the ASU or a CNF, then the date the CDF was completed should be entered in the space provided. If the cancer reported on the ASU or CNF was the result of a work-up for a positive screen, enter either the date that the CDF was completed or the date of the positive screen, which ever occurred first. Zero fill month and day, if necessary, and record the last two digits of the year (e.g., 02/07/2002).

Purpose of Abstract: This form may be used for either the initial abstracting of medical record information, or for repeat abstraction of the medical record for quality assurance. Mark the box corresponding to the purpose of the abstract as follows:

- **Initial abstract:** Medical record information is being abstracted for the first time to follow up a positive screen.

- **Re-abstract for QA:** Medical record information which has already been abstracted to follow up a positive screen is being re-abstracted for the purpose of quality assurance. (This will not apply to the SC MRAs.)

Multiple DE #: The purpose of this item is to link information arising from additional primary invasive lung cancers diagnosed simultaneously with or subsequent to the first primary invasive lung cancer within the same study year. Synchronous primary invasive lung cancers (diagnosed simultaneously) may have different histologies or be located in different parts of the lung and each should be recorded on a separate DE form. A second primary invasive lung cancer diagnosed within the same study year also should be recorded on a separate DE. Indicate the sequence number for the DE form as it relates to the primary cancer. The first DE form completed is always sequence number "1" and should be abstracted on a separate DE form. If this primary cancer is the second primary diagnosed (in chronological date order), enter number "2" entered for the multiple DE #. If it is the third, enter "3," etc. DEs in the subsequent study years also should start with the number "1".

NOTE: Cases in which no primary invasive lung cancer or only one primary invasive lung cancer was diagnosed should be coded as "1."

Part A: Diagnostic Evaluation and Staging:

This section refers to the diagnostic evaluation. Abstracting these data will require careful review of the participant's medical records from one or more hospitals, clinics, or physicians' offices.

If this form is being completed for a positive screen, do not include information from any physician/hospital visits or procedures that took place prior to the participant's screening examination, even if these visits or procedures are related to a diagnosis that was made after the participant was screened. If the DE is being competed for a diagnosis of primary invasive lung cancer and this is unrelated to a screening exam, the abstractor will collect information once there is a suspicion for primary invasive lung cancer.

1. **Did participant undergo diagnostic procedures?** The purpose of this item is to document whether diagnostic procedures were performed. Mark the box corresponding to the most appropriate response. If the DE form is being completed to document a lung cancer confirmed on a Cancer Diagnosis Form, this question must be marked "Yes."

   Yes: The record indicates that diagnostic procedures were performed. This includes situations when diagnostic procedures were performed to follow up a positive screening examination (chest x-ray or spiral CT scan). In the latter situation, the internal review should be recorded as the first Diagnostic/Staging procedure.

   No, Physician Report: The medical record indicated or the health care provider reported to the SC that based on review of the NLST/LSS screening examination results, and possibly any medical history prior to the screening examination, no follow-up of the positive screening exam was deemed necessary. The health care provider's decision is not based on a visit with the participant. Mark "No malignancy, determined by clinical evaluation only – no pathologic proof" for Item A.5 (Result of Diagnostic Evaluation for Primary Invasive Lung Cancer) and complete Item D.18 (Comments) and Part E (Health

Care Provider/Hospital Location Information). The reason provided by the physician and the date should be recorded in D.18 (Comments). This category can only be used when the decision that follow-up is unnecessary is made without any additional information from the participant. If the information is obtained verbally from the health care provider or his/her office, document this on a telephone log or a memo with SC letterhead and place in the participant's folder.

In the event of a T_3 DE form being completed for a T_2 screening exam comparison read result (Item E.3a) of "A" for which there was no definitive diagnosis recorded on the T_2 DE form, the decision to not follow up the positive screening exam can be applied to the T_3 DE form, even if the decision was made during the T_2 study year.

No, Participant Self-Report: The participant reported that the physician reviewed the NLST/LSS screening examination results, and possibly other medical history prior to the screening examination, and deemed no additional follow-up was necessary. Mark "No malignancy, determined by clinical evaluation only – no pathologic proof" for Item A.5 (Result of Diagnostic Evaluation for Primary Invasive Lung Cancer) and complete Item D.18 (Comments) and Part E (Health Care Provider/Hospital Location Information). The reason the physician gave the participant why additional follow-up was unnecessary and the date should be recorded in D.18 (Comments).

In the event of a T_3 DE form being completed for a T_2 screening exam comparison read result (Item E.3a) of "A" for which there was no definitive diagnosis recorded on the T_2 DE form, the decision to not follow up the positive screening exam can be applied to the T_3 DE form, even if the decision was made during the T_2 study year.

- *Before accepting a participant self-report, the SC should first attempt to obtain written documentation from the participant's physician. If written documentation cannot be obtained from the physician, the SC should then attempt to obtain verbal confirmation from the physician's office that the physician did not recommend additional follow-up of the positive screening examination. In cases where only the participant's report of the physician's recommendation can be obtained, this box should be marked. Information from the participant's report should be documented on a telephone log or memo with SC letterhead and placed in the participant's file.*

2. **Reason for Initial Visit for Diagnostic Evaluation:** The purpose of this item is to identify the participant's motivation for seeking clinical evaluation. In the absence of evidence stating otherwise, it is assumed that if a participant seeks medical care within twelve months of a positive screen, it is for the purpose of follow-up of that positive screen. If medical care is sought more than twelve months after a positive screen, the NCI assumes that it is not for follow-up to a positive screen. Mark the boxes corresponding to all reasons that apply as follows:

   - **Symptomatic:** The record indicates that the participant went for a clinical evaluation because s/he was experiencing symptoms that are suspicious for possible lung cancer. This should be checked if the medical records note that symptoms worrisome for lung cancer motivated the participant to seek an initial evaluation.

   - **Follow-up of positive NLST screen:** The record indicates that the participant went for an initial clinical evaluation to follow up on a positive NLST screen, *within twelve months* of the positive screen.

- **Other (SPECIFY):** If the record indicates that the participant went for a clinical evaluation for a reason other than those listed, specify the reason in the space provided. This includes instances where the participant went for an initial clinical evaluation to follow up on a non-positive (Result code C or D) NLST screen.

3. **Diagnostic Evaluations:** The following are general guidelines for identifying diagnostic and staging procedures in the medical record:

   - Only procedures involved in diagnostic evaluation or staging and that are clearly stated in the record (including outpatient records, discharge summaries, and operative reports) should be recorded. If the operative report and/or discharge summary is missing, procedures noted in doctor's notes or a history taken *after* the procedure may be used to record a diagnostic/staging procedure. For example, if a chest CT report is missing but a clinician confirms in a subsequent note that it was done it should be recorded. Do not record those procedures that are planned but no report or documentation that it was carried out can be found. Every attempt should be made to obtain the appropriate documentation. *Please call the CC if there is any uncertainty about recording diagnostic/staging procedures.*

   - Following a positive screening examination (chest x-ray or spiral CT scan) at T_0 or T_1, the SC should collect information on all diagnostic and staging procedures until a conclusive diagnosis is made, the next screening exam is completed, or twelve months from the date of the positive screen, whichever comes first. For the time frame for DE's collected at T_2 see Chapter 7, Section 7.2. If the DE form is being completed to document a lung cancer confirmed on a Cancer Diagnosis Form, the SC should collect information on all diagnostic and initial staging procedures. (The abstractor should not collect diagnostic procedures related to the investigation of a potential complication, cancer progression or cancer recurrence.) If information about additional diagnostic procedures is found after the DE form has been completed and entered into the DE form should be modified.

   For each diagnostic/staging procedure performed, complete the following items:

   Procedure #: Enter the information regarding each procedure on a separate row.

   Date of Procedure: Record the month, day, and year that the diagnostic/staging procedure was performed. If it is not clear from the record the date that the diagnostic/staging procedure was performed, year and month can usually be assessed, even if the exact date cannot be determined. In this situation, record the exact month and year and the day as "99." Zero fill month and day, and record the last two digits of the year (e.g., 02/07/2002).

   Type of Procedure: Enter the number corresponding to the type of diagnostic/staging procedure performed. Refer to the Procedure Codes for the list of diagnostic and staging procedures for primary invasive lung cancer. When the procedure on the Procedure Code list indicates "SPECIFY," describe the body site or the actual procedure, as appropriate, in the space next to the code. The following are guidelines for coding type of procedure:

   - **Laboratory Tests**: Pulmonary function tests (PFTs) and cytology (sputum, bronchial washing/brushing) reports are the only laboratory tests to be recorded. All PFTs performed prior to the date of the lung cancer diagnosis or a conclusion that there is no lung cancer should be recorded. If primary invasive lung cancer

can not be confirmed within the window of data collection then all PFTs performed should be recorded.

- **Clinical Evaluation**: A clinical evaluation (clinical assessment) by a health care provider should be recorded in this section if there is a reference to either the NLST screening exam or follow-up to a screening for cancer. A clinical evaluation is defined as a visit to a health care provider for medical care and may include a history and physical examination of the lungs, or may include a history about the positive screening examination only. A telephone conversation with a health care provider is not considered a clinical evaluation. A subsequent clinical evaluation that only serves to repeat or confirm previous findings as in a follow-up medical appointment should not be recorded. The following examples illustrate how the form should be completed to document a clinical evaluation:

  - If a visit to a health care provider includes a history with some reference to the NLST screening exam as well as a physical examination of the lungs, this is considered a clinical evaluation. Document this clinical evaluation using procedure code 14 = Clinical evaluation. For subsequent examinations, to include consultations, record only those that give additional history, a new physical exam finding, or a new/different assessment or plan.

  - If a visit to a health care provider includes *only* a history and not a physical examination of the lungs, this is also considered a clinical evaluation. Record this procedure using 14 = Clinical evaluation. Again, only those visits to a health care provider that result in additional or new information should be recorded. Do not record subsequent clinical evaluations unless the evaluation contributes to the confirmation of or ruling out of cancer. While a subsequent referral to a consultant can result in a very detailed clinical evaluation, if there is no new information that helps to rule out cancer, it should not be recorded. (Generally, only the initial clinical evaluation will be recorded.)

- **Telephone Conversation:** When the decision not to have further follow-up of an abnormality from the NLST/LSS screening exam occurs in a phone conversation after some evaluation has occurred, document this using procedure code 36 = Other (SPECIFY), and specify "telephone conversation." This would be the only example for which a telephone conversation would be recorded as a procedure.

- **Chest Radiographs:**

  - 13 = Radiograph – chest should be used to code a diagnostic chest x-ray. Use this code when a diagnostic chest x-ray is in the record, regardless of whether a particular view is specified such as PA, lateral, bucky, kyphotic, or lordotic. Record the first chest x-ray in the record but do not record subsequent ones unless new information to rule in or to rule out lung cancer is noted.

  - 15 = Comparison with historical images should be coded in the instance of an internal referral or other review of multiple scans. Use this code only to note when a film is reviewed, compared, and interpreted at a different time from the original reading of the film. This code may also be used when a clinician is reviewing films at a later date to determine the significance of the abnormal finding. (This would be equivalent to rendering a second opinion.) Do not record the comparison with the prior screen performed at the NLST screening exam. Also do not include the comparison of films done as a component to

the interpretation of radiographic film if the comparison is noted prior to rendering the final impression of the film.

- **Biopsy and Cytology Procedures:**

  - Needle Aspiration Biopsy: There are several codes for a fine needle aspiration of the lung as described below:

    - Use code 58 if cytology is obtained from bronchoscopic needle aspiration.

    - Use code 59 if cytology is obtained through percutaneous transthoracic aspiration is specified.

    - Use code 60 if cytology was obtained but the method was not specified.

  - 08 = Biopsy - Other (SPECIFY): Record the site of the biopsy next to the code, not the method of biopsy. Use this code to record both incisional and excisional biopsies of organs other than the lung if the biopsy type does not match one of the existing codes.

- **Surgical Approaches:** Record the surgical approach documented in the medical record separately from related diagnostic and staging procedures, e.g. thoracotomy, thoracoscopy (to include video assisted thorascopic surgery), mediastinoscopy, or mediastinotomy.

- **Lymph Node Procedures**:

  - If lymph node sampling and lymph node dissection are both performed, this should be considered as one procedure and recorded only once as 29 = Lymphadenectomy/lymph node sampling.

  - Lymph node removal accompanying surgical resection should be coded as a separate procedure. Code both procedures separately under the appropriate codes.

- **Resection:** While a lobectomy and pneumonectomy are treatments for lung cancer, record 43 = Resection if a wedge resection, lobectomy, or pneumonectomy provides diagnostic/staging information. If done during the same procedure/ operation, then consider the surgical removal collectively as one resection. An exception is when a procedure involves an interruption to allow for an intraoperative pathology review for diagnosis. If cancer is confirmed, the surgery continues with an additional excision that would not have been done had cancer not been confirmed. For example, if cancer is not previously confirmed and a diagnostic wedge resection of the lung nodule is done and upon intraoperative pathology review, cancer is confirmed so a lobectomy is now performed, these procedures should be recorded separately. The diagnostic wedge resection should be recorded as an open surgical biopsy and the lobectomy as a resection. (On the TI form they will be recorded separately as well but as a wedge resection and lobectomy, respectively.) The type of resection may be specified on the TI form. If surgical resections are done during different procedures/operations, record separately using "43 = Resection" for each procedure.

- **CT Scans**: If CT procedures for multiple locations appear in the record as a combined procedure, they should be recorded as a single procedure with one date (e.g. code 17 = CT - Abdomen and pelvis, code 71 = CT - Chest and abdomen, and code 72 = CT - Chest, abdomen, and pelvis). If these procedures are performed on the same date and appear in the record as separate procedures, the abstractor should record them separately. Record what is ordered for the CT scan. For example, if a CT of the chest is ordered, and some of the cuts include organs in the upper abdomen, record as CT of the chest and not CT of the chest/upper abdomen combined.

- **"**CT – Chest, diagnostic" (code 57) includes any routine chest CT, either spiral or non-spiral, and either with or without contrast. Include with code 57 those chest CT scans that are a thin section of the entire chest (i.e., not limited thin section) and those spiral CT scans that are at not low dose. Special studies that are limited to a portion of the chest, such as a limited thin section CT of the nodule (code 23), a limited thin section CT of the entire lung (code 70), contrast enhanced densitometry (code 56), and low dose spiral CT (code 69) are recorded separately.

- **"**CT- Chest, low dose spiral" (code 69) includes CT exams performed as part of follow-up that are at doses similar or identical to those used in NLST.

The following is a list of many of the diagnostic and staging procedures that are named on the DE form. The procedures are listed in numerical order. A definition or explanation is provided for each of the procedures and for some procedures an example is given. Examples, when provided, directly follow the definition or explanation and are in italics.

01 **Biopsy – Endobronchial:** Biopsy obtained from within the bronchial tubes by bronchoscopy. An endobronchial lesion is usually visualized and then biopsied.

Bronchoscopy report: The Olympus fiberoptic bronchoscope was introduced transnasally. The cords and larynx were visualized and were normal. The bronchoscope was passed through the cords without difficulty into the trachea which was visualized and was normal. It was passed from the trachea down to the carina which was visualized and was normal. It was passed from the carina into the left side of the tracheobronchial tree. It was passed down into the left mainstem to the secondary carina. The left lower lobe bronchus was visualized. There were tumor implants extending up both the medial and lateral walls. Washings, brushings, and biopsies were done here. There was minimal bleeding which stopped with dilute epinephrine lavage. The left upper lobe and lingular bronchi were visualized and there were tumor implants there as well which extended back up into the left mainstem.

02 **Biopsy - Percutaneous liver:** A biopsy done by inserting a long needle through the skin between two of the right lower ribs into the liver to remove a sample of liver tissue.

03 **Biopsy – Lymph Node, other (Specify):** A biopsy in which a lymph node or a piece of a lymph node is removed for examination under a microscope. Use this if only one lymph node is removed. Specify the type of lymph node such as cervical, mediastinal, hilar, etc. Do not use if multiple lymph nodes are obtained, instead for multiple lymph nodes biopsies use lymphadenectomy or lymph node sampling.

04 **Biopsy – Lymph node, scalene (supraclavicular) nodes:** Biopsy of the supraclavicular lymph nodes above the clavicle or collar bone.

08 **Biopsy – Other (Specify):** Other biopsies not otherwise specified by a procedure code. The line next to the procedure code should be used to record the site of the biopsy, not the method of the biopsy.

09 **Biopsy – Open surgical:** Tissue obtained during surgery, typically through a thoractomy incision. For NLST, when a wedge resection is done prior to lobectomy for diagnostic purposes, this is to be coded as an open surgical biopsy.

10 **Biopsy – Transbronchial:** Utilized to obtain tissue from a pulmonary lesion too peripheral to be visualized directly from the bronchoscope. Biopsy forceps/ needle passed into the lesion using radiographic (fluoroscopic) guidance.

Bronchoscopy report: The bronchoscope was advanced into the left mainstem bronchus and subsequently into the left upper lobe, lingual, and left lower lobe bronchi. No endobronchial obstructing lesions were identified but there was mild chronic bronchitis. The bronchoscope was then withdrawn to the trachea and then advanced into the right mainstem bronchus and subsequently into the right upper lobe, right intermediate bronchus, right middle lobe, and right lower lobe bronchi. No endobronchial obstructing lesions were visualized, but there was moderate chronic bronchitis. Bronchial brushings were obtained for cytology and cultures from the right upper lobe. Multiple transbronchial lung biopsies were obtained from the right upper lobe, right middle lobe, and right lower lobe to evaluate for infiltrating bronchogenic carcinoma.

11 **Radiograph – Bone:** Radiographic (x-ray) examination of the bones.

13 **Radiograph – Chest:** X-ray of the chest cavity for the evaluation of the lungs and thoracic bones. This may also be referred to as CXR, PA, PA and Lateral CXR. Record only those chest x-rays that are screening/diagnostic for cancer, and not those to check for complications post procedures.

14 **Clinical Evaluation:** A clinical evaluation is defined as a visit to a health care provider for medical care and may include a history and physical examination of the lungs, or may include a history about the positive screening examination only. Record the clinical evaluation if there is a reference to either the NLST screening exam or follow-up to a screening for cancer. A telephone conversation is not considered a clinical evaluation. Generally, only the initial clinical evaluation will be recorded. Subsequent clinical evaluations that only serve to repeat or confirm previous findings should not be recorded. Subsequent clinical evaluations may be recorded if they contribute substantially to the confirmation of or ruling out of cancer, provide new and/or additional history, or provide new and/or different assessment or plan.

15 **Radiograph – Comparison with historical images:** Should be coded in the instance of an internal referral or other review of multiple scans. Use this code only to note when a film is reviewed, compared, or interpreted at a different time from the original reading of the film. This code may also be used when a

clinician is reviewing a film at a later date to determine the significance of the abnormal reading – e.g. rendering a second opinion.

Physician's notes: CT scan of the chest (04/23/03). It was not compared to the prior CT scans that were done with the Radiology Screening Research Protocol. It does not demonstrate the right-sided nodules that were seen before. There is the left lower lobe superior segment lesion that is essentially unchanged from that of four months ago. On this particular scan, it continues into the abdomen, and there is a nodular appearance in the adrenal gland. There are also some scattered small lymph nodes that were not mentioned in the screening scan, but all less than a centimeter. Additionally, there is a questionable lesion in the liver, and there are prior old fractures noted of his left ribs.

17 **CT – Abdomen and pelvis:** Computed Tomography or Computed Transaxial Tomography. Procedure wherein a computerized tomography scanner is used to scan and produce an axial image of an organ or area of the body. An abdominal and pelvis CT combined is one CT scan of the abdomen which is extended to include the pelvic region as one procedure, rather than viewing the abdomen and pelvis as two separate CT scans.

18 **CT – Brain:** Computed Tomography or Computed Transaxial Tomography of the brain. Procedure wherein a computerized tomography scanner is used to scan and produce an axial image of an organ or area of the body. May be used to evaluate known or suspected primary or secondary neoplasm, cystic lesions, seizure disorders, etc.

22 **CT – Other (Specify):** Other CT scans not otherwise specified by a procedure code. The line next to the procedure code should be used to record the type of CT scan done.

23 **CT – Chest, limited thin section of nodule:** Computed Tomography or Computed Transaxial Tomography utilizing thin sections of a nodule or a limited section of the lung.

Technique: Multiple noncontrast axial images were obtained through the chest using a 5 mm. slice thickness. In addition, multiple thin section 1.25 mm. slice thickness axial images were obtained through multiple pulmonary nodules.

Technique: Noncontrast CT images were obtained through the chest and upper abdomen. 1 mm. slices were obtained through the nodule in question.

Technique: Unenhanced helical images of the chest were made. In addition, thin section images were made of a nodule in the left upper lobe.

25 **Cytology – Sputum:** The study of the anatomy, physiology, pathology, and chemistry of cells obtained from sputum. Sputum is material, especially mucus or mucopurulent material, that is expelled by coughing and then spitting out what came up with the cough.

27 **Fluoroscopy:** An imaging technique commonly used to obtain real-time images of the internal structures of a patient through the use of a fluoroscope. In its

simplest form, a fluoroscope consists of an x-ray source and fluorescent screen between which a patient is placed. However, modern fluoroscopes couple the screen to an x-ray image intensifier and CCD video camera allowing the images to be played and recorded on a monitor.

29 **Lymphadenectomy/Lymph node sampling:** Lymphadenectomy consists of the surgical removal of one or more groups of lymph nodes. It is almost always performed as part of the surgical management of cancer.

30 **Mediastinoscopy/Mediastinotomy:** A surgical procedure used to view areas of the mediastinum, the cavity behind the breastbone that lies between the lungs. The organs in the mediastinum include the heart and its vessels, the lymph nodes, trachea, esophagus, and thymus. Mediastinoscopy is most commonly used to detect or stage cancer. It is also ordered to detect infection and to confirm diagnosis of certain conditions and diseases of the respiratory organs. A mediastinoscope is passed through a suprasternal notch incision, allowing access to some carinal and hilar nodes, to peribronchial and paratracheal nodes, and to the superior posterior mediastinum.

31 **MRI – Bone:** Magnetic Resonance Imaging of the bone. Procedure in which the patient is placed in a strong magnetic field and radiofrequency pulses are transmitted into the patient in an extremely controlled and defined manner. An MRI provides 3-D images of the body's interior, delineating muscle, bone, blood vessel, nerve, organ, and tumor tissue.

32 **MRI – Brain:** Magnetic Resonance Imaging of the brain. Procedure in which the patient is placed in a strong magnetic field and radiofrequency pulses are transmitted into the patient in an extremely controlled and defined manner. An MRI provides 3-D images of the body's interior, delineating muscle, bone, blood vessel, nerve, organ, and tumor tissue.

33 **MRI – Chest:** Magnetic Resonance Imaging of the chest. Procedure in which the patient is placed in a strong magnetic field and radiofrequency pulses are transmitted into the patient in an extremely controlled and defined manner. An MRI provides 3-D images of the body's interior, delineating muscle, bone, blood vessel, nerve, organ, and tumor tissue.

35 **MRI – Other (Specify):** Other MRI not otherwise specified by a procedure code. The line next to the procedure code should be used to record the site of the MRI.

36 **Other (Specify):** A diagnostic or staging procedure other than those listed in the procedure codes.

37 **Radiograph – Other (Specify):** Includes any type of x-ray film study other than those listed in the procedure codes. The line next to the procedure code should be used to record the site of the x-ray.

39 **Pulmonary function tests/spirometry:** Spirometry (meaning *the measuring of breath*) is the most common of the Pulmonary Function Tests (PFTs), measuring lung function, specifically the measurement of the amount (volume) and/or speed

(flow) of air that can be inhaled and exhaled. Spirometry is an important tool used for assessing conditions such as asthma, cystic fibrosis, and COPD. The following is a list of the components of a PFT.

- **TLC**: Total lung capacity is the volume of air in the lungs after maximal inspiration.
- **VC**: Vital capacity is the maximum volume of air exhaled from the point of maximum inspiration.
- **FVC**: Forced vital capacity is the vital capacity measured during a maximally forced expiratory effort.
- **FRC**: Functional residual capacity is the volume of air remaining in the lungs at the end-expiratory position.
- **RV**: Residual volume is that volume of air remaining in the lungs after maximal exhalation.
- **IC, ERV**: Dividing the vital capacity into portions above and below the functional residual capacity defines the inspiratory capacity and expiratory reserve volume.
- **VT**: Tidal volume is the volume exhaled during normal breathing, and may increase, during exercise, to a large fraction of vital capacity.
- **FEV1**: Forced expiratory volume in 1 second is the volume of air exhaled in the first second of the forced vital capacity.
- **FEV1/FVC%**: The FEV1-to-FVC ratio, expressed as a percentage.
- **FEF75**: Instantaneous forced expiratory flow after 75% of the FVC has been exhaled.
- **MVV**: Maximal voluntary ventilation. The volume of air expired in a specified period during repetitive maximal respiratory effort, expressed as L/min.
- **PO2, PCO2**: Partial pressure of the indicated gas in air, blood, or other liquid, expressed in the same units as barometric pressure (mm Hg or kP).
- **FIO2**: Fractional inspired oxygen concentration, e.g., the FIO2 of air is 0.21.

40 **Radionuclide scan – Bone:** A nuclear medicine study to detect bone abnormalities. The patient is injected with a small amount of radioactive material and then scanned with a Gamma camera, a device sensitive to the radiation emitted by the injected material. About half of the radioactive material is localized by the bones. The more active the bone turnover, the more radioactive material will be seen. Some tumors, fractures, and infections show up as areas of increased uptake. Others can cause decreased uptake of radioactive material.

41 **Radionuclide scan – Brain:** A nuclear medicine study utilizing radiopharmaceutical agents to visualize the brain. Also known as brain scintigraphy, Ceretec brain scan, and Spectamine brain scan.

42 **Radionuclide scan – Liver:** A nuclear medicine study utilizing radiopharmaceutical agents to visualize the liver. Also known as liver scintigraphy, liver and spleen scan, radioisotope hepatic scan, and spleen scan.

43 **Resection:** While lobectomy and pneumonectomy are treatments for lung cancer, record 43-Resection if a wedge resection, lobectomy, or pneumonectomy provides diagnostic/staging information. If done during the same procedure/ operation, then consider the surgical removal collectively as one resection. The exception is when a procedure involves an interruption to allow for an intraoperative pathology review for diagnosis. For example, if cancer is not previously confirmed, and a diagnostic wedge resection of the lung nodule is done and upon intraoperative pathology review, cancer is confirmed so a lobectomy is now performed, these procedures should be recorded separately. The diagnostic wedge resection should be recorded as an open surgical biopsy and the lobectomy as a resection.

- Wedge Resection (segmentectomy) – the surgical removal of a segment or wedge-shaped piece of the lung.
- Lobectomy – the surgical removal of one lobe of the lung.
- Bi-lobectomy – the surgical removal of two lobes of the lung.
- Pneumonectomy – the surgical removal of an entire lung.

46 **Thoracotomy:** A surgical incision into the chest. It is performed to gain access to the thoracic organs, most commonly the heart, the lungs, the esophagus, or thoracic aorta, or for access to the anterior spine. Thoracotomy is a major surgical maneuver – the first step in thoracic surgery, which involves major procedures such as coronary artery bypass surgery and pneumonectomy for lung cancer. There are many different approaches to thoracotomy. The most common modalities of thoracotomy follow.

- Median thoracotomy provides wide access to the mediastinum and is the incision of choice for most open-heart surgery.
- Posterolateral thoracotomy is a common approach for operations on the lungs or mediastinum, including the esophagus. When performed over the fifth intercostal space, it allows optimal access to the pulmonary hilum (pulmonary artery and pulmonary vein) and therefore is considered the approach of choice for pulmonary resection (pneumonectomy and pulmonary lobectomy).
- Anterolateral thoracotomy is performed upon the anterior chest wall.
- Bilateral anterolateral thoracotomy combined with transverse sternotomy results in the "clamshell" incision, the largest incision commonly used in thoracic surgery.

47 **Thoracentesis:** The insertion of a hollow trocar or needle with a cannula into the pleural cavity or lung space to remove fluid from the lung. A diagnostic thoracentesis is most frequently performed to determine the etiology of a pleural effusion. Pleural fluid analysis is important in the diagnosis and staging of a suspected or known malignancy. A therapeutic thoracentesis is performed to relieve respiratory insufficiency caused by a large pleural effusion. It can be used to introduce sclerosing or antineoplastic agents into the pleural space after removing pleural fluid.

48 **Ultrasound (Specify):** Medical ultrasonography (sonography) is an ultrasound-based diagnostic imaging technique used to visualize muscles and internal organs, their size, structure, and any pathological lesions, making them useful for scanning the organs. Ultrasonography (sonography) is widely utilized in

medicine. It is possible to perform diagnosis or therapeutic procedures with the guidance of ultrasonography (for instance biopsies or drainage of fluid collections). Typically uses a hand-held probe (often called a scan head or transducer) that is placed directly on and moved over the patient: a water-based gel ensures good coupling between the patient and scan head. The line next to the procedure code should be used to specify the site of the ultrasound.

49 **Thoracoscopy:** The insertion of an endoscope, a narrow-diameter tube with a viewing mirror or camera attachment, through a very small incision (cut) in the chest wall. Thoracoscopy makes it possible to examine the lungs or other structures in the chest cavity, without making a large incision. It is an alternative to thoracotomy (opening the chest cavity with a large incision). Many surgical procedures, especially taking tissue samples (biopsies), can also be accomplished with thoracoscopy.

50 **Biopsy – Thoracoscopic:** Biopsy performed via thoracoscopy.

52 **Biopsy – Percutaneous adrenal:** A biopsy procedure whereby a needle or trocar is inserted through the skin (percutaneous) into the adrenal gland. Cells and tissue fragments are recovered for histologic or cytologic analysis.

53 **Biopsy – Percutaneous transthoracic yielding histology:** A biopsy procedure whereby a needle or trocar is inserted through the skin (percutaneous) into the chest and tissue fragments are recovered for histologic analysis.

54 **Bronchoscopy without biopsy or cytology:** Bronchoscopy (either flexible fiberoptic bronchoscope or a rigid bronchoscope) allows direct visual examination of the upper airway and tracheobronchial tree, sampling of respiratory tract secretions and cells, and biopsy of airway, lung, and mediastinal structures.

55 **CT – Abdomen (or liver):** Computed Tomography or Computed Transaxial Tomography of the abdomen or liver. Procedure wherein a computerized tomography scanner is used to scan and produce an axial image of an organ or area of the body. An abdominal CT scan may include the liver, spleen, kidneys, pancreas, aorta, retroperitoneum, gastrointestinal tract, and pelvis for the purposes of diagnosis and/or evaluation of cysts, tumors, masses, aneurysms, metastases, abscesses, and trauma.

56 **CT – Chest, plus contrast-enhanced nodule densitometry:** CT densitometry measures the attenuation coefficients of a particular lesion to determine its density. The results are expressed in Hounsfield units (HU).

57 **CT – Chest, diagnostic:** Computed Tomography or Computed Transaxial Tomography of the chest. Procedure wherein a computerized tomography scanner is used to scan and produce an axial image of an organ or area of the body. Includes any routine chest CT, either spiral or non-spiral, and either with or without contrast.

58 **Cytology – Bronchoscopic:** Cytology acquired during bronchoscopy.

59 **Cytology – Percutaneous transthoracic:** A procedure whereby a needle or trocar is inserted through the skin (percutaneous) into the chest. This procedure is used to obtain cytologic specimens from lung and mediastinal lesions, especially peripheral nodules in the lung parenchyma and pleural space. Less frequently, it is used to obtain specimens from infected areas of the lung for direct smear and culture for identification of specific pathogens.

60 **Cytology – Other (Specify):** Other cytology not otherwise specified by a procedure code. The line next to the procedure code should be used to record the site from where the cytology was collected.

61 **Echocardiography:** The echocardiogram is an ultrasound of the heart. Using standard ultrasound techniques, two-dimensional slices of the heart can be imaged. The latest ultrasound systems now employ 3-D real-time imaging. The standard echocardiogram is also known as a transthoracic echocardiogram, or TTE. In this case, the echocardiography transducer (or probe) is placed on the chest wall (or thorax) of the subject, and images are taken through the chest wall. This is a non-invasive, highly accurate, and quick assessment of the overall health of the heart. A cardiologist can quickly assess a patient's heart valves and degree of heart muscle contraction (an indicator of the ejection fraction). The TTE is a popular test which keeps improving with more and more advances in the field. Another method to perform an echocardiogram is to insert a specialized scope containing an echocardiography transducer (TEE probe) into the patient's esophagus, and record pictures from there. This is known as a transesophageal echocardiogram, or TEE. The advantages of TEE over TTE are clearer images, since the transducer is closer to the heart. Some structures are better imaged with the TEE. These structures include the aorta, the pulmonary artery, the valves of the heart, and the left and right atria. While TTE can be performed easily and without pain for the patient, TEE may require light sedation and a local anesthetic lubricant for the esophagus. Unlike the TTE, the TEE is considered an invasive procedure. In addition to creating two-dimensional pictures of the cardiovascular system, the echocardiogram can also produce accurate assessment of the velocity of blood and cardiac tissue at any arbitrary point using Pulsed or Continuous wave Doppler ultrasound. This allows assessment of cardiac valve areas and function, any abnormal communications between the left and right side of the heart, any leaking of blood through the valves (valvular regurgitation), and calculation of the cardiac output as well as the ejection fraction.

62 **MRI – Abdomen (or liver):** Magnetic Resonance Imaging of the abdomen or liver. Procedure in which the patient is placed in a strong magnetic field and radiofrequency pulses are transmitted into the patient in an extremely controlled and defined manner. An MRI provides 3-D images of the body's interior, delineating muscle, bone, blood vessel, nerve, organ, and tumor tissue.

63 **Radionuclide scan – FDG-PET scan:** A nuclear medicine medical imaging technique which produces a three dimensional image or map of functional processes in the body. A short-lived radioactive tracer isotope which decays by emitting a positron, chemically incorporated into a metabolically active molecule, is injected into the blood circulation. There is a waiting period while the metabolically active molecule (usually a sugar) becomes concentrated in

tissues of interest, then the subject is placed in the imaging scanner. The short-lived isotope decays, emitting a positron. After travelling up to a few millimeters the positron annihilates with an electron, producing a pair of annihilation photons (similar to gamma rays) moving in opposite directions. These are detected when they reach a scintillator material in the scanning device, creating a burst of light which is detected by photomultiplier tubes. PET scanning with the tracer (^{18}F) fluorodeoxyglucose (FDG, FDG-PET) is widely used in clinical oncology. This tracer is a glucose analog and is taken up by cells, phosphorylated by hexokinase (whose mitochondrial form is greatly elevated in rapidly-growing malignant tumors), and retained by tissues with high metabolic activity, such as the brain, the liver, and most types of malignant tumors. As a result FDG-PET can be used for diagnosis, staging, and monitoring treatment of cancers, particularly in Hodgkin's disease, non Hodgkin's lymphoma, and lung cancer.

64 **Radionuclide scan – Gallium:** A procedure to detect areas of the body where cells are dividing rapidly. It is used to locate cancer cells or areas of inflammation. A very small amount of radioactive gallium is injected into a vein and travels through the bloodstream. The gallium is taken up by rapidly dividing cells in the bones, tissues, and organs and is detected by a scanner.

65 **Radionuclide scan – Somatostatin receptor:** A type of radionuclide scan used to find carcinoid tumors, also called Somatostatin receptor scintigraphy (SRS). In SRS, radioactive octreotide, a drug similar to somatostatin, is injected into a vein and travels through the bloodstream. The radioactive octreotide attaches to carcinoid tumor cells that have somatostatin receptors. A radiation-measuring device detects the radioactive material, showing where the carcinoid tumor cells are in the body. This procedure is also called an octreotide scan.

66 **Radionuclide scan – Ventilation/perfusion scan:** A diagnostic test for pulmonary embolism in which an x-ray of the lung records the distribution and perfusion of a radionuclide that is inhaled and a second radionuclide that is administered intravenously.

67 **Radionuclide scan – Other (Specify):** Other radionuclide scans not otherwise specified by a procedure code. The line next to the procedure code should be used to record the site of the scan.

68 **Radionuclide scan – Fusion PET/CT scan:** Fusion PET/CT scan offers the electronic fusion of CT and PET images on the same scanner. This technology allows for direct visual comparison of two different data sets. In other words, it shows how the organs look and how they are working. Traditional CT scans show the physical structure of the body in great detail, while a PET scan examines the body's chemistry, giving information about how the body is functioning.

Dosage: 13.34 mCi 18-FDG administered intravenously. After an uptake period of approximately 60 minutes, a PET/CT scan was performed from the skull base to the mid-thighs. Attenuated and non-attenuated PET images were reconstructed. The PET images, CT images, and the fused PET/CT images were reviewed on a 3-D workstation.

Technique: The PET images were acquired with F-18 fluorodeoxyglucose in the amount of 12 mCi. The CT images were acquired with oral contrast but no intravenous contrast. Imaging was performed from the base of the brain to the proximal thighs. Orthogonal tomograms of the PET, CT, and coregistered images were reconstructed.

Technique: Noncontrast CT from the skull base to upper legs was performed on the 16-slice helical scanner. One hour after intravenous injection of 16 mCi of F18-FDG (fluoroxyglucose), tomographic emission images were acquired over the same anatomy using the nuclear medicine PET scanner, reviewed in multiple planes. Data from the CT and PET scans were co-registered and the fusion images were reviewed at the workstation.

69 **CT – Chest, low dose spiral:** Computed Tomography or Computed Transaxial Tomography of the chest that utilizes a spiral and low dose technique. Includes CT exams performed as part of follow-up that are at doses similar or identical to those used in NLST.

70 **CT – Chest, limited thin section of entire lung:** Computed Tomography or Computed Transaxial Tomography of the chest that evaluates the entire lung area with thin sections.

Technique: 2.5 mm images performed through the chest without intravenous contrast.

Technique: Initially, unenhanced multidetector helical CT images were obtained through the mid-upper lung zones. Subsequently, following the uncomplicated intravenous administration of 150 ml of Omnipaque 300, multidetector helical CT scan was obtained from the thoracic inlet interior to the upper abdomen and reformatted at 2.5 mm slices through the chest and photographed in soft tissue, lung, and liver windows.

Technique: Helical axial T-2 scanning of the chest is performed at 5 mm increments without intravenous contrast. Additional thin section 1 mm scans were then reconstructed through the entire chest.

71 **CT – Chest and abdomen:** Computed Tomography or Computed Transaxial Tomography of the chest and abdomen. Procedure wherein a computerized tomography scanner is used to scan and produce an axial image of an organ or area of the body. A chest and abdomen CT, combined may extend from the lung apices to the abdominal area as one procedure. It evaluates not only the chest contents but also the parts of the abdomen, particularly lymph node abnormalities as well as the liver and spleen.

72 **CT – Chest, abdomen and pelvis:** Computed Tomography or Computed Transaxial Tomography of the chest abdomen and pelvis. Procedure wherein a computerized tomography scanner is used to scan and produce an axial image of an organ or area of the body.

4. Medical Complications: The only medical complications to be collected are the medical complications that are currently listed on the DE form under Complication Codes. General

guidelines for identifying these selected medical complications in the medical record are given below:

- Only those selected medical complications that were a result of the diagnostic evaluation or staging procedures *and that required medical attention* should be recorded.

- Information on medical complications can usually be found in the discharge summary, or the doctor's or nurse's notes within the medical record.

- Medical complications that occur up to six months after the date of diagnosis for primary invasive lung cancer should be collected. Medical complications that occur up to twelve months after the date diagnostic evaluation began should be collected for other diagnoses including non cancer diagnoses.

- Medical complications that are the result of treatment for cancer should not be recorded.

After review of the medical records to determine whether medical complications from diagnostic or staging procedures occurred, mark your response.

- **No:** If the review of the medical record indicates that none of the selected medical complications occurred, mark the box labeled "No", and go to A.5.

- **Yes:** If the record states or indicates that one or more of the selected medical complications listed on page 2 of the DE form resulted from a diagnostic or staging procedure, enter the date and the code for the complication(s) in the table. Record all complications occurring on a given date on the same line.

  The following are guidelines for coding some of the medical complications:

  01 = Acute respiratory failure: The record indicates that the participant experienced acute respiratory failure, which is sudden insufficient oxygenation that can result from a variety of causes and requires intervention. ARDs would be included here.

  02 = Allergic reaction: The record indicates that the participant experienced an allergic reaction, including swelling, itching, or rash (with or without local redness and warmth) that required treatment as a result of a diagnostic or staging procedure.

  03 = Anaphylaxis: The record indicates that the participant experienced anaphylaxis, a severe allergic reaction with a dramatic drop in blood pressure, severe wheezing, or dramatic swelling and requiring treatment with supplemental oxygen, intubation, or intravenous fluids as a result of a diagnostic or staging procedure.

  14 = Fever requiring antibiotics: The record indicates that the participant had a fever as a result of a diagnostic or staging procedure which necessitated the use of antibiotics (e.g., a fever resulting from an infection following a diagnostic or staging

procedure). Infections that are not accompanied by a fever but are treated with antibiotics should not be recorded as a medical complication.

17 = **Hospitalization post procedure**: Use only if reason for hospitalization is not another selected complication.

23 = **Pneumothorax requiring tube placement**: A pneumothorax is an accumulation of air or gas in the pleural cavity. The record indicates that the participant developed a pneumothorax, as a result of a diagnostic or staging procedure and medical intervention, specifically tube placement, was required. Often a small pneumothorax is seen after a chest procedure, but for this study, only those that required tube placement should be recorded. However, do not record the placement of a chest tube that is routinely done post-operatively from an open chest surgery. Rather record a pneumothorax as a complication if after the post-operative chest tube is removed it has to be re-inserted.

25 = **Respiratory arrest:** The record indicates that the participant experienced a respiratory arrest or cessation of breathing.

37 = **Infection requiring antibiotics:** The record indicates that the participant had an infection without fever attributable to a diagnostic or staging procedure and required antibiotics. For example, if after a bronchoscopy a participant develops pneumonia requiring antibiotics but does not have a fever because of steroid or NSAID use. This code should not be used if the antibiotics are prescribed prophylactically for a possible infection that is attributable to a diagnostic or staging procedure.

99 = **Unknown:** If you do not have all of the medical records or you cannot reliably determine complications, mark the box labeled "Unknown." Enter nines for the date of complication (e.g., 99/99/9999). Enter the appropriate complication code.

5. Result of Diagnostic Evaluation for Primary Invasive Lung Cancer: The purpose of this item is to record the overall results of the diagnostic evaluation for primary invasive lung cancer. This information should be found in the impression/conclusion sections of the various diagnostic and staging reports. Only one response should be recorded.

When multiple diagnoses are made, such as a cancer and a non-cancer diagnosis, only the most serious diagnosis should be recorded. If a primary lung malignancy is confirmed, this should always be recorded. If a primary lung malignancy is not confirmed, but another malignancy is confirmed, this should be recorded. If there is no malignancy, but one of the specific lung diagnoses is confirmed, this should be recorded.

Record the result of the diagnostic evaluation for primary invasive lung cancer as follows:

- **No malignancy, confirmed by histology or cytology:** The record indicates that no malignancy was found following diagnostic evaluation that included histology or

cytology. Mark the box, and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer, Items B.6 and B.7. Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

- **No malignancy, determined by clinical evaluation only – no pathologic proof:** The record indicates that no malignancy was found following diagnostic evaluation that included only a clinical evaluation, not histology or cytology. Mark the box, and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer, Items B.6 and B.7. Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

  A result of "No malignancy, determined by clinical evaluation only – no pathologic proof" should also be coded in the following situations:

  - When diagnostic follow-up data have been abstracted for twelve months following a positive screening examination or until the next screening examination, and the diagnosis was not conclusively malignant. Complete Part B.

  - When no diagnostic procedures are performed following a positive screening examination – (i.e., when Item A.1: Did participant undergo diagnostic procedures? is coded "No, physician report," or "No, participant self-report").

  - When the record clearly indicates that follow-up by a health care provider, or "active surveillance," is scheduled on a regular basis, such as every six months, to ensure stability of an abnormality.

- **Primary invasive lung malignancy confirmed histologically:** The record indicates that the participant has been diagnosed with primary invasive lung cancer, confirmed by histologic examination (study of tissue). Diagnosis of Carcinoid of the lung should be included here. Diagnosis of extranodal lymphoma of the lung, sarcoma of the lung, and neoplasm of uncertain behavior *should not* be included here as primary lung malignancies. Histologic information may come from a biopsy, and can be found on the pathology report, sometimes called a histopathology report. Mark the box and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer and Part C: Primary Invasive Lung Cancer Diagnosis Information.

- **Primary invasive lung malignancy confirmed cytologically:** The record indicates that the participant has been diagnosed with primary invasive lung cancer, confirmed by cytologic examination (study of cells). Diagnosis of Carcinoid of the lung should be included here. Diagnosis of extranodal lymphoma of the lung, sarcoma of the lung, and neoplasm of uncertain behavior *should not* be included here as primary lung malignancies. Diagnosis from cytologic information may come from a bronchial brushing or washing, or a fine-needle aspiration, and can be found on the cytology report, sometimes called a cytopathology report. Mark the box and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer and Part C: Primary Invasive Lung Cancer Diagnosis Information.

  NOTE: If the lung malignancy was confirmed by both histologic and cytologic examination, information from histologic confirmation takes precedence over

cytologic confirmation, and is the basis to answer Item A.5. If both histologic and cytologic examinations are present yet yield inconclusive results (e.g., "suspicious" for malignancy, but not confirmed) then Item A.5 must be recorded as "Primary lung malignancy diagnosed by clinical examination only – no pathologic proof."

- **Primary invasive lung malignancy diagnosed by clinical examination only – no pathologic proof**: The record indicates that the participant has been diagnosed with primary invasive lung cancer by clinical examination and the diagnosis has not been confirmed by histologic examination (study of tissue) or cytologic examination (study of cells) prior to disease modifying treatment (except for neoadjuvent treatment). It is an extremely rare event for a malignancy to be confirmed only by clinical examination and not histologically or cytologically. Mark the box and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer and Part C: Primary Invasive Lung Cancer Diagnosis Information. In the case of a clinically diagnosed lung cancer, Items C.14a and C.14b should be left blank; however, if treatment is given and then there is subsequent histologic or cytologic confirmation then this should be documented in C.14a and C.14b with an explanation in Item D.18 (Comments). In those cases where there is no cytologic or histologic confirmation of cancer prior to treatment, the results of the diagnostic evaluation remains "diagnosed by clinical evaluation only – no pathologic proof."

- **Malignancy other than primary invasive lung cancer, with or without lung metastasis, confirmed by histology or cytology:** The diagnosis of a malignancy other than primary invasive lung cancer was confirmed by histologic examination (study of tissue) or cytologic examination (study of cells). Histologic information can be found on the histology report, sometimes called the histopathology report, and cytologic information can be found on the cytology report, sometimes referred to as a cytopathology report. Mark the box and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer. Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

  - This answer category should also be coded if the diagnostic evaluation for primary invasive lung cancer reveals a malignancy (including a lung malignancy) that is a *metastasis* from a primary cancer site other than the lung. In this situation, the *primary* cancer site should be recorded in Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer.

- **Malignancy other than primary invasive lung cancer, with or without lung metastasis, diagnosed by clinical evaluation only – no pathologic proof:** The diagnosis of a malignancy other than primary invasive lung cancer was confirmed by clinical evaluation only without documented pathological proof (histology or cytology). The MRA should make every attempt to determine if pathological proof is available prior to accepting the clinical evaluation as the only diagnosis. Mark the box and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer. Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

  - This answer category should also be coded if the clinical evaluation for primary invasive lung cancer reveals a malignancy (including a lung malignancy) that is a *metastasis* from a primary cancer site other than the lung. In this situation,

the *primary* cancer site should be recorded in Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer.

- **Diffuse idiopathic pulmonary neuroendocrine hyperplasia:** The record indicates that the participant has been diagnosed with diffuse idiopathic pulmonary neuroendocrine hyperplasia. Mark the box, and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer, code the ICD-O-3 code (Item B.7a) and date of diagnosis (Item B.7b). Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

- **Carcinoma in situ:** The record indicates that the participant has been diagnosed with carcinoma in situ, confirmed by histologic examination. Carcinoma in situ is defined as malignant cell changes in the epithelial tissue that have not extended beyond the basement membrane of the mucosa. In situ may also be expressed as intraepithelial, non-infiltrating, non-invasive, pre-invasive, or no stromal invasion. Mark the box, and complete Part B, Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer, code the ICD-O-3 code (Item B.7a) and date of diagnosis (Item B.7b). Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

- **Neoplasm of uncertain behavior:** The record indicates that the participant has been diagnosed with neoplasm of uncertain behavior, confirmed by histologic examination. A neoplasm of uncertain behavior is defined as a tumor that is no longer consistent with a benign neoplasm, but also does not have characteristics consistent with a malignancy. Neoplasms of uncertain behavior are certain histomorphologically well-defined neoplasms, the subsequent behavior of which can not be predicted from the present appearance. These are not, however, a malignancy at the time of diagnosis. Mark the box, and complete Part B, Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer, code the ICD-O-3 code (Item B.7a) and date of diagnosis (Item B.7b). Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

- **Squamous dysplasia:** The record indicates that the participant has been diagnosed with squamous dysplasia. Mark the box, and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer, code the ICD-O-3 code (Item B.7a) and date of diagnosis (Item B.7b). Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

- **Atypical adenomatous hyperplasia – Lung:** The record indicates that the participant has been diagnosed with atypical adenomatous hyperplasia. Mark the box, and complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer, code the ICD-O-3 code (Item B.7a) and date of diagnosis (Item B.7b). Do not complete Part C: Primary Invasive Lung Cancer Diagnosis Information.

- **Further follow-up required:** The record indicates that an abnormality was identified and no conclusive diagnosis was made. The health care provider indicates that it is necessary to re-evaluate the abnormality with a procedure that might provide conclusive diagnosis two to three months after the regular window of data collection has ended for that study year. This code should not be used when the record clearly indicates that follow-up, or "active surveillance," is scheduled on a regular basis, such

as every six months, to ensure stability of an abnormality. For "Further follow-up required" there must be a heightened suspicion for the possibility of primary invasive lung cancer, but the evaluation was not quite done prior to the close of the data collection window. Mark the box and go to Item D.18 (Comments), to record the reason for further follow-up. Do not complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer or Part C: Primary Invasive Lung Cancer Diagnosis Information.

The SC must continue to collect medical records and update the DE form when more information becomes available. A DE form with a result of "Further follow-up required" must be updated before the close of the next study year window (i.e., a T_1 DE form with "Further follow-up required" must be updated before the end of the T_2 study year.)

- **No information available:** There is equivocal or no information available in the record regarding the result of the diagnostic evaluation for primary invasive lung cancer. Mark the box and go to Item D.18 (Comments), and record the reasons that a diagnosis could not be recorded. Do not complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer or Part C: Primary Invasive Lung Cancer Diagnosis Information.

  - "No information available" should also be coded in the situation when diagnostic evaluation procedures are discontinued by the participant, and it cannot be determined conclusively whether the participant had no malignancy or had a lung or other malignancy.

*Note: When the participant has both a primary invasive lung cancer and an other (cancer or non-cancer) diagnosis, the MRA should complete only **one** DE form. The MRA will complete A.5, Result of Diagnostic Evaluation for Primary Invasive Lung Cancer, by selecting the appropriate box for lung cancer, and will complete Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer and Part C: Primary Invasive Lung Cancer Diagnosis Information.*

Part B: Diagnosis Information for Any Condition Other Than Primary Invasive Lung Cancer:

Only diagnoses resulting from the diagnostic evaluation that have not been indicated in Item A.5 will be documented in this section. Many participants have multiple medical problems, include here medical problems identified through the diagnostic evaluation process which could include such things as any cancer other than lung; any pre-invasive neoplasm of uncertain behavior that is from a site other than the lung; and other non-cancer lung diagnoses such as emphysema, to name a few. The diagnosis of the other medical problems should be recorded from documents in the medical record that are prefaced with "Diagnosis/Impression/Conclusion/Assessment." These should be obtained directly from the participant's health care provider when the SC contacts him/her during follow-up of a positive screening examination. Depending on the extent of the information available and the health care provider's preference, the requested information may be obtained either by phone or written documentation. The diagnosis can be from a source other than the original diagnosing physician as long as the source states the original diagnosis. One example is a progress note. A pathology report documenting a benign condition is also an appropriate source.

Multiple Diagnoses: If the result of the diagnostic evaluation was a cancer other than the lung **and** a selected medical condition, record the selected medical condition in the space for

the ICD-9-CM code in B.6a & B6.b, and record the cancer in B.7a, B7b.and B.7c. [Only cancers other than primary invasive lung cancers should be recorded in B.7.]

For example, if the result of diagnostic evaluation is granuloma as well as a metastatic renal cancer, record the specified code for granuloma in B.6 and record the renal cancer B.7.

If more than one condition or cancer other than lung results from the diagnostic evaluation, the corresponding ICD-9-CM codes, ICD-O-3 codes, and dates of diagnosis should be recorded in Item D.18 (Comments). Begin your statement in Comments with the verbatim as recorded in the following example:

Item D.18 (Comments):

Item #	Comments
B.6	Additional Conditions are: ICD-9-CM code(s) – Date(s) of diagnosis -

AND/OR

Item #	Comments
B.7	Additional Other Cancer Diagnosis are: ICD-O-3 code(s) – Date(s) of diagnosis -

6a. Non-Cancer Diagnosis: This item is to be used to record all diagnoses other than cancer. If a condition other than cancer has been recorded in A.5, mark the box for "Yes" and complete the ICD-9-CM Classification, Date of Diagnosis, and Nosologist/Abstractor ID #. If a condition other than cancer has not been diagnosed, mark the box for "No" and go to Item D.18 (Comments) (Item B.6b will be left blank). Item B.7a is only completed if a malignancy other than primary invasive lung cancer was diagnosed.

ICD-9-CM Classification: Any non-cancer diagnosis must be classified according to ICD-9-CM (International Classification of Diseases, 9th Revision, Clinical Modification). ICD-9-CM coding for the NLST/LSS must be consistent with the national ICD-9-CM coding standards and should not be influenced by specific institutional coding philosophies.

6b. Date of Diagnosis: Record the date of diagnostic determination for the condition recorded in Item B.6a. Operative reports are generally more accurate for date of procedure than surgical pathology reports, so in the case of a discrepancy, record the date of procedure from the operative report as the date of diagnosis.

If the exact date of diagnosis cannot be determined from the record, year and month can usually be assessed. In this situation, record the exact month and year and the day as "99." Zero fill month and day, and record the last two digits of the year (e.g., 02/07/2002). For any portion of the date that is unknown, record "9's."

Nosologist/Abstractor ID#: Record the staff ID number for the nosologist/abstractor who completed the ICD-9-CM Classification.

7a. Cancer Diagnosis, Site other than primary invasive lung: This item is used to record all cancer diagnoses other than primary invasive lung cancer. If a cancer other than primary invasive lung cancer has been diagnosed, mark the box for "Yes" and complete the ICD-O-3 Cancer Classification, Date of Diagnosis, and CTR ID#. If a cancer other than primary invasive lung cancer has not been diagnosed, mark the box for "No." Remember to record only primary cancer from sites other than the lung, not the metastic site of the cancer, in Part B. The cancer that is recorded should be a result of the diagnostic evaluation and not an incidental finding from review of the medical record or other work up. Those cancers documented in Part B do not need to be documented on the CNF. Include here extranodal lymphoma of the lung and primary sarcoma of the lung. Also record lung carcinoma in situ; neoplasm of uncertain behavior; diffuse idiopathic pulmonary neuroendocrine hyperplasia; squamous dysplasia; and atypical adenomatus hyperplasia in this section.

ICD-O-3 Cancer Classification: This is the ICD-O-3 coding for cancer or neoplasms of uncertain behavior, with the origin other than lung. This item must be completed by a CTR who should enter the ten-digit ICD-O-3 classification code in the space provided. When the diagnosis of the cancer is from metastatic tissue (such as a lymph node) and not from the primary cancer site, record the ICD-O-3 grade as 9 (unknown). Place an asterisk by B.7a and record the grade of the metastatic tissue, if known, in Item D.18 (Comments).

7b. Date of Diagnosis: Record the date of diagnostic determination for the cancer recorded in the ICD-O-3 Cancer Classification. This is the date the abnormality is determined to be another (non-lung) cancer, and <u>not</u> the original date of diagnosis of the primary cancer, should the findings represent metastasis to the lung. For example, if the participant has a history of breast cancer diagnosed in 1992, and has a positive screen in 2002 that represents metastatic disease to the lung from breast cancer, record the date when the abnormality is determined to be a metastasis from the breast. Operative reports are generally more accurate for date of procedure than surgical pathology reports, so in the case of a discrepancy, record the date of procedure from the operative report as the date of diagnosis.

