



U.S. DEPARTMENT OF
ENERGY



2018

FORMER WORKER MEDICAL SCREENING PROGRAM REPORT



U.S. DEPARTMENT OF
ENERGY



Partners:



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Abbreviations Used in This Report

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>
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>
NDAA	<i>National Defense Authorization Act</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>
PHI	<i>Protected Health Information</i>
PII	<i>Personal 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 (NDAA). The NDAA charged the Department of Energy (DOE or Department) with conducting an ongoing 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. In 1996, seven defense nuclear facilities initiated program activities, and medical screenings began 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 follow-up 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
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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. A team of independent physicians specializing in occupational medicine developed the customized medical screening protocol.

This Report presents an overview of the structure and accomplishments of the FWP and provides the Fiscal Year (FY) 2018 updates, as well as cumulative program results, 1997-2018. The FWP was mandated by the U.S. Congress as part of Section 3162 of the NDAA for FY 1993 (Public Law 102-484). Program activities began in 1996, and started offering medical screenings 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 2018, 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 91,793 DOE workers, provided 145,871 examinations, and screened 15,325 DOE workers for early detection of lung cancer.

FY 2018 Program Activities

1. Outreach.

- In FY 2018, the FWP conducted aggressive outreach using direct mailings and attending events near DOE communities.

2. Ongoing Medical Screening.

- In FY 2018, the FWP conducted 2,709 initial medical examinations and 6,002 re-screen medical exams.
- In FY 2018, the FWP screened 3,496 participants for occupational lung cancer using low-dose helical computed tomography (2018), of which 216 were new participants receiving a baseline computed tomography (CT) and 3,280 were participants receiving either a followup or annual scan. A total of 3,686 CT scans were performed; this includes baseline, followup, and annual scans.

3. Communicate Results.

- Participants receive exam results 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 collected medical information is confidential and 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 in Appendix A.

“When a person is diagnosed with cancer, their whole world changes. Goals, values, and hopes take on a new meaning. There are programs, such as the Employees Occupational Illness Compensation Program Act, that offers some relief in some cases.

However, for an afflicted individual, troubled in mind and body, gaining access to such help can become a bewildering experience.

It is at this juncture that the Worker Health Protection Program becomes a vital resource for guidance through the maze of regulations, procedures, and bureaucracy. Just a few people, capable and caring, working for the well-being of many.

I am an old Sailor (Korea), and I found WHPP to be a lighthouse in a time of storm.”

- Bill Christopher, Former K-25 Worker

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 FY 2018 updates, as well as cumulative program results, 1997-2018. 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 FWP designed the medical screening exams to check for potential adverse health effects related to occupational exposures, including but not limited to radiation, beryllium, asbestos, silica, welding fumes, lead, cadmium, chromium, solvents, and noise.

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

NDAA 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 22 years has resulted in high-quality services; and the level of satisfaction expressed by participants, 98.1 percent on surveys, speaks to the skill and professionalism of the organizations administering the program for AU.

Since 1997, a total of 145,871 medical exams (initial and re-screen exams) have been provided to 91,793 former workers through the FWP. Since 2000, the FWP has screened 15,325 participants for occupational lung cancer with low-dose helical computed tomography (CT), and completed 56,162 CT scans; 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 Science Center 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

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

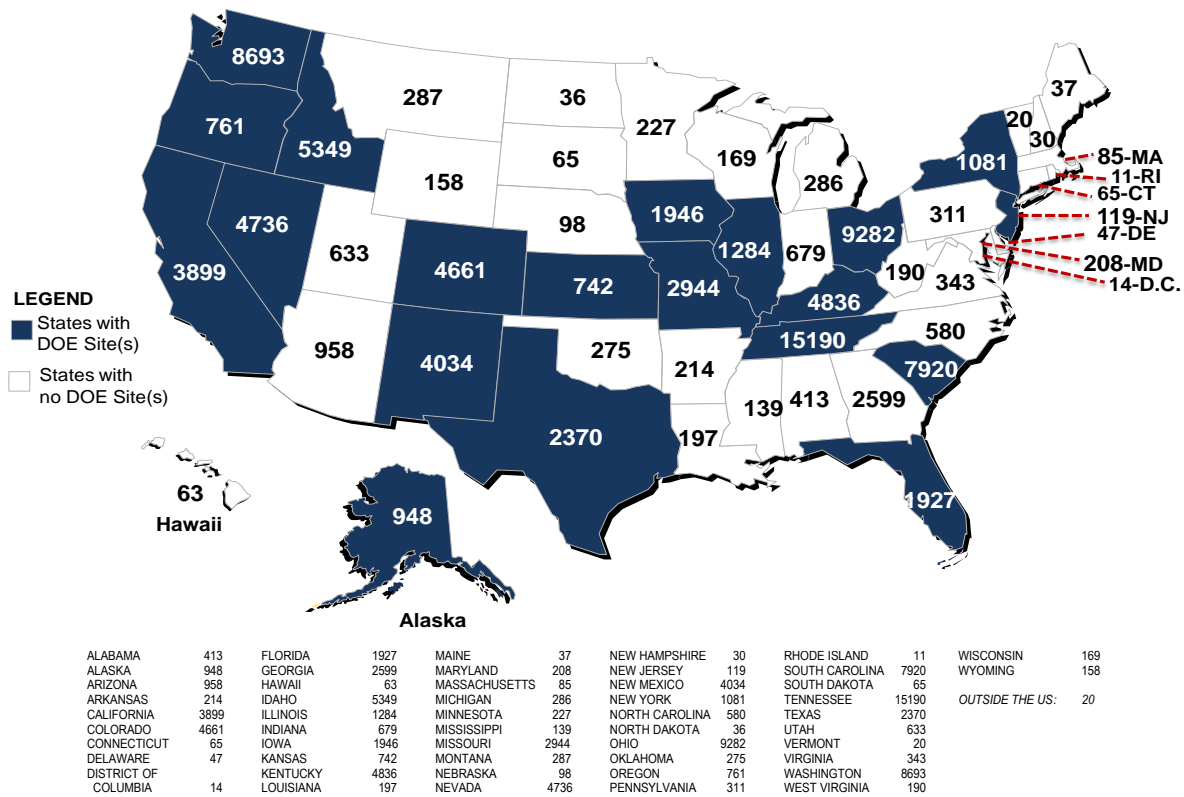


Figure 1. Participants Screened by State of Residence (1997 – September 2018)

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>).

