



U.S. DEPARTMENT OF
ENERGY



Former Worker Medical Screening Program Report 2017





U.S. DEPARTMENT OF
ENERGY



Partners:



ATOMIC TRADES AND LABOR COUNCIL
AFFILIATED WITH METAL TRADES DEPARTMENT AFL-CIO
Oak Ridge, Tennessee 37831-4803
www.ATTC.org/ENR



Table of Contents

| | |
|--|-----|
| Abbreviations Used in This Report | iii |
| Foreword..... | v |
| Executive Summary | vii |
| 1.0 Program Overview..... | 1 |
| 2.0 Program Implementation | 5 |
| 3.0 Program Findings | 13 |
| 4.0 Summary..... | 17 |
| Appendix A: Individual Project Descriptions | 18 |
| Appendix B: Exams Conducted through the Former Worker Program..... | 45 |
| Appendix C: Exam Results..... | 47 |
| Appendix D: Resources..... | 65 |

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Abbreviations Used in This Report

| | |
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| ACOEM | <i>American College of Occupational and Environmental Medicine</i> |
| AFL-CIO | <i>American Federation of Labor and Congress of Industrial Organizations</i> |
| AU | <i>Office of Environment, Health, Safety and Security</i> |
| BAECP | <i>Burlington Atomic Energy Commission Plant</i> |
| BeLPT | <i>Beryllium Lymphocyte Proliferation Test</i> |
| BTMed | <i>Building Trades National Medical Screening Program</i> |
| CHSi | <i>Comprehensive Health Services, Inc.</i> |
| CMIO | <i>Chief Medical Informatics Officer</i> |
| CPWR | <i>CPWR – The Center for Construction Research and Training</i> |
| CT | <i>Computed Tomography</i> |
| CXR | <i>Chest X-ray</i> |
| Department | <i>U.S. Department of Energy</i> |
| DOE | <i>U.S. Department of Energy</i> |
| DOL | <i>U.S. Department of Labor</i> |
| EEOICP | <i>Energy Employees Occupational Illness Compensation Program</i> |
| EEOICPA | <i>Energy Employees Occupational Illness Compensation Program Act</i> |
| ELCD | <i>Early Lung Cancer Detection</i> |
| FWP | <i>Former Worker Medical Screening Program or Former Worker Program</i> |
| FY | <i>Fiscal Year</i> |
| GDP | <i>Gaseous Diffusion Plant</i> |
| HIPAA | <i>Health Insurance Portability and Accountability Act</i> |
| IAAP | <i>Iowa Army Ammunition Plant</i> |
| JHBSPH | <i>Johns Hopkins Bloomberg School of Public Health</i> |
| JHU | <i>Johns Hopkins University</i> |
| JOTG | <i>Joint Outreach Task Group</i> |
| K-25 | <i>Oak Ridge K-25 Gaseous Diffusion Plant</i> |
| LANL | <i>Los Alamos National Laboratory</i> |
| LDCT | <i>Low-Dose Computed Tomography</i> |

| | |
|--------|---|
| NIOSH | <i>National Institute for Occupational Safety and Health</i> |
| NSSP | <i>National Supplemental Screening Program</i> |
| ORAU | <i>Oak Ridge Associated Universities</i> |
| ORNL | <i>Oak Ridge National Laboratory</i> |
| PFT | <i>Pulmonary Function Test</i> |
| PII | <i>Personally Identifiable Information</i> |
| SNL | <i>Sandia National Laboratories</i> |
| UNM | <i>University of New Mexico</i> |
| USW | <i>United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union</i> |
| UTHSCT | <i>University of Texas Health Science Center at Tyler</i> |
| WHPP | <i>Worker Health Protection Program</i> |
| Y-12 | <i>Y-12 National Security Complex</i> |

Foreword

The Former Worker Medical Screening Program, or Former Worker Program (FWP), was mandated by Congress in the Fiscal Year 1993 National Defense Authorization Act, which charged the Department of Energy (DOE or Department) with conducting an on-going medical screening program, offered at no cost, for its former workers who may be at risk for occupational disease as a result of their work at DOE sites. Program activities were initiated in 1996 at seven defense nuclear facilities, and medical screenings began to be offered in 1997. The program now serves all former workers from all DOE sites in locations close to their residences.

The FWP has made significant contributions and provided valuable health information to numerous former workers. Participants with medical findings are referred for medical followup and to the U.S. Department of Labor's Energy Employees Occupational Illness Compensation Program, which compensates eligible current and former DOE employees, or their survivors, and its contractors/subcontractors for occupational illnesses.

The FWP receives strong support from the Department. DOE is committed to the safety and health of our workforce – past, present, and future – and will continue to be an advocate for this important program.

Matthew B. Moury

*Associate Under Secretary for
Environment, Health, Safety and Security
Office of Environment, Health, Safety and Security
U.S. Department of Energy*

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Executive Summary

The U.S. Department of Energy's (DOE) Former Worker Medical Screening Program, or Former Worker Program (FWP), directly benefits former DOE workers by: (1) identifying signs or symptoms of work-related health conditions at an early stage when they are more treatable; and (2) improving workers' understanding of health risks they may have faced due to possible exposures during their employment with DOE. The medical screening exam uses a customized medical screening protocol that was developed by a team of independent physicians specializing in occupational medicine.

This Report presents an overview of the structure and accomplishments of the FWP and provides the Fiscal Year (FY) 2017 updates, as well as cumulative program results, 1997-2017. The FWP was mandated by the U.S. Congress as part of Section 3162 of the National Defense Authorization Act for FY 1993 (Public Law 102-484). Program activities began in 1996, and medical screenings began to be offered in 1997. The FWP continues to provide ongoing medical screening examinations, offered at no cost, to all eligible former DOE Federal, contractor, and subcontractor workers from all DOE sites. The program also serves former workers from DOE's predecessor Agencies (the Manhattan Engineer District, the Atomic Energy Commission, and the Energy Research and Development Administration). In FY 2017, the FWP successfully fulfilled its congressional mandate of delivering medical screening services to all participating eligible former workers.

Since medical screening activities began in 1997, we have examined 89,081 DOE workers, provided a total of 137,201 examinations, and screened 15,112 DOE workers for early detection of lung cancer.

FY 2017 Program Activities

1. Outreach.

- In FY 2017, the FWP conducted aggressive outreach using direct mailings and attending events near DOE communities.

2. Ongoing Medical Screening.

- In FY 2017, the FWP conducted 2,814 initial medical examinations and 5,787 re-screen medical exams.
- In FY 2017, 3,467 participants were screened for occupational lung cancer using low-dose helical computed tomography (CT), of which 273 were new participants receiving a baseline CT and 3,194 were participants receiving either a followup or annual scan. A total of 3,681 CT scans were performed; this includes baseline, followup, and annual scans.

3. Communicate Results.

- Exam results are provided to participants in a letter. When a condition is possibly work related, the FWP physicians include causation language. This language can be helpful to participants who decide to file a claim under the Energy Employees Occupational Illness Compensation Program Act, a program administered by the U.S. Department of Labor.

4. Protect Personally Identifiable Information and Protected Health Information.

- All medical information that is collected as part of this program is treated as confidential and is used only as allowed by the Privacy Act of 1974 and the Health Insurance Portability and Accountability Act.

Descriptions of the organizations that conduct the medical screening exams and the biographies of each Principal Investigator are provided in Appendix A.



"You guys provide great service. It gives you peace of mind that someone is aware of problems you might have come across in the industry.

I was just amazed by the whole process. The whole thing is very proactive. The follow-up was very quick and the medical assistant spent a lot of time talking with me over the phone.

I can't say enough good things about the program. They really care about you."

- D. Threepersons, former Hanford worker, Boilermakers Local 104

1.0 Program Overview

This Report presents an overview of the structure and accomplishments of the U.S. Department of Energy’s (DOE or Department) Former Worker Medical Screening Program or Former Worker Program (FWP). This report provides the Fiscal Year (FY) 2017 updates, as well as cumulative program results, 1997-2017. The FWP is a congressionally mandated program that is responsible for providing medical screening exams, at no cost, to all interested and eligible former DOE Federal, contractor, and subcontractor workers from all DOE sites who may have been exposed to hazardous substances. The program also serves former workers from DOE’s predecessor Agencies (the Manhattan Engineer District, the Atomic Energy Commission, and the Energy Research and Development Administration). The medical screening exams offered by the FWP are designed to check for potential adverse health effects related to occupational exposures, including but not limited to radiation, beryllium, asbestos, lasers, silica, welding fumes, lead, cadmium, chromium, solvents, and noise.

The program was established following the issuance of the National Defense Authorization Act for FY 1993 (Public Law 102-484), which called for DOE to:

National Defense Authorization Act for FY 1993:

“... establish and carry out a program for the identification and on-going medical evaluation of its... former employees who are subject to significant health risks as a result of the exposure of such employees to hazardous or radioactive substances during such employment.”

Since the inception of the FWP, DOE has made great strides in addressing the occupational health legacy of its activities from nuclear weapons design and production, as well as other activities that may have exposed its workers to toxic substances. The FWP, managed by the DOE’s Office of Environment, Health, Safety and Security (AU), uses independent occupational health experts from universities, labor unions, and commercial organizations to administer the medical screening program. Using these third-party providers ensures that medical evaluation services are objective and credible. Their dedication to the DOE workforce over the past 21 years has resulted in high-quality services; and the level of satisfaction expressed by participants, 97.5 percent on surveys, speaks to the skill and professionalism of the organizations administering the program for AU.

Since 1997, a total of 137,201 medical exams (initial and re-screen exams) have been provided to 89,081 former workers through the FWP. Since 2000, 15,112 participants were screened for occupational lung cancer with low-dose helical computed tomography (CT), and a total of 52,476 CT scans were performed; these include baseline, followup, and annual scans.

The FWP consists of four regional projects located near major DOE sites, as well as two nationwide projects.

The regional FWP projects include:

- Pantex Former Worker Medical Surveillance Program, conducted by Drexel University Dornsife School of Public Health in conjunction with the University of Texas Health Northeast at Tyler

- Medical Exam Program for Former Workers at Los Alamos and Sandia (New Mexico) National Laboratories, conducted by Johns Hopkins Bloomberg School of Public Health in conjunction with the University of New Mexico
- Worker Health Protection Program (WHPP), conducted jointly by Queens College of the City University of New York, United Steelworkers, the Atomic Trades and Labor Council in Oak Ridge, and the former Fernald Atomic Trades and Labor Council
- Former Burlington Atomic Energy Commission Plant and Ames Laboratory Workers Medical Screening Program, conducted by The University of Iowa College of Public Health

The nationwide FWP projects include:

- National Supplemental Screening Program (NSSP), conducted by Oak Ridge Associated Universities (ORAU) in conjunction with Axion Health, Comprehensive Health Services, National Jewish Health, and the University of Colorado Denver
- Building Trades National Medical Screening Program (BTMed), conducted by CPWR – The Center for Construction Research and Training (CPWR) in conjunction with Stoneturn Consultants, Duke University Medical Center, University of Cincinnati, and Zenith-American Solutions

A list of DOE sites and the organizations conducting medical screening exams for former workers is provided on the FWP Website (<http://energy.gov/ehss/downloads/former-worker-program-summary-services>)¹. Individual FWP project descriptions are provided in Appendix A.

Medical screenings are provided at clinics in communities near DOE sites, as well as through a large network of health clinics nationwide, thus allowing services to be provided near most workers' residences. This network of clinics has allowed the FWP to provide medical screening exams in all 50 States and several international locations (see Figure 1).

¹ Links to referenced documents have been included for the reader's convenience, but the reader should be aware that links may change when newer versions of the cited documents are posted on the FWP Website.

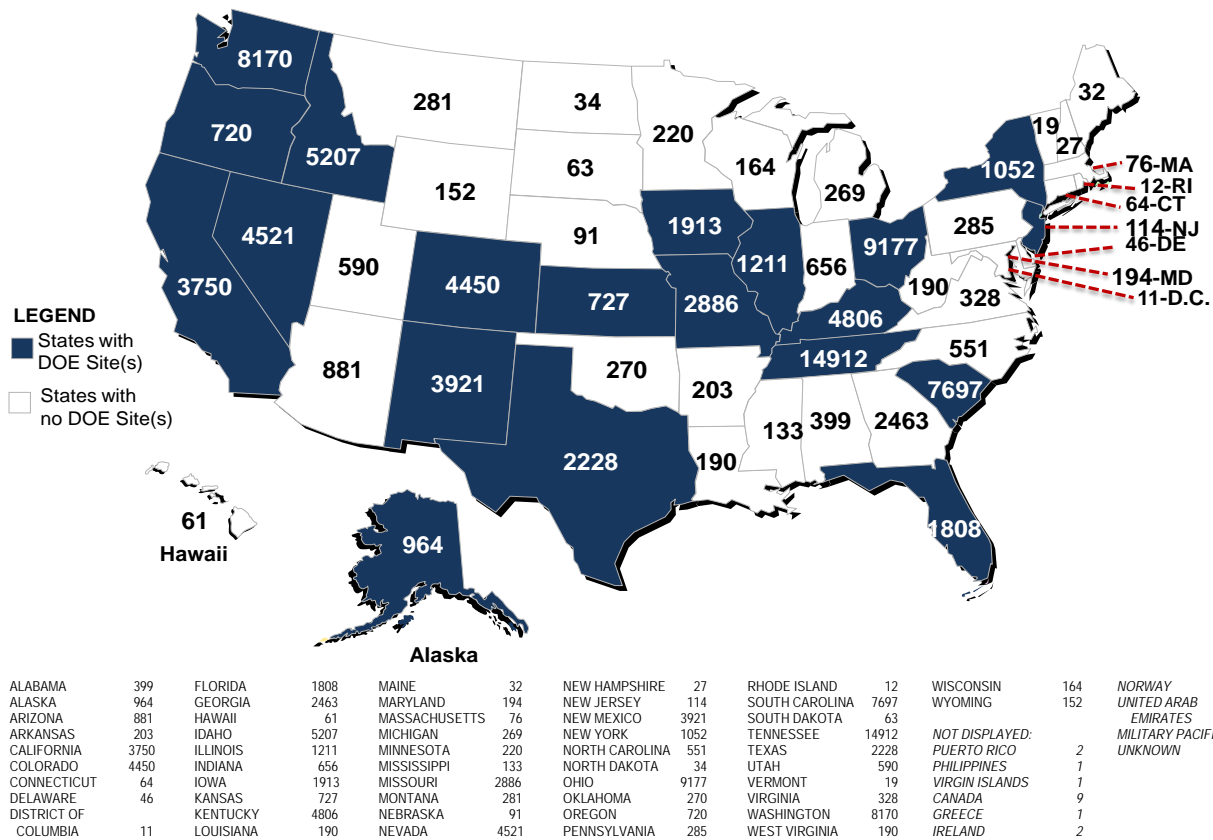


Figure 1. Participants Screened by State of Residence (1997 – September 2017)

The FWP directly benefits former DOE workers by: (1) identifying signs or symptoms of work-related health conditions at an early stage when they are more treatable; and (2) improving workers’ understanding of health risks they may have faced due to possible exposures during their prior employment with DOE.

Additional information on the FWP, how it is managed by DOE, and descriptions of the medical exam components can be found on the FWP Website (<http://energy.gov/ehss/services/worker-health-and-safety/former-worker-medical-screening-program>).

“I very much appreciate the screening and concern shown by your staff. When I was first contacted, I thought it was by mistake, as I assumed only those who did “war work” were involved and perhaps my name came up due to working as a secretary in the administration office. I’m happy now that all who may have been exposed to dangerous substances are being monitored. Thanks very much.”

- Ames Laboratory former worker

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2.0 Program Implementation

Program implementation focuses primarily on four specific activities, which are:

1. **Outreach:** Identify the potential pool of former DOE workers and notify them of FWP medical screening services.



Eileen Montano, WHPP local outreach coordinator at the Lawrence Livermore National Laboratory Retiree Benefits Fair

Since the inception of the FWP, DOE realized there would be challenges in locating workers to participate in the medical screening program; there is no centralized database of former DOE workers. In addition, many workers were employed intermittently by subcontractors, and these companies typically did not leave a copy of employee records with the prime contractor when their job was completed. Thus, the availability of rosters varies greatly by site.

Rosters are lists of names of former DOE workers, along with other identifying information, such as last known address, that may be available from employers or DOE. AU works closely with DOE Headquarters program offices to obtain rosters of former workers from site contractors and field/site offices. Invitations are sent by the FWP projects to individuals using the last known address. When addresses are found to be outdated or inaccurate, the FWP projects use address-update services to obtain current contact information. The organizations administering the FWP periodically check the list of workers' names against the National Death Index to ensure that letters of invitation are not sent to individuals who are deceased.