If the exact date of diagnosis cannot be determined from the record, year and month can usually be assessed. In this situation, record the exact month and year and the day as "99." Zero fill month and day, and record the last two digits of the year (e.g., 02/07/<u>20</u>02). For any portion of the date that is unknown, record "9's."

CTR ID#: Record the staff ID number for the CTR or CTR-eligible individual who completed the ICD-O-3 Cancer Classification.

7c. Is this Cancer Metastatic to Lung? Mark the box to indicate whether or not the cancer in B.7a has metastasized to the lung.

<u>Part C: Primary Invasive Lung Cancer Diagnosis Information:</u>

This section documents all relevant information pertaining to a primary invasive lung cancer diagnosis. If the participant was diagnosed with more than one primary invasive lung cancer, record information about the first (i.e., chronologically by date of diagnosis) primary in Part C. For all subsequent primaries use another DE form (refer to instructions for multiple primary invasive lung cancer in the Administrative Section of these specifications). If more than one primary was diagnosed on the first date of diagnosis, record information about the most advanced cancer diagnosed on that day in Part C, and use additional DE forms for any other cancers diagnosed on that day.

8. Date of Primary Invasive Lung Cancer Diagnosis: Record the month, day, and year of the primary invasive lung cancer diagnosis. The date recorded should be the earliest result of the diagnostic evaluation, determined by clinical evaluation, cytology, or histopathology that ***initially*** prompted a decision to treat the primary invasive lung cancer. If there are multiple reports that confirmed the primary cancer, record the earliest date available.

If the date corresponds to a histology/histopathology or cytology/cytopathology report, then record the date that the actual procedure (biopsy, surgery, aspiration of cells, etc.) was performed that confirmed this primary invasive lung cancer diagnosis. Operative reports are generally more accurate for date of procedure than surgical pathology reports, so in the case of a discrepancy, record the date of procedure from the operative report.

In the rare situation in which primary invasive lung cancer was diagnosed by clinical examination only and not histologically or cytologically, the date of first lung cancer diagnosis is the date of the clinical examination that diagnosed the cancer prior to the initiation of treatment.

Zero fill month and day, and record the last two digits of the year (e.g., 02/07/2002) of the date of diagnosis of primary invasive lung cancer. If confirmed histologically or cytologically, this date will correspond to the date of a procedure in Item A.3. If clinically confirmed, this date will correspond to another procedure in Item A.3. An exact date is expected.

9. Photocopy of Report Confirming Primary Invasive Lung Cancer: The purpose of this item is to document that the clinical examination record, the histology/histopathology report, or the cytology/cytopathology report that confirmed the primary invasive lung cancer has been photocopied and placed in the participant's study file.

- If there are multiple pathology reports confirming this primary invasive lung cancer, the photocopy should be of the first histology or cytology report which was the source for the date of the primary invasive lung cancer diagnosis recorded in Item C.8, and the ICD-O-3 code recorded in Item C.11. If the Date of Primary Invasive Lung Cancer Diagnosis and the ICD-O-3 Cancer Classification came from different reports, keep copies of both reports.

- A situation may arise in which an institution does not allow the photocopying of records. Every reasonable attempt should be made to obtain permission to photocopy the histology or cytology report since it captures critical information. If special permission or approval is required, the abstractor should work with the SC Coordinator/Principal Investigator to obtain the necessary approval. If this item cannot be completed in a timely manner, mark "Report exists but cannot be obtained."

Mark the box to indicate whether a photocopy of the histology or cytology report is available as follows:

- **No Report/Clinical Examination:** There is no histology or cytology report in the medical record. This is the rare occasion where primary invasive lung cancer was diagnosed by clinical examination, and not histologically or cytologically confirmed. In this situation, Item C.10, Verbatim Description of Primary Invasive Lung Cancer Diagnosis, must be completed.

- **Histology/Histopathology:** The histology report is available and a photocopy has been obtained and placed in the participant's study file. The photocopy should be labeled with the PID, titled "medical record abstract/histology report," and inserted into the participant's folder.

- **Cytology/Cytopathology:** The cytology report is available and a photocopy has been obtained and placed in the participant's study file. The photocopy should be labeled with the PID, titled "medical record abstract/cytology report," and inserted into the participant's folder.

- **Report exists but cannot be obtained:** The histology or cytology report exists in the medical record, but a photocopy cannot be obtained. Place an asterisk by Item C.9, and provide a detailed explanation in the Comments section (Item D.18) of why the pathology report cannot be obtained. In this situation, Item C.10, Verbatim Description of Primary Invasive Lung Cancer Diagnosis, must be completed. Begin your statement in Comments with the verbatim as recorded in the following example:

Item D.18 (Comments):

Item #	Comments
C.9	Histology or cytology report cannot be obtained because:

10. Verbatim Description of Primary Invasive Lung Cancer Diagnosis: This item is concerned with the actual physician diagnosis of primary invasive lung cancer. This item is optional except in the following situations:

- The diagnosis is based on clinical examination only and not histology/cytology; or

- The SC is unable to obtain a copy of the histology or cytology report that corresponds to the ICD-O-3 code in Item C.11.

Record the verbatim description of the primary invasive lung cancer diagnosis from the histology/histopathology report (or cytology/cytopathology report if a pathology report is not available). The verbatim description should come from the diagnosis section of the *earliest* (chronological) histology report (or cytology report if the histology report is not available) that had an adequate specimen and that confirms the cancer diagnosis.

- Occasionally, the diagnosis section will say "see above" or "see microscopic." In this situation record verbatim all of the information from the appropriate section of the report that pertains to the cancer diagnosis.

- Do not record any information about metastases or recurrent cancer.

- Do not record any information about benign conditions listed in the diagnosis section of the histology or cytology report.

11a. ICD-O-3 Cancer Classification: This item is for classifying the physician diagnosis of the primary invasive lung cancer according to ICD-O-3 (International Classification of Diseases for Oncology, Third edition, 2000) and should be based on histology, if available.

NOTE: This item is to be completed by a Tumor Registrar who is a CTR or CTR-eligible individual.

The CTR or CTR-eligible individual should code the ten digit ICD-O-3 classification in the space provided above "Topography," "Morphology," "Behavior," and "Grade." The CTR or CTR-eligible individual should also record his/her four-digit staff ID number in the space provided.

- The ICD-O-3 code should be based on the earliest histology specimen that confirms the diagnosis. This may not be the earliest confirmation of the cancer (i.e., clinical evaluation or cytological confirmation) as reflected in C.8 – Date of Primary Invasive Lung Cancer Diagnosis.

- If the record clearly indicates that primary invasive lung cancer was confirmed by a histology or cytology report but the report is not available, code the diagnosis from other available documents, (i.e. physician's notes, progress reports, etc.) that reference the earliest procedure from an adequate specimen. Indicate the source used to derive the ICD-O-3 code in Item C.11b. If the histology and cytology report are unavailable, and another source was used then place an asterisk by Item C.11b, and indicate in the Comments section the source of the diagnosis. Begin your statement in Comments with the verbatim as recorded in the following example:

Item D.18 (Comments):

Item #	Comments
C.11b	Histology or cytology report not available. Source of diagnosis is:

- When the diagnosis of the cancer is from metastatic tissue (such as a lymph node) and not from the primary cancer site, record the ICD-O-3 grade as 9 (unknown), place an asterisk by C.11a, and record the grade of the metastatic tissue obtained, if known, in Comments, D.18.

- If the primary invasive lung cancer was diagnosed by clinical examination only, code the diagnosis using the report from the clinical examination that diagnosed the cancer. Using the clinical examination report, complete as much of C.11 as is known.

- The ICD-O-3 cancer classification should be entered by the CTR or CTR-eligible individual regardless of whether the ICD-O-3 code is available in the medical record.

11b. Source: This item is for classifying the source used for coding the ICD-O-3 code. In most cases the source will be histology, but in some instances cytology can be used when supporting histology documentation is not present. The most complete information on the tumor should be coded even if it requires using information from different sources.

Occasionally both histology and cytology documentation will be used to derive the ICD-O-3 code describing the type of primary invasive lung cancer. In this instance, indicate that both were used and complete the comments in Item D.18 indicating why both types of supporting documentation were necessary to derive the ICD-O-3 code. If there is an unknown component of an ICD-O-3 code from the initial biopsy that confirmed the cancer, and a later specimen is obtained that provides the missing information, then the CTR should use the information form both histological and cytological samples to have the ICD-O-3

code be as complete as possible. An example of when a combined source would be used is if the diagnosis is confirmed from cytology from a pleural effusion but there is tissue obtained from an additional procedure. The confirmation from the cytology would provide information for all but the grade of the primary tumor (as the grade of a metastatic site cannot be attributed to the primary tumor). Rather than record "9" to indicate that the information regarding grade is missing based on the cytological specimen, record the actual grade from the histological sample obtained from the subsequent procedure.

Mark the box to indicate whether the histology, cytology, combined cytology and histology, or clinical examination results were used to derive the ICD-O-3 code as follows:

- **Histology:** The histology report is available and was used to derive the ICD-O-3 code regardless of whether a photocopy of the documentation was obtained for the participant's folder.

- **Cytology:** The cytology report is available and was used to derive the ICD-O-3 code regardless of whether a photocopy of the documentation was obtained for the participant's study folder.

- **Combined (Cytology and Histology):** The histology and cytology reports are available and were both used to derive the ICD-O-3 code regardless of whether a photocopy of the documentation was obtained for the participant's study folder. Provide a detailed explanation of why both types of reports were used to derive the ICD-O-3 code in the Comments section (Item D.18).

- **Clinical:** The ICD-O-3 code was derived based on clinical examination only (no pathological proof). Provide a detailed explanation of why the results of the clinical examination were used to derive the ICD-O-3 code in the Comments section (Item D.18).

12. **Primary Tumor Location:** This item is to document the site of origin of the malignant lung tumor, as determined by a surgical report, pathology report, or radiology report. Mark all boxes that correspond to the site of origin. If the primary tumor location is unknown or not mentioned in the record, mark the box next to "Unknown." For example, if the primary tumor is in the right upper lobe and the satellite metastasis is noted in the right middle lobe, then only the right upper lobe would be recorded. If the primary tumor is overlapping the right upper and middle lobes, then both would be marked. Note that generally the topography code in C.11 should match the location indicated in C.12. (Note in the Comments section if there is a reason for the difference.)

13. **Pathology Lesion Size:** This item documents the size of the tumor (lesion) at its maximum dimension in millimeters. This information can be determined from the pathology report (preferable), operative report, or radiology report. If the size of the lesion cannot be determined, or if the information is unknown or not recorded, the "999" should be entered. The boxes should be zero filled as necessary.

14a. **Pathologic Type for Primary Invasive Lung Cancer:** This item is to be completed only by a CTR or CTR-eligible individual. This refers to the ICD-O-3 morphology code and behavior for the type of cell composing the tumor, usually determined by the pathologist from a tissue specimen. This information can be obtained from the histology or cytology report. If there are multiple reports that confirmed the primary invasive lung cancer, use information from the report that collected the most tissue. If there is no histology report (no tissue obtained), but there is cytological confirmation, then cytology can be used. If neither

a histology report nor a cytology report is available, this information may be found in the discharge summary, or an operative report. If the histopathologic type is obtained from a source other than the pathology report, place an asterisk by C.14, and record the source of the information in Comments (Item D.18). Begin your statement in Comments with the verbatim as recorded in the following example:

Item D.18 (Comments):

Item #	Comments
C.14	Source of histopathologic type of lesion is:

- If the cancer was diagnosed by clinical evaluation only – no pathologic proof, this item should be left blank. If pathologic information becomes available after treatment, this information should be updated and an explanation provided in Item D.18 (Comments).

- If the cancer has two different histopathologic types, the diagnosis is usually based on the predominant type. This should be stated in the pathology report. In this situation, record the predominant histopathologic type. If the pathology report does not indicate a predominant type, record the first type in Item C.14, place an asterisk by Item C.14, and record the other type(s) in the Comments section. Begin your statement in Comments with the verbatim as recorded in the following example:

Item D.18 (Comments):

Item #	Comments
C.14	Additional histopathologic type of lesion is:

- If the histopathologic type is unknown or not available, the appropriate general ICD-O-3 code such as 8000/3 or 8000/1 in the spaces provided. An example of when to use this is if the lung cancer diagnosis is confirmed in the absence of pathologic proof and the tissue is obtained post treatment. Record "9's" for the date indicating unknown or not applicable.

- Note that if a specific histopathologic type is recorded for the ICD-O-3 in C.11, this question cannot be completed with a nonspecific morphology code and unknown date.

- While the morphology that is recorded in C.14a may not exactly match what is recorded in C.11, there should be some similarity. For example, if on the biopsy that confirms a squamous cell carcinoma, NOS is noted, in C.11 the morphology code would be 8070/3. However, in a subsequent lobectomy, the pathology is reported to be squamous cell carcinoma, large cell, nonkeratinizing, NOS, in C.14a the morphology code would be 8072/3. This is a reasonable change. What would not be expected is a combination of squamous cell carcinoma from a biopsy (8070/3), and small cell carcinoma (8043/3) from a wedge resection. If such a difference in morphology of the primary tumor is noted from a biopsy to a later resection, record a note in the comments section that the difference was verified.

14b. Date of Pathologic Confirmation: This is the date that corresponds to the response in Item C.14a. Record the date that the actual procedure (biopsy, surgery, aspiration of cells, etc.)

was performed that collected the most tissue and confirmed this primary invasive lung cancer diagnosis. Operative reports are generally more accurate for date of procedure than surgical pathology reports, so in the case of a discrepancy, record the date of procedure from the operative report. In the event of a clinically diagnosed lung cancer, this item should be left blank, but may be updated if pathologic information becomes available post-treatment. An explanation of the source of the information should be provided in Item D.18 (Comments).

If the exact date of histopathologic confirmation cannot be determined from the record, year and month can usually be assessed. In this situation, record the exact month and year and the day as "99." Zero fill month and day, and record the last two digits of the year (e.g., 02/07/2002). For any portion of the date that is unknown, record "9's."

15. Grade of Primary Invasive Lung Cancer: This item is to be completed only by a CTR or CTR-eligible individual. Grade refers to a system of classifying certain characteristics of the cell. This information can be obtained directly from the histology report that collected the most tissue, a cytology report, a TNM form, a staging classification form, the discharge summary, or from doctor's notes.

- If the medical record states two types of histopathologic grades or a range of grades, record the most severe type. "Well differentiated" is the least severe type and "Undifferentiated" is the most severe type. The most severe grade should be recorded from the primary site. The grade from the metastatic site should not be recorded here, even if it is more severe.

Mark the box for "Unknown" when there is no indication in the record of the histopathologic grade.

16. TNM Staging for Primary Invasive Lung Cancer: This item refers to the TNM or AJCC (American Joint Committee on Cancer) staging system and is to be completed by a CTR or CTR-eligible individual. S/he should use all relevant information from the patient's medical record to assign the TNM stage.

TNM staging describes the anatomic extent of disease based on three components:

(1) The extent of the primary tumor (T),

(2) The absence or presence and extent of regional lymph node metastases (N), and

(3) The absence or presence of distant metastases (M).

In each of these components, the accompanying number indicates the extent of the malignant disease, thus showing progressive increase in tumor size or involvement.

- If the participant receives neoadjuvant therapy prior to staging, the abstractor should mark the box for "Yes" to indicate that the participant received neoadjuvant therapy prior to surgical resection. Mark the box for "No" to indicate that the participant did not receive neoadjuvant therapy prior to surgical resection.

The AJCC Manual for Staging of Cancer provides the minimum requirements for clinical and pathological staging. A list of relevant documentation, based on those requirements can be found below.

Note: The 6th Edition of the AJCC Cancer Staging Manual should be used to code the staging of all NLST lung cancers.

General Guidelines for N_X vs. N_0 and M_X vs. M_0:

The X category should be used when involvement of regional lymph nodes or distant metastatic sites was not evaluated or could not be evaluated. It is not sufficient to assume that an evaluation would have been negative (or positive). If there is a statement in the record documenting the physician's assessment of regional lymph nodes and/or metastatic sites as negative or not involved, without physical examination, imaging or other diagnostic procedures, this may be used to assign 0 rather than X. The use of category 0, as in N_0 or M_0, means that no involvement was found after some type of evaluation including appropriate work-up and/or the physician's clinical impression.

(NOTE: SCs should photocopy any documents from medical records that are used for TNM staging, and keep these with the participant's file.)

16a. TNM Clinical Staging (To be completed only by a CTR or CTR-eligible individual.)

Clinical staging is based on the assessment of the anatomic extent of disease. All information available prior to the first definitive treatment of primary invasive lung cancer may be used for TNM clinical staging. Relevant documentation that is suggested to assign clinical staging includes:

- Physical examination and medical history;
- Imaging procedures;
- Endoscopy, including bronchoscopy, esophagoscopy, mediastinoscopy, thoracentesis, and thoracoscopy, and
- Other tests designed to demonstrate extrathoracic metastasis and regional extension.

After review of the records; mark whether or not TNM Clinical Staging is available.

- **YES:** Mark yes if any part of the TNM Clinical Staging can be completed. Mark the boxes corresponding to the Primary Tumor (T) code, the Nodal Involvement (N) code, and the Distant Metastases (M) code.
- **NO:** Mark no if none of the TNM Clinical Staging is available. If any part of the TNM Clinical Staging is missing, skip to C.16b, TNM Pathological Staging.

16b. TNM Pathological Staging (To be completed only by a CTR or CTR-eligible individual.)

If both clinical and pathological staging are available, both should be recorded. Relevant documentation which is necessary to assign pathologic staging includes:

- Any data for clinical staging; and
- Examination of the resected specimen, including lymph nodes.

After review of the records, mark whether or not TNM Pathological Staging is available.

- **YES:** Mark yes if any part of the TNM Pathological Staging can be completed. Mark the boxes corresponding to the Primary Tumor (T) code, the Nodal Involvement (N) code, and the Distant Metastases (M) code.

- **NO:** Mark no if none of the TNM Pathological Staging is available. If any part of the TNM Pathological Staging is missing, skip to C.17, Record Stage.

17. Record Stage: Complete only if any part of the TNM Pathological Staging is x, (Tx, Nx, or Mx), unknown, or unavailable. This item is to document the stage of disease for primary invasive lung cancer using a system other than TNM. There are three stage classifications provided for lung cancer: "Stage Only," "VALSCG" (Veterans Administration Lung Cancer Study Group) for small cell lung cancer only, and "Summary Staging."

- If information about one or more of the stage classifications is not available in the medical record, it is not necessary to try to obtain it from another source.

- For small cell lung cancer, the VALSCG stage should be recorded, even if pathologic TNM stage is complete.

- If stage of disease is not available for any of these classification, but a different stage of classification is available in the record, place an asterisk beside Item C.17, and record in the Comments section the staging information found in the record. Begin your statement in Comments with the verbatim as recorded in the following example:

Item D.18 (Comments):

Item #	Comments
C.17	Other Stage of Classification is _____. Stage = _____.

If "Stage Only," "VALCSG," and/or "Summary Staging" is available, mark the boxes corresponding to the code for each. If stage of disease is not available for any particular classification, mark the box next to "Not available" in the appropriate column. If no stage of disease information is available, it is not necessary for the abstractor to obtain it from another source.

- For carcinoids (of the lung) that are malignant, "Summary Stage" should be completed.

Part D: Comments:

18. Comments: Use this section to record notes, comments and any overflow information while abstracting from the participant's medical record. Discrepant information should not be recorded in Comments. If an item being abstracted has conflicting or discrepant information, the SC Lead Abstractor, SC Coordinator, and/or Principal Investigator should review the discrepant information for the appropriate coding decision prior to contacting the CC MRA Coordinator.

If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes," then record the comments as follows:

- Any additional diagnostic or staging procedure that is listed in Comments should be entered into under Item A.3.

- Enter the item number to which the comments are related and record the comments in the space provided to the right of the item number.

- Throughout these specifications, standard phrases are given to preface comments so they will be easier to locate during analysis. *Please use these phrases at the beginning of the comments, if applicable.*

- Place an asterisk next to the item number being referenced in the main body of the DE form.

Part E: Health Care Provider/Hospital Location Information:

In this section, record health care provider and hospital location information, where the participant received diagnostic evaluation for lung cancer. Items E.19 and E.20 are not required, but it is recommended they be completed to facilitate collection of additional medical record data.

19. Health Care Provider for Diagnostic Evaluation: Record the name, address, and telephone number of the health care provider who performed diagnostic evaluation for lung cancer. Space has been allotted for entry of two health care providers. Record the health care provider's office address, if available. Record the participant's medical record or chart number for each health care provider location.

20. Hospital or Clinic for Diagnostic Evaluation: Record the name, address, and telephone number of the hospital or clinic at which the participant underwent diagnostic evaluation for lung cancer. Space has been allotted for entry of two hospitals or clinics. Record the participant's medical record or chart number for each hospital or clinic location.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.

- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.

- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.

- Enter the form into

- File the form in the participant's study file.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

MEDICAL RECORD ABSTRACT TREATMENT INFORMATION FORM (TI)

Administrative Section	
Date Abstracted: |__|__| / |__|__| / |__|__|__|__| Abstractor ID: |__|__|__|__| Screening Center ID: |__|__| Study Year: T|__| Purpose of Abstract: ☐ Initial Abstract ☐ Re-abstract for QA Multiple DE #_____	Initials Complete: _____ Initials QC: _____ Participant ID Label

PART A: INITIAL TREATMENT FOR PRIMARY INVASIVE LUNG CANCER

1. Radiation Treatment For Primary Invasive Lung Cancer:
☐ No (GO TO A.2)
☐ Yes
☐ Unknown (GO TO A.2)

1a. Sequence of Radiation Treatment:
(CHECK ALL THAT APPLY)
☐ Pre-operative
☐ Post-operative
☐ Definitive
☐ Unknown

1b. Details of Radiotherapy Treatment:

Radiotherapy Site	Start Date (mm/dd/yyyy)	End Date (mm/dd/yyyy)
Primary Chest Tumor and/or Regional Nodes	|__|__| / |__|__| / |__|__|__|__|	|__|__| / |__|__| / |__|__|__|__|
Prophylactic Brain	|__|__| / |__|__| / |__|__|__|__|	|__|__| / |__|__| / |__|__|__|__|
Other (Specify) _____	|__|__| / |__|__| / |__|__|__|__|	|__|__| / |__|__| / |__|__|__|__|
Unknown	|__|__| / |__|__| / |__|__|__|__|	|__|__| / |__|__| / |__|__|__|__|

2. Surgical Treatment for Primary Invasive Lung Cancer:

☐ No (GO TO A.4)
☐ Yes **(IF YES, COMPLETE CHART BELOW USING SURGICAL PROCEDURE CODES LISTED)**
☐ Unknown (GO TO A.4)

Surgical Procedure Code	Date of Procedure (mm-dd-yyyy)
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|

SURGICAL PROCEDURE CODES

01 – Exploratory thoracotomy without resection
02 = Median sternotomy
03 = Lobectomy
04 = Bilobectomy
05 = Pneumonectomy
06 = Wedge resection
07 = Segmental resection
08 = Lymphadenectomy/lymph node sampling
09 = Chest wall resection
10 = Thoracentesis
11 = Partial pleurectomy
12 = Multiple wedge resections
13 = Multiple segmental resections
88 = Other (SPECIFY)
99 = Unknown

3. Any Local or Regional Residual Disease After Surgery: .....
(TO BE COMPLETED BY CTR OR CTR-ELIGIBLE STAFF)

CTR ID # |___|___|___|___|

☐ No
☐ Yes – Microscopic
☐ Yes – Gross Tumor
☐ Unknown

4. Systemic Chemotherapy for Primary Invasive Lung Cancer:

☐ No (GO TO A.5)
☐ Yes **(IF YES, COMPLETE DATE CHEMOTHERAPY BEGAN)**
☐ Unknown (GO TO A.5)

Date Course of Chemotherapy Began:

|___|___| - |___|___| - |__|__|__|__|
MO DAY YEAR

5. Other Type of Treatment for Primary Invasive Lung Cancer:

☐ No (GO TO B.6)
☐ Yes **(IF YES, COMPLETE TABLE BELOW SPECIFYING TYPE OF TREATMENT AND START DATE)**
☐ Unknown (GO TO B.6)

Type of Treatment 01 Immune Therapy 02 Radiofrequency Ablation 03 Thermal Ablation 04 Chemical Ablation 05 Other (specify) 99 Unknown treatment	**Treatment Start Date** (mm-dd-yyyy)
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|__|__|__|__|
|__|__| _____	|__|__|-|__|__|-|_|__|__|__|

PART B: COMMENTS

6. Comments:

☐ No
☐ Yes **(IF YES, PLEASE SPECIFY)**

ITEM	COMMENTS

PART C: HEALTH CARE PROVIDER/HOSPITAL LOCATION INFORMATION

7. HEALTH CARE PROVIDER FOR TREATMENT:

a. NAME: MR./MRS./MISS/MS./DR. | FIRST | MIDDLE | LAST | (JR., SR., etc.)

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

MEDICAL RECORD / CHART NUMBER

b. NAME: MR./MRS./MISS/MS./DR. | FIRST | MIDDLE | LAST | (JR., SR., etc.)

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

MEDICAL RECORD / CHART NUMBER

8. HOSPITAL OR CLINIC FOR TREATMENT:

a. NAME OF HOSPITAL OR CLINIC

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

MEDICAL RECORD / CHART NUMBER

b. NAME OF HOSPITAL OR CLINIC

STREET ADDRESS 1 | STREET ADDRESS 2 | SUITE OR OFFICE NO

CITY | STATE | ZIP

TELEPHONE 1	TELEPHONE 2	FAX NUMBER:
( )	( )	( )

MEDICAL RECORD / CHART NUMBER

National Lung Screening Trial (NLST)

Specifications for Completion of the Medical Record Abstract Treatment Information Form (TI)

This form should be completed by the SC Coordinator, the Medical Record Abstractor, and the CTR or CTR-eligible individual. The SC Coordinator should complete the Administrative Section. The SC MRA and CTR should complete the remainder of the form, although only the CTR should complete Item A.3 (Any Local or Regional Residual Disease After Surgery). This form should be completed in black or blue ink.

Some key guidelines for abstracting treatment information are presented below:

- The TI form is only expected after a DE form is completed with a result of the diagnostic evaluation of primary invasive lung cancer. Each DE form with a result of primary invasive lung cancer will set an expectation for a separate TI form.
- Primary cancers of the trachea are classified as primary invasive lung cancers for the purposes of medical record abstraction; therefore, a TI form is required following completion of the DE form.
- When abstracting date information for items with multiple treatments, record the dates in the order in which they are found in the medical record.
- Sources of information for abstracting the variable items on the form should be used in priority order by best source. The preferred sources of information are a health care provider, hospital, or tumor registry. If the treatment is considered to be a non-traditional therapy that would not usually be mentioned in a medical record, it is acceptable to take the participant's self-report. In all other cases, the SC should attempt to obtain information from a clinic or health care provider before accepting a report from the participant only.
- Information about treatment procedures should be collected for the initial, or first, course of treatment. Initial treatment usually begins within six months of the cancer diagnosis; however, if an initial treatment begins more than six months after diagnosis, it should still be recorded. The maximum time period for which medical records should be collected for treatment information is one year from the date of a cancer diagnosis.
- This form includes items that require that data be entered verbatim, such as recording "Other (Specify)," and recording comments. The MRA should be sure to use clear language and legible handwriting when completing these items.
- If additional space is needed to record treatment information, use the Comments section. Record the same type of data as requested in the initial treatment information section.
- If any item has unclear, discrepant, or conflicting information, review this information with the SC Lead Abstractor, SC Coordinator, or the Principal Investigator prior to contacting the CC MRA Coordinator.

Specifications for completing each item of the form are given on the following pages.

Appendix 7-5 Specifications for Completion of the Medical Record Abstract Treatment Information Form (TI)

Administrative Section:

Participant ID: Affix a PID label in the box provided at the top of the form.

Date Abstracted: Record the date the medical record was abstracted. This is the date the form was completed. Zero fill the month and day and record the last two digits of the year (e.g., 05/05/2002).

Abstractor ID: Record the four-digit staff ID number assigned to the individual who is abstracting the medical record and completing the TI form.

Screening Center ID: Record the two-digit SC ID number.

Study Year: Record the study year the participant was in when s/he received the positive screening exam for which follow-up revealed a primary lung cancer, or if the cancer diagnosis is not the result of a positive screening exam, enter the study year the participant was in when the lung cancer was reported. If the cancer diagnosis originated from a T_3 DE form completed following a T_2 screening exam with a result code "A," enter T_3 as the study year for the TI form.

Purpose of Abstract: This form may be used for either the initial abstracting of medical record information, or for repeat abstraction of the medical record for quality assurance. Mark the box corresponding to the purpose of the abstract as follows:

> **Initial abstract:** Medical record information is being abstracted for the "first" time to confirm the treatment of lung cancer.
>
> **Re-abstract for QA:** Medical record information that has already been abstracted to confirm the treatment of lung cancer is being re-abstracted for the purpose of quality assurance. (This will not apply to the SC MRA.)

Multiple DE #: The purpose of this item is to indicate whether this form is being used to abstract information about an additional primary invasive lung cancer that was diagnosed simultaneously with or subsequent to the first primary invasive lung cancer within the same study year. The sequence number used here should match the number used on the DE form that describes the same particular primary invasive lung cancer. The MRA will determine the correct DE form by comparing the diagnostic information given in Part C of the DE form (histology, cytology, staging, date of diagnosis) with the description of the cancer that is part of the treatment information provided in the medical record.

NOTE: Cases in which no primary invasive lung cancer or only one primary invasive lung cancer was diagnosed should be coded as "1."

Part A: Initial Treatment Information for Primary Invasive Lung Cancer:

In this section, record all treatments that make up the initial, or first course of, treatment the participant received for primary invasive lung cancer. Do not record treatments for metastases to the lung from other primary cancers.

- Initial treatment, in general, is treatment that is received within six months of the diagnosis.

- If the treatment is intended as initial treatment, it should be recorded, even if it occurs more than six months after diagnosis.

- Time Period Rules for First Course of Treatment (in order of precedence):

  (1) If there is a documented first course of treatment, record treatments that occur through the end of this course, regardless of its duration.

  (2) If the patient is treated according to a facility's standards of practice, first course ends according to the facility's standards of practice.

  (3) If there is no documentation of a first course of treatment or standards of practice, *first course of treatment includes all treatment received before disease progression or treatment failure*. If it is undocumented whether there is disease progression/treatment failure and the treatment in question begins more than one year after diagnosis, assume that the treatment is not part of the first course.

  (4) If a patient refuses all treatment modalities and does not change his/her mind within one year, or if the health care provider opts not to treat the patient, record that there was no treatment in the first course.

All modalities of treatment should be included, regardless of their sequence or the degree of completion.

- If there is a significant treatment that is not in the first course of treatment and the abstractor and the SC Principal Investigator feel it should be recorded, the relevant medical records should be copied (identifiers deleted) and sent to the CC MRA Coordinator with a memo describing the situation.

  - Combination Treatments: If multiple treatments of the same type are given in combination, enter the date of the first treatment for the combination treatments. If a treatment is added to or removed from the combination, the new combination should be recorded as a new treatment with a new start date.

1. Radiation Treatment for Primary Invasive Lung Cancer: This item asks for the radiation treatment the participant received for lung cancer. Radiation treatment most commonly consists of either external photon beam therapy or brachytherapy (interbronchial implant). More rarely, radiation treatment may consist of either neutron or proton external beam therapy. Note that this item is concerned with radiation treatment and **not** diagnostic x-rays such as a CT scan.

External photon beam therapy is delivered by a machine which generates x-rays or contains a large amount of a radioactive isotope, such as cobalt, or is delivered by a linear accelerator. External beam treatments are given in one or more "series" or "courses." Each course of radiation is administered over a period of days or weeks in small daily doses.

Brachytherapy is a method of radiotherapy in which radioactive sources are applied to the external surface of the patient, implanted in tissue, or inserted into body cavities. Brachytherapy procedures usually are performed in an operating room since they require anesthesia. Although the brachytherapy treatment may be performed in a surgical suite and

recorded in surgical notes, it is radiotherapy and should be recorded as such for purposes of describing the participant's treatment.

Some institutions may have the capability to deliver neutron beam therapy, via a hospital based high-energy cyclotron, or proton beam therapy via a hospital-based synchrotron. Treatment via these modalities is usually administered in "courses" or "series" over a period of time. Hyperfractionated therapy refers to treatment with more than one fraction of radiation a day.

Mark the box corresponding to whether the participant received radiation treatment as follows:

- **No:** The record clearly states that the participant did not receive radiation treatment, or there is no mention of radiation treatment (planned or given) in the records. Mark the box for "No" and go to Item A.2.

- **Yes:** The record indicates that the participant received radiation treatment. Mark the box for "Yes" and complete Item A.1a.

- **Unknown:** The record states that a radiation treatment is planned but provides no mention of whether or not it was actually given. This code should also be used if the record clearly states that this information is unknown. Mark the box for "Unknown" and go to Item A.2.

1a. Sequence of Radiation Treatment (CHECK ALL THAT APPLY): This item asks for specification as to the timing of the radiation treatment received in relation to surgical resection. Mark the boxes corresponding to whether the radiation treatment was pre-operative, post-operative, definitive, or unknown. Check all that apply.

- **Pre-operative:** Mark this box if the radiation treatment was received prior to surgical resection.

- **Post-operative:** Mark this box if the radiation treatment was received following surgical resection.

- **Definitive:** Mark this box if the radiation treatment was received without a therapeutic surgical resection. Treatments other than surgical resection, such as chemotherapy, may have been utilized, though.

- **Unknown:** Mark this box if the sequence of radiation treatment in relation to other treatments is unknown.

1b. Details of Radiotherapy Treatment: This item asks for the radiotherapy site, and the start and end dates for treatment. The options for radiotherapy site are Primary Chest Tumor and/or Regional Nodes, Prophylactic Brain, Other, and Unknown. For start and end dates, record the month, day, and year that the radiation treatment was begun and ended for a particular course next to the appropriate site. If the first course of radiation treatment is given to the same site as an initial component and then a boost, record the overall dates. If radiotherapy treatment was given both pre-operatively and post-operatively, complete Item A.1b using the dates of the pre-operative therapy, and then record the dates of the post-operative therapy in Item B.6, Comments. Zero fill month and day, and record the last two digits for the year (e.g., 02/07/2002). If the date is not clear, year and month can usually be assessed, even if

the exact date cannot be determined. In this situation, record the exact month and year. Record the day as "99"

2. **Surgical Treatment for Primary Invasive Lung Cancer:** This item asks for the surgical treatment that the participant received for lung cancer. Mark the box corresponding to whether the participant received surgical treatment as follows:

   - **No:** The record clearly states that the participant did not receive surgical treatment, or there is no mention of surgical treatment (planned or given) in the records. Mark the box for "No" and go to Item A.4.

   - **Yes:** The record indicates that the participant received surgical treatment. Mark the box for "Yes" and record the appropriate surgical code(s) and the date(s) surgical treatment(s) began. Refer to the Surgical Procedure Codes listed for the list of common surgical procedures for lung cancer. If the participant had a surgical procedure other than those listed, mark the box for "Other (SPECIFY)" and record the surgical procedure performed on the line provided. Record the month, day, and year that the surgical procedure was performed. If the date is not clear, year and month can usually be assessed, even if the exact date cannot be determined. In this situation, record the exact month and year and the day as "99." Zero fill month and day, and record the last two digits for the year (e.g., 02/07/2002). Record information for up to five surgical procedures.

     Type of Surgical Procedure: Complete the table. Record the two digit procedure code in the spaces provided, then write the type of procedure in the space provided, and record the date the procedure was performed using the month, day, year format. Refer to the Surgical Procedure Codes listed for the common surgical procedures for lung cancer. If the participant has a surgical procedure other than those listed, record "88" for "other" and write the type of procedure in the space provided.

     - If surgical resection with removal of lymph nodes was performed, this should be coded as two separate procedures using the appropriate code for surgical resection and code "08" for the lymph node removal.

     - Mediastinoscopy is not a treatment for lung cancer and should not be documented as a procedure.

     - If an open surgical biopsy (diagnostic wedge resection) and a surgical resection were performed, these should be coded as two separate procedures using the appropriate code for surgical resection and code "06" for the wedge resection.

If more space is needed to record additional surgical procedures, use the Comments section (B.6) to record those procedures. In Comments, record A.2 and date(s) of surgical procedures.

   - **Unknown:** The record states that a surgical treatment is planned but then there is no mention of whether it occurred. This code should also be used if the record clearly states that this information is unknown. Mark the box for "Unknown" and go to Item A.4.

3. **Any Local or Regional Residual Disease After Surgery:** This item should be completed only by a CTR or CTR-eligible individual. The individual who completes the form should

enter their CTR staff ID number in the space provided. This item documents whether the participant had any local or regional residual disease after surgery. Record information for this item for any attempted surgical procedure *even if the procedure was not completed*. Surgery is defined as any of the surgical procedures listed in Item A.2. If there are multiple surgeries, use the last surgery in the first course of treatment. Regional residual disease is defined as a cancer that remains after surgery and is related to the original site by direct extension. It does not apply to metastases. If neither pathology nor operative reports are available, a discharge summary or health care provider's note with treatment plan may be used to record this item. Mark the box corresponding to whether the participant had any local or regional residual disease left after surgery as follows:

- **No:** The record indicates that the participant had no local or regional residual disease left after surgery. Mark the box for "No" and go to Item A.4.

- **Yes - Microscopic:** The record indicates that the participant had local or regional residual disease left after surgery which was microscopic (of minute size and cannot be visualized with the naked eye). For example, if the pathology report states "tumor to surgical margin" mark the box for "Yes – Microscopic" and go to Item A.4.

- **Yes – Gross Tumor:** The record indicates that the participant had local or regional residual disease left after surgery which was macroscopic (can be visualized with the naked eye). Mark the box for "Yes – Gross Tumor" and go to Item A.4.

- **Unknown:** The record does not mention if the participant had local or regional residual disease after surgery, or the record clearly states that this information is unknown. Mark the box for "Unknown" and go to Item A.4.

4. Systemic Chemotherapy for Primary Invasive Lung Cancer: This item asks for any systemic chemo-therapy the participant received for primary invasive lung cancer. Chemotherapy is the use of drugs as treatment for cancer. Chemotherapy may be the primary treatment prescribed in cases of advanced cancer, or may be an adjuvant treatment, given in addition to surgery or radiation.

The participant's medical record may not contain chemotherapy data. Unlike surgery and radiation, which must be performed at a hospital or clinic, chemotherapy may be administered at a health care provider's office. In addition, it may be self-administered under the supervision of a health care provider. It is therefore especially important that the abstractor carefully review the record and, if necessary, contact the health care provider for information on chemotherapy.

A course of chemotherapy is typically divided into discrete components called cycles. Each cycle has a set of medications given in a prescribed sequence for a set duration. Examples of chemotherapeutic medications include vindesine, cisplatin, cyclophosphamide, doxyrubicin, vinblastine, etoposide (VP-16), and mitomycin. Often the combinations are part of a protocol. For a given course of chemotherapy, a predetermined number of cycles are given – for example, a participant may be on his first course of chemotherapy that has six cycles. In such a cycle, drug 1 may be given day one for a six-hour infusion. Drug 2 may be given days one through seven for an hour infusion each day. A third drug may be given day ten. The cycle may be 28 days long with the 29th day being day one of the next cycle, and the regimen is repeated. In such a case, six cycles would require 24 weeks, and would be considered one course of chemotherapy. The start of the three drug regimen (day one, cycle one) would be the date of the first course of chemotherapy. The entire treatment of six cycles is considered one course of chemotherapy.

Mark the box corresponding to whether the participant received chemotherapy treatment as follows:

- **No:** The record clearly states that the participant did not receive chemotherapy or there is no mention of chemotherapy (planned or given) in the records. Mark the box for "No" and go to Item A.5.

- **Yes:** The record indicates that the participant received chemotherapy, including the instance where a participant is enrolled in a chemotherapy randomized controlled trial with no placebo arm (e.g. one chemotherapy regimen versus another chemotherapy regimen). Mark the box for "Yes" and record the date chemotherapy began: Record the month, day, and year that the chemotherapy was begun for a particular course. If the date is not clear, year and month can usually be assessed, even if the exact date cannot be determined. In this situation, record the exact month and year and the day as "99." Zero fill month and day, and record the last two digits for the year (e.g., 02/07/2002).

  If more space is needed to record additional chemotherapy treatments, use the Comments section (B.6) to record the same type of data. In Comments, record A.4 and date(s) chemotherapy began.

- **Unknown:** The record states that a chemotherapy treatment is planned but provides no mention of whether it was given. This code should also be used if the record clearly states that this information is unknown. Mark the box for "Unknown" and go to Item A.5.

  If the participant is enrolled in a chemotherapy randomized controlled trial with a placebo arm and the randomization assignment is blinded and thus unknown, mark the box for "Unknown" and provide a comment in Part B. If the participant's treatment arm becomes known in the future, update the TI form and to indicate the correct Yes or No response.

5. Other Type of Treatment for Primary Invasive Lung Cancer: This item asks for any treatment other than surgery, radiation, and chemotherapy treatment, which the participant received for primary invasive lung cancer. Other types of treatment might include immune therapy, radiofrequency ablation, thermal ablation, or chemical ablation. *(Note: Pleurodesis is not considered an "Other Type of Treatment for Primary Invasive Lung Cancer" as it treats a problem related to the cancer, not the lung cancer itself.)*

Mark the box corresponding to whether the participant received some other type of treatment as follows:

- **No:** The record clearly states that the participant did not receive any other type of treatment, or there is no mention of other treatments (planned or given) in the records. Mark the box for "No" and go to Item B.6.

- **Yes:** The record indicates that the participant received some other type of treatment. Mark the box for "Yes" and record the type of treatment and date(s) other treatment began. Record the month, day, and year that the other type of therapy began. Specify the type of treatment by noting the appropriate treatment code in the boxes next to the date. If the participant had a treatment other than those listed, mark the box for "Other (SPECIFY)" and record the treatment on the line provided. Record information for up to five "other" treatments in this section of the form. If the date is

not clear, year and month can usually be assessed, even if the exact date cannot be determined. In this situation, record the exact month and year and the day as "99." Zero fill month and day, and record the last two digits for the year (e.g., 02/07/2002).

If more space is needed to record other type of treatments for lung cancer, use the Comments section (B.6) to record the same type of data. In Comments, record A.5 and date(s) other treatment(s) began.

- **Unknown:** The record states that an "other" treatment is planned but provides no mention of whether or not it was given. This code should also be used if the record clearly states that this information is unknown. Mark the box for "Unknown" and go to Item B.6.

Part B: Comments:

6. **Comments:** Use this section to record notes, comments, and any overflow information. Discrepant information should not be recorded in Comments. If an item being abstracted provides conflicting or discrepant information, the SC Lead Abstractor, SC Coordinator, and/or Principal Investigator should review the discrepant information for the appropriate coding decision prior to contacting the CC MRA Coordinator.

   If there are no additional comments, mark the box next to "No." If there are additional comments, mark the box next to "Yes," then record the comments as follows. Enter the item number to which the comments are related, record the comments in the space provided to the right of the item number. Place an asterisk next to the item number being referenced in the main body of the TI form.

Part C: Health Care Provider/Hospital Location Information:

In this section, record health care provider location information, where the participant received treatment for lung cancer. Items C.7 and C.8 are not required, but it is recommended they be completed to facilitate collection of additional medical record data.

7. **Health Care Provider for Treatment:** Record the name, address, and telephone number of the health care provider who provided care during the participant's treatment for lung cancer and/or the health care provider who provided or administered the treatment. Space has been allotted for entry of two health care providers. Record the health care provider's office address, if available. Record the participant's medical record or chart number for each health care provider location.

8. **Hospital or Clinic for Treatment:** Record the name, address, and telephone number of the hospital or clinic at which the participant underwent treatment for lung cancer. Space has been allotted for entry of two hospitals or clinics. Record the participant's medical record or chart number for each hospital or clinic location.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the first page.

- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the first page. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

MEDICAL RECORD ABSTRACT
CANCER PROGRESSION FORM (CP)

Administrative Section	
Date Completed: |_|_|/|_|_|/|_|_|_|_|	Initials Complete:_____ Initials QC: _____
Abstractor ID: |_|_|_|_|	
Screening Center ID: |_|_|	
Study Year: T|_|	Participant ID Label
Purpose of Abstract: ☐ Initial Abstract ☐ Re-abstract for QA	

Part A. Progressive Disease Following Treatment of First Primary Invasive Lung Cancer

1. Did the participant develop progressive disease (progression of primary site, metastatic disease, recurrence) following treatment for lung cancer?

☐ No (Go to B.4)

☐ Yes

☐ Unknown (Go to B.4)

2. Date of the first documentation of progressive lung cancer: |_|_|-|_|_|-|_|_|_|_|

3. Site(s) of progression (record all that apply):

a. |_|_|
b. |_|_|
c. |_|_|
d. |_|_|
e. |_|_|

01 Original lung site
02 Other lung site
03 Pleura
04 Mediastinum
05 Brain
06 Bone
07 Liver
08 Adrenal
09 Other, specify_____
99 Unknown site

Part B. Development of Second Primary Invasive Lung Cancer

4. Did the participant develop a second primary invasive lung cancer after treatment for the first lung cancer during the trial?

- ☐ No (Go to B. 6)
- ☐ Yes
- ☐ Unknown (Go to B. 6)

5. Date of diagnosis of second primary invasive lung cancer: |_|_|-|_|_|-|_|_|_|_|

6. Comments: _____

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_____
Medical Chart Abstractor

National Lung Screening Trial (NLST)

Specifications for Completion of the Cancer Progression Form (CP)

This form is to be completed yearly following completion of the DE and TI forms, through 2009 by the MRA for each participant with confirmed lung cancer. Some key guidelines for abstracting cancer progression information are presented below:

- The CP form should be completed within the first two months of the study year following the study year in which the TI is completed. However, will not set an expectation for the CP form until the TI form has been entered. For example, if the date of a positive T_0 screen is 02/01/03, the DE is completed on 10/15/03, and the TI is completed on 03/01/04 (T_1 study year), then the CP will be expected during the T_2 study year. The CP form is to be completed within the first two months of the study year in which it is due.

- The purpose of the form is to document the progression of lung cancer. The progression of the lung cancer documented on this form will only be for the participant's current study year. If the participant has already had a progression of his/her lung cancer that was recorded on a previous CP, that information should not be repeated.

- Each CP is identifying new or further progression of disease. The MRA will request medical records for the interim (previous study year) at the beginning of each new study year following the confirmation of the lung cancer. The form will be used initially the study year after the TI was receipted. Expectations will be set to receive the form on an annual basis once the DE is entered in

- Primary cancers of the trachea are classified as primary invasive lung cancers for the purposes of medical record abstraction; therefore, a CP form is required in the study year following completion of the DE and TI forms.

- If there is an expectation in for a CP form and the participant is deceased, the CP form should be completed with information about disease progression since the time of completion of the TI form or the most recent CP form.

Administrative Section

Participant ID Label: Affix a PID label in the box provided at the top of the form.

Date Completed: Record the date the CP form was completed. Zero fill month and day, if necessary, and record the last two digits of the year (e.g., 02/07/2002).

Abstractor ID: Record the four-digit staff ID number assigned to the individual who is abstracting the medical record and completing the CP form. If more than one abstractor completes the CP form, the SC Coordinator should determine which abstractor is responsible for the content of the form – it is this abstractor's ID number that should be recorded here.

Screening Center ID: Record the two-digit SC ID number.

Study Year: Indicate the study year the participant is currently in when the CP is being completed.

Appendix 7-7 Specifications for Completion of the Cancer Progression Form (CP)

Purpose of Abstract: This form may be used for either the initial abstracting of medical record information, or for repeat abstraction of the medical record for quality assurance. Mark the box corresponding to the purpose of the abstract as follows:

Initial abstract: Medical record information is being abstracted for the first time to document the progression of lung cancer.

Re-abstract for QA: Medical record information that has already been abstracted to document the progression of lung cancer is being re-abstracted for the purpose of quality assurance. (This will not apply to the SC MRA.)

Part A. Progressive Disease Following Treatment of First Primary Invasive Lung Cancer

1. Progressive Disease:

- **No,** the participant did not develop progressive disease following treatment for lung cancer. If No is recorded then the MRA should skip to Item B.4 and leave Items A.2 and A.3 blank.

- **Yes,** the participant did develop progressive disease following treatment of lung cancer. Progressive disease is defined as enlargement of the original tumor, new metastasis to lymph nodes or other organ site not included in the original tumor staging, or disease recurrence. Death is not considered disease progression.

- **Unknown**, it is unknown whether the participant developed progressive disease following treatment for lung cancer. If Unknown is recorded then the MRA should skip to Item B.4 and leave Items A.2 and A.3 blank.

2. Date of the First Documentation of Progressive Lung Cancer: Record the date progressive lung cancer was first documented in the medical record. Zero fill month and day, if necessary, and record the last two digits of the year (e.g., 02/07/2002).

3. Site(s) of Progression: Record the site where progression has been identified. More than one site may be recorded. If the site is not listed, then record 09 = Other, specify and record the site in the space provided. If the site of progression is unknown, record 99.

Part B. Development of Second Primary Invasive Lung Cancer

4. Development of Second Primary Invasive Lung Cancer: Indicate whether the participant developed a second primary invasive lung cancer after treatment for the first lung cancer during the trial.

5. Date of Diagnosis of Second Primary Invasive Lung Cancer: Record the date a second primary invasive lung cancer was first documented in the medical record. Zero fill month and day, if necessary, and record the last two digits of the year (e.g., 02/07/2002). If a second cancer is identified the SC should check to see that a CNF was completed.

6. Comments: Document any comments in the space provided.

Medical Chart Abstractor: The MRA completing the form should sign this form when completed.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the first page. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.

National Lung Screening Trial (NLST)

Medical Records Abstraction Quality Assurance Plan

It is the responsibility of the Coordinating Center (CC) to ensure the quality of medical records abstraction at each SC. The CC MRA Coordinator will monitor the QA process at each SC and provide input for resolution of medical record abstraction issues. To achieve this, the CC MRA Coordinator will implement the following medical records quality assurance plan. The primary goals of the plan are to:

- Ensure that the SC MRAs utilize standard abstracting procedures;
- Ensure a high level of accuracy for data elements;
- Evaluate the quality of data recorded on the Diagnostic Evaluation, Treatment Information, and Cancer Progression Forms, and
- Improve the quality of data abstracted by providing feedback to the SC MRAs in areas where problems are identified.

The CC will re-abstract a portion of cases to assess accuracy and completeness of MRA form completion, as well as to provide feedback to the SCs. All SCs will be asked to submit to the CC a copy of the medical records for the first ten primary invasive lung cancer cases and the first ten non-cancer cases abstracted. The QA process will continue for all SCs and the proportion of forms selected for re-abstraction may change over time, depending on MRA performance and after consultation with the SC. Currently, the selection process is as follows:

- Diagnostic Evaluation (DE) Form: The CC will perform a monthly selection of forms for QA review from all DE forms entered into within the past month. The selection will include one hundred percent (100%) of DE forms with a diagnosis of primary invasive lung cancer and a random sample of five percent (5%) of all non-lung cancer cases.
- Treatment Information (TI) Form: The CC will perform a yearly selection of forms for QA review from all TI forms received within a specified one-year time period. The case selection will include 45 forms from each screening arm and will represent a pre-determined number of early and late stage lung cancer cases.
- Cancer Progression (CP) Form: The CC will perform an initial selection of five CP forms per SC for review. Following the initial review period, the CC will perform a yearly selection of forms for QA review from all CP forms received within a specified one-year time period. The cases selection will include 45 forms from each screening arm and will represent a pre-determined number of early and late stage lung cancer cases.

The SCs will follow the usual process of requesting records and supporting documents that are needed for abstraction, removing all identifiers for those sent to the CC for re-abstraction. The CC and the SCs will follow these procedures for the Quality Assurance of Medical Records Abstraction:

- The CC will identify the PIDs for the forms selected for re-abstraction according to the previously described criteria;

- The CC will record the PID numbers from those forms identified;
- The CC will request that the SCs provide copies of all medical records documenting information abstracted on the DE, TI, or CP form for the identified PIDs;
- The SC MRAs will copy the requested medical records, removing all personal identifiers from the medical records, and submit these to the CC with a Forms Transmittal Log (Appendix 11-14) within two weeks of the initial request for medical records;
- Qualified CC MRAs will re-abstract these medical records on appropriate forms (DE, TI, or CP);
- The CC will compare the CC re-abstracted form to the original form from the SC for each identified PID;
- The CC will perform adjudication of any discrepancies identified during the comparison;
- The CC will provide feedback regarding the review to the SCs on a regular basis;
- The SCs will make necessary revisions to the database based upon feedback from the CC;
- The CC will provide the SC with quarterly QA reports for review, and
- The CC will provide the NCI with monthly QA reports for review.

The SCs are encouraged to contact the CC MRA Coordinator with any questions or issues that arise on any aspect of the medical record abstraction process. The CC MRA Coordinator will provide a prompt response.

8. ASCERTAINMENT OF CANCER STATUS

8.1 Overview

Each SC implemented procedures to ascertain cancer status through December 31, 2009 for all randomized individuals. Ascertainment of cancer status included procedures to investigate and confirm diagnoses for all primary invasive lung cancers identified among randomized individuals. In addition, SCs investigated and confirmed diagnoses for all reported cancers and for all cancers identified as part of the Endpoint Verification Process. (See Chapter 9 for information regarding the Endpoint Verification Process.) Ascertainment of a cancer diagnosis could occur either as a result of follow-up of a positive screening examination or from reports of cancer from other sources, such as the participant, the participant's family members or physician, or a Death Certificate. Chapter 7 provides detailed information regarding the ascertainment of cancer resulting from the follow-up of a positive screen, including information regarding completion of the Diagnostic Evaluation (DE), Treatment Information (TI), and Cancer Progression (CP) forms. Any cancer recorded on a DE form, including the non-lung primary cancers that were the result of the diagnostic evaluation, did not need to be documented on a Cancer Notification Form (CNF). Chapter 8 provides information regarding the ascertainment of cancer from other sources, such as the participant, the participant's family members or physician, or a Death Certificate.

All reports of cancer were documented and investigated according to protocol. Cancers reported to have been diagnosed on or before December 31, 2009 were investigated for verification of the diagnosis. Cancers reported to have been diagnosed after December 31, 2009 were documented, but not investigated. For these cancers, only the diagnosis and estimated diagnosis date were collected. For every case of confirmed primary invasive lung cancer diagnosed on or before December 31, 2009, information on diagnostic evaluation, cancer diagnosis, initial treatment, and cancer progression (if necessary) was collected. For every case of confirmed non-lung cancer diagnosed on or before December 31, 2009, information on the cancer diagnosis was collected. The information collected was abstracted onto the appropriate medical record abstract forms. The main steps for cancer ascertainment are as follows:

1. Ascertain each participant's cancer status through sources such as the ASU, the participant, the participant's family members or physician, or the Death Certificate.

2. For all cancers reported outside of the ASU or DE form, complete a Cancer Notification Form (CNF, Appendix 8-1). The Specifications for Completion of the CNF are found in Appendix 8-2.

3. For all cancers documented on an ASU or CNF with a diagnosis date on or before December 31, 2009, collect medical records to confirm the diagnosis.

4. For all reported cancers documented on an ASU or CNF, complete a Cancer Diagnosis Form (CDF, Appendix 8-3) to confirm the diagnosis. If the cancer was reported to have been diagnosed after December 31, 2009, only the diagnosis and estimated diagnosis date should be recorded on the CDF. The Specifications for Completion of the CDF are found in Appendix 8-4. If a cancer was erroneously reported, this should be recorded on the CDF.

5. If the CDF confirms a primary invasive lung cancer that has not previously been reported, complete a Diagnostic Evaluation (DE) form, Treatment Information (TI) form, and Cancer Progression (CP) form, if necessary (See Chapter 7). Attach a copy of the pathology report that supports the diagnosis.

6. Upon completion of the appropriate medical record abstract form(s), or MDF(s), enter the form(s) into

7. Monitor the cancer ascertainment process through use of the Expected Forms Report (Appendix 11-18).

The cancer ascertainment and documentation procedures listed above are presented in a flowchart, Exhibit 8-1.