“You were very thorough. The results are presented in an organized and efficient manner. Keep up the good work.”

- Former Hanford 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.



John Steward, local coordinator for WHPP, attends an outreach event.

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, subcontractors employed many workers intermittently, 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. The FWP projects send invitations to individuals using the last known address. When addresses are 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. The primary method of outreach is direct mailings to former workers inviting them to participate in the program. The FWP projects also conduct outreach events at DOE sites or in the communities near DOE facilities. In FY 2018, the FWP participated in 500 outreach events and assisted the U.S. Department of Labor (DOL) with 8 of its outreach events. Workers also receive exit packets with program information when separating from a site, and hyperlinks are 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.



Sherry Gosseen, local coordinator for BTMed, attends an outreach event.



Barbara Neill, project coordinator for the NSSP, and Chuck Hayes, Chair of the NSSP Advisory Committee, attend a retiree event at the Savannah River Site.

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 2018. 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 that 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 is on the FWP Website (<http://energy.gov/ehss/outreach-former-worker-medical-screening-program-fwp>).

2. Medical Screening: Provide medical screening exams 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 screenings can identify diseases or precursor conditions at an early stage of development, often before signs and symptoms occur. Clinics can refer individuals with suspicious findings to their personal physician or a specialist for further testing, diagnosis, and treatment. The FWP is not 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. A team of independent physicians, specializing in occupational medicine, customized the medical screening program. This protocol is periodically updated as necessary or at least every 2 years based on new research findings within the



Stephen Howell, a participant with The University of Iowa FWP, receives a spirometry test.

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. In many cases, the interviewers 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 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 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. The participant’s personal physician can treat many of the conditions that fall into this category, significantly improving 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 2018, the FWP conducted 2,709 initial exams and 6,002 re-screen exams. Since 1997, a total of 145,871 medical exams have been conducted through the FWP, comprising 91,793 initial screening exams and 54,078 re-screen exams. A breakdown of the number of initial and re-screen exams conducted through FWPs for the past several years is in Figure 2.

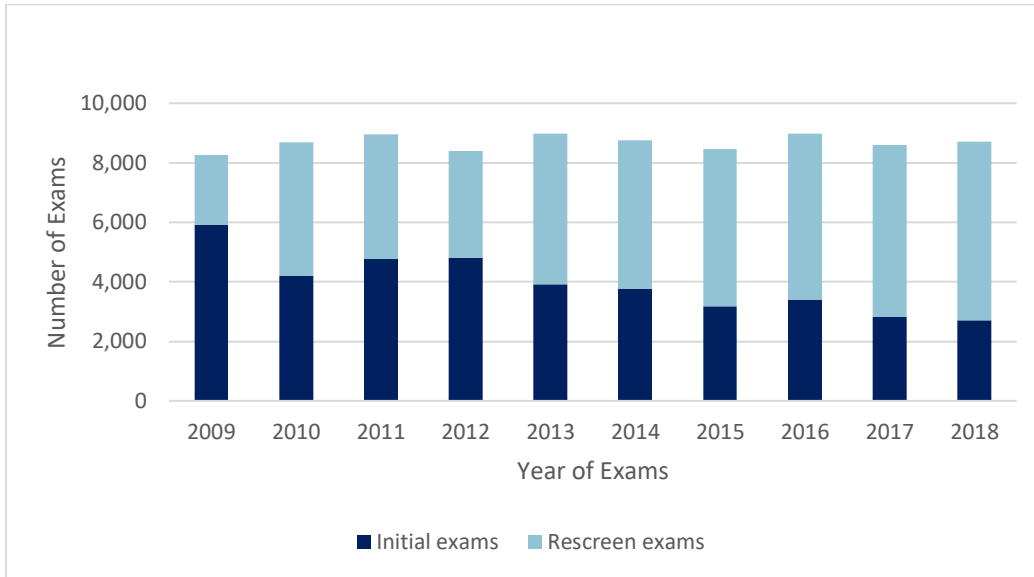


Figure 2. Initial and Re-Screen Exams by Year (October 2009 – September 2018)

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



Maria Adams (BTMed outreach coordinator), Keelan Zius (National Jewish Lung Cancer Screening Coordinator), Dr. Stella Hines (BTMed Assistant Medical Director), and Dr. Debra Dyer (National Jewish Director of Lung Cancer Screening Program) stand by the CT Scan machine at National Jewish Health in Denver, Colorado.

a nodule is suspicious for lung cancer, the participant will be referred to a specialist for diagnostic evaluation. Ongoing annual repeat low-dose CT scans are offered if an individual's initial/baseline scan is normal. This is 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 2018, 3,496 participants were screened, of which 216 were new participants receiving a baseline and 3,280 were participants receiving either a followup or annual scan, and a total of 3,686 CT scans were performed; this includes baseline, followup, and annual scans. Since 2000, the FWP's ELCD program has screened 15,325 eligible participants and provided 56,162 CT scans. To date, 213 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
- The University of Iowa.

Other FWP projects are exploring how to incorporate CT scanning into their current protocols.

More in-depth information regarding the ELCD program, including low-dose CT scans, is 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, 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.



Richard McCartney, IBEW Local 575, was one of the first BTMed participants to receive a CT scan through the Early Lung Cancer Detection Program in the Portsmouth, Ohio, area.

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 the Energy Employees Occupational Illness Compensation Program Act (EEOICPA), which is administered by DOL. Moreover, FWP provides participants with 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 (PHI): 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 FWP is confidential and used only as allowed by the Privacy Act of 1974 and the Health Insurance Portability and Accountability Act (HIPAA). FWP conducts all activities 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/PHI.

“If it weren’t for my medical screening, I wouldn’t know that I even had cancer. Thank you for helping me!”