All of the FWP projects use multiple outreach methods to notify eligible former DOE workers about the availability of FWP services and to increase the visibility of the program in communities surrounding DOE sites. In FY 2017, the FWP participated in 525 outreach events and assisted the U.S. Department of Labor (DOL) with 9 of its outreach events. Program information is also provided in exit packets for workers separating from a site, and hyperlinks are provided on retiree/DOE site webpages. To further increase awareness of the FWP, AU recently sent out a Department-wide message to inform current workers of the availability of medical screening for former DOE workers and to make current workers aware of their eligibility to participate in the program once they have retired/separated from DOE.

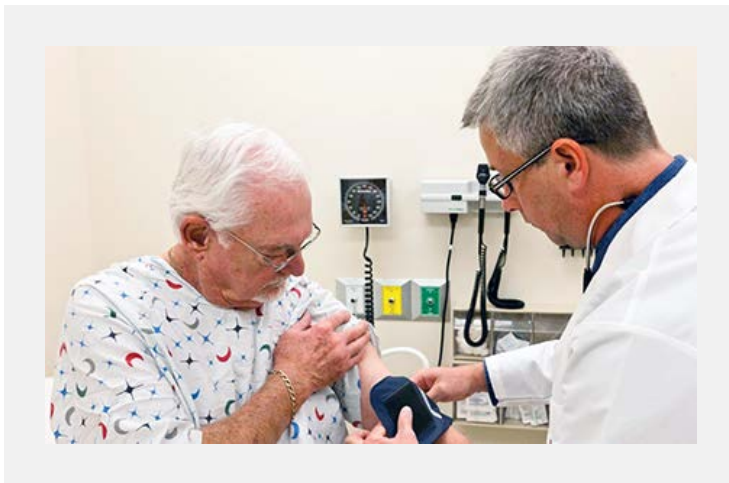
In FY 2009, the Joint Outreach Task Group (JOTG) was established to coordinate outreach efforts among the Agencies involved in the FWP and the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). The JOTG includes representatives from DOE, DOL, the National Institute for Occupational Safety and Health (NIOSH), DOL's Office of the Ombudsman for EEOICPA, the Ombudsman to NIOSH for EEOICPA Part B, and the DOE-funded FWP projects. To meet its goal, the JOTG holds town hall meetings

in and near the communities of DOE sites. This partnership among the different government Agencies promotes transparency and open government. In FY 2017, meetings were held in two locations near DOE communities. To date, meetings have been held in, or near, the communities of 32 DOE sites.

The mission of the Department, as well as its predecessor Agencies, undertaken for over 70 years, includes nuclear weapons design and production, environmental cleanup from the Cold War nuclear mission, and other activities that may have exposed its workers to toxic substances. To locate these workers, the FWP projects continued to conduct aggressive outreach efforts in FY 2017. Those who are interested and eligible have either completed their medical screening examinations or are in the process of being scheduled for an exam. Despite the aggressive outreach efforts, there are many reasons why former workers may not wish to participate in the FWP, including: they believe they are in good health, they are simply not interested in screening, or they may harbor a mistrust of a government program. Additional information regarding outreach can be found on the FWP Website (<http://energy.gov/ehss/outreach-former-worker-medical-screening-program-fwp>).

2. **Medical Screening:** Provide medical screening exams that are designed to check for adverse health conditions related to occupational exposures in former workers who choose to participate in the program, including a re-screen exam every 3 years.

a. Conventional Medical Screening Program



Medical screening is used to identify diseases or precursor conditions at an early stage of development, often before signs and symptoms occur, and to refer individuals with suspicious findings to their personal physician or a specialist for further testing, diagnosis, and treatment. The FWP is not intended to serve as a substitute for routine medical exams received through an individual's personal physician; however, the program provides some general health screening services at minimal cost to DOE.

The medical screening exam offered by the FWP evaluates a former employee's health as it relates to the individual's potential occupational exposure to hazardous agents. The FWP uses a customized medical screening protocol that was developed by a team of independent physicians specializing in occupational medicine. This protocol is periodically updated as necessary or at least every 2 years based on new research findings within the scientific/medical community. The health conditions targeted in the medical screening exams include chronic lung diseases, lung cancer, beryllium-related disorders, hearing loss, and damage to other selected major organs that may be associated with occupational exposures. A list of exposures and medical examinations offered through the FWP is available in the medical protocol posted on the FWP Website (<http://energy.gov/ehss/downloads/former-worker-program-medical-protocol>).

Before participating in the medical screening program, former workers must complete a medical history questionnaire and an occupational history questionnaire, either on their own or via an interviewer-

conducted session. The interviews are conducted by the local outreach coordinators employed by the FWP projects who, in many cases, are former workers with knowledge of DOE sites and the type of exposures at the sites.

The initial medical screening examination includes a physical examination and may consist of the following based on the individual's occupational exposure history:

- Chest x-ray with B reading (interpretation for occupational lung disease)
- Spirometry (breathing test)
- Low-dose chest CT scan
- Beryllium Lymphocyte Proliferation Test (BeLPT) (a test to detect beryllium sensitization)
- Blood chemistry test
- Urinalysis
- Audiometry (hearing test).

Participation in the FWP is completely voluntary, and participants can refuse any portion of the medical screening examination.

Due to the latency period (the time between the onset of exposure and the diagnosis of the disease) of occupational-related diseases, the FWP also offers re-screen examinations 3 years after the initial medical screening and every 3 years thereafter. The re-screening improves the detection of occupational disease, which may not show signs or symptoms for decades after exposure. Certain medical exams may be recommended only during the initial screening exam and excluded from the re-screen exam.

In addition to the core function of identifying conditions that may have been related to workplace exposures, the program also provides some general health screening services. Participants are screened for some common non-occupational health conditions, such as diabetes (blood sugar), coronary artery disease (cholesterol), cardiovascular disease/hypertension (blood pressure), obesity, and chronic kidney dysfunction (serum creatinine levels).

The results of general health screening tests, as well as findings during examinations, can be of great benefit to a participant. Many of the conditions that fall into this category can be treated by the participant's personal physician and can significantly improve longevity and quality of life. DOE and the FWP projects are committed to ensuring that the overall well-being of our former workers is evaluated within the program.

In FY 2017, 2,814 initial exams and 5,787 re-screen exams were conducted. Since 1997, a total of 137,201 medical exams have been conducted through the FWP, comprising 89,081 initial screening exams and 48,120 re-screen exams. A breakdown of the number of initial and re-screen exams conducted through FWP for the past several years is shown in Figure 2.

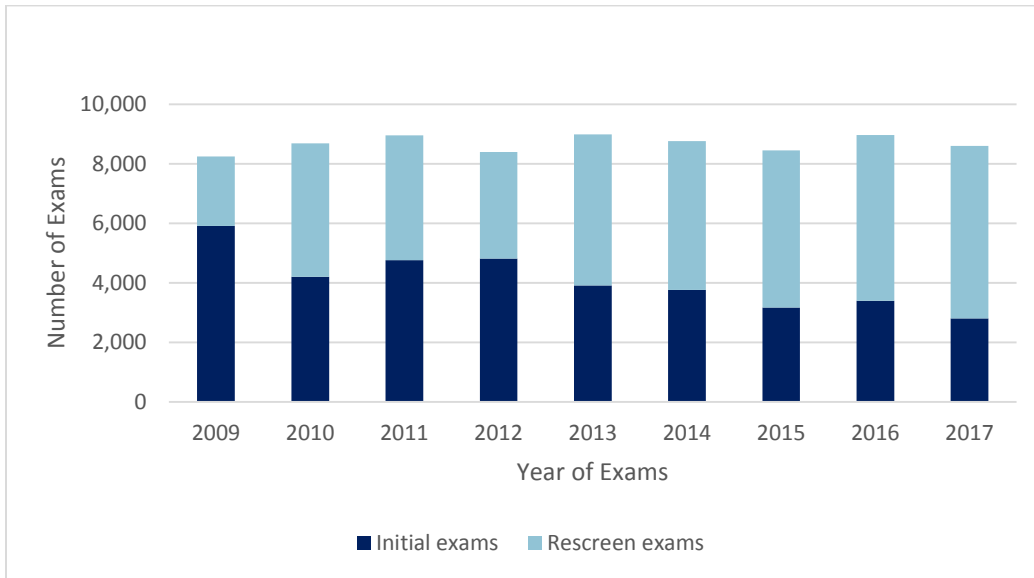


Figure 2. Initial and Re-Screen Exams by Year (October 2009 – September 2017)

A breakdown of the number of initial and re-screen exams conducted through FWP by DOE site is presented in Appendix B. A detailed description of the components of the medical screening exams can be found on the FWP Website (<http://energy.gov/ehss/conventional-medical-screening-program>). The medical findings by DOE site can be found in Appendix C.

b. Early Lung Cancer Detection Program



Since 2000, DOE has made screening for lung cancer with low-dose helical CT scans available because many former workers may be at risk for occupational lung cancer as a result of their work for DOE. Occupational hazards, such as asbestos, ionizing radiation, silica, beryllium, and diesel exhaust, may cause or contribute to the disease. Through the FWP, DOE initiated the Early Lung Cancer Detection (ELCD) program to detect lung

cancers at an earlier, more treatable stage.

ELCD participants are offered initial/baseline, followup, and annual scans. If an individual’s initial/baseline scan shows one or more nodules that are not highly suspicious for cancer, they will be offered a followup scan at 3 or 6 months to determine if there have been any changes to the nodule(s). If a nodule is suspicious for lung cancer, the participant will be referred to a specialist for diagnostic evaluation. If an individual’s initial/baseline scan is normal, they will be offered ongoing annual repeat

low-dose CT scans to determine if new nodules are present or if there are changes in previously detected nodules, which may indicate that lung cancer is present.

In FY 2017, 3,467 participants were screened, of which 273 were new participants receiving a baseline and 3,194 were participants receiving either a followup or annual scan, and a total of 3,681 CT scans were performed; this includes baseline, followup, and annual scans. Since 2000, the FWP's ELCD program has screened a total of 15,112 eligible participants and provided 52,476 CT scans. To date, 196 lung cancers have been detected through this vital component of FWP medical screening.

The projects currently participating in the ELCD program include:

- WHPP, administered by Queens College of the City University of New York and the United Steelworkers, along with their partners;
- BTMed, conducted by CPWR in conjunction with their partners; and
- NSSP, administered by ORAU and its partners.

Other FWP projects are either exploring how to incorporate CT scanning into their current protocols or in the planning phases for initiating this component.

More indepth information regarding the ELCD program, including low-dose CT scans, can be found on the FWP Website (<http://energy.gov/ehss/early-lung-cancer-detection-program>).

3. Communicate Results: Provide medical screening exam results to participants, as well as information concerning any conditions that may require followup medical care with their personal physicians or specialists, and offer information regarding possible compensation for work-related illnesses.



Occupational medicine physicians review the results from the medical screening exams, along with the completed medical and occupational exposure history questionnaires, to determine whether any abnormal findings exist and whether the findings may have been caused by a work-related exposure. Participants requiring urgent medical attention for an abnormal test result are contacted immediately by phone or mail, informed of the finding, and provided recommendations for further evaluation and treatment by their personal physicians or a specialist. Urgent findings are also documented in a letter to the participant that is sent by overnight mail.

Participants are provided with a summary of all the findings, both occupational related and non-occupational related, from their medical screening exam in a results letter several weeks after their examination, along with any necessary followup recommendations. The results letter also includes general health advice for workers, such as recommendations for smoking cessation. While the FWP projects offer medical screening exams, followup medical evaluation and treatment are not within the scope of the FWP.

When appropriate, the FWP physicians who write the results letters include language regarding the possible work-relatedness of a condition, especially if the condition is known to be a potential occupational disease. The inclusion of this language, known as “causation” language, can be helpful for participants considering whether to file a claim under EEOICPA, which is administered by DOL. Moreover, participants are provided contact information for DOL EEOICPA Resource Centers in the results letters, as well as other State and Federal workers’ compensation programs when appropriate.

While participation in the medical screening program is not required for filing an EEOICPA compensation claim, the medical results may be useful in supporting a claim by offering former DOE workers with detailed information about the possible relationship between their condition and their occupational exposure at a DOE site. In addition, FWP project staff, many of whom are former DOE workers, are able to assist participants by providing useful site and exposure information to include in their claims packages.

4. Protect Personally Identifiable Information (PII)/Protected Health Information: Protect the confidentiality and privacy of participants.

The confidentiality and privacy rights of former workers are not only a legal requirement, they are crucial to establishing and maintaining credibility with the former worker community. All medical information that is collected as part of this program is treated as confidential and is used only as allowed by the Privacy Act of 1974 and the Health Insurance Portability and Accountability Act (HIPAA). All FWP activities are conducted with the approval of the Institutional Review Boards, or Human Subjects Committees, of DOE and involved organizations. All individuals sign an informed consent and HIPAA authorization prior to participation. In addition, all program staff are required to take annual privacy awareness training, and all FWP projects have security procedures in place for the safe transmittal and storage of PII.



“I first heard about the Worker Health Protection Program (WHPP) while working at the Portsmouth Gaseous Diffusion Plant. I believe a letter or post card was sent to my home encouraging me to call a phone number for a free physical and CT scan. I talked with the guys at work about receiving the invitation into the program, and we were hesitant at first to participate because DOE was funding these services, and we felt that we were already getting the work physicals by the Portsmouth Plant physician once a year, so, it would be a waste of time.

My wife insisted that I schedule the physical because the results of the tests were read by an occupational disease specialist at Queens College in New York. Southern Ohio does not have occupational disease physicians, so I made the call to Queens College.

I am extremely grateful that I participated in the former worker program. My experience with all those involved, from scheduling appointments, having the physical and the CT scan, to receiving

the result letters could not have been more worker-friendly and efficient. The Union Hall also helped me complete the exposure questionnaires.

I believe I participated in the monitoring program every three years until I received the results of a CT scan that showed three areas of concern. It scared me when they asked me to return in three months. I can't remember who I spoke with, but they explained that the areas could be infection, but they wanted to monitor them closely with the low-dose scan for any growth or changes. The three areas being monitored did not grow, so I was returned to the regular surveillance for lung cancer.

Approximately ten years later, I became ill with a fungus on my lungs, thought to have happened due to handling damp hay. My personal physician diagnosed and treated this condition but wanted a yearly follow-up CT, so I no longer participated in the low-dose WHPP CT monitoring but continued the WHPP physicals. My WHPP physical results letter showed elevated levels in my blood, and Queens College urged me to see my personal physician, but my physician explained that my blood levels were off because of the medicine I was taking to treat the fungus.

On the follow-up last year, my personal physician found three nodules in my lungs and referred me to a Cancer Center for removal of only one cancerous nodule. I contacted Queens College and sent them the information on the three nodules and expressed concern that only the one nodule was being removed, and the opinion of the Cancer Center was that there was no need to be concerned about the other two. After reviewing my CT scans, Dr. Miller at Queens College was very concerned about all three of the nodules and wrote a detailed letter to the Cancer Center recommending the removal of all three cancer nodules.

In turn, the Cancer Center removed all three cancerous nodules successfully at Stage 1. I am so blessed to have Queens College and the medical screening program. They saved my life! I would encourage all my coworkers to participate in this program. It is hard to find the quality of service and a staff that will go beyond what is expected to keep you alive and healthy."

- S. Cisco, Portsmouth Gaseous Diffusion Plant worker

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3.0 Program Findings

A summary of medical examinations performed through FWP from 1997 to September 2017 is presented in Tables 1-4. Only new abnormal findings on re-screen exams are reported (i.e., abnormal results found on initial exams are not counted again in the re-screen results). Suspected work-related findings have been primarily lung-related conditions (e.g., asbestosis and/or silicosis, beryllium sensitization, and lung cancer) and hearing loss.

Table 1. Chest X-ray Findings on Initial and Re-screen Exams
(1997 through September 2017)

| Screening Exam | Workers Screened | Asbestos-related Lung Disease ² | Silicosis ³ | Other Dust-related Disease ⁴ | Lung Nodules, Nodes, or Lesions ⁵ |
|----------------|------------------|--|------------------------|---|--|
| Initial | 81,465 | 9,565 (11.7%) | 187 (0.2%) | 1,194 (1.5%) | 3,052 (3.7%) |
| Re-screen | 28,292 | 2,075 (7.3%) | 29 (0.1%) | 374 (1.3%) | 1,270 (4.5%) |

Table 2. Spirometry Findings on Initial and Re-screen Exams
(1997 through September 2017)

| Screening Exam | Workers Screened | Obstructive Airways Dysfunction Detected ⁶ |
|----------------|------------------|---|
| Initial | 80,259 | 15,430 (19.2%) |
| Re-screen | 28,485 | 4,281 (15.0%) |

² Asbestos-related diseases include asbestosis of the lungs and asbestos-related pleural plaques, caused by breathing in asbestos fibers.

³ Silicosis is a lung disease caused by breathing in silica dust.

⁴ Mixed dust pneumoconiosis or pneumoconiosis, not otherwise specified.