8.2 Sources for Ascertaining Cancer Status

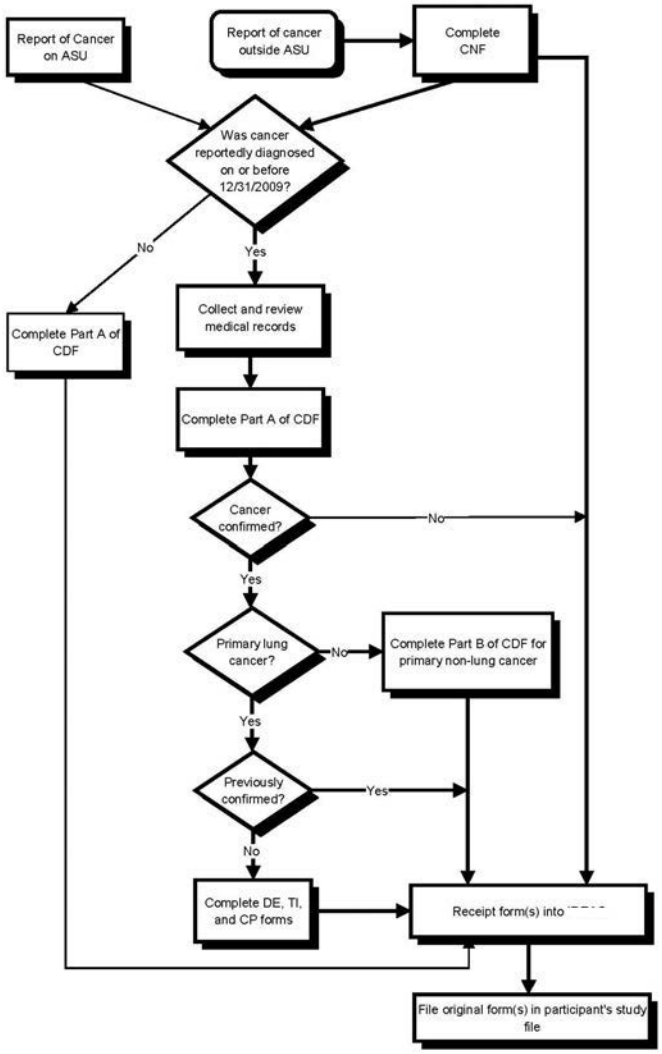
The SC attempted to ascertain cancer status for all participants. This was accomplished primarily through two types of sources: notification by the participant on the Annual Study Update (ASU, Appendix 3-11) and notification by sources outside the ASU. These may have included notification by the participant other than on the ASU, notification by a participant's family member or health care provider, or notification by the participant's Death Certificate.

8.2.1 Notification of Cancer on the Annual Study Update (ASU)

The ASU was administered to all randomized participants each year of the study after the baseline year with the final ASU administered on an accelerated schedule in 2010. The ASU was the

primary method of identifying potential cancers among participants who refused to schedule screening examinations and for participants who had completed all years of screening. The ASU asked if a participant had been newly diagnosed with any type of cancer and collected the type of cancer and the date of diagnosis. The identification of a cancer on the ASU set an expectation for a CDF. If the reported cancer was diagnosed outside of the time period covered by the ASU and the cancer was previously reported on an ASU or CNF, the participant's response could be edited and the cancer not investigated. If the reported cancer was diagnosed within the time period covered by the ASU, even if the cancer was previously reported, the cancer was investigated and documented on a CDF. If a cancer was reported on an ASU, it did not need to be reported on a CNF.

Exhibit 8-1 NLST/LSS
Cancer Ascertainment Process



8.2.2 Notification of Cancer Outside of the Annual Study Update (ASU)

An SC could have been notified of a potential cancer through many sources other than the ASU. The primary sources were the participant, the participant's family members or health care provider, and the participant's Death Certificate. All reports of cancer outside the ASU were required to be documented on a CNF, which set an expectation for a CDF.

8.2.2.1 Notification from the Participant, a Family Member, or Health Care Provider

A variety of people could have notified the SC of a cancer diagnosis. It was suggested that the SC implement a system, such as a telephone log, to record such information when it was received. All reports of cancer outside the ASU were required to be recorded on a CNF. Only one CNF was to be completed per participant, per study year. The CNF could be updated if there were subsequent reports of cancer. Once completed, this form was entered into which set an expectation for a CDF.

8.2.2.2 Notification from the Participant's Death Certificate

The SCs were responsible for collecting Death Certificates for participants who were reported to be deceased if the date of death was on or before December 31, 2009. On a monthly basis, or more often as requested by the CC, the SCs shipped Death Certificates to the CC for cause of death coding. If, prior to shipping the Death Certificate to the CC, the SC discovered a cancer that had not previously been reported, a CNF was to be completed and entered into In addition, as part of the EVP, the CC requested that the SC document cancers that were reported on the Death Certificate but were not yet investigated. These cancers were identified with a "Cancer Suspicion" (CS) status on the EVP Algorithm Report (see Section 9.8.2). As necessary, the CC MRA Coordinator provided guidance to the SC Abstractors for completing the required abstraction forms when a CS status was assigned. The SC was required to complete a CNF for all newly reported cancers and the CNF was entered into which generated an expectation for a CDF.

8.3 Confirmation of Cancer

A separate CDF was required for each cancer reported, even if multiple cancers were reported on the same ASU or CNF. The primary method for confirming reports of cancer was the collection and review of medical records. Cancers diagnosed after December 31, 2009 were documented on a CDF with the estimated date of diagnosis; however, medical records were not collected to confirm the diagnosis.

8.3.1 Collection of Medical Records

The process of confirming the diagnosis of cancer included collecting participant medical records. The nature and quantity of medical records collected varied depending on the type of the suspected cancer (lung or non-lung cancer).

The SC contacted the participant's health care provider or obtained medical records to determine whether cancer was diagnosed. In addition to obtaining information from the participant's medical records, the SC may have used the tumor registry information to help obtain additional source documents, but the SC could not complete NLST/LSS abstracts on the basis of a tumor registry abstract alone.

The SC was required to collect sufficient medical records to enable the abstractor to record the result of the investigation (lung primary, metastasis, non-lung primary, etc.), the date of diagnosis for the primary cancer, and the ICD-O-3 code for the primary cancer.

In some cases, the SC may have been charged fees for obtaining copies of medical records. Since the NLST is a federally-funded research study, the SC could attempt to obtain a waiver of fees from each institution from which they obtained medical records. Medical Record Release Authorization Forms (Appendix 3-4) generally were required for collection of records as described in Section 3.2.1.4.

Once copies of the medical records were obtained, the records were carefully reviewed to confirm that they pertained to the correct participant. The records were then organized chronologically. A PID label was affixed to each page of the medical record. Each document was reviewed for legibility and completeness. It was suggested that the SC compare consistency of information between documents

and, if necessary, contact the health care provider to resolve any problems. In addition, if the records were not complete, the SC may have needed to contact the diagnosing health care provider for additional information.

8.3.1.1 Acquisition of the Histopathology/Cytopathology Report

For each case of lung and non-lung cancer diagnosed histologically or cytologically on or before December 31, 2009, the SC was to obtain a photocopy of the histology or cytology report that confirmed the initial cancer diagnosis. Information from the histology or cytology report also was abstracted onto the CDF or DE forms. If the cancer was diagnosed both histologically and cytologically, information was abstracted from the earliest histology procedure with an adequate specimen that gave a definitive diagnosis of cancer. If no adequate histology specimen was available, but a cytology specimen was available, the cytology report was to be used. A copy of the corresponding histopathology or cytopathology report that supported the diagnosis of cancer on the DE form or the CDF was required to be maintained in the participant's study file.

8.4 Completion of the Cancer Diagnosis Form (CDF)

The outcome of the cancer ascertainment process was documented on Part A of the CDF. If the result of the investigation was a primary invasive lung cancer not previously reported, a DE form and a TI form were required to document the diagnostic evaluation, staging, and initial treatment of the primary invasive lung cancer. A CP form was required during the first two months of each subsequent study year through 2009. Detailed instructions for completing these forms are provided in Chapter 7. If the result of the investigation was a primary non-lung cancer, the diagnosis information was recorded on Part B of the CDF. The SC was asked to make every attempt to investigate and complete the CDF within one to two months.

If a cancer was reported but the diagnosis could not be verified after a review of the medical record, the SC was to consider the report of cancer erroneous. The SC completed the CDF with a result of "erroneous report of cancer."

If a cancer was reported with a diagnosis date after December 31, 2009, the diagnosis and estimated diagnosis date was recorded on the CDF. No additional documentation was necessary.

If the result of the investigation was a primary invasive lung cancer or a metastasis to the lung from a non-lung primary cancer, expectations for future screening exams were turned off.

8.5 Documenting Non-response for Cancer Confirmation

In some cases, the SC was not able to complete a CDF for the participant. The following are the conditions under which an MDF may have been completed for a CDF:

- When the SC was unable to locate the participant to obtain consent to collect medical records, code 02 (Can't locate) was recorded on the MDF for the CDF;
- When the participant sought follow-up attention but subsequently died and the SC was unable to contact the participant's family for consent to obtain medical records, or the participant's family was contacted, but refused to consent to the release of the participant's medical records, code 22 (Family refuses to release medical records) was recorded on the MDF;
- When the medical records necessary for the completion of the CDF were not available because the records could not be located, code 25 (Medical records lost) was recorded on the MDF;
- When the medical records necessary for the completion of the CDF were not available because of institutional refusal, or foreign or non-local institution, code 23 (Health care provider refuses to release medical records) or code 24 (Health care provider does not respond to record requests) was recorded on the MDF, and
- When a participant refused to sign a Medical Record Release Authorization Form for the SC to obtain medical records to document diagnostic follow-up procedures, code 21 (Participant refuses to release medical records) was recorded on the MDF.

8.6 Tracking, Reporting, and Monitoring Medical Record Abstraction Activities

A detailed discussion on the process of reporting and monitoring medical record abstraction can be found in Chapter 7, Section 7.8.

8.7 Quality Assurance for Cancer Confirmation

At each SC, a trained and approved medical record abstractor abstracted information regarding diagnostic evaluation, cancer confirmation, initial treatment, and cancer progression. A certified nosologist (medical coder) was required for coding cancer and non-cancer diagnoses. A certified tumor registrar was required for coding cancer information. (Refer to Chapter 7, Section 7.7.1 for qualifications and certification requirements for the medical record abstractor and the study nosologist.)

The MRA Coordinator at the CC facilitated regular communication between the SCs and the NCI regarding medical record abstraction issues and problem resolution and coordinated training. This process is discussed in detail in Chapter 7, Section 7.7.2. The lead abstractor at each SC assisted the CC MRA Coordinator in monitoring internal quality assurance at their SC and provided input for medical record abstraction issue resolution.

Appendices for Chapter 8

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

CANCER NOTIFICATION FORM (CNF)

ADMINISTRATIVE SECTION

Screening Center ID: |___|___|

Screening Center Staff ID: |___|___|___|___|

Study Year: T |__|

Initials Complete:_____

Initials QC: _____

Participant ID Label

PART A. CANCER INFORMATION

1. TYPE/SITE OF CANCER	2. DATE REPORTED	3. SOURCE OF INFORMATION
A. _____	A. |_|_|-|_|_|-|_|_|_|_|	A. 1 2 3 4 5 6 _____ (Specify)
B. _____	B. |_|_|-|_|_|-|_|_|_|_|	B. 1 2 3 4 5 6 _____ (Specify)
C. _____	C. |_|_|-|_|_|-|_|_|_|_|	C. 1 2 3 4 5 6 _____ (Specify)

SOURCE CODES

1. Participant
2. Relative, spouse, or friend
3. Health care provider
4. Medical records
5. Death certificate
6. Other (SPECIFY)

National Lung Screening Trial (NLST)

Specifications for the Completion of the Cancer Notification Form (CNF)

The purpose of the Cancer Notification Form (CNF) is to document the type, date reported, and source of information for a cancer reported from sources other than the ASU and not as the result of a positive screen. These sources include the participant; the participant's relative, spouse, or friend; health care provider; medical records; or Death Certificate. The CNF should not be completed to document cancers that are identified as a result of follow-up from a positive screen, including non-lung primary cancer. The completion of the form triggers an expectation for a Cancer Diagnosis Form (CDF).

This form should be completed for every report of cancer outside of the ASU and not as the result of a positive screen, except for basal-cell and squamous-cell skin cancers, which should not be reported. Multiple cancers reported in the same study year should be reported on one form. Only one CNF should be completed per participant, per study year. If another cancer of the same type is reported at a later time within the same study year, the original CNF must be updated on the form and in The same applies to multiple reports of the same cancer, which would be recorded on one line only of the CNF, but additional information such as other sources can be added. The CNF is edited via completion of the SC Edit Form (Appendix 11-7). The Specifications for Completion of the SC Edit Form can be found in Appendix 11-8.

Administrative Section:

Participant ID Label: Affix a PID label to the space provided in the upper right-hand corner of the form. DO NOT write the PID in this space.

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID number of the person completing the form.

Study Year: Record the study year that the participant was in when the cancer was reported.

Part A. Cancer Information

1. **Type/Site of Cancer:** Write in the type/site of cancer reported. If more than one cancer was reported, it should be documented on the same CNF. List each cancer reported on a different line.

2. **Date Reported:** Record the date the cancer was reported. Zero fill month and day, if necessary, and record the last two digits of the year (e.g., 02/07/2002).

3. **Source of Information:** Circle the number corresponding to the source from which the SC learned the participant had cancer. Refer to the Source Codes printed at the bottom of the

CNF for the list of possible sources of information. If the SC learned of the cancer from the ASU, the CNF should not be completed. If a cancer was reported from more than one source, multiple sources can be recorded on the same line. The same cancer should not be recorded on separate lines.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the form.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the form. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.

CANCER DIAGNOSIS FORM (CDF)

ADMINISTRATIVE SECTION

Completion Date: |__|__| / |__|__| / |__|__|__|__|
Month Day Year

Date Cancer Suspicion Reported: |__|__| / |__|__| / |__|__|__|__|
Month Day Year

Screening Center ID: |__|__|

Screening Center Staff ID: |__|__|__|__|

Study Year: T |__|

Initials Complete: _____

Initials QC: _____

Participant ID Label

PART A. RESULT OF INVESTIGATION OF REPORTED CANCER

1. Reported Cancer: _____

2. Source of Cancer Suspicion Information:

	FORM	LINE		
☐	ASU	☐ A	☐ B	☐ C
☐	CNF	☐ A	☐ B	☐ C

3. Results of Confirmation of Reported Cancer: (**MARK ONLY ONE)**

- ☐ Primary cancer – lung (Must complete DE if not already completed for this cancer.)
- ☐ Primary cancer – site other than lung
- ☐ Metastases to lung from non-lung primary cancer
- ☐ Metastases to lung from unknown primary cancer
- ☐ Metastases to other site from primary invasive lung cancer (Must complete DE if not already completed for this cancer.)
- ☐ Metastases to other site from non-lung primary cancer
- ☐ Metastases to other site from unknown primary cancer
- ☐ Cancer diagnosed prior to randomization (Complete PHVF if participant randomized ineligible.)
- ☐ Erroneous report of cancer (GO TO PART C)
- ☐ Cancer reportedly diagnosed on or after January 1, 2010. Estimated diagnosis date: _____ (GO TO PART C)

3a. Has this cancer been previously confirmed?
- ☐ Yes (GO TO PART C)
- ☐ No (COMPLETE PART B IF NON-LUNG PRIMARY. GO TO PART C IF LUNG PRIMARY.)

PART B. PRIMARY NON-LUNG CANCER DIAGNOSIS INFORMATION

4. Date of Primary Cancer Diagnosis:

|___|___| / |___|___| / |___|___|___|___|

5. ICD-O-3 Cancer Classification of Primary Cancer:

C: |___|___|___| |___|___|___|___| |___| |___| CTR ID #: |___|___|___|___|
TOPOGRAPHY MORPHOLOGY BEHAVIOR GRADE

PART C. COMMENTS

6. Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

☐ continued

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Cancer Diagnosis Form (CDF)

The purpose of the Cancer Diagnosis Form (CDF) is to document the SC investigation of cancer(s) reported on the Annual Study Update (ASU), or Cancer Notification Form (CNF). Cancer diagnosis information such as the ICD-O-3 code will be recorded on this form for reported primary cancers other than lung cancer and for primary cancers when reported cancers are determined to be metastatic sites. The CDF also documents an erroneous report of cancer if the cancer is not confirmed by a health care provider's documentation and documents cancer site and estimated diagnosis date for cancers diagnosed after December 31, 2009. This form should be completed for each report of a different cancer from a source other than follow-up of a positive screen. Subsequent reports of the same cancer will require a CDF to be completed. Only one suspected cancer should be reported on a form. If more than one cancer is reported on the ASU or CNF, a separate CDF should be completed for each cancer.

The SC MRA and a tumor (or cancer) registrar who is a certified tumor registrar (CTR) or CTR-eligible should complete the CDF. Specifically, the MRA will complete all non-administrative items on the form, with the exception of medical coding. The medical coding Item B.5, ICD-O-3 Cancer Classification of Primary Cancer is to be completed by the CTR. The MRA may complete all items if s/he is also a CTR or CTR-eligible. This form should be completed in black or blue ink.

For guidelines on general abstracting techniques, refer to Chapter 7 (see Section 7.5). Some key guidelines are presented below.

- This form includes items that require that data be entered verbatim, such as recording the cancer diagnosis and recording comments. The abstractor should be sure to use clear and legible handwriting when completing these items.

- If the medical record contains unclear or conflicting information for any item, the SC Lead Abstractor, SC Coordinator, and/or Principal Investigator should first be consulted for a resolution and an appropriate coding decision, prior to contacting the CC MRA Coordinator.

- Tumor registry information may be used to help obtain additional source documents, but CDFs should not be completed on the basis of a tumor registry abstract.

Below are some specific guidelines for the collection of information about "other cancer" using this form:

- The SCs should consult the ICD-9-CM coding manual to determine whether reported conditions are cancer or not. All conditions that are coded in ICD-9-CM as a primary malignant neoplasm (140-195, 200-208), carcinoma in-situ (230-234), or neoplasms of uncertain behavior, including carcinoids (235-238), should be reported.

- This form should be completed for cancer diagnosed both *before* and *after* the participant is enrolled in the study. If the primary cancer that was diagnosed before randomization is lung cancer, a Protocol and HIPAA Violation Form (PHVF) should also be completed to document the participant as a randomized ineligible (see Section 11.5.2.1). Primary lung cancers diagnosed prior to randomization should be recorded in Item A.3 as a "Cancer diagnosed prior to randomization," rather than a "Primary cancer – lung."

- The SC should document diagnosis information on the CDF about non-lung primary cancers only. Date of diagnosis and ICD-O-3 code should be collected for all non-lung primary cancers. The SC's responsibility is to document the result of the investigation of each report of "cancer." When a participant, relative, etc., reports a cancer, the SC must first investigate whether it is primary, metastatic, or an erroneous report. It is possible that the participant may report several "cancers" but upon investigation, it is determined that one or more of them is actually a metastatic site, not a primary cancer.

- When an ASU is completed with a "yes" for cancer or when a CNF is completed, an expectation is set for the CDF. If an ASU is completed with more than one report of cancer, expectations will be set for that number of cancers. The expectation for a CDF should first trigger an investigation by the SC. The results of the investigation should be recorded on the CDF.

- A separate CDF should be completed for each report of cancer.

- If a reported cancer has been previously confirmed, this should be documented on the CDF.

- For multiple reports of a cancer that have been confirmed as a metastatic site in a previous study year, the SC will be required to determine (via a method chosen by the SC such as a review of diagnosis dates, contact with the participant, review of medical records) whether it is the same metastasis or a new primary, and to properly document it on the CDF.

- If, upon review of the medical record to confirm a reported "cancer," there was found to be no cancer, it should be properly noted on the CDF.

- If the primary cancer site is identified to be lung, Part B should not be completed. If this cancer has not previously been confirmed, a DE form must be completed.

- Primary cancers of the trachea are classified as primary lung cancers for medical record abstraction purposes. In the event that a reported cancer is confirmed as a primary cancer of the trachea, Item A.3, Results of Confirmation of Reported Cancer, should be recorded as "primary cancer – lung" and Part B should not be completed. If this cancer has not previously been confirmed, a DE form must be completed.

- Once the SC is notified of a cancer, every attempt should be made to investigate and complete the CDF within one to two months.

- If the cancer is confirmed by both a histology and a cytology report, information from the earliest procedure with adequate histology should be abstracted onto the CDF. A copy of the report should be kept in the participant's file. Histology provides a more definitive diagnosis; therefore, every attempt should be made to determine if one exists. If multiple procedures with histology were performed and the earliest does not have a confirming histology report, a later procedure with a confirming histology report should be used to code the ICD-O-3 cancer diagnosis, if necessary. Other items must be coded from the earliest procedure, using other documentation, such as health care provider notes or progress reports. If the cancer is confirmed by cytologic diagnosis alone, then information should be taken from the earliest procedures with cytology. If the cancer is confirmed by clinical examination and diagnostic tests such as radiology, information may be taken from the earliest report if no histology or cytology report exists. For the date of diagnosis, the SC should record the date of the earliest procedure with histology that gave a definitive

diagnosis of cancer and the most complete picture of the cancer. The earliest procedure with adequate histology is determined by date, whereas the most complete picture of cancer is determined through a confirming histology report.

- Medical records should not be collected to confirm cancers reported to have been diagnosed after December 31, 2009. For these cancers, Part A of the CDF should be completed to document the diagnosis and the estimated diagnosis date. The ICD-O-3 code should not be recorded in Part B and no further documentation is required.

Specifications for completion of the form are given below.

Administrative Section:

Participant ID Label: Affix a PID label to the space provided in the upper right-hand corner of the form. DO NOT write the PID in this space.

Completion Date: Record the date that the entire CDF was completed. Month and day should be zero filled, and the last two digits of the year should be recorded (e.g., 02/07/2002).

Date Cancer Suspicion Reported: Record the date that the most recent ASU was completed or the date the cancer was reported on the CNF. Month and day should be zero filled, and the last two digits of the year should be recorded (e.g., 02/07/2002).

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID number.

Study Year: Record the study year that the participant was in when the cancer was reported.

Part A: Result of Investigation of Reported Cancer:

1. **Reported Cancer:** Write the type of cancer reported on the ASU or CNF.

   For each cancer listed on the ASU or CNF, a separate CDF should be completed. Reports of cancers are designated on the ASU and CNF by letter (A, B, etc.). Complete and attach additional forms if necessary.

2. **Source of Cancer Suspicion Information:** Use this section to mark from what source the SC learned that the participant had cancer.

   - **ASU:** Mark this box if the first documentation of the specified cancer was from the ASU.

     A: Mark this box if the cancer for which the CDF is being completed was recorded under "A" on the ASU.

     B: Mark this box if the cancer for which the CDF is being completed was recorded under "B" on the ASU.

C: Mark this box if the cancer for which the CDF is being completed was recorded under "C" on the ASU.

- **CNF:** Mark this box if the first documentation of the specified cancer was from the CNF.

  A: Mark this box if the cancer for which the CDF is being completed was recorded under "A" on the CNF.

  B: Mark this box if the cancer for which the CDF is being completed was recorded under "B" on the CNF.

  C: Mark this box if the cancer for which the CDF is being completed was recorded under "C" on the CNF.

3. Results of Confirmation of Reported Cancer: This item should be completed after the SC has investigated the reported cancer(s) and determined the primary cancer. Mark only one box to record category of cancer. The result chosen should reflect the result of the investigation for the **reported** cancer. The result categories are described below.

- **Primary cancer – lung:**

  - Mark this box if the reported cancer is primary invasive lung cancer. If this is a newly reported primary invasive lung cancer, completion of this item and receipt of the CDF will set an expectation for a DE form. Part B of the CDF should not be completed since this information will be recorded on the DE form.

  - If the primary lung cancer was diagnosed prior to randomization, it should be recorded as a "Cancer diagnosed prior to randomization," rather than a "Primary cancer – lung." A PHVF must also be completed.

- **Primary cancer – site other than lung:**

  - Mark this box if the investigation of the reported cancer reveals a primary non-lung cancer confirmed by histologic examination (study of tissue), cytologic examination (study of cells), clinical examination only, or clinical investigation (such as radiography, immunologic or biologic tests, exploratory surgery, etc.).

  - If the primary cancer was confirmed by both histologic and cytologic examination, information should be abstracted only from the earliest histology report with an adequate sample, even if it has a later date than the cytology report. As the histology report is more definitive, every attempt should be made to determine if one exists before using the cytology report for diagnosis. Other documents such as health care provider notes or progress reports may be used as confirmation of histologic diagnosis. If the primary cancer was confirmed by cytologic examination alone, then cancer diagnosis information should be taken from the cytology report.

- **Metastases to lung from non-lung primary cancer:**

  - Mark this box if the investigation of the reported cancer reveals a primary non-lung cancer with metastasis to the lung confirmed by histologic examination (study of tissue), cytologic examination (study of cells), clinical examination only, or clinical investigation (such as radiography, immunologic or biologic tests, exploratory surgery, etc.).

  - If the primary cancer was confirmed by both histologic and cytologic examination, information should be abstracted only from the earliest histology report with an adequate sample, even if it has a later date than the cytology report. As the histology report is more definitive, every attempt should be made to determine if one exists before using the cytology report for diagnosis. Other documents such as health care provider notes or progress reports may be used as confirmation of histologic diagnosis. If the primary cancer was confirmed by cytologic examination alone, then cancer diagnosis information should be taken from the cytology report.

- **Metastases to lung from unknown primary cancer:**

  - Mark this box if the investigation of the reported cancer reveals that it is actually a metastasis from a primary cancer that could not be identified.

- **Metastases to other site from primary invasive lung cancer:**

  - Mark this box if the investigation of the reported cancer reveals that it is actually a metastasis from a primary invasive lung cancer. If this is a newly reported primary invasive lung cancer, completion of this item and receipt of the CDF will set the expectations for confirmation of the lung cancer and receipt and completion of a DE form. Part B of the CDF should not be completed since this information will be recorded on the DE form.

- **Metastases to other site from non-lung primary cancer:**

  - Mark this box if the investigation of the reported cancer reveals that it is actually a metastasis from a non-lung primary cancer.

- **Metastases to other site from unknown primary cancer:**

  - Mark this box when the investigation of the reported cancer reveals that it was actually a metastasis to a different site, other than the site reported, from a primary cancer that could not be identified.

- **Cancer diagnosed prior to randomization:**

  - Mark this box when the investigation of the reported cancer reveals that the primary cancer was diagnosed prior to the randomization date.

  - Mark this box in instances where a primary tumor associated with a recent recurrence was initially diagnosed prior to NLST enrollment. If the initial diagnosis was at least five years prior to eligibility determination (and

randomization), a PHVF (Chapter 11, Section 11.5.2) is not necessary since the participant is not a randomized ineligible. However, if the initial cancer was diagnosed within five years of the eligibility determination, the participant should have been randomized ineligible, a PHVF should be completed.

- If the reported cancer is primary lung, a PHVF should be completed to document the participant as randomized ineligible.

- The investigation of reported cancer reveals a primary cancer confirmed by histologic examination (study of tissue), cytologic examination (study of cells), clinical examination only, or clinical investigation (such as radiography, immunologic or biologic tests, exploratory surgery, etc.).

■ **Erroneous report of cancer:**

- Mark this box when the investigation of the reported cancer reveals it is not a cancer. Part B of the form should be skipped.

■ **Cancer diagnosed on or after January 1, 2010:**

- Mark this box when the cancer was reported to have been diagnosed after December 31, 2009. Record the reported diagnosis date from the ASU or CNF in the space provided. Part B of the form should be skipped.

3a. Has this cancer been previously confirmed? Mark the box corresponding to whether this cancer has previously been confirmed. If the cancer has previously been confirmed, Part B of the CDF should be skipped and Part C should be completed. If the cancer has not previously been confirmed AND it is a non-lung primary cancer, Part B of the form should be completed. Part B should NOT be completed for a primary invasive lung cancer. This question refers to the diagnosis of the primary cancer, and not the metastasis. For example, if breast cancer is reported in 2003 on an ASU and a CDF is completed with the confirmation of the breast cancer diagnosis, and in 2004 bone metastasis are reported related to the breast cancer then the answer to this question would be "Yes" as the breast cancer is previously diagnosed and documented in

Part B. Primary Non-Lung Cancer Diagnosis Information:

4. Date of Primary Cancer Diagnosis: Record the month, day, and year of a newly diagnosed primary non-lung cancer diagnosis that is confirmed by histology or cytology report. This is the date that the actual procedure was performed that confirmed this cancer diagnosis. If there are multiple reports that confirmed this cancer, record the earliest date available. If the primary cancer is known, this should be the date the primary cancer was first diagnosed. If the primary cancer is unknown, this should be the first date of diagnosis for the unknown primary.

Documentation of the cancer diagnosis should be maintained in the participant's file. This documentation should include copies of histology or cytology reports that report the participant's cancer. If no diagnostic reports are available, but cancer is documented in the

other sources, these sources should be photocopied or recorded verbatim. All confirmation material should be attached to the CDF and maintained in the participant's file.

- This item should not be completed when the reported cancer is a primary invasive lung cancer or is found to be a metastatic site from a primary invasive lung cancer.

- If the reported cancer is a metastasis from a recently or newly diagnosed non-lung or unknown primary, this item should be completed with information regarding the primary cancer, not the metastatic site. If the report of cancer is a metastasis from a previously diagnosed primary cancer that was diagnosed prior to enrollment in the study, the date of diagnosis is the date that the metastasis is diagnosed. For example, bone metastasis is noted in 12/03 from breast cancer that was originally diagnosed in 1990. The date should reflect the date of diagnostic determination that the metastasis was from the breast cancer, and not the date of the original breast cancer diagnosis. In the comments (Part C, Item 6) note the date of the original diagnosis of the primary cancer.

- If both histology and cytology reports are available confirming the cancer diagnosis, use the earliest histology report with an adequate specimen that provides definitive information for a cancer diagnosis. In most instances, the histology report should be used as the source for recording information, even if the histology report has a later date than the cytology report. If only a cytology report is available, then record the date from that report. If only a radiographic report or a report from some other diagnostic examination is available, record the date from the available report.

- If a report that confirms date of cancer diagnosis is unavailable, another source from the medical record can be used to complete this item. Other sources include health care provider notes, admission notes, history and physical, discharge summary, or surgical pathology report with a reference to the prior slide from the biopsy (with date of collection).

- In the rare occasion where the cancer is diagnosed by clinical examination only and not histologically or cytologically, the date of the cancer diagnosis is the date of the clinical examination during which the cancer was diagnosed.

- Zero fill month and day, and record two digits for the year. Month and year of primary cancer diagnosis must be known, however, if the day is unknown, record "99."

5. **ICD-O-3 Cancer Classification of Primary Cancer:** This item is for classifying the diagnosis of the primary cancer according to ICD-O-3 (International Classification of Diseases for Oncology, Third edition, 2000).

   - This item should not be completed when the reported cancer is a primary invasive lung cancer or is found to be a metastatic site from a primary invasive lung cancer.

   - If the reported cancer is a metastasis from a non-lung or unknown primary, this item should be completed with information regarding the primary cancer, not the metastatic site.

- This item is to be completed by a tumor registrar who is a CTR or is CTR-eligible. The CTR should code the ten digit ICD-O-3 classification in the space provided. The CTR should also record his/her four-digit staff ID number in the space provided for "CTR ID."

- The ICD-O-3 code should reflect the diagnosis from the *earliest* (chronological) histology report (or cytology report if the histology report is not available) with the initial definitive diagnosis. This item *must* be coded from the histology report on an adequate tissue specimen. If multiple procedures with histology were completed, and the earliest does not have a confirming histology report, a later procedure with histology and a confirming histology report should be used to code this item. Other sources, i.e. cytology report, health care provider notes, admission notes, history and physical, discharge summary, or surgical pathology report with reference to the prior slide from the biopsy (with date of collection), may not be used to code this item. The source used to code this item might not be the same source used to code the date of diagnosis in Item B.4.

- If the primary cancer is unknown, the topography section of the ICD-O-3 code should be C809.

- The ICD-O-3 cancer classification should be coded by the CTR, if the required documents are available in the medical record.

Part C. Comments

6. **Comments:** Use this section to record any overflow information or discrepant information while abstracting from the participant's medical records.

   - If an abstracted item has conflicting or discrepant information, the SC Lead Abstractor, SC Coordinator, or, if necessary, the Principal Investigator should review the discrepant information prior to submission to the CC MRA Coordinator.

   - In the Comments Section, first enter the item number indicating the item to which the comments are related, record the comments in the space provided, and then record your initials and the date.

   - Place an asterisk on the form next to the item number being referenced in Comments.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.

- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.

- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.

- Enter the form into
- File the form in the participant's study file.

9. VITAL STATUS ASCERTAINMENT AND THE ENDPOINT VERIFICATION PROCESS

9.1 Introduction

9.1.1 Background

The SCs, the CC, and the NLST Endpoint Verification Team (EVT) participated in activities to implement a review of cause of death for all participants who died during the course of the study. The purpose of the Endpoint Verification Process (EVP) was to minimize error and bias in assignment of cause of death for study participants, and therefore, ensure a more accurate assessment of the ability of the spiral CT and chest x-ray screening exams to affect lung cancer mortality.

Participants randomized to receive a spiral CT examination may have been diagnosed with lung cancer earlier in its natural history than those receiving a chest x-ray examination. Moreover, since those participants underwent a potentially more sensitive screening test, it was possible that a cancer may have been diagnosed that would never have presented in that individual's lifetime. Therefore, during each year of follow-up in this study, the incidence of lung cancer in the spiral CT arm was likely to be higher than that in the x-ray arm. This could affect mortality data, since it has been shown that cancer diagnoses influence assignment of cause of death on Death Certificates. This effect, known as "sticking diagnosis bias," could lead to an over-reporting of lung cancer as cause of death among spiral CT arm participants. Further investigation of medical records could reveal that some of these deaths were not actually due to lung cancer.

Certain ICD-10 and ICD-O-3 codes may have represented a misreported lung cancer diagnosis or death. Examples include causes of death which suggest uncertainty of the diagnosis of cancer. Further investigation of medical records could reveal that some of these deaths were due to lung cancer.

Concern over another bias that might affect screening trials was expressed by Black et al. in 2002. The "slippery linkage bias" has been described as follows, "Many subjects in the screened group may undergo invasive testing for a suspicious screening result, and many others may be treated for early disease. These interventions may lead to deaths that are difficult to trace back to screening."

Because the EVP involved a review of deaths occurring among persons diagnosed with lung cancer, deaths with mention on the Death Certificate of lung cancer, certain medical misadventures or other causes possibly masking death due to lung cancer, as well as deaths occurring within close proximity to certain diagnostic evaluation procedures, the process would minimize error associated with over- and underreporting of lung cancer as the Death Certificate cause of death. This process would further ensure that ascertainment of the fact of death was equally applied to the spiral CT and chest x-ray arm participants.

9.1.2 Overview of the Endpoint Verification Process

The following is a brief overview of the activities completed by the SCs, the CC, and the EVT to implement the EVP.

- **Ascertainment of the Fact of Death:** Each SC was responsible for implementing procedures to follow up all study participants for vital status ascertainment during the course of the study. For participants who were reported deceased, the SC was responsible for confirmation of death through procurement of the Death Certificate. The SC was responsible for shipping Death Certificates to the CC on a monthly basis.

- **Cancer Ascertainment:** Each SC determined cancer diagnoses for study participants during the course of the study as described in Chapters 7 and 8. Each SC collected medical records to abstract diagnostic evaluation for all positive screens and reported lung cancers, as well as treatment information and cancer progression information for all confirmed lung cancers.

- **Identification of Deaths for Review by the EVT:** The CC was responsible for identifying deaths to be submitted to the EVT for review. The CC coded causes of death and significant conditions listed on the SC-supplied Death Certificates, including the NCHS Derived Underlying Cause of Death. This information was entered into the central database, and a computer algorithm was applied at least monthly to select deaths that met criteria for EVT review. For those deaths that did not meet the criteria of the selection algorithm, the death was deemed "Certified" and no additional action was required. Deaths lacking sufficient information for processing were rejected by the algorithm and re-processed once information was provided by the SC.

- **Collection of Medical Records for Endpoint Verification:** The SC was responsible for collecting all necessary documentation for deaths requiring EVT review. All records were carefully reviewed by the SC, and any portion of the record that identified personal information, randomization assignment, whether a lung cancer was screen- or symptom-detected, or made mention of the NLST/LSS, was to be deleted. When record collection was complete, the SC prepared a folder with all requested

EVP documentation, batched it with other completed EVP folders, and forwarded them to the CC. The CC verified that documents were present and properly edited before forwarding the information to the EVT Chair for review.

- **Review by the Endpoint Verification Team:** The EVT was composed of five physicians who were not affiliated with the NLST or any of its SCs. The review process determined whether a death was due to lung cancer and resulted in collection of data concerning the impact of diagnostic evaluation or treatment of a confirmed or suspected lung cancer on a participant's death. In addition, data were collected concerning the impact on the participant's death of diagnostic evaluation or treatment of a clinically significant finding identified on an NLST screening exam.

  All deaths selected for EVT review were first reviewed by the Chair. The Chair's cause of death assignment was compared to the NCHS Derived Underlying Cause of Death, which was ascertained from information on the Death Certificate. Some Chair-reviewed deaths also were reviewed by an additional EVT member and some deaths reviewed by the Chair and an additional member also were reviewed by a panel of EVT members. The need for review beyond the Chair-level depended, in most instances, on whether there existed disagreement between two sources (Chair versus Death Certificate or additional member versus Chair) on lung cancer as cause of death. Once agreement was reached as to whether a death was due to lung cancer or diagnostic evaluation or treatment of a suspected lung cancer, that death was certified and the EVT-determined cause of death recorded. All results were reported monthly to the SCs.

The remainder of this chapter describes in detail the SC procedures and review activities completed for ascertaining and confirming participant deaths, providing Death Certificates to the CC, identifying cases for submission to the EVT, and obtaining, editing, and processing all medical record documentation submitted to the EVT. Activities performed by the CC, including central Death Certificate coding, data processing, coordination procedures, and procedures to be completed by the EVT are documented in the . Details of the review process are found in the

which can be obtained from the CC after permission for release is granted by NCI.

9.2 Vital Status Ascertainment Activities

9.2.1 Introduction

The SC determined the vital status of all participants during the course of the study and obtained Death Certificates for those participants reported to be deceased. Tracing procedures were

implemented for all participants who were considered lost to follow-up in order to ascertain their vital status.

9.2.2 Vital Status Ascertainment

Ascertainment of vital status was the first step in the EVP. The primary method for identifying possible deaths was the Annual Study Update (ASU) (Appendix 3-11), which was to be completed by all participants on an annual basis. For participants who did not respond to the ASU, follow-up tracing activities were required to determine whether they were alive or deceased. In some cases, the participant's relatives or friends may have completed and returned the ASU indicating that the participant died, or the ASU mailing may have prompted the participant's relatives or friends to call and report the death. If a participant was reported deceased on an ASU or by a relative, friend, or obituary, the SC Coordinator was required to complete a Non-Response Form (NRF) (Appendix 11-3). If the SC learned of a potential death through post office returned mail, the SC Coordinator was required to investigate the report of death prior to completing the NRF and only completed the NRF if the report was confirmed through another source (such as a relative or friend.) Once an NRF was completed, the participant's vital status was updated to "presumed deceased." For presumed deaths that occurred on or before December 31, 2009, the SC Coordinator was required to confirm the death. The SC Coordinator needed to obtain the date of death and state of death in order to obtain the Death Certificate from the appropriate state Vital Statistics Bureau. The SC Coordinator determined the most appropriate strategy to obtain this information. For presumed deaths that occurred after December 31, 2009, confirmation of the death was not required.

When participants were considered lost to follow-up because of failure to return the ASU or to keep an appointment for a screening visit, relatives, friends, and/or physicians/health care providers could be contacted for information. The Participant Contact Form (PCF) (Appendix 3-1) and the Participant Contact Update Form (Appendix 3-7) collected contact information on the participant's relatives, friends, and current physicians/health care providers. If the participant was identified as having a positive screening examination and/or lung cancer at some time during the study, Part E of the Diagnostic Evaluation (DE) form (Appendix 7-2) provided additional information about health care providers, hospitals, or clinics where the participant was seen. In the absence of contact within 18 months, tracing procedures were initiated (Section 9.2.3). The 18-month period began on the date of the very last verbal or written contact with a participant or participant's spokesperson. Tracing procedures

may have included a search for fact of death with the Social Security Death Index (SSDI), tumor registries, Departments of Motor Vehicle Administration, and Vital Statistics Bureaus.

Critical identifying information, essential for making submission requests for vital status determination and for tracing participants, was maintained by the SC. This information was collected on the Eligibility Verification Form (EVF) (Appendix 2-10) and the PCF and/or PCUF. It includes:

- Name: first, middle, and last;
- Sex;
- Date of Birth: month, day, and year;
- Social Security Number, and
- Last known address and date last known address was ascertained.

9.2.3 Tracing Lost Participants

When participant contact was attempted for any follow-up activity, it may have been determined that the participant could no longer be reached at the last known address and/or phone number. In this situation, tracing activities were initiated. The information collected on the PCF/PCUF would greatly facilitate the tracing process. It was suggested that this information be used initially to try to locate the participant. In subsequent years of the study, outside sources such as the Department of Motor Vehicles, the Social Security Administration, National Death Index, Post Office checks, cancer registries, credit bureaus, etc., could be utilized. The SC was required to make every effort to minimize the number of participants lost to follow-up during the course of the study.

Each SC was responsible for tracking tracing efforts for all participants lost to follow-up. Tracking may have been done manually or by using an automated system. The SC Coordinator determined the tracking method.

9.2.3.1 Centers for Medicare and Medicaid Services (CMS)

The Centers for Medicare and Medicaid Services (CMS) was identified as a good resource for determining the vital status of participants who were lost to follow-up. CMS is the government

agency that administers the programs. For individuals who received benefits, the CMS files provide date and state of death. Prior approval was required by CMS for all submissions for record searches. An application and instructions could be obtained by contacting CMS at the address below.

Centers for Medicare and Medicaid Services
Bureau of Data Management and Strategy
6325 Security Boulevard
Baltimore, MD 21207

CMS files can be searched either by Social Security Number or by name. Submission requirements include a valid Social Security Number for the Social Security Number search, or the first and last name and full date of birth for the name search. The Social Security Number match was strongly recommended over the name search because of the quality of information provided. Once a submission is made, the response time is quick and the information provided is accurate.

9.2.3.2 Social Security Death Index

The Social Security Death Index (SSDI) is an online search index of deceased individuals whose Social Security benefits have been paid out. It provides the last and first name; the Social Security Number; birth and death dates; city, county, state, and zip code of the last residence, and city, county, state, and zip code to which the final lump sum payment was made. It is useful for verifying a death or completing information about a death prior to submission to the state vital statistics office. The SSDI is updated monthly. The main disadvantages to using this system are that it includes only those individuals assigned a Social Security Number and who have had Social Security benefits paid out and the accuracy of the information is not guaranteed.

The SSDI may be accessed on the Internet at http://ssdi.genealogy.rootsweb.com/ or http://www.ancestry.com/search/rectype/vital/ssdi/main.htm. Both of these Web sites provide information about using the SSDI.

9.2.3.3 Other Sources for Vital Status Determination

It was expected that most deaths would be ascertained through the methods described above. Other tracing resources for locating lost to follow-up participants and for determining vital status include: National Death Index, cancer registries, Departments of Motor Vehicle Administration, and Vital Statistics Bureaus. These sources became more useful in subsequent years of the study when there was an increase in the number of participants who were lost to follow-up. The SC Coordinator was responsible for establishing the tracing methodologies to be used and for conducting all searches.

9.2.4 Searching the National Death Index Database

The National Death Index (NDI), a product of the National Center for Health Statistics (NCHS), is a computerized database that contains death record information from all 50 states, the District of Columbia, the Virgin Islands, and Puerto Rico. The NDI was developed to facilitate health research efforts and covers deaths that occurred from 1979 forward. An NDI-Plus search, which provides coded causes of death (using the International Classification of Diseases, ICD-10), is available for a particular calendar year approximately 14 to 16 months after the close of that year. For example, NDI-Plus provided nearly complete coverage for deaths that occurred through 2004 by April 2006. All proposed search requests must be accompanied by a formal application and must be approved by the NDI Board.

The NLST used NDI to obtain vital status and cause of death information for participants with whom the SCs lost contact. The CC prepared and submitted the NDI application for the request on behalf of the NLST/LSS SCs. For each search, the SCs prepared and submitted a data file directly to the NDI, and results were returned to the SC, generally within one week. The NCI established an interagency agreement with the NCHS to provide payment for the cost of the search.

Prior to each file submission, the SCs received additional information from the CC regarding preparation of data files using and interpretation of NDI results. A copy of *NDI User's Manual and NDI Plus: Coded Causes of Death, Supplement to the User's Manual* also was provided to all SC Coordinators. The SCs were responsible for retrieving the returned NDI output and for determining appropriate matches.

9.2.4.1 Submission of Files to NDI

In May 2006, the SCs began annual NDI-Plus searches in order to determine vital status and to obtain coded causes of death for participants who were lost to follow-up, or those known to be deceased but for whom the SC was unable to obtain a Death Certificate. Any SC not planning to perform an annual NDI search was required to provide written justification to the NCI. The NDI Website, http://www.cdc.gov/nchs/ndi.htm, describes the NDI database, outlines the procedures for submitting data files, and provides contact information for NDI staff. It was recommended that the SC Coordinator maintain a system for storing NDI documents by creating an NDI folder for each year the search was completed. The NDI folder would include NDI search queries, submission files, NDI return files, and NDI Results Forms.

The SC Coordinator used to facilitate the NDI searches by generating a query to identify potential NDI candidates. The program in could be located through the NDI module. The "NDI Submission" option enabled the SC to perform an initial query to identify all potential candidates. The query identified participants who had an NRF with a reason of "lost contact," "refusals" (hard refusals only), "medical condition," or "deceased" (with no Death Certificate on file) through December of the year in which the NDI database was current. Participants who reportedly died within the past calendar year were not included because NDI would not yet have a record of their death. The query incorporated the necessary identifying information from the randomization database, MHQ, and PCF/PCUF for each PID. Each record contained the following information, if available:

First name, last name, middle initial
Date of birth
Social Security Number
Sex
State of residence

These data elements were included in the search to enable as close a match as possible with NDI records. In order to be eligible for an NDI search each record was required to contain at least one of the three following combinations of data elements:

First and Last Name and Social Security Number;
First and Last Name and Month and Year of Birth, or

Social Security Number and Date of Birth and Sex.

The NDI submission program was designed to identify participants whose information was insufficient to perform a search. Upon attempting to select the record for inclusion in the submission file, the program automatically checked for the above three combinations, and displayed an error message when participants did not have at least one of the three. The program prevented these participants from being selected for the final submission file. The SC staff reviewed the participant files for any information that was lacking and added missing data by editing the PCF/PCUF or entering the missing data items into a new PCF/PCUF. The updated information was picked up by re-running the query, after which it appeared in the initial query results grid in

After reviewing the output from the initial query to determine if the available information was complete, the SC Coordinator selected participants to be included in the submission file. For instance, the SC staff may have been aware of information about a participant that would lead them to exclude him/her from the NDI search, such as knowledge that the participant was no longer in the United States. A participant could be excluded from the submission file by simply not selecting him/her.

Once the SC staff reviewed the candidates and selected all records to be included in the submission file, they clicked on the Create File button. At that time, the system generated either one or two submission files, depending on the type of candidates selected, and replaced the NLST PID with a unique NDI identification number. One file contained records for participants who were known to be deceased (NRF with reason code 5, but no Death Certificate) and the other contained records for participants with NRF reason codes 1, 2, or 4, participants whose status was unknown. This distinction determined fees for the search.

The user was able to view and print the participant records included in the submission file. The SC was advised to print a copy and save it in the NDI folder. saved the submission file on the SC server. The SC then copied the file onto a CD-ROM or standard 3.5-inch diskette. The NDI recommended that the submission file be password protected prior to mailing. The CC forwarded to the SCs information regarding their assigned NDI numbers, which was to be included in the submission file name and also recorded on the outside of the CD or diskette

A transmittal form was provided to each SC and was required to accompany each file submitted for an NDI search. The CC provided the transmittal form, the specifications for completing

that form, and a fee worksheet prior to the expected submission. The transmittal form, fee worksheet, and CD or diskette that contained the files were sent by express mail on the designated dates for all SCs (in order to have all NLST/LSS files arrive at NDI on approximately the same day) to:

National Death Index
National Center for Health Statistics
3311 Toledo Road, Room 7318
Hyattsville, MD 20782
Phone: 301-458-4444

SCs were advised to e-mail NDI (ndi@cdc.gov) in order for NDI to anticipate receipt of a submission file from that center. The SC also sent a copy of the e-mail to the CC NDI Coordinator.

9.2.4.2 NDI Reports

Approximately one week after NCHS received the data file, a CD-ROM containing the NDI output was returned directly to each SC for review and determination of matches. This output contained ten different output files; one of which was the NDI Retrieval Report. Whenever a participant record matched with NDI records, it appeared on this report. The other reports provided information on the records that were submitted, coded causes of death, and a file for forms to request Death Certificates from states' vital statistics offices. For a list and brief description of the NDI Retrieval Reports, see Appendix 9-17.

9.2.4.3 Determining NDI Matches

Many records submitted to NDI will either have false matches, or will not have a match at all. Specific matching criteria were developed to assist in correctly identifying a particular participant from NDI record matches. The NDI Retrieval Report was the main report to use when determining matches. On the NDI Retrieval Report, the results of each match were ranked according to the number of NDI data items in agreement with data items belonging to the participant. When all items submitted by the SC matched exactly with an NDI record, the NDI record included an asterisk next to the state of death. The NDI-Plus search provided cause of death codes for matches that were ranked first or achieved a sufficient "probabilistic score" (Appendix A of the *NDI-Plus User's Manual* provides additional

information on probabilistic scoring). For NLST purposes, the terms "Exact" and "Probable" were based upon the definitions below.

Exact Match: If the following data items matched exactly, the NDI record was considered an Exact Match to the PID:

- First and Last Names, and Middle Initial
- Social Security Number
- Date of birth
- Sex

Probable Match: Possible matches appeared on the NDI Retrieval Report ranked based on the number of data items in agreement with the data items of the participant. For NLST purposes, a record was considered a Probable Match when some of the data items did not match exactly, but there was indication that they were close. Sex code was required to match. However, if other data items did not match exactly, they were required to meet the following criteria, at a minimum:

- Under "Name" in the Retrieval Report, if F (for first name) had an NDI code of "I," this indicated that the first initial of the first name matched.
- Under "Name" in the Retrieval Report, if L (for last name) had an NDI code of "N," this indicated that the name matched only on NYSIIS (New York State Identification and Intelligence System) phonetic codes.
- At least the last four digits of the Social Security Number matched. If the Social Security Number was not provided, then the DOB was required to match exactly, i.e., month, day, and year.
- Month of birth within one month before or after the participant's date of birth.
- Year of birth within ten years before or after the participant's date of birth.

The submission file also included state of residence to help determine the suitability of a match. If a record did not meet the criteria for an Exact Match or Probable Match, then it would fall into one of the two following categories:

No Match:

- The participant record was not involved in an Exact or Probable Match with NDI records.

Rejected:

- No information was returned from NDI for this participant because the record failed to satisfy the basic criteria of the NDI edit program and was rejected prior to the search. These participants were easily identified using the Rejected User Records report.

9.2.4.4 Entering the Results of the NDI Search into

Results from the NDI search were entered into using the National Death Index Results (NDIR) Form. After the submission files were created, the SC staff generated NDI Results Forms for each participant record submitted. These forms could be generated immediately following the creation of the submission file or at any time before the results were returned, but it was recommended that they be printed soon after the file was created. generated one form for each participant. The forms were preprinted with the participant's NLST PID and their assigned unique NDI identification number for the particular submission. Since the NLST PID was not sent to the NDI, the results from the search had to be matched with the participant's unique NDI identification number. The NDIR form collected data on the type of match that resulted from the search, whether a Death Certificate would be requested for a probable match as well as the underlying cause of death (ICD-10), and year of death. Please refer to Appendices 9-18 and 9-19 for the NDIR form and specifications.

Once the NDI results were reviewed and the NDIR form completed, the form was entered into Data entry occurred within the NDI module under "NDI Results." Following entry of the NDIR forms into the database, copies were to be filed in the participant's NLST folder as well as the NDI results folder.

9.2.4.5 Requesting Death Certificates

The Death Certificate was requested for all Exact Matches, and for Probable Matches that appeared to correctly identify a participant. If a participant had an Exact Match and Probable Matches, the SC Coordinator was advised to request a Death Certificate only for the Exact Match. In general, only one Death Certificate was to be requested per PID. However, in the event that several Probable Matches appeared to identify a participant equally well, the SC Coordinator could request these Death Certificates. Upon receipt of the Death Certificates, the SC Coordinator would compare the information on the Death Certificates with the information in the participant folder. Additional data in the folder such as race, occupation, and marital status could help to identify the correct Death Certificate for the participant. Death Certificate(s) that were determined not to correctly identify the participant were to be shredded immediately.

With the return of the results of the NDI search, the SC also received a document entitled Obtaining State Death Certificates. This document contained the most recent available information on each state's requirements and charges for the release of copies of Death Certificates. The document also included the name, address, and phone number of a contact person in each state's vital statistics office, as well as the specific Death Certificate release policy and charge.

When requesting copies of Death Certificates from a vital statistics office, the SCs were strongly encouraged to use NDI's Death Certificate Request Form, which was provided with the NDI search reports (Appendix 9-20). The Death Certificate Request Form listed the NDI record matches for each state sorted first by year of death and then by Death Certificate number. Selected information from each matching record was also presented. This information assisted the vital statistics office in releasing the correct Death Certificate. The request form for certain states was several pages long. For such a form, the SC could eliminate all pages (other than the first page) that did not contain requests for certificates.

Steps in requesting Death Certificates identified through NDI were as follows:

1. Place a check mark in the left margin of the Death Certificate Request Form for those Death Certificates being requested.
2. Always complete the first page of a state's Death Certificate Request Form. Eliminate all other pages that do not contain requests for Death Certificates.

3. Contact vital statistics offices to determine their fees, how to make payment, and what additional information is needed in order to allow the office to release copies of the Death Certificates.

4. Mail the forms along with payment to the appropriate state office.

5. Upon receipt of the Death Certificate, verify that the information on the Death Certificate matches with information in the participant's file.

9.3 Death Certificate Acquisition

Death Certificates were required to be obtained for all deceased participants with a reported date of death on or before December 31, 2009. The death was not considered confirmed until the Death Certificate was obtained. The SC was responsible for the procurement and processing of all Death Certificates. The process of requesting and receiving Death Certificates at the SC was documented on the Death Certificate Tracking Form (DCTF) (Appendix 9-15). The DCTF was expected for all participants with an NRF participant status of "deceased" and a reported date of death on or before December 31, 2009. Specifications for Completion of the DCTF are found in Appendix 9-16. A certified copy of the Death Certificate was not required for the EVP; the SC could obtain a photocopy of the Death Certificate. Copies of all Death Certificates were to be edited to delete identifying information and shipped monthly, or more often as requested, to the CC for cause of death coding. A new folder was to be prepared to store the Death Certificate, as well as the medical record information relating to the EVP (see Section 9.6). This documentation was in addition to the documentation collected for medical record abstraction used for the cancer ascertainment process.

Some state Vital Statistics Bureaus began releasing electronic Death Certificates. Electronic Death Certificates typically do not include all of the pertinent information needed for the NLST. If an SC received notification that a Death Certificate would be released electronically, the SC Coordinator was advised to request a hard copy. The NCI offered to provide a letter for the SC to submit to the state Vital Statistics Bureau with justification for the request. If necessary, the SC was asked to contact the CC to obtain such a letter.

A brief description follows of the various activities associated with Death Certificate acquisition and processing:

- Prepare and submit all necessary application forms to the various state Vital Statistics Bureaus for approval to obtain Death Certificates.

- Upon receipt of approval, prepare and submit Death Certificate requests to the state Vital Statistics Bureaus.
- Receive and review results of the Death Certificate acquisition efforts.
- Determine which Death Certificate is most likely to represent the participant under investigation based on comparisons with the data submitted to the state.
- Conduct quality assurance by ensuring the Death Certificate matches the participant for whom the request was made, by checking the Death Certificate for legibility and accuracy, and, if necessary, following back to the Vital Statistics Bureau for clarification.
- Verify that the Death Certificate contains date of death, date of birth, race, occupation, and cause of death information. (Some states, such as Florida, have two versions of the Death Certificate, one with the cause of death, and one without.)
- Place a PID label where it does not obscure any information, preferably in the upper right hand corner of the Death Certificate.

It was expected that Death Certificates would be obtained for all deaths occurring in the United States. For deaths occurring outside the U.S., every attempt was to be made to obtain the Death Certificate from the country in which the participant died or through the State Department. In extremely rare circumstances, SC efforts to obtain a Death Certificate were not successful. In theses instances, the SC contacted the CC to obtain a blank Documentation for a Missing Death Certificate (Appendix 9-22) to document the missing Death Certificate. Specifications for completing the Documentation for a Missing Death Certificate are found in Appendix 9-23. The CC and the NCI reviewed the completed form to determine whether all reasonable efforts were exhausted. Upon NCI approval, the CC turned off expectations for the Death Certificate and the SC initiated medical record collection for the EVP.