- Former Hanford Worker

3.0 Program Findings

A summary of medical examinations performed through FWP from 1997 to September 2018 is 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 2018)

Screening Exam	Workers Screened	Asbestos-related Lung Disease ²	Silicosis ³	Other Dust-related Disease ⁴	Lung Nodules, Nodes, or Lesions ⁵
Initial	84,042	9,584 (11.4%)	171 (0.2%)	1,206 (1.4%)	2,729 (3.2%)
Re-screen	30,471	2,364 (7.8%)	26 (0.1%)	383 (1.3%)	1,180 (3.9%)

Table 2. Spirometry Findings on Initial and Re-screen Exams (1997 through September 2018)

Screening Exam	Workers Screened	Obstructive Airways Dysfunction Detected ⁶
Initial	82,813	13,231 (16.0%)
Re-screen	30,720	3,146 (10.2%)

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 2018)

Screening Exam	Workers Screened	1 Abnormal ⁷	2 Abnormal	1 Abnormal and 1+ Borderline
Initial	75,159	910 (1.2%)	742 (1.0%)	253 (0.3%)
Re-screen	24,493	216 (0.9%)	212 (0.9%)	114 (0.5%)

Table 4. Audiometry Findings on Initial Exam (1997 through September 2018)⁸

Workers Screened	Noise-induced Hearing Loss
74,662	39,779 (53.3%)

The results from low-dose screening through the FWP ELCD program from 2000 through September 2018 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, 2018)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)	194	4	3	3 (100%)

⁷ Individuals with one abnormal BeLPT are encouraged to file a claim with the DOL EEOICPA. An occupational medicine physician will diagnose beryllium sensitization based on the BeLPT results.

⁸ Audiometry is 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.

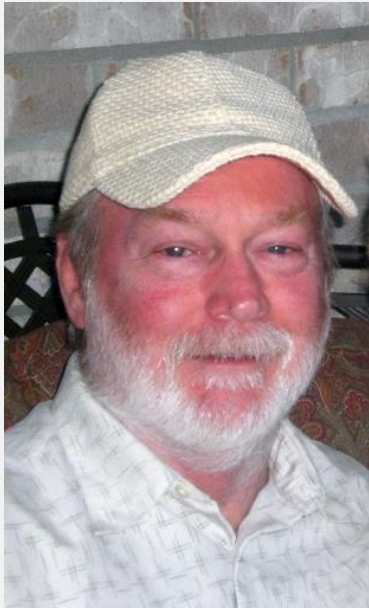
¹⁰ The TNM classification system describes the stage of lung cancer defined by the American Joint Committee of Cancer (AJCC Cancer Staging Manual, 7th Edition, 2010). The TNM Staging System is based on the extent of the tumor (T), the extent of spread to the lymph nodes (N), and the presence of metastasis (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)	458	4	3	2 (67%)
Hanford (Construction Workers)	348	8	8	7 (88%)
Idaho National Laboratory (Production Workers)	697	9	9	6 (67%)
K-25 (Production Workers)	2,875	38	37	29 (78%)
Mound Plant (Production Workers)	616	6	6	5 (83%)
Nevada National Security Site (All Workers)	714	6	5	3 (60%)
ORNL (Production Workers)	1,281	15	15	8 (53%)
Oak Ridge Reservation (Construction Workers)	504	16	16	9 (56%)
Miscellaneous Sites (All Workers)	244	8	7	7 (100%)
Paducah (Production Workers)	2,020	25	24	19 (79%)
Portsmouth (Production Workers)	2,273	28	26	21 (81%)
Rocky Flats (Production Workers)	98	1	1	1 (100%)
Savannah River Site (Construction Workers)	263	4	4	2
Y-12 (Production Workers)	2,745	41	39	28 (72%)
Total	15,325	213	203	150 (74%)

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

**Table 6. Other Diseases Found on CT Scan by
ELCD Programs (2000 through September 30, 2018)**

Condition	Number Detected
Aortic aneurysm	76
Appendiceal cancer	2
Breast cancer	1
Heart aneurysm	7
Hemangiopericytoma	1
Kidney cancer	13
Liver cancer	3
Lymphoma	9
Mesothelioma	2
Metastatic cancer (primary site other than lung)	7
Metastatic cancer (primary site unknown)	6
Pneumonia	108
Splenic aneurysm	4
Thymoma	12
Thyroid cancer	5



“Keep up the good work – This program helps many people – Thanks again for all help that you give the workers.

I want to express my appreciation to the Building Trades for offering the Medical Screening Program.

The examination is very thorough with blood tests, breathing tests, x-rays, all at no cost. The staff is extremely helpful and courteous, making you feel comfortable and at ease. They will send you a summary of your results and make recommendations for further evaluation if needed.

Thankfully, my test were oaky and did not reveal any significant work related health issues.

For nearly 50 years I have been a Pipefitter out of Cincinnati Local No. 392. I would urge all union members to take advantage of this program.”

- Timothy Glenn, former Fernald worker, Pipefitters Local 392

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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 2019, 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.



“I worked for 32 years at the Y-12 plant as a machinist. I received a low-dose CT scan in July of 2009 through the WHPP Early Lung Cancer Detection Program. I was contacted the following day and told that I needed to see a doctor immediately for follow-up. WHPP assisted me in getting an appointment as soon as possible with a pulmonologist and supplied a copy of my scan. The doctor reviewed my scan and did additional tests. He then referred me to a surgeon, and I had lung surgery in an urgent manner. The lower lobe on my left lung was removed, and the pathology report confirmed it was cancer. At the time of my test, I did not have any symptoms. If it had not been for this program and I had not participated in it, by the time my cancer would have been discovered, it would probably have been too late. I believe the medical screening program saved my life. It has been eight years today, and I am cancer free thanks to this program.”

- Fred W. Farley, former Y-12 worker

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 Maryland Medical Center, and Zenith-American Solutions.

What we do:

BTMed identifies construction and subcontractor trades workers who worked on DOE sites and screens them for occupational illnesses. BTMed screens workers from 35 different DOE sites. BTMed offers conventional medical screenings, as well as an early lung cancer detection (ELCD) program. Using the latest and most advanced low-dose computed tomography (CT) scans, the ELCD program is designed to detect lung cancers at an early stage while they can be treated effectively.



More than 38,000 medical screenings and 4,650 low-dose CT scans have been delivered through a network of more than 225 specially credentialed clinics across the country.

What we have found:

FWP medical screening

- Chest x-rays (CXRs) (N=22,116 participants receiving at least one CXR): 19.3 percent of 22,216 participants demonstrated findings consistent with work-related lung disease.
- Pulmonary Function Tests (PFTs) (N=21,796 participants receiving at least one PFT): 22.6 percent of 21,796 participants demonstrated findings consistent with obstructive disease.
- Beryllium Lymphocyte Proliferation Tests (BeLPTs) (N=20,517 participants receiving at least one BeLPT): 2.2 percent of 20,517 participants had at least one abnormal BeLPT.
- Audiometry (N=20,298 participants receiving at least one audiogram): 64.6 percent of 20,298 participants demonstrated hearing loss for normal speech tones.