⁵ The presence of non-trivial parenchymal lung nodules, enlarged lymph nodes in the chest, or other lung or pleural abnormality that requires medical followup as suggested by the chest x-ray B-reader or the local radiologist.

⁶ Obstructive airways dysfunction includes chronic obstructive pulmonary disease, which is a progressive lung disease caused by long-term exposure to lung irritants, such as cigarette smoke, air pollution, chemical fumes, or dust. Obstructive airways dysfunction also includes asthma, which is a chronic inflammatory disease of the bronchial tubes or airways that causes swelling and narrowing of the airways. It is believed to be caused by a combination of environmental and genetic factors.

Table 3. Results of BeLPTs on Initial and Re-screen Exams (1997 through September 2017)

| Screening Exam | Workers Screened | 1 Abnormal ⁷ | 2 Abnormal | 1 Abnormal and 1+ Borderline |
|----------------|------------------|-------------------------|------------|------------------------------|
| Initial | 73,209 | 892 (1.2%) | 723 (1.0%) | 248 (0.3%) |
| Re-screen | 23,096 | 190 (0.8%) | 192 (0.8%) | 95 (0.4%) |

Table 4. Audiometry Findings on Initial Exam (1997 through September 2017)⁸

| Workers Screened | Noise-induced Hearing Loss |
|------------------|----------------------------|
| 72,103 | 36,019 (50.0%) |

The results from low-dose screening through the FWP ELCD program from 2000 through September 2017 are summarized in Tables 5 and 6 below. The detected lung cancers have been staged – indicated by a descriptor (usually numbers I to IV) representing how much the cancer has spread. CT screening has led to cancers being detected at an early stage when treatment is more likely to be effective and has proved to be better for early lung cancer detection and preventing deaths than conventional chest x-rays.

Table 5. Stage of Lung Cancers Detected by WHPP, BTMed, and NSSP ELCD Program (2000 through September 30, 2017)⁹

| Site of ELCD Program | Number of Participants Screened | Number of Lung Cancers Detected | Number of Detected Lung Cancers That Were Staged | Number (%) of Early (Carcinoma In Situ, Stage I or II Non-Small Cell, or Limited Small Cell) Cancers Detected ¹⁰ |
|---|---------------------------------|---------------------------------|--|---|
| Feed Materials Production Center (Construction Workers) | 176 | 2 | 2 | 2 (100%) |

⁷ Individuals with one abnormal BeLPT are encouraged to file a claim with the DOL EEOICPA. Beryllium sensitization is diagnosed by an occupational medicine physician based on abnormal BeLPT results.

⁸ Audiometry is currently offered only on the initial exam since occupational hearing loss would typically be detected during the initial screen exam of retired workers.

⁹ Findings include results from baseline, followup, and annual scans.

¹⁰ The stage of lung cancer is described using the TNM classification system according to the American Joint Committee of Cancer (AJCC Cancer Staging Manual, 7th Edition, 2010). The TNM Staging System is based on the extent of the tumor (T), the extent of spread to the lymph nodes (N), and the presence of metastasis (M). Staging is based on pathology status, or clinical status if pathology status is not available.

| Site of ELCD Program | Number of Participants Screened | Number of Lung Cancers Detected | Number of Detected Lung Cancers That Were Staged | Number (%) of Early (Carcinoma In Situ, Stage I or II Non-Small Cell, or Limited Small Cell) Cancers Detected ¹⁰ |
|---|---------------------------------|---------------------------------|--|---|
| Feed Materials Production Center (Production Workers) | 457 | 3 | 3 | 2 (67%) |
| Hanford (Construction Workers) | 335 | 7 | 7 | 6 (86%) |
| Idaho National Laboratory (Production Workers) | 684 | 8 | 7 | 4 (57%) |
| K-25 (Production Workers) | 2,869 | 35 | 33 | 26 (79%) |
| Mound Plant (Production Workers) | 614 | 5 | 5 | 4 (80%) |
| Nevada National Security Site (All Workers) | 687 | 5 | 5 | 3 (60%) |
| ORNL (Production Workers) | 1,271 | 16 | 14 | 7 (50%) |
| Oak Ridge Reservation (Construction Workers) | 484 | 14 | 14 | 8 (57%) |
| Miscellaneous Sites (All Workers) | 176 | 7 | 6 | 6 (100%) |
| Paducah (Production Workers) | 2,015 | 25 | 24 | 19 (79%) |
| Portsmouth (Production Workers) | 2,271 | 25 | 23 | 18 (78%) |
| Rocky Flats (Production Workers) | 95 | 1 | 1 | 1 (100%) |
| Savannah River Site (Construction Workers) | 247 | 3 | 3 | 1 (33%) |
| Y-12 (Production Workers) | 2,731 | 40 | 39 | 28 (72%) |
| Total | 15,112 | 196 | 186 | 135 (73%) |

The ELCD program has also detected other diseases of importance (see Table 6).

Table 6. Other Diseases Found on CT Scan by WHPP, BTMed, and NSSP ELCD Program (2000 through September 30, 2017)

| Condition | Number Detected |
|--|-----------------|
| Appendiceal cancer | 2 |
| Breast cancer | 1 |
| Kidney cancer | 13 |
| Liver cancer | 2 |
| Lymphoma | 9 |
| Thyroid cancer | 5 |
| Aortic aneurysm | 69 |
| Heart aneurysm | 5 |
| Hemangiopericytoma | 1 |
| Splenic aneurysm | 2 |
| Pneumonia | 94 |
| Thymoma | 10 |
| Metastatic Melanoma | 2 |
| Mesothelioma | 2 |
| Metastatic Cancer (primary site unknown) | 1 |



“I received a letter telling me about the Pantex Former Worker program. I didn’t have any problem in contacting and getting an appointment set up at all. My experience and process with the exam was they did everything right on time, and I didn’t have any problems. They uncovered some problems with my blood pressure and my blood sugar while I was there. Everything went just fine and was a normal wait time. I received the results pretty soon after the exam, and it had a detailed report which I greatly appreciated. It kind of exceeded my expectations because it had more information in it than I expected. I would most definitely tell other former workers and recommend this program. Out of the whole experience, I appreciated the detail of the report and the professionalism of all the people that checked me out. I guess it is the nurse that walked me through everything, and I really appreciated the way they handled it. I don’t know what you could improve because everything I experienced was great.”

- P. Butler, former Pantex worker

4.0 Summary

Through the FWP, the Department continues to demonstrate a steadfast commitment to its workforce. The FWP provides an objective, high-quality, targeted medical screening program for occupational diseases among DOE former workers using third-party medical experts. DOE has made great advances in addressing the occupational health legacy of more than 70 years of nuclear weapons design and production, as well as other activities that may have exposed its workers to toxic substances. The exams offered by the FWP can provide important information on health conditions, which if caught early, may be treated. Participants who are found not to have work-related conditions during their exams receive the benefit of this reassurance.

While the Department strives to improve upon past successes, the program is not without its challenges. AU staff meet on a regular basis with FWP members to seek their input on how to improve implementation of the program and ensure that the most appropriate medical tests are offered. Also, the FWP routinely monitors participant satisfaction with program elements, including medical clinic staff, wait times, and locations. Clinics that perform poorly are removed from the program. Another challenge is recruiting and encouraging former workers to participate in the screening program. While the FWP continuously conducts outreach activities, including attending local meetings and preparing mailings, the FWP is always looking for new ways to increase participation rates.

In FY 2018, the Department, through the FWP, will continue to meet its obligation to its former workers by providing medical screening examinations to all eligible individuals. The FWP projects will continue to expand CT scanning for early lung cancer detection to other interested and eligible worker populations. In addition, DOE will continue to maintain the program elements and practices that contribute to the program's success while building on lessons learned.

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Appendix A: Individual Project Descriptions

The U.S. Department of Energy (DOE) Former Worker Program (FWP) projects are briefly described below.

Building Trades National Medical Screening Program



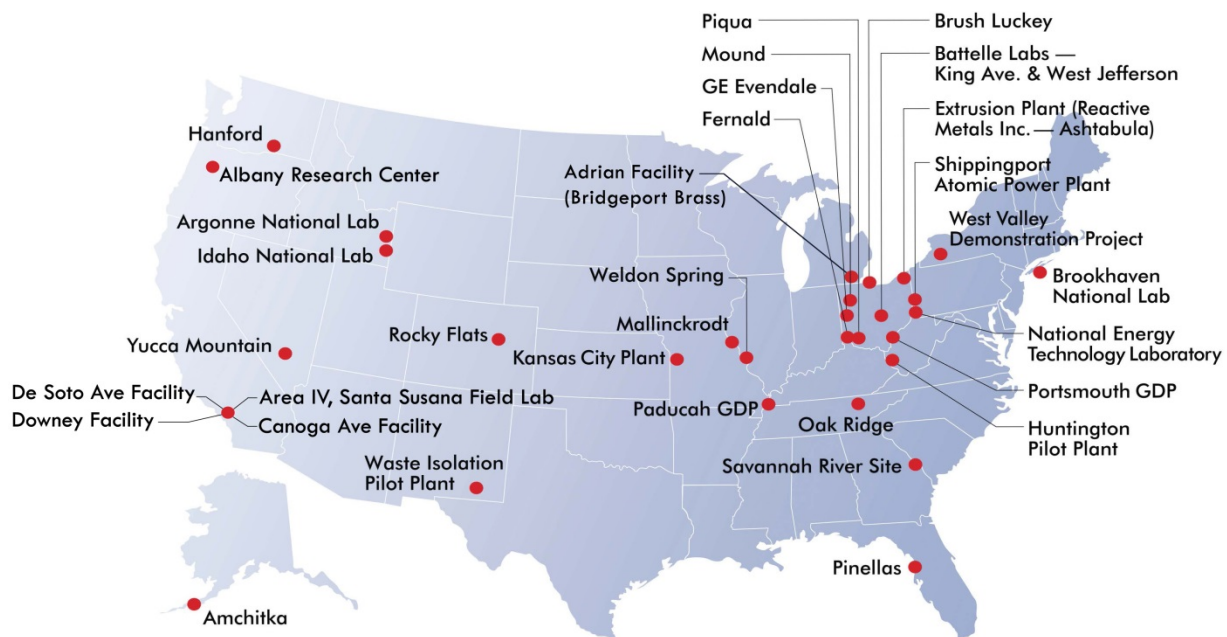
Who we are:

The Building Trades National Medical Screening Program (BTMed) is administered by CPWR – The Center for Construction Research and Training (CPWR), the health and safety research center of North America’s Building Trades Unions, in partnership with Stoneturn Consultants, Duke University Medical Center, University of Cincinnati, and Zenith-American Solutions.

What we do:

BTMed identifies construction and subcontractor trades workers who have been employed on DOE sites and screens them for occupational illnesses. In addition to conventional medical screening services, BTMed also offers early lung cancer detection (ELCD) using the latest and most advanced low-dose, computed tomography (CT) scans to detect lung cancers at an early stage while they can be treated effectively. It is not possible to accomplish this using conventional chest x-rays. Over 36,000 medical screenings and 4,300 low-dose CT scans have been delivered through a network of 225 specially credentialed clinics across the country.

BTMed serves workers from 34 DOE sites.



What we have found:

- **Important Occupational Health Findings**
 - Chest x-rays (CXRs) (N=21,147 participants receiving at least one CXR): 19.5 percent of participants had findings consistent with work-related lung disease.
 - Pulmonary function (breathing) tests (PFTs) (N=21,129 participants receiving at least one PFT): 23 percent of participants had findings consistent with obstructive disease most likely caused by work-related exposures.
 - Beryllium Lymphocyte Proliferation Tests (BeLPT) (N=20,163 participants receiving at least one BeLPT): 2.1 percent of participants had at least one abnormal BeLPT.
 - Audiometry (N=19,666 participants receiving at least one audiogram): 64% percent of participants demonstrated hearing loss above what is normal in the general population.

- **ELCD Program Findings**
 - Lung cancer has been detected in 32 of 1,417 DOE workers tested.
 - 23 of the 32 lung cancers were detected at an early stage when they could be treated effectively. Without the screening, it is unlikely those participants would have survived.

BTMed and Research:

BTMed maintains a research function which uses the medical screening data for three purposes:

- To improve the services we deliver to our participants, make improvements in the delivery of occupational medical services, and strengthen occupational medical recommendations.
- To identify work-related health risks and make recommendations about ways to improve worker protection within the DOE facilities.
- To identify unmet or poorly met general health needs and find ways to improve health care delivery.

To date, 14 studies have been published in the scientific literature. Most recently, a study was published on how pleural plaques identified on chest x-rays independently contributes to both the probability of developing Chronic Obstructive Pulmonary Disease and also the severity of the disease. This is the first study using longitudinal data to establish this as a causal relationship.

Toll-free number: 1-800-866-9663/1-888-464-0009

Web site: www.btmed.org

Facebook: <https://www.facebook.com/BTMed/>

Laura S. Welch, MD
 Medical Director, BTMed
 CPWR
lwelch@cpwr.com



Dr. Welch, second from right, meets with staff from the Seattle Cancer Care Alliance to discuss low-dose CT scans.

Dr. Laura Welch serves as the Medical Director for CPWR, a research and development institute affiliated with the Building and Construction Trades Department of the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO). She is a lecturer at George Washington University's Department of Environmental and Occupational Health. She previously held full-time faculty positions at the Albert Einstein, Yale University, and George Washington University Schools of Medicine.

She serves as a consultant to many Federal Agencies, including the Occupational Safety and Health Administration, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, and National Institutes of Health, and has many leadership roles in the American Public Health Association and Association of Occupational and Environmental Clinics. Dr. Welch provides occupational medicine expertise to the AFL-CIO, having worked with several union-management committees on health and safety issues. Her extensive work experience has led her to author over 100 peer-reviewed publications, abstracts, and technical reports.

As CPWR's Medical Director, Dr. Welch manages two national medical screening programs for construction workers. She is the principal investigator for the Early Lung Cancer Detection Program for construction workers, which is part of BTMed. She is also responsible for a nationwide screening program for sheet metal workers. She received her medical degree from the State University of New York at Stony Brook.

Knut Ringen, DrPH, MHA, MPH
Principal Investigator, BTMed
CPWR
knutringen@msn.com



With more than 40 years of experience in public health administration, Dr. Knut Ringen can be considered one of the founders of the field of occupational high risk management. Due to his intensive studies of issues within one of the most high-risk industries in the world, he is an expert in construction safety and health. In 1996, he used this experience to establish the first medical screening program for former DOE construction workers, which evolved into the BTMed. The BTMed program, which serves construction workers from 28 DOE sites across the country, has delivered in excess of 30,000 screenings to date.

In 1979, Dr. Ringen launched three projects to demonstrate that medical screenings among workers known to have been exposed to work-related health hazards could identify occupational illnesses and could help these workers secure their rights and prevent a premature death. When growing evidence from scientific studies and concerns expressed by workers suggested that DOE working conditions were hazardous, Dr. Ringen advocated for a special focus on construction workers, as these workers were usually employed by subcontractors and were more likely to be assigned to the most hazardous duties. Using the data collected from these medical screenings, Dr. Ringen and others could show how effective this model of medical screening and assistance was and why it should be applied to construction workers on DOE sites. This scientific analysis helped encourage Congress to enact legislation in 1993 that forms the basis for DOE's FWP.

BTMed has saved lives, helped workers and their families with compensation, and demonstrated to DOE that construction workers need better safety and health protections. It is well appreciated by the participants.

BTMed is administered by CPWR (cpwr.com), a 501(c 3) non-profit research institution, which serves as the research arm of Building and Construction Trades Department, AFL-CIO.

Dr. Ringen was the first executive director of CPWR and currently is its senior science advisor. He has directed other non-profit health organizations and has worked at the National Academy of Sciences and the National Cancer Institute. Among many honors, he is a fellow of the European Academy of Sciences and the Collegium Ramazzini, the international society of scholars in environmental and occupational health. He has a Master's in Hospital Administration from the Medical College of Virginia (now a part of Virginia Commonwealth University) and PhD and Master's degrees in Public Health from Johns Hopkins University (JHU).



THE PANTEX FORMER WORKER MEDICAL SURVEILLANCE PROGRAM

Conducted by The Dornsife School of Public Health at Drexel University

Who we are:

- Primary: The Dornsife School of Public Health at Drexel University; PI: Arthur L. Frank, MD, PhD.
- Outreach: Department of Occupational and Environmental Health Sciences, University of Texas Health Science Center at Tyler, Texas; Co-PI: C. David Rowlett, MD, MS.
- Clinical Services: Amarillo, Texas; Clinician: Angela Phillips, DNP, APRN, FNP-BC affiliated with West Texas A&M University.