9.4 Shipment of Death Certificates

Once a Death Certificate was received, it was shipped to the CC. All Death Certificates were photocopied and the copy edited to delete participant identifiers. Death Certificates were shipped monthly, or more often as requested, to the CC following the procedures described below:

- Photocopy the Death Certificate and place the original in the participant's EVP folder (see Section 9.6).
- On the photocopy, delete the following identifying information: the deceased's name, Social Security Number, address, spouse or other relative names and addresses, and informant name and address. It is recommended that a black

marker be used. The area should be blacked out on both sides of the document. Do NOT delete participant date of birth on the Death Certificate.

- Verify that the identifiers cannot be read.
- Prior to shipping, complete or generate from a Death Certificate Transmittal Log (Appendix 9-1). The transmittal log should list the PID for each Death Certificate included in the shipment.
- Assemble the Death Certificates in the order in which they appear on the transmittal log. Verify that all Death Certificates are present. If any Death Certificates cannot be located or are not ready to be shipped, cross off the corresponding PID on the transmittal log.
- Include one copy of the Death Certificate Transmittal Log with the package of Death Certificates sent to the CC. Fax a copy of the Death Certificate Transmittal Log to:

- Keep one copy of the Death Certificate Transmittal Log for the SC files.
- Package the Death Certificates in a Tyvek envelope and send to:

- Send the Death Certificates to the CC using Federal Express, UPS, or another certified mail carrier. Keep a record of the package number.
- Any month that the SC will not be shipping Death Certificates, the SC must notify with this information.

The CC received and verified all shipments of Death Certificates from the SC. Upon receipt of a shipment, the CC checked the Death Certificate Transmittal Log. If there was a discrepancy between the transmittal log and the contents of the shipment, or if any of the certificates were incorrect or illegible, the CC Data Manager contacted the SC Coordinator by telephone, fax, or e-mail to resolve the discrepancy.

9.5 Destruction of Identifiable NDI Data and Death Certificates from NDI Searches

In 2007, the NDI formalized recommendations for destruction of "identifying or identifiable death record information" with a request for studies approved prior to April 2007 to develop a plan for destroying this information at the end of the study. The completed NDI Data Destruction Form, signed by the NLST/LSS Project Officer and approved by the NDI, was considered current by NDI until June 2012, and is described in the next paragraph.

SCs and the CC must destroy all original and photocopied Death Certificates three years after the completion of final data analysis and published final results for the study. In addition, electronic files and/or printouts containing identifying information obtained from the NDI or death records must be destroyed within the same time period. If an individual state has more stringent requirements for destruction of Death Certificates, the SC is responsible for tracking this information, reporting the requirements to the CC, and destroying the Death Certificates as required by the state. Acceptable methods for destruction of hard copy materials include shredding or incineration.

9.6 Folder Preparation and the Death Documentation Sheet (DDS)

Once a death was confirmed through acquisition of the Death Certificate, a new folder was prepared for the participant's file. It was suggested that the folder be a color or type unique to the EVP and be labeled with the PID number. All documentation relating to the EVP, including a copy of the Death Certificate, was to be placed in the EVP folder to facilitate access and review. An EVP folder was created for all deceased participants, regardless of whether or not they were selected for review by the EVT.

In addition to the Death Certificate, each EVP folder contained a Death Documentation Sheet (DDS) (Appendix 9-2). The DDS was a manual tracking record to document and monitor completion of each step of the EVP. It was used to indicate completion of cancer ascertainment, ongoing medical record collection and editing, and shipment of EVP materials. The SC may have developed an addendum to the DDS to meet SC specific procedures for requesting and obtaining medical record documentation. The Specifications for Completion of the DDS are provided in Appendix 9-3.

9.7 Cancer Status Determination and Confirmation

Once a participant's vital status was confirmed through collection of the Death Certificate, the cancer confirmation process began. Cancer confirmation in preparation for EVP included the following major steps:

- Identify and document on a CNF all previously unreported cancers from outside the ASU, including the Death Certificate;
- Complete and process the CDF for all suspected cancers;
- Close out the DE forms for all positive screening exams, and DE and TI forms for all confirmed lung cancers, and
- Administer the History of Malignancy form (HOM) (Appendix 9-4) for those participants whose Death Certificates list the cause of death as "natural causes."

These steps are described in detail in the following sections.

9.7.1 Cancer Reports from ASU and Other Sources

Cancer in participants may have been reported by the participant on the ASU or the SC may have been notified by a participant, relative, physician, health care provider, or health care clinic, etc. that a cancer was diagnosed. The SC also may have incidentally found a primary cancer diagnosis upon review of the participant's medical record, or a previously unreported cancer may have been reported on the participant's Death Certificate. The SC was responsible for documenting all reports of cancer outside the ASU on a CNF. The SC was responsible for following up cancer suspicions from the ASU and CNF and documenting the results of the investigation on a CDF.

9.7.2 Completion of the CDF for Suspected Cancers

Cancer ascertainment and confirmation was not considered complete until a CDF was completed for all cancers reported on an ASU or CNF. Further details regarding cancer ascertainment and confirmation are provided in Chapter 8.

9.7.3 Completion of DE and TI Forms for Positive Screening Exams and Confirmed Lung Cancers

The SC was required to complete a DE form for all positive screening exams, and for all confirmed lung cancers documented on a CDF and diagnosed on or before December 31, 2009. The SC was required to complete a TI form for all confirmed lung cancers documented on a DE form. The SC was required to complete a CP form for all confirmed lung cancers each year through 2009 beginning in the study year following the completion of the TI form. Further details regarding completion of the DE, TI, and CP forms are provided in Chapter 7.

9.7.4 Death Certificates with Causes of Death – "Natural Causes"

The cause of death on Death Certificates is occasionally listed as "natural causes." In such cases, additional information was required for the EVT in order to determine a more specific cause of death. In addition, the EVT would need to confirm that there was no lung cancer.

To obtain this information, the History of Malignancy (HOM) form (Appendix 9-4) was sent to the deceased participant's physician/health care provider or health care clinic. The Specifications for Completion of the HOM are found in Appendix 9-5. The SC sent the HOM to the physician/health care provider or health care clinic with a cover letter. A sample cover letter is provided in Appendix 9-6. The HOM was sent only for those individuals who died of "natural causes."

9.8 Determining Eligibility for EVT Review

All participant deaths were reviewed by a computer algorithm at the CC that examined the causes of death and significant conditions listed on the participant's Death Certificate as well as other participant data to determine eligibility for EVT review. The algorithm rejected deaths that had incomplete information following pre-processing, identified deaths with outstanding cancer suspicions, selected deaths requiring EVT review, and certified deaths with complete information that did not require EVT review and therefore required no additional action.

The procedures to determine the eligibility of a death for EVT review are described below.

9.8.1 CC Cause of Death Coding

On a monthly basis, the CC reviewed the recent shipment of Death Certificates for proper editing and legibility. The SC Coordinator was notified if there was a problem with a Death Certificate. Two CC nosologists independently coded all causes of death, including the NCHS Derived Underlying Cause of Death, using a Death Certificate Coding Form (DCCF), as documented in the Any discrepancies in coding were arbitrated by a third CC nosologist as necessary.

9.8.2 The EVP Algorithm

At least once a month, certain deaths (those with newly coded Death Certificate information or those that needed to be re-processed) were run through the CC EVP selection algorithm. The algorithm performed an initial pre-processing step to identify those deaths that were missing an NRF or had an expectation for, but no receipt of, medical record abstraction forms (CDF or DE). Deaths that were missing an NRF, DE form, or CDF were rejected by the algorithm and assigned a status of "RJ" for "Rejected." SCs were required to complete the outstanding information before the death could continue through the algorithm.

Deaths that were not rejected during the pre-processing phase continued through the selection algorithm to determine whether there was a need for review by the EVT. Deaths selected by the algorithm for EVT review were assigned a status of "AR" for "Additional Review." Deaths that did not meet any of the criteria for additional review were assigned a status of "AC" for "Achieved Certification." Deaths for which a previously undocumented cancer was listed on the Death Certificate were assigned a status of "CS" for "Cancer Suspicion."

A designated user at each SC was able to access the system to view the current status of the algorithm results in the algorithm reports. The algorithm report consisted of four separate sub-reports, one for each status (RJ, AR, AC, and CS), which listed all deceased participants by report run date and PID. See Appendix 9-7 for examples of the EVP Algorithm Reports.

All deaths designated "AC" were certified and required no additional action. All deaths designated "AR" required review by the EVT; therefore, the SC was advised to begin record collection as described in Section 9.9. All deaths designated "RJ" or "CS" required further investigation by the SC and outstanding study forms and/or incomplete information were required to be provided before the death could continue to be processed through the selection algorithm. For example, an "RJ" status may have been assigned if there was a positive screening exam for which a DE form was not completed. In this situation, the SC was asked to complete the DE form to document follow-up of the positive screen. A "CS" status may have been assigned if a cancer that was initially reported on the Death Certificate was not confirmed by a CDF or DE. If the cancer was not reported on an ASU or CNF, the SC would have been asked to complete a CNF to document the report of cancer and generate an expectation for a CDF. The SC was required to complete the CDF and close out any resulting DE expectations. Deaths initially assigned a status of "RJ" or "CS" continued to be included in the monthly algorithm run until either an "AR" or "AC" status was assigned.

9.9 Collection and Preparation of Documents for the EVT

The SC was responsible for preparing all documentation for the EVT. All documentation collected for the EVP was to be placed in the participant's EVP folder. Documentation was to be collected, reviewed, and edited by a trained medical record abstractor with at least two years experience abstracting medical records, and a demonstrated knowledge of medical record terminology, anatomy, physiology, and concepts of disease. The SC attempted to collect the same types of information for all participants selected for endpoint verification. Obtaining all relevant documentation was critical for the determination of the underlying cause of death. If the SC experienced problems obtaining information from a physician/health care provider's office, hospital, or health care clinic, the Principal Investigator may have provided assistance as necessary. Procedures for collection and preparation of documents for the EVT review are given in the following sections.

9.9.1 Document Collection

Any participant with an EVP status code of "AR," as designated by the selection algorithm, required review by the EVT. The EVT required all in/outpatient medical records including:

- Diagnosis documents;
- Treatment documents;
- Outpatient notes;
- Hospital admission history/physical;
- Operative procedures reports;
- Pathology reports;
- Chemotherapy notes;
- Radiotherapy notes;
- Hospital discharge abstracts;
- Hospital discharge summary;
- Diagnostic procedure reports;
- Diagnostic imaging reports;
- Autopsy reports;
- Clinical laboratory data;
- Consultation reports, and
- Emergency medicine documents.

The EVT also required any notes regarding the management of co-existing cancers and terminal events.

Diagnostic documents differed depending on the type of cancer. The Medical Documentation Section (Part B) of the DDS was to be updated as each document was collected.

For each case, SCs used informed judgment regarding the appropriate time frame for medical record collection. The required medical records were expected to vary in amount and nature according to each individual case, but generally records should have been sufficient to determine the cause of death as well as the contributing factors that led up to death. The time frame should have been long enough to enable adequate characterization of cancer status at the time of death, and in general would encompass the last several weeks or months of life.

The EVT also was given information on cancers diagnosed prior to randomization. This information simply included the fact that a cancer was diagnosed, based on participant self-report on the Medical History Questionnaire (MHQ) (Appendix 3-5). Any cancers listed on the MHQ were reported to the EVT by photocopying Item 26 from the MHQ and including it with the EVP folder.

In some cases, the physician/health care provider's office, hospital, or health care clinic might not have accepted the NLST/LSS consent form as sufficient for release of medical records. Additional authorization may have been needed from the participant's next of kin. A sample Medical Records Release Authorization Form to serve this purpose is provided in Appendix 3-4; however, some hospitals or insurance plans may have required a release in a specific format. A template letter to be signed by the SC Principal Investigator is provided in Appendix 9-21. This letter may have been used to help collect medical records in difficult cases. If necessary, a letter from the NLST/LSS Project Officer could also be obtained by contacting the CC.

9.9.2 Document Review

Once the SC Coordinator determined that all available information was collected, all documents were reviewed and edited. Documentation was to be evaluated for completeness, placed in chronological order, and each of the following questions answered:

- Does each hospital discharge summary have a corresponding admission history and physical? (Exceptions may occur, if initial diagnosis and treatment were outpatient.)
- Is there an operative and pathology report for all surgical procedures related to a malignancy or suspected malignancy?
- Is there a report for each diagnostic procedure performed?

If the answer to any of these questions was "no," then additional information was collected. If the SC attempted and was unable to obtain certain documentation, this was to be documented in Part B of the DDS. Copies of any call logs that included documentation of these efforts were to be attached to the DDS.

9.9.3 Document Editing

Participant identifiers, including date of birth, were deleted from all medical records to maintain participant confidentiality. EVT members were blinded as to participant randomization arm (spiral CT or chest x-ray), and as to whether a cancer was screen-detected or symptom-detected.

Therefore, medical records submitted to the EVT were to be edited to remove mention of the NLST/LSS, participation in research (e.g. clinical trials), involvement in special lung cancer detection programs, and the method of cancer detection.

Medical records were edited using the following guidelines:

- Editing should only be performed on a copy of the medical record. Original medical records should be photocopied and returned to the participant file or hospital (if on loan). **The SC should keep an unedited copy of the medical records in the file.**
- All participant identifiers, including date of birth, should be crossed out with a black marker or White Out.
- Any mention of the NLST/LSS should be crossed out with a black marker or White Out.
- Any reference to the participant's randomization arm should be removed.
- Any indication as to whether the cancer was screen-detected or symptom-detected should be deleted.
- Incorrect grammar and spelling should not be changed.
- When in doubt, do NOT white it out. The CC and EVT Chair will help provide examples of information that should be deleted from the record. The CC EVP Coordinator will provide feedback to the SCs regarding information that should have been deleted.
- Edits should not be initialed, dated, or highlighted in any way.
- Each page of documentation should be labeled with a PID number (PID label or stamp, do NOT hand write). The PID should be placed anywhere on the front of the page (so that it will appear on the photocopies). This step is important in case a folder becomes disassembled at some point during the Endpoint Verification Process.
- All documentation that is required by the EVT should be included in the EVP folder, and if it is not available, this should be documented on the DDS.

After all documentation was gathered and editing was complete, the DDS was to be updated to indicate that medical record collection and editing was complete and the folder was ready for shipment (Part C).

9.10 EVP Material Shipment

EVP materials were shipped to the CC as folders were completed. Once the SC Coordinator verified that a participant's documentation was complete, one copy of the participant's EVP folder was made. Completed folders were then batched and shipped to the CC as follows:

- Verify that the DDS is included in the folder.
- Photocopy all documents in the participant's EVP folder; do NOT staple the documents together.
- Identify each document and folder with the appropriate PID.
- Include a copy of the Death Certificate that was previously sent to the CC.
- Include one full page of extra PID labels for each participant.
- Place a rubber band around each folder to ensure that all materials stay together.
- Batch receipt the DDS into for each PID being sent to the CC.
- Prepare and print a batch transmittal log (See Appendix 9-8, EVP Material Transmittal Log) of PIDs included in the shipment using
- Compare the log against the actual hard copy material. If any folders cannot be located or are not ready to be shipped, they should not be included on the transmittal log. Delete any PIDs for which EVP materials are not being included in the shipment.
- Keep one copy of the transmittal log for SC files.
- Assemble the folders in the order they appear on the transmittal log. Package the folders and a copy of the batch transmittal log in a box and send to the CC using Federal Express, UPS, or another certified mail carrier. Keep a record of the package number. Send the package to at the following location:

9.11 CC Preparation of Materials for the EVT

The CC received and verified all shipments of documentation from the SC. Upon receipt of a shipment, the CC checked the transmittal log. If there was a discrepancy between the transmittal log and the contents of the shipment, the CC EVP Coordinator contacted the SC Coordinator by telephone or e-mail to resolve the discrepancy.

Once the contents of the shipment were verified, the CC reviewed all of the material to ascertain that proper editing was completed. When the CC review was complete, the EVT review process began with initial review of folders by the EVT Chair.

9.12 Requests for Additional Information from the SC

The CC, EVT Chair, and other members of the EVT participating in the review process evaluated the adequacy of the information provided. If more information was needed, an Additional Documentation Request (ADR) form (Appendix 9-9) was completed. Specifications for Completion of the ADR are provided in Appendix 9-10. The EVT Chair and/or members completed the ADR and faxed or e-mailed it to the CC EVP Coordinator. The CC EVP Coordinator forwarded the request to the SC. The ADR documented the specific additional information that was needed. The SC collected these documents, deleted identifiers and any other information as stated above, and sent a photocopy to the CC in the same manner as the original EVP documentation, using the EVP Material Transmittal Log. If the SC was unable to obtain requested information, the reason was to be documented in the transmittal log. Upon receipt, the additional requested information was reviewed at the CC to ensure proper editing and then forwarded to the requestor. The SC was advised to keep a copy of all information that was sent to the CC.

Since the clinical record may have contained conflicting or ambiguous information regarding the cancer diagnosis, EVT members may have requested acquisition and an external review of pathology slides by two NLST-designated pathologists and/or review of diagnostic images by external radiologists. A Pathology/Radiology Review Request (PRR) form (Appendix 9-11) was used to document this request. The Specifications for Completion of the PRR are provided in Appendix 9-12. The SC Coordinator completed the Pathology/Radiology Review Request Transmittal Log (Appendix 9-13) when sending

slides or images to the CC. The Specifications for Completion of the PRR Transmittal Log are provided in Appendix 9-14.

Appendices for Chapter 9

9-1	Death Certificate Transmittal Log
9-2	Death Documentation Sheet (DDS)
9-3	Specifications for Completion of the Death Documentation Sheet
9-4	History of Malignancy Form (HOM)
9-5	Specifications for Completion of the History of Malignancy Form
9-6	History of Malignancy Cover Letter
9-7	Algorithm Reports
9-8	Endpoint Verification Process Material Transmittal Log
9-9	Additional Documentation Request Form (ADR)
9-10	Specifications for Completion of the Additional Documentation Request Form
9-11	Pathology/Radiology Review Request Form (PRR)
9-12	Specifications for Completion of the Pathology/Radiology Review Request Form
9-13	Pathology/Radiology Review Request Transmittal Log
9-14	Specifications for Completion of the Pathology/Radiology Review Request Transmittal Log
9-15	Death Certificate Tracking Form (DCTF)
9-16	Specifications for Completion of the Death Certificate Tracking Form
9-17	NDI Retrieval Reports
9-18	National Death Index Results Form (NDIR)
9-19	Specifications for Completion of the National Death Index Results Form
9-20	National Death Index Death Certificate Request Form
9-21	Template PI Letter for EVP Medical Record Collection
9-22	Documentation for a Missing Death Certificate
9-23	Specifications for Completion of the Documentation for a Missing Death Certificate

Appendix 9-1 Death Certificate Transmittal Log

National Lung Screening Trial (NLST)

DEATH CERTIFICATE TRANSMITTAL LOG

Please complete this transmittal for the Death Certificates which are currently being shipped (one copy for each PID). Keep a copy of this log at the SC for your records and fax a copy to at Please ship transmittal and Death Certificates to:

SC: _____ Date Sent to Westat: _____

PID
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.

National Lung Screening Trial (NLST)

DEATH DOCUMENTATION SHEET (DDS)

Screening Center _____

Participant's Date of Death _____/_____/_____

Initials Complete: _____
Initials QC: _____

DDS

Participant ID Label

PART A: CANCER CONFIRMATION

Check each step as it is completed:

- ☐ All ASUs receipted.
- ☐ All outside reports of cancer documented on CNF.
- ☐ All suspected cancers confirmed on CDF.
- ☐ Follow-up of all positive screens documented on DE forms.
- ☐ All confirmed lung cancers documented on DE forms.

Was this case selected for review? ☐ YES (COMPLETE PARTS B AND C) ☐ NO (END)

PART B: MEDICAL DOCUMENTATION

Complete the following chart as documents are collected for endpoint verification.

Document Type	Requested (√)	Received (√)	N/A (√)	Comments
Terminal events				
Hospital admission history/physical				
Operative procedures reports				
Pathology reports				
Chemotherapy notes				
Radiotherapy notes				
Management of co-existing cancers				
Hospital discharge abstracts				
Hospital discharge summary				
Diagnostic procedure reports				
Diagnostic imaging reports				
Outpatient notes				
Autopsy Reports				
Clinical Laboratory Data				

Document Type (ctd.)	Requested (√)	Received (√)	N/A (√)	Comments
Consultation Reports				
Emergency Medicine Documents				
Other diagnosis documents				
Specify: _____				
Other treatment documents				
Specify: _____				

PART C: EDITING AND SHIPPING EVP DOCUMENTS

Check each step as it is completed:

Editing of Documentation:

- ☐ Identifiers removed
- ☐ References to NLST/LSS removed or not applicable
- ☐ References to participant allocation (SCT or XRY) removed or not applicable
- ☐ Method of cancer detection removed or not applicable
- ☐ Each page labeled with PID

Medical Record Documentation Complete? ☐ Yes ☐ No

Shipping of Materials:

- ☐ One copy of EVP folder
- ☐ One copy of death certificate
- ☐ One copy of MHQ Question 26 only
- ☐ One full page of extra PID labels
- ☐ Folders organized
- ☐ EVP Material Transmittal completed

Date Materials Posted to CC: _____/_____/_____

Additional Comments:

_____

_____

_____

_____

_____

National Lung Screening Trial (NLST)

Specifications for Completion of the Death Documentation Sheet (DDS)

The Death Documentation Sheet (DDS) is a manual tracking record to document and monitor completion of each step of the Endpoint Verification Process (EVP). It should be initiated when the Death Certificate is received by the SC and should be used as a checklist to indicate completion of cancer ascertainment, ongoing medical record collection and editing, and shipment of EVP materials.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID: Affix a PID label to the space provided in the upper right section of the form. DO NOT write in the PID.

Screening Center: Enter the two-digit Screening Center ID.

Participant's Date of Death: Record the participant's date of death.

Part A: Cancer Confirmation: This section documents the cancer confirmation activities that must take place prior to submission of the case to be evaluated for endpoint verification (the algorithm run at the CC). In this section, the SC staff member should check off each task as it is completed. The tasks are described below.

All ASUs receipted: The SC has receipted an ASU or an MDF for an ASU for each study year in which it is expected for the participant.

All outside reports of cancer documented on CNF: The SC has completed and receipted a CNF for all reports of cancer outside the ASU, including any searches of cancer registries and hospital records that the SC routinely performs for cancer identification.

All suspected cancers confirmed on CDF: The SC has completed all medical record abstracting for all cancers reported on an ASU or CNF, and there are no open expectations for any CDFs.

Follow-up of all positive screens documented on DE forms: The SC has completed and receipted all medical record abstracting for diagnostic evaluation information following all positive screening examinations.

All confirmed lung cancers documented on DE forms: The SC has completed and receipted all medical record abstracting for diagnostic evaluation information for all lung cancers confirmed on a CDF.

Was this case selected for review? This item indicates whether or not this death was selected for review by the endpoint verification algorithm (run by the CC).

Yes: Check this item if the case was classified by the algorithm as "AR" (Review).

No: Check this item if the algorithm determined that the case does not need review and classified it as "AC" (Certified). If this item is checked, the EVP is considered completed for this participant.

Part B: Medical Documentation: The purpose of this section is to document the medical record collection process. The chart will serve as a checklist to help the SC ensure complete records collection and will help the EVT assess the scope and success of the medical records collection task.

Document Type: This is the type of document that may be collected for endpoint verification. Not all document types will be collected for a single case.

Requested: Place a check mark in this column if all applicable documents of this type were requested.

Received: Place a check mark in this column if all applicable documents of this type were received.

N/A (Not Applicable): Place a check mark in this column if this type of document is not applicable to this case.

Comments: Use this space to record any comments related to why this document could not be obtained, including the number of attempts made to obtain it. Attach copies of any call logs that document these efforts.

Part C: Editing and Shipping EVP Documents: The purpose of this section is to document the editing of the medical records for the EVT and the shipping of the one copy to the CC for distribution to the team.

Editing of Documentation:

Identifiers Removed – all participant and relative names and participant medical record number or Social Security Number and date of birth removed.

References to NLST/LSS removed or not applicable – If there were references to NLST/LSS or to lung cancer screening in the record, they have been removed.

Reference to participant allocation (SCT or XRY) removed or not applicable – If there were references to the participant's randomization arm, they were removed.

Method of cancer detection removed or not applicable – If there were references to whether the cancer was detected as a result of a screening examination, they were removed.

Each page labeled with PID – Each page has been labeled with a PID label. DO NOT write the PID.

When the SC considers the editing to be complete, all boxes should be checked.

Medical Record Documentation Complete? Check the appropriate response as follows:

Yes – All available records have been collected.

No – All available records have not been collected. The SC did attempt to obtain some records that may have been appropriate for the EVP but were not available. Details should be provided in the appropriate Comments section.

Shipping of Materials

One copy of EVP folder – Check this item when a photocopy of the EVP folder (including the DDS) has been made. Ensure that the photocopy is readable before shipping to the CC.

One copy of Death Certificate – Check this item when a photocopy of the Death Certificate has been made. Ensure that the photocopy is readable before shipping to the CC.

One copy of MHQ Question 26 only – Check this item when a photocopy of MHQ question 26 has been made. This is necessary only if the participant reported a cancer on question 26 of the MHQ. Ensure that the photocopy is readable before shipping to the CC. If cancer was not reported on question 26 of the MHQ, write "N/A" for "Not Applicable" next to the check box.

One full page of extra PID labels – Check this item when the full page of extra PID labels have been enclosed in the EVP folder.

Folders organized – Check this item when the folders are organized in the order they appear on the transmittal and secured with rubber bands to prevent documents from falling out of the folders. Do not staple the documents.

EVP Material Transmittal completed – Check this item when the EVP Material Transmittal is completed and checked against the folders.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the first page. This should not be the same SC staff member who completed the form.

Initials edit: _____

FOR OFFICE USE

National Lung Screening Trial (NLST)

HISTORY OF MALIGNANCY FORM (HOM)

To Dr. _____ Date: _____/_____/_____

Re: _____ Patient's Address: _____

Date of Birth: _____/_____/_____ _____

Date of Death: _____/_____/_____ SSN: _____-_____-_____

Please answer the following questions. Check only one box, unless instructed otherwise.

1. On what date did you last see this patient? _____/_____/_____

2. During which years was this patient seen at your facility? _____ to _____

3. Have you ever diagnosed cancer in this patient? □ No (Go to 4)
   □ Yes

   a. On what date did you first make the diagnosis? _____/_____/_____

   b. At what institution(s) were the diagnostic tests performed?

      1. Hospital/Clinic/Physician Office: _____

         Address: _____

      2. Hospital/Clinic/Physician Office: _____

         Address: _____

   c. Was it possible to determine the organ within which the tumor arose (primary site)?
      □ No
      □ Yes (Site: _____)

4. If you have not diagnosed a malignancy in this patient, are you aware of a diagnosis of cancer made by another physician caring for your patient?
   □ No
   □ Yes (Site and type of cancer _____)

   Diagnosing physician's name and address:

   Name: _____

   Address: _____

Form completed by: Signature: _____

Print name: _____ Date Completed: _____/_____/_____

National Lung Screening Trial (NLST)

Specifications for Completion of the History of Malignancy Form (HOM)

The History of Malignancy Form (HOM) is to be administered to the physician/health care provider or health care clinic for deceased NLST/LSS participants whose cause of death is listed as "Natural Causes." SC staff should identify the appropriate physician/health care provider or health care clinics and complete the top administrative section of the form. The HOM should be sent to the physician/health care provider or health care clinic with a cover letter.

Specifications for completing each item of the form are given below:

Administrative Section:

This section should be completed by the SC staff prior to sending the HOM to each physician/health care provider or health care clinic. The PID should not be written on the form, nor should a PID label be applied to the form prior to mailing, since this would provide a link between the participant's name and the PID and could compromise participant confidentiality.

To Dr.: Record the name of the physician/health care provider or health care clinic.

Date: Record today's date.

Re: Record the name of the participant.

Address: Record the last known address of the participant.

Date of Birth: Record the participant's date of birth.

Date of Death: Record the participant's date of death.

SSN: Record the participant's Social Security Number, if available.

Question 1: On what date did you last see this patient?

The physician/health care provider or health care clinic should record date of the most recent office visit or examination by the physician/health care provider or health care clinic.

Question 2: During which years was this patient seen at your facility?

The physician/health care provider or health care clinic should record the year of the first encounter between the participant and himself/herself, and the year of the last encounter between them, even if there was a gap of several years between encounters. The year of the last encounter should correspond with the date of the last visit in Question 1.

Question 3: Have you ever diagnosed cancer in this patient?

The physician/health care provider or health care clinic should record "Yes" if s/he diagnosed cancer in the patient. If there were several cancers diagnosed, the physician/health care provider or health care clinic should record the information for one cancer in Items 3a – 3c and the same information for additional cancers on a separate sheet or on the back of the form.

a. On what date did you first make the diagnosis?

The physician/health care provider or health care clinic should record the date of the first diagnosis of cancer in this participant.

b. At what institution(s) were the diagnostic tests performed?

The physician/health care provider or health care clinic should record up to two hospitals, clinics, or physician's offices in which the main diagnostic procedures were performed.

c. Was it possible to determine the organ within which the tumor arose (primary site)?

The physician/health care provider or health care clinic should indicate whether it was possible to determine the primary site of the cancer. If "Yes" is recorded, the physician/health care provider or health care clinic should write in the site in the space provided.

Question 4: If you have not diagnosed a malignancy in this patient, are you aware of a diagnosis of cancer made by another physician caring for your patient?

The physician/health care provider or health care clinic should indicate whether s/he is aware of a cancer diagnosed by another physician caring for the patient. If "Yes" is recorded, the physician/health care provider or health care clinic should write the site and type of cancer in the space provided, and record the name and address of the physician who diagnosed the cancer in the lines provided.

Form completed by: The physician/health care provider or health care clinic staff member should sign his/her full name, and print his/her full name.

Date Completed: The physician/health care provider or health care clinic staff member should record the date on which s/he completed this form.

<u>After completing the form</u>:

- If another physician was listed in Question 4, the SC should follow-up with this physician to obtain information concerning the cancer diagnosis.
- If a cancer was reported on the HOM, the SC should complete a CNF and CDF as appropriate.

Appendix 9-5 Specifications for Completion of the History of Malignancy Form

- The form should be checked to make sure it is accurate, legible, and complete.
- The person who checks the form for completion should write their initials in the designated space in the box at the top right corner of the first page.
- The HOM form should be filed in the participant's EVP folder.

National Lung Screening Trial (NLST)

History of Malignancy Cover Letter

(*Date*)

(*Physician Name*)
(*Physician Address*)
(*City, State, Zip Code*)

Dear (*Physician Name*):

(*Participant Name*) was a participant in the National Lung Screening Trial (NLST) at (*Screening Center*) and our records indicate that you were involved in his/her medical care.

The National Cancer Institute (NCI) and *(Screening Center)* are sponsoring this nationwide study of older Americans with a history of long-term or heavy smoking. The purpose of the study is to compare screening with spiral CT and screening with chest x-ray for effectiveness in reducing the number of deaths due to lung cancer.

(In the past, you provided us with information about participant's _____ cancer. Thank you for that information. We would now like to confirm whether or not there were any additional cancer diagnoses in participant). We would appreciate your cooperation in completing the enclosed questionnaire. Also enclosed is an authorization for release of information signed by (*Participant*)'s (*relationship, e.g., brother, wife, etc.*). Please return the questionnaire to:

(*Study Coordinators name and address*)

By completing this questionnaire, you will be making an important contribution to this project. We have enclosed a self-addressed, stamped envelope for your convenience. If you have any questions, please contact me at (*PI phone number*). Thank you for your help.

Sincerely,

(Name of Investigator)
Principal Investigator

National Lung Screening Trial (NLST)

NLST ENDPOINT VERIFICATION PROCESS ALGORITHM REPORT – AC

The following Participant IDs have achieved certification and require no additional action.

Date Printed: Executed By:

Batch No	Participant ID	Report Status	ReportRunDate

National Lung Screening Trial (NLST)

NLST ENDPOINT VERIFICATION PROCESS ALGORITHM REPORT – AR

The following Participant IDs have been assigned to the EVP Coordinator for additional review.

Date Printed: Executed By:

Batch No	Participant ID	Report Status	ReportRunDate

National Lung Screening Trial (NLST)

NLST ENDPOINT VERIFICATION PROCESS ALGORITHM REPORT – RJ

The following Participant IDs require Screening Center resolution. They have a current status of Rejected.

Date Printed: Executed By:

Batch No	Participant ID	Report Status	ReportRunDate

National Lung Screening Trial (NLST)

NLST ENDPOINT VERIFICATION PROCESS ALGORITHM REPORT – CS

The following Participant IDs require Screening Center resolution. They have a current status of Cancer Suspicion.

Date Printed: Executed By:

Batch No	Participant ID	Report Status	ReportRunDate

National Lung Screening Trial (NLST)

ENDPOINT VERIFICATION PROCESS MATERIAL TRANSMITTAL LOG

Please complete this transmittal for the EVP folders which are currently being shipped (one copy for each PID). Please print out and keep a copy of this log at the SC for your records, and include a copy of the log in the package of EVP folders to be shipped to:

SC: _____ Date Sent to Westat: _____

PID	DATE OF BIRTH
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	

National Lung Screening Trial (NLST)

ADDITIONAL DOCUMENTATION REQUEST FORM (ADR)

Screening Center ID |__|__|

Participant's Date of Death |__|__|-|__|__|-|2|0|__|__|

Requested by:
☐ CC
☐ EVT Reviewer Name: _____

Date Requested |__|__|-|__|__|-|2|0|__|__|

Participant ID: _____

Document Type	Date
1	
2	
3	
4	
5	
6	
7	
8	

National Lung Screening Trial (NLST)

Specifications for Completion of the Additional Documentation Request Form (ADR)

The Additional Documentation Request (ADR) form for the Endpoint Verification Process (EVP) is used by the CC and the Endpoint Verification Team (EVT) to request additional medical record documents from the SC to support the EVP.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID: This will be generated electronically.

Screening Center: Record the two digit SC ID number.

Participant's Date of Death: Record the month day and year of the participant's death. Record the last two digits of the year (e.g., 02/07/2002).

Requested by: Check a box to indicate whether the request is from the CC EVP Coordinator or a member of the EVT. If the request is from the EVT, record the name of the reviewer.

Date Requested: Record the date of the CC or EVT member's request for additional documentation.

Document Request Section:

This section is used to request documents. The requestor should describe the missing document(s) (e.g., pathology report, urinalysis, etc.) and record the approximate or exact date(s) of the document(s). This will help the SC to determine the source from which the document(s) should be requested (hospital or physician office).

After this form is completed: EVT requestors should submit the form via fax or electronically to the EVP Coordinator. The CC EVP Coordinator will track the request and send an e-mail to the SC Coordinator requesting the material. Copies of the ADR or e-mail notification should be kept with the EVP folder both at the SC and the CC.

National Lung Screening Trial (NLST)

PATHOLOGY/RADIOLOGY REVIEW REQUEST FORM (PRR)

SC ID: _____

DATE OF DEATH: _____

DATE REQUESTED: _____

EVT Member(s): _____

PID_____

NO.	INSTITUTION	ANATOMIC LOCATION	PATHOLOGY ACCESSION NUMBER	RADIOLOGY CASE NUMBER	IMAGE TYPE	DATE
1						
2						
3						
4						
5						

Comments:

_____

_____

_____

_____

_____

National Lung Screening Trial (NLST)

Specifications for Completion of the Pathology/Radiology Review Request Form (PRR)

The Pathology/Radiology Review Request Form (PRR) for the Endpoint Verification Process (EVP) is used by the Endpoint Verification Team (EVT) to request review of pathology slides by external pathologists, and/or review of images by external radiologists. The form is completed electronically in the . Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID: The EVT member will enter the PID in the space provided in

Screening Center ID: The two-digit SC ID number will be pre-filled electronically in

Date of Death: The participant's date of death will be pre-filled electronically in

Date Requested: The EVT member will enter the date that the request is made in the space provided in

EVT Member(s): The EVT member(s) will enter his (their) name(s) in the space provided in

Slide/Radiology Request Section: This section is used to request the slide or image to be reviewed. This information should be ascertained from the participant's medical records and will help the SC to determine the source from which the slide/image should be requested. There is also space for additional comments.

For Pathology Requests:

Institution: Enter the name of the institution where the tissue sample was obtained.

Anatomic Location: Enter the organ site where the tissue sample was obtained.

Pathology Accession Number: Enter the pathology accession number for the tissue sample being requested.

Date: Enter the date the tissue sample was obtained.

For Radiology Requests:

Institution: Enter the name of the institution where the image was obtained.

Anatomic Location: Enter the organ site or anatomic location that was imaged.

Radiology Case Number: Enter the radiology case number for the image being requested.

Image type: Enter the type of image being requested. (e.g.: CT, X-ray, or FDG-PET scan).

Date: Enter the date that the image was obtained.

After this form is completed: The EVT reviewer submits the form electronically in

National Lung Screening Trial (NLST)

PATHOLOGY/RADIOLOGY REVIEW REQUEST TRANSMITTAL LOG

SC ID: _____

SC Staff ID #: _____

DATE PRR RECEIVED FROM CC: _____

DATE SLIDES/IMAGES SENT: _____

Participant ID

PATHOLOGY

NO.	INSTITUTION	ANATOMIC LOCATION	PATHOLOGY ACCESSION NUMBER	SLIDE NUMBER	RETURN REQUESTED (Yes/No)
1					
2					
3					
4					
5					

Total number of slides sent:

Comments:

_____

_____

RADIOLOGY

NO.	INSTITUTION	ANATOMIC LOCATION	RADIOLOGY CASE NUMBER	IMAGE TYPE / NUMBER OF IMAGES	RETURN REQUESTED (Yes/No)
1					
2					
3					
4					
5					

Total number of images sent:

Comments:

_____

_____

National Lung Screening Trial (NLST)

Specifications for Completion of the Pathology/Radiology Review Request Transmittal Log

A Pathology/Radiology Review Request Transmittal Log must be completed for each shipment of pathology slides or radiological images to the CC. This log is to be completed by the SC staff member who is responsible for shipping the pathology slides or images to the CC. Complete only the portion of the log that applies to the type of material being sent. If slides or images from more than one PID are being sent, use a separate transmittal log for each PID. Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a Participant ID label in the space provided.

SC ID: Enter the two-digit screening center ID.

SC Staff ID #: The SC staff member who prepared the transmittal should record his/her SC staff ID number.

Date PRR Received from the CC: Record the date that the PRR containing the request for the materials that are being sent was received from the CC.

Date Slides/Images Sent: Record the month, day, and year the slides or images are sent to the CC.

Log for Pathology Slides:

Institution: Record the institution name where the pathology was carried out.

Anatomic Location: Record the location (i.e. the organ site) from which the tissue was removed for the pathology slide.

Pathology Accession Number: Record the pathology accession number for the tissue sample being sent. If there are multiple slides for the same tissue sample, this number only needs to be listed once.

Slide Number: Record the slide number for each slide on a separate line.

Return Requested (yes/no): Indicate whether or not the slide needs to be returned to the SC.

Total Number of Slides Sent: Record the total number of slides sent to the CC.

Comments: This space can be used by the SC staff member to record any information s/he would like to communicate to the CC regarding the pathology slides.

Log for Radiological Images:

Institution: Record the institution name where the image was obtained.

Anatomic Location: Record the organ site or anatomic location that was imaged.

Radiology Case Number: Record the radiology case number for the image being sent.

Image Type: Record the type of image being sent (e.g.: CT, X-ray, or FDG-PET scan).

Return Requested (yes/no): Indicate whether or not the image needs to be returned to the SC.

Total Number of Images Sent: Record the total number of images sent to the CC.

Comments: This space can be used by the SC staff member to record any information s/he would like to communicate to the CC regarding the radiological images.

After the transmittal log is completed:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC should fax the transmittal log to:

- The SC should ship the transmittal log and materials to:

National Lung Screening Trial (NLST)

DEATH CERTIFICATE TRACKING FORM (DCTF)

Participant ID Label

Initials Complete: _____

Initials QC: _____

1. Date SC learned of participant's death: |___| |___| / |___| |___| / |_2| |0| |___| |___|
   Month Day Year

2. Date Death Certificate requested: |___| |___| / |___| |___| / |2| |0| |___| |___|
   Month Day Year

3. Was Death Certificate received? ☐ Yes ☐ No (Go to Item 4)

   3a. If yes, date received: |___| |___| / |___| |___| / |2| |0| |___| |___|
   Month Day Year

4. Comments:

National Lung Screening Trial (NLST)

Specifications for Completion of the Death Certificate Tracking Form (DCTF)

The purpose of the Death Certificate Tracking Form (DCTF) is to document the SC's efforts to obtain a Death Certificate for each deceased participant. Expectations will be set to receive the form once a Non-Response Form (NRF) has been completed indicating that the participant is deceased. The DCTF will not be expected for deaths occurring after December 31, 2009. The DCTF is to be kept in the participant's study file. The form should be completed by the SC Coordinator or his/her designee. The DCTF can either be completed as the information becomes available or once the process is completed using information from the participant's study file.

The data from the completed form will be entered into when the Death Certificate is sent to the CC or when all reasonable attempts to obtain the Death Certificate have failed.

Specifications for completion of the form are given below.

Participant ID Label: Affix a PID label in the space provided. DO NOT write the participant ID in this space.

1. **Date SC learned of participant's death:** Record the date that the SC learned of the participant's death from any source including NDI. Month and day should be zero filled and the last two digits of year should be recorded (e.g., 02/07/2003).

2. **Date Death Certificate requested:** Record the date that the SC initially requested the Death Certificate. If more than one request was made, the dates for each additional request should be recorded in the Comments section. Month and day should be zero filled, and the last two digits of the year should be recorded (e.g., 02/09/2003).

3. **Was Death Certificate received?** Mark the box corresponding to whether the Death Certificate has been received.

Yes: The Death Certificate was received.

No: This box should only be marked when all reasonable attempts to obtain the Death Certificate have failed. The information regarding the effort made to obtain the Death Certificate, including dates of contact, must be recorded in the Comments section. If No is recorded, skip to Item 4 and leave Item 3a blank.

3a. **If yes, date received:** Record the date that the SC received a copy of the Death Certificate. Month and day should be zero filled, and the last two digits of year should be recorded (e.g., 02/09/2003).

4. **Comments:** Use this space to record information regarding the effort made to obtain the Death Certificate. This includes but is not limited to the dates of any additional requests for the Death Certificate following the initial request.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the page. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.

NDI Retrieval Reports

A standard NDI search will generate Files 1-8. An NDI-Plus search will generate all ten.

File 1 **Summary Retrieval Statistics** (page 37 of the *NDI User's Manual*) -- This file contains a three page report, which provides summary information about the NDI search. The information includes the SC Coordinator's name and address, years of death searched, number of NDI records involved in possible record matches, and other statistics related to the NDI search.

File 2 **NDI Retrieval Report** (page 41 of the *NDI User's Manual*) -- The NDI Retrieval Report indicates which participant records matched with the NDI records.

File 3 **Compressed NDI Retrieval Report** (page 45 of the *NDI User's Manual*) – This report contains the same information as the NDI retrieval report, but without the column and headings and spacing to reduce the amount of paper generated when printing this report.

File 4 **Death Certificate Request Form** (page 46 of the *NDI User's Manual*) – This report lists all the possible NDI matches grouped by the states in which the deaths occurred. A separate form is generated for each state that had at least one NDI match.

File 5 **Combined File** (page 49 of the *NDI User's Manual*) – This file combines the participant record with the matching NDI records. A separate Combined Record is created for each NDI record match. The file is intended for users who receive a large number of matches and would like to write a computer program to assess the quality of these matches.

File 6 **Matching User Records** (page 52 of the *NDI User's Manual*) – This file only contains those records submitted by the SC that were involved in possible matches with one or more NDI records.

File 7 **Non-Matching User Records** (page 52 of the *NDI User's Manual*) – This file only contains those records submitted by the SC that were not involved in matches with any NDI records.

File 8 **Rejected User Records** (page 52 of the *NDI User's Manual*) – This file contains the records that did not satisfy the basic criteria of the NDI edit program and were thus rejected prior to the search of the NDI file. Records are rejected if they did not contain the participant's social security number, date of birth, and sex code.

File 9 **Cause of Death File** (page 9 of the *NDI-Plus: Coded Causes of Death*) – This file begins with the same record format as the Combined File, but includes the coded causes of death (positions 180-438). Prior to using this file, true and questionable NDI record matches should be determined.

File 10 **Cause of Death Report** (page 20 of the *NDI-Plus: Coded Causes of Death*) – This report is meant to be an easy-to-read printout of the same coded causes of death included in the Cause of Death File. This report is intended primarily for NDI users who submit a small number of records for an NDI-Plus search.

National Lung Screening Trial (NLST)

NATIONAL DEATH INDEX RESULTS FORM (NDIR)

ADMINISTRATIVE SECTION		
		Initials Complete: _____ Initials QC: _____
Screening Center ID: |__|__| Screening Center Staff ID: |__|__|__|__| Submission Year: <Insert Year>	<Insert NDI ID>	<Insert Participant ID>

1. Indicate the results of the NDI search for this participant. Select the best match for this participant:

   ☐ Exact match
   ☐ Probable match
   ☐ No match (END)
   ☐ Rejected (END)

2. Will you be requesting a Death Certificate for this match?

   ☐ Yes
   ☐ No

3. Record results of NDI search:

   Underlying cause of death: ICD-10 |____|____|____|____|

   Year of death: |____|____|____|____|

National Lung Screening Trial/Lung Screening Study (NLST/LSS)

Specifications for Completion of the National Death Index Results Form

The SC Coordinator should complete the National Death Index Results Form to document the outcome of the search of the National Death Index database.

Specifications for the completion of each item of the form are given below:

Administrative Section:

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID.

Submission Year: Enter the four-digit calendar year in which the PID was sent to the NDI search.

NDI ID: generates a unique NDI identification number that will automatically appear in the space provided.

Participant ID: will automatically print the PID label in the space provided.

NDI Results Section:

Question 1. Indicate the results of the NDI search for this participant:

For this question, the SC Coordinator will have to review the files from the NDI results.

Exact Match: Exact matches are indicated on the NDI Retrieval Report with an asterisk next to the State of Death. If the following data items match exactly, the NDI record is an Exact Match to the PID:

- First and Last Names, and Middle Initial
- Social Security Number
- Date of birth
- Sex code

Probable Match: Possible matches appear on the NDI Retrieval Report ranked based on the number of NDI data items that are in agreement with the data items of the participant. For NLST purposes, a record should be considered a Probable Match when some of the data items do not match exactly. Sex code must always match. Other data items need to match exactly or meet the following criteria:

- Under "Name" in the Retrieval Report, if F (for first name) has an NDI code of "I," this indicates that the first initial of the first name matches.
- Under "Name" in the Retrieval Report, if L (for last name) has an NDI code of "N," this indicates that the name matched only on NYSIIS (New York State Identification and Intelligence System) phonetic codes.

- At least the last four digits of the Social Security Number match. If the Social Security Number is not provided, then the DOB should match exactly, i.e., month, day, and year.
- Month of birth within one month before or after the participant's date of birth.
- Year of birth within ten years before or after the participant's date of birth.

The submission file also included state of residence to help determine the suitability of a match. If a record does not meet the criteria for an Exact Match or Probable Match, then one of the two following codes may be assigned:

No match (END)

- Select this box if the participant record was not involved in an Exact or Probable Match with NDI records.

Rejected (END)

- Select this box if no information was returned from NDI for this participant. These participants can be easily identified using the Rejected User Records report.

Question 2. Will you be requesting a Death Certificate for this match?

- **Yes** If the search resulted in an Exact Match, the SC Coordinator should request the Death Certificate and this box should be checked. If the search did not result in an Exact Match, but resulted in a Probable Match that the SC Coordinator considers as correctly identifying a participant, than the Death Certificate should be requested and this box should be checked.

- **No** If the results ended in a Probable Match that does not match well enough with information identifying the participant, and the SC Coordinator decides against requesting a Death Certificate, this box should be checked.

Question 3. Record results of the NDI search:

Underlying cause of death: ICD-10. To locate the correct response to this question, the SC staff should refer to the National Death Index Plus: Cause of Death Report. This report lists coded causes of death for the PIDs that are ranked first or have a high "probabilistic score" (for a description of probabilistic scores, please refer to Appendix A of the *NDI-Plus User's Manual*). The control number (fourth field in the first line of the output for each record) refers to the unique NDI identification number generated by After the correct unique NDI ID has been identified, then the SC Coordinator can identify the underlying cause of death. The underlying cause code occupies the sixth field on the first line of the output for each record, and specifies the International Classification of Diseases 10 code. It should be entered here as it appears in the Cause of Death report: alpha-number-number (if it is a two-digit number, leave the first space blank) or alpha-number-number-number.

Year of death. Year of death occupies the first field on the first line of the output for each record. Enter all four digits.

Appendix 9-20 National Death Index Death Certificate Request Form

UNITED STATES DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL
NATIONAL CENTER FOR HEALTH STATISTICS

RUN DATE: 07/17/90

N A T I O N A L   D E A T H   I N D E X

D E A T H   C E R T I F I C A T E   R E Q U E S T   F O R M S

NDI APPLICATION NUMBER: 900099

REQUESTOR: ROBERT BILGRAD
N. C. H. S.
DEMONSTRATION RUN
PRESIDENTIAL
6525 BELCREST ROAD
HYATTSVILLE MD 20782
PHONE: 301-436-8951

ALL OF THE POSSIBLE NDI RECORD MATCHES ARE GROUPED ON THE ATTACHED FORMS BASED ON THE REGISTRATION AREAS IN WHICH THE DEATHS OCCURRED. WITHIN A GIVEN REGISTRATION AREA, THE RECORDS ARE SORTED FIRST BY YEAR OF DEATH AND THEN BY DEATH CERTIFICATE NUMBER.

YOU ARE ENCOURAGED TO USE THESE FORMS TO REQUEST COPIES OF DEATH CERTIFICATES FROM THE REGISTRATION AREA OFFICES. AFTER YOU EVALUATE EACH NDI RECORD MATCH LISTED IN YOUR NDI RETRIEVAL REPORT, YOU CAN USE THESE FORMS TO CHECK OFF ONLY THOSE DEATH CERTIFICATES YOU WOULD LIKE TO OBTAIN FROM EACH OFFICE. BEFORE MAILING THESE FORMS TO THE REGISTRATION AREA OFFICES, REFER TO THE DOCUMENT ENTITLED "OBTAINING STATE DEATH CERTIFICATES" FOR INFORMATION ON STATE FEES, REQUIREMENTS FOR THE RELEASE OF CERTIFICATES, AND PERSONS TO CONTACT FOR ADDITIONAL INFORMATION.

* * * * NOTE: DATA IN THIS SAMPLE REPORT ARE PURELY HYPOTHETICAL. * * * *

NATIONAL DEATH INDEX: DEATH CERTIFICATE REQUEST FORM

RUN DATE: 07/17/90 PAGE 1

REGISTRATION AREA
CALIFORNIA

NDI APPLICATION NO
900099

WE ARE REQUESTING COPIES OF ONLY THOSE DEATH CERTIFICATES WHICH WE HAVE CHECKED IN THE LEFT MARGIN. PLEASE SEND COPIES TO:

TOTAL NDI RECORD MATCHES: 7

NO. OF CERTIFICATES REQUESTED: .....

STATE CHARGE PER CERTIFICATE: $.....

TOTAL STATE CHARGE (ATTACHED): $.....

QUESTIONS SHOULD BE DIRECTED TO:

NAME:.....

TELEPHONE:(...).....

TO BE COMPLETED BY REGISTRATION AREA: NUMBER OF CERTIFICATES FURNISHED..... NOT FURNISHED.....

PLEASE RETURN THIS FORM WITH COPIES OF THE REQUESTED CERTIFICATES. IF YOU ARE UNABLE TO FURNISH A PARTICULAR CERTIFICATE, PLEASE PLACE AN "X" IN THE LEFT MARGIN AND PROVIDE A BRIEF EXPLANATION IN THE SPACE BELOW THE RECORD.

NDI RECORD		USER RECORD INFORMATION						SEQ NO
CERT NUMBER	DATE OF DEATH	NAME OF STUDY SUBJECT	FATHERS SURNAME	SOC SEC NO	BIRTH DATE	CONTROL NO/DATA		
.... 066571	04-27-81	JOHN C. WILLIAMS	WILLIAMS	444-55-6666	09-16-14	NCHS	15 85	00001
.... 110809	08-13-82	MARY B. JONES	SMITH	987-65-4321	03-30-19	NCHS	13 79	00002
.... 051447	03-11-84	JOHN C. WILLIAMS	WILLIAMS	444-55-6666	09-16-14	NCHS	15 85	00003
.... 126195	08-02-84	MARY B. JONES	(N)SMITH	987-65-4321	03-30-19	NCHS	13 79	00004
.... 159867	10-24-86	(N)RICHARD D. DOE	DOE	678-90-1234	05-21-30	NCHS	21 82	00005
.... 144084	08-07-87	JOHN C. WILLIAMS	WILLIAMS	444-55-6666	09-16-14	NCHS	15 85	00006
.... 192015	11-11-87	JOHN C. WILLIAMS	WILLIAMS	444-55-6666	09-16-14	NCHS	15 85	00007

(A)=ALIAS RECORD (N)=NYSIIS PHONETIC MATCH ON NAME(S)

Appendix 9-21 Template PI Letter for EVP Medical Record Collection

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

(Date)

(Health Care Provider/Clinic/Hospital Name)
(Health Care Provide/Clinic/Hospital Address)
(City, State, Zip Code)
Attention Medical Records Department

RE: (*Participant Name)*
(*Date of Birth)*

Dear Director of Medical Records Correspondence:

We would like to request copies of medical records for the above named patient who, prior to *(his/her)* death, was a participant in the National Lung Screening Trial (NLST). This is a long-term study being conducted by the National Cancer Institute (NCI) and *(Screening Center Name)* to determine if screening is effective in reducing the number of deaths from lung cancer. In order to complete the research file we would appreciate receiving copies of medical records as indicated below.

- ☐ Physician/clinic/outpatient notes
- ☐ Hospital admission history/physical
- ☐ Operative procedure reports
- ☐ Pathology reports
- ☐ Radiology reports
- ☐ Chemotherapy notes
- ☐ Hospital discharge abstracts/summary
- ☐ Diagnostic procedure reports
- ☐ Diagnostic imaging reports
- ☐ Autopsy reports
- ☐ Clinical laboratory results
- ☐ Consultation reports
- ☐ Emergency Medicine documents
- ☐ Other documents: _____

In accordance with the Health Insurance Portability and Accountability Act (HIPAA), 45 CFR, 164.512(i)(1)(iii) you are allowed to release this protected health information (PHI) to NLST without a separate authorization other than the one signed by the participant, as the participant is deceased and use of the PHI is solely for research purposes. The requested PHI is absolutely essential to the outcome of the trial and I assure you that the PHI will be used only as directed in the informed consent.

If you have any questions, please contact *(SC Coordinator's Name)* at the number listed below.

Sincerely yours,

(Principal Investigator's Name)
Principal Investigator
National Lung Screening Trial

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

DOCUMENTATION FOR A MISSING DEATH CERTIFICATE

Administrative Section

Date Completed: __ __/__ __/2 0 __ __

Screening Center ID: __ __

SC Staff Member: _____

Participant ID Label

SC Documentation

1. How did the SC first learn of this death? _____

_____

_____

2. Source for confirmation of death:

☐ Death Transcript ☐ Medical Records

☐ NDI (if not exact match, specify match criteria) _____

☐ SSDI (specify match criteria) _____

☐ Other (specify) _____

3. Describe measures taken to obtain the death certificate and reasons why it could not be obtained. Attach any supporting documentation.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

For CC Use Only

Date sent to NCI: __ __/__ __/2 0 __ __

Date approved by NCI: __ __/__ __/2 0 __ __

Date DCCF entered: __ __/__ __/2 0 __ __

Date selected for EVP: __ __/__ __/2 0 __ __

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Documentation for a Missing Death Certificate

An SC staff member should complete the Documentation for a Missing Death Certificate to document instances when a death certificate cannot be obtained for a death that occurred on or before December 31, 2009. The form should be completed only after all efforts to obtain the death certificate have been exhausted. The completed form should be sent to the CC for processing, including NCI approval, close-out of expectations for a death certificate, and selection for EVP review.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label to the space provided in the upper right portion of the form. Do not write the participant ID in this space.

Date Completed: Record the date the form was completed. Month and day should be zero filled, and the last two digits should be recorded for the year (e.g., 02/07/2002).

Screening Center ID: Record the two-digit SC ID number.

SC Staff Member: Record the name of the SC staff member completing the form.