ELCD Program

- Lung cancer was detected in 39 of 1,548 DOE workers tested.
- 28 of the 39 (71.8 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.

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, 15 studies have been published in the scientific literature. Most recently, a study was published on *early detection of lung cancer in a population at high risk due to occupation and smoking*. Low-dose CT scans can save lives by identifying lung cancers at an early stage, when treatment is most likely to be effective. Based on a growing body of evidence, the US National Comprehensive Cancer Network (NCCN) recommends including both smoking and occupational exposures to define populations eligible for CT screening. In this study, BTMed researchers screened 1260 former construction workers from BTMed, a population that included both heavy smokers and also lighter smokers who had been exposed to harmful vapors, gases, dusts, and fumes – including known carcinogens – during their years on the job. The full paper is available on www.btmed.org.

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 (Retired)



After 25 years of service as BTMed's Medical Director, Dr. Laura Welch (pictured second from left) retired. Dr. Welch was also the principal investigator for the Early Lung Cancer Detection Program for construction workers, which is part of BTMed. In addition to her BTMed work, she created and administered a nationwide screening program for sheet metal workers. She has been a tireless advocate for the health and the well-being of construction workers and will be missed by all.

BTMed Medical Team:



Marianne Cloeren, MD, MPH

Dr. Cloeren has decades of experience managing teams of clinicians, serving as Medical Director for a variety of private and government programs. Work experience includes interacting with remote nurse case managers, managing quality assurance and audits, and delivering effective and well-reasoned case reviews in a Federal program; she has written or overseen the production of tens of thousands of such reviews. Dr. Cloeren serves as the primary medical director for BTMed.



Stella Hines, MD, MSPH

Dr. Hines is board-certified in Occupational Medicine, Pulmonary Medicine, Critical Care Medicine, and Internal Medicine. Her research and work experience includes respiratory protection, pulmonary function testing, and surveillance for exposure to beryllium, asbestos, and other pulmonary toxins.



Joanna Gaitens, MSN, MPH, PhD

Dr. Gaitens is a doctorally prepared nurse researcher who applies her PhD in Public Health/Occupational and Environmental Health to the management of long-term medical surveillance programs following individuals with toxic occupational exposures.



Melissa McDiarmid, MD, MPH

Dr. McDiarmid is a clinical toxicologist who is board-certified in Internal Medicine and Occupational Medicine; she heads the University of Maryland Division of Occupational and Environmental Medicine. A seasoned clinician and researcher, she is an expert in medical surveillance programs and cancer related to occupational exposures.

Knut Ringen, DrPH, MHA, MPH
Principal Investigator, BTMed



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.



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; Principal Investigator: Arthur L. Frank, MD, PhD.
- Outreach: Department of Occupational and Environmental Health Sciences, University of Texas Health Science Center at Tyler, Texas; Co-Principal Investigator: 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 includes offering 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: 5.67 percent of 1,182 participants demonstrated findings consistent with work-related lung disease.
- CXRs: 5.08 percent of 1,182 participants demonstrated findings consistent with suspicious lung nodules or lesions.
- Pulmonary function tests (PFTs): 43.24 percent of 1,182 participants demonstrated findings consistent with obstructive disease.
- BeLPTs: 1.27 percent of 1,182 participants had at least one abnormal BeLPT.
- Audiometry: N/A.
- Our Participation Surveys continue to show 99.4% satisfaction with the program.

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

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 – Albuquerque (SNL).
- The JHBSPH Medical Exam Program is one of several unique programs within the Department of Energy Former Worker Program. Examinations are done in New Mexico in Espanola, New Mexico, and Albuquerque, New Mexico, by occupational health professionals from JHBSPH and UNM. We offer initial examinations and re-examinations every 3 years.
- 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 each 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 4,461 examinations of former workers since the program began in 2000. Of these exams, 3,695 were new exams, and 766 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, DOL Office of Workers Compensation, DOL Ombudsman's Office, NIOSH Ombudsman's Office, and the DOL Resource Centers.
- 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 Meetings in Espanola, New Mexico, and Santa Fe, New Mexico, where we discussed the program and recruited program participants.
- We attended two local Town Hall Meetings and a LANL Retirees Meeting.

What we have found:

- Chest x-rays (CXRs) (N= 3,432 receiving at least one chest x-ray): 10.1 percent demonstrated findings consistent with work-related lung disease;
- Pulmonary Function Tests (PFTs) (N = 2,508 receiving at least one PFT): 1.5 percent demonstrated findings consistent with obstructive disease;
- Beryllium Lymphocyte Proliferation Tests (BeLPTs) (N = 3,398 receiving at least one abnormal BeLPT): 3.5 percent had at least one abnormal BeLPT; and
- Audiometry (N= 3,111 receiving at least one audiometry): 54.4 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 the needs of the NSSP 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 (BeLPTs), and the low-dose CTs (LDCTs) and radiological reviews for the NSSP LDCT Pilot Project.

The **University of Colorado** School of Public Health Center for Health, Work and 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 country's largest nationwide clinic 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 DOE former 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 71 additional DOE sites, including:
 - referrals from the other Former Worker Programs (FWPs) whose participants live outside of their respective medical screening coverage areas and
 - DOE sites for which no other FWP has been established or 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 information and assistance in filing Energy Employee Occupational Illness Compensation Program (EEOICP) benefit claims with the Department of Labor (DOL).
- In FY 2017, the NSSP began providing the hemoglobin A1c test as a component of all medical screening examinations. The hemoglobin A1c provides information about a person's average levels of blood glucose over the 3 months prior to the exam and is the primary test used for diabetes management and diabetes research. Having results from the A1c test has significantly improved our ability to provide medical follow-up recommendations.
- More than 99% of the responding NSSP participants were satisfied with their experience in the NSSP.