What we do:

- The Pantex Former Worker Medical Surveillance Program offers former Pantex Plant employees and contract workers the opportunity to obtain an independent, objective assessment of their health in relation to their workplace exposures by a health care provider experienced in occupational medicine.
- Participants are scheduled for an appointment at a time convenient for them at a clinic in Amarillo. Former workers that live outside the Amarillo area are referred to the National Supplemental Screening Program.
- Each participant completes an occupational exposure history, as well as past medical history, prior to having their medical screening examination.
- The initial screening exam may include some or all of the following tests: physical exam, chest x-ray (CXR) with International Labour Organization B-read, spirometry, Beryllium Lymphocyte Proliferation Test (BeLPT), blood chemistry tests, and urinalysis.
- Former workers who participate in the program receive results of their clinical exam and medical tests in a personalized “results letter” from a board certified occupational medicine physician along with any necessary follow-up recommendations.
- The screening process is an opportunity for former workers to receive additional wellness information and support for lifestyle changes to improve their health and quality of life.
- Each participant is offered the opportunity to return for a “re-screening” exam every 3 years. The re-screening exam is focused on previous findings and any new health developments with all laboratory testing repeated as appropriate.
- Workers are assisted with claims made through the Department of Labor Energy Employees Occupational Illness Compensation Program, as appropriate.

What we have found:

- CXRs (N=1,119 participants receiving at least one CXR): 5.63 percent demonstrated findings consistent with work-related lung disease, and 5.01 percent demonstrated findings consistent with suspicious lung nodules or lesions
- Pulmonary function tests (PFTs) (N=1,119 participants receiving at least one PFT): 44.15 percent demonstrated findings consistent with obstructive disease
- BeLPTs (N=1,119 participants receiving at least one BeLPT): 1.34 percent had at least one abnormal BeLPT
- Audiometry: N/A
- Our Participation Surveys continue to show 98.6 percent satisfaction with the program

Toll-free number: 1-888-378-8939



Publication:

Phillips Angela, Frank Arthur, Loftin Collette, Shepherd Sara. “A detailed review of systems: an educational feature.” The Journal for Nurse Practitioners 13(10): 681-686.

<https://doi.org/10.1016/j.nurpra.2017.08.012>

The Pantex Former Worker Medical Surveillance Program



THE PANTEX FORMER WORKER MEDICAL SURVEILLANCE PROGRAM
Conducted by the Drexel University School of Public Health

Arthur L. Frank MD, PhD



Dr. Frank is a Professor of Public Health at the Drexel University School of Public Health in Philadelphia. He is also Chair Emeritus of the Department of Environmental and Occupational Health. He holds faculty positions as Professor of Medicine and as Professor of Civil, Architectural, and Environmental Engineering. His medical degree is from the Mount Sinai School of Medicine (1972), and his PhD in Biomedical Sciences is from the Mount Sinai campus of the City University of New York (1977). He worked at Mount Sinai with Dr. Irving Selikoff and, since his days as a medical student, has been continuously engaged in research regarding the health effects of asbestos. His professional interests involve exposure to other dusts and to carcinogens in general. He has also worked in the area of agricultural safety and health. Dr. Frank has taught at Mount Sinai, the University of Kentucky, and in the University of Texas system before joining the faculty

at Drexel. He is boarded in both internal medicine and occupational medicine and has served as an advisor to such organizations as the National Institute for Occupational Safety and Health, the Occupational Safety and Health Administration, the Environmental Protection Agency, and the Centers for Disease Control and Prevention. He has been a consultant to companies and unions. He has done work internationally, including in China, India, and Mongolia. He has published some 200 publications, many related to asbestos, and served many publications as an editor and reviewer.

The Pantex Former Worker Medical Surveillance Program



THE PANTEX FORMER WORKER MEDICAL SURVEILLANCE PROGRAM
Conducted by the Drexel University School of Public Health

C. David Rowlett, MD, MS, FACOEM



Dr. Rowlett joined the Department of Occupational Health Sciences at University of Texas Health Science Center at Tyler (UTHSCT) as an Associate Professor in 2010 and began working with the Pantex former worker program in 2014. In addition, he serves as medical director of both employee health and of the occupational health clinic at UTHSCT. He also serves as part-time medical director for Eastman Chemical Company. Prior to UTHSCT, Dr. Rowlett was first a designated physician and then the site occupational medical director at the Pantex Plant, Amarillo, Texas, from 2003-2009. Dr. Rowlett received an MS in Chemical Engineering from Texas Tech University, Lubbock, Texas, in 1977, after which he served on active duty as a research engineer for the U.S. Army. After 4 years on active duty, he entered industry in 1981 as a process engineer and technical superintendent. After 3 years in industry, he returned to Texas Tech where

he received his MD in 1987. He completed an MS in Preventive Medicine in 1989 and an occupational medicine residency in 1990 at The University of Iowa, Iowa City, Iowa. He returned to industry with Exxon Company USA, serving as medical director of the Baytown refinery, Baytown, Texas, 1990-1993. Following this, Dr. Rowlett spent a decade in multispecialty group practice, first with Scott & White Clinic, Temple, Texas (1993-1999) and then with the Covenant Medical Group, Lubbock, Texas (1999-2003) before joining Pantex.

While at Scott & White, Dr. Rowlett served as an assistant professor at Texas A&M University with appointments in the College of Medicine, Nuclear and Safety Engineering/Industrial Hygiene, and the NSF Ergonomics Center. During this time, Dr. Rowlett became a member of the American College of Occupational and Environmental Medicine's (ACOEM) Practice Guidelines committee where he served for almost a decade. He was a contributing editor and a chapter lead for the second addition of the "Guidelines." His presentations and publications span the fields of industrial hygiene, toxicology, engineering, safety and surety, as well as evidence-based practice of medicine. He is board certified in occupational medicine and a fellow of ACOEM.



Espanola program office and medical clinic.

Medical Exam Program for Former Workers from Los Alamos National Laboratory and Sandia (New Mexico) National Laboratories

Who we are:

- Johns Hopkins Bloomberg School of Public Health (JHBSPH)
- University of New Mexico (UNM)

What we do:

- Provide medical screening exams to all interested former workers from Los Alamos National Laboratory (LANL) and Sandia National Laboratories (SNL).
- The JHBSPH Medical Exam Program is one of several unique programs within the DOE FWP. Examinations are done in New Mexico in Espanola, New Mexico, and Albuquerque, New Mexico, by occupational health professionals from JHBSPH and UNM.
- Examination sessions are scheduled over a 2-day or 3-day period two to three times per year. Physicians, health care providers, and occupational health professionals travel from Baltimore, Maryland; Espanola, New Mexico; and Albuquerque, New Mexico, to the examination site to conduct physical examinations.
- During examination sessions, former workers have the opportunity to meet with the program occupational medicine physician to discuss their examination results and to ask questions.
- Each participant has a detailed exposure and medical history interview prior to their initial examination and a short medical history interview before their re-examination. These interviews are conducted by a former worker from LANL.
- The program staff assists former workers with workers' compensation claims and, when appropriate, writes letters in support of claims for Federal compensation for former workers from both sites.
- The project has completed 4,274 examinations of former workers since the program began in 2000. Of these exams, 3,555 were new exams, and 714 were re-examinations of former LANL workers for past exposures to asbestos, beryllium, and radiation, and SNL former workers for past exposure to asbestos, beryllium, radiation, and silica.
- On exit surveys, over 97 percent of program participants stated that they were satisfied with their overall evaluation, and 97 percent would recommend the program to other former workers.
- The program works with the Joint Outreach Task Group (JOTG) to develop outreach strategies to recruit former workers who are eligible for the medical screening program and the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). The JOTG has representatives from the National Institute for Occupational Safety and Health (NIOSH), DOE, the Former Worker Programs, the Department of Labor (DOL) Office of Workers' Compensation Programs, DOL Ombudsman's Office, NIOSH Ombudsman's Office, and the DOL Resource Centers.
- Over the past year, we hosted an Open House for the Joint Outreach Task Group, claimants from the DOL EEOICPA program and LANL and SNL former workers in Santa Fe, NM. This meeting was held the evening before the DOL Advisory Board on Toxic Substances and Worker Health, which was

open to the public. We had 80 people from the area attend the Open House and meet with representatives from DOE, NIOSH, DOL Compensation Program, the DOL Ombudsman's Office, the Espanola Resource Center, and the DOL Seattle Claims Office. During this meeting time, current and former workers discussed issues with DOL and the Seattle Claims Office about their claims, completed a claim for compensation with the Resource Center representatives, discussed employment records with DOE, and applied to participate in the JHU Former Worker Program.

- When we are unable to attend DOL meetings in the New Mexico area, we send brochures for both programs to the Espanola Resource Center for these meetings.
- We participated in the Cold War Patriots Town Hall Meeting in Espanola, NM, where we discussed the program and recruited program participants.

What we have found:

- Chest x-rays (CXRs) (N= 3,343 participants receiving at least one CXR): 10.3 percent demonstrated findings consistent with work-related lung disease;
- Pulmonary Function Tests (PFTs) (N=2,428 participants receiving at least one PFT): 5.5 percent demonstrated findings consistent with obstructive disease;
- Beryllium Lymphocyte Proliferation Tests (BeLPTs) (N=3,312 participants receiving at least one BeLPT): 1.7 percent had at least one abnormal BeLPT; and
- Audiometry (N=3,032 participants receiving at least one audiogram): 55 percent demonstrated hearing loss for normal speech tones.

Toll-free number: 1-877-500-8615

Web site: <http://www.jhsph.edu/lanlfw/>

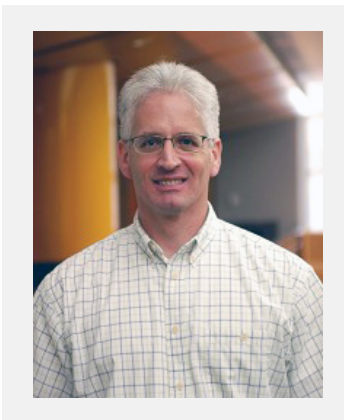
Maureen Cadorette, PhD, COHN-S



Dr. Cadorette has been a nurse for over 40 years. She graduated from Nursing School in 1972 and completed a Bachelor's degree in nursing in 1992. She has a Master's in Public Health (1994) and a PhD in Occupational and Environmental Health (2005) from JHU. She has worked in many areas of nursing, but Orthopedics was her longest stint, and she was at one time certified in Orthopedic Health Nursing. Today, she is a Certified Occupational Health Nurse. She has worked at JHU as a staff member and an Assistant Scientist since 1997, and she has worked in Occupational Health for 20 years. She is on the Faculty of the Education and Research Center at JHBSPH. They are funded by the National Institute for Occupational Safety and Health, and they educate occupational health professionals. She has been with the FWP since 1997 as a

project coordinator and now as a Co-Principal Investigator. She manages the day-to-day activities of the program and works with their staff in New Mexico to keep the program working smoothly.

Brian S. Schwartz, MD, MS



Dr. Schwartz is a Professor in the Department of Environmental Health Sciences in the JHBSPH. He is jointly appointed in the Department of Epidemiology in the School of Public Health and in the Department of Medicine in the School of Medicine. He joined the faculty at Johns Hopkins as an Assistant Professor in 1990 and was promoted to Professor in 2001. He served as Director of the Division of Occupational and Environmental Health from 1996 to 2006 and as Director of the Occupational and Environmental Medicine Residency from 1993 to 1998, for which he is currently Co-director. He is a board-certified specialist in internal medicine and occupational and environmental medicine. Dr. Schwartz has been evaluating patients concerned about occupational and environmental diseases since 1990 in the Johns Hopkins

Center for Occupational and Environmental Health. He also has an active research program on how metals, solvents, other chemicals, industrial processes, and environmental and community conditions can affect health. Dr. Schwartz has been the leader or co-leader of the FWP at LANL and SNL since 2000. The two programs take a unique approach in that program health care providers perform all the examinations themselves. The two programs have completed over 4,000 examinations of former workers.

National Supplemental Screening Program

Who we are:

The National Supplemental Screening Program (NSSP) is managed by **Oak Ridge Associated Universities (ORAU)**. ORAU provides innovative scientific and technical solutions for the Department of Energy (DOE) and other federal agencies to advance national priorities in science, health, education, and national security. ORAU accomplishes this by integrating unique specialized teams of experts and connecting former DOE workers to the right people and resources in their area for medical screening examinations. The NSSP team of experts includes:



National Jewish Health is an academic medical research facility specializing in respiratory, cardiac, immune, and allergic disorders. National Jewish Health provides the NSSP with medical examinations, beryllium lymphocyte proliferation tests, and Low-dose Computed Tomography (LDCT) scans and radiological reviews for the NSSP LDCT Pilot Project.

The **University of Colorado**, School of Public Health, Center for Health, Work & Environment provides the NSSP with medical examination results letter preparation, operational oversight, and periodic evaluation of the DOE/NSSP medical protocol.

Comprehensive Health Services, Inc. (CHSi) is a leading provider of medical management solutions and has one of the largest nationwide networks. CHSi provides the NSSP with participant scheduling and medical examination services at more than 2,300 facilities around the country. With staff physician oversight, CHSi medical readiness teams respond to employers' health care needs. CHSi scalable exam and surveillance programs provide dynamic, proven, and robust solutions for national and international workplace health.

Axion Health provides the NSSP with ReadySet®, a cloud-based employee health management system to increase compliance, employee engagement, and organizational efficiency. ReadySet® is currently used by many prestigious U.S. health systems, integrating employee/occupational health and medical surveillance. The system is Health Insurance Portability and Accountability Act (HIPAA), National Institute for Standards and Technology, and Service Organization Control 2 (SOC2) compliant; easy to learn; and quick to implement. ReadySet® is a secure solution covering over a million individuals.

What we do:

- The NSSP provides medical screening examinations to former DOE workers from eight primary DOE sites:
 - Argonne National Laboratory,
 - Fermi National Accelerator Laboratory,
 - Hanford,
 - Kansas City Plant,
 - Princeton Plasma Physics Laboratory,
 - Pinellas,
 - Rocky Flats,
 - Savannah River Site,

- Former workers from 68 additional DOE Sites including:
 - referrals from the other Former Worker Programs (FWPs) whose participants (Production, Construction and Building Trades) may live outside of their respective medical screening coverage areas and
 - DOE sites where no DOE FWP has been assigned.
- The NSSP provides DOE former workers with exposure-based medical screening examinations and screening tests and procedures to identify medical conditions that are non-occupational in origin. As a result, former workers have the opportunity to receive wellness information and support for lifestyle changes to improve their health and quality of life.
- The NSSP provides the opportunity for participants to receive a re-screening medical examination every 3 years.
- The NSSP provides DOE former workers with assistance in regards to filing Energy Employee Occupational Illness Compensation Program benefit claims with the Department of Labor.
- In FY2013, the NSSP began an LDCT Pilot Program to detect early stage lung cancer, as well as other work-related lung diseases and medical conditions in 98 NSSP participant volunteers who lived in the greater Denver metro area. The NSSP LDCT Pilot Program was based on the National Comprehensive Cancer Network's Clinical Practice Guidelines. NSSP LDCTs and radiology evaluations were performed at National Jewish Health, Denver, Colorado.
- In FY2017 the NSSP LDCT Pilot Program completed the third year of annual LDCTs. One case of lung cancer (Stage 1) was diagnosed, and referred for additional consultation/follow-up.
- In FY2017 the NSSP began providing the hemoglobin A1c as a component for all medical screening examinations. The hemoglobin A1c provides information about a person's average levels of blood glucose over the previous 3 months and is the primary test used for diabetes management and diabetes research. The results from the A1c screenings will significantly improve the ability to provide medical follow-up recommendations.
- More than 99 percent of the responding NSSP participants were satisfied with their experience in the NSSP.

What we have found:

- Initial medical screening examinations for 17,002 former DOE workers representing 75 DOE sites and re-screening examinations for 4,004 former workers.
- Chest X-rays (CXRs) (with B-Read interpretation): N=16,226 participants receiving at least one CXR
 - 5.1 percent had findings consistent with asbestosis without pleural disease
 - 1.0 percent had findings consistent with asbestosis with pleural disease
 - 17.3 percent had findings consistent with asbestos-related pleural disease
 - 0.2 percent had findings consistent with silicosis
 - 0.0 percent had findings consistent with mixed dust pneumoconiosis
 - 3.1 percent had findings consistent with pneumoconiosis, not otherwise specified
- Pulmonary Function Tests (PFTs): N=16,143 participants receiving at least one PFT
 - 21.6 percent had findings consistent with restrictive lung disease
 - 14.3 percent had findings consistent with obstructive lung disease
 - 2.9 percent had findings consistent with mixed pattern lung disease
- BeLPTs: N=14,966 participants receiving at least one BeLPT
 - 2.7 percent had at least one abnormal BeLPT
- Audiometry: N=14,411 participants receiving at least one audiogram

- 42.8 percent demonstrated noise-induced hearing loss for normal speech tones
- ELCD Scans:
 - 1 - diagnosed lung cancer
 - 1 of 1 (100 percent) of individuals whose lung cancers have been staged had an early stage lung cancer (Stage I) at the time of diagnosis
 - Lung cancer was detected in 1 of 98 DOE workers tested

Toll-free number: 1-866-812-6703

Web site: <http://www.ora.gov/nssp>

Donna L. Cragle, PhD



Dr. Cragle is the Senior Vice President and Director, Health, Energy and Environment, at ORAU. She has been involved with research of occupational hazards in DOE facilities for 35 years. The primary focus of her research has been in the area of occupational epidemiology, with particular interest in radiation and beryllium exposures. She has worked on numerous international projects, including an international committee to assess the body of data related to human health effects related to nickel exposure. She also worked on a data preservation effort for an international radiation epidemiology project involving health effects of radiation exposure. Dr. Cragle has also been involved in decision making related to maintenance of the large worker databases. She has extensive experience with large-scale studies involving data from multiple worker populations. She has assisted outside researchers in their access to worker data and worked collaboratively with these researchers to facilitate their

understanding of the data. Dr. Cragle's knowledge of occupational epidemiology has resulted in teaching opportunities both nationally and internationally. Her publications have provided significant contributions to the occupational epidemiology literature. Dr. Cragle received her Bachelor of Arts degree in biological sciences from Indiana University and her Masters of Science in human genetics from Virginia Commonwealth University. Dr. Cragle received her PhD in environmental epidemiology from the University of North Carolina-Chapel Hill.