SC Documentation Section:

1. **How did the SC first learn of this death?:** Briefly describe how the SC first learned of the participant's death. This may include a report by a family member or friend, returned mail from the post office, or obituary.

2. **Source for confirmation of death:** Check the box next to the official source used by the SC to confirm the participant's death.

   Death Transcript: Check this box if the SC was able to obtain an official death transcript to confirm the death.

   Medical Records: Check this box if the participant's death was documented in medical records.

   NDI: Check this box if the participant's death was confirmed through an NDI search. If the NDI search yielded a probable match for the participant, specify the match criteria.

   SSDI: Check this box if the participant's death was confirmed through a search of the Social Security Death Index (SSDI). Specify the match criteria.

   Other (specify): Check this box if the SC confirmed the participant's death using an official source other than those listed. Specify the source.

3. **Describe measures taken to obtain the death certificate and reasons why it could not be obtained:** Describe the measures taken by the SC to obtain the death certificate and the reason(s) why the death certificate could not be obtained. Attach copies of any supporting documentation, such as Call Logs.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- Send a copy of the completed form to the CC Coordinator for NCI approval and CC processing.
- File the form in the participant's study file.

10. PROCEDURES TO ASSESS CONTAMINATION

10.1 Overview

As part of the NLST/LSS, a sample of participants that had a negative result with no significant abnormalities on their most recent screening examination were recontacted to estimate the extent to which participants received screening examinations outside of this study. Contamination was measured by the Health Assessment Questionnaire (HAQ, Appendix 10-1). Participants who were beyond their baseline (T_0) study year were eligible to be randomly selected on an annual basis to complete the HAQ. The HAQ assessed the extent to which study participants received either spiral CT examinations (for participants randomized to the chest x-ray arm) or chest x-ray examinations (for participants randomized to the spiral CT arm) outside of those screens administered through the NLST/LSS. The NCI provided additional criteria for selection. The CC designated the participants who were to complete the HAQ and the SCs were given one month to collect contamination information from the designated participants.

10.2 Timeframe

Contamination assessment occurred annually from 2004 to 2010 according to the following timetable.

- **February-March -** The NCI determined the number and criteria for contamination assessment.
- **March -** The CC randomly selected participants for the sample.
- **April -** The CC sent HAQs pre-printed with the PID number, participant study year, and SC name and address to the appropriate SC. The sample from each SC consisted of participants who had a negative chest x-ray screening examination with no significant abnormalities at their most recent screening examination and participants who had a negative spiral CT screening examination with no significant abnormalities at their most recent screening examination.
- **May -** The SCs mailed packets containing the pre-printed HAQs along with a cover letter and postage-paid return envelope to selected participants. Three weeks after the mailing, the SCs contacted non-responding participants by telephone to administer the HAQ.

- **June -** The SCs forwarded the last completed HAQs or completed MDFs to the CC. All attempts to contact non-respondents and all data retrieval were completed.

10.3 Methods for Administration of the Health Assessment Questionnaire (HAQ)

The CC and each SC shared the responsibilities for completing tasks associated with contamination assessment. Due to the short period of time allotted for this activity, it was important that the CC and SCs dedicated staff and materials to meet the stated deadlines. The responsibilities of the CC and SCs are described in the sections that follow.

10.3.1 CC Responsibilities

The NCI provided the criteria for selection of participants. To initiate contamination assessment, a sample of participants from each SC and each study arm stratified by study year, were randomly selected to complete an HAQ. The CC was responsible for the random selection of the participants from those with negative screening examination results with no significant abnormalities on their most recent NLST/LSS screening examination. The selection was completed in March of each year. At that time, the CC prepared each HAQ with the PID number, participant study year, and the SC mailing address. The CC sent the HAQs to the SCs approximately two weeks prior to the SC mailing date. The CC also sent blank HAQs to the SCs for use for telephone follow-up.

10.3.2 SC Responsibilities

The SC was responsible for mailing the HAQs to selected participants. Upon receiving the pre-printed HAQs, the SC assembled the packets and prepared the packets for mailing. The SC included the following items in each packet:

- An HAQ pre-printed with PID number, participant study year, and SC mailing address;
- A cover letter on SC letterhead, and
- A postage-paid return envelope with first-class postage.

The HAQ packets were mailed from the SCs to the selected participants with a cover letter explaining the purpose and the one month timeframe for completion of the HAQ. These packets were to be sent by first-class mail.

The HAQ was to be completed and returned by mail to the SC. The SCs were given one month to obtain completed HAQ information on all randomly selected participants. Participants that did not respond to the mailed HAQ within three weeks of mailing (non-respondents) were called in an attempt to administer the HAQ by telephone. SC staff attached a PID label and recorded the participant study year on the blank HAQs provided by the CC for use in telephone administration. Specifications for Completion of the HAQ are provided in Appendix 10-2. The SC was responsible for shipping completed forms to the CC.

A sample cover letter for the HAQ is provided in Appendix 10-3. If the SC decided to use a letter that differed from the sample, the SC was required to submit the letter to the CC for approval by the NCI prior to use.

10.4 Editing and Data Retrieval for the HAQ

When a completed HAQ was received by mail, SC staff was to review it for legibility, completeness, and consistency. Participant identifiers and any personal notes were removed from the HAQ. If the SC received a HAQ with any missing or unclear critical data items, the participant was contacted by telephone to obtain the information. Items 4, 6, 7, 8, 9, and 10 on the HAQ are **critical data items** and data retrieval must be performed as necessary.

10.5 Documenting Non-Response to the HAQ

SCs were asked to obtain completed HAQs for one hundred percent (100%) of the selected participants to ensure an unbiased estimation of contamination. If an HAQ was not completed for a selected participant during the designated time period, the SC completed an MDF in place of the HAQ (see Section 11.5.1). It was expected that an HAQ or an MDF would be on file at the SC for each participant who was sent an HAQ at the end of the designated collection period.

10.6 Tracking, Reporting, and Monitoring HAQ Collection Activities

Each SC was required to track the collection of HAQs in order to document whether all expected HAQs were collected. Each SC had a system, manual or automated, for tracking the steps involved in the collection and transmittal of HAQs. This system was to include, at a minimum, a tracking record for each participant randomly selected for the contamination assessment. The SC tracked the date the HAQ was sent to the participant, the date of receipt of the HAQ from the participant, and the date the HAQ was sent to the CC after receipt from the participant. The SC tracked the progress of the contamination assessment process using the Expected Forms Report (Appendix 11-18). This report allowed for the monitoring of missing HAQs by the SC and the CC during the contamination assessment period. SC staff used this report to ensure that CC records for the collection of HAQs matched the SC records.

In cases where the SC contacted the participant by telephone to complete the HAQ, at a minimum, follow-up efforts as described in section 3.9.1 were required. The SC may have used a participant call record for the HAQ to track SC efforts in telephone data collection. A Sample Call Record is provided in Appendix 11-13.

10.7 Transmittal of the HAQ to the CC

In preparation for shipping completed forms to the CC, the SC photocopied the HAQs and removed any participant identifiers or personal notes. The HAQs were mailed to the CC each week. A Transmittal Log (Appendix 11-14) was expected to accompany each shipment of HAQs.

Appendices for Chapter 10

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

HEALTH ASSESSMENT QUESTIONNAIRE (HAQ)

For Office Use Only	
Screening Center ID: |___|___| Screening Center Staff ID: |___|___|___|___| Sample Year _____	Initials Complete:_____ Initials QC:_____ Participant ID Label

Instructions: *Please complete each question by placing a check (✓) in the box next to the answer that best fits your situation.* ***Mark only one answer for each question****.*

Since April of 200__, have you had any of the following physical examinations or medical tests?

1. A blood pressure check? 1☐ Yes → 2☐ No (GO TO ITEM 2) 8☐ Don't Know (GO TO ITEM 2)	1a. If yes, what was the main reason you had this blood pressure check? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine physical examination or as a screening exam*
2. A test to check your blood cholesterol level? 1☐ Yes → 2☐ No (GO TO ITEM 3) 8☐ Don't Know (GO TO ITEM 3)	2a. If yes, what was the main reason you had this test to check your blood cholesterol level? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine physical examination or as a screening exam*

* A screening examination is a medical test used to detect a disease before symptoms have occurred.

Instructions: *Please complete each question by placing a check (✓) in the box next to the answer that best fits your situation.* ***Mark only one answer for each question****.*

Since April of 200__, have you had any of the following physical examinations or medical tests?

3. A test to examine your eyes for glaucoma or cataracts? 1☐ Yes → 2☐ No (GO TO ITEM 4) 8☐ Don't Know (GO TO ITEM 4)	3a. If yes, what was the main reason you had this eye examination? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine eye examination or as a screening exam*
4. A spiral CT exam of your chest or lungs, not including any spiral CT exam(s) you may have had for the National Lung Screening Trial? 1☐ Yes → 2☐ No (GO TO ITEM 5) 8☐ Don't Know (GO TO ITEM 5)	4a. If yes, what was the main reason you had this spiral CT examination? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine physical examination or as a screening exam*
5. An examination of your colon or rectum? 1☐ Yes → 2☐ No (GO TO ITEM 6) 8☐ Don't Know (GO TO ITEM 6)	5a. If yes, what was the main reason you had this examination of your colon or rectum? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine physical examination or as a screening exam*
6. An FDG-PET scan of your chest or lungs? 1☐ Yes → 2☐ No (GO TO ITEM 7) 8☐ Don't Know (GO TO ITEM 7)	6a. If yes, what was the main reason you had this FDG-PET scan? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine physical examination or as a screening exam*

* A screening examination is a medical test used to detect a disease before symptoms have occurred.

Instructions: *Please complete each question by placing a check (✓) in the box next to the answer that best fits your situation.* ***Mark only one answer for each question****.*

Since April of 200__, have you had any of the following physical examinations or medical tests?

7. An MRI scan of your chest or lungs? 1☐ Yes → 2☐ No (GO TO ITEM 8) 8☐ Don't Know (GO TO ITEM 8)	7a. If yes, what was the main reason you had this MRI scan? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine physical examination or as a screening exam*
8. A chest x-ray, not including any chest x-ray(s) you may have had for the National Lung Screening Trial? 1☐ Yes → 2☐ No (GO TO ITEM 9) 8☐ Don't Know (GO TO ITEM 9)	8a. If yes, what was the main reason you had this chest x-ray? 1☐ Because of a specific health problem 2☐ Follow-up to a previous health problem 3☐ Part of a routine physical examination or as a screening exam*
9. What is your date of birth? MONTH DAY YEAR	
10. Today's date: MONTH DAY YEAR	

* A screening examination is a medical test used to detect a disease before symptoms have occurred.

Thank you for completing this questionnaire. Please return this form to:

(SC Name)

(Address)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Health Assessment Questionnaire (HAQ)

This form is designed to be self-administered by all participants selected to complete the HAQ. However, if the participant has difficulty completing the HAQ, the SC staff member may assist the participant (by telephone). If the participant does not return a completed HAQ within three weeks of the initial mailing, the SC staff member should administer the HAQ by telephone. These specifications provide guidelines for the completion of each question on the HAQ. An asterisk (*) in these specifications indicates a critical data item. These consist of whether the participant has had a spiral CT exam (Item # 4), an FDG-PET scan (Item # 6), an MRI (Item # 7), or chest x-ray (Item # 8), the participant's date of birth (Item # 9), and the date of completion (Item # 10). The SC should perform data retrieval on all critical data items. Data retrieval is not necessary for the other items on the form. Specifications for each item on the HAQ are given below:

Participant ID Number, Study Year, SC Name and Address: The CC will print the PID on the HAQ in both numeric and barcode formats. The CC will insert the participant study year on the HAQ and will also print the SC name and address after the last question on the form.

If the SC uses blank forms for non-respondents or data retrieval, it is the responsibility of SC staff to affix the appropriate PID label and record the participant study year on each HAQ.

The HAQ concerns the participant's physical exams or medical tests since April of the previous calendar year. For each examination or medical test, the participant is asked if s/he had the examination or test since April of the previous calendar year, and the reason for the examination or test. The participant should mark only one response for each question. The text of the base question for all questions on the form is listed at the top of each page. The wording of that text is as follows:

Since April of 200___, have you had any of the following **physical examinations or medical tests**?

1. A blood pressure check?

Mark the appropriate response. If "Yes," complete 1a. If "No" or "Don't Know," skip to 2.

1a. What was the main reason you had this blood pressure check?

Mark the box indicating the appropriate reason for the blood pressure check. The possible reasons include the following:

- *Because of a specific health problem*: The participant had his/her blood pressure checked due to a particular health problem. It was not done as part of a regular or routine physical examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.

- *Follow-up to a previous health problem*: The participant had his/her blood pressure checked due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or part of a regular or routine physical exam.

- *Part of a routine physical examination or as a screening exam*: The participant had his/her blood pressure checked during the course of and as part of a regular physical examination or as a screening examination. The examination was not performed as a result of a specific health problem or as a follow-up examination due to a specific health problem, but as one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

2. A test to check your blood cholesterol level?

Mark the appropriate response. If "Yes," complete 2a. If "No" or "Don't Know," skip to 3.

2a. What was the main reason you had this test to check your blood cholesterol level?

Mark the box indicating the appropriate reason for the blood cholesterol test. The possible reasons include the following:

- *Because of a specific health problem*: The participant had a blood cholesterol test due to a particular health problem. It was not done as part of a regular or routine physical examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.

- *Follow-up to a previous health problem*: The participant had a blood cholesterol test due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or part of a regular or routine physical exam.

- *Part of a routine physical examination or as a screening exam*: The participant had a blood cholesterol test during the course of and as part of a regular physical examination or as a screening examination. The examination was not performed as a result of a specific health problem or as a follow-up examination due to a specific health problem, but as one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

3. A test to examine your eyes for glaucoma or cataracts?

Mark the appropriate response. If "Yes," complete 3a. If "No" or "Don't Know," skip to 4.

3a. What was the main reason you had this eye examination?

Mark the box indicating the appropriate reason for the glaucoma or cataracts test. The possible reasons include the following:

- *Because of a specific health problem*: The participant had a glaucoma or cataracts test due to a particular health problem. It was not done as part of a regular or routine eye

examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.

- *Follow-up to a previous health problem*: The participant had a glaucoma or cataracts test due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or part of a regular or routine eye exam.

- *Part of a routine eye examination or as a screening exam*: The participant had a glaucoma or cataracts test during the course of and as part of a regular eye examination or as a screening examination. The examination was not performed as a result of a specific health problem or as a follow-up examination due to a specific health problem, but as one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

4.* A "whole body" CT examination or a CT examination of your chest or lungs, not including any CT examination(s) you may have had for the National Lung Screening Trial?

This does not include any spiral CT screening examination received as part of the National Lung Screening Trial.

Mark the appropriate response. If "Yes," complete 4a. If "No" or "Don't Know," skip to 5.

This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink, and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

4a. What was the main reason you had this CT examination?

Mark the box for the appropriate reason for the spiral CT exam. The possible reasons include the following:

- *Because of a specific health problem*: The participant had a spiral CT due to a particular health problem. It was not done as part of a regular or routine physical examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.

- *Follow-up to a previous health problem*: The participant had a spiral CT due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or part of a regular or routine physical exam.

- *Part of a routine physical examination or as a screening exam*: The participant had a spiral CT during the course of and as part of a regular physical examination or a screening examination. The examination was not performed as a result of a specific chest problem or as a follow-up examination due to a specific chest problem, but as

one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

5. An examination of your colon or rectum?

An examination of the colon or rectum could include a barium enema, flexible sigmoidoscopy, or colonoscopy. If a participant asks for descriptions of these exams, the SC should read the following:

- A barium enema involves giving an enema containing barium, a white, chalky liquid, and taking x-rays of the colon and rectum.
- A flexible sigmoidoscopy examination involves the insertion of a thin, lighted viewing instrument into the rectum to look at the rectum and partial length of the colon.
- A colonoscopy is a procedure in which a doctor or health care provider inserts a long, flexible viewing tube into the rectum to inspect the rectum and the entire length of the colon.

Mark the appropriate response. If "Yes," complete 5a. If "No" or "Don't Know," skip to 6.

5a. What was the main reason you had this examination of your colon or rectum?

Mark the box indicating the appropriate reason for the examination of the colon or rectum. The possible reasons include the following:

- *Because of a specific health problem*: The participant had an examination of the colon or rectum due to a particular health problem. It was not done as part of a regular or routine physical examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.
- *Follow-up to a previous health problem*: The participant had an examination of the colon or rectum due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or a regular or routine physical exam.
- *Part of a routine physical examination or as a screening exam*: The participant had an examination of the colon or rectum during the course of and as part of a regular physical examination or screening examination. The examination was not performed as a result of a specific health problem or as a follow-up examination due to a specific health problem, but as one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

6.* An FDG-PET scan of your chest or lungs?

If a participant asks for descriptions of an FDG-PET scan, the SC should read the following:

- An FDG-PET scan, or fluorodeoxyglucose positron emission tomography, involves injecting an individual with a solution known as a glucose tracer, and then using a powerful computerized camera, or scanner to take pictures of the body.

Mark the appropriate response. If "Yes," complete 6a. If "No" or "Don't Know," skip to 7.

This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink, and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

6a. What was the main reason you had this FDG-PET scan?

Mark the box indicating the appropriate reason for the FDG-PET scan. The possible reasons include the following:

- *Because of a specific health problem*: The participant had an FDG-PET scan due to a particular health problem. It was not done as part of a regular or routine physical examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.

- *Follow-up to a previous health problem*: The participant had an FDG-PET scan due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or a regular or routine physical exam.

- *Part of a routine physical examination or as a screening exam*: The participant had an FDG-PET scan during the course of and as part of a regular physical examination or screening examination. The examination was not performed as a result of a specific health problem or as a follow-up examination due to a specific health problem, but as one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

7.* An MRI scan of your chest or lungs?

If a participant asks for descriptions of an MRI scan, the SC should read the following:

- An MRI, or magnetic resonance imaging, uses a strong magnetic field, radio waves, and computers to look inside an individual's body. An MRI usually requires an individual to lie on his/her back and then be slid into a horizontal tube, or a scanner with open sides. Once the body part to be scanned is in the exact center of the magnetic field, the scan begins. Sometimes an individual is injected with a dye before the scan begins to enhance the image obtained.

Mark the appropriate response. If "Yes," complete 7a. If "No" or "Don't Know," skip to 8.

This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink, and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

7a. What was the main reason you had this MRI scan?

Mark the box indicating the appropriate reason for the MRI scan. The possible reasons include the following:

- *Because of a specific health problem*: The participant had an MRI scan due to a particular health problem. It was not done as part of a regular or routine physical examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.

- *Follow-up to a previous health problem*: The participant had an MRI scan due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or a regular or routine physical exam.

- *Part of a routine physical examination or as a screening exam*: The participant had an MRI scan during the course of and as part of a regular physical examination or screening examination. The examination was not performed as a result of a specific health problem or as a follow-up examination due to a specific health problem, but as one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

8.* A chest x-ray not including any chest x-ray(s) you may have had for the National Lung Screening Trial?

This does not include any chest x-ray the participant may have had as part of the National Lung Screening Trial.

Mark the appropriate response. If "Yes," complete 8a. If "No" or "Don't Know," skip to 9.

This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink, and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

8a. What was the main reason you had this chest x-ray?

Mark the box for the appropriate reason for the chest x-ray. The possible reasons include the following:

- *Because of a specific health problem*: The participant had a chest x-ray due to a particular health problem. It was not done as part of a regular or routine physical

examination and not as part of a follow-up examination for a pre-existing or past health problem for which s/he has previously had an exam.

- *Follow-up to a previous health problem*: The participant had a chest x-ray due to a previous health problem and for follow-up purposes only. The examination was not due to a new health problem or a regular or routine physical exam.

- *Part of a routine physical examination or as a screening exam*: The participant had a chest x-ray during the course of and as part of a regular physical examination or a screening examination. The examination was not performed as a result of a specific chest problem or as a follow-up examination due to a specific chest problem, but as one of many routine checks during the participant's regular office visit. An insurance physical is considered a routine physical exam.

9.* Date of Birth: Instruct the participant to enter the month, day, and year s/he was born.

This question is a critical data item. If it is incomplete or not answered, data retrieval must be attempted. If data retrieval is successful, make any changes in a different color ink, and record your initials and the date of data retrieval in the white space next to the question. If data retrieval is unsuccessful, write "D.R. attempted," your initials, and the date of the data retrieval attempt in the white space next to the question.

10.* Today's Date: This is the date the form is completed. Instruct the participant to enter the month, day, and year. Month and day should be zero filled, if applicable. For the year the last two digits should be filled in.

This item is a critical data item. If this item is incomplete or not answered, use the date of receipt of the form as the date of completion. Complete this information according to the following guidelines:

1. *If the participant left all parts of the date blank (month, day, and year), replace the blanks with the full receipt date (month, day, and year). Record this date in another color ink in the space provided. Note on the form that the date recorded is the date the form was received at the SC.*

2. *If the participant wrote a partial date (e.g., month, day only) or a partially incorrect date (e.g., month and day fall prior to date questionnaire was sent to him/her), replace what the participant wrote with the full receipt date (month, day, and year). Record this date in another color ink in the white space near the participant's response. Do not replace part(s) of the completion date with part(s) of the receipt date.*

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.

- If administered by telephone, the SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the first page.
- If self-administered by the participant, the SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the first page.
- Copy the form.
- Send the original form to the CC.
- File a copy of the form in the participant's study file.

Appendix 10-3 Sample Cover Letter for the Health Assessment Questionnaire (HAQ)

National Lung Screening Trial/Lung Screening Study (NLST/LSS)

(Date)

(Participant Name)
(Participant Address)
(City, State, Zip Code)

Dear *(Participant Name)*:

On *(date of screening exam)*, you received a *(Chest x-ray/Spiral CT)* as part of the National Lung Screening Trial. We thank you for your participation. We would like to receive some additional information about your recent health care. We are interested in the time since April 200__. Enclosed is a questionnaire that we are asking you to complete.

The questionnaire is very brief and will take about five minutes to fill out. Instructions for completing the questionnaire can be found on the form itself. We would appreciate it if you would complete the questionnaire and return it in the enclosed postage-paid envelope as soon as possible, preferably within the next week. If you are unable to complete the questionnaire or if you have any questions while completing the questionnaire, please contact the study office.

Please be assured that all information you provide will be kept strictly confidential. Your name or other identifying information will not appear on any study report – all results from the National Lung Screening Trial will be reported as statistical summaries only.

Do not hesitate to call the study office at *(Telephone Number)* if you have any questions or concerns about the questionnaire or any aspect of the National Lung Screening Trial. Your participation represents a valuable contribution to medical research, and we thank you again for your cooperation.

Sincerely yours,

(Name of SC PI or Coordinator)
(Title)

11. ADMINISTRATIVE PROCEDURES

11.1 Overview

The Screening Center (SC) Coordinator had overall responsibility for the management of the Screening Center. These management tasks included staffing and training, scheduling and documenting data collection activities, record keeping, requesting information, completing data collection forms, entering data into shipping Medical History Questionnaires (MHQ) and Health Assessment Questionnaires (HAQs) to the Coordinating Center (CC), transmitting data to the CC, monitoring SC activities, and quality assurance. This chapter describes the SC management activities and the tools provided to perform these activities.

11.2 Software and Communications Support

The CC provided the SCs with computer systems support for randomization pre-processing, data entry, monitoring and reporting participant status in the NLST/LSS, data cleaning, and the Endpoint Verification Process (EVP). The CC also provided computer systems support for the NLST/LSS Publications, Presentations, and Associated Studies (PPA) process and the NLST Publications and Presentations Committee (PPC) process. The major systems functions provided include the following.

Randomization pre-processing. This program was located on the hard drive of the PC. It identified as ineligible, potential participants who were already participating in PLCO or the NLST/LSS. (See the for additional information.)

The CC provided an that was used by both the SC and the CC for study management. The desktop PCs were configured with provided reports, through both pre-programmed queries and a query builder, to identify forms and activities that were upcoming and delinquent. Using the data from all SCs, the CC produced monthly progress and monitoring reports for CC discussions with the NCI. (See the for additional information.)

Data Cleaning System. The CC developed a Web-based system for managing data cleaning tasks. The CC used this system to program new logic checks, run edit checks against NLST/LSS study data, review edit failures, and post data cleaning tasks on a monthly basis. The system was available to the SCs for viewing edit failures, printing CC Edit Forms, requesting overrides, and tracking the status of data cleaning tasks.

. The CC developed the Web-based system to support the EVP. was available to the SCs for viewing the status of participants in the EVP and was available to the Endpoint Verification Team (EVT) to complete required forms for cases selected for review. The CC used to manage and track the progress of the EVP.

The CC developed NLST/LSS a Web-based system, to facilitate the submission and review process for all associated study proposals, as well as publications, presentations, and abstracts utilizing NLST/LSS data. Refer to Section 1.6.3 for more information.

The CC developed a second Web-based system to facilitate the submission and review process for all associated study proposals, as well as publications, presentations, and abstracts utilizing NLST joint ACRIN/LSS data. Refer to Section 1.6.3 for more information.

Basic office automation software. The desktop PCs were configured to include various software packages to support basic office automation. This package included Microsoft Office.

Telecommunications. The CC configured each PC to import and export data to and from the CC securely and reliably. The SC was prohibited from loading additional software, including utilities like screen savers, or upgrading any software, such as browsers, that was not provided by the CC without express permission prior to the activity. User Support assisted SCs in ensuring compatibility of additional software before it was loaded and in handling any configuration issues.

The CC provided each SC with two PCs and a printer. SC requests for additional equipment were required to be submitted through the CC and approved by the NCI. The SCs provided one dedicated phone line, unless otherwise agreed with the CC and NCI. The telephone line was required to be of data quality and not a "shared" or "rollover" line. Licenses for all software provided by the CC were held by the CC. The SC was responsible for acquiring software licenses for any individual software (approved by the CC) that the SC used in addition to what was provided by the CC.

11.3 Interactive Voice Response System

During randomization the CC provided an interactive telephone-based randomization system for SC use. The SCs used existing telephone lines to call the centralized randomization system and enter required data elements using the telephone keypad. The system was configured for access by a toll-free number and was available 24 hours a day, seven days a week. The toll free number to access the system

was A separate User Support Hotline provided assistance to the SCs and could be reached by dialing ; User Support was also reached by fax at The SCs provided a designated e-mail address for use in receiving confirmation reports related to the randomization process. Confirmations were sent to this designated e-mail address only, so it was critical that it be accessed regularly to check for confirmation reports. (See Appendix 2-12,)

11.4 Training and Registration of SC Staff by CC

The CC was responsible for training the SC Coordinators in the protocol and procedures for conducting the study. The primary reason for training the SC Coordinator was to ensure that the protocol was clearly understood and to ensure that standard procedures were followed across all SCs. Central training sessions conducted by the CC offered the opportunity for introduction to and discussion of procedures and hands-on practice with reference materials and data collection instruments. SC Coordinators attended training sessions in August 2000 prior to randomization of LSS feasibility study participants, in October 2001 prior to the extension of the LSS feasibility study, and in April and September 2002 prior to the start of NLST. The CC also conducted periodic workshops for Medical Record Abstractors, and conducted a central training for Pathology Tissue Collection in November 2008. The CC agreed to conduct further training sessions for SC Coordinators as needed. The purpose of the training was to familiarize the SC Coordinators with requirements, protocols, timeline, and tools of the study in subsequent study years. In addition, the CC distributed information using Decision Logs and annual updates to the Manual of Operations and Procedures were discussed during the Steering Committee Meeting which was held twice a year until May 2011.

11.4.1 Training of SC Staff by SC Coordinator

The SC Coordinator had ongoing responsibility for training all staff on forms completion and administrative procedures. It was the SC Coordinator's responsibility to ensure that study forms were completed accurately. When training SC staff, the SC Coordinator was asked to emphasize the following key items:

> The PID label for the appropriate participant should be placed on all participant study forms. The CC will define label specifications and the SC will have the ability to print PID labels as needed. The PID label should be affixed in the designated location. The PID should never be hand written in this section of the form.
>
> The specifications for completing each study form should be reviewed prior to completion. It is important to follow the form specifications to ensure accurate completion of each study form.
>
> The study form should be reviewed to make sure the handwriting is legible and that all of the requested information is given.
>
> The "Administrative Section" or the "For Office Use Only" section should be completed in advance of the participant's study visit or should be completed prior to mailing the form to the participant. The remainder of the form should not be pre-filled prior to the participant's visit or mailing to him/her.
>
> A Missing Data Form (MDF, Appendix 11-1), should be completed when a participant is unable or unwilling to complete a study activity. The Specifications for Completion of the MDF appear in Appendix 11-2.
>
> The confidentiality of study forms should be maintained at all times. Any information linking the PID to the participant's name should be removed or blacked out prior to the shipment of the forms to the CC.

11.4.2 Certification and Registration of Staff

For each staff member, the SC Coordinator was required to document the individual's qualifications for the NLST/LSS on a Record of Experience, Credentials, and Training (ECT, Appendix 11-5). Training/certification requirements for examiners are described in Chapters 4 and 5. Training/ certification requirements for medical record abstractors and nosologists are described in Chapter 7. The ECT was required to be transmitted to the Credentialing Coordinator at the CC before the staff member performed any NLST/LSS tasks, including screening examinations. Additionally, the ECT was required to be approved by the NCI before a staff member could perform duties for the NLST/LSS. Specifications

for Completion of the ECT are provided in Appendix 11-6. In addition, the SC Coordinator assigned a staff ID number to each person performing NLST/LSS tasks. If an individual was a registered staff member for PLCO, a new ECT was required for the NLST/LSS; however, the SC Coordinator could assign that person the same staff ID number as his/her PLCO staff ID number.

Updates to the credentials for previously submitted ECTs were requested on an annual basis throughout the screening phase by the CC for radiologic technologists, radiologists, and medical physicists. ECTs for radiologic technologists were to be submitted with current ARRT certifications or proof that the individual was board eligible. The ECT for medical physicists was to be accompanied by a state license. Radiologists were required to be board eligible or have a current ARRT certificate and a state license. Refer to Sections 4.5.4 and 5.5.4 for specifications on submission of annual updates.

11.5 Additional Study Documentation

For each participant, data collection activities took place at baseline (T_0) and annually through December 2009 with an accelerated effort to complete final ASUs in 2010 (See Section 3.6.1). Additional data collection took place for participants who were diagnosed with lung cancer or who died during the course of the study.

Additional documentation was necessary when study activities could not be completed, were not completed according to the NLST/LSS protocol, or were associated with participant complications. The following sections provide an overview of the procedures for documenting missing data activities, documenting and resolving protocol and HIPAA violations, reporting adverse events, and documenting withdrawal from the study.

11.5.1 Documenting Missing Data Activities and Non-Response

The SC Coordinator completed a Missing Data Form (MDF, Appendix 11-1) when a participant was unable or unwilling to complete a study activity for a given study year. This may have been due to a variety of reasons such as participant refusal or inability to locate the participant. The MDF was to be used only when all efforts to obtain data were unsuccessful and it was believed the data for that study year would never be obtained.

Specifications for Completion of the MDF are included in Appendix 11-2. After the form was completed, it was reviewed to ensure that it was filled out completely. The form was entered into and then filed in the participant's study file.

If an MDF was completed for a study form that was later found or able to be completed, the SC was required to delete the MDF from and then enter the study form into The deleted MDF was to be attached to the study form that replaced it and then filed in the participant's study folder.

If the SC Coordinator considered the participant's inactive status to be permanent, a Non-Response Form (NRF, Appendix 11-3) was completed. The participant's permanent inactive status may have been due to a variety of reasons such as inability to locate the participant, participant refusal, an incapacitating medical condition, or death of the participant. Presumed and confirmed deaths were documented on an NRF, although an MDF for the study year in which the participant's death was discovered also was required.

Once the NRF was completed and entered into no further MDFs for any form were necessary or expected for future study years; however, MDFs for all forms expected during the study year in which the NRF was completed were still required to be submitted into For example, Participant A had complete T_0 information and died midway through T_1. An NRF was completed during the T_1 study year and forms were automatically closed out for T_2 –T_7, however an MDF was still required for all outstanding T_1 forms. The NRF also allowed for the reactivation of a participant's status when circumstances changed.

Specifications for Completion of the NRF are included in Appendix 11-4. Only the SC Coordinator or Administrator could complete an NRF. After the form was completed, it was reviewed to ensure that it had been filled out completely. The form was entered into and then filed in the participant's study file.

11.5.1.1 Data Collection Involving Living Non-responders

While most non-response was due to participant death, some living participants refused participation in certain or all study activities. These participants were classified by their degree of

unwillingness to participate. Data collection activities varied by the type of refusal. There were three categories of refusal: soft, hard, and absolute.

Participants who no longer wished to be screened but were willing to participate in all other study activities were classified as soft refusals. An NRF was not completed on soft refusals, and all study forms for all remaining study years were expected. An MDF was to be completed for the current screening exam. MDFs were not to be completed for future screening exams on the off chance that the participant decided to return to screening. Medical records were to be collected on soft refusals in the instance of a lung cancer diagnosis or selection for EVP. In the event of death, a Death Certificate was collected as well.

Participants who stated verbally that they were no longer interested in participating in any aspect of the study, including screening exams and completion of study questionnaires, were classified as hard refusals. An NRF was required for all hard refusals. Additionally, MDFs were completed for outstanding expected forms for the study year in which the NRF was completed. If the participant signed a Medical Records Release Authorization Form that was likely to be honored by medical facilities, the SC may have, but was not required to, attempt to collect medical records in the instance of a lung cancer diagnosis or selection for EVP. The SC was advised to exercise caution in making the decision to collect medical records for hard refusals, especially in the instance of an irate participant. A Death Certificate was to be collected for hard refusals, however. If at all possible, the SC was to inform all hard refusals that their data would remain in the study database unless a written request to exclude it was received. If it was not possible to collect medical records, a note was to be placed in the EVP folder describing the circumstances that were responsible for the lack of documentation.

Participants who in writing withdrew their consent, requested that their data be removed from study, or requested that study forms be returned to him or her were classified as absolute refusals. For each instance of an absolute refusal, the SC was required to provide documentation to the CC, who then discussed the case with the NCI. After receiving approval from the CC and NCI, the SC completed an NRF. Additionally, MDFs were completed for outstanding expected forms for the study year in which the NRF was completed. No additional data collection was to be attempted for absolute refusals, even if a signed Medical Records Release Authorization Form was available and likely to be honored by a medical facility. Furthermore, a Death Certificate was not to be obtained in the case of death. Following completion of the NRF, the SC was to provide a written confirmation to the participant that his/her data would be removed or returned. The SC forwarded a copy of the NRF and written confirmation that was

sent to the participant to the CC. The SC was responsible for removing all hard copy documents from NLST files as dictated by the SC IRB, but maintained a copy of these documents, including the signed informed consent, in a location separate from active NLST files in case litigation ensued. If requested, the SC returned to the participant all study documents completed by the participant (including but not limited to informed consents, PCFs, ASUs, MHQs), but did not return study documents never seen by the participant (such as screening exam forms or DE forms). The SC also was to delete participant information from all SC-maintained electronic databases. Upon receipt of the completed NRF and written confirmation, the CC initiated procedures to delete participant information from NLST data files. Any hard copy forms and/or images stored at the CC were retrieved and returned to the SC. Electronic data pertaining to the participant was deleted from all applicable sources, including and any other data collection repositories. In addition, the CC coordinated the removal of all participant data from external locations, including IMS and the CTIL. The CC provided a written report to the SC Coordinator when this process was completed.

11.5.2 Documenting and Resolving Protocol and HIPAA Violations

All investigators were expected to adhere to the procedures set out in the NLST/LSS protocol. Instances where SC staff performed activities that deviated from established study protocol were considered protocol violations. All protocol violations were required to be documented on a Protocol and HIPAA Violation Form (PHVF, Appendix 11-9). Only one protocol violation per participant was reported on each PHVF.

If a participant's protected health information (PHI) was released in a manner that was inconsistent with confidentiality assurances in the study consent forms, this was considered a violation of the Health Insurance Portability and Accountability Act (HIPAA). Although the event may not have been considered a protocol violation, all HIPAA violations were required to be reported on the Protocol and HIPAA Violation Form (PHVF). (See Appendix 11-10, Specifications for Completion of the Protocol and HIPAA Violation Form.) It may have been necessary for the SC to consult their institutional IRB or HIPAA expert to determine if a violation occurred. Reporting the results of a screening exam to the wrong participant was both a protocol violation and a HIPAA violation. Sharing PHI with an outside institution or agency without permission from the participant is an example of a HIPAA violation.

The original PHVF was sent to the CC and a copy of the PHVF placed in the participant's study file. The PHVF was to be checked for completeness and entered into Protocol and HIPAA violations were reported to the CC in the SC's weekly report to the CC. The CC used PHVF reports to report violations to the appropriate entities (e.g. NCI, DSMB). All HIPAA violations were required to be reported to the NCI. Examples of common protocol violations are:

Randomizing ineligible participants;

Randomizing the same individual more than once;

Screening a participant without a signed consent form;

Screening a participant with lung cancer;

Performing the screening exam to which the participant was not randomized;

Reporting erroneous results to participants or health care providers;

Performing a duplicate screening exam, and

Using incorrect technical parameters for the screening examination.

The following sections discuss the documentation of some of the examples of protocol violations.

11.5.2.1 Randomized Ineligibles

If the SC became aware that a randomized participant was ineligible at the time of randomization, the participant was documented as "ineligible participant randomized" on the PHVF. The following information was recorded on the PHVF:

Date the SC discovered that the ineligible individual was randomized;

Date the protocol violation occurred, which was the date the individual was randomized;

Reason the individual was not eligible for the study at the time of randomization, and

Method of discovery.

Randomization errors may have involved the following:

Individuals who were randomized in error (i.e., the participant provided information to the SC indicating his/her ineligibility, but the SC failed to exclude him/her from the study), and

Individuals who were randomized appropriately based on information provided at the time of randomization, but for whom it was discovered after randomization that the information provided had been incorrect.

It was important to document on the PHVF the specifics of the situation so that the above situations could be distinguished.

The CC used PHVF reports to determine the number of randomized ineligible protocol violations that occurred for each SC within a given timeframe.

All participants discovered to have been ineligible after randomization (with the exception of those who did not sign a consent form) continued to be study participants regardless of the method of discovery. Randomized ineligible participants were offered screening exams and followed for all study activities. If the participant refused screening, an MDF was completed for all screening forms.

11.5.2.2 Duplicate Randomization

If a participant was randomized more than once, the first assignment, both PID and study arm, was used.* A PHVF was to be completed regardless of whether the two randomizations resulted in assignment to the same arm or different arms. The duplicate randomization PID label was to be affixed to the upper right hand corner of the form and the original PID written in the proper field adjacent to the violation type. In the highly unlikely instance of triplicate randomization, the third PID assignment was to be documented on a new PHVF and the corresponding PID label affixed to the form. The CC and the participant were both to be informed of the error. The charts could be combined or left separate but complete documentation was required to be kept so that both PIDs could be easily identified and the correct records traced if necessary.

* Note*: In the event that the participant was randomized at both an NLST/LSS and ACRIN site, the site which first (earliest date) randomized the participant maintained the participant for the study. The site (NLST/LSS or ACRIN) that performed the second randomization was required to complete a PHVF*

according to study protocol and bear the responsibility of informing the participant of the correct study arm and study site. Additionally, the site with the second randomization maintained a record of the protocol violation (duplicate randomization) but did not track the participant as a randomized ineligible. A record of crossover duplicate randomizations was to be maintained by the SCs and reported to the NLST Executive Committee.

11.5.2.3 Incorrect Screening Exam Performed

Instances in which an incorrect screening exam was performed (e.g., a chest x-ray for a participant who was randomized to the spiral CT arm or vice versa) were to be documented on a PHVF. Results from the examination actually completed were sent to the participant and his/her health care provider. The participant would not receive another screening examination for that study year.
did not allow the SC to enter a screening examination form for an erroneous screen. An MDF with a code of 88 (Other, specify) was to be entered in lieu of the proper screening exam form. A DE form was required for an incorrect screening exam that yielded a positive result. In this instance, the DE form was not entered into The DE form was to be filed in the participant's study file.

11.5.2.4 Erroneous Results Reported

If the results letter that was mailed to the participant and/or his/her health care provider were found to be erroneous (i.e., incorrect results were reported), this was to be documented on a PHVF. In addition, the participant and his/her health care provider were to be contacted and given the correct results.

11.5.2.5 Duplicate Screen Performed

If a participant was erroneously screened more than once in a study year, a PHVF was to be completed. The earlier screening exam and the PHVF were entered into The second screening exam would not be entered into Copies of both screening exam forms were to be included when the PHVF was sent to the CC. Results for both screening exams were to be sent to the participant and his/her health care provider. If the second screening exam resulted in a positive screen, a DE form was

required. In this instance, the DE form was not entered into The DE form was to be filed in the participant's study file.

11.5.3 Reporting Adverse Events

SCs were responsible for reporting the occurrence of any adverse events that may have been related to participation in the NLST/LSS. The SCs were to document the following as adverse events:

Death;

Life-threatening event;

In-patient hospitalization;

Persistent or significant disability/incapacity;

Medical or surgical intervention to prevent one of the above outcomes, and

Other adverse events related to participation in the study (to be specified).

If medical complications occurred at the SC during the screening procedure a member of the SC staff was to complete a Report of Adverse Events for NIH-Sponsored Clinical Trials (RAE, Appendix 11-11). These complications were to be documented in the Comments Section of the appropriate screening examination form (see Chapters 4 and 5) and submitted to the CC. If there were any questions regarding whether a medical complication was an adverse event, the SC was urged to contact the CC.

If an adverse event occurred, the SC was required to notify its local IRB and complete a RAE. The adverse event was to be thoroughly described on this report. Specifications for Completion of the RAE are provided in Appendix 11-12. The RAE was to be kept in the participant's study file and appropriate follow-up with the participant and his/her health care provider was conducted until the problem was resolved. When the problem was resolved, the RAE was to be entered into and filed in the participant's study file. The CC used RAE reports to report the occurrence of adverse events to the appropriate entities (e.g., NCI, DSMB).

11.5.4 Documenting Withdrawal from the Study

If a participant decided to withdraw from the study, the SC completed a Non-Response Form (NRF, Appendix 11-3). Specifications for the Completion of the Non-Response Form are found in Appendix 11-4.

11.6 Processing, Receipting, and Shipping of Study Data

All study forms were entered into with the exception of the MHQ and HAQ, which were copied and shipped to the CC. The following sections cover these activities.

11.6.1 Manual Editing of Study Forms

All forms were to be manually edited twice prior to entry into The SC staff member who completed the form performed the first edit and then wrote his/her initials in the space labeled "Initials Complete" in the box at the top of the page. If the form was completed at a screening visit, the edit was to be completed before the participant departed the SC so that any corrections could be made immediately. The SC Coordinator or a designated staff member performed the second edit and then wrote his/her initials in the space labeled "Initials QC" in the box at the top of the page. The second edit was to be performed after the first edit was completed and before the forms were entered into **The SC staff member who performed the second edit could not be the same SC staff member who completed the form.** The manual editing process involved two main steps: (1) reviewing the form for completeness, legibility, consistency, and accuracy and (2) making changes to the form after the review or data retrieval. The following guidelines were provided for manual editing:

1. Review for completeness, legibility, consistency, and accuracy. Consult the form specifications during this review.

2. Make changes that do not require data retrieval. Initial and date all changes to individual items. Any erasure or change that has not been initialed and dated will be considered a participant or examiner change rather than an edit.

3. Perform data retrieval for critical data items.

   - Data retrieval may be performed in person if the participant is in the clinic.

   - If the participant is not in the clinic, attempts should be made to contact the participant to complete data items before forms are entered into

   - Five attempts should be made to contact the participant to complete critical data items. See Section 3.9.1 for guidelines on making follow-up telephone calls. If the data cannot be obtained, leave the item blank, and mark your initials and date near the question.

   - Maintain a call record to document attempts to contact the participant. A Sample Call Record is given as Appendix 11-13. Call records to document forms completion should be stored in the participant's study file.

4. Annotate the form as follows to document data retrieval.

   - If the item in question was left blank and, upon data retrieval, the participant or examiner is unwilling or unable to supply the data, leave the item blank, and mark your initials and the date near the question.

   - If the item in question was left blank and, upon data retrieval, the participant or examiner supplies the data, complete the item and mark your initials and the date near the question. If the new data involve a verbatim response, record the data in another color ink or pencil (except red) from the participant's original response.

   - If the item in question was completed incorrectly (e.g., an incorrect examination result) or required clarification, and the participant or health care provider supplied different or additional data, make the changes and mark your initials and the date near the question. If the changes involve a verbatim response, using another color ink or pencil (except red), cross out the original verbatim response with one line and write the corrected response near it; original verbatim responses should never be erased.

If the SC Coordinator discovered an error after forms had been entered into the SC was expected to make the appropriate change to the form and in the database. If the SC Coordinator discovered an error to the HAQ or MHQ after they had been sent to the CC, the SC Edit Form (Appendix 11-7) was to be completed and sent by e-mail or by FedEx package to the CC. The SC Edit Form documented changes on only one data form. A separate SC Edit Form was needed for each form that required changes. Specifications for Completion of the SC Edit Form are found in Appendix 11-8. A copy of the completed form that documented the change was to be maintained in the participant's study file behind the first version of the form. Only one participant was listed on a form. Once the form was submitted to the CC, a copy was to be placed in the participant's study file.

11.6.2 Critical Data Items

Critical Data Items, referred to throughout the MOOP, were the specific items listed in form specifications that required data retrieval to ensure the item was completed.

11.6.3 Shipping Forms to the CC

The Medical History Questionnaire (MHQ), Health Assessment Questionnaire (HAQ), Protocol and HIPAA Violation Form (PHVF), the Report of Adverse Events for NIH-Sponsored Clinical Trials (RAE), and the SC Edit Form were shipped to the CC. The forms, with an accompanying transmittal detailing the contents of the shipment, were shipped by FedEx.

Forms were to be copied prior to shipment to the CC. The copies were to be filed in the participant study files at the SC. Original study forms were shipped to the CC. All identifying or personal information was to be removed or blacked out prior to shipment to the CC.

A Transmittal Log (Appendix 11-14) was expected to accompany each form shipment. A transmittal log listing all forms included in the shipment could be generated from The SC Coordinator located the study forms that had been receipted since the last shipment and scanned the PIDs into the transmittal listing. Forms were to be placed in PID order within form type. For detailed information in generating a shipment transmittal refer to the The SC Coordinator was advised to make a copy of the transmittal and copy all study forms for shipment that had not yet been copied. The original transmittal was to be placed on top of the batched forms for shipment. A copy of the transmittal was to be filed at the SC for reference.

The following **original study forms** were processed and shipped to the CC as needed:

Medical History Questionnaire (MHQ)
Health Assessment Questionnaire (HAQ)
Protocol and HIPAA Violation Form (PHVF)
Report of Adverse Events for NIH-Sponsored Clinical Trials (RAE)

SC Edit Form

Study forms were to be sent only when the form had been comprehensively edited and all data retrieved. The SC Coordinator was responsible for checking the forms prior to sending any materials to the CC.

The CC did not receive copies of any forms that contained identifying information from NLST/LSS participants or potential participants. The SC did not ship the following forms to the CC:

Consent Form
Screening Examination Results Letters (unless requested for QA purposes)
Eligibility Screener (ES)
Eligibility Verification Form (EVF)
Participant Contact Form (PCF)
Medical Record Release Authorization Form
Results Withheld Form
Cover page of MHQ
Call Records

11.7 Data Quality Assurance

The implementation of procedures designed to ensure the collection of quality data is critical to the success of a research study. The NLST/LSS employed various data quality assurance procedures at the SCs and CC to ensure that complete and accurate data were available for data analysis. The purpose of this section is to describe NLST/LSS data quality procedures and to outline recommended practices for the SCs and CC to promote the production of complete and accurate NLST/LSS study data.

11.7.1 Data QA Responsibilities of the SC

The SC was responsible for developing and implementing data quality assurance procedures at their site. In addition, the SC was responsible for ensuring that all study staff were appropriately informed of all QA procedures for which they were responsible. The SC also was responsible for

adhering to the data QA guidelines for data security, data processing, and data monitoring outlined in this section.

11.7.1.1 Data Security at the SC

Study documents and data were not permitted to be stored in the participant's regular medical record at any hospital or institution with which the SC was affiliated. Copies of screening results, however, could eventually become part of a participant's regular medical record as a result of referral of the participant to a health care provider for follow-up of an abnormal screening result. Study documents will be kept for at least ten years after the end of the study, defined as September 29, 2011, and then destroyed. Study documents related to individuals that were never enrolled in the trial, such as Eligibility Screeners, Eligibility Verification Forms, and call records were permitted to be destroyed by the SCs at the conclusion of the SC contracts.

All study materials that carried identifying information such as name, address, and Social Security Number were to be kept in a locked and secure area at the SC. The SC Coordinator controlled access to this area. If the central file was computerized, the system was required to be protected from outside access (e.g., password control, locked system, or data encrypted). Similarly, all reports produced from the system that carried such data required controlled distribution and were to be destroyed when no longer needed (e.g., shredded). Any computerized data management system that processed NLST/LSS study data, either in-house or provided by the CC (e.g., was required to be password protected and underwent validation checks to ensure data integrity. Additional guidelines for SC data security were set forth in a memo from the CC to the SCs and are provided in Appendix 11-15.

During the recruitment phase, mailing houses may have been contracted to recruit potential participants. Any SC wishing to release participant information to organizations for such a circumstance must first have obtained from the organization a written statement assuring that participant confidentiality would be maintained. A copy of the statement was to be submitted to the NCI and the CC. However, if the SC provided a list or file of names and addresses of potential participants without any data elements linking the potential participant to enrollment in the study, it was not necessary to obtain an assurance of confidentiality.

11.7.1.2 Data Processing at the SC

The SC was responsible for maintaining standard data processing procedures for promoting the collection of good quality data. These data processing procedures involved reviewing data for accuracy and completeness and identifying and resolving data discrepancies.

All study forms were to be manually reviewed by study staff according to the guidelines provided in MOOP Chapter 11.6.1, Manual Editing of Study Forms, prior to data entry. Study forms that passed the manual editing review were single or double entered into at the individual SCs by trained data entry staff. The SC staff member who performed the second entry was not permitted to be the same SC staff member who performed the first entry. Each SC was responsible for developing a system for ensuring that forms were entered into in a timely manner. The provides a list of study forms requiring data entry into and the method of entry appropriate for each form.

The database was designed to assess the preliminary validity of data by placing certain restrictions on data at time of entry. These restrictions were implemented through the incorporation of edit checks that ran on data entered during both Pass 1 and Pass 2. Section 11.7.2.2 provides details on the types of edit checks that were incorporated into the application.

The same basic edit checks were run on data entered during Pass 1 and Pass 2 but during Pass 2 the database also compared the keyed data to the data that was entered during Pass 1. If the data differed, the Pass 2 operator received a comparison failure alert either at the moment of entry or when attempting to save the record. The data entry operator then checked the form to determine which value was correct and made the appropriate change to the data at that time. When the Pass 2 operator accepted or entered a new value, the edit checks ran again and if the error was resolved the record was saved to the final NLST/LSS database.

If the operator entered a data value that still did not pass the edit check, a discrepancy remained and a printable error log was generated. At this point the data entry process remained in the pending phase until the discrepancy could be resolved and the form successfully met the edit check requirements of Pass 2 data entry.

11.7.1.3 Data Monitoring at the SC

The SC was responsible for monitoring the quality of study data to identify missing and/or delinquent study forms. This may have been accomplished through the use of data queries, manual review of participant charts, and the regular generation of data reports. The SCs were able to run data queries and generate data reports using the application. queries and reports were essential data quality tools for promoting the timely collection of complete and accurate data and for this reason, SCs were strongly encouraged to use these QA tools on a regular basis. See Section 11.7.3 Data Reports, for a list of the reports available in

11.7.2 Data QA Responsibilities of the CC

The CC was responsible for the development and implementation of data quality procedures for the promotion of good quality data collection and maintenance of NLST/LSS study data. The CC was responsible for implementing data quality procedures related to data security, data processing, and data monitoring. The CC was responsible for ensuring that all NLST/LSS staff was informed of any data QA procedures for which they were responsible.

In addition to developing QA procedures for internal use, the CC also was responsible for developing various data quality assurance tools to assist sites in identifying and resolving inconsistencies in their study data. Examples of data QA tools provided to the SCs included but were not limited to the following:

- Programmed validation edit checks in the study database
- Data querying tools in
- Data monitoring reports in
- Data clarification requests as a result of discrepancies identified through QA procedures performed at the CC
- Web-based data cleaning system

11.7.2.1 Data Security at the CC

All NLST/LSS study forms at the CC were kept stored in a locked cabinet in a secure environment. In addition, any documents or reports generated by the CC that contained results of PID-specific study data were stored in a locked cabinet in a secure area.

Any computerized system developed or maintained by the CC for the purpose of processing or storing NLST/LSS study data underwent systems validation testing and was required to be protected from outside access (e.g., password control, locked system, or data encrypted) to ensure data integrity. In addition, reports produced from the system that carried participant study data required controlled distribution and were to be destroyed when no longer needed (e.g., shredded).

11.7.2.2 Data Processing at the CC

Once study data were transmitted to the CC or keyed into the database by CC data entry staff, the CC performed additional quality assurance checks on the study data on a regular basis. Data discrepancies identified during this process were communicated to the SC by one of the following ways: the CC Edit Form (Appendix 11-16), e-mail, telephone, or the Web-based data cleaning system. The SC was responsible for responding to any requests for data retrieval within the time specified, or a reasonable period of time if no deadline was given.

The CC was responsible for developing edit checks to assess the quality of data entered into the database. Prior to the transition to a distributed data entry system double data entry was performed by CC data processing staff and edit checks were run on keyed data. Any discrepancies identified during the edit check run were distributed to each SC through the use of the CC Edit Form or by telephone or e-mail. This particular system of data entry continued to be utilized for the entry of MHQ and HAQ forms, and this process applied to the data collected on this form.

For the majority of the NLST/LSS study forms, data processing and data entry occurred at each individual SC with data entered into the database. The CC incorporated the following pre-programmed edit checks into the application:

- Data type errors (e.g., a character response entered into a numeric field or decimal response to a question that takes an integer);
- Length errors (e.g., the question was defined with a length of 4 and the value entered has a length of 3);
- Code list errors (the value entered is not a valid response);
- Date errors (e.g., only part of the date was entered when a whole date was expected, date entered is in the future);
- Mandatory response is missing;
- Range checks (e.g., technical parameter is not within the acceptable range of values);
- Comparison checks across data fields (e.g., date of screening exam is after the previous scan date of any comparison exam in Part E), and
- Cross-form checks (e.g., an attempt is being made to enter a DE form when there is no corresponding positive screening exam or CDF with a confirmed primary lung cancer, date of screening exam is prior to randomization date).

11.7.2.3 Data Monitoring at the CC

The CC monitored data collection and the quality of study data through the use of data queries and the generation of data reports. During the screening phase of the trial, the CC was responsible for generating monthly data reports regarding recruitment, retention, screening examination results, data collection, and other study-related activities for distribution to NCI. During the follow-up phase of the trial, the CC generated pertinent reports for distribution to NCI on a quarterly basis. Data reports were reviewed by CC staff members responsible for monitoring study activities at the SCs and discussed issues with the SC as needed. The CC continued to monitor study data and request clarification and/or resolution for identified errors throughout the study.

11.7.3 Data Reports

- SC Cumulative Recruitment Summary Report (Appendix 11-17): This report was used during the recruitment phase of the study to show summary totals for recruitment activities at each SC. The report was produced by the CC using information entered by the SC from the Cumulative Recruitment Summary Form.
- SC Receipt Activity Report (RAR, Appendix 11-18): This report displayed the total number of forms that were entered into by form type and study year. The

RAR generated in at the SC showed only data for that particular site. The CC was able to generate the RAR for each SC.

- Expected Forms Report (EFR, Appendix 11-19): For each participant, this report showed the data collection forms that were expected but not yet entered into These real-time reports were generated in at the SC with each center having the capability to view only its own report. For viewing ease, the report could be limited to form type and month of randomization, or month of expected receipt date, if desired. In addition, the report could be sorted by PID, randomization date, form type, or study arm. The form could be printed or exported as a data file from The CC was able to generate the EFR for all SCs.

- Screening Exam Results Report (SERR, Appendix 11-20): This real time report, generated in provided the SC with a list of participant exam results at its screening center. The report showed PID, study arm, study year, screening exam date, and screening result. This report also showed the date the results letter was sent and indicated if results were sent late when result letter generation occurred in This report also identified screens performed on ineligible participants and could be sorted by PID, study arm, screening date, or screening result. The CC was able to generate the SERR for all screening centers.