What we have found:**Chest X-rays (with B-Read interpretation): N=17,224**

5.3%	had findings consistent with asbestosis without pleural disease
1.0%	had findings consistent with asbestosis with pleural disease
5.0%	had findings consistent with asbestos-related pleural disease
0.2%	had findings consistent with silicosis
0.0%	had findings consistent with mixed dust pneumoconiosis
3.3%	had findings consistent with pneumoconiosis, not otherwise specified

Pulmonary Function Tests: N=17,114

21.8%	had findings consistent with restrictive lung disease
13.9%	had findings consistent with obstructive lung disease
2.9%	had findings consistent with mixed pattern lung disease

BeLPTs: N=15,322

2.8%	had at least one abnormal BeLPT
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Audiometry: N=15,322

45.2%	demonstrated noise-induced hearing loss for normal speech tones
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Hemoglobin A1c: N=3,284

1,883	(57.3%) Normal (A1c value < 5.7)
933	(28.4%) Prediabetes (A1c value 5.7 - 6.4)
468	(14.3%) Diabetes (A1c value 6.5 or greater)

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

Web site: <http://www.orau.org/nssp>

Donna L. Cragle, PhD



Dr. Cragle is the Senior Vice President and Director of the Health, Energy, and Environment program group at Oak Ridge Associated Universities (ORAU). She has been involved with research of occupational hazards in Department of Energy (DOE) facilities for more than 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 research 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

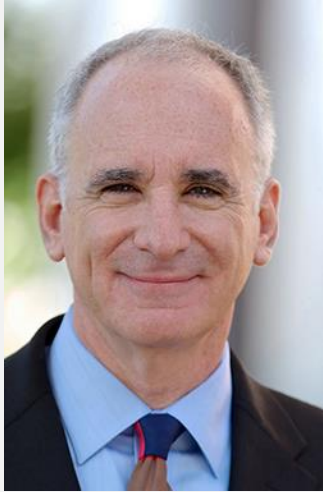
understanding of the data. Dr. Cragle's knowledge of occupational epidemiology has resulted in teaching opportunities both nationally and internationally. Her publications have provided significant contributions to the occupational epidemiology literature. Dr. Cragle received her Bachelor of Arts degree in biological sciences from Indiana University and her Masters of Science in human genetics from Virginia Commonwealth University. Dr. Cragle received her Ph.D. 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. Dr. McInerney coordinates the NSSP evaluation tests and procedures, 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 he has 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 Center for Health, Work and Environment, Colorado School of Public Health, University of Colorado Denver. He is Director of the Center for Worker Health and Environment, Director of the National Institute for Occupational Safety and Health-supported Mountain and Plains Education and Research Center, and is the 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's 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, 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:

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 Department of Energy (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 initiated medical screenings in 1998 and currently provides FWP examinations at 14 DOE sites in 8 states. Additionally, WHPP pioneered the use of low-dose 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 site offices and worker groups, advising on the development of program materials, and providing appropriate referral guidance to claimants regarding the Department of Labor-administered Energy Employees Occupational Illness Compensation Program and state workers’ compensation claims. Local coordinators have been an essential component in the recruitment of more than 33,500 DOE workers who have participated in over 64,500 total examinations through WHPP.

What we do:

The consortium utilizes expert occupational medicine physicians and administrative staff to provide independent medical screening to assess for occupational illness, as well as select non-occupationally related conditions common among former DOE workers. In addition to the standard FWP medical screening, WHPP administers the Early Lung Cancer Detection (ELCD) program, which offers low-dose CT scans at 9 DOE sites and will expand to 12 sites in 2019.

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)

- Lawrence Berkeley National Laboratory (California) – Starting February 2019
- Lawrence Livermore National Laboratory (California) – Starting February 2019
- Sandia National Laboratory (California) – Starting February 2019

Standard FWP medical screenings only are provided to workers from:

- Waste Isolation Pilot Plant (New Mexico)
- Brookhaven National Laboratory (New York)

What we have found:

FWP medical screening

- Chest X-rays (CXRs) (N=33,058 participants receiving at least one CXR): 8.4 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=33,094 participants receiving at least one PFT): 16.8 percent demonstrated findings consistent with obstructive lung disease (percentage of PFT abnormalities – obstructive pattern and mixed pattern combined).
- Beryllium Lymphocyte Proliferation Tests (BeLPTs) (N=30,237 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=31,226 participants receiving at least one audiogram): 48.2 percent demonstrated occupational hearing loss.

ELCD Program

- 172 ELCD Program participants have been diagnosed with primary lung cancer from 2000 to the present.
- 121 of the 164 (73.8 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 1 of approximately 84 DOE workers cumulatively tested since 2000 (N=13,679).

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

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

Facebook: www.facebook.com/WorkerHealthProtectionProgramwhpp

Steven Markowitz, MD, DrPH



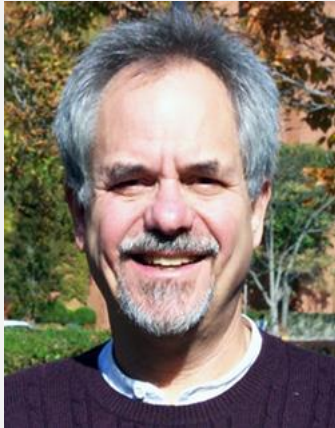
Steven Markowitz, MD, DrPH, an occupational medicine physician and epidemiologist, directs the Barry Commoner Center for Health and the Environment at Queens College, City University of New York. He is Adjunct Professor of Preventive Medicine at Mount Sinai School of Medicine. He received his undergraduate 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. At Queens College, he 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.

Dr. Pepper retired from Queens College and the WHPP program in early FY 2018.

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 1942.

Nearly 11,000 workers were employed in the manufacture and disassembly of nuclear weapons at the BAECP with an estimated 2,696 still living and have known addresses; 38 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, 2018, a total of 1,417 former workers have been screened with 824 receiving a 3-year repeat screening, 525 a 6-year, 309 a 9-year, 118 a 12-year, and 23 a 15-year repeat screening.

Over 14,000 employees worked at the Ames Laboratory conducting materials science and applied chemical and physical research, and 11,076 of those workers are still living and have known addresses; 70 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, 2018, a total of 2,123 former workers have been screened with 1,044 receiving a 3-year repeat screening, 599 a 6-year, 194 a 9-year repeat screening, and 9 a 12-year repeat screening.

What we have found:

FWP medical screening

- Chest x-rays (CXRs) (N=2,035 participants receiving at least one CXR): 15 percent demonstrated findings consistent with work-related lung disease.
- Pulmonary function tests (PFTs) (N=2,133 participants receiving at least one PFT): 21 percent demonstrated findings consistent with obstructive disease.