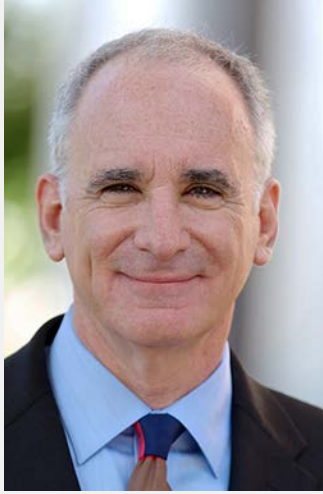
John R. McInerney, MD



Dr. McInerney is a physician with ORAU, manager of the ORAU Arvada Office, and is the Co-Principal Investigator of the Nssp and the Nssp LDCT Pilot Program. Dr. McInerney coordinates the Nssp evaluation tests and procedures and participant education and results notification with the occupational physicians and radiologists at the University of Colorado Denver and National Jewish Health. He is residency-trained and board-certified in Emergency Medicine and Occupational Medicine and practiced in the Emergency Departments of major hospitals in Detroit, Chicago, Minneapolis, and Denver. Dr. McInerney served 3 years as a commissioned officer in the Indian Health Service providing medical and urgent care to the Hopis and Navajos at a remote hospital in northeastern Arizona. Dr. McInerney owned and operated a medical care facility in Golden, Colorado, for 15 years that provided emergency, general, and occupational medical services to the surrounding community. He served as an elected Golden,

Colorado, city councilman for 8 years and was the Colorado School of Mines team physician for 25 years. Prior to accepting the position with ORAU, he worked as a physician at the DOE Rocky Flats Plant for 10 years, the last 7 of which he was the DOE Rocky Flats Site Occupational Medical Director. Dr. McInerney has also served as an advisor on DOE health-related committees and continues his interaction with the DOE Site Occupational Medicine Directors regarding Nssp former DOE worker findings.

Lee S. Newman, MD, MA, FCCP, FACOEM



Dr. Newman is Professor of Environmental and Occupational Health in the Colorado School of Public Health, University of Colorado Denver. He is Director of the Center for Worker Health and Environment, Director of the NIOSH-supported Mountain and Plains Education and Research Center, and is Chief Medical Informatics Officer (CMIO) of Axion Health, Inc. Dr. Newman is also a Professor of Medicine in the Division of Allergy and Clinical Immunology and Division of Pulmonary Sciences and Critical Care Medicine in the School of Medicine at the University of Colorado Denver, Anschutz Medical Campus. Dr. Newman serves as the Co-Principal Investigator of the NSSP. In his role as founder and CMIO of Axion Health, Dr. Newman led the team in the development of the highly secure software system that has been used by the NSSP since 2005 to efficiently conduct former energy worker exams throughout the country. He has also served as an advisor to many Federal Agencies, including the DOE, the Department of Labor Energy Employees Occupational Illness Compensation Program Act,

the National Institutes of Health, the Food and Drug Administration, the Environmental Protection Agency, and the Centers for Disease Control and Prevention. Dr. Newman is board certified in internal medicine and pulmonary medicine and is an internationally renowned expert on occupational and environmental lung disorders. Dr. Newman is recognized for his contributions to our understanding of how beryllium affects the immune system. As the former Chief of the Division of Environmental and Occupational Health at National Jewish Health, he pioneered the use of the Beryllium Lymphocyte Proliferation Test and was instrumental in bringing this test into routine use for both clinical diagnosis and screening of beryllium-exposed workers leading to the current clinical definition of beryllium sensitization and Chronic Beryllium Disease. Dr. Newman received his Bachelor of Arts degree in psychology from Amherst College and his Masters of Arts degree in social psychology from Cornell University Graduate School of Arts and Sciences. He earned his MD from Vanderbilt University School of Medicine, completed internship and residency in Internal Medicine at Emory University School of Medicine, and pulmonary fellowship at the University of Colorado Denver/National Jewish Health.



Worker Health Protection Program (WHPP)

Who we are:

The WHPP is administered by the Barry Commoner Center for Health and the Environment at Queens College of the City University of New York, in conjunction with the United Steelworkers, the Atomic Trades and Labor Council in Oak Ridge, and the Fernald Medical Screening Program. Screening is conducted through partnerships with medical groups located within local DOE communities, including the University of Tennessee Graduate School of Medicine in Knoxville, TN, and the University of Nevada, Las Vegas, School of Medicine.

WHPP offers examinations at 14 DOE sites in 8 states. WHPP pioneered the use of low-dose Computed Tomography (CT) scanning for the early detection of lung cancer among former DOE workers beginning in 2000.

WHPP employs a small network of former and current DOE workers as “local coordinators” to conduct outreach and assist with program operations in the DOE communities where medical screening occurs. Activities of local coordinators include conducting outreach at community events, scheduling and assisting with program registration, answering medical screening questions, liaising with local DOE site offices and worker groups, advising on the development of program materials, and providing appropriate guidance regarding the energy Employees Occupational Illness Compensation Program claims process. Local coordinators have been an essential component in the recruitment of more than 32,500 DOE workers who have participated in over 60,000 total examinations through WHPP.

What we do:

The consortium utilizes expert occupational medicine physicians and support staff to provide independent medical screening to workers who are at risk of illnesses related to their DOE work. In addition to the standard FWP medical screening, WHPP administers the Early Lung Cancer Detection (ELCD) program, which offers low-dose CT scans at nine DOE sites.

WHPP provides both FWP medical screening and the ELCD Program to workers from:

- Idaho National Laboratory (Idaho)
- Paducah Gaseous Diffusion Plant (GDP) (Kentucky)
- Nevada Test Site, now called the Nevada National Security Site (Nevada)
- Fernald (Ohio)
- Mound Plant (Ohio)
- Portsmouth GDP (Ohio)
- K-25 GDP (Tennessee)
- Oak Ridge National Laboratory (Tennessee)
- Y-12 National Security Complex (Tennessee)

Standard FWP medical screenings only are provided to workers from:

- Lawrence Berkeley National Laboratory (California)
- Lawrence Livermore National Laboratory (California)
- Sandia National Laboratories (California)
- Waste Isolation Pilot Plant (New Mexico)
- Brookhaven National Laboratory (New York)

What we have found:

FWP medical screening

- Chest x-rays (CXRs)* (N=27,575 participants receiving at least one CXR): 7.9 percent demonstrated findings consistent with work-related lung disease (total percentage of CXR abnormalities in the following categories: asbestosis without pleural disease, asbestosis with pleural disease, asbestos-related pleural disease, silicosis, mixed dust pneumoconiosis, and pneumoconiosis not otherwise specified).
- Pulmonary Function Tests (PFTs) (N=32,332 participants receiving at least one PFT): 24.7 percent demonstrated findings consistent with obstructive lung disease (percentage of PFT abnormalities – obstructive pattern and mixed pattern combined).
- Beryllium Lymphocyte Proliferation Tests (BeLPTs) (N=29,364 participants receiving at least one BeLPT): 3.7 percent had at least one abnormal BeLPT (total percentage of BeLPT abnormalities – 1, 2 or 1 and 1+ borderlines).
- Audiometry* (N=25,938 participants receiving at least one audiogram): 33.0 percent demonstrated occupational hearing loss.

*Does not include the Nevada Test Site

ELCD Program

- 162 ELCD Program participants have been diagnosed with primary lung cancer.
- 111 of the 153 (72.5 percent) individuals whose lung cancers have been staged to date, had an early stage lung cancer (Carcinoma in situ, Stage I or Stage II non-small cell cancer or limited small cell cancer) at the time of diagnosis.
- Lung cancer was detected in one of approximately 84 DOE workers tested (N=13,597).

Toll-free number: 1-888-241-1199

Web site: <http://worker-health.org>

Facebook: www.facebook.com/WorkerHealthProtectionProgramwhpp

Steven Markowitz, MD, DrPH



Steven Markowitz, MD, DrPH, an occupational medicine physician and epidemiologist, directs the Barry Commoner Center for Health and the Environment at Queens College, City University of New York. He is Adjunct Professor of Preventive Medicine at Mount Sinai School of Medicine. He received his undergraduate education at Yale University, his medical degree and doctorate in epidemiology from Columbia University, and completed residencies in internal medicine at Montefiore Hospital and in occupational medicine at Mt. Sinai School of Medicine.

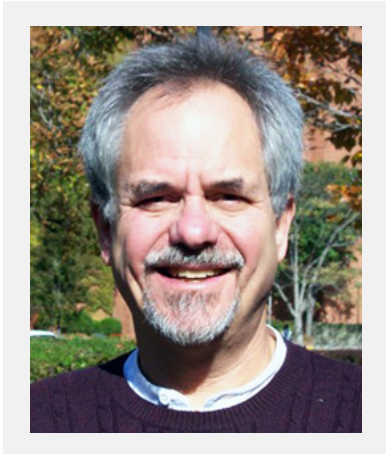
In 1996, Dr. Markowitz worked with the DOE, other physicians, and labor unions to establish the DOE FWP. Under these auspices since 1997, Dr. Markowitz has co-directed *WHPP*, a national medical screening program for former DOE nuclear weapons workers at 14 DOE sites in 8 States. Program collaborators include the United Steelworkers and the Oak Ridge and Fernald Atomic Trades & Labor Councils.

Dr. Markowitz has conducted research in the areas of occupational cancer, asbestos-related diseases, immigrant occupational health and surveillance of occupational injuries and illnesses, publishing approximately 100 journal articles and book chapters. Earlier in his career, Dr. Markowitz directed the occupational medicine residency at Mount Sinai School of Medicine and initiated a NIH-funded training for medical students and a Fogarty Center-funded international occupational health fellowship in Mexico, Brazil, and Chile. For more than a decade, he has worked with community groups in New York City to address immigrant occupational health, providing medical screening in 2002 for Latino day laborers who worked near Ground Zero, documenting health and safety problems of immigrant restaurant workers in New York City, and training and equipping 500 Latino day laborers to perform Hurricane Sandy cleanup work.

Dr. Markowitz is Editor-in-Chief, *American Journal of Industrial Medicine* and Associate Editor of a major textbook, *Environmental and Occupational Medicine (4th edition)* (2007). He currently serves as Chair of the Advisory Board on Toxic Substances and Worker Health for Part E of the Energy Employees Occupational Illness Compensation Program Act. He also serves on the Board of Scientific Counselors of the National Toxicology Program and on the National Institute for Occupational Safety and Health, Scientific and Technical Advisory Board of the World Trade Center Health Program. He has served as a consultant to the World Health Organization and the Pan American Health Organization. He founded and directed the World Trade Center Clinical Center of Excellence based in Queens.

Founded in 1966, the Barry Commoner Center for Health and the Environment is an environmental and occupational health institute at Queens College, City University of New York, the nation's largest public university. The Center addresses real world problems, involves affected communities, and seeks to find achievable solutions.

Dr. Lewis Pepper, MD, MPH



Dr. Pepper came to WHPP at Queens College in 2011 after 20 years at the Boston University School of Public Health. Since coming to Queens College, he has served as the Associate Medical Director of the WHPP. Dr. Pepper has been interested in beryllium-related health effects. He has co-authored a paper examining beryllium exposure at the Nevada Test Site, and most recently was a member of the American Thoracic Society's *Ad Hoc Committee on Beryllium Sensitivity and Chronic Beryllium Disease* assisting in their June 2014 Statement on Beryllium Disease.

Dr. Pepper was the Principal Investigator of the National Institute for Occupational Safety and Health-funded studies of lead exposure among bridge construction workers and the health impacts of workplace reorganization and downsizing at DOE. The latter study involved almost 6,000 employees at five DOE facilities.

Currently, Dr. Pepper is an Adjunct faculty member of the Hunter School of Public Health of the City University of New York.

James Frederick



Jim Frederick is the Assistant Director of the Health, Safety & Environment Department (HSE) of the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union (USW). Jim has been with the USW since 1994, working at the Pittsburgh headquarters. Jim is a member of USW local union 9305. He has a Bachelor's degree in environmental health from Purdue University and a Master's degree in environmental health and safety management from Rochester Institute of Technology.

The USW is the largest industrial union in North America and has 850,000 members in the U.S., Canada, and the Caribbean. It represents workers employed in the metals, rubber, chemicals, paper, energy, government, and service sectors.

The USW HSE Department's primary task is to assist the union's membership through their local unions in protecting their health and safety and maintaining environmental health for the communities in which our members and their neighbors live. The USW HSE Department is comprised of 27 full-time staff and more than 300 local union trainers and activists working part-time for the USW HSE Department on an ongoing basis.

Jim's work for the USW includes:

- providing health, safety, and environmental assistance to the membership;
- coordinating workplace health and safety audits, as well as fatality and catastrophic incident investigations at USW-represented facilities;
- facilitating health, safety, and environmental negotiations with various USW employers;
- providing a range of training programs to local union health and safety activists, employers, and others;
- working with government representatives and other organizations to improve workplace health, safety, and environmental protections;
- providing oversight of health, safety, and environment conferences for the members of the union; and
- serving as the principal investigator on cooperative grant programs for the USW's Tony Mazzocchi Center for Health, Safety, and Environmental Education.

Ashlee Fitch, OHST



Ashlee Fitch is International Health and Safety Representative for the United Steelworkers (USW) Health, Safety and Environment department and Principal Investigator representing the USW for the Worker Health Protection Program. As a health and safety advocate, Ms. Fitch works to provide technical assistance to the local unions of the USW and focuses on the advancement of federal and state laws that promote the health and safety for workers and their communities. Ms. Fitch also serves as Board Member at Large for the Beryllium Health and Safety Committee, which focuses on education on occupational exposure to beryllium and the prevention of beryllium-induced conditions and illnesses.

Prior to joining the USW, Ms. Fitch worked in a rolled aluminum plant and served as a union representative on the labor-management health and safety committee. She has a Bachelor of Science degree in Natural Resource and Environmental Economics and a Master of Science degree in Safety

Management, both from the University of West Virginia and is a certified Occupational Safety and Health Technologist through the Board of Certified Safety Professionals.



Former Burlington Atomic Energy Commission Plant (BAECP) and Ames Laboratory Workers Medical Screening Program

Who we are:

The University of Iowa College of Public Health

What we do:

The University of Iowa College of Public Health administers medical screenings to former workers from two DOE facilities in Iowa: the BAECP/Line 1/Division B at the Iowa Army Ammunition Plant (IAAP) in West Burlington, Iowa, operational between 1949 and mid-1975, and the Ames Laboratory on the campus of Iowa State University in Ames, Iowa, established in the early 1940s.

Nearly 11,000 workers were employed in the manufacture and disassembly of nuclear weapons at the BAECP with an estimated 2,348 still living and have known addresses; 30 percent of those do not live in Iowa and are being referred to the National Supplemental Screening Program (NSSP) for screenings. Medical screenings for BAECP workers began in 2002. As of September 30, 2017, a total of 1,398 former workers have been screened with 817 receiving a 3-year repeat screening, 508 a 6-year, 253 a 9-year, 101 a 12-year and 7 a 15-year repeat screening.

In the early 1940s, the Ames Laboratory developed the process for purifying uranium metal for nuclear reaction purposes for the Manhattan Project. Overall, the Laboratory produced over 2 million pounds (1,000 tons) of high-purity uranium for the nuclear weapons industry. The Ames Laboratory presently conducts a broad range of applied chemical and physical research.

Over 14,000 employees worked at the Ames Laboratory, and 10,832 of those workers are still living and have known addresses; 71 percent do not live in Iowa and are being referred to NSSP for screenings. Medical screenings for former Ames Laboratory workers began in 2006. As of September 30, 2017, a total of 2,053 former workers have been screened with 974 receiving a 3-year repeat screening, 523 a 6-year, and 112 a 9-year repeat screening.