- Participant Overview Report (POR, Appendix 11-21): This PID-specific report provided the SC with a summary of study activities for the participant as well as participant status information. The report was useful in assisting the SC with scheduling study activities and for follow-up related to positive screens. The CC was not able to generate the POR since the report contained confidential privacy data.

- Study Progression Report (SPR, Appendix 11-22): This report showed the total number of participants randomized and the total number of participants in each study window at the time the report was run. The report also showed a breakdown of screening activities by window, including the number of participants eligible to be screened, the number of completed screens, the number MDFs for screening exams, the number of positive screens and DE form completion status. Reports generated by the SC did not contain summary data related to positive screens or DE form completion as a result of the DSMB decision to limit SC access to data on positivity rates. Unlike the SCs, the CC was able to generate reports containing positivity data. The CC also was able to generate individual reports for each SC or a summary report containing information on all sites.

- Medical Abstraction Report (MAR, Appendix 11-23): This report was designed to assist the SC in managing and tracking the completion of medical record abstraction activities. The various querying options available in the MAR enabled the SC to view the status of all expected DE forms and CDFs based upon user selected criteria. This feature was especially useful in identifying PIDs for outstanding forms by number of months since the expectation was generated. Results of the report could be exported from and merged with the SC's in-house study management system.

Appendices for Chapter 11

Appendix 11-1 Missing Data Form (MDF)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

MISSING DATA FORM (MDF)

Date Form Completed: MONTH DAY.....YEAR

Screening Center ID: |___|___|

Screening Center Staff ID: |___|___|___|___|

Study Year: T |__|

Initials Complete: _____

Initials QC: _____

Participant ID Label

STUDY FORM	CHECK BOX	REASON CODE (IF CODE = 88, SPECIFY REASON)	REASON FOR CODE = 88
1. Medical History Questionnaire (MHQ)	|___|	|___|___|	
2. Annual Study Update (ASU) or ASU-Post Screening (ASU-PS)	|___|	|___|___|	
3. Chest X-ray Screening Examination Form (XRY)	|___|	|___|___|	
4. Spiral CT Screening Examination Form (SCT)	|___|	|___|___|	
5. Diagnostic Evaluation Form (DE)	|___|	|___|___|	
6. Treatment Information Form (TI)	|___|	|___|___|	
7. Cancer Diagnosis Form (CDF) ☐ ASU or ASU-PS ☐A ☐B ☐C ☐ CNF ☐A ☐B ☐C	|___|	|___|___| |___|___|	
8. Cancer Progression Form (CP)	|___|	|___|___|	
9. Health Assessment Questionnaire (HAQ)	|___|	|___|___|	
10. Participant Contact Form (PCF)	|___|	|___|___|	

Reason Codes

02 = Can't locate
03 = Deceased
05 = No response
06 = Out of area
07 = No show for scheduled appointments
08 = Transportation problems
09 = Concerned about privacy
10 = Physical illness/cognitive impairment
11 = Family responsibilities
12 = Work demands
13 = Concerned about medical cost responsibility
14 = Concerned about health effects of participation
15 = Active surveillance
16 = Participating in other research study
17 = Loss of interest in study
18 = Dissatisfied with study
19 = No reason given
20 = Reported lung cancer
21 = Participant refuses to release medical records
22 = Family refuses to release medical records
23 = Health care provider refuses to release medical records
24 = Health care provider does not respond to record requests
25 = Medical records lost
26 = No perceived benefit
88 = Other (SPECIFY)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Missing Data Form (MDF)

An SC staff member should complete a Missing Data Form (MDF) to document the absence of a study data collection form. This MDF will cancel expectations for the noted missing form(s) and any other related expectations. These missing data may be due to a variety of reasons such as participant refusal, inability to locate the participant, death of the participant, and inability to obtain medical records.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label to the space provided in the upper right portion of the form. Do not write the participant ID in this space.

Date Form Completed: Record the date the MDF was completed. Month and day should be zero filled, and the last two digits should be recorded for the year (e.g., 02/07/2002).

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID number.

Study Year: Record the study year for the missing data collection form.

Missing Data Section:

Study Form: Mark the box next to the data collection form(s) that is/are missing, i.e., the form(s) that will not be completed by or for the participant, and therefore will not be receipted at the CC.

Since a Cancer Diagnosis Form (CDF), which is completed when there is a report of cancer, is expected from an ASU, ASU-PS, or a CNF and each of those can report up to three cancers, an MDF needs to be completed listing both the form and the cancer type, by marking the box that corresponds to the reported cancer. If the MDF is being used to close multiple reports of cancer, the box corresponding to each reported cancer to be closed must be marked.

For Cancer Diagnosis Form (CDF):

- ASU or ASU-PS: Mark this box if the first documentation of the specified cancer was from the ASU or ASU-PS.

  A. Mark this box if the cancer for which the MDF is being completed was recorded under "A" on the ASU or ASU-PS.

  B. Mark this box if the cancer for which the MDF is being completed was recorded under "B" on the ASU or ASU-PS.

C. Mark this box if the cancer for which the MDF is being completed was recorded under "C" on the ASU or ASU-PS.

- CNF: Mark this box if the first documentation of the specified cancer was from the CNF.

  A. Mark this box if the cancer for which the MDF is being completed was recorded under "A" on the CNF.

  B. Mark this box if the cancer for which the MDF is being completed was recorded under "B" on the CNF.

  C. Mark this box if the cancer for which the MDF is being completed was recorded under "C" on the CNF.

Reason Code: For each missing form, complete this item to document the reason the data collection form is missing. Refer to the Reason Codes printed at the bottom of the MDF for the list of possible reasons the data collection form is missing. If more than one reason applies, the primary reason should be determined. Enter the code corresponding to the reason the data collection form is missing as follows:

02 = Can't locate: The SC is unable to locate the participant during the study period, despite tracing efforts.

03 = Deceased: The participant has died. This reason code will "turn off" the expectations for study activities that require participant contact (such as exams and forms).

05 = No response: The participant is contacted but does not respond to SC requests to complete data collection forms or schedule study visits.

06 = Out of area: The participant is contacted but is unwilling or unable to schedule study visits or screening examinations because s/he is out of the area.

07 = No show for scheduled appointments: The SC has scheduled study visits with the participant but s/he repeatedly fails to show up for the visits.

08 = Transportation problems: The participant refuses to schedule a study visit because s/he does not have transportation to/from the screening center.

09 = Concerned about privacy: The participant refuses to complete data collection forms or schedule study visits because s/he is concerned about privacy.

10 = Physical illness/cognitive impairment: The participant refuses to complete data collection forms or schedule study visits because s/he has a physical illness or cognitive impairment. This code may also be selected if the participant's family member or health care provider reports that s/he is unable to participate in study activities due to a physical illness or cognitive impairment.

11 = Family responsibilities: The participant refuses to complete data collection forms or schedule study visits because s/he has family responsibilities that preclude participation in the study activities.

12 = Work demands: The participant refuses to complete data collection forms or schedule study visits because s/he has work demands that preclude participation in the study activities.

13 = Concerned about medical cost responsibility: The participant refuses to schedule a screening examination because s/he is concerned about medical costs that may arise as a result of the exam (i.e., follow-up procedures).

14 = Concerned about health effects of participation: The participant refuses to schedule a screening examination because s/he is concerned about negative health effects of participation.

15 = Active surveillance: The participant refuses to schedule a screening examination because s/he is under active surveillance for a lung condition by a health care provider. This code may also apply if the participant has been advised not to receive the exam by his/her health care provider because s/he is under active surveillance.

16 = Participating in other research study: The participant refuses to complete study activities because s/he is currently participating in another research study.

17 = Loss of interest in study: The participant refuses to complete study activities because s/he has lost interest in the study.

18 = Dissatisfied with study: The participant refuses to complete study activities because s/he is dissatisfied with the study.

19 = No reason given: The participant refuses to complete study activities but does not give a specific reason for his/her refusal.

20 = Reported lung cancer: The participant is not eligible to receive a screening examination because s/he is reported to have lung cancer. The report of lung cancer must be documented on the Annual Study Update (ASU), ASU-PS, or a Cancer Notification Form (CNF).

21 = Participant refuses to release medical records: The medical records necessary for completion of the CDF, DE, TI, or CP form cannot be obtained because the participant refuses to have the records released.

22 = Family refuses to release medical records: The medical records necessary for completion of the CDF, DE, TI, or CP form cannot be obtained because the participant's family refuses to have the records released.

23 = Health care provider refuses to release medical records: The medical records necessary for completion of the CDF, DE, TI, or CP form cannot be obtained because the participant's health care provider refuses to release the records.

24 = Health care provider does not respond to record requests: The medical records necessary for completion of the CDF, DE, TI, or CP form cannot be obtained because the participant's health care provider does not respond to SC requests for the records.

25 = Medical records lost: The participant's medical records were obtained but the CDF, DE, TI, or CP form cannot be completed because the SC lost the records.

26 = No perceived benefit: The participant does not see the utility in returning for his/her NLST screening examination, or does not follow up with his/her health care provider (HCP) via phone or in person following a screening exam. Also, the code may be used in other instances when the participant states that s/he does not see a benefit in completing a study activity, for example, not completing the ASU or ASU-PS.

88 = Other (SPECIFY): Please SPECIFY the reason for the missing data in the space provided.

Reason for Code = 88: If Reason Code 88 = Other (SPECIFY) is marked, please specify the reason for the missing data in the designated column.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top of the first page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top of the first page. This should not be the same SC staff member who completed the form.
- Enter the form into
- File the form in the participant's study file.

Appendix 11-3 Non-Response Form (NRF)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

NON-RESPONSE FORM (NRF)

ADMINISTRATIVE SECTION

Date Form Completed: Month Day Year

Screening Center ID: |___|___|

Screening Center Staff ID: |___|___|___|___|

Study Year: T |__|

Date of Last Contact: Month Day Year

Participant ID Label

PARTICIPANT STATUS	CHECK ONLY ONE	COMMENTS
Lost Contact Can't locate – No active contact with participant	|___|	
Refusals Hard refusal – Refuses further participation in NLST; **OR** Absolute refusal – Participant withdraws consent	|___| |___|	
Medical Condition Physical illness or cognitive impairment	|___|	
Deceased Date of death |___|___|-|___|___|-|__|__|__|__| MO DAY YEAR	|___|	
Return to NLST	|___|	

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Non-Response Form

The SC Coordinator or Administrator should complete a Non-Response Form (NRF) to document the cessation of data collection from an inactive participant. The NRF should be utilized when a participant's inactive status is considered permanent. The NRF form also will allow for the reactivation of a participant should circumstances change.

Changes can be made to the Administrative Section and date of death field in the participant's most recent NRF in A change in the participant's status will require completing a new NRF from and entering it into Any previous NRF forms completed for that participant can be viewed in but not updated. If the participant status on the original NRF is determined to have been incorrect (i.e. participant was presumed deceased, but later discovered to be alive), the NRF with the incorrect status should be deleted. If necessary, a new NRF with the correct status (e.g. lost contact) should be entered.

Once the NRF is completed and entered into no further MDFs for any form will be necessary or expected for future study years; however, MDFs for all forms expected during the study year in which the NRF was completed are still required to be submitted into For example, Participant A has complete T_0 information and dies midway through T_1. An NRF is completed during the T_1 study year and forms are closed out for $T_2 - T_7$, however an MDF must still be completed for all outstanding T_1 forms.

The participant's inactive status may be due to a variety of reasons such as inability to locate the participant, participant refusal, an incapacitating medical condition, or death of the participant. Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label to the space provided in the upper right portion of the form. Do not write the participant ID in this space.

Date Form Completed: Record the date the NRF was completed. Month and day should be zero filled, and the last two digits should be recorded for the year (e.g., 02/07/2002).

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID number.

Study Year: Record the study year the participant is in when the Non-Response Form is completed. For example, if a participant dies during the T_2 study year; but the SC learns of the death during his/her T_4 study year, the study year for the NRF should be T_4.

Date of Last Contact: Record the date on which the SC last had any communication (verbal or written) with the participant, family member or known acquaintance of the participant. The definition of the "Date of Last Contact" is dependent on the reason for the

participant's status. Guidelines for recording the date of last contact are specified for each reason in the Participant Status Section below.

Month and day should be zero-filled and the last two digits should be recorded for the year (e.g., 02/07/2002).

Participant Status Section

Mark the box next to the reason for the participant's inactive status. Only one box may be checked for participant status, so if more than one reason applies, the primary reason should be documented. The code and the description of participant status will be displayed on the Participant Overview Report (POR) in

Lost Contact:

The purpose of this item is to document participant non-response because the participant has been lost to follow-up. This reason should only be entered as a last resort when there is no active contact with the participant, and the SC is unable to locate the participant during the study period, despite intensive tracing efforts over a reasonably long period of time. Tracing resources may include but are not limited to: the Department of Motor Vehicles, Social Security Administration, the National Death Index, and the US Postal Service. The SC should not complete this form if tracing efforts will continue or if the participant has simply relocated and may be willing to return to the SC for annual visits or to complete questionnaires by mail. Participant status on the POR is displayed as "Lost Contact." No further MDFs for any form will be necessary or expected for future study years; however, MDFs for all forms expected during the study year in which the NRF was completed are still required to be submitted into In the event of death, a Death Certificate should be collected. If the participant has signed a Medical Records Release Authorization Form that is likely to be honored by medical facilities, the SC should attempt to collect medical records in the instance of a lung cancer diagnosis or selection for EVP.

The "Date of Last Contact" is defined in this instance as the date the SC last had any verbal or written communication with the participant. This does *not* include any contact with the participant's family members or acquaintances. If the written contact was the receipt of a form at the SC, the date of last contact should be the date the participant completed the form, not the receipt date in

Refusals:

Hard refusal:
The purpose of this item is to document that the participant refuses further participation in NLST. The refusal may be for a variety of reasons which could include transportation problems, concern about privacy, family responsibilities, work demands, concern about medical cost that may arise as a result of the exam, concern about negative health effects of participation, active surveillance for a lung condition, participation in another research study, loss of interest in study, dissatisfaction with study, or no stated reason. No further MDFs for

any form will be necessary or expected for future study years; however, MDFs for all forms expected during the study year in which the NRF was completed are still required to be submitted into If the participant has signed a Medical Records Release Authorization Form that is likely to be honored by medical facilities, the SC may, but is not required to, attempt to collect medical records in the instance of a lung cancer diagnosis or selection for EVP. The SC should exercise caution in making the decision to collect medical records for hard refusals, especially in the instance of an irate participant. In the event of death, a Death Certificate is to be collected for hard refusals, however. If at all possible, the SC should inform all hard refusals that their data will remain in the study database unless a written request to exclude it is received.

The "Date of Last Contact" is defined in this instance as the date the SC last had any verbal or written communication with the participant regarding his/her withdrawal from the trial; or the date a relative/friend of the participant notified the SC (verbally or written) of the participant's withdrawal from the trial.

Absolute refusal:
The purpose of this item is to document that the participant withdraws consent to participate in the study or indicates that s/he no longer wants his/her name or records included as part of the study. The SC will need to obtain documentation of such a request in writing and the documentation should be forwarded to the CC for NCI approval prior to entering the NRF into Once the NRF is entered, no further MDFs for any form will be necessary or expected for future study years, however, MDFs for all forms expected during the study year in which the NRF was completed still require submission into In addition, all information regarding the participant is removed from NLST study files/tables after consultation with NCI. No additional data collection is to be attempted for absolute refusals, even if a signed Medical Record Release Authorization Form is available and likely to be honored by a medical facility. Furthermore, a Death Certificate should not be obtained in the case of death. The participant is unavailable for EVP.

The "Date of Last Contact" is defined in this instance as the date the SC last had any verbal or written communication with the participant regarding his/her withdrawal from the trial; or the date a relative/friend of the participant notified the SC (verbally or written) of the participant's withdrawal from the trial.

Medical Condition:

The purpose of this item is to document when the participant is unwilling or unable to complete data collection forms or schedule study visits because s/he has a physical illness or cognitive impairment. For example, this reason would be used in the situation where a participant diagnosed with lung cancer decides to no longer participate actively in the trial. This reason may also be selected if the participant's family member or health care provider reports that s/he is unable to participate in study activities due to a physical illness or cognitive impairment. No further MDFs for any form will be necessary or expected for future study years; however, MDFs for all forms expected during the study year in which the NRF was completed are still required to be submitted into The participant remains available for EVP, if necessary.

The "Date of Last Contact" is defined in this instance as the date the SC last had any verbal or written communication with the participant regarding his/her withdrawal from the trial; or the date a relative/friend of the participant notified the SC (verbally or written) of the participant's withdrawal from the trial.

Deceased:

The purpose of this item is to document when a participant is presumed or confirmed dead. No further MDFs for any form will be necessary or expected after the end of the study year in which the NRF was submitted, but MDFs for all forms expected during the study year in which the NRF was completed are still required to be submitted into and EVP will be instituted. The SC should not select this reason code if the death was reported through returned mail, unless the report has been confirmed through another source (such as a relative.)

Record the date of death in the spaces provided. Month and day should be zero filled, and the last two digits should be recorded for the year (e.g., 02/07/2002). If, upon receipt of the Death Certificate, it is determined that the date of death recorded on the NRF is not correct, the SC should write the correct date of death on the hard copy NRF and sign and initial the change. The date of death must also be updated in

The "Date of Last Contact" is defined in this instance as the date the SC last had any verbal or written communication with the participant regarding his/her withdrawal from the trial; or the date the SC last had any verbal or written communication with a relative/friend of the participant regarding the participant's status in the trial.

Return to NLST:

The purpose of this item is to document when the participant wishes to return to the trial after an NRF has been submitted for any of the above reasons, apart from death. The SC should complete a new NRF and check the box for "Return to NLST" under the Participant Status Section of the form. Expectations for all forms will be re-set for the study year in which the new NRF was receipted into and for all future study years. It may be necessary to complete an MDF for any form expected in the study year the new NRF was receipted. MDFs generated by for study years prior to the study year in which the new NRF is receipted will be retained in the database. The participant status will then be displayed as "Active" in the POR.

This code should not be used for participants who were presumed deceased but were later determined to be alive. In this situation, the NRF with the "deceased" status should be deleted. If necessary, a new NRF with the appropriate status should be entered.

Comments: Further comments, if necessary, can be recorded in this section.

After completing the form:

- The form should be reviewed to make sure it is accurate, legible, and complete.
- Enter the form into
- File the form in the participant's study file.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

RECORD OF EXPERIENCE, CREDENTIALS, AND TRAINING (ECT)
EXAMINER/INTERPRETER/QUALITY ASSURANCE EXAMINER/MEDICAL PHYSICIST/ MEDICAL RECORD ABSTRACTOR/NOSOLOGIST
REGISTRATION FORM

1. DATE FORM COMPLETED: |___|___|–|___|__|–|___|___|___|___|
   MONTH DAY YEAR

2. SCREENING CENTER ID: |___|___|

3. NAME OF STAFF MEMBER TO BE REGISTERED:_____
   Last First Middle Initial

4. **STAFF POSITION:** (Mark all that apply.)

XRY	**SCT**	**ABSTRACTOR**	**NOSOLOGIST**
☐ Examiner	☐ Examiner	☐ Medical Record Abstractor	☐ ICD-9-CM Coder
☐ Interpreter	☐ Interpreter		☐ ICD-O-3 Coder
☐ QA Examiner	☐ QA Examiner		☐ TNM Staging Coder
☐ Medical Physicist	☐ Medical Physicist		

5. DATE NLST/LSS TRAINING COMPLETED: |___|___|–|___|___|–|__|__|___|___|
   MONTH DAY YEAR

6. SCREENING CENTER STAFF ID OF THE PERSON COMPLETING FORM: |___|___|___|___|

Appendix 11-5 Record of Experience, Credentials, and Training (ECT)

7. **EXPERIENCE:** (Mark the experience that applies. For abstractors and nosologists, provide a specific number for what is asked.)

XRY: Technologist (Examiner)

☐ Meets current ACR guidelines

Radiologist (Interpreter/QA Examiner)

☐ Meets current ACR guidelines

Medical Physicist

☐ Meets current ACR guidelines

SCT: Technologist (Examiner)

☐ Meets current ACR guidelines

Radiologist (Interpreter/QA Examiner)

☐ Meets current ACR guidelines

Medical Physicist

☐ Meets current ACR guidelines

ABSTRACTOR: Medical Record Abstractor

_____ Number of years of on-the-job experience abstracting medical records (Minimum of two years on-the-job experience. Attach documentation such as resume or letter of reference.)

NOSOLOGIST: ICD-9-CM coding/ICD-O-3 coding and TNM Staging

_____ Number of years of on-the-job experience performing coding (Attach documentation such as resume or letter of reference.)

8. **CREDENTIALS**: (Mark the credentials that apply. Attach a photocopy of the documentation requested.)

XRY: Technologist (Examiner)

☐ Meets current ACR guidelines
☐ Other: _____ (Attach copy of qualifying documentation.)

Radiologist (Interpreter, QA Examiner)

☐ Meets current ACR guidelines
☐ Is licensed to practice in _____ (state) with license # _____
☐ Other: _____ (Attach copy of qualifying documentation.)

Medical Physicist

☐ Meets current ACR guidelines
☐ Other: _____ (Attach copy of qualifying documentation.)

SCT: Technologist (Examiner)

☐ Meets current ACR guidelines
☐ Other: _____ (Attach copy of qualifying documentation.)

Radiologist (Interpreter, QA Examiner)

☐ Meets current ACR guidelines
☐ Is licensed to practice in _____ (state) with license # _____
☐ Other: _____ (Attach copy of qualifying documentation.)

Medical Physicist

☐ Meets current ACR guidelines
☐ Other: _____ (Attach copy of qualifying documentation.)

ABSTRACTOR: Medical Record Abstractor

☐ Knowledge of medical record terminology, anatomy, physiology, and concepts of disease
☐ Basic medical coding education (Attach qualifying documentation.)

NOSOLOGIST: All Coders

☐ Knowledge of medical record terminology, anatomy, physiology, and concepts of disease
☐ Basic medical coding education (Attach qualifying documentation.)

ICD-9-CM Coder

☐ Certified Coding Specialist, CCS (Attach copy of certification.)
☐ Registered Health Information Technician, RHIT (Attach copy of certification.)
☐ Registered Health Information Administrator, RHIA (Attach copy of certification.)
☐ Other: _____ (Attach copy of qualifying documentation.)

ICD-O-3 and TNM Staging Coder

☐ Certified Tumor Registrar, CTR (Attach copy of certification.)
☐ Tumor Registrar, CTR-eligible.
☐ Other: _____ (Attach copy of qualifying documentation.)

9. **TRAINING:** (Complete for all that apply. Required training on protocols and forms must be documented for each Examiner, Interpreter, QA Examiner, and Medical Physicist (protocol only) position marked in Item 4

XRY:
- ☐ Protocol for Chest x-ray Exam
- ☐ XRY Form

SCT:
- ☐ Protocol for Spiral CT Exam
- ☐ SCT Form

ABSTRACTOR AND NOSOLOGIST:
- ☐ DE Form
- ☐ CDF
- ☐ TI Form
- ☐ CP Form

10. **REGISTRATION:** (To be completed by the NCI reviewer.)

This individual is qualified to perform as a National Lung Screening Trial: (Mark all that apply.)

XRY	SCT	ABSTRACTOR	NOSOLOGIST
☐ Examiner	☐ Examiner	☐ Medical Record Abstractor	☐ ICD-9-CM Coder
☐ Interpreter	☐ Interpreter		☐ ICD-O-3 Coder
☐ QA Examiner	☐ QA Examiner		☐ TNM Staging Coder
☐ Medical Physicist	☐ Medical Physicist		

Signature of NCI reviewer: _____

Date: _____

Comments:

_____

_____

_____

_____

STAFF ID# ASSIGNMENT: (To be completed by the Screening Center **following NCI approval**.)

Staff ID#: |___|___|___|___|

Date:_____

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Record of Experience, Credentials, and Training (ECT)

Examiner/Interpreter/Quality Assurance Examiner/Medical Physicist/ Medical Record Abstractor/Nosologist

Registration Form

This form is to be completed for all SC staff who are to perform or interpret screening examinations, serve as a medical physicist, or perform medical records abstraction or coding for the NLST/LSS. One form should be completed for each staff member, including those who are currently registered as staff members for PLCO. When the form is completed and approved by the NCI reviewer, it will be sent back to the SC for assignment of a staff ID number. No staff member may work on the NLST/LSS without a staff ID number. The form will be completed one time per staff member; however, annual updates to the information provided will be requested by the CC.

Items 1-9 are to be completed by SC staff. Specifications for completion of these items are given below.

1. **Date Form Completed:** Record the date the ECT was completed. Month and day should be zero filled, and the last two digits should be recorded for the year (e.g., 12/07/2000).

2. **Screening Center ID:** Enter the two-digit SC ID number.

3. **Name of Staff Member to be Registered:** Enter the full name (last, first, middle initial) of the staff member to be registered.

4. **Staff Position:** Place a mark in the box next to each position that this new staff member will assume. Mark all positions that apply.

5. **Date NLST/LSS Training Completed:** Record the date the staff member completed the NLST/LSS training required for their position.

6. **Screening Center Staff ID of Person Completing Form:** Enter the four-digit SC staff ID number of the person completing the form.

7. **Experience:** For each XRY or SCT position marked in Item 4, mark whether the new staff member meets current ACR guidelines. For abstractors, record the total years of on-the-job experience abstracting medical records (a minimum of two years) and attach documentation to substantiate experience (such as a resume or letter of reference). For nosologists, record the number of years of on-the-job coding experience, and attach documentation to substantiate experience (such as a resume or letter of reference).

8. Credentials: For each position marked in Item 4, place a mark next to the credential that qualifies the staff member for this position. Attach a photocopy of the qualifying documentation requested (such as certification, etc.). Please note that in the "NOSOLOGIST" section, the "All Coders" section must be filled out for ICD-9-CM coders and ICD-O-3 and TNM staging coders. In addition to the "All Coders" section, the "ICD-9-CM Coder" and "ICD-O-3 and TNM staging Coder" sections should be completed based on the staff person's coding position (ICD-9-CM and/or ICD-O-3 and TNM staging).

For each position, the minimum qualifications, as given in the current screening examination protocols, include:

Function	Position	Minimum Qualifications
XRY Exam	Technician	- Meets current ACR guidelines
	Interpreter/QA Examiner	- Meets current ACR guidelines - Licensed to practice in ___ (state) with license # _____ (for radiologist only)
	Medical Physicist	- Meets current ACR guidelines
SCT Exam	Technician	- Meets current ACR guidelines
	Interpreter/QA Examiner	- Meets current ACR guidelines - Licensed to practice in ___ (state) with license # _____ (for radiologist only)
	Medical Physicist	- Meets current ACR guidelines
Medical Records Abstraction	Abstractor	- Knowledge of medical record terminology, anatomy, physiology, and concepts of disease - Basic medical coding education - A minimum of two years on-the-job experience abstracting medical records
	Nosologist (All Coders)	- Knowledge of medical record terminology, anatomy, physiology, and concepts of disease - Basic medical coding education
	Nosologist (ICD-9-CM Coder only)	- One or more of the following credentials: Certified Coding Specialist (CCS) Registered Health Information Technician (RHIT) Registered Health Information Administrator (RHIA)
	Nosologist (ICD-O-3 Coder only) and TNM Staging Coder	- Certified Tumor Registrar (CTR or CTR-eligible)

If the staff member does not possess any of the credentials listed, but possesses some other credential that the SC feels qualifies him/her for this position, mark the box next to "Other" and record the type of credential being submitted. Attach a photocopy of the documentation of this credential.

9. Training: For each position marked in Item 4, place a mark next to each training activity completed by the staff member. All Examiners, Interpreters, QA Examiners, Medical Record Abstractors and Nosologists must undergo training on the appropriate examination protocol and

form completion. All Medical Physicists must undergo training on the appropriate examination protocol only.

Item 10 is to be completed by the NCI reviewer. Specifications for completion of this item are given below.

10. Registration: For each position marked in Item 4, review the experience (Item 7), credentials (Item 8), and training (Item 9) to determine whether or not the staff member is qualified to perform in that position for the NLST/LSS. If so, place a mark in the box for the appropriate position.

Sign the form and record the date of signature. In the Comments Section, record any additional comments regarding this staff member.

The following item is to be completed by the SC <u>following NCI approval</u>. Specifications for completion of this item are given below.

Staff ID# Assignment: Record the staff ID number and the date it was assigned in the space provided. If the staff member is a registered staff member for PLCO, the SC Coordinator should assign him/her the same staff ID number used for PLCO. Notify the Credentials Coordinator at the CC what staff ID number has been assigned.

<u>After completing the form:</u>

- The form should be checked to make sure it is accurate, legible, and complete.
- The original ECT form for all newly registered staff should be sent to the Credentials Coordinator at the CC when completed.
- A copy of the ECT should be kept on file at the SC.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

SC EDIT FORM

Date Completed: |___|___|-|___|___|-|__|__|___|___|
Month Day Year

Screening Center ID: |___|__|

Screening Center Staff ID: |___|___|___|___|

Initials Complete: _____

Initials QC: _____

Participant ID Label

INSTRUCTIONS: Complete PID, Form Type, Item Number, and correct data for each item to be updated.

Form Type	Item Number	Description of Change [SPECIFY CORRECT DATA]

SC staff member who completed the form _____

SC staff member telephone number _____

Send the original or e-mail version of the form to the CC. Retain a copy for participant files.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the SC Edit Form

This form is to be completed by an SC staff member to document changes to data after a data collection form has been sent to the CC.

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label to the space provided in the upper right corner of the form. **Do NOT** write the participant ID in this space. If the SC Edit Form is e-mailed, type in the PID.

Date Completed: Record the date the SC Edit Form was completed. Month and day should be zero-filled, and the last two digits of the year should be recorded (02/07/2002).

Screening Center ID: Record the two-digit SC ID number.

Screening Center Staff ID: Record the four-digit SC staff ID number of the person completing the form.

Data Update Section:

One SC Edit Form should be completed for each participant. For each form that has a data correction(s), complete the form type, the item number requiring the change, and the correct data. Multiple changes to one form can be listed. However, once the form has been submitted to the CC, subsequent edits should be noted on another SC Edit Form.

As an example of completing the SC Edit Form, suppose there is a change to the description of the second abnormality on the Spiral CT Screening Examination Form. It might be recorded as follows:

Form Type	Item Number	Description of Change [SPECIFY CORRECT DATA]
SCT	C.2.2.2	Code = 3

Note that Item C.2 on the SCT form is a grid. When dealing with grids, the row number should be given before the column number. In this example, the data to be changed is in Item C.2, row 2 (Abnormality), column 2 (Location of Epicenter).

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.
- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the page.
- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the page. This should not be the same SC staff member who completed the form.
- Send the completed form to the CC via FedEx shipment, or an e-mail attachment,
- File a copy of the form in the participant's study file.

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

PROTOCOL AND HIPAA VIOLATION FORM (PHVF)

Date Form Completed: |___|___|-|___|___|-|___|___|___|___|
Month Day Year

Screening Center ID: |___|___|

Screening Center Staff ID: |___|___|___|___|

Study Year: T |___|

Initials Complete: _____

Initials QC: _____

Participant ID Label

INSTRUCTIONS: Please mark the type of protocol or HIPAA violation below. Depending on the type of violation, please provide the information requested on all pages. Attach additional sheets as necessary.

***PLEASE COMPLETE A SEPARATE FORM FOR EACH PARTICIPANT AND FOR EACH INSTANCE OF A PROTOCOL OR HIPAA VIOLATION.**

1. MARK THE TYPE OF PROTOCOL OR HIPAA VIOLATION BEING REPORTED

- ☐ Ineligible participant randomized
- ☐ Participant randomized more than once **(Original PID #|__|__|-|__|__|__|__|__|-|__|)**
- ☐ Participant completed study activity before signing consent form
- ☐ Screened eligible participant with a reported or confirmed lung cancer
- ☐ Chest x-ray screen administered to spiral CT arm participant
- ☐ Spiral CT screen administered to chest x-ray arm participant
- ☐ Erroneous results reported to participant or health care provider
- ☐ Duplicate screen administered
- ☐ Incorrect technical parameters used for screening examination
- ☐ Original hard copy or digital screening exam image can no longer be accessed and no backup exists
- ☐ Protected Health Information (PHI) revealed
- ☐ Other, Specify (In the space below, include any error not listed above.)

_____

_____

2a. Date Violation Discovered: |___|___|-|___|___|-|___|___|___|___|
Month Day Year

2b. Date Violation Occurred: |___|___|-|___|___|-|___|___|___|___|
Month Day Year

THIS SECTION IS TO BE COMPLETED ONLY FOR PROTOCOL VIOLATION "INELIGIBLE PARTICIPANT RANDOMIZED"

3a. Reason for Ineligibility: (Mark all that apply.)

- ☐ 01 = Unwilling/Unable to provide consent
- ☐ 02 = Spiral CT screen in past 18 months
- ☐ 03 = Other Specify **(MARK ALL THAT APPLY)**
- ☐ 31 = Age < 55 yrs or > 74 years
- ☐ 32 = Non-smoker or quit smoking more than 15 yrs ago
- ☐ 33 = Less than 30 pack-years smoking history
- ☐ 34 = Participant in PLCO or other cancer screening study
- ☐ 35 = Participant in cancer prevention study other than smoking cessation
- ☐ 36 = Diagnosed with confirmed lung cancer **(Complete 3b)**
- ☐ 37 = Evidence of cancer, or in treatment for cancer other than non-melanoma skin cancer or carcinoma in situ (except transitional cell CIS, or bladder CIS) within the past five years
- ☐ 38 = Had a lung, or any portion of a lung surgically removed
- ☐ 40 = Unable to lie on back with arms raised over head
- ☐ 41 = Metallic implants in chest or back
- ☐ 42 = Home oxygen supplementation requirement
- ☐ 43 = Weight loss greater than 15 pounds in past 12 months or recent hemoptysis
- ☐ 44 = Pneumonia or respiratory infection requiring antibiotics in past 12 weeks

3b.* Date of Lung Cancer Diagnosis: |__|__|-|__|__|-|__|__|__|__| ☐ Estimated day
MO DAY YEAR

*only complete if 36 is coded in 3a.

4. Description of Protocol or HIPAA Violation:

Describe the violation by including the following elements: How was the violation discovered? How did the violation occur? What are the ramifications for the participant? What was done to clean up after this violation (include contacts with participants, systems changes, forms completed, etc.)? What steps have been taken to prevent future occurrences of this type of violation?

4. Description of Violation (continued):

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Protocol and HIPAA Violation Form (PHVF)

This form is to be completed by an SC staff member to document any violation of the requirements of the protocol for study enrollment or screening. This form is also used to document any violation of the Health Insurance Portability and Accountability Act (HIPAA).

Specifications for completing each item of the form are given below:

Administrative Section:

Participant ID Label: Affix a PID label in the box provided. DO NOT write the participant ID in this space.

Date Form Completed: Record the date the PHVF was completed. Month and day should be zero-filled, and the last two digits of the year should be recorded (e.g., 02/07/2002).

Screening Center ID: Enter the two-digit SC ID number.

Screening Center Staff ID: Enter the four-digit staff ID number of the person completing the form.

Study Year: Record the study year the participant was in when the violation was discovered.

Please do not include the participant's name or any identifying information. Use the PID to identify the participant. Please complete a separate form for each participant and for each instance of a violation.

Protocol or HIPAA Violation Information:

1. **Type of Violation:** Put a mark in the box to the left of the type of violation being reported.

- **Ineligible participant randomized:** Mark this box when it is discovered that an erroneous randomization occurred, that is, randomization of an individual who did not meet eligibility criteria at the time of randomization. **Do not use this code to report a duplicate randomization.**

- **Participant randomized more than once:** Mark this box when it is discovered that a participant was randomized more than once, regardless of whether the second randomization was to the same study arm or the opposite study arm. **Write the original PID number in the space provided. Place the new PID label in the space provided on the form.**

- **Participant completed study activity before signing consent form:** Mark this box when it is discovered that a participant completed any study activity before signing a consent form.

- **Screened eligible participant with a reported or confirmed lung cancer:** Mark this box when it is discovered that an eligible participant with a reported or confirmed lung cancer was inadvertently given a screening examination.

- **Chest x-ray screen administered to spiral CT arm participant:** This box is marked when a participant randomized to the spiral CT arm is screened with a chest x-ray instead of a spiral CT scan. A copy of the erroneous XRY Form and a completed MDF for the SCT should accompany the PHVF.

- **Spiral CT screen administered to chest x-ray arm participant:** This box is marked when a participant randomized to the chest x-ray arm is screened with a spiral CT scan instead of a chest x-ray. A copy of the erroneous SCT Form and a completed MDF for the XRY should accompany the PHVF.

- **Erroneous results reported to participant or health care provider**: Mark this box when it is discovered that the results letter sent to the participant or the participant's health care provider incorrectly reported the results of the screening examination.

- **Duplicate screen administered:** Mark this box when it is discovered that a participant was screened more than once during a study year.

- **Incorrect technical parameters used for screening examination:** Mark this box when it is discovered that one or more technical parameters used for the screening examination were outside the range specified in the protocol.

- **Original hard copy or digital screening exam image can no longer be accessed and no backup exists:** Mark this box when the original hard copy or digital screening examination image can no longer be accessed (due to loss, corruption, or irreversible modification such that the image can no longer be read according to study protocol) and no backup copy exists. For example, this box should be marked if the original spiral CT image was replaced with an image that utilized a filter that was not allowed by the protocol and no backup copy of the original image (with an allowable filter) exists.

- **Protected Health Information (PHI) revealed:** Mark this box when it is discovered that a participant's PHI has been released in a manner that is inconsistent with confidentiality assurances in the study consent forms.

- **Other, Specify:** Mark this box if there is a violation of the study protocol other than those listed above and indicate the nature of the violation in the space provided. If the comparison read was not performed at the T_1 or T_2 visit, mark this box and record the reason the comparison was not performed (e.g. T_0 image lost). Note that if the T_0 and/or T_1 images are available, the comparison read must be performed and a PHVF should not be completed.

2a. Date Violation Discovered: Record the date that the SC staff discovered the violation. For ineligible participant randomized, record the date that the ineligibility was discovered. Month and day should be zero-filled, and the last two digits of the year should be recorded (e.g., 02/07/2002).

2b. Date Violation Occurred: Record the date that the violation actually occurred. For ineligible participant randomized, record the date that the participant was randomized. Month and day should be zero-filled, and the last two digits of the year should be recorded (e.g., 02/07/2002).

Information Regarding Protocol Violation for a Randomized Ineligible Participant:

3a. Reason for Ineligibility: The reason for ineligibility is the criterion or criteria that should have made the participant ineligible at the time of randomization. Mark either box 01, 02, or 03 corresponding to the appropriate exclusion criterion. If box 03 "Other Specify" is marked, mark the subcategory under "Other Specify" that corresponds to the participant's situation. If the participant met more than one of the exclusion criteria, mark all that apply.

3b. Date of Lung Cancer Diagnosis: If Code 36 has been marked in 3a. complete 3b. Record the month, day, and year the cancer was diagnosed. If you have only the month and year, record "15" as an estimated day and mark the "Estimated Day" box. If you have only the year, record the year, and list "99" for month and day.

4. Description of Violation: Provide a detailed description of the violation and the resolution. The description should include the following elements:

- How the violation was discovered;
- How the violation occurred;
- Ramifications for the participant;
- What was done to "clean-up" after the violation (include contacts with participants, systems changes, forms completed, etc.), and
- The steps that have been taken to prevent future occurrences of this type of violation.

One of the purposes of the PHVF is to differentiate between types of "randomized ineligibles." If the violation being described is a randomized ineligible, the description should also include details that specify the type of randomized ineligible, as described below:

1. Participant was randomized in error (i.e., the participant provided information to the SC indicating his/her ineligibility, but the SC failed to exclude him/her from the trial);

2. Participant was randomized appropriately based on information provided at the time of randomization, but it was discovered after randomization that the information provided had been incorrect.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.

- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the first page.

- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the first page. This should not be the same SC staff member who completed the form.

- Enter the form into
- Copy the form.
- Send the original form to the CC.
- File a copy of the form in the participant's study file.

Report of Adverse Events for NIH-Sponsored Clinical Trials (RAE)

Date of Associated Screening Exam: |___|___|-|___|___|-|___|___|___|___|
Month Day Year

Date of Adverse Event: |___|___|-|___|___|-|___|___|___|___|
Month Day Year

Screening Center ID: |___|___|

Screening Center Staff ID: |__|__|__|__|

Study Year: T |___|

Visit Number: |___|

Initials Complete: _____

Initials QC:

Participant ID Label

1. Category of event (Mark all that apply):

☐ Death
☐ Life threatening event
☐ In-patient hospitalization
☐ Persistent or significant disability/incapacity
☐ Medical or surgical intervention to prevent one of the above outcomes
☐ Other, Specify _____

2. Description of participant who experienced the adverse event, such as gender, age, etc. (no identifiers please):

_____
_____
_____
_____
_____

3. Brief description of the event:_____
_____
_____
_____
_____

4. Description of the outcome of the event:_____
_____
_____
_____
_____
_____

☐ **(continued)**

5. Using your best judgement, do you believe that the adverse event was study related?

   ☐ Yes, study related
   ☐ Possibly study related
   ☐ Not study related
   ☐ Unknown

6. Do you feel revision to the consent form is necessary?

   ☐ Yes, revision of the consent form is necessary
   ☐ Revision of the consent form may be necessary
   ☐ No revision of the consent form is necessary
   ☐ Unknown

Investigator's Signature and Date: _____

Investigator's Printed Last Name and Initial: _____

(Please attach copies of any relevant examination forms or other documentation regarding the event.)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Report of Adverse Events for NIH-Sponsored Clinical Trials (RAE)

The Report of Adverse Events for NIH-Sponsored Clinical Trials (RAE) is to be completed for all adverse events, regardless of their nature or severity that may occur as a result of screening procedures performed as part of the NLST/LSS. The following should be documented as adverse events:

- Death
- Life threatening event
- In-patient hospitalization
- Persistent or significant disability/incapacity
- Medical or surgical intervention to prevent one of the above outcomes
- Other, Specify

Complications that would not be included in the RAE would include, for example, problems that resulted from diagnostic evaluations for a positive screening exam such as a pneumothorax after a bronchoscopy. Complications such as this would be recorded in the medical complications section of the Diagnostic Evaluation forms and not on an RAE.

The RAE should be kept in the participant's study file and appropriate follow-up with the participant and his/her health care provider should be conducted until the problem is resolved. When the problem is resolved, the RAE should be entered into and filed in the participant's study file.

The specifications for completing each question are listed below:

Administrative Section:

Participant ID Label: Place the PID label in the designated space. DO NOT write the participant ID in this space.

Date of Associated Screening Exam: Record the date the RAE was completed. Enter the date in MM/DD/YYYY format. This should be the date that the participant received the screening examination that is considered the cause of the event. Month and day should be zero filled, and the last two digits of the year should be recorded (e.g., 02/07/2002).

Date of Adverse Event: Record the date the adverse event occurred. Enter the date in MM/DD/YYYY format. Month and day should be zero filled, and the last two digits of the year should be recorded (e.g., 02/07/2002)

Screening Center ID: Enter the two-digit SC ID number.

Screening Center Staff ID: Enter the four-digit SC staff ID number of the person completing the form.

Study Year: Record the study year the participant was in when the screening exam causing the adverse event was performed.

Visit Number: Record the visit number of the screening exam for which the form is being completed.

Event Description Section:

1. **Category of event:** Mark all categories that describe the event.

   - Death: This category should be used if the participant died.

   - Life threatening event: This category should be used if the participant experiences events such as cardiac/respiratory arrest, cardiac arrhythmia, significant blood loss, etc.

   - In-patient hospitalization: This category should be used if the event required the participant to be hospitalized. This would include visits to the emergency room during which the participant was admitted to the hospital.

   - Persistent or significant disability/incapacity: This category includes events that caused the participant a significant reduction in daily functioning and activities. This would include any paralysis or loss of organ function.

   - Medical or surgical intervention to prevent one of the above outcomes: This category should be used if the participant required a major medical or surgical intervention as a result of the event. This would include surgery performed or medication given to repair internal injury or organ damage.

   - Other, Specify: This category should be used if the participant did not experience a catastrophic or life threatening event, an event which required in-patient hospitalization, an event that caused the participant significant disability or incapacity, or an event which required major medical or surgical intervention as described in the above categories. Specify the type of event in the space provided. This category should be used if the participant required no or minimal medical intervention. Further details can be outlined in the sections "Description of the event" and "Outcome of the event."

2. **Description of participant who experienced the adverse event:** Include items such as gender, age, and race. It is also important to note any other characteristics of the participant that may have played a role in the event, such as comorbidities or medications. Note: please be sure that this description does not contain any participant identifiers such as name and address.

3. **Brief description of the event**: This item should give a description of the participant's experiences that may have led to the adverse event. Report symptoms, the timing of the onset of these symptoms, and the manner in which the SC became aware of the event.

4. **Description of the outcome of the event**: This should be a description of any medical interventions that the participant received and their outcome. Any persistent or significant disability/incapacity (as described above) should be described here as well.

5. **Using your best judgment, do you believe that the adverse event was study related?** The PI should decide whether or not the event reported by the participant was related to their involvement in the NLST/LSS. The four responses are:

    - Yes, study related: This should be used if the PI feels certain that the event occurred as a result of the participant's screening exam.

    - Possibly study related: This should be used if the PI is not certain that the event occurred as a result of the participant's involvement but it is likely.

    - Not study related: This should be used if the PI feels certain that the event did not occur as a result of the participant's screening exam.

    - Unknown: If the PI is unsure if the event was related to the screening examination, this response should be used.

6. **Do you feel revision to the consent form is necessary?** The PI should indicate whether s/he believes that the event warrants revision of the consent form to mention it as a possible danger. The four responses are:

    - Yes, revision of the consent form is necessary: This should be used if the PI feels certain that all participants should be made aware of the potential danger.

    - Revision of the consent form may be necessary: This means that the PI is not certain that all participants should be made aware of the potential danger but it may be necessary.

    - No revision of the consent form is necessary: This should be used if the PI feels certain that the event does not warrant announcement in the consent form.

    - Unknown: If the PI is unsure whether the event warrants announcement in the consent form.

After these questions are completed, the PI is required to sign and date the form as well as print his/her last name and first initial below the signature. The SC may attach any relevant examination forms or other documentation regarding the event. If any other documentation is attached, the SC should be sure that no personal identifying information is present.

After completing the form:

- The form should be checked to make sure it is accurate, legible, and complete.

- The SC staff member who completed the form should write his/her initials in the space labeled "Initials Complete" in the box at the top right corner of the first page.

- The SC staff member who checked the form for completion should write his/her initials in the space labeled "Initials QC" in the box at the top right corner of the first page. This should not be the same SC staff member who completed the form.

- Enter the form into

- Copy the form
- Send the original form to the CC.
- File a copy of the form in the participant's study file.

Appendix 11-13 Sample Call Record

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Participant Name: _____

Address: _____

_____

PID

Telephone Number: (H) |__|__|__|-|__|__|__|-|__|__|__|__|

(W) |__|__|__|-|__|__|__|-|__|__|__|__|

(Other) |__|__|__|-|__|__|__|-|__|__|__|__|

Date of First Mailing: |___|___|-|___|___|-|___|___|

Date of Last Contact: |___|___|-|___|___|-|___|___|

Gender: (M/F) |___|

Day:_____ Date: |__|__|-|__|__|-|__|__|__|__| Time of Call: ____:____ am ____:____ pm Initials: |___|___|___|	Outcome of Call: ☐ No Answer ☐ Busy ☐ Call Back ☐ Left Message ☐ Form Complete ☐ Refusal	Reason for Refusal: ☐ Too Busy ☐ Not Interested ☐ Other (Specify): _____ _____ _____ _____	Level of Refusal: ☐ Mild ☐ Firm ☐ Hostile	Comments: _____ _____ _____ _____ _____ _____ _____
Day:_____ Date: |__|__|-|__|__|-|__|__|__|__| Time of Call: ____:____ am ____:____ pm Initials: |___|___|___|	Outcome of Call: ☐ No Answer ☐ Busy ☐ Call Back ☐ Left Message ☐ Form Complete ☐ Refusal	Reason for Refusal: ☐ Too Busy ☐ Not Interested ☐ Other (Specify): _____ _____ _____ _____	Level of Refusal: ☐ Mild ☐ Firm ☐ Hostile	Comments: _____ _____ _____ _____ _____ _____ _____

Appendix 11-13 Sample Call Record

Day:____________________ Date: |__|__|-|__|__|-|__|__|__|__| Time of Call: ____:____ am ____:____ pm Initials: |___|___|___|	Outcome of Call: ☐ No Answer ☐ Busy ☐ Call Back ☐ Left Message ☐ Form Complete ☐ Refusal	Reason for Refusal: ☐ Too Busy ☐ Not Interested ☐ Other (Specify): __________ __________ __________ __________	Level of Refusal: ☐ Mild ☐ Firm ☐ Hostile	Comments: ____________________ ____________________ ____________________ ____________________ ____________________ ____________________ ____________________
Day:____________________ Date: |__|__|-|__|__|-|__|__|__|__| Time of Call: ____:____ am ____:____ pm Initials: |___|___|___|	Outcome of Call: ☐ No Answer ☐ Busy ☐ Call Back ☐ Left Message ☐ Form Complete ☐ Refusal	Reason for Refusal: ☐ Too Busy ☐ Not Interested ☐ Other (Specify): __________ __________ __________ __________	Level of Refusal: ☐ Mild ☐ Firm ☐ Hostile	Comments: ____________________ ____________________ ____________________ ____________________ ____________________ ____________________ ____________________
Day:____________________ Date: |__|__|-|__|__|-|__|__|__|__| Time of Call: ____:____ am ____:____ pm Initials: |___|___|___|	Outcome of Call: ☐ No Answer ☐ Busy ☐ Call Back ☐ Left Message ☐ Form Complete ☐ Refusal	Reason for Refusal: ☐ Too Busy ☐ Not Interested ☐ Other (Specify): __________ __________ __________ __________	Level of Refusal: ☐ Mild ☐ Firm ☐ Hostile	Comments: ____________________ ____________________ ____________________ ____________________ ____________________ ____________________ ____________________
Day:____________________ Date: |__|__|-|__|__|-|__|__|__|__| Time of Call: ____:____ am ____:____ pm Initials: |___|___|___|	Outcome of Call: ☐ No Answer ☐ Busy ☐ Call Back ☐ Left Message ☐ Form Complete ☐ Refusal	Reason for Refusal: ☐ Too Busy ☐ Not Interested ☐ Other (Specify): __________ __________ __________ __________	Level of Refusal: ☐ Mild ☐ Firm ☐ Hostile	Comments: ____________________ ____________________ ____________________ ____________________ ____________________ ____________________ ____________________

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Transmittal Log

Study:	
Center ID:	
Shipment Date:	
Total No. of Forms:	
Form:	
Sr No.	PID Selected

NLST/LSS Guidelines for SC Data Security

- Do not store files directly on the workstation's hard drive. Instead, the server should be used for storing and retrieving all electronic files. The server provides a more secure environment for electronic files and scheduled daily back-ups provide additional protection against data loss. The Coordinating Center (CC) System Administrator will perform initial workstation audits and will move files from the workstations to the server as needed. The CC System Administrator will continue to perform random workstation audits to ensure proper storage of electronic files.
- Store backup tapes in a secure location. At least one copy is to be maintained in an off-site location for added protection against data loss due to unforeseen circumstances such as fire or water damage.
- Store all images in a secure location. For electronic images, the file storage system must be protected from outside access (e.g. password control or locked system).
- Participant level NLST data containing personal identifiers should not be stored on a laptop that leaves the SC offices.
- Any NLST data that have been stored on non-NLST workstations to facilitate SC operations should be removed or encrypted on an ongoing basis.
- All study materials containing personal identifiers such as name, address, or Social Security number should be kept in a secure area and shredded when no longer needed.
- Avoid copying NLST data to any removable media (CDs, floppy disks, USB flash drives, etc). If there is a legitimate need to store NLST data on removable media, the data must be encrypted using a zip utility.
- Do not connect any unauthorized devices to the NLST network, including laptops. There should be no need to attempt to attach to the NLST network in this manner.
- Do not leave workstations unattended while logged in to The CC will provide additional security by installing a "time-out" feature to all workstations. Once installed, the workstation will "lock" after ten minutes of inactivity and can only be "unlocked" by entering a valid username and password. It is also recommended that workstations be shut down at the end of each work day.
- Do not leave computers unattended while logged in to the NLST or system Web sites.
- Strive to keep the NLST SC study area secure and free from unauthorized personnel. Access to NLST information systems including the workstations, and systems should be limited to necessary NLST SC staff. The SC should immediately notify the CC Coordinator of any staffing change so user accounts can be deactivated as needed.
- Use a zip utility to encrypt and password protect all NLST data that are sent via e-mail. The CC System Administrator will also zip data files sent via e-mail and will transmit NLST data to SCs by uploading to NLST servers rather than by e-mail.

July 7, 2008

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

CC EDIT FORM

THE SC WILL RECEIVE THIS FORM WITH SHADED ITEMS FILLED IN BY THE CC. THE SC MUST FILL IN THE RESOLUTION COLUMN AND THE DATE. RETURN THE ORIGINAL TO CC AND KEEP A COPY FOR SC FILES.