- Beryllium Lymphocyte Proliferation Tests (BeLPTs) (N=2,226 participants receiving at least one BeLPT): 3 percent had at least one abnormal BeLPT.

Early Lung Cancer Detection (ELCD) Program

- No ELCD program participants have been diagnosed with primary lung cancer.
- Lung cancer was detected in 0 of 5 DOE workers tested.

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

Web site: www.iowafwp.org

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 19 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 the Principal Investigator on the Iowa Former Worker Program since 2018 and was the Co-Principal Investigator beginning in 2008. He has also 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).

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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 2018)

State	Sites	Initial Screenings	Re-screens
AK	Amchitka Island Test Site	1,445	792
CA	Lawrence Berkeley National Laboratory	498	269
CA	Lawrence Livermore National Laboratory	2,197	1,534
CA	Sandia National Laboratories, CA	185	113
CO	Rocky Flats Plant (Construction Workers)	951	616
CO	Rocky Flats Plant (Production Workers)	4,186	1,592
FL	Pinellas (Production Workers)	675	258
IA	Ames Laboratory	2,123	1,846
IA	Iowa Army Ammunition Plant	1,417	1,811
ID	Idaho National Laboratory (Construction Workers)	1,317	542
ID	Idaho National Laboratory (Production Workers)	5,248	4,570
IL	Argonne National Laboratory	805	217
IL	Fermi National Accelerator Laboratory	170	19
KY	Paducah GDP (Construction Workers)	1,087	597
KY	Paducah GDP (Production Workers)	3,567	3,281
MO	Kansas City Plant (Construction Workers)	782	349
MO	Kansas City Plant (Production Workers)	2,719	624
NM	Los Alamos National Laboratory	3,319	679
NM	Sandia National Laboratories, NM	430	58
NV	Nevada National Security Site	5,442	3,547
NY	Brookhaven National Laboratory (Construction Workers)	616	335
NY	Brookhaven National Laboratory (Production Workers)	528	124
OH	Feed Materials Production Center (Construction Workers)	2,406	1,748

State	Sites	Initial Screenings	Re-screens
OH	Feed Materials Production Center (Production Workers)	1,388	1,142
OH	Mound Plant (Construction Workers)	467	233
OH	Mound Plant (Production Workers)	1,690	1,474
OH	Portsmouth GDP (Construction Workers)	1,249	733
OH	Portsmouth GDP (Production Workers)	3,852	3,765
SC	Savannah River Site (Construction Workers)	5,274	2,533
SC	Savannah River Site (Production Workers)	6,128	526
TN	Oak Ridge K-25 (K-25) (Production Workers)	4,869	5,050
TN	Oak Ridge National Laboratory (ORNL) (Production Workers)	2,402	2,368
TN	Oak Ridge Reservation ¹¹ (Construction Workers)	3,815	2,030
TN	Y-12 National Security Complex (Y-12) (Production Workers)	4,374	4,257
TX	Pantex Plant	1,643	650
WA	Hanford Site (Construction Workers)	4,437	1,996
WA	Hanford Site (Production Workers)	6,078	1,110
	Other Sites ¹² (Construction Workers)	1,578	650
	Other Sites ¹³ (Production Workers)	436	40
Grand Total		91,793	54,078

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 2018, and Table 9 provides findings on re-screens.

**Table 8. Chest X-ray Findings on Initial Screening
(1997 through September 2018)**

State	Sites	Workers Screened	Asbestos-related Lung Disease	Silicosis	Other Dust-related Disease	Lung Nodules, Nodes, or Lesions
AK	Amchitka Island Test Site	1,129	161 (14.3%)	1 (0.1%)	0 (0.0%)	62 (5.5%)
CA	Lawrence Berkeley National Laboratory	468	7 (1.5%)	0 (0.0%)	3 (0.6%)	7 (1.5%)
CA	Lawrence Livermore National Laboratory	2,130	54 (2.5%)	1 (0.0%)	9 (0.4%)	42 (2.0%)
CA	Sandia National Laboratories, CA	181	2 (1.1%)	0 (0.0%)	0 (0.0%)	2 (1.1%)
CO	Rocky Flats Plant (Construction Workers)	842	244 (29.0%)	7 (0.8%)	14 (1.7%)	34 (4.0%)
CO	Rocky Flats Plant (Production Workers)	3,745	820 (21.9%)	4 (0.1%)	62 (1.7%)	115 (3.1%)
FL	Pinellas (Production Workers)	655	56 (8.5%)	5 (0.8%)	16 (2.4%)	31 (4.7%)
IA	Ames Laboratory	2,045	80 (3.9%)	1 (0.0%)	62 (3.0%)	57 (2.8%)
IA	Iowa Army Ammunition Plant	1,311	126 (9.6%)	0 (0.0%)	68 (5.2%)	35 (2.7%)
ID	Idaho National Laboratory (Construction Workers)	1,098	119 (10.8%)	0 (0.0%)	2 (0.2%)	33 (3.0%)
ID	Idaho National Laboratory (Production Workers)	5,170	399 (7.7%)	1 (0.0%)	25 (0.5%)	155 (3.0%)
IL	Argonne National Laboratory	728	85 (11.7%)	1 (0.1%)	29 (4.0%)	25 (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	158	13 (8.2%)	0 (0.0%)	5 (3.2%)	5 (3.2%)
KY	Paducah Gaseous Diffusion Plant (GDP) (Construction Workers)	993	161 (16.2%)	7 (0.7%)	12 (1.2%)	58 (5.8%)
KY	Paducah GDP (Production Workers)	3,535	233 (6.6%)	9 (0.3%)	20 (0.6%)	128 (3.6%)
MO	Kansas City Plant (Construction Workers)	690	95 (13.8%)	0 (0.0%)	1 (0.1%)	35 (5.1%)
MO	Kansas City Plant (Production Workers)	2,662	304 (11.4%)	2 (0.1%)	70 (2.6%)	100 (3.8%)
NM	Los Alamos National Laboratory	3,119	217 (7.0%)	0 (0.0%)	100 (3.2%)	52 (1.7%)
NM	Sandia National Laboratories, NM	411	23 (5.6%)	1 (0.2%)	14 (3.4%)	3 (0.7%)
NV	Nevada National Security Site	5,227	336 (6.4%)	21 (0.4%)	54 (1.0%)	126 (2.4%)
NY	Brookhaven National Laboratory (Construction Workers)	496	90 (18.1%)	0 (0.0%)	0 (0.0%)	9 (1.8%)
NY	Brookhaven National Laboratory (Production Workers)	485	27 (5.6%)	0 (0.0%)	5 (1.0%)	20 (4.1%)
OH	Feed Materials Production Center (Construction Workers)	2,135	236 (11.1%)	5 (0.2%)	0 (0.0%)	34 (1.6%)
OH	Feed Materials Production Center (Production Workers)	1,328	59 (4.4%)	0 (0.0%)	13 (1.0%)	55 (4.1%)
OH	Mound Plant (Construction Workers)	381	69 (18.1%)	0 (0.0%)	3 (0.8%)	7 (1.8%)
OH	Mound Plant (Production Workers)	1,652	106 (6.4%)	2 (0.1%)	1 (0.1%)	62 (3.8%)
OH	Portsmouth GDP (Construction Workers)	1,102	198 (18.0%)	3 (0.3%)	3 (0.3%)	50 (4.5%)
OH	Portsmouth GDP (Production Workers)	3,824	252 (6.6%)	5 (0.1%)	15 (0.4%)	112 (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)	4,674	439 (9.4%)	4 (0.1%)	2 (0.0%)	181 (3.9%)
SC	Savannah River Site (Production Workers)	4,437	1,092 (24.6%)	59 (1.3%)	395 (8.9%)	63 (1.4%)
TN	Oak Ridge K-25 (K-25) (Production Workers)	4,779	321 (6.7%)	5 (0.1%)	12 (0.3%)	100 (2.1%)
TN	Oak Ridge National Laboratory (ORNL) (Production Workers)	2,346	118 (5.0%)	1 (0.0%)	2 (0.1%)	82 (3.5%)
TN	Oak Ridge Reservation ¹⁴ (Construction Workers)	3,249	529 (16.3%)	6 (0.2%)	6 (0.2%)	132 (4.1%)
TN	Y-12 National Security Complex (Y-12) (Production Workers)	4,289	243 (5.7%)	4 (0.1%)	13 (0.3%)	170 (4.0%)
TX	Pantex Plant	1,612	83 (5.1%)	1 (0.1%)	15 (0.9%)	55 (3.4%)
WA	Hanford Site (Construction Workers)	3,728	871 (23.4%)	3 (0.1%)	3 (0.1%)	188 (5.0%)
WA	Hanford Site (Production Workers)	5,523	1,072 (19.4%)	4 (0.1%)	127 (2.3%)	263 (4.8%)
	Other Sites ¹⁵ (Construction Workers)	1,295	191 (14.7%)	5 (0.4%)	0 (0.0%)	29 (2.2%)
	Other Sites ¹⁶ (Production Workers)	410	53 (12.9%)	3 (0.7%)	25 (6.1%)	12 (2.9%)
Grand Total		84,042	9,584 (11.4%)	171 (0.2%)	1,206 (1.4%)	2,729 (3.2%)