What we have found:

- Chest x-rays (CXRs) (N=2,000 participants receiving at least one CXR): 16 percent demonstrated findings consistent with work-related lung disease.
- Pulmonary function tests (PFTs) (N=2,101 participants receiving at least one PFT): 20 percent demonstrated findings consistent with obstructive disease.

- Beryllium Lymphocyte Proliferation Tests (BeLPTs) (N=2,194 participants receiving at least one BeLPT): 3 percent had at least one abnormal BeLPT.

Toll-free number: 1-866-282-5818

Web site: www.iowafwp.org

Laurence Fuortes, MD, MS



Laurence Fuortes, MD, MS, is a Professor of Occupational and Environmental Health and Internal Medicine at The University of Iowa. He is an occupational medicine physician with over 30 years of clinical experience and has directed the University Employee Health Clinic for 25 years. Dr. Fuortes teaches courses in environmental toxicology and international health and mentors graduate students, medical students, and occupational medicine residents in the Pulmonary Division Outpatient Clinic at the University Hospitals.

He has been the Principal Investigator of the FWP at The University of Iowa College of Public Health since its inception in 2000, which provides screenings to the two DOE sites in Iowa: IAAP and Ames Laboratory. In addition to evaluating the former workers at the medical screening, Dr. Fuortes provides thorough assistance with recommendations for follow-up care and conducts Energy Employees Occupational Illness Compensation Program impairment evaluations for former DOE workers. His personalized attention has been greatly appreciated by the workers and was recognized in receiving The University of Iowa Brody Service Award. Dr. Fuortes has also directed studies of the health effects of Department of Defense conventional weapons workers from the IAAP.

With over 90 peer-reviewed publications, Dr. Fuortes has been an investigator on numerous occupational and environmental public health programs, many with major service components, such as pesticide toxicology in agricultural workers, traumatic head and spinal cord injury epidemiology, and health services delivery to Iowa migrant farm workers. Dr. Fuortes also served as an Internist with the Indian Health Service and an Epidemic Intelligence Service Officer and has been involved with extensive global occupational health initiatives as well, including serving as a World Health Organization/Fulbright Lecturer in Costa Rica and a Senior Fulbright Scholar in South Africa and Armenia, as well as directing Fogarty international research-training programs.

Marek Mikulski, MD, PhD, MPH



Dr. Mikulski is an Adjunct Assistant Professor and Research Scientist in Occupational and Environmental Health at The University of Iowa. He received his PhD and MPH degrees from the University of Iowa and MD from the Medical University of Lodz, Poland. Dr. Mikulski is an occupational epidemiologist with over 18 years of research experience, including studies of health effects of exposures in nuclear and conventional munitions production, adverse birth outcomes from use of pesticides, and effects of age on assessment of pulmonary function. His research interests include a broad area of work-related lung disease, with specific interest in epidemiology and novel, computer-based methods used in diagnosing lung disease. Dr. Mikulski has published extensively and delivered presentations in these areas both at national and international meetings. He has also been an investigator on several occupational health/occupational medicine studies and projects, including those on the training programs in Europe where he served on the Board of the European Association of Schools of Occupational Medicine.

Dr. Mikulski has been a Co-Principal Investigator on the Iowa Former Worker Program since 2008 and has been actively involved in studies of health effects of Iowa Department of Defense conventional munitions workers. Dr. Mikulski is also a liaison with Department of Labor, Department of Energy, and congressional representation from the State of Iowa for issues relating to exposure profile and verification of employment for Energy Employees Occupational Illness Compensation Program (EEOICP).

Appendix B: Exams Conducted through the Former Worker Program

Table 7. Number of Former Workers Screened and Re-screened by U.S. Department of Energy Site (1997 through September 2017)

| State | Sites | Initial Screenings | Re-screens |
|-------|---|--------------------|------------|
| AK | Amchitka Island Test Site | 1,434 | 727 |
| CA | Lawrence Berkeley National Laboratory | 474 | 249 |
| CA | Lawrence Livermore National Laboratory | 2,101 | 1,345 |
| CA | Sandia National Laboratories, CA | 182 | 99 |
| CO | Rocky Flats Plant (Construction Workers) | 916 | 519 |
| CO | Rocky Flats Plant (Production Workers) | 3,966 | 1,336 |
| FL | Pinellas (Production Workers) | 666 | 241 |
| IA | Ames Laboratory | 2,053 | 1,609 |
| IA | Iowa Army Ammunition Plant | 1,398 | 1,686 |
| ID | Idaho National Laboratory (Construction Workers) | 1,227 | 481 |
| ID | Idaho National Laboratory (Production Workers) | 5,075 | 4,088 |
| IL | Argonne National Laboratory | 676 | 191 |
| IL | Fermi National Accelerator Laboratory | 167 | 12 |
| KY | Paducah GDP (Construction Workers) | 1,061 | 535 |
| KY | Paducah GDP (Production Workers) | 3,552 | 2,923 |
| MO | Kansas City Plant (Construction Workers) | 770 | 318 |
| MO | Kansas City Plant (Production Workers) | 2,690 | 542 |
| NM | Los Alamos National Laboratory | 3,234 | 628 |
| NM | Sandia National Laboratories, NM | 418 | 56 |
| NV | Nevada National Security Site | 5,220 | 3,271 |
| NY | Brookhaven National Laboratory (Construction Workers) | 611 | 318 |
| NY | Brookhaven National Laboratory (Production Workers) | 504 | 82 |
| OH | Feed Materials Production Center (Construction Workers) | 2,371 | 1,584 |

| State | Sites | Initial Screenings | Re-screens |
|-------------|--|--------------------|------------|
| OH | Feed Materials Production Center (Production Workers) | 1,365 | 1,020 |
| OH | Mound Plant (Construction Workers) | 460 | 207 |
| OH | Mound Plant (Production Workers) | 1,675 | 1,366 |
| OH | Portsmouth GDP (Construction Workers) | 1,226 | 704 |
| OH | Portsmouth GDP (Production Workers) | 3,810 | 3,449 |
| SC | Savannah River Site (Construction Workers) | 5,086 | 2,264 |
| SC | Savannah River Site (Production Workers) | 5,952 | 366 |
| TN | Oak Ridge K-25 (K-25) (Production Workers) | 4,825 | 4,546 |
| TN | Oak Ridge National Laboratory (ORNL) (Production Workers) | 2,310 | 2,011 |
| TN | Oak Ridge Reservation ¹¹ (Construction Workers) | 3,738 | 1,860 |
| TN | Y-12 National Security Complex (Y-12) (Production Workers) | 4,233 | 3,561 |
| TX | Pantex Plant | 1,538 | 608 |
| WA | Hanford Site (Construction Workers) | 4,276 | 1,792 |
| WA | Hanford Site (Production Workers) | 5,868 | 944 |
| | Other Sites ¹² (Construction Workers) | 1,536 | 559 |
| | Other Sites ¹³ (Production Workers) | 417 | 23 |
| Grand Total | | 89,081 | 48,120 |

¹¹ Includes K-25, ORNL, and Y-12

¹² Sites where the number of individuals screened by the Building Trades National Medical Screening Program to date is less than 100.

¹³ Sites where the number of individuals screened by the National Supplemental Screening Program or the Worker Health Protection Program to date is less than 100.

Appendix C: Exam Results

More indepth information regarding the exam components offered through the program can be found on the Former Worker Program Website (<http://energy.gov/ehss/conventional-medical-screening-program>). Medical findings by the U.S. Department of Energy (DOE) site/worker population are provided below.

Table 8 illustrates chest x-ray findings on initial exams from 19971 through September 2017, and Table 9 provides findings on re-screens.

Table 8. Chest X-ray Findings on Initial Screening
(1997 through September 2017)

| State | Sites | Workers Screened | Asbestos-related Lung Disease | Silicosis | Other Dust-related Disease | Lung Nodules, Nodes, or Lesions |
|-------|--|------------------|-------------------------------|-----------|----------------------------|---------------------------------|
| AK | Amchitka Island Test Site | 1,118 | 160 (14.3%) | 1 (0.1%) | 0 (0.0%) | 61 (5.5%) |
| CA | Lawrence Berkeley National Laboratory | 453 | 9 (2.0%) | 0 (0.0%) | 4 (0.9%) | 25 (5.5%) |
| CA | Lawrence Livermore National Laboratory | 2,056 | 53 (2.6%) | 0 (0.0%) | 10 (0.5%) | 142 (6.9%) |
| CA | Sandia National Laboratories, CA | 179 | 2 (1.1%) | 0 (0.0%) | 1 (0.6%) | 12 (6.7%) |
| CO | Rocky Flats Plant (Construction Workers) | 807 | 237 (29.4%) | 7 (0.9%) | 13 (1.6%) | 31 (3.8%) |
| CO | Rocky Flats Plant (Production Workers) | 3,525 | 795 (22.6%) | 4 (0.1%) | 53 (1.5%) | 108 (3.1%) |
| FL | Pinellas (Production Workers) | 646 | 56 (8.7%) | 5 (0.8%) | 16 (2.5%) | 31 (4.8%) |
| IA | Ames Laboratory | 1,976 | 77 (3.9%) | 1 (0.1%) | 62 (3.1%) | 57 (2.9%) |
| IA | Iowa Army Ammunition Plant | 1,294 | 125 (9.7%) | 0 (0.0%) | 67 (5.2%) | 33 (2.6%) |
| ID | Idaho National Laboratory (Construction Workers) | 1,012 | 115 (11.4%) | 0 (0.0%) | 2 (0.2%) | 30 (3.0%) |
| ID | Idaho National Laboratory (Production Workers) | 4,999 | 381 (7.6%) | 1 (0.0%) | 24 (0.5%) | 153 (3.1%) |
| IL | Argonne National Laboratory | 615 | 72 (11.7%) | 1 (0.2%) | 17 (2.8%) | 21 (3.4%) |

| State | Sites | Workers Screened | Asbestos-related Lung Disease | Silicosis | Other Dust-related Disease | Lung Nodules, Nodes, or Lesions |
|-------|--|------------------|-------------------------------|-----------|----------------------------|---------------------------------|
| IL | Fermi National Accelerator Laboratory | 155 | 14 (9.0%) | 0 (0.0%) | 5 (3.2%) | 5 (3.2%) |
| KY | Paducah Gaseous Diffusion Plant (GDP) (Construction Workers) | 968 | 158 (16.3%) | 7 (0.7%) | 12 (1.2%) | 49 (5.1%) |
| KY | Paducah GDP (Production Workers) | 3,521 | 230 (6.5%) | 9 (0.3%) | 20 (0.6%) | 129 (3.7%) |
| MO | Kansas City Plant (Construction Workers) | 678 | 94 (13.9%) | 0 (0.0%) | 1 (0.1%) | 35 (5.2%) |
| MO | Kansas City Plant (Production Workers) | 2,635 | 301 (11.4%) | 2 (0.1%) | 69 (2.6%) | 99 (3.8%) |
| NM | Los Alamos National Laboratory | 3,037 | 216 (7.1%) | 0 (0.0%) | 98 (3.2%) | 52 (1.7%) |
| NM | Sandia National Laboratories, NM | 395 | 23 (5.8%) | 1 (0.3%) | 13 (3.3%) | 2 (0.5%) |
| NV | Nevada National Security Site | 5,017 | 542 (10.8%) | 39 (0.8%) | 97 (1.9%) | 415 (8.3%) |
| NY | Brookhaven National Laboratory (Construction Workers) | 491 | 90 (18.3%) | 0 (0.0%) | 0 (0.0%) | 9 (1.8%) |
| NY | Brookhaven National Laboratory (Production Workers) | 464 | 26 (5.6%) | 0 (0.0%) | 5 (1.1%) | 20 (4.3%) |
| OH | Feed Materials Production Center (Construction Workers) | 2,102 | 235 (11.2%) | 5 (0.2%) | 0 (0.0%) | 33 (1.6%) |
| OH | Feed Materials Production Center (Production Workers) | 1,315 | 59 (4.5%) | 0 (0.0%) | 13 (1.0%) | 55 (4.2%) |
| OH | Mound Plant (Construction Workers) | 375 | 69 (18.4%) | 0 (0.0%) | 3 (0.8%) | 7 (1.9%) |
| OH | Mound Plant (Production Workers) | 1,636 | 89 (5.4%) | 1 (0.1%) | 1 (0.1%) | 61 (3.7%) |
| OH | Portsmouth GDP (Construction Workers) | 1,081 | 198 (18.3%) | 3 (0.3%) | 3 (0.3%) | 40 (3.7%) |
| OH | Portsmouth GDP (Production Workers) | 3,783 | 244 (6.4%) | 5 (0.1%) | 17 (0.4%) | 109 (2.9%) |

| State | Sites | Workers Screened | Asbestos-related Lung Disease | Silicosis | Other Dust-related Disease | Lung Nodules, Nodes, or Lesions |
|-------------|--|------------------|-------------------------------|------------|----------------------------|---------------------------------|
| SC | Savannah River Site (Construction Workers) | 4,488 | 430 (9.6%) | 4 (0.1%) | 2 (0.0%) | 161 (3.6%) |
| SC | Savannah River Site (Production Workers) | 4,264 | 1,058 (24.8%) | 58 (1.4%) | 381 (8.9%) | 61 (1.4%) |
| TN | Oak Ridge K-25 (K-25) (Production Workers) | 4,735 | 315 (6.7%) | 5 (0.1%) | 12 (0.3%) | 99 (2.1%) |
| TN | Oak Ridge National Laboratory (ORNL) (Production Workers) | 2,257 | 117 (5.2%) | 1 (0.0%) | 2 (0.1%) | 81 (3.6%) |
| TN | Oak Ridge Reservation ¹⁴ (Construction Workers) | 3,175 | 528 (16.6%) | 6 (0.2%) | 6 (0.2%) | 125 (3.9%) |
| TN | Y-12 National Security Complex (Y-12) (Production Workers) | 4,151 | 238 (5.7%) | 5 (0.1%) | 12 (0.3%) | 164 (4.0%) |
| TX | Pantex Plant | 1,508 | 75 (5.0%) | 1 (0.1%) | 14 (0.9%) | 52 (3.4%) |
| WA | Hanford Site (Construction Workers) | 3,572 | 859 (24.0%) | 3 (0.1%) | 3 (0.1%) | 186 (5.2%) |
| WA | Hanford Site (Production Workers) | 5,332 | 1,041 (19.5%) | 4 (0.1%) | 115 (2.2%) | 259 (4.9%) |
| | Other Sites ¹⁵ (Construction Workers) | 1,257 | 186 (14.8%) | 5 (0.4%) | 0 (0.0%) | 28 (2.2%) |
| | Other Sites ¹⁶ (Production Workers) | 393 | 48 (12.2%) | 3 (0.8%) | 21 (5.3%) | 12 (3.1%) |
| Grand Total | | 81,465 | 9,565 (11.7%) | 187 (0.2%) | 1,194 (1.5%) | 3,052 (3.7%) |

¹⁴ Includes K-25, ORNL, and Y-12.

¹⁵ Sites where the number of individuals screened by the Building Trades National Medical Screening Program (BTMed) to date is less than 100.

¹⁶ Sites where the number of individuals screened by the National Supplemental Screening Program (NSSP) to date is less than 100.