Initials Complete: _____

Initials QC:

Report Date: |___|___|/|___|___|/|_2_|_0_|___|___| Page _____ of _____ To: Screening Center ID: |___|___|

Participant ID	Form	Item No.	Description of Error	RESOLUTION

Date returned to CC: |___|___|-|___|___|-|_2_|_0_|___|___|
MO DAY YEAR

Questions? Please contact _____at _____

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

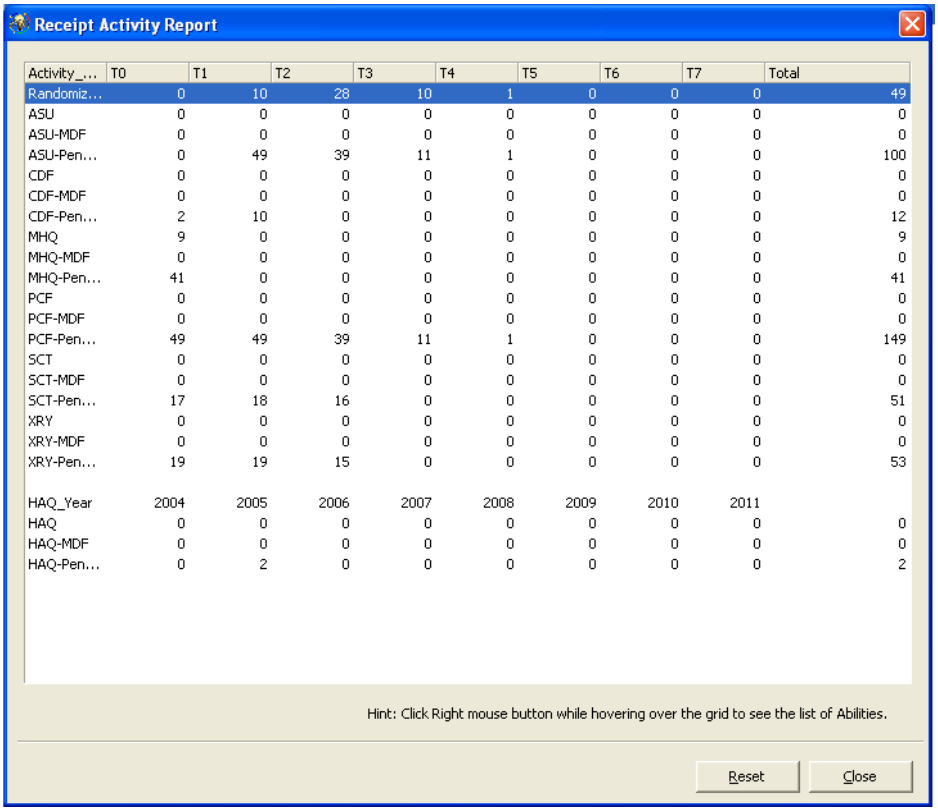
SC Cumulative Recruitment Summary Report

Recruitment Activity	SC										TOTAL
	01	02	03	04	05	06	08	09	10	11	
Recruitment packets mailed											
Eligible participants pending randomization											
Ineligible participants											
Number randomized											
Spiral CT											
Chest x-ray											
Screening exams scheduled, but not yet complete											
Spiral CT											
Chest x-ray											
Number screened*											
Spiral CT											
Chest x-ray											
Percent screened**											
Spiral CT											
Chest x-ray											
Screened+Scheduled											
Percent Screened+Scheduled											
Week ending											

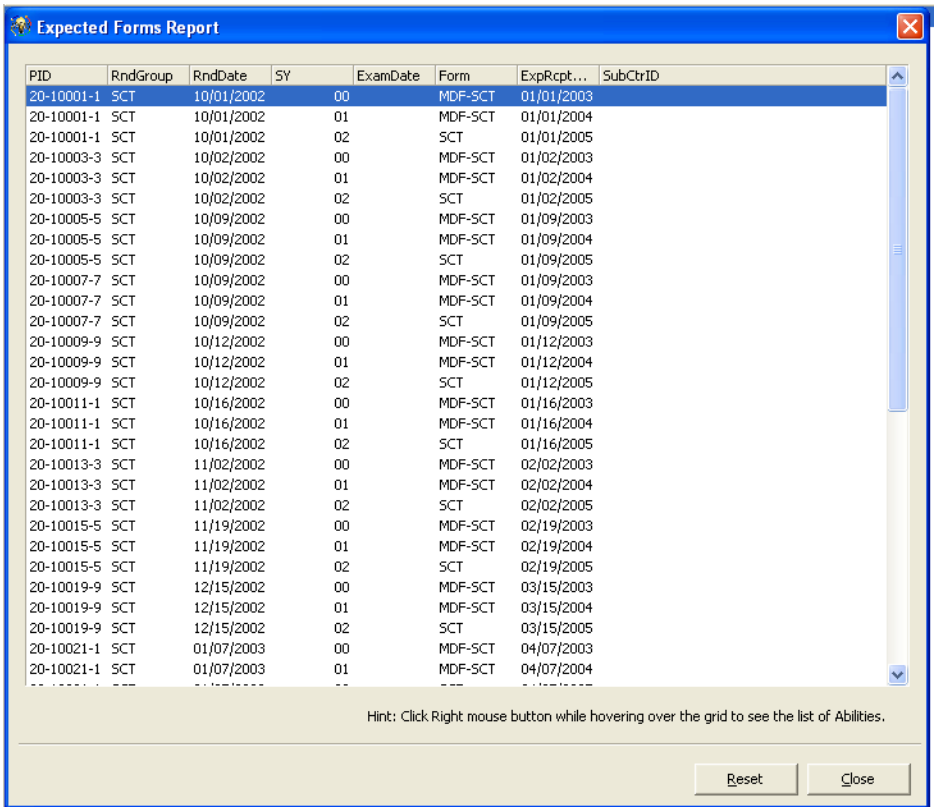
* Number screened = Number of screening exams completed regardless of whether or not radiologist has read

** Percent screened = Number screened/number randomized

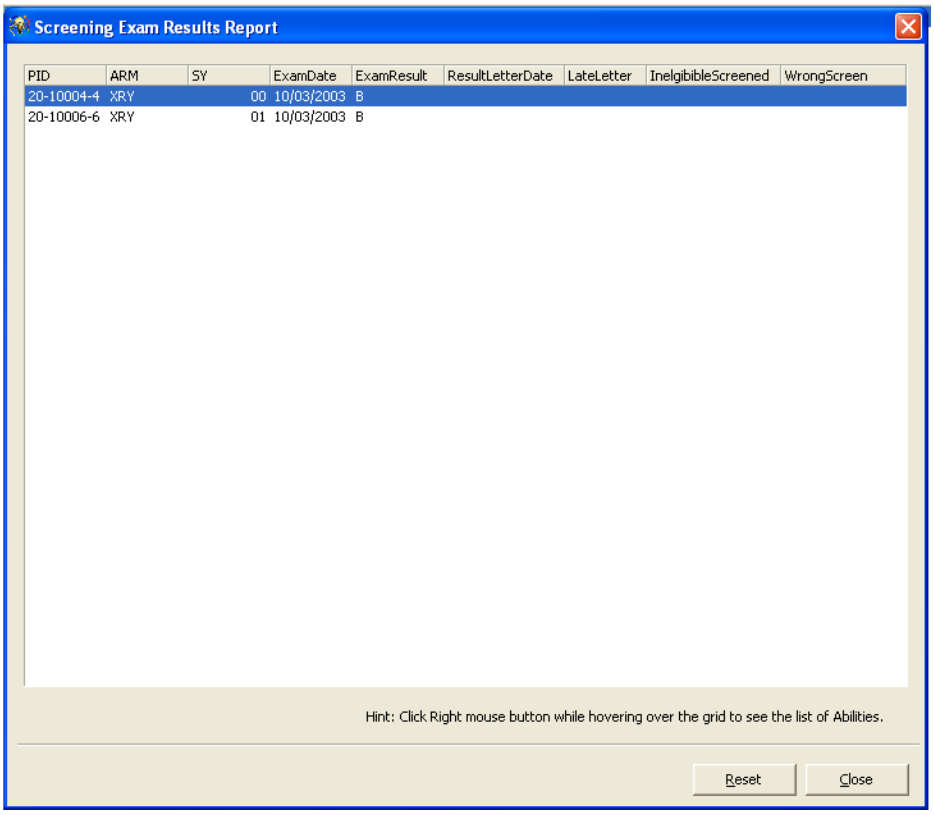
Appendix 11-18 SC Receipt Activity Report



Appendix 11-19 Expected Forms Report



Appendix 11-20 Screening Exam Results Report



Appendix 11-21 Participant Overview Report (POR)

NLST/LSS Participant Overview Report

Participant Information

Participant Name:

PID: 20-10001-1

Status: Active

Study Year: 03

Insurance:

Randomization Date: 10/01/2002

Date of Birth: 11/01/1933

Group: SCT

Date of Death:

Gender: M

Current Home Address:

H Phone:

W Phone:

Vacation Home/Other Residence:

H Phone:

Scheduling Notes

3/8/2006 10:30:28 AM PID: 20-10001-1 Page 1 of 2

Physician and Hospital Information

Physicians

Study Form Activity

Study Year	Form	MDF Form(s)	Visit	Receipt Date	Exam Result	Exam Date
00	DE		1	10/14/2005		
00	RAE		1	08/31/2004		
00	SCT		1	04/12/2005	A	02/12/2003
01	ASU			07/28/2005		
01	CDF			09/12/2005		
01	CNF			10/06/2005		
01	DE		1	04/21/2004		

Expected Forms Information

Study Year	Study Form	Expected Receipt Date
00	MDF-MHQ	01/01/2003
00	TI	01/01/2003
01	MDF-CDF - ASU(A)	01/21/2006
01	MDF-CDF - CNF(A)	08/05/2005
02	DE	
02	MDF-ASU	01/01/2005
03	ASU	01/01/2006
03	PCF	01/01/2006

Cancer Information

Study Year	Source	Cancer Description	Status	Status Date
00	SCT	Primary Lung	Confirmed	05/05/2005

3/8/2006 10:15:30 AM PID: 20-10001-1 Page 2 of 2

NLST/LSS

Study Progression Report

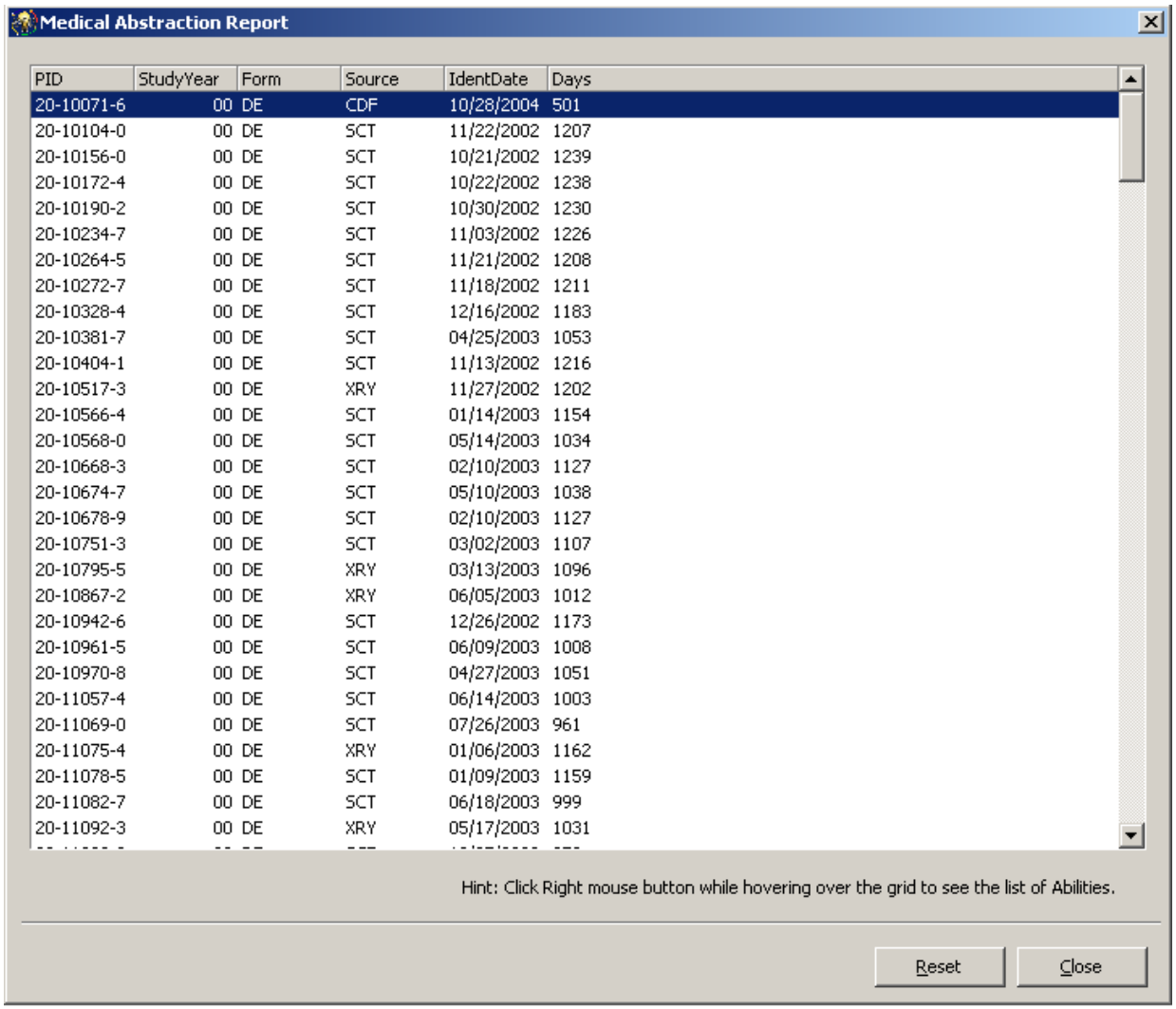
Study Year		T0	T1	T2	T3	T4	T5	T6	T7	Overall
Randomized Participants	In Window	0	10	28	10	1	0	0	0	49
	Randomized Eligible	0	8	26	10	1	0	0	0	45
	Randomized Ineligible	0	2	2	0	0	0	0	0	4

Study Year		T0	T1	T2	T3	T4	T5	T6	T7	Overall
SCT Screens	Screens Eligible	22	22	19	6	0	0	0	0	69
	Screens Completed	0	0	0	0	0	0	0	0	0
	% Screens Completed	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Screening MDF	0	0	0	0	0	0	0	0	0
XRY Screens	Screens Eligible	23	23	18	5	1	0	0	0	70
	Screens Completed	0	0	0	0	0	0	0	0	0
	% Screens Completed	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Screening MDF	0	0	0	0	0	0	0	0	0

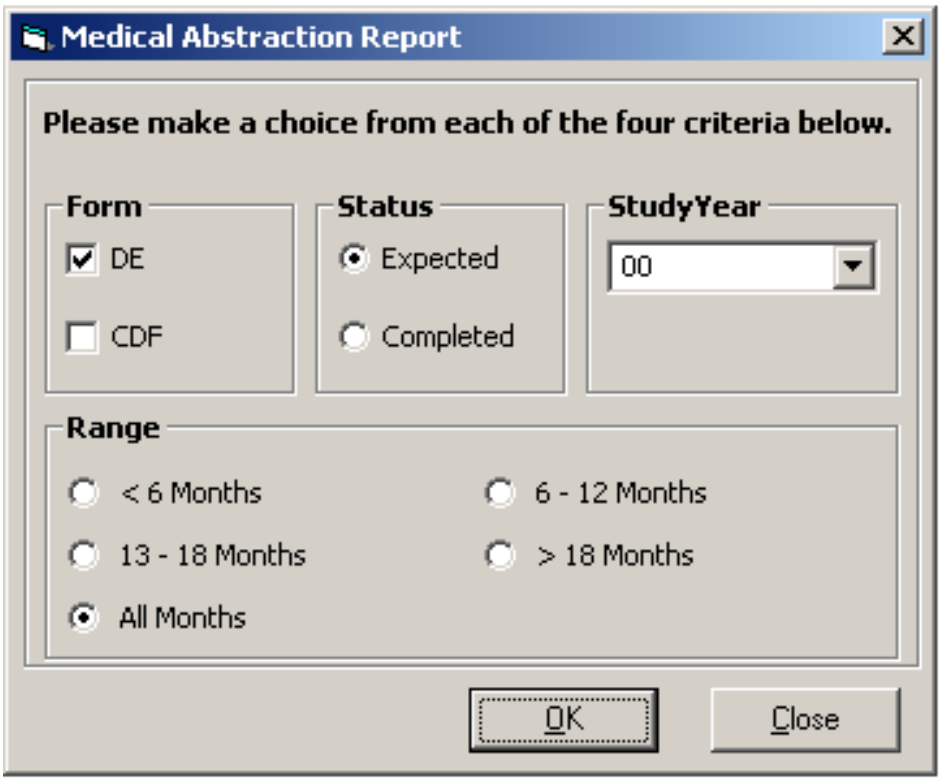
3/9/2005 12:12:26 PM Page 1 of 1

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Medical Abstraction Report



Appendix 11-23 Medical Abstraction Report



12. PATHOLOGY TISSUE COLLECTION

12.1 Overview

Beginning September 30, 2008, the CC and SCs implemented the collection of pathology tissue from NLST/LSS participants with resected lung cancer.

Pathology tissue from lung cancer patients provides increasing opportunities for the study of biological questions relevant to tumor etiology. The pathologic material obtained from this study is expected to have a special role in elucidating the contribution of genetic and proteomic factors that initiate and sustain lung cancer. The pathology specimens for this effort were formalin-fixed, paraffin-embedded (FFPE) tumor tissue blocks.

12.1.1 Study Objectives

The main objective of the Pathology Tissue Collection effort was to answer crucial questions about lung cancer etiology. This collection is a valuable resource because the tissue was obtained from a sample of participants who were well characterized with regard to exposure. In addition, the prospective nature of the trial allowed the study of questionnaire exposure data free of bias from the presence of disease.

Specific objectives were:

- To collect pathology tissue to provide opportunities for research relating risk factors to histological and molecular-pathologic sub-types of lung cancer;
- To study tissue related to epidemiological observations, and
- To study the influence of environmental exposures, hereditary factors, and other types of exposures on molecular lesions.

These goals were achieved through the collaboration of the NCI, the ten NLST/LSS SCs, the CC, the University of Colorado Pathology Department (Colorado), and the UCLA Tissue Array Core Facility (UCLA).

12.1.2 Scientific Background

Pathology tissue specimens previously obtained from NLST/LSS participants were collected from pathology labs and used to generate tissue microarrays (TMAs). TMAs are produced by removing minute cores from conventional histologic paraffin blocks and placing the cores into an array on a recipient paraffin block. Multiple blocks from various individuals, including tumors of varying grades or stages, may be located on the same array.

Histologic slides provide an invaluable way to do evaluations of the significance of potential cancer-associated genes as diagnostic markers or as therapeutic targets for specific cancers. TMA tissue is amenable to analysis by various techniques such as histochemical stains, immunologic stains with either chromogenic or fluorescent visualization, in situ hybridization (mRNA ISH and FISH), and tissue micro-dissection. Compared with conventional paraffin-embedded material, TMAs allow these same types of analyses to be conducted, but on a high-throughput scale without exhausting limited tissue resources. TMAs are created using small cores, sized 0.6 mm in diameter, taken from the original tissue blocks.

When creating TMAs, the original tissue blocks can be returned to the pathology lab after they are cored and any remaining material may be used for conventional histologic sectioning. As a result, generation of TMAs amplifies the limited tissue resource of the tumor tissue. Another benefit of TMAs is that they allow each sample placed in the same array to be treated in an identical way, thereby eliminating slide-to-slide variability often seen with analysis of conventional histologic sections. In addition, TMA analyses require only very small volumes of reagent to analyze an entire cohort.

12.1.3 Tissue Types

The following tissue types were collected during the Pathology Tissue Collection effort:

- Primary lung cancer – Primary tumors were collected if the tumor size was 5 mm or greater. All histologic types were collected.
- Adjacent normal lung tissue – Tissue blocks containing adjacent normal lung tissue were collected; however, additional benign histologies may have been sampled, if available, for the creation of TMAs.

- Resected regional malignant lymph nodes – It is estimated that up to 25% of all lung cancer cases undergoing resection may have involved intrathoracic lymph nodes resected as well. The molecular signatures of regional nodes may differ from that of the primary tumors and the collection of these specimens could yield important information about the spread of lung cancer. Every effort was made to collect these resected, involved lymph nodes for the creation of TMAs.
- Resected sites of metastatic disease – Resected sites of metastatic disease are available in an extremely small percentage of lung cancer cases; however, any metastatic lesions in which there was tissue resected were to be obtained for TMA creation.

Each of the tissue types obtained was processed as specified in Section 12.6.6.

12.1.4 Pathology Tissue Collection Activities

The collection of pathology tissue included the activities briefly listed below. These activities are described in more detail in subsequent sections of the MOOP, Chapter 12.

- The CC and NCI developed sample selection criteria.
- The CC applied the sample selection criteria to all NLST/LSS participants in and notified the SCs of the participant identification numbers (PIDs) of eligible participants.
- The CC developed procedures and materials for SC use, created and maintained systems for tracking authorization and requisition activities, and supplied other materials and services as needed. These included modifications to the existing NLST/LSS data entry system, and the software system, the specimen tracking system used at UCLA for PLCO pathology tissue collection.
- The SC located pathology reports for each eligible participant to verify cancer information and obtained pathology lab contact information for specimen requests.
- The SC verified participant consent for pathology tissue collection and, if necessary, the SC sent a Pathology Authorization Form (PAF – Appendix 12-2) to participants for a signature. The SC followed up with participants to receive outstanding PAFs, and documented the receipt of returned PAFs in
- The SC abstracted information from the pathology report for each participant for whom adequate authorization was obtained and entered the information into
- The SC used to assemble a requisition packet for each participant for whom blocks would be requested and submitted a requisition packet to the appropriate pathology lab.

- The pathology lab was asked to either ship the requested specimen to the SC, or return the requisition form indicating the reason for no shipment. Non-response by a pathology lab was to be followed up with a standard procedure.
- The SC documented receipt of each specimen as well as all correspondence with the pathology lab. The SC relabeled specimens with a sample ID label and retained the link between the originating pathology lab and the specimen. The SC then shipped all specimens on an established schedule to UCLA.
- UCLA documented receipt and quality of each specimen, and prepared an H & E slide of each tissue block for review by a pathologist at the University of Colorado. The pathologist annotated regions of interest (ROIs) from which cores were to be sampled.
- UCLA constructed TMAs based upon the pathologist's mapping and retained blocks for permanent storage or, if required by the originating pathology lab, shipped to the SC for return.
- SCs returned tissue blocks to the originating pathology lab using support from

12.1.5 Timeline for the Pathology Tissue Collection Effort

Figure 12-1 shows the anticipated timeline of activities for the Pathology Tissue Collection effort.

Figure 12-1

Task	10/08	11/08	12/08	1/09	2/09	3/09	4/09	5/09	6/09	7/09	8/09	9/09
SC Coordinator Training Conference Call (overview, authorization, pathology lab information)	X											
CC provides PID lists, template authorization materials, and pathology lab information to SCs	X											
CC provides support for authorization and pathology lab information	X											
SCs request IRB approval if necessary	X	X	X									
SCs generate SC-specific materials and receive NCI approval	X	X	X									
SCs contact pathology labs and enter information into	X	X	X									
SCs mail Pathology Authorization Forms (PAFs) to participants or next of kin as required, and follow up for authorization		X	X	X								
SCs send de-identified copies of pathology reports to CC		X	X	X								
SC Pathology Lead Training (central and teleconference sessions for overview, block selection, systems support)		X	X									
CC provides systems support for specimen requests, shipping, and tracking		X	X	X	X	X						
SCs abstract pathology reports and request specimens from pathology labs			X	X	X	X						
SCs ship specimens to UCLA			X	X	X	X	X	X	X	X		
UCLA returns specimens to SCs							X	X	X	X	X	X
SCs return specimens to pathology labs							X	X	X	X	X	X
CC performs data cleanup and delivery												X

12.2 Sample Selection

The CC worked with NCI to develop sample selection criteria and selected the potential participants for this effort. The CC provided each SC with a list of selected participants. The list was accessible in and included the PID, randomization date, study year of cancer diagnosis, diagnosis date, procedure date, tumor site, tumor size, and ICD-O-3 code. Upon receiving the list, and prior to sending a request for pathology tissue, SC staff verified the identifying information for each participant by comparing the given information against the participant's pathology report that confirmed the cancer diagnosis.

The SC created a Pathology Tissue Collection (PTC) folder in the participant's study file for each participant selected for the effort. Any documentation related to the effort was to be filed in the PTC folder.

12.2.1 Selection Criteria

The selection criteria included all NLST/LSS participants, in both the spiral CT and chest x-ray arms, with a histologically confirmed diagnosis of lung cancer and the potential for available tumor tissue, as determined by the presence of specific diagnostic procedures on the Diagnostic Evaluation (DE) Form. The procedures of interest included:

- 03 "Biopsy – Lymph node, other (Specify)"
- 04 "Biopsy – Lymph node, scalene (supraclavicular) nodes"
- 09 "Biopsy – Open surgical"
- 29 "Lymphadenectomy/lymph node sampling"
- 30 "Mediastinoscopy/Mediastinotomy"
- 43 "Resection"
- 46 "Thoracotomy"
- 49 "Thoracoscopy"
- 50 "Biopsy – Thoracoscopic"

12.2.2 Confidentiality

Maintaining the confidentiality of the identity of participants was a priority. All collected information was protected in accordance with federal regulatory guidelines. Access to study data was limited to staff working on the study. All computerized data were maintained in a manner consistent with the Title 21 Code of Federal Regulations (CFR) Part 11. In addition, access to the data management system was limited to designated staff through the use of a confidential log-in ID and password.

The data from the Pathology Tissue Collection effort will be maintained and stored with other study data. When it is no longer required for research, the data will be destroyed as required by federal regulatory guidelines.

Human research subjects are protected in accordance with Title 45 CFR Part 46 and Title 21 CFR Part 50. Each SC was required to obtain approval from its Institutional Review Board (IRB) for the Pathology Tissue Collection effort.

12.2.3 Informed Consent

Human research subjects are protected by informed consent procedures in accordance with Title 45 CFR Part 46 and Title 21 CFR Part 50. The signing of an informed consent form was a criterion for eligibility to participate in NLST. Each SC obtained signed consent from eligible participants before enrolling participants in NLST.

In most cases, the original NLST/LSS study consent form granted permission for study investigators to request and obtain surgical material, such as pathologic tissue, and to use those samples for research involving molecular studies on the development of lung cancer and/or other diseases. If an SC-specific informed consent form did not include permission for the collection of pathology tissue specimens, the SC was required to administer the Pathology Authorization Form (PAF) to all participants selected for the Pathology Tissue Collection effort. See Section 12.2.5 for more information about administering the PAF.

12.2.4 Contacting Pathology Laboratories

Since a pathology lab may have special loan policy requirements such as requiring use of a proprietary authorization form, a data use agreement, or other special arrangements, the pathology lab should be contacted prior to requesting participant authorization for specimen collection.

The original pathology report from participants with the diagnosis of primary lung cancer identified the source pathology lab. The SC was advised to contact the pathology lab to establish a relationship and procure contact information. It may have been helpful for the SC to identify all selected

specimens for the pathology lab prior to contacting the lab. This information would be useful for discussions about work load, cost, and scheduling. Initial information to be obtained from the pathology lab included the following:

- Pathology lab institution name
- Shipping address
- Pathology lab general phone
- Name and position of pathology lab contact person
- Direct phone and fax numbers for pathology lab contact person
- Authorization policy
- Cost per patient or per block
- Cost comments (checks payable to, sent with requests or separately, etc.)
- General loan period
- Pathology lab ID (nickname created by SC)

The SC determined, recorded on the Pathology Lab Information Form (PLIF, Appendix 12-1), and entered into the pathology lab contact information, authorization policies, and costs for specimen loans. The SC determined whether the lab was willing to grant permanent retention of specimens or, if not, what maximum loan period was permitted. A loan period of six months was requested, but a minimum loan period of three months was required to ensure adequate time for shipping and processing. Payment for requests, if required by the pathology lab, was to be managed by the SC in agreement with the pathology lab.

12.2.5 Participant Authorization

Each SC reviewed the original NLST/LSS study consent form for the selected participants to determine whether consent for pathology tissue collection was provided. The CC also recommended that SCs contact pathology labs to determine whether a copy of the participant's consent form would be accepted as authorization. The SC sent an authorization packet to each participant for whom it was required. The authorization packet included two copies of the Pathology Authorization Form (PAF, Appendix 12-2), a personalized PAF cover letter generated using the template provided as Appendix 12-3, and a self-addressed stamped envelope. The participant was asked to sign the PAF and return one copy to the SC in the envelope provided.

If the participant was deceased or unable to provide written authorization due to illness or other reason, the participant's proxy was asked to give authorization. A template PAF cover letter for next of kin is provided as Appendix 12-4.

The SC reviewed each completed PAF, stored it in the PTC folder of the participant's study file, and documented that the authorization was received in

12.2.5.1 Non-Response Follow-Up for Authorization

SCs were required to track the mailing of PAFs to participants for whom it was required. If the SC did not receive a signed PAF from the participant or proxy within two weeks of the initial mailing, the SC Coordinator initiated non-response follow-up efforts. Each follow-up effort consisted of at least five telephone call attempts to make contact with the participant or proxy, and re-mailing of materials if needed. If a signed PAF was not received within two weeks of the initial follow-up effort, a second follow-up effort was completed. If a signed PAF was not received within three weeks of completing the second follow-up effort, the SC could conclude the effort and document the participant response in

The results of non-response follow-up efforts were to be documented on a Call Record (Appendix 11-13) and filed in the PTC folder of the participant's study file.

12.3 Requesting Specimens from Pathology Labs

The SC reviewed the pathology report for each selected participant and determined the specimens to be requested. Information was recorded on the Pathology Report Abstraction Form (PRAF) and entered into The SC then used to generate a Pathology Request Form (PRF) and assembled a request packet for each participant for whom specimens would be requested. Additional details regarding these procedures are described in the following sections.

12.3.1 Pathology Report Abstraction

The SC used to generate a Pathology Report Abstraction Form (PRAF, Appendix 12-5) for each participant selected for Pathology Tissue Collection. The PRAF included pre-filled information from the Diagnostic Evaluation (DE) Form, the Participant Contact Form (PCF), and the Pathology Lab Information Form (PLIF). The SC reviewed this information as well as the participant's pathology report(s) to identify specific blocks to be requested. The SC abstracted the following information onto the PRAF:

- Participant name (if not pre-filled by from the PCF)
- Pathology report date
- Medical record number
- Accession number
- Neoadjuvant therapy
- Related procedure date and code
- Block ID
- Block section

The most representative blocks of lung tumor tissue and adjacent normal tissue were to be requested. All histologic types of lung tumors were requested; however, primary tumors less than 5 mm were not requested. If available, resected lymph node tissue and/or tissue from a resected metastatic site also were requested. In most cases, the number of blocks requested would be three: two primary lung and one adjacent normal tissue. If tissue from a lymph node and/or metastatic site was available, the number of blocks requested would be four: two primary lung, one adjacent normal tissue, one lymph node or one metastatic site. In extremely rare circumstances, the SC may have requested lymph node tissue and tissue from a metastatic site, bringing the total requested blocks to five, although it is possible that one primary lung specimen would be sufficient. Lymph node tissue, if available, was requested even if primary lung tumor tissue was not available. The exact distribution of tissue type specimen blocks was decided on a case by case basis. SCs were advised to contact the CC MRA for assistance identifying tissue blocks if needed.

The SC reviewed the pathology report and abstracted information onto the PRAF for each tissue type (primary lung, normal, lymph node, or metastatic). If one or more of the tissue types was not requested, the SC indicated the reason on the PRAF. For some participants, it may have been determined

that no specimens would be requested. The most common reason for not requesting specimens was a primary lung tumor less than 5 mm. In this situation, the SC completed the PRAF indicating the reason why no specimens were requested. Refer to Appendix 12-6, Specifications for Completion of the PRAF, for more information.

A copy of the pathology report for each participant selected for Pathology Tissue Collection was de-identified and each page labeled with a PID label. Data elements to be de-identified included: personal identifiers (e.g. name, address, date of birth, Social Security number), medical record numbers, and accession numbers. De-identified, PID labeled copies of pathology reports were shipped to:

The CC reviewed the pathology reports to ensure proper de-identification and scanned the reports into digital files for future use at the discretion of NCI.

12.3.2 Pathology Lab Request Packets

After obtaining authorization and loan policy information from the pathology labs, obtaining participant authorization as needed, and selecting blocks to be requested, the SC assembled a request packet for each pathology lab. Requests may have included specimens from multiple participants. Each request packet included the following items:

- Pathology Request Form (PRF) cover letter, signed by the SC Principal Investigator;
- PRF for each participant for whom specimens were being requested;
- A copy of the original NLST/LSS study consent form, PAF, or pathology lab proprietary authorization form, if required by the lab, for each participant for whom specimens were being requested;
- A copy of the pathology report for each participant for whom specimens were being requested;
- Pre-addressed, postage-paid bubble wrap lined mailer, and shipping materials for pathology lab to send specimens; and
- Payment for requested tissue specimens, if required.

12.3.2.1 PRF Request Cover Letter

The PRF cover letter was designed to simplify the request process and to facilitate rapid retrieval of specimens. The PRF cover letter explained the purpose of the request, described how loaned specimens would be processed and returned to the originating pathology lab, and requested that specimens be shipped to the SC in the enclosed pre-addressed, postage-paid shipping containers. The PRF cover letter was to be signed by the SC Principal Investigator. A template PRF cover letter is provided in Appendix 12-7.

12.3.2.2 Pathology Request Form

The SC used to generate a Pathology Request Form (PRF, Appendix 12-8) for each participant for whom specimens were requested. The PRF was used by the SCs to request specimens and by the pathology labs to indicate the release of specimens or to document any problems fulfilling the request. The PRF was returned to the SC from the pathology labs along with the requested specimens or was returned alone to indicate barriers or reasons for refusal to provide tissues. The PRF was also used by the SC to document the outcome of each requested specimen.

Multiple PRFs may have been included in a request packet if specimens from multiple participants were being requested at one time. Also, a pathology lab may have received additional request packets as the SC continued to work through the participant selection list, obtain participant authorizations, and abstract information from pathology reports onto PRAFs.

12.3.2.3 Participant Authorization for Pathology Labs

A copy of the original signed NLST/LSS study consent form for each participant for whom specimens were being requested was included in the request packet, unless specifically not required by a pathology lab. If required by the pathology lab, a signed copy of the PAF or pathology lab proprietary authorization was included in the packet in addition to or in place of the original study consent form.

If the participant was deceased, the pathology lab may have required documentation of the participant's death in addition to or in place of the study consent form. A copy of the death certificate could be used for this purpose, unless privacy regulations in the state issuing the death certificate prohibit it. If prohibited, the SC was required to ask the state for special permission or document the death for the pathology lab in another manner.

12.3.2.4 Pathology Reports

For each participant, a copy of the pathology report that confirmed and described the primary cancer of interest from which specimen samples would be collected was included in the pathology lab request packet.

12.3.2.5 Shipping Materials

SCs obtained and included the appropriate shipping materials in the pathology lab request packet to facilitate shipment of specimens from pathology laboratories. The shipping materials included in the pathology lab request packet were:

- One pre-addressed, postage-paid bubble-wrap lined mailer per request (Associated Bag Company part no. 534-2-106, dimensions 6" x 10" or equivalent);
- Zipper Bags for storing and shipping tissue blocks (Associated Bag Company part no. 270-13H, dimensions 3" x 4" or equivalent);
- Zipper Bags for storing and shipping tissue blocks (Associated Bag Company part no. 270-39, dimensions 12" x 12" or equivalent), and
- Shipping address labels.

12.3.3 Non-Response Follow-Up for Specimen Request

In the event that the requested specimens were not received at the SC within three weeks of sending the request packet, the SC Coordinator contacted the pathology lab to confirm that the request packet was received and to determine if further assistance was required. If, after two follow-up attempts,

there was still no response or if the pathology lab refused to release or loan the requested materials, the SC Principal Investigator or designee would pursue negotiations with the pathology lab staff to gain access to the materials. The result of each follow-up effort was documented on a hard copy Call Record (Appendix 11-13) and filed in the PTC folder of the participant's study file. SCs could monitor the return of the PRF using the Expected Forms Report in

12.4 Collecting Specimens at the SC

The pathology lab received the request packet and reviewed the cover letter and accompanying PRF and materials. If the pathology lab was willing to release the requested specimens, the lab staff returned the PRF and specimens to the SC in the SC-provided pre-addressed, postage paid, bubble wrap-lined mailer. If the pathology lab was not willing to release the specimens, the lab staff indicated the reason for refusal on the PRF and faxed or mailed it to the SC.

12.4.1 Receipting Specimens from Pathology Labs

Receipting specimen materials at the SC involved review of both the completed PRF and the specimens. The SC implemented the following procedures for receipting specimens:

1. Check to see that a completed PRF was returned. If the PRF is missing or incomplete, contact the pathology lab to obtain a completed form.
2. Verify that each specimen corresponds to tissue requested, or has been documented on the PRF by the pathology lab. If there are any undocumented discrepancies, contact the pathology lab and complete a Discrepancy Notification Form (Appendix 12-9).
3. Check each specimen for damage. If a block is damaged, contact the pathology lab to report the damage and to request a replacement block if needed and available. Damaged blocks should be returned to the originating pathology lab. If the SC is uncertain as to the viability of a block, the specimen should be shipped to UCLA to determine if the block can be processed.
4. For each specimen requested on the PRF, and for any additional specimens received and documented on the PRF by the pathology lab, enter the information from the PRF into including whether the specimen was received, the date received, and the status code. If no specimens were received, enter the appropriate PRF status code into If one block was received for multiple tissue types requested, one tissue type must be receipted into and the remaining tissue type(s) marked as not received, using the appropriate PRF status code.

5. Label each specimen to be shipped to UCLA with a sample ID label and attach identical labels to the participant's pathology report (see Section 12.4.2). The SC may also attach identical labels to the PRAF or PRF for documentation and streamlined entry into The SC should ensure that any protected health information is de-identified prior to sending the specimens to UCLA.
6. Enter the sample ID label number for each specimen into via barcode scanning as the specimen is receipted.
7. If a received specimen will not be forwarded to UCLA because it was not requested and is not needed, is an unknown specimen, or is unusable for any reason, the specimen should be receipted into with the appropriate status code and should not be labeled with a sample ID label. The SC must contact the originating pathology lab for problem resolution and for return and refund arrangements, as needed.

12.4.2 Labeling and Storing Specimens from Pathology Labs

For tracking purposes, the CC developed a specimen labeling scheme using Biospecimen Inventory system ID labels (BSI ID) labels. This is the labeling system used by the NCI biospecimen repository. The CC supplied each SC with pre-printed, bar-coded labels for labeling specimens and forms. As requested specimen blocks were received from pathology labs, the SC labeled each specimen to be sent to UCLA with a BSI sample ID label, attached duplicate labels to a copy of the participant's pathology report, and receipted blocks into The SC could also attach duplicate labels to the PRAF or PRF for documentation purposes and/or to facilitate entry into Sample ID labels were printed in a bar-coded and eye-readable format and were used in sequential order as specimens were received from pathology labs.

If a pathology lab applied identifier was visible on a block after application of the sample ID label, supplied blank labels were to be used as needed to mask the identifier. SC sample ID labels had a removable adhesive, and were removed prior to eventual return to the originating pathology labs.

The BSI ID number printed on each sample ID label identified each tissue block belonging to a participant. The sample ID numbers had a BSI format, AA NNNNN NNNN:

- AA: two letter alpha prefix
- NNNNN: zero padded 5-digit "root" number
- NNNN: 4-digit "sequence" number

If multiple blocks were obtained for a single participant, each block was to have the same "root" number and an incremental "sequence" number. If a single participant had multiple primary lung cancer diagnoses, each lung cancer diagnosis was to have a separate "root" number. The following procedures were used to label the tissue blocks:

1. Peel and attach the sample ID label on the side-edge of the paraffin block cassette.
2. Attach the duplicate label on the corresponding pathology report.
3. Use blank labels to cover identifiers elsewhere on the cassette.
4. Place the cassette in a small (2" x 3") Zipper Bag.
5. Place each bag in a 5½" x 5½" x 2" (or 3") storage box.
6. Store in a cool place until the next scheduled shipping date to UCLA.

12.5 Shipping Specimens to UCLA

The pathology specimens collected for this effort were formalin-fixed and preserved in paraffin blocks by the pathology labs. Prior to shipment, the specimens were required to be stored in a cool, dark container and protected from excessive light and temperature to prevent deterioration of the wax and embedded tissue.

Weather problems, holiday schedules, and end-of-week shipping could cause specimen shipment delays, which the SC was advised to avoid if possible. Shipping methods were to take seasonal temperatures into account, and extra insulated packaging, overnight delivery, and a cooling agent, were to be used as needed. The standard shipping package for a specimen included a zipper bag inside a storage box inside a foam-insulated shipping box known as a bioshipper.

All non-problematic specimens obtained from pathology labs were to be shipped to UCLA every two weeks by overnight courier. Specimens were to be shipped with a paper copy of the generated UCLA Pathology Transmittal Form (Appendix 12-10) and appropriate pathology reports. A data file including data from the PRAF also was created by for transferring to UCLA. Information related to the specimen shipment was automatically stored in

SCs shipped specimens to UCLA according to the shipping schedule provided by the CC. On the day of shipment, the SC Coordinator was to notify UCLA by e-mail of the upcoming shipment

with estimated date of arrival. Upon receipt of the specimens, UCLA reconciled the materials and identified any missing or damaged specimens. UCLA was to contact the SC to resolve any problems.

12.5.1 Shipping Materials

The appropriate shipping materials for shipping tissue specimens to UCLA were:

1. Storage boxes for blocks (Bell Metal Specialty, dimensions 5" x 5" x 2").
2. Multi-purpose insulated bio-shippers (Polyfoam Packers part 325UPS, internal dimensions 11-5/8" x 9-7/8" x 7").

12.5.2 Shipping Task Checklist

The SC completed the following tasks on the day of a scheduled shipment to UCLA:

1. Select the specimens to be shipped and prepare a shipping transmittal in The SC staff member preparing the transmittal was required to verify the loan period for each block prior to generating the transmittal. This information was critical to UCLA for prioritizing specimen processing. In addition, special circumstances pertaining to a shipment, such as the inclusion of multiple tissue types on one block, were to be handwritten on the transmittal form.
2. Mask corresponding pathology reports for personal identifiers, including PID. Do not mask the sample ID labels.
3. Prepare and send a notification e-mail or fax to UCLA listing the specimens being shipped, including the number of storage boxes, courier tracking number, and the expected date of arrival.
4. Place the transmittal form, a floppy disk or CD with the data file generated by after the transmittal, and pathology reports inside a Zipper Bag and place the bag inside the bottom of the corrugated fiberboard shipping container box (8" x 8" x 4¼").
5. Pack the storage boxes containing specimens in the shipping container.
6. Place packing materials such as paper towels or crumpled newspaper around and between the storage boxes to prevent them from shifting during transit.
7. Seal the shipping container with strong tape.
8. Label each shipping container with an express courier label and address labels.

9. Send the package using an overnight traceable courier service such as FedEx to:

10. File a copy of the transmittal form in the PTC folder of the participant's study file.
11. Upload the -generated shipment data file into

12.5.3 Shipping Schedules

Specimens were shipped to UCLA according to a shipping schedule developed by the CC and UCLA. Shipments to UCLA were scheduled for every two weeks for each SC and were limited to Monday, Tuesday, and Wednesday in order to minimize the chance of an over-weekend delivery delay. If no specimens were shipped on a scheduled day because there were no specimens to send, the SC was asked to notify UCLA. If no specimens were shipped on a scheduled day for any other reason, such as holiday or office closure, the SC was asked to contact UCLA to discuss the possibility of a make-up shipping day. If an SC requested to ship on a date other than an assigned shipping date, approval from UCLA was required in advance. Such requests were only to be made if necessary (e.g. to expedite a specimen with a short loan period). The CC monitored the number of specimens shipped to UCLA so as not to exceed the maximum number of specimens that could be processed each month.

12.6 Specimen Processing at UCLA

The following sections provide an overview of the procedures used by UCLA, including specimen receipt, preparing new sections, shipping representative slides of paraffin blocks to the Colorado for standardized pathology review, pathology review at Colorado, slide receipt from Colorado, and array construction.

12.6.1 Specimen Receipt

Specimens were unpacked and inspected for shipping damage and for completeness according to the transmittal and the SC was notified of any problems. UCLA assigned a lab-specific ID

to each block, and entered this along with the BSI ID, other specimen information, and receipt and problem information. Pathology reports were assigned specimen-matching IDs and filed in ID order in a notebook for future reference if needed.

UCLA created a "patient" in the database based on random code. This corresponded one-to-one to each participant included in a specimen shipment. A case code was assigned, corresponding one-to-one with each specimen or BSI ID root number. Blocks were entered with the BSI ID as inventory in the database. Blocks from each shipment were stored by the date the shipment was received, grouped by SC and BSI ID order in dedicated block histology boxes, marked with NLST/LSS and date of receipt. Marker cards were used to group the blocks for each case, or specimen.

UCLA periodically uploaded information that updated the status of the specimens to The SC was able to log in to to track the status of all specimens shipped to UCLA.

12.6.2 Preparing Sections

UCLA lab protocol was followed for preparing new sections. This included pre-labeling of slides, cutting pre-cooled blocks in 4 μm sections down to a full-face section, floating, and mounting sections on slides. Once a full-face was obtained, UCLA cut one 4 μm slide per block for H&E staining to determine core location(s) and for nucleic acid studies. Lab protocol was followed for H&E staining.

12.6.3 Shipping Slides to Colorado for Standardized Pathology Review

UCLA securely packaged slides in a slide box within a padded, corrugated box for shipment to the University of Colorado reviewing pathologist. This shipment included the slides to review, a copy of the corresponding pathology reports, and the NLST Colorado Unique Primary Tumor (CO) Form and the NLST Colorado Target Annotation (TA) Form (Appendix 12-11) to denote which specific blocks contained the annotated histologies. UCLA updated the database inventory to reflect the new location of the slides on the day of shipment to Colorado. Slides were shipped to:

12.6.4 Standardized Pathology Review

The histological description of the tissue section was compared with that of the histology laboratory and became the baseline diagnosis. UCLA confirmed that the donor block was of good quality with adequate tissue. The reviewing pathologist at Colorado received an H&E slide and a copy of the corresponding pathology report for each block. The pathologist noted his/her histological diagnosis and circled representative areas for each of the following tissue types:

- Tumor: Primary invasive histology; secondary invasive histology, and carcinoma in situ
- Benign/normal: Adjacent normal lung tissue, benign lymph node tissue, proximal bronchus and distal bronchiole
- Metastatic: Involved lymph nodes (local) and distant metastases

Colorado prepared a printed color transparency of the digitally annotated slides (one enlarged size and one actual size on the same transparency) and shipped them to UCLA with the completed NLST CO and TA Forms, pathology reports, and unmarked slides with Colorado barcode labels. The review process of the slides was estimated to take two weeks.

12.6.5 Slide Receipt from Colorado

UCLA updated the database inventory to reflect the new location of the slides on the day of receipt of shipment from Colorado. A quality control check of the annotated areas matched with the corresponding blocks was done to make sure that the area annotated on the slide had enough tissue area and depth on the block loaned from the originating pathology lab.

12.6.6 Array Construction and DNA Isolation

UCLA performed the following for each of the four tissue types listed in section 12.1.3. The sample and coordinate information for each core taken was recorded in the UCLA database.

Primary Tumor

- Take two (2) cores of 0.6 mm from up to three (3) sites of the primary cancer, main histology, (six total cores) for duplicate sets of TMAs. The cores should be widely sampled regionally within the main tumor regions of interest (ROI) (e.g., AdenoCa, grade 3). Cores should focus on areas matching highest case grade where available.
- Take two (2) cores of 0.6 mm from up to three (3) sites of the primary cancer of secondary invasive histology (six total cores), if available, for duplicate sets of TMAs. The cores should be widely sampled regionally within the tumor of secondary invasive histology ROI(s) (e.g. BAC component, from mixed invasive AdenoCA and BAC).
- Take two (2) cores of 0.6 mm from up to three (3) sites of carcinoma in situ, (six total cores), if available, for duplicate sets of TMAs.
- Take one (1) core of 0.6 mm from up to three (3) sites of the primary cancer of main histology to place in Eppendorf tubes for DNA isolation.
- Take one (1) core of 0.6 mm from up to three (3) sites of the primary cancer of secondary invasive histology, if available, to place in Eppendorf tubes for DNA isolation.
- Take one (1) core of 0.6 mm from up to three (3) sites of carcinoma in situ, if available, to place in Eppendorf tubes for DNA isolation.

Normal Lung Tissue

- Take two (2) cores of 0.6 mm from three (3) sites of adjacent normal lung tissue (six cores total) for duplicate sets of TMAs.
- Take two (2) cores of 0.6 mm from one (1) site of normal proximal bronchus (two cores total) and one (1) site of normal distal bronchiole (two cores total), if available, for duplicate sets of TMAs.
- Take one (1) core of 0.6 mm from up to three (3) sites of adjacent normal lung tissue to place in Eppendorf tubes for DNA isolation.

Involved Lymph Nodes/Metastatic Lesions

- Take two (2) cores of 0.6 mm from up to three (3) sites of local (involved lymph node) or distant metastatic lesion (six total cores), if available, for duplicate sets of TMAs.
- Take one (1) core of 0.6 mm from up to three (3) sites of local (involved lymph node) or distant metastatic lesion, if available, to place in Eppendorf tubes for DNA isolation.

Benign Lymph Nodes

- Take two (2) cores of 0.6 mm from up to three (3) sites of benign lymph node tissue (six total cores), if available, for duplicate sets of TMAs.
- Take one (1) core of 0.6 mm from up to three (3) sites of benign lymph node tissue, if available, to place in Eppendorf tubes for DNA isolation.

If multiple blocks were obtained for a single tissue, cores may have been distributed from among the blocks for improved capture of heterogeneity, selection of tumor and uninvolved tissue, and block preservation. After coring, UCLA filled voided areas in the block with additional paraffin. The CC worked with UCLA to link CC and UCLA systems for receipt, shipment, and tracking support. TMAs were stored in lidded containers such as Petri dishes with Parafilm covers to prevent cores from sticking to the container. Room temperature allows for indefinite storage.

If the originating pathology lab limited the number of 0.6 mm core samples that could be obtained on a given block, priority was given to the primary TMA, then to DNA cores, then to the duplicate TMA. For all cases, the maximum number of core samples to be taken was 18 per block and 39 per case. If additional cores were to be sampled for a given block or case due to the presence of numerous tissue types, UCLA was required to contact the SC to obtain approval from the originating pathology lab. If additional cores could not be taken, the priority of punches was as follows: primary tumor histology, secondary invasive tumor histology, carcinoma in situ, adjacent normal lung tissue, metastatic lesion, benign lymph node, proximal bronchus, and distal bronchiole.

12.7 Returning Loaned Specimens

A specimen obtained for permanent retention was stored at UCLA after processing. A loaned specimen was returned by the SC to the originating pathology lab within the loan period. Prior to return to the SC, a processed specimen was repaired by filling punched holes with molten paraffin. The specimen was then "checked out" of the UCLA database inventory, packed in original packaging and shipped to the SC with advance notification, including courier tracking number. UCLA regularly uploaded status information to for access by the SCs.

The SC receipted each returned specimen and, if needed, contacted UCLA to resolve any discrepancy or problem with the shipment. The SC batched and shipped specimens to originating

pathology labs as needed to meet loan period deadlines. A Pathology Lab Transmittal Form for returning specimens to originating pathology labs was generated in (Appendix 12-12). Materials were packaged as described for specimen shipments to UCLA. BSI sample ID labels and any blank masking labels were to be removed prior to packaging for return. The SC was responsible for returning the block within the timeframe required by the pathology lab.

12.8 Coordination Activities

The CC coordinated all activities related to the Pathology Tissue Collection effort and served as liaison for the SCs, NCI, and UCLA. Coordination efforts included: development of the protocol documentation, forms, and template materials; supplying SCs with sample ID labels; and providing computerized systems support (and Additional coordination efforts included training SC staff, maintaining regular communication with the SCs and UCLA, and reporting progress to NCI.

12.8.1 Training SC Staff

The CC conducted a one-day central training session to prepare SC staff to successfully perform tasks in a consistent and standardized fashion. Compliance in execution of the protocols by the SCs was critical to ensuring that the Pathology Tissue Collection effort conformed to all procedural and regulatory requirements in a standardized manner. The central training session provided an opportunity for introduction to and discussion of procedures, timelines, data collection instruments, specimen collection materials, and systems support for the Pathology Tissue Collection effort. One staff member from each SC attended the training to ensure that all SCs received the same instructions and that study procedures would be carried out in a standardized manner.

The SC Coordinator was responsible for identifying the appropriate staff member to attend the central training session. The SC Coordinator, or representative, was responsible for training other SC staff members as necessary. SC staff working on the Pathology Tissue Collection effort was asked to refer to this chapter, as well as CC-provided training materials and documentation to ensure standardized training.

12.8.2 Communication

The CC arranged conference calls at least monthly to address any questions or concerns about Pathology Tissue Collection and to discuss progress of the effort. Conference calls included representatives from the SCs, NCI, and UCLA.

12.8.3 Systems Support

The CC-provided was used to support the Pathology Tissue Collection effort and included the following features:

- Storage and update of sample selection information.
- Templates for generating authorization and request forms and letters. Template documents for cover letters and the PAF could be stored in for easy access.
- Functions for storing participant and pathology lab information. stored pathology lab and specimen data as well as dates for mailing, shipping, and receipt.
- Templates for generating transmittal forms for shipment from the SC to UCLA and for shipments from the SCs to the originating pathology labs.
- Functions for monitoring activity using the Expected Forms Report in and the system. Detailed status reports were generated by the CC and provided to the SCs at least monthly or more often as requested. Sample status reports are included as Appendix 12-13.

SC staff could refer to the for additional information regarding the use of to support Pathology Tissue Collection activities.

The CC-provided system provided support for tracking specimens shipped to UCLA. Together, and provided the SCs with the functions for shipping specimens to UCLA, and for tracking data associated with the shipment for reconciliation purposes. The SCs utilized to generate a data file of specimens to be shipped to UCLA and then accessed to upload the data file for receipt by UCLA.

Specimen tracking activities at UCLA also were supported by which provided UCLA with the ability to view specimens shipped from the SCs, and receipt and track the specimens.

supported an interface with the pathology tissue inventory system at UCLA. Additionally, the CC used to monitor and support the Pathology Tissue Collection effort. Refer to the for additional information regarding the system.

Appendices for Chapter 12

Pathology Lab Information Form

Lab ID* _____

Lab Institution Name* _____

Street Address 1* _____

Street Address 2 _____

City* _____

State* _____ **Zip Code** _____

Lab Phone **(_____) _____ - _____**

Contact Name _____

Contact Position _____

Contact Phone **(_____) _____ - _____**

Contact Fax **(_____) _____ - _____**

Authorization Policy* ____ **Not required (Consent form adequate)**

____ **PAF**

____ **Proprietary**

____ **No Loan Policy**

Cost _____

Cost Comments _____

Loan period* _____

Loan Period Comments _____

**denotes fields required by*

Appendix 12-2 Participant Authorization Form (PAF)

Letterhead of Screening Center

PID Barcode PID

National Lung Screening Trial (NLST)

Authorization to Release Surgical Material and Related Health Information
that Identifies You for Research

Your signature below gives permission to staff at <<PathLabName>> to release surgical material (also known as pathology specimen) and related health information obtained during your diagnosis or treatment of lung cancer or related condition. The surgical material will be used for research in lung cancer detection, prevention, and treatment by the ongoing National Lung Screening Trial (NLST), in which you are a participant.

The health information to be released for this research includes the surgical material and any identifying information attached to the material such as a specimen ID, medical record number, or your name. Additionally, a copy of the pathology department report on the surgical material may be released if your local NLST screening center does not already have a copy.

The materials listed above may be released to and used by your local NLST screening center, identified at the top of this form, and to the NLST central laboratory: University of California at Los Angeles Tissue Array Core Facility. Only the screening center and central laboratory staff involved with NLST research will have access to your materials listed above.

<<PathLabName>> is required by law to protect your health information. By signing this document, you authorize them to release your health information for this research. Your local NLST screening center and the NLST central laboratory have agreed to hold your health information in confidence, to use it only for study purposes, and not to release it to anyone other than the study team unless required by law.

Your medical treatment will not be affected in any way based on your decision to sign or not sign this Authorization.

You may change your mind and revoke, or take back, this Authorization at any time, except to the extent that actions have already been taken based on this Authorization. To revoke this Authorization, contact your local NLST screening center. This Authorization does not have an expiration date.

Signature of participant *or* participant's personal representative	Date signed
Printed name of participant *or* participant's personal representative	If applicable, description of personal representative's authority to sign for participant

Appendix 12-3 Cover Letter for Participant Authorization Form

Letterhead of Screening Center

National Lung Screening Trial (NLST)

<<DateAuthToPpt>>

<<ParticipantName>>
<<ParticipantAddress>>

Dear <<ParticipantTitle>> <<ParticipantName>>:

Thank you for your continuing participation in the National Lung Screening Trial.

Our records show that, since the time you started with the NLST, you have had a lung related medical procedure. We would like to obtain a small amount of the surgical material (also known as pathology specimen) that was removed and preserved after your procedure. This will help future cancer research.

To allow us to obtain the material from the pathology lab, please sign the Authorization Form included with this letter. We have enclosed two copies of the form. Please read, sign, and return one copy to us in the enclosed postage-paid envelope. The other copy is for your records.

As you know, you have already given us consent for your involvement in the NLST, but now because of the important new HIPAA laws that are designed to protect the privacy of your medical information, we are asking for this additional "authorization" to obtain a pathology specimen from the pathology lab.

If you have any questions about this request or the NLST, please call me or your NLST study coordinator, <<SCCoordinator>>, at <<SCPhone>>. Thank you very much for your help with our continuing research.

Sincerely,

SC PI
SC PI Title
SC Name
SC Address

Enclosures: Authorization Form (two copies), return envelope

Appendix 12-4 Next of Kin Cover Letter for Participant Authorization Form

Letterhead of Screening Center

National Lung Screening Trial (NLST)

<<DateAuthToNextofKin>>

<<Nextof KinName>>
<<NextofKinAddress>>

Dear <<NextofKinTitle>> <<NextofKinName>>:

We very much appreciate <<ParticipantName>>'s participation in the National Lung Screening Trial.

Our records show that, after enrolling in NLST, <<ParticipantName>> had a lung related medical procedure. We would like to obtain a small amount of the surgical material (also known as pathology specimen) that was removed and preserved after the procedure. This will help future cancer research.

To allow us to obtain the material from the pathology lab, please sign the Authorization Form included with this letter on behalf of <<ParticipantName>>. We have enclosed two copies of the form. Please read, sign, and return one copy to us in the enclosed postage-paid envelope. The other copy is for your records.

<<ParticipantName>> has already given us consent for involvement in the NLST, but now because of the important new HIPAA laws that are designed to protect the privacy of medical information, we are asking for this additional "authorization" to obtain a pathology specimen from the pathology lab.

If you have any questions about this request or the NLST, please call me or the NLST study coordinator, <<SCCoordinator>>, at <<SCPhone>>. Thank you very much for your help with this continuing research.

Sincerely,

SC PI
SC PI Title
SC Name
SC Address

Enclosures: Authorization Form (two copies), return envelope

National Lung Screening Trial/Lung Screening Study (NLST/LSS)

PATHOLOGY REPORT ABSTRACTION FORM (PRAF)

ADMINISTRATIVE SECTION

Date Abstracted: |___|___| / |___|___| / |___|___|___|___|

Staff ID: |___|___|___|___|

Screening Center ID: _____

Study Year: _____

Multiple DE#: _____

PART A: Lung Cancer Diagnosis Information

This section will be pre-filled

1. Date of Pathologic Confirmation: _____
2. ICD-O-3 Code: _____
3. Pathologic Type: _____
4. Grade of Primary Invasive Lung Cancer: _____
5. Pathology Lesion Size (mm): _____
6. Targeted DE Procedures:

Procedure Date	Procedure Code	Procedure Description
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Appendix 12-5 Pathology Report Abstraction Form (PRAF)

~PID~

PART B: Pathology Tissue Block Information

Questions 7–9 and 13 will be pre-filled. Questions 10-12 and 14 are to be completed by SC Staff.