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 2018)**

State	Sites	Workers Screened	Asbestos-related Lung Disease	Silicosis	Other Dust-related Disease	Lung Nodules, Nodes, or Lesions
AK	Amchitka Island Test Site	463	40 (8.6%)	2 (0.4%)	0 (0.0%)	24 (5.2%)
CA	Lawrence Berkeley National Laboratory	113	4 (3.5%)	0 (0.0%)	1 (0.9%)	3 (2.7%)
CA	Lawrence Livermore National Laboratory	704	15 (2.1%)	1 (0.1%)	3 (0.4%)	14 (2.0%)
CA	Sandia National Laboratories, CA	51	1 (2.0%)	0 (0.0%)	0 (0.0%)	4 (7.8%)
CO	Rocky Flats Plant (Construction Workers)	341	17 (5.0%)	0 (0.0%)	2 (0.6%)	7 (2.1%)
CO	Rocky Flats Plant (Production Workers)	1,292	292 (22.6%)	5 (0.4%)	44 (3.4%)	36 (2.8%)
FL	Pinellas (Production Workers)	199	31 (15.6%)	1 (0.5%)	15 (7.5%)	1 (0.5%)
IA	Ames Laboratory	982	51 (5.2%)	1 (0.1%)	68 (6.9%)	21 (2.1%)
IA	Iowa Army Ammunition Plant	548	47 (8.6%)	0 (0.0%)	66 (12.0%)	17 (3.1%)
ID	Idaho National Laboratory (Construction Workers)	358	34 (9.5%)	0 (0.0%)	0 (0.0%)	11 (3.1%)
ID	Idaho National Laboratory (Production Workers)	2,088	121 (5.8%)	0 (0.0%)	4 (0.2%)	53 (2.5%)
IL	Argonne National Laboratory	182	22 (12.1%)	2 (1.1%)	17 (9.3%)	2 (1.1%)
IL	Fermi National Accelerator Laboratory	17	1 (5.9%)	0 (0.0%)	2 (11.8%)	0 (0.0%)
KY	Paducah GDP (Construction Workers)	377	40 (10.6%)	0 (0.0%)	1 (0.3%)	25 (6.6%)

State	Sites	Workers Screened	Asbestos-related Lung Disease	Silicosis	Other Dust-related Disease	Lung Nodules, Nodes, or Lesions
KY	Paducah GDP (Production Workers)	1,808	78 (4.3%)	1 (0.1%)	0 (0.0%)	88 (4.9%)
MO	Kansas City Plant (Construction Workers)	235	20 (8.5%)	0 (0.0%)	0 (0.0%)	5 (2.1%)
MO	Kansas City Plant (Production Workers)	551	53 (9.6%)	1 (0.2%)	31 (5.6%)	13 (2.4%)
NM	Los Alamos National Laboratory	576	74 (12.8%)	0 (0.0%)	23 (4.0%)	2 (0.3%)
NM	Sandia National Laboratories, NM	52	12 (23.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
NV	Nevada National Security Site	1,776	116 (6.5%)	3 (0.2%)	9 (0.5%)	113 (6.4%)
NY	Brookhaven National Laboratory (Construction Workers)	224	16 (7.1%)	0 (0.0%)	0 (0.0%)	4 (1.8%)
NY	Brookhaven National Laboratory (Production Workers)	96	5 (5.2%)	0 (0.0%)	0 (0.0%)	1 (1.0%)
OH	Feed Materials Production Center (Construction Workers)	1,000	85 (8.5%)	1 (0.1%)	0 (0.0%)	7 (0.7%)
OH	Feed Materials Production Center (Production Workers)	593	16 (2.7%)	0 (0.0%)	4 (0.7%)	23 (3.9%)
OH	Mound Plant (Construction Workers)	140	16 (11.4%)	0 (0.0%)	1 (0.7%)	2 (1.4%)
OH	Mound Plant (Production Workers)	738	27 (3.7%)	0 (0.0%)	2 (0.3%)	34 (4.6%)
OH	Portsmouth GDP (Construction Workers)	483	71 (14.7%)	0 (0.0%)	0 (0.0%)	7 (1.4%)
OH	Portsmouth GDP (Production Workers)	1,903	127 (6.7%)	1 (0.1%)	4 (0.2%)	109 (5.7%)