Table 9. Chest X-ray Findings on Re-screening
(1997 through September 2017)

| State | Sites | Workers Screened | Asbestos-related Lung Disease | Silicosis | Other Dust-related Disease | Lung Nodules, Nodes, or Lesions |
|-------|--|------------------|-------------------------------|-----------|----------------------------|---------------------------------|
| AK | Amchitka Island Test Site | 451 | 34 (7.5%) | 1 (0.2%) | 0 (0.0%) | 22 (4.9%) |
| CA | Lawrence Berkeley National Laboratory | 110 | 2 (1.8%) | 0 (0.0%) | 1 (0.9%) | 13 (11.8%) |
| CA | Lawrence Livermore National Laboratory | 661 | 8 (1.2%) | 1 (0.2%) | 4 (0.6%) | 68 (10.3%) |
| CA | Sandia National Laboratories, CA | 48 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 6 (12.5%) |
| CO | Rocky Flats Plant (Construction Workers) | 313 | 16 (5.1%) | 0 (0.0%) | 2 (0.6%) | 5 (1.6%) |
| CO | Rocky Flats Plant (Production Workers) | 1,111 | 263 (23.7%) | 4 (0.4%) | 32 (2.9%) | 32 (2.9%) |
| FL | Pinellas (Production Workers) | 187 | 28 (15.0%) | 1 (0.5%) | 11 (5.9%) | 1 (0.5%) |
| IA | Ames Laboratory | 927 | 49 (5.3%) | 1 (0.1%) | 57 (6.1%) | 19 (2.0%) |
| IA | Iowa Army Ammunition Plant | 531 | 46 (8.7%) | 0 (0.0%) | 65 (12.2%) | 17 (3.2%) |
| ID | Idaho National Laboratory (Construction Workers) | 336 | 33 (9.8%) | 0 (0.0%) | 0 (0.0%) | 10 (3.0%) |
| ID | Idaho National Laboratory (Production Workers) | 2,002 | 100 (5.0%) | 0 (0.0%) | 3 (0.1%) | 48 (2.4%) |
| IL | Argonne National Laboratory | 161 | 21 (13.0%) | 2 (1.2%) | 16 (9.9%) | 2 (1.2%) |
| IL | Fermi National Accelerator Laboratory | 11 | 0 (0.0%) | 0 (0.0%) | 2 (18.2%) | 0 (0.0%) |
| KY | Paducah GDP (Construction Workers) | 354 | 38 (10.7%) | 0 (0.0%) | 1 (0.3%) | 24 (6.8%) |

| State | Sites | Workers Screened | Asbestos-related Lung Disease | Silicosis | Other Dust-related Disease | Lung Nodules, Nodes, or Lesions |
|-------|---|------------------|-------------------------------|-----------|----------------------------|---------------------------------|
| KY | Paducah GDP (Production Workers) | 1,744 | 70 (4.0%) | 1 (0.1%) | 0 (0.0%) | 81 (4.6%) |
| MO | Kansas City Plant (Construction Workers) | 224 | 19 (8.5%) | 0 (0.0%) | 0 (0.0%) | 4 (1.8%) |
| MO | Kansas City Plant (Production Workers) | 487 | 36 (7.4%) | 1 (0.2%) | 27 (5.5%) | 12 (2.5%) |
| NM | Los Alamos National Laboratory | 549 | 73 (13.3%) | 0 (0.0%) | 22 (4.0%) | 2 (0.4%) |
| NM | Sandia National Laboratories, NM | 50 | 11 (22.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| NV | Nevada National Security Site | 1,657 | 117 (7.1%) | 9 (0.5%) | 59 (3.6%) | 224 (13.5%) |
| NY | Brookhaven National Laboratory (Construction Workers) | 220 | 13 (5.9%) | 0 (0.0%) | 0 (0.0%) | 4 (1.8%) |
| NY | Brookhaven National Laboratory (Production Workers) | 69 | 4 (5.8%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| OH | Feed Materials Production Center (Construction Workers) | 941 | 73 (7.8%) | 1 (0.1%) | 0 (0.0%) | 7 (0.7%) |
| OH | Feed Materials Production Center (Production Workers) | 558 | 13 (2.3%) | 0 (0.0%) | 4 (0.7%) | 18 (3.2%) |
| OH | Mound Plant (Construction Workers) | 127 | 15 (11.8%) | 0 (0.0%) | 1 (0.8%) | 2 (1.6%) |
| OH | Mound Plant (Production Workers) | 699 | 24 (3.4%) | 0 (0.0%) | 0 (0.0%) | 31 (4.4%) |
| OH | Portsmouth GDP (Construction Workers) | 462 | 67 (14.5%) | 0 (0.0%) | 0 (0.0%) | 7 (1.5%) |
| OH | Portsmouth GDP (Production Workers) | 1,823 | 97 (5.3%) | 1 (0.1%) | 4 (0.2%) | 101 (5.5%) |

| State | Sites | Workers Screened | Asbestos-related Lung Disease | Silicosis | Other Dust-related Disease | Lung Nodules, Nodes, or Lesions |
|-------------|--|------------------|-------------------------------|-----------|----------------------------|---------------------------------|
| SC | Savannah River Site (Construction Workers) | 1,472 | 133 (9.0%) | 1 (0.1%) | 1 (0.1%) | 68 (4.6%) |
| SC | Savannah River Site (Production Workers) | 335 | 47 (14.0%) | 1 (0.3%) | 16 (4.8%) | 8 (2.4%) |
| TN | K-25 (Production Workers) | 2,364 | 105 (4.4%) | 2 (0.1%) | 4 (0.2%) | 100 (4.2%) |
| TN | ORNL (Production Workers) | 1,212 | 39 (3.2%) | 0 (0.0%) | 3 (0.2%) | 55 (4.5%) |
| TN | Oak Ridge Reservation ¹⁷ (Construction Workers) | 1,246 | 132 (10.6%) | 0 (0.0%) | 0 (0.0%) | 46 (3.7%) |
| TN | Y-12 (Production Workers) | 2,036 | 84 (4.1%) | 1 (0.0%) | 4 (0.2%) | 123 (6.0%) |
| TX | Pantex Plant | 399 | 11 (2.8%) | 0 (0.0%) | 0 (0.0%) | 14 (3.5%) |
| WA | Hanford Site (Construction Workers) | 1,187 | 120 (10.1%) | 0 (0.0%) | 1 (0.1%) | 57 (4.8%) |
| WA | Hanford Site (Production Workers) | 790 | 110 (13.9%) | 1 (0.1%) | 33 (4.2%) | 29 (3.7%) |
| | Other Sites ¹⁸ (Construction Workers) | 421 | 21 (5.0%) | 0 (0.0%) | 0 (0.0%) | 9 (2.1%) |
| | Other Sites ¹⁹ (Production Workers) | 17 | 3 (17.6%) | 0 (0.0%) | 1 (5.9%) | 1 (5.9%) |
| Grand Total | | 28,292 | 2,075 (7.3%) | 29 (0.1%) | 374 (1.3%) | 1,270 (4.5%) |

¹⁷ Includes K-25, ORNL, and Y-12.

¹⁸ Sites where the number of individuals screened by BTMed to date is less than 100.

¹⁹ Sites where the number of individuals screened by NSSP to date is less than 100.

Table 10 illustrates spirometry (breathing test) findings from 1997 through September 2017 on initial exams, and Table 11 provides findings on re-screening.

Table 10. Spirometry Findings on Initial Screening
(1997 through September 2017)

| State | Sites | Workers Screened | Obstructive Airways Dysfunction Detected |
|-------|---|------------------|--|
| AK | Amchitka Island Test Site | 1115 | 173 (15.5%) |
| CA | Lawrence Berkeley National Laboratory | 462 | 49 (10.6%) |
| CA | Lawrence Livermore National Laboratory | 2,061 | 249 (12.1%) |
| CA | Sandia National Laboratories, CA | 178 | 16 (9.0%) |
| CO | Rocky Flats Plant (Construction Workers) | 798 | 205 (25.7%) |
| CO | Rocky Flats Plant (Production Workers) | 3,837 | 876 (22.8%) |
| FL | Pinellas (Production Workers) | 638 | 174 (27.3%) |
| IA | Ames Laboratory | 2,012 | 223 (11.1%) |
| IA | Iowa Army Ammunition Plant | 1,323 | 263 (19.9%) |
| ID | Idaho National Laboratory (Construction Workers) | 992 | 234 (23.6%) |
| ID | Idaho National Laboratory (Production Workers) | 4,998 | 894 (17.9%) |
| IL | Argonne National Laboratory | 624 | 62 (9.9%) |
| IL | Fermi National Accelerator Laboratory | 154 | 12 (7.8%) |
| KY | Paducah GDP (Construction Workers) | 952 | 234 (24.6%) |
| KY | Paducah GDP (Production Workers) | 3,500 | 523 (14.9%) |
| MO | Kansas City Plant (Construction Workers) | 664 | 150 (22.6%) |
| MO | Kansas City Plant (Production Workers) | 2,608 | 564 (21.6%) |
| NM | Los Alamos National Laboratory | 2,154 | 127 (5.9%) |
| NM | Sandia National Laboratories, NM | 359 | 30 (8.4%) |
| NV | Nevada National Security Site | 5,079 | 1,575 (31.0%) |
| NY | Brookhaven National Laboratory (Construction Workers) | 514 | 66 (12.8%) |

| State | Sites | Workers Screened | Obstructive Airways Dysfunction Detected |
|-------------|--|------------------|--|
| NY | Brookhaven National Laboratory (Production Workers) | 499 | 65 (13.0%) |
| OH | Feed Materials Production Center (Construction Workers) | 2,046 | 393 (19.2%) |
| OH | Feed Materials Production Center (Production Workers) | 1,309 | 177 (13.5%) |
| OH | Mound Plant (Construction Workers) | 376 | 83 (22.1%) |
| OH | Mound Plant (Production Workers) | 1,602 | 362 (22.6%) |
| OH | Portsmouth GDP (Construction Workers) | 1,072 | 255 (23.8%) |
| OH | Portsmouth GDP (Production Workers) | 3,772 | 778 (20.6%) |
| SC | Savannah River Site (Construction Workers) | 4,414 | 738 (16.7%) |
| SC | Savannah River Site (Production Workers) | 3,604 | 396 (11.0%) |
| TN | K-25 (Production Workers) | 4,690 | 964 (20.6%) |
| TN | ORNL (Production Workers) | 2,251 | 440 (19.5%) |
| TN | Oak Ridge Reservation ²⁰ (Construction Workers) | 3,135 | 583 (18.6%) |
| TN | Y-12 (Production Workers) | 4,134 | 875 (21.2%) |
| TX | Pantex Plant | 1,503 | 502 (33.4%) |
| WA | Hanford Site (Construction Workers) | 3,552 | 836 (23.5%) |
| WA | Hanford Site (Production Workers) | 5,634 | 987 (17.5%) |
| | Other Sites ²¹ (Construction Workers) | 1,248 | 227 (18.2%) |
| | Other Sites ²² (Production Workers) | 396 | 70 (17.7%) |
| Grand Total | | 80,259 | 15,430 (19.2%) |

²⁰ Includes K-25, ORNL, and Y-12.

²¹ Sites where the number of individuals screened by BTMed to date is less than 100.

²² Sites where the number of individuals screened by NSSP to date is less than 100.

Table 11. Spirometry Findings on Re-screening
(1997 through September 2017)

| State | Sites | Workers Screened | Obstructive Airways Dysfunction Detected |
|-------|---|------------------|--|
| AK | Amchitka Island Test Site | 440 | 39 (8.9%) |
| CA | Lawrence Berkeley National Laboratory | 122 | 12 (9.8%) |
| CA | Lawrence Livermore National Laboratory | 668 | 39 (5.8%) |
| CA | Sandia National Laboratories, CA | 53 | 3 (5.7%) |
| CO | Rocky Flats Plant (Construction Workers) | 313 | 14 (4.5%) |
| CO | Rocky Flats Plant (Production Workers) | 1,112 | 133 (12.0%) |
| FL | Pinellas (Production Workers) | 189 | 32 (16.9%) |
| IA | Ames Laboratory | 949 | 102 (10.7%) |
| IA | Iowa Army Ammunition Plant | 492 | 207 (42.1%) |
| ID | Idaho National Laboratory (Construction Workers) | 326 | 18 (5.5%) |
| ID | Idaho National Laboratory (Production Workers) | 2,116 | 542 (25.6%) |
| IL | Argonne National Laboratory | 162 | 5 (3.1%) |
| IL | Fermi National Accelerator Laboratory | 10 | 1 (10.0%) |
| KY | Paducah GDP (Construction Workers) | 349 | 20 (5.7%) |
| KY | Paducah GDP (Production Workers) | 1,735 | 255 (14.7%) |
| MO | Kansas City Plant (Construction Workers) | 216 | 5 (2.3%) |
| MO | Kansas City Plant (Production Workers) | 477 | 50 (10.5%) |
| NM | Los Alamos National Laboratory | 471 | 30 (6.4%) |
| NM | Sandia National Laboratories, NM | 47 | 0 (0.0%) |
| NV | Nevada National Security Site | 1,846 | 640 (34.7%) |
| NY | Brookhaven National Laboratory (Construction Workers) | 229 | 3 (1.3%) |
| NY | Brookhaven National Laboratory (Production Workers) | 78 | 10 (12.8%) |
| OH | Feed Materials Production Center (Construction Workers) | 899 | 37 (4.1%) |

| State | Sites | Workers Screened | Obstructive Airways Dysfunction Detected |
|-------------|--|------------------|--|
| OH | Feed Materials Production Center (Production Workers) | 563 | 66 (11.7%) |
| OH | Mound Plant (Construction Workers) | 121 | 4 (3.3%) |
| OH | Mound Plant (Production Workers) | 765 | 107 (14.0%) |
| OH | Portsmouth GDP (Construction Workers) | 449 | 29 (6.5%) |
| OH | Portsmouth GDP (Production Workers) | 1,826 | 429 (23.5%) |
| SC | Savannah River Site (Construction Workers) | 1,432 | 67 (4.7%) |
| SC | Savannah River Site (Production Workers) | 328 | 21 (6.4%) |
| TN | K-25 (Production Workers) | 2,419 | 422 (17.4%) |
| TN | ORNL (Production Workers) | 1,230 | 189 (15.4%) |
| TN | Oak Ridge Reservation ²³ (Construction Workers) | 1221 | 105 (8.6%) |
| TN | Y-12 (Production Workers) | 2,069 | 369 (17.8%) |
| TX | Pantex Plant | 391 | 40 (10.2%) |
| WA | Hanford Site (Construction Workers) | 1,153 | 84 (7.3%) |
| WA | Hanford Site (Production Workers) | 779 | 129 (16.6%) |
| | Other Sites ²⁴ (Construction Workers) | 421 | 20 (4.8%) |
| | Other Sites ²⁵ (Production Workers) | 19 | 3 (15.8%) |
| Grand Total | | 28,485 | 4,281 (15.0%) |

²³ Includes K-25, ORNL, and Y-12.

²⁴ Sites where the number of individuals screened by BTMed to date is less than 100.

²⁵ Sites where the number of individuals screened by NSSP to date is less than 100.

Table 12 illustrates beryllium testing findings on initial exams from 1997 through September 2017, and Table 13 provides findings on re-screens.

Table 12. Results of Beryllium Lymphocyte Proliferation Tests (BeLPT) by DOE Site on Initial Screening (1997 through September 2017)

| State | Sites | Workers Screened | 1 Abnormal | 2 Abnormal | 1 Abnormal and 1+ Borderline |
|-------|--|------------------|------------|------------|------------------------------|
| AK | Amchitka Island Test Site | 98 | 2 (2.0%) | 0 (0.0%) | 0 (0.0%) |
| CA | Lawrence Berkeley National Laboratory | 190 | 2 (1.1%) | 6 (3.2%) | 0 (0.0%) |
| CA | Lawrence Livermore National Laboratory | 1,329 | 12 (0.9%) | 29 (2.2%) | 8 (0.6%) |
| CA | Sandia National Laboratories, CA | 114 | 1 (0.9%) | 3 (2.6%) | 1 (0.9%) |
| CO | Rocky Flats Plant (Construction Workers) | 811 | 4 (0.5%) | 4 (0.5%) | 0 (0.0%) |
| CO | Rocky Flats Plant (Production Workers) | 2,515 | 22 (0.9%) | 13 (0.5%) | 13 (0.5%) |
| FL | Pinellas (Production Workers) | 639 | 9 (1.4%) | 22 (3.4%) | 3 (0.5%) |
| IA | Ames Laboratory | 2,009 | 27 (1.3%) | 23 (1.1%) | 6 (0.3%) |
| IA | Iowa Army Ammunition Plant | 1,391 | 19 (1.4%) | 12 (0.9%) | 8 (0.6%) |
| ID | Idaho National Laboratory (Construction Workers) | 984 | 14 (1.4%) | 5 (0.5%) | 6 (0.6%) |
| ID | Idaho National Laboratory (Production Workers) | 4,639 | 37 (0.8%) | 31 (0.7%) | 14 (0.3%) |
| IL | Argonne National Laboratory | 321 | 7 (2.2%) | 2 (0.6%) | 2 (0.6%) |
| IL | Fermi National Accelerator Laboratory | 107 | 2 (1.9%) | 1 (0.9%) | 0 (0.0%) |
| KY | Paducah GDP (Construction Workers) | 967 | 16 (1.7%) | 8 (0.8%) | 1 (0.1%) |
| KY | Paducah GDP (Production Workers) | 3,025 | 38 (1.3%) | 18 (0.6%) | 7 (0.2%) |