7. Participant Name: _____
8. Pathology Lab ID: _____
9. Loan Period: _____
10. Pathology Report Date: |___|___| / |___|___| / |___|___|___|___|
11. Medical Record Number: _____
12. Accession Number: _____
13. Neoadjuvant therapy? _____
14. Record block information for two blocks of primary lung tissue and one block each of normal lung tissue, lymph node tissue, and metastatic tissue. If requesting a block, record the tissue type, procedure date, procedure code, block ID, and block section, then record 02 in Status Code. If not requesting a block, record the tissue type, then skip to the Status Code field and enter the code that reflects the reason the block is not being requested. Additional blocks requested and replacement blocks from the lab are also to be recorded here.

Tissue Type	Procedure Date	Proc Code	Block ID	Block Section	Status Code	Date Received	BSI ID

Tissue Type
T – Primary lung
L – Normal lung
N – Lymph nodes
M – Metastatic site

Status Codes
00 – Not obtained
01 – Obtained, but tissue size <5 mm
02 – Requesting block
03 – Obtained, but not malignant (N or M)

Appendix 12-6 Specifications for Completion of the Pathology Report Abstraction Form (PRAF)

National Lung Screening Trial / Lung Screening Study (NLST/LSS)

Specifications for Completion of the Pathology Report Abstraction Form (PRAF)

The purpose of the Pathology Report Abstraction Form (PRAF) is to document appropriate pathology specimens from the pathology report for request from pathology labs. This form is to be completed for all participants selected for Pathology Tissue Collection that have appropriate authorization for specimen collection.

Specifications for completing each item of the form are as follows:

Administrative Section:

Participant ID Label: The PID will be pre-filled by

Date Abstracted: Record the date the pathology report was abstracted. This is the date the form was completed. Zero fill month and day, if necessary, and record the last two digits of the year (e.g., 12/02/2008).

Abstractor ID: Record the four-digit staff ID number assigned to the individual who is abstracting the pathology report and completing the PRAF.

Screening Center ID: The two-digit SC ID number will be pre-filled by

Study Year: The study year in which the participant was diagnosed with lung cancer will be pre-filled by

Multiple DE: The multiple Diagnostic Evaluation (DE) item will be pre-filled by and indicates additional primary invasive lung cancers diagnosed simultaneously with or subsequent to the first primary invasive lung cancer within the same study year. Synchronous primary invasive lung cancers (diagnosed simultaneously) may be different histologies or be located in different parts of the lung and each should have been recorded on a separate DE Form.

Part A: Lung Cancer Diagnosis Information:

This section will be pre-filled by and includes the following information as recorded on the DE Form completed for this primary invasive lung cancer diagnosis:

1. **Date of Pathologic Confirmation:** This item corresponds to the DE response in Item C.14b and represents the date that the procedure was performed that collected the most tissue and confirmed the primary invasive lung cancer diagnosis.

2. **ICD-O-3 Code:** This item corresponds to the DE response in Item C.11a and represents the classification of the primary invasive lung cancer according to ICD-O-3 and should be based on histology, if available.

3. **Pathologic Type:** This item corresponds to the DE response in Item C.14a and represents the ICD-O-3 morphology code and behavior for the type of cell composing the tumor, usually determined by the pathologist from a tissue specimen.

4. **Grade of Primary Invasive Lung Cancer:** This item corresponds to the DE response in Item C.15 and documents the histopathologic grade of the primary invasive lung cancer.

5. **Pathology Lesion Size (mm):** This item corresponds to the DE response in Item C.13 and documents the size of the tumor (lesion) at its maximum dimensions in millimeters. This information may have been determined from the pathology report, operative report, or radiology report.

6. **Targeted DE Procedures:** These items correspond to the DE responses in Item A.3 and documents diagnostic or staging procedures that may have procured tumor material or indicated a surgical approach.

Part B: Pathology Tissue Block Information:

7. **Participant Name:** The participant name will be pre-filled with the PCF data if available. The name can be modified or added as needed.

8. **Pathology Lab ID:** The pathology lab ID linked to this participant during the authorization process will be pre-filled by

9. **Loan Period:** The loan period that corresponds to the Pathology Lab ID from the Pathology Lab Information Form will be pre-filled by

10. **Pathology Report Date**: Record the month, day, and year of the pathology report. The pathology report date may be different than the date of the diagnostic or surgical procedure that procured the specimen.

11. **Medical Record Number:** Record the medical record number as it appears on the pathology report. The medical record number is used to identify an individual and his/her medical record information. The number may be either numeric or a combination of alpha and numeric characters.

12. **Accession Number:** Record the laboratory accession number as it appears on the pathology report. This is the number assigned to the sample when it arrives at the laboratory and may be either numeric or a combination of alpha and numeric characters.

13. **Neoadjuvant Therapy?:** Record whether or not the participant received neoadjuvant therapy. Neoadjuvant therapy is treatment given before the primary treatment. Examples of neoadjuvant therapy include chemotherapy, radiation therapy, and hormone therapy.

14-17. Tissue Blocks: Complete each of the lines in Items 14 through 17 regardless of whether any blocks of a particular tissue type will be requested. Each possible block request must be accounted for in

- **Procedure Date:** Record the month, day, and year of the procedure that procured the specimen. This date may be different than the pathology report date. If no blocks are requested, leave this item blank.

- **Proc Code:** Record the procedure code associated with the specimen. If no blocks are requested, leave this item blank.

- **Block ID:** Record the block ID that identifies the specimen. The block ID is the basic identifier appearing on a pathology specimen block and is usually denoted by an alpha character. If no blocks are requested, leave this item blank.

- **Block Section:** Record the block section number of the most representative section of specimen. If no blocks are requested, leave this item blank.

- **Status Code:** Record the appropriate status code for each block requested. If no blocks of a particular tissue type are being requested, record the status code that describes the reason why.

    - 00 – Not Obtained
    - 01 – Not Requesting – Tissue size < 5 mm
    - 02 – Requesting Block
    - 03 – Obtained, not malignant (N or M)

After Completing the Form

- The form should be checked to make sure it is accurate, legible, and complete.

- Enter the form into

- File the form in the PTC folder of the participant's study file.

Appendix 12-7 Cover Letter for Pathology Request Form

Letterhead of Screening Center

National Lung Screening Trial (NLST)

Date

Director, Pathology Department
Pathology Lab Name
Pathology Lab Street Address
Pathology Lab City, State Zip Code

Dear Director of Pathology Department,

We are writing to request your participation in a pathology tissue collection effort for the National Lung Screening Trial (NLST). *SC Name* is one of ten screening centers in the United States collaborating with the National Cancer Institute (NCI) on this study. The purpose of the NLST is to determine whether imaging-based screening reduces lung cancer-specific deaths. Pathology specimens offer great potential for increasing our understanding of lung cancer and its genetic and environmental causes as well as for improving lung cancer prevention and treatment efforts.

The formalin-fixed, paraffin-embedded tissue blocks (FFPE) collected will be used to construct tissue microarrays (TMAs). From each block, one 4µm slide will be cut for H & E staining. Based upon this slide, up to twelve 0.6 mm cores of the tumor and six 0.6 mm cores of adjacent normal tissue will be removed for TMA construction. If multiple blocks are obtained for a single tissue, cores may be distributed from among the blocks for improved capture of heterogeneity, selection of tumor and normal tissue, and core preservation. If lymph node tissue is obtained, up to nine 0.6 mm cores will be removed and, if tissue from a metastatic site is available, a minimum of four and up to twelve 0.6 mm cores will be removed. The voided areas in each FFPE block will be repaired with molten paraffin prior to their return.

The NLST participant(s) listed on the attached Pathology Request Form(s) have given signed consent and/or authorization to collect pathology material from cancer-related procedures during this trial. For each participant, a copy of the consent and/or authorization is attached along with a copy of the pathology report pertinent to this pathology material.

The Pathology Request Form specifies the material we are requesting. For tumors, we are requesting the most representative specimen(s) of primary tumor with tumor-free margin. If available, we are also requesting lymph node and/or metastatic tissue specimens. Please indicate on the Pathology Request Form your response to each request, including any problems in fulfilling our request. Please also indicate your preferred loan period for the material. We are requesting a six-month loan period; however, a minimum loan period of three-months will be required to process the specimen block(s).

Please ship the specimen(s) and a copy of the Pathology Request Form using the enclosed self-addressed, postage paid shipping materials. Please advise us of any additional costs associated with this request for preserved tissue. If you are unable to ship the requested specimen(s), please fax the Pathology Request Form to *SC Coordinator* at *SC Fax*.

Thank you for your assistance with this research. If you have any questions, please call me or our NLST study coordinator, *SC Coordinator* at *SC Phone*.

Sincerely,
SC PI
SC PI Title
SC Name
SC Address

Enclosures: Pathology Request Form, Authorization Form(s), return envelope

Appendix 12-8 Pathology Request Form (PRF)

National Lung Screening Trial (NLST)
Pathology Request Form

Path Lab Name:

Participant Name:

Date of Birth:

Medical Record Number:

Accession Number:

The NLST participant listed above reported diagnostic procedures at your institution. Please send the paraffin blocks requested below. If there is a more representative block of primary lung tumor tissue, please send it in place of the requested primary lung tumor block, noting the relevant information in a blank grid row. Please complete the Pathology Lab columns to indicate the status of each requested specimen and **ship this form** and the requested specimens using the enclosed pre-paid packaging. If no specimens will be shipped, please indicate the reason below and **fax this form** to <<SCFax>>. Thank you for your assistance.

☐ No specimens shipped Reason ____ SC Status Code ________

Tissue Type	Procedure Date	Block ID	Block Section	Path Lab Use Only Shipping status	Path Lab Use Only Reason not shipped	SC Use Only Specimen receipt	SC Use Only Status Code	SC Status Codes	
				☐ Specimen shipped ☐ Specimen not shipped	☐ Not most representative ☐ Specimen not available ☐ Other:________________	☐ Specimen received ☐ Date ____________ ☐ Specimen not received	________	10 Specimen adequate 11 Specimen not available 12 Not most representative 13 Unwanted specimen 14 Too small/multiple fragments 15 Biopsy only 16 Not formalin fixed 17 Specimen damaged; not usable 18 Path lab will only release slides 19 Path lab will only release cores 20 Path lab policy changed to no loan 21 Path lab no response 99 Other (specify) ______________	
				☐ Specimen shipped ☐ Specimen not shipped	☐ Not most representative ☐ Specimen not available ☐ Other:________________	☐ Specimen received ☐ Date ____________ ☐ Specimen not received	________		
				☐ Specimen shipped ☐ Specimen not shipped	☐ Not most representative ☐ Specimen not available ☐ Other:________________	☐ Specimen received ☐ Date ____________ ☐ Specimen not received	________		
				☐ Specimen shipped ☐ Specimen not shipped	☐ Not most representative ☐ Specimen not available ☐ Other:________________	☐ Specimen received ☐ Date ____________ ☐ Specimen not received	________		
				☐ Specimen shipped ☐ Specimen not shipped	☐ Not most representative ☐ Specimen not available ☐ Other:________________	☐ Specimen received ☐ Date ____________ ☐ Specimen not received	________		
				☐ Specimen shipped ☐ Specimen not shipped	☐ Not most representative ☐ Specimen not available ☐ Other:________________	☐ Specimen received ☐ Date ____________ ☐ Specimen not received	________		

How soon does material need to be returned to your facility? (*check one box*) ☐ Permanent retention is fine. ☐ Return in ____ months (prefer a minimum of 6 months).

SC Name
SC Address 1
SC Address 2
SC City State Zip

Appendix 12-9 Discrepancy Notification Form

NLST/LSS Pathology Tissue Collection
DISCREPANCY NOTIFICATION FORM

Date: _____

To: _____

From: _____

Subject: Problem with your shipment dated: _____

Identification of problem item (specimen ID, etc.): _____

Problem description:

_____

_____

_____

Problem resolution:

_____

_____

_____

Resolution date: _____

National Lung Screening Trial (NLST)
LSS Pathology Tissue Transmittal Form - UCLA

Screening Center: University

Shipment Date: 01/05/2009

Shipment ID: U20001

Total # of Blocks: 4

Receipt Confirmation	Neoadjuvant Therapy	Tissue Type	BSI ID	Block ID	Block Section	Loan Policy	Comments
☐	Y	T	KC12345-0701	10	G	3	_____
☐	N	L	KC12345-0702	10	H	3	_____
☐	N	N	KC12345-0703	10	J	3	_____
☐	N	N	KC12346-0701	10	J	3	_____

Appendix 12-11 NLST Colorado Unique Primary Tumor (CO) Form and NLST Colorado Target Annotation (TA) Form

CO **NLST 6654 / LSS - Colorado Unique Primary Tumor Form**

Case#/ PID#: _____

Instructions: Complete this form once for each unique primary tumor (i.e. lung cancer). All slides associated with the same unique primary tumor should be listed and summarized on this form.

1. Was at least one slide associated with this tumor annotated? [1] ☐ **No** ☐ **Yes**

1a. If no, indicate the primary reason below: [2]

- ☐ 220= Insufficient target tissue: Volume
- ☐ 221= Insufficient target tissue: Histologic type
- ☐ 222= Insufficient target tissue: Histologic grade
- ☐ 223= Poor fixation seen histologically
- ☐ 224= Autolysis seen histologically
- ☐ 225= Extra tissue not needed for arrays
- ☐ 227= Slide broken
- ☐ 228= Slide stain poor
- ☐ 229= Slide not labeled
- ☐ 230= Slide other, specify, _____ [3]

2. Most representative <u>topography</u> of tumor, <u>as per original path report</u>? [4]

- ☐ 01= C34.0, Main Bronchus | Malignant neoplasm of bronchus and lung
- ☐ 02= C34.1, Upper Lobe | Malignant neoplasm of bronchus and lung
- ☐ 03= C34.2, Middle Lobe | Malignant neoplasm of bronchus and lung
- ☐ 04= C34.3, Lower Lobe | Malignant neoplasm of bronchus and lung
- ☐ 05= C34.8, Overlapping lesion of bronchus and lung | Malignant neoplasm
- ☐ 06= C34.9, Not otherwise specified
- ☐ 07= C33, Malignant Neoplasm of Trachea
- ☐ 88= Other, specify reason: _____ [5]

3. Which side of body was tumor located, <u>as per original path report</u>? [6] ☐ **Right** ☐ **Left** ☐ **Not Specified**

4. Longest Diameter of tumor, <u>as per original path report</u>: |__|__|__|. |__| [7] mm

5. List the Block IDs of all of the annotated slides associated with this tumor:

Block ID			
i. [8]	**iii.** [10]	**v.** [12]	**vii.** [14]
ii. [9]	**iv.** [11]	**vi.** [13]	**viii.** [15]

Summarize the tumor and non-tumor histology present on the slide(s) below:

<u>6.WHO Classification</u> [16]	**<u>7.Longest Diameter of Invasive Component</u>** [17]	**<u>8. Highest Grade (Select only one)</u>** [18]	**<u>9. Likely metastases?</u>** [20] **<u>(Select only one)</u>**
|__|__|__|__| / |__|	|__|__|__|. |__| mm	☐ 1= Well differentiated ☐ 2= Moderately ☐ 3= Poorly ☐ 4= Undifferentiated ☐ 88 = Other, specify: _____ [19]	☐ 1= None ☐ 2= Unlikely ☐ 3= Probable ☐ 4= Can't Determine

<u>10. NON-Tumor: Histology (check all that apply)</u>		**<u>11. NON-Tumor: Pre-malignant (check all that apply)</u>**
☐ 01= Normal lung [21]	☐ 07= Emphysema [27]	☐ 01= Squamous carcinoma *in situ* (8070/2) [34]
☐ 02= Granuloma [22]	☐ 08= Fibrosis [28]	☐ 02= Squamous dysplasia, MILD [35]
☐ 03= Hemorrhage [23]	☐ 09= Pre-neoplastic tissue [29]	☐ 03= Squamous dysplasia, MODERATE [36]
☐ 04= Pneumonia [24]	☐ 10= Chronic bronchitis [30]	☐ 04= Squamous dysplasia, SEVERE [37]
☐ 05= Necrosis [25]	☐ 88= Other, Specify: [31]	☐ 05= Atypical adenomatous hyperplasia (AAH) [38]
☐ 06= Infarction [26]	_____ [32]	☐ 06=Diffuse idiopathic neuroendocrine cell hyperplasia(DIPNECH) [39]
	☐ 99= N/A [33]	☐ 07= Reserve Cell Hyperplasia (RCH) [40]
		☐ 08= Carcinoid tumorlet [41]
		☐ 88= Other, Specify: _____ [42]
		☐ 99= N/A [43]

_____ [44] Interpreting Pathologist's initials

_____ [45] Initials of person completing the form

_____/_____/_____ [46] Date Form Completed **(mm/dd/yyyy)**

Appendix 12-11 NLST Colorado Unique Primary Tumor (CO) Form and NLST Colorado Target Annotation (TA) Form

TA **NLST 6654 / LSS**
Colorado Target (Region of Interest) Annotation

Affix Barcode Slide Label Here

Case #/ PID#: ______________

Block ID: ______________________________ [1]

Slide Label: S_____ [2]

Complete the following questions, in columns. **Date of Slide Annotation:** ____/____/________ [3] (mm/dd/yyyy)

4	ROI #1	ROI #2	ROI #3	ROI #4
5	**Label Color** ☐ Purple = Normal Lung ☐ Yellow = Proximal Bronchus ☐ Green = Distal Bronchial ☐ Black = Invasive Carcinoma ☐ Blue = Carcinoma In Situ ☐ Red = Invasive Type II ☐ Aqua = Metastasis ☐ Orange = Normal LN ☐ Brown = Pre-Malignant ☐ Other: ________________[6]	**Label Color** ☐ Purple = Normal Lung ☐ Yellow = Proximal Bronchus ☐ Green = Distal Bronchial ☐ Black = Invasive Carcinoma ☐ Blue = Carcinoma In Situ ☐ Red = Invasive Type II ☐ Aqua = Metastasis ☐ Orange = Normal LN ☐ Brown = Pre-Malignant ☐ Other:________________[6]	**Label Color** ☐ Purple = Normal Lung ☐ Yellow = Proximal Bronchus ☐ Green = Distal Bronchial ☐ Black = Invasive Carcinoma ☐ Blue = Carcinoma In Situ ☐ Red = Invasive Type II ☐ Aqua = Metastasis ☐ Orange = Normal LN ☐ Brown = Pre-Malignant ☐ Other: ________________[6]	**Label Color** ☐ Purple = Normal Lung ☐ Yellow = Proximal Bronchus ☐ Green = Distal Bronchial ☐ Black = Invasive Carcinoma ☐ Blue = Carcinoma In Situ ☐ Red = Invasive Type II ☐ Aqua = Metastaasis ☐ Orange = Normal LN ☐ Brown = Pre-Malignant ☐ Other: ________________[6]
7	**Representative Histology** ☐ 1 = Tumor ☐ 2 = Non-tumor (see Q17&20)	**Representative Histology** ☐ 1 = Tumor ☐ 2 = Non-tumor (see Q17&20)	**Representative Histology** ☐ 1 = Tumor ☐ 2 = Non-tumor (see Q17&20)	**Representative Histology** ☐ 1 = Tumor ☐ 2 = Non-tumor (see Q17&20)
8	**WHO Classification** |__|__|__|__| / |__|	**WHO Classification** |__|__|__|__| / |__|	**WHO Classification** |__|__|__|__| / |__|	**WHO Classification** |__|__|__|__| / |__|
9	**Highest Grade** ☐ 1= Well differentiated ☐ 2= Moderately ☐ 3= Poorly ☐ 4= Undifferentiated ☐ 88 = Other, specify: ______________________ [10]	**Highest Grade** ☐ 1= Well differentiated ☐ 2= Moderately ☐ 3= Poorly ☐ 4= Undifferentiated ☐ 88 = Other, specify: ______________________ [10]	**Highest Grade** ☐ 1= Well differentiated ☐ 2= Moderately ☐ 3= Poorly ☐ 4= Undifferentiated ☐ 88 = Other, specify: ______________________ [10]	**Highest Grade** ☐ 1= Well differentiated ☐ 2= Moderately ☐ 3= Poorly ☐ 4= Undifferentiated ☐ 88 = Other, specify: ______________________ [10]
11	**Cellular %** |__|__|__| % (001-100)	**Cellular %** |__|__|__| % (001-100)	**Cellular %** |__|__|__| % (001-100)	**Cellular %** |__|__|__| % (001-100)
12	**Invasion Component (mm)** |__|__| . |__|	**Invasion Component (mm)** |__|__| . |__|	**Invasion Component (mm)** |__|__| . |__|	**Invasion Component (mm)** |__|__| . |__|
13	**Lymphatic invasion?** ☐ NO ☐ YES	**Lymphatic invasion?** ☐ NO ☐ YES	**Lymphatic invasion?** ☐ NO ☐ YES	**Lymphatic invasion?** ☐ NO ☐ YES
14	**Blood vessel invasion?** ☐ NO ☐ YES	**Blood vessel invasion?** ☐ NO ☐ YES	**Blood vessel invasion?** ☐ NO ☐ YES	**Blood vessel invasion?** ☐ NO ☐ YES
15	**% inflammatory cells?** |__|__|__| % (001-100)	**% inflammatory cells?** |__|__|__| % (001-100)	**% inflammatory cells?** |__|__|__| % (001-100)	**% inflammatory cells?** |__|__|__| % (001-100)
16	**Likely metastases?** ☐ 1= None ☐ 2= Unlikely ☐ 3= Probable ☐ 4= Can't Determine	**Likely metastases?** ☐ 1= None ☐ 2= Unlikely ☐ 3= Probable ☐ 4= Can't Determine	**Likely metastases?** ☐ 1= None ☐ 2= Unlikely ☐ 3= Probable ☐ 4= Can't Determine	**Likely metastases?** ☐ 1= None ☐ 2= Unlikely ☐ 3= Probable ☐ 4= Can't Determine
17	**NON-Tumor: histology** |__|__| [17] (Table 3) ☐ N/A [18]	**NON-Tumor: histology** |__|__| [17] (Table 3) ☐ N/A [18]	**NON-Tumor: histology** |__|__| [17] (Table 3) ☐ N/A [18]	**NON-Tumor: histology** |__|__| [17] (Table 3) ☐ N/A [18]
	If other specify: ____________ ________________________[19]	**If other specify:** ____________ ________________________[19]	**If other specify:** ____________ ________________________[19]	**If other specify:** ____________ ________________________[19]
20	**NON-Tumor: pre-malignant** |__|__| [20] (Table 4) ☐ N/A [21]	**NON-Tumor: pre-malignant** |__|__| [20] (Table 4) ☐ N/A [21]	**NON-Tumor: pre-malignant** |__|__| [20] (Table 4) ☐ N/A [21]	**NON-Tumor: pre-malignant** |__|__| [20] (Table 4) ☐ N/A [21]
	If other specify: ____________ ________________________[22]	**If other specify:** ____________ ________________________[22]	**If other specify:** ____________ ________________________[22]	**If other specify:** ____________ ________________________[22]

____________________________ [23]
Interpreting Pathologist's initials

__________________________________ [24]
Initials of person completing the form

_____/_____/__________ [25]
Date Form Completed **(mm/dd/yyyy)**

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National Lung Screening Trial (NLST)
LSS Pathology Tissue Transmittal Form – Return to Pathology Lab

Screening Center: University of Maryland

Pathology Lab: Allegheny General Hospital

Shipment Date: 04/10/09

Shipment ID: S20001

Total # of Blocks: 4

Receipt Confirmation	Tissue Type	Block ID	Block Section	Accession Number	Procedure Date	Comments
☐	Tumor	10	G	27789014	2/15/05	_____
☐	Lung	10	H	27789014	2/15/05	_____
☐	Nodes	10	J	27789014	2/15/05	_____
☐	Tumor	10	J	41368932	11/16/04	_____

NLST/LSS – Pathology Status Report Summary
Site 20

	Participant Authorization Status					
Site ID	Not Required	Pending	Obtained	MDF_Refused	MDF- No Response	MDF-No Loan
20	11	0	3	1	0	1

	Case Status				
Site ID	Selected	Authorized	Request Pending	Request Complete	Shipped
20	17	15	5	10	6

Appendix 12-13 NLST/LSS SC Pathology Status Reports

NLST/LSS - Pathology Block Status Report
Site 20

PID	SY	Visit	Date Requested	Requested	Pending	Received Adequate	Received Inadequate	Date Received	Shipped	Date Shipped
20-10001-1	01	1	01/14/2009	2	0	2	0	02/06/2009	2	02/11/2009
20-10012-5	05	1	04/08/2009	3	0	3	0	04/01/2009	0	.
20-10048-1	00	1	01/14/2009.	0	0	0	0	.	0	.
20-10167-7	00	1	01/06/2009	3	3	0	0	.	0	.
20-10239-4	04	1	01/06/2009	3	3	0	0	.	0	.
20-10254-1	02	1	01/06/2009	3	0	1	2	02/23/2009	1	03/11/2009
20-10345-6	01	1	01/06/2009	3	0	1	2	02/23/2009	1	03/11/2009
20-10362-3	02	1	01/06/2009	3	0	3	0	02/05/2009	3	02/11/2009
20-10401-0	05	1	04/08/2009	1	1	0	0	.	0	.
20-10483-0	02	1	.	0	0	0	0	.	0	.
20-10498-8	01	1	01/06/2009	3	3	0	0	.	0	.
20-10552-1	01	1	01/06/2009	3	0	2	1	02/05/2009	2	02/11/2009
20-10560-3	00	1	01/06/2009	3	0	3	0	02/05/2009	3	02/11/2009
20-10881-9	02	1	.	0	0	0	0	.	0	.
20-11099-4	01	1	01/14/2009	3	3	0	0	.	0	.
Totals				33	13	15	5		12	
N = 15										

Note: Received Inadequate includes blocks requested but not most representative or not adequate.

Report Date: April 14, 2009

13. SCREENING CENTER STUDY CLOSEOUT

13.1 Overview

Study closeout refers to the process for terminating the study and ensuring proper documentation and storage of study-related data and materials. The tasks and timeline for NLST/LSS SC study closeout was driven by SC contract requirements as well as recommendations from the NLST DSMB. This chapter provides details on the SC study closeout requirements, timeline, and tasks.

13.2 Organization

The SC study closeout process was facilitated by the NLST/LSS SC Closeout Committee, established in March 2010. The committee included representatives from each of the ten NLST/LSS SCs, the CC, and NCI. The CC Coordinator routinely communicated with SC Coordinators to identify specific issues requiring resolution. The CC discussed issues with NCI, documented resolutions, and coordinated regular conference calls for the committee to discuss issues and resolutions. Final decisions related to SC closeout tasks were disseminated to the SCs by the CC in NCI-approved decision logs. The NLST/LSS closeout decision logs have been incorporated into this chapter in order to provide a single resource for closeout information.

13.3 Timeline

The overall timeline for SC closeout activities was driven by the SC contract termination date, September 29, 2011. Discussions about the closeout process began at the NLST/LSS Steering Committee meeting in February 2010. NLST/LSS SC Closeout Committee conference calls were initiated in March 2010. Within the overall plan for SC study closeout, the timeline for certain activities related to final data collection and cleaning was driven by the DSMB's decision to stop the trial in October 2010 and report findings in November 2010. See Figure 13-1 for a timeline of SC study closeout related activities.

Figure 13-1: Timeline for SC Study Closeout Activities

Task	01/10	02/10	03/10	04/10	05/10	06/10	07/10	08/10	09/10	10/10	11/10	12/10	01/11	02/11	03/11	04/11	05/11	06/11	07/11	08/11	09/11
Initial closeout discussion at Steering Committee Meeting		X																			
SC Closeout Committee			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Contact participants for final (accelerated) ASU	x	x	x	x	x	X															
Data entry for final (accelerated) ASU	x	x	x	x	x	x	x	x	X												
Final NDI search and data entry									x	x	X										
Notify participants of trial results											X										
Mail final NCI participant newsletter												X									
Complete medical record abstraction	x	x	x	x	x	x	x	x	x	x	x	X									
Complete data collection and data entry	x	x	x	x	x	x	x	x	x	x	x	X									
Collect and ship death certificates and EVP folders to CC	x	x	x	x	x	x	x	x	x	x	x	X									
Enter final updates to database													X								
Enter final updates to participant contact information													X								
Discontinue use of retention materials													X								
Closeout imaging QA and CTIL equipment														X							
Notify participants of SC closeout															X						
Closeout equipment																x	x	x	x	X	
Pull and shred death certificates																			x	X	
Pull NDIR forms and ship to CC																			x	X	
Box records for long-term storage																			x	X	
Ship records to long-term storage facility																					X
Submit final report to NCI Contracts																					X
Designate SC contact to serve as future resource																					X

x = work in progress

X = task completion date

13.4 Completion of Data Collection

The final phase of data collection included the administration of the final ASU, the completion of expected medical record abstraction forms, and the collection of death certificates and other information to support the Endpoint Verification Process (EVP). Each of these activities is discussed in the following sections.

13.4.1 Final (Accelerated) ASU

Administration of the final ASU, including the timeline for administration, is described in detail in Section 3.6.1. All data entry related to the final ASU was completed by September 29, 2010.

13.4.2 Medical Record Abstraction

Medical record abstraction, including completion of the Diagnostic Evaluation (DE) form, Treatment Information (TI) form, Cancer Progression (CP) Form, and Cancer Diagnosis Form (CDF), is described in detail in Chapters 7 and 8. SCs continued to complete the appropriate medical record abstraction forms for all cancers reported to have been diagnosed on or before December 31, 2009. SCs were asked to prioritize medical record abstraction for reported and confirmed lung cancers, with a target deadline of July 31, 2010 for completion of these cases. The final deadline for completing all medical record abstraction forms was December 31, 2010.

The medical record abstraction QA process, described in Appendix 7-8, continued through January 21, 2011.

13.4.3 Endpoint Verification Process

During study closeout, it was critical to ascertain complete information about participant deaths that occurred on or before December 31, 2009. Based on directives from the NCI and the NLST DSMB, SCs were asked to make every effort to accelerate the collection and shipment of death certificates and documentation to support the Endpoint Verification Process (EVP), described in detail in

Chapter 9. To facilitate the acceleration of the EVP, in April 2012, the CC began applying the EVP algorithm on a weekly basis and began processing death certificates and EVP folders in an ongoing manner, rather than in batches. SCs continued to ship death certificates and EVP documentation to the CC through December 31, 2010. The final conference call of the EVT was held on January 12, 2011.

13.5 Final Data Processing

SC and CC data processing tasks are described in Sections 11.7.1 and 11.7.2, respectively. All data entry was completed by December 31, 2010. Final data processing continued at the SCs through January 2011 and at the CC through September 2012.

13.5.1 Final Research Data Sets

Throughout 2011 and through September 2012, the CC continued to work with IMS and ACRIN to assemble comprehensive data sets that were made available upon request to NLST investigators for research purposes. Procedures for requesting and obtaining access to the investigator research data sets are described in Section 1.6.2.1 and Appendix 1-6.

The investigator research data sets were made available in phases as study data were cleaned, processed, and compiled. The data sets would ultimately consist of all data elements collected during the study, as well as additional variables added during data processing. In addition to numerous derived variables, additional data included supplemental staging information abstracted by the CC using the 7th Edition AJCC Cancer Staging Manual and additional histopathology data collected using the revised IASLC classification schema for lung adenocarcinoma.

Following a one-year period of preferred investigator access, the research data sets will be made available upon request to the broader scientific research community.

13.6 Concluding Participant Contact

13.6.1 Discontinuing Participant Retention Materials

Effective October 18, 2010, SCs were asked to discontinue the use of all participant retention materials except the national newsletter, SC newsletters, condolence cards, and holiday cards, which could continue to be used through December 31, 2010. The final NLST national newsletter was provided to the SCs by NCI in December 2010. Effective January 1, 2011, SCs were asked to discontinue the use of all retention materials except condolence cards, which could be mailed through the contract end date, September 29, 2011. Any SC wishing to utilize other types of retention materials, or to utilize any of the listed materials (except condolence cards) beyond December 31, 2010 was required to submit a written request to the CC Coordinator for NCI approval prior to use.

13.6.2 Final Updates to Participant Contact Information

Though data entry for the final ASUs and PCFs was complete by September 29, 2010, it was possible for the SCs to learn about changes to participant contact information after this date through the mailing of the final result letter, the national newsletter or other retention material, or through notification by the participant. SCs were permitted to make changes to participant contact information in through January 21, 2011. After this date, participant contact information could not be changed.

13.6.3 Notifying Participants of Trial Results

On October 20, 2010, the NLST DSMB decided that there were sufficient data for the trial to reach a definitive conclusion. Due to the importance of the findings, NCI, with input from the DSMB, devised a plan for immediate dissemination of information related to study findings to participants. NCI prepared the official NLST Final Results Letter (Appendix 13-1) and provided it to the SCs on November 4, 2010 simultaneously with an NCI press teleconference to announce trial results. SCs were notified in advance and asked to prepare stamped, addressed envelopes prior to receipt of the letter in order to expedite the process. SC IRBs were not required to approve the participant letter; however, SCs were asked to provide a copy to their institutional IRBs for information. NCI requested that every effort be made to mail the letter to all participants by close of business on November 5, 2010.

13.6.4 Notifying Participants of SC Closeout

NCI developed a template letter for use by SCs wishing to inform study participants of the closing of SC offices. See Appendix 13-2 for the template NLST/LSS SC Participant Closeout Letter. The template letter was provided to the SCs in January 2011 for optional use in March 2011. SCs wishing to mail the letter were required to submit an SC-specific version to the CC Coordinator by February 15, 2011 for NCI approval.

13.6.5 Contacting Participants for Additional Research

Since the NLST/LSS consent form did not address recruitment of participants for research projects not related to the NLST, the use of participant personal identifiers to recruit subjects for other research was determined by the NCI to be subject to SC institutional IRB review and approval.

13.7 Disposition of SC Records

13.7.1 Location and Duration of Long-term Storage

SC NLST/LSS records will be stored for 10 years after completion of the study, defined as September 29, 2011. Records may be stored onsite at the SC or at an offsite location arranged by the SC. NCI provided funds for the purchase of storage boxes but did not provide funds for the storage or maintenance of records. In addition, the SC will be responsible for any costs associated with accessing records in the event of a mandatory audit or other authorized purpose. SCs also may be asked to access records in long-term storage to facilitate ancillary research; however, the SC will not be responsible for these costs as such costs must be covered by the approved ancillary project.

NCI identified three acceptable methods for long-term storage of SC NLST/LSS records: storage in sealed boxes; storage in locked file cabinets; or storage on shelving systems that reside in locked areas used solely for record storage. The requirements for each option are as follows.

Storage in sealed boxes:

- Within each box, place records and participant files in PID order.
- Label each box with the range of PIDs contained in that box.
- Seal the box with packing tape.
- If storing boxes at the SC, place boxes in a locked room or locked area used solely for record storage.
- If storing boxes at an off-site storage facility, make arrangements for boxes to be stored in a locked area that is used solely for record storage.

Storage in locked file cabinets:

- Within each file cabinet, place records and participant files in PID order.
- Label the outside of each file cabinet with the range of PIDs contained in that file cabinet.
- Place file cabinets in either a room (locked or unlocked) or an open work space.

Storage on shelving systems that reside in locked areas used solely for record storage:

- Within each shelf, place records and participant files in PID order.
- Label the side of each shelf with the range of PIDs contained on that shelf.
- Storage area must not be located within an office suite.

Each SC was required to provide the details of its plans for long-term storage of records and participant files by completing the form, "SC Plan for Long-term Storage of NLST Records and Participant Files," provided in Appendix 13-3. Completed forms were submitted to the CC Coordinator by January 28, 2011 for NCI approval.

13.7.2 Types of SC Records to be Maintained

Any SC record or documentation that is PID-specific was to be retained in participant files for long-term storage (See Section 13.7.2.1). Non PID-specific records or documentation that pertained

to unique SC practices or decisions were to be retained for long-term storage (See Section 13.7.2.2). In addition, screening exam images were also expected to be retained (See Section 13.7.2.3).

In general, any SC record or documentation that is neither PID-specific nor unique to the SC may have been, but was not required to be, retained for long-term storage. Examples of this type of documentation include: contact information and eligibility determination materials for individuals never enrolled; batch transmittal forms; Manuals of Operations and Procedures (MOOP); decision logs; blank study forms; and general correspondence to all SCs from the CC or NCI. SCs were permitted to destroy these records at the conclusion of the contract period.

13.7.2.1 Long-term Storage of Participant Files

In general, all PID-specific documentation, with the exception of death certificates and selected NDIR forms, was to be retained for long-term storage. Details regarding the disposition of death certificates are described in Section 13.7.2.4. Details regarding the disposition of NDIR forms are described in Section 13.7.2.5. NLST/LSS participant files were to include the following applicable documents for long-term storage:

Eligibility determination and randomization materials:

- Eligibility Screener (ES)
- Eligibility Verification Form (EVF)
- IVRS confirmation
- Informed consent form

Baseline and annual data collection forms:

- Medical History Questionnaire (MHQ)
- Annual Study Update (ASU) and ASU – Post Screening (ASU-PS)
- Participant Contact Form (PCF) and Participant Contact Update Form (PCUF)

Screening exam forms:

- Spiral CT Screening Exam (SCT) Form
- Chest X-ray Screening Exam (XRY) Form
- Attestation forms

Annual visit documentation:

- Appointment letters
- Radiology reports
- Screening exam results letters

Medical record abstraction documents:

- Cancer Notification Form (CNF)
- Cancer Diagnosis Form (CDF)
- Diagnostic Evaluation (DE) Form
- Treatment Information (TI) Form
- Cancer Progression (CP) Form
- Medical Record Release Authorization
- Requests for medical records
- Medical records

Documentation of non-response:

- Missing Data Form (MDF)
- Non-Response Form (NRF)

Heath Assessment Questionnaire (HAQ)

Protocol and HIPAA Violation Form (PHVF)

Report of Adverse Events for NIH-Sponsored Clinical Trials (RAE)

Death documentation:

- Death Certificate Tracking Form (DCTF)
- Endpoint Verification Process (EVP) documents
  - Medical records collected for EVP
  - Death Documentation Sheet (DDS)
  - History of Malignancy (HOM) Form
  - Additional Documentation Request (ADR) Form
  - Pathology/Radiology Review Request (PRR) Form

National Death Index (NDI) documentation:

- National Death Index Results (NDIR) Form
- Requests for medical records

Pathology Tissue Collection documentation:

- Participant Authorization Form (PAF)
- Pathology Report Abstraction Form (PRAF)
- Pathology Request Form (PRF)
- Discrepancy Notification Form

Data cleaning documentation:

- SC Edit Form
- CC Edit Form
- CC/SC correspondence
- SC documentation

Other participant correspondence and documentation of participant correspondence.

If an SC filed any of the above listed documentation such as MRA records, EVP documentation, Pathology Tissue Collection documentation, NDI documentation, and/or data cleaning records separately from the main participant file, the SC was asked to place all folders for each PID together in preparation for storage. Any PID-specific electronic correspondence or documentation of data cleaning decisions were required to be printed and placed in the participant file for long-term storage.

13.7.2.2 Long-term Storage of SC-Specific Records

SC-specific documentation was required to be retained for long-term storage. Examples of these types of records include the following:

- IRB submissions and approvals
- SC staff records, including Records of Experience, Credentials, and Training (ECT) forms
- Unique correspondence between the SC and the CC or NCI
- Machine Parameter and Quality Assurance forms
  - CT/CXR Equipment Characteristics Forms
  - Attestation to CT/CXR Performance Testing Forms
  - Bi-Monthly CT Water Phantom Measurement Forms
  - CT Dosimetry Measurement Forms
  - Annual CXR Exposure Measurement Forms

These SC-specific records were to be placed into labeled boxes and stored in the same location as the participant files.

Each SC was required to contact their individual Contracts or Financial Office to determine the institutional policy for storage of financial records.

13.7.2.3 Long-term Storage of Screening Exam Images

Spiral CT (CT) screening exam images were not required to be retained for long-term storage since the images were transferred to the NLST/LSS CT Image Library (CTIL) at Washington University. Hard copy and digital CT images were permitted to be destroyed at the conclusion of SC contracts. Since there is no central storage of chest x-ray (CXR) images, SCs were required to retain these images. Requirements for long-term storage of hard copy and digital CXR images are described in the following paragraphs.

Hard copy CXR images are stored locally. The images were boxed separately from participant files and the boxes labeled with the PID ranges included. Hard copy images may be stored at the SC's Radiology Department or at the local storage facility where participant files and other SC records are stored. If requested by the SC, NCI provided funds for the purchase of storage boxes for hard copy images.

Digital CXR images are also stored locally. Digital images may be stored on data CDs at the SC's Radiology Department, at the local storage facility where participant files and other SC records are stored, or directly on the SC server.

SCs are responsible for costs associated with the storage and maintenance of images. In addition, it is the responsibility of the SC to ensure that all hard copy and/or digital images will be retained for at least 10 years after the end of the study, defined as September 29, 2011.

13.7.2.4 Disposition of Death Certificates

Beginning in July 2011, SCs were required to pull all hard copy death certificates, including de-identified copies, from participant files and/or other stored locations, and shred all copies of the death certificates. Prior to shredding, SCs sent to the CC a list of PIDs for which death certificates were to be shredded. The CC verified that a de-identified copy of each death certificate was on file at the CC and then notified the SC that the death certificates could be shredded. SCs notified the CC and NCI when shredding was complete, and also notified the state(s) that issued death certificates, if required. Electronic copies of death certificates, including scanned images and keyed data, were required to be destroyed at SC closeout. Confirmation of the destruction of these files was provided to the CC and NCI.

Some states required confirmation that death certificates and related data were destroyed at the conclusion of the trial. Confirmation typically required the date and method of destruction for hard copy and electronic records, and was provided through e-mail, first class mail, or certified mail. SCs were required to refer to their agreements with state Vital Statistics Offices (VSOs) and ensure compliance with any such requirements. SCs could also choose to provide confirmation of destruction to all state VSOs from which death certificates were received for the trial.

At the request of NCI, the CC will retain de-identified copies of death certificates for three years following the conclusion of data analysis and publication of the final results. The purpose is to protect the data set from inadvertent destruction as a result of computer failure, perform additional analyses, confirm analyses, or provide source documents in the event of an audit. At the conclusion of this time period, the de-identified death certificates will be destroyed by shredding. If storage of the de-identified death certificates for this time period is precluded by the SC's agreement with a state VSO that provided death certificates for the trial, the SC was asked to contact the state VSO to request permission. If the state VSO did not grant permission, the SC was asked to inform the CC and NCI. In this instance, the SC was required to provide the CC with a list of PIDs for which death certificates must be shredded as per state VSO requirements.

13.7.2.5 Disposition of NDI Materials

At the conclusion of SC contracts, SCs were required to destroy all hard copy and electronic results files received from the NDI. NDI Results (NDIR) forms that documented an exact or probable match from an NDI search were pulled from the participant files and shipped to the CC. The CC provided PID lists to the SCs for this effort. NDIR forms for exact and probable matches will be stored at the CC for three years following the conclusion of data analysis and publication of the final results, and then shredded. NDIR forms that do not document an exact or probable match were retained with the participant files for long-term storage.

13.8 Disposition of Equipment

13.8.1 Imaging QA and CTIL Equipment

Washington University provided SCs and satellite screening sites with equipment to support imaging QA and CTIL activities. Imaging QA equipment consisted of a workstation and monitor. CTIL equipment consisted of a portable laptop computer. The following two-part process for closing out the imaging QA and CTIL equipment was established by Washington University and approved by the NCI.

Part I: Hard Drive Cleansing

The hard drives on both the imaging QA workstation and the CTIL laptop were wiped clean to ensure that no lingering protected health information remained. Washington University provided to each site a CD containing a program designed for this purpose. Each site executed the program on both the imaging QA workstation and the CTIL laptop. Washington University also provided each site with a NLST/LSS Imaging QA and CTIL Equipment Decommission Form (Appendix 13-4) to document the successful execution of the program. The staff member who executed the program and the site Principal Investigator (PI) were required to sign the form. If the site did not wish to run the program locally, the site was asked to ship the equipment to Washington University, at the site's expense, for hard drive cleansing.

Part II: Disposition of the Equipment

After running the hard-drive cleansing program, the site chose one of three options for equipment disposition, described below. Destroying or discarding the equipment was not an option.

1. Assume ownership and re-use the equipment – If this option was chosen, it was explained that, after wiping the hard drive, the system would no longer boot unless an operating system was installed. To install an operating system, the site was able to use the recovery disk that was originally shipped with the equipment, or may have used an institutional blanket license to install an operating system.
2. Donate the equipment to a school or charity.
3. Return the equipment – If this option was chosen for the imaging QA workstation, the workstation was shipped to the NCI at the site's cost. If this option was chosen for the imaging QA monitor and/or CTIL laptop, the equipment was shipped to Washington University. Funds to cover shipping costs for the imaging QA monitor and CTIL laptop could be requested from Washington University, but funds were not guaranteed.

Sites were permitted to apply different options to different pieces of equipment and were required to record the option(s) chosen on the NLST/LSS Imaging QA and CTIL Equipment Decommission Form before returning the form to Washington University. Washington University collated site responses and submitted an overall plan to the NCI Contracts Office. Per the Code of Federal Regulations (CFR), the NCI Contracts Office reviewed and approved each site's disposition plan.

13.8.2 Equipment

The CC provided SCs and satellite screening sites with equipment to support the Equipment consisted of a server, workstations, printer(s), and barcode scanners. The following multi-step process was established by the CC and approved by NCI.

Step 1: Confirmation of Equipment at the Sites

The CC contacted each SC to verify an accounting of equipment at the SC.

Step 2: Hard Drive Cleansing

The hard drive on the workstation(s) was wiped clean to ensure that no protected health information (PHI) or software licenses remained. For this purpose, the CC provided each SC with a disk erasure program and CC User Support worked with each SC to execute the program. Following execution of the program, the SC documented its completion on the Equipment Decommission Form (Appendix 13-5).

Step 3: Disposition of the Equipment

After running the disk erasure program, the SC was given the option to retain the workstation(s) at no additional cost, or return the workstation(s) to the CC. The disposition plan for workstations was documented on the NLST/LSS Equipment Decommission Form. The SC was required to dispose of printers, and was required to return barcode scanners to the CC. The CC provided packing instructions and pre-paid shipping labels for the barcode scanners and any workstations that were returned. The CC also provided shipping boxes upon request.

13.8.2.1 Retaining Equipment for Potential Future Studies

To allow for the possibility of future follow-up on NLST/LSS participants, SCs were asked to retain the server and one workstation after September 29, 2011. Prior to September 29, 2011, SCs completed the following tasks.

- Create a final tape back-up of data. If the SC was unable to create a final tape back-up, the SC was asked to retain the last two back-up tapes that were created.
- Create a final CD back-up of data with guidance from Westat User Support.
- Place the server and workstation in a secure, temperature-controlled storage location. If possible, keep the server and workstation plugged into a surge-protected electrical outlet, and retain the modem connection.
- Place the back-up CD in a locked drawer or file cabinet that is accessible only to the staff member that will serve as the NLST designated contact after September 29, 2011.
- Store the back-up tape(s) with the participant files in the long-term record storage location.

After September 29, 2011, SCs should visually check the stored equipment and back-up data CD on a monthly basis to ensure that they are secure and undamaged.

13.8.2.2 Destruction of Back-up Tapes

Each SC was asked to refer to its institutional policies and procedures for data destruction and then document its plan for destruction of back-up tapes. Destruction plans were submitted to the CC for NCI approval. Following destruction of the back-up tapes, SCs notified the CC to confirm destruction.

13.9 Designating an SC Contact

Each SC was required to designate a contact person for future queries related to the NLST. The name and contact information for the SC-designated contact was provided to the CC Coordinator.

Appendices for Chapter 13

13-1 NLST Final Results Letter

13-2 NLST/LSS SC Participant Closeout Letter

13-3 SC Plan for Long-term Storage of NLST Records and Participant Files

13-4 NLST/LSS Imaging QA and CT Image Library (CTIL) Equipment Decommission Form

13-5 NLST/LSS Equipment Decommission Form

Appendix 13-1: NLST Final Results Letter

November 4, 2010

Dear NLST Participant:

This letter is to tell you about important news from the National Lung Screening Trial (NLST), and to thank you for your participation and commitment to the trial. As a participant in NLST, you have made a major contribution to this research study and to the field of lung cancer research. This highly significant study would not have been possible without you.

Because of your efforts, we now know that screening for lung cancer with low-dose helical (spiral) CT can reduce deaths from lung cancer by 20 percent in individuals aged 55 to 74 who are former and current heavy smokers.

When you joined NLST, we told you that we would let you know the study results as they were being made public. However, in this age of instant communication, this letter has probably not reached you before you learned about the trial results on the news. We would have preferred to notify you first, but because the results of the NLST show that screening will save lives, we were obliged to make the results public as quickly as possible. The NLST findings may change medical practice and the Nation's health care policy related to lung cancer screening. Again, because of your contribution, older, long-term heavy smokers may be able to reduce their chances of dying from lung cancer.

Here is a summary of the initial results of the NLST:

- The people who were assigned to receive low-dose helical (spiral) CT for lung cancer screening were found to have 20 percent fewer lung cancer deaths than those assigned to chest x-ray screening. For every 300 NLST participants screened with helical CT, one life has been extended.

- About 25 percent of all the deaths in the NLST were from lung cancer. Other common causes were heart attack and other heart diseases, stroke, and complications from lung diseases such as chronic obstructive pulmonary disease (COPD) and emphysema, all of which are associated with a history of heavy smoking.

- Although not part of the study's original plan, NLST researchers also saw a significant difference in all causes of death between the screening groups and found that the helical CT group had a 7 percent lower death rate from all causes than the group assigned to chest x-ray.

- Low-dose helical CT scans were able to identify lung cancer at an early stage, which gave doctors a better chance to treat it effectively. There were also fewer late-stage cancers found in those participants included in the helical CT group by the time they had their second and third scans.

- This study provides the first evidence from a randomized, prospective clinical trial that any lung cancer screening test can reduce deaths from lung cancer.

The initial results of the NLST that are now being released will be part of a fuller analysis, with more detailed findings, which will be published as a formal, peer-reviewed scientific publication, as quickly as possible. It is important for you to know that researchers are still reviewing some of the data you have contributed to the trial. In addition, some of them will begin new studies to examine the blood and tissue samples provided during the trial to better understand lung cancer. Much more information from the NLST will be published over the next few years.

Here is what you should know, based on the analysis to date and the group to which you were randomly assigned:

If you had **chest X-rays** during NLST:

- Chest X-rays have not been shown to be effective in reducing lung cancer deaths in any previously published clinical trial.
- You may want to talk to your personal health care provider about having low-dose helical CT screening for lung cancer. However, right now, the cost of a scan is generally not reimbursed by insurance if you do not have an existing medical condition. The current estimated Medicare reimbursement rate for a non-contrast, diagnostic helical CT of the lung is $300, but varies by geographic location.
- If you are still a smoker, please think about stopping now. Quitting smoking is the best way to reduce your chance of dying from many cancers, heart disease, and lung diseases.
- If you have stopped smoking, keep up the good work! The study results do not mean it is okay to start smoking again.

If you have **low-dose helical (spiral) CT scans** during NLST:

- The scans in your group were helpful in reducing lung cancer deaths.
- We do not know if additional CT scans will be beneficial to you. You may want to talk to your personal health care provider about whether you should have additional screening with low-dose helical CT. However, right now, the cost of a scan is generally not reimbursed by insurance if you do not have an existing medical condition. The current estimated Medicare reimbursement rate for a non-contrast, diagnostic helical CT of the lung is $300, but varies by geographic location.
- If you are still a smoker, please think about stopping now. Quitting smoking is the best way to reduce your chance of dying from many cancers, heart disease, and lung diseases.
- If you have stopped smoking, keep up the good work! The study results do not mean it is okay to start smoking again.

If you or your health care provider would like more information, please visit the NLST webpage at the National Cancer Institute (NCI) at http://cancer.gov/nlst/updates. You will find the press release and other information about the study results there. When the scientific papers describing the results of NLST are published, we will ensure that those papers are quickly, fully, and freely available to the public.

The NCI also has more information about stopping smoking at http://smokefree.gov or you can call the Smoking Quitline at 1-877-44U-QUIT (1-877-448-7848). At that phone number, you can talk with an NCI smoking cessation counselor for help quitting and for answers to smoking-related questions in English or Spanish, Monday through Friday, from 8:00 a.m. to 8 p.m. Eastern time.

With sincere appreciation for all that you have done to advance our ability to control lung cancer,

Denise R. Aberle, M.D.
NLST ACRIN National Principal Investigator
David Geffen School of Medicine
University of California-Los Angeles

Christine D. Berg, M.D.
Lung Screening Study Project Officer
Division of Cancer Prevention
National Cancer Institute

Appendix 13-2: NLST/LSS SC Participant Closeout Letter

Dear Participant:

Last November you received a letter from the National Lung Screening Trial (NLST) informing you of the study's important finding that low-dose helical (spiral) CT can reduce lung cancer deaths in former and current heavy smokers ages 55 to 74. The hard work of the study participants and our diligent site investigators is now drawing to an end. We are therefore writing to let you know that NLST offices will close at the end of September, 2011. We have enjoyed working with you over the years as part of this landmark lung cancer screening study.

Please know that we are grateful for your significant contribution to NLST. Important studies such as NLST are possible thanks to the generosity of people like you.

You can find information about NLST, both now and after our offices have closed, at the following Web site: http://www.cancer.gov/NLST/updates. Information on NLST-related scientific papers that describe the study and its results will be posted to the Web site as such papers are published.

We wholeheartedly thank you for your invaluable contribution to lung cancer research.

Sincerely yours,

NLST Local PI

SC PLAN FOR LONG-TERM STORAGE OF NLST RECORDS AND PARTICIPANT FILES

Administrative Section

Screening Center: _____

Completed By: _____

Date Completed: _____

SC Documentation

1. Location of storage area: ☐ At SC ☐ Off-site

2. Address of storage area:

Institution or name of facility: _____

Department: _____

Address (include room number): _____

City, state, and zip code: _____

3. Type of storage system: ☐ Sealed boxes ☐ Locked file cabinets ☐ Shelving system

3. Storage environment:

☐ Locked room located in an office suite
☐ Locked room located in an area other than an office suite
Specify area: _____
_____
☐ Locked storage area used solely for record storage
☐ Open work space
☐ Hallway
☐ Other, specify _____
_____

4. Describe the security measures that will be used to maintain confidentiality of the records and participant files:

_____
_____
_____
_____
_____

Continued

SC Documentation – Continued

5. Contact information for the individual responsible for maintenance of the storage area and future access of the records:

Name: _____

Title: _____

Department: _____

Telephone: _____

E-mail: _____

6. Additional information:

_____

_____

_____

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Appendix 13-4: NLST/LSS Imaging QA and CT Image Library (CTIL) Equipment Decommission Form

Institution: _____

Desktop Service Tag: _____ Laptop Service Tag: _____

Sony SDM P82 Monitor Serial Number:

_____

Desktop and Laptop Sanitization Performed

	Desktop PC	Laptop PC
Date:	_____	_____
By (print name):	_____	_____
By (signature):	_____	_____

Equipment Disposition Matrix

Choose one disposition option per piece of equipment. Mark the selected option with an "X".

	Desktop PC	Laptop PC	Monitor
Site will take possession	_____	_____	_____
Site will return *	_____	_____	_____
Date returned:	_____	_____	_____

**The desktop PC must be returned to NCI; the laptop PC and/or monitor must be returned to Washington University*

Site will donate _____ _____ _____

List the name of the charitable organization, and the address and Federal ID #.

Desktop PC: _____

_____

Laptop PC: _____

_____

_____

Monitor: _____

Principal Investigator Approval

_____ _____ _____

(printed name) (signature) (date)

Appendix 13-5: NLST/LSS Equipment Decommission Form

Institution: _____

Holding Phase Equipment

Server Asset Tag Number: _____

Workstation Asset Tag Number: _____

Storage Location: _____

Remaining Equipment

Workstation Asset Tag Number: _____

Disk Erasure Performed by: _____ Date: _____

Disposition Plan: ___ Return to Westat Date: _____

___ SC to take possession

___ SC to donate (specify recipient)

_____

****

Printer Asset Tag Number: _____

Disposition Plan: ___ SC to take possession

___ SC to donate (specify recipient)

_____

****

Barcode Scanners

Disposition Plan: ___ Return to Westat Date: _____

****

Principal Investigator Approval

_____ _____ _____

(printed name) (signature) (date)