| State | Sites | Workers Screened | 1 Abnormal | 2 Abnormal | 1 Abnormal and 1+ Borderline |
|-------|---|------------------|------------|------------|------------------------------|
| MO | Kansas City Plant (Construction Workers) | 668 | 4 (0.6%) | 12 (1.8%) | 3 (0.4%) |
| MO | Kansas City Plant (Production Workers) | 2,573 | 38 (1.5%) | 23 (0.9%) | 10 (0.4%) |
| NM | Los Alamos National Laboratory | 3,014 | 45 (1.5%) | 35 (1.2%) | 22 (0.7%) |
| NM | Sandia National Laboratories, NM | 389 | 11 (2.8%) | 3 (0.8%) | 3 (0.8%) |
| NV | Nevada National Security Site | 3,299 | 36 (1.1%) | 28 (0.8%) | 12 (0.4%) |
| NY | Brookhaven National Laboratory (Construction Workers) | 499 | 5 (1.0%) | 23 (4.6%) | 0 (0.0%) |
| NY | Brookhaven National Laboratory (Production Workers) | 493 | 5 (1.0%) | 18 (3.7%) | 7 (1.4%) |
| OH | Feed Materials Production Center (Construction Workers) | 2,070 | 8 (0.4%) | 13 (0.6%) | 4 (0.2%) |
| OH | Feed Materials Production Center (Production Workers) | 1,151 | 7 (0.6%) | 6 (0.5%) | 2 (0.2%) |
| OH | Mound Plant (Construction Workers) | 374 | 0 (0.0%) | 2 (0.5%) | 0 (0.0%) |
| OH | Mound Plant (Production Workers) | 1,606 | 20 (1.2%) | 15 (0.9%) | 4 (0.2%) |
| OH | Portsmouth GDP (Construction Workers) | 1,075 | 16 (1.5%) | 3 (0.3%) | 1 (0.1%) |
| OH | Portsmouth GDP (Production Workers) | 3,359 | 21 (0.6%) | 11 (0.3%) | 4 (0.1%) |
| SC | Savannah River Site (Construction Workers) | 4,482 | 31 (0.7%) | 39 (0.9%) | 12 (0.3%) |
| SC | Savannah River Site (Production Workers) | 3,212 | 63 (2.0%) | 23 (0.7%) | 8 (0.2%) |
| TN | K-25 (Production Workers) | 4,734 | 93 (2.0%) | 89 (1.9%) | 23 (0.5%) |
| TN | ORNL (Production Workers) | 2,237 | 23 (1.0%) | 30 (1.3%) | 13 (0.6%) |

| State | Sites | Workers Screened | 1 Abnormal | 2 Abnormal | 1 Abnormal and 1+ Borderline |
|-------------|---|------------------|---------------|---------------|------------------------------|
| TN | Oak Ridge Reservation ²⁶ (Construction Workers) | 3,452 | 26 (0.8%) | 25 (0.7%) | 11 (0.3%) |
| TN | Y-12 (Production Workers) | 4,160 | 59 (1.4%) | 69 (1.7%) | 13 (0.3%) |
| TX | Pantex Plant | 1,487 | 13 (0.9%) | 5 (0.3%) | 1 (0.1%) |
| WA | Hanford Site (Construction Workers) | 3,575 | 40 (1.1%) | 31 (0.9%) | 7 (0.2%) |
| WA | Hanford Site (Production Workers) | 5,083 | 109 (2.1%) | 38 (0.7%) | 18 (0.4%) |
| | Other Sites ²⁷ (Construction) | 840 | 3 (0.4%) | 3 (0.4%) | 1 (0.1%) |
| | Other Sites ²⁸ (Production) | 238 | 4 (1.7%) | 2 (0.8%) | 0 (0.0%) |
| Grand Total | | 73,209 | 892 (1.2%) | 723 (1.0%) | 248 (0.3%) |

Table 13. Results of Beryllium Lymphocyte Proliferation Tests (BeLPT) by DOE Site on Re-screening (1997 through September 2017)

| State | Sites | Workers Screened | 1 Abnormal ²⁹ | 2 Abnormal ³⁰ | 1 Abnormal and 1+ Borderline |
|-------|---------------------------------------|------------------|--------------------------|--------------------------|------------------------------|
| AK | Amchitka Island Test Site | 23 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| CA | Lawrence Berkeley National Laboratory | 41 | 0 (0.0%) | 0 (0.0%) | 1 (2.4%) |

²⁶ Includes K-25, ORNL, and Y-12.

²⁷ Sites where the number of individuals screened by BTMed to date is less than 100.

²⁸ Sites where the number of individuals screened by NSSP to date is less than 100.

²⁹ May include individuals who did not receive a BeLPT at the time of their initial screening or who had a normal result on their initial screening and a single abnormal result on the re-screening.

³⁰ May include individuals who did not receive a BeLPT at the time of their initial screening, had a normal result on the initial screening, or had a single abnormal or borderline result on their initial screening that was confirmed on their re-screening.

| State | Sites | Workers Screened | 1 Abnormal ²⁹ | 2 Abnormal ³⁰ | 1 Abnormal and 1+ Borderline |
|-------|--|------------------|--------------------------|--------------------------|------------------------------|
| CA | Lawrence Livermore National Laboratory | 491 | 5 (1.0%) | 4 (0.8%) | 1 (0.2%) |
| CA | Sandia National Laboratories, CA | 39 | 2 (5.1%) | 0 (0.0%) | 0 (0.0%) |
| CO | Rocky Flats Plant (Construction Workers) | 213 | 1 (0.5%) | 0 (0.0%) | 0 (0.0%) |
| CO | Rocky Flats Plant (Production Workers) | 845 | 4 (0.5%) | 2 (0.2%) | 1 (0.1%) |
| FL | Pinellas (Production Workers) | 181 | 1 (0.6%) | 1 (0.6%) | 2 (1.1%) |
| IA | Ames Laboratory | 931 | 6 (0.6%) | 4 (0.4%) | 1 (0.1%) |
| IA | Iowa Army Ammunition Plant | 788 | 12 (1.5%) | 4 (0.5%) | 4 (0.5%) |
| ID | Idaho National Laboratory (Construction Workers) | 231 | 2 (0.9%) | 0 (0.0%) | 0 (0.0%) |
| ID | Idaho National Laboratory (Production Workers) | 1,699 | 9 (0.5%) | 15 (0.9%) | 10 (0.6%) |
| IL | Argonne National Laboratory | 97 | 2 (2.1%) | 0 (0.0%) | 0 (0.0%) |
| IL | Fermi National Accelerator Laboratory | 11 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| KY | Paducah GDP (Construction Workers) | 279 | 0 (0.0%) | 2 (0.7%) | 0 (0.0%) |
| KY | Paducah GDP (Production Workers) | 1,510 | 9 (0.6%) | 6 (0.4%) | 10 (0.7%) |
| MO | Kansas City Plant (Construction Workers) | 215 | 5 (2.3%) | 1 (0.5%) | 0 (0.0%) |
| MO | Kansas City Plant (Production Workers) | 474 | 1 (0.2%) | 2 (0.4%) | 1 (0.2%) |
| NM | Los Alamos National Laboratory | 510 | 6 (1.2%) | 1 (0.2%) | 0 (0.0%) |
| NM | Sandia National Laboratories, NM | 47 | 2 (4.3%) | 0 (0.0%) | 1 (2.1%) |

| State | Sites | Workers Screened | 1 Abnormal ²⁹ | 2 Abnormal ³⁰ | 1 Abnormal and 1+ Borderline |
|-------|--|------------------|--------------------------|--------------------------|------------------------------|
| NV | Nevada National Security Site | 1,362 | 12 (0.9%) | 9 (0.7%) | 4 (0.3%) |
| NY | Brookhaven National Laboratory (Construction Workers) | 213 | 7 (3.3%) | 2 (0.9%) | 1 (0.5%) |
| NY | Brookhaven National Laboratory (Production Workers) | 71 | 0 (0.0%) | 2 (2.8%) | 0 (0.0%) |
| OH | Feed Materials Production Center (Construction Workers) | 575 | 4 (0.7%) | 0 (0.0%) | 0 (0.0%) |
| OH | Feed Materials Production Center (Production Workers) | 451 | 1 (0.2%) | 5 (1.1%) | 2 (0.4%) |
| OH | Mound Plant (Construction Workers) | 89 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| OH | Mound Plant (Production Workers) | 567 | 1 (0.2%) | 11 (1.9%) | 6 (1.1%) |
| OH | Portsmouth GDP (Construction Workers) | 350 | 1 (0.3%) | 0 (0.0%) | 0 (0.0%) |
| OH | Portsmouth GDP (Production Workers) | 1,689 | 8 (0.5%) | 8 (0.5%) | 6 (0.4%) |
| SC | Savannah River Site (Construction Workers) | 1,108 | 14 (1.3%) | 3 (0.3%) | 2 (0.2%) |
| SC | Savannah River Site (Production Workers) | 325 | 1 (0.3%) | 1 (0.3%) | 1 (0.3%) |
| TN | K-25 (Production Workers) | 2,143 | 29 (1.4%) | 33 (1.5%) | 14 (0.7%) |
| TN | ORNL (Production Workers) | 881 | 5 (0.6%) | 24 (2.7%) | 7 (0.8%) |
| TN | Oak Ridge Reservation ³¹ (Construction Workers) | 1,199 | 8 (0.7%) | 7 (0.6%) | 3 (0.3%) |
| TN | Y-12 (Production Workers) | 1,517 | 15 (1.0%) | 35 (2.3%) | 14 (0.9%) |

³¹ Includes K-25, ORNL, and Y-12.

| State | Sites | Workers Screened | 1 Abnormal ²⁹ | 2 Abnormal ³⁰ | 1 Abnormal and 1+ Borderline |
|-------------|--|------------------|--------------------------|--------------------------|------------------------------|
| TX | Pantex Plant ³² | 209 | 2 (1.0%) | 5 (2.4%) | 0 (0.0%) |
| WA | Hanford Site (Construction Workers) | 810 | 6 (0.7%) | 4 (0.5%) | 0 (0.0%) |
| WA | Hanford Site (Production Workers) | 711 | 7 (1.0%) | 0 (0.0%) | 2 (0.3%) |
| | Other Sites ³³ (Construction Workers) | 187 | 2 (1.1%) | 1 (0.5%) | 1 (0.5%) |
| | Other Sites ³⁴ (Production Workers) | 14 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Grand Total | | 23,096 | 190 (0.8%) | 192 (0.8%) | 95 (0.4%) |

Table 14 illustrates audiometry (hearing test) findings on initial exams from 1997 through September 2017.

Table 14. Audiometry Findings on Initial Screening (1997 through September 2017)

| State | Sites | Workers Screened | Noise Induced Hearing Loss (NIHL) |
|-------|--|------------------|-----------------------------------|
| AK | Amchitka Island Test Site | 1,138 | 758 (66.6%) |
| CA | Lawrence Berkeley National Laboratory | 255 | 87 (34.1%) |
| CA | Lawrence Livermore National Laboratory | 1,161 | 441 (38.0%) |
| CA | Sandia National Laboratories, CA | 89 | 38 (42.7%) |
| CO | Rocky Flats Plant (Construction Workers) | 781 | 507 (64.9%) |
| CO | Rocky Flats Plant (Production Workers) | 3,772 | 2,233 (59.2%) |
| FL | Pinellas (Production Workers) | 636 | 246 (38.7%) |

³² The site-specific project does not offer repeat BeLPTs. However, workers referred to the NSSP are provided repeat BeLPTs.

³³ Sites where the number of individuals screened by BTMed to date is less than 100.

³⁴ Sites where the number of individuals screened by NSSP to date is less than 100.

| State | Sites | Workers Screened | Noise Induced Hearing Loss (NIHL) |
|-------|---|------------------|-----------------------------------|
| IA | Ames Laboratory ³⁵ | 201 | 58 (28.9%) |
| IA | Iowa Army Ammunition Plant ³⁶ | 105 | 86 (81.9%) |
| ID | Idaho National Laboratory (Construction Workers) | 951 | 629 (66.1%) |
| ID | Idaho National Laboratory (Production Workers) | 4,800 | 1,395 (29.1%) |
| IL | Argonne National Laboratory | 642 | 236 (36.8%) |
| IL | Fermi National Accelerator Laboratory | 163 | 64 (39.3%) |
| KY | Paducah GDP (Construction Workers) | 908 | 692 (76.2%) |
| KY | Paducah GDP (Production Workers) | 3,444 | 1,148 (33.3%) |
| MO | Kansas City Plant (Construction Workers) | 641 | 376 (58.7%) |
| MO | Kansas City Plant (Production Workers) | 2,597 | 1,220 (47.0%) |
| NM | Los Alamos National Laboratory | 2,760 | 1,618 (58.6%) |
| NM | Sandia National Laboratories, NM | 343 | 194 (56.6%) |
| NV | Nevada National Security Site | 4,458 | 3,345 (75.0%) |
| NY | Brookhaven National Laboratory (Construction Workers) | 522 | 341 (65.3%) |
| NY | Brookhaven National Laboratory (Production Workers) | 489 | 167 (34.2%) |
| OH | Feed Materials Production Center (Construction Workers) | 2,054 | 1,041 (50.7%) |
| OH | Feed Materials Production Center (Production Workers) | 1,308 | 250 (19.1%) |
| OH | Mound Plant (Construction Workers) | 361 | 228 (63.2%) |

³⁵ The site-specific project does not offer audiograms. However, workers referred to the NSSP are provided audiograms.

³⁶ The site-specific project does not offer audiograms. However, workers referred to the NSSP are provided audiograms.

| State | Sites | Workers Screened | Noise Induced Hearing Loss (NIHL) |
|-------------|--|------------------|-----------------------------------|
| OH | Mound Plant (Production Workers) | 1,596 | 387 (24.2%) |
| OH | Portsmouth GDP (Construction Workers) | 1,109 | 799 (72.0%) |
| OH | Portsmouth GDP (Production Workers) | 3,681 | 1,149 (31.2%) |
| SC | Savannah River Site (Construction Workers) | 4,581 | 2,714 (59.2%) |
| SC | Savannah River Site (Production Workers) | 3,631 | 2,076 (57.2%) |
| TN | K-25 (Production Workers) | 4,342 | 1,726 (39.8%) |
| TN | ORNL (Production Workers) | 2,244 | 660 (29.4%) |
| TN | Oak Ridge Reservation ³⁷ (Construction Workers) | 3,083 | 2,163 (70.2%) |
| TN | Y-12 (Production Workers) | 4,124 | 1,737 (42.1%) |
| TX | Pantex Plant ³⁸ | 105 | 44 (41.9%) |
| WA | Hanford Site (Construction Workers) | 2,821 | 1,964 (69.6%) |
| WA | Hanford Site (Production Workers) | 4,786 | 2,367 (49.5%) |
| | Other Sites ³⁹ (Construction Workers) | 1,029 | 645 (62.7%) |
| | Other Sites ⁴⁰ (Production Workers) | 392 | 190 (48.5%) |
| Grand Total | | 72,103 | 36,019 (50.0%) |

³⁷ Includes K-25, ORNL, and Y-12.

³⁸ The site-specific project does not offer audiograms. However, workers referred to the NSSP are provided audiograms.

³⁹ Sites where the number of individuals screened by BTMed to date is less than 100.

⁴⁰ Sites where the number of individuals screened by NSSP to date is less than 100.

Appendix D: Resources

U.S. Department of Energy (DOE) Former Worker Medical Screening Program (FWP) Website
<http://energy.gov/ehss/services/worker-health-and-safety/former-worker-medical-screening-program>

FWP Medical Protocol
<http://energy.gov/ehss/downloads/former-worker-program-medical-protocol>

FWP Summary of Services
<http://energy.gov/ehss/downloads/former-worker-program-summary-services>

A Basic Overview of the FWP (Brochure)
<http://energy.gov/ehss/downloads/former-worker-medical-screening-program-brochure>

DOE Chronic Beryllium Disease Awareness Website
<https://ehss.energy.gov/HealthSafety/fwsp/advocacy/cbd/>

Building Trades National Medical Screening Program
<http://www.btmed.org/default.cfm>
1-800-866-9663

FWP for Burlington Atomic Energy Commission Plant (otherwise known as the Iowa Army Ammunition Plant) and Ames Laboratory
<http://www.iowafwp.org>
1-866-282-5818

Medical Exam Program for Los Alamos National Laboratory Former Workers
<http://www.jhsph.edu/LANLFW/index.html>
1-877-500-8615

National Supplemental Screening Program
<http://www.ornl.gov/nssp/>
1-866-812-6703

Pantex FWP
1-888-378-8939

Worker Health Protection Program
<http://www.worker-health.org/>
1-888-241-1199
1-877-771-7977 (for former Nevada National Security Site workers)

Medical Facilities with Experience Evaluating Chronic Beryllium Disease

<http://energy.gov/ehss/downloads/former-workers-medical-facilities-experience-evaluating-chronic-beryllium-disease>

DOE Human Subjects Protection Program

<http://science.energy.gov/ber/human-subjects/>

A Basic Overview of the Energy Employees Occupational Illness Compensation Program (EEOICP) (Brochure)

<http://energy.gov/ehss/downloads/basic-overview-energy-employees-occupational-illness-compensation-program>

U.S. Department of Labor (DOL) Division of Energy Employees Occupational Illness Compensation

<http://www.dol.gov/owcp/energy/index.htm>

DOL Resource Centers

<http://www.dol.gov/owcp/energy/regs/compliance/ResourceMeetings/ResourceCenters.htm>

National Institute for Occupational Safety and Health (NIOSH) Dose Reconstruction

<http://www.cdc.gov/niosh/ocas/ocasdose.html>

DOL Office of the Ombudsman for the EEOICP

<http://www.dol.gov/eeombd/>