State	Sites	Workers Screened	Asbestos-related Lung Disease	Silicosis	Other Dust-related Disease	Lung Nodules, Nodes, or Lesions
SC	Savannah River Site (Construction Workers)	1,568	145 (9.2%)	1 (0.1%)	1 (0.1%)	73 (4.7%)
SC	Savannah River Site (Production Workers)	471	82 (17.4%)	1 (0.2%)	27 (5.7%)	11 (2.3%)
TN	K-25 (Production Workers)	2,426	127 (5.2%)	2 (0.1%)	4 (0.2%)	110 (4.5%)
TN	ORNL (Production Workers)	1,342	43 (3.2%)	0 (0.0%)	4 (0.3%)	61 (4.5%)
TN	Oak Ridge Reservation ¹⁷ (Construction Workers)	1,314	134 (10.2%)	0 (0.0%)	0 (0.0%)	51 (3.9%)
TN	Y-12 (Production Workers)	2,332	101 (4.3%)	1 (0.0%)	5 (0.2%)	126 (5.4%)
TX	Pantex Plant	429	12 (2.8%)	0 (0.0%)	1 (0.2%)	16 (3.7%)
WA	Hanford Site (Construction Workers)	1,279	130 (10.2%)	0 (0.0%)	1 (0.1%)	61 (4.8%)
WA	Hanford Site (Production Workers)	938	128 (13.6%)	1 (0.1%)	42 (4.5%)	35 (3.7%)
	Other Sites ¹⁸ (Construction Workers)	451	24 (5.3%)	1 (0.2%)	0 (0.0%)	9 (2.0%)
	Other Sites ¹⁹ (Production Workers)	31	6 (19.4%)	0 (0.0%)	1 (3.2%)	1 (3.2%)
Grand Total		30,471	2,364 (7.8%)	26 (0.1%)	383 (1.3%)	1,180 (3.9%)

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 2018 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	1125	174 (15.5%)
CA	Lawrence Berkeley National Laboratory	486	49 (10.1%)
CA	Lawrence Livermore National Laboratory	2,155	258 (12.0%)
CA	Sandia National Laboratories, CA	181	16 (8.8%)
CO	Rocky Flats Plant (Construction Workers)	831	212 (25.5%)
CO	Rocky Flats Plant (Production Workers)	4,044	901 (22.3%)
FL	Pinellas (Production Workers)	645	176 (27.3%)
IA	Ames Laboratory	2,078	227 (10.9%)
IA	Iowa Army Ammunition Plant	1,342	267 (19.9%)
ID	Idaho National Laboratory (Construction Workers)	1,075	238 (22.1%)
ID	Idaho National Laboratory (Production Workers)	5,171	633 (12.2%)
IL	Argonne National Laboratory	742	71 (9.6%)
IL	Fermi National Accelerator Laboratory	156	12 (7.7%)
KY	Paducah GDP (Construction Workers)	976	238 (24.4%)
KY	Paducah GDP (Production Workers)	3,514	373 (10.6%)
MO	Kansas City Plant (Construction Workers)	676	152 (22.5%)
MO	Kansas City Plant (Production Workers)	2,635	568 (21.6%)
NM	Los Alamos National Laboratory	2,230	128 (5.7%)
NM	Sandia National Laboratories, NM	371	30 (8.1%)
NV	Nevada National Security Site	5,289	964 (18.2%)
NY	Brookhaven National Laboratory (Construction Workers)	519	67 (12.9%)

State	Sites	Workers Screened	Obstructive Airways Dysfunction Detected
NY	Brookhaven National Laboratory (Production Workers)	523	31 (5.9%)
OH	Feed Materials Production Center (Construction Workers)	2,076	394 (19.0%)
OH	Feed Materials Production Center (Production Workers)	1,327	150 (11.3%)
OH	Mound Plant (Construction Workers)	381	83 (21.8%)
OH	Mound Plant (Production Workers)	1,617	218 (13.5%)
OH	Portsmouth GDP (Construction Workers)	1,092	255 (23.4%)
OH	Portsmouth GDP (Production Workers)	3,815	503 (13.2%)
SC	Savannah River Site (Construction Workers)	4,592	762 (16.6%)
SC	Savannah River Site (Production Workers)	3,768	413 (11.0%)
TN	K-25 (Production Workers)	4,730	642 (13.6%)
TN	ORNL (Production Workers)	2,342	241 (10.3%)
TN	Oak Ridge Reservation ²⁰ (Construction Workers)	3,205	585 (18.3%)
TN	Y-12 (Production Workers)	4,273	515 (12.1%)
TX	Pantex Plant	1,606	522 (32.5%)
WA	Hanford Site (Construction Workers)	3,703	857 (23.1%)
WA	Hanford Site (Production Workers)	5,825	1,006 (17.3%)
	Other Sites ²¹ (Construction Workers)	1,286	232 (18.0%)
	Other Sites ²² (Production Workers)	411	68 (16.5%)
Grand Total		82,813	13,231 (16.0%)

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 2018)**

State	Sites	Workers Screened	Obstructive Airways Dysfunction Detected
AK	Amchitka Island Test Site	451	39 (8.6%)
CA	Lawrence Berkeley National Laboratory	123	14 (11.4%)
CA	Lawrence Livermore National Laboratory	724	60 (8.3%)
CA	Sandia National Laboratories, CA	58	5 (8.6%)
CO	Rocky Flats Plant (Construction Workers)	337	15 (4.5%)
CO	Rocky Flats Plant (Production Workers)	1284	153 (11.9%)
FL	Pinellas (Production Workers)	203	33 (16.3%)
IA	Ames Laboratory	1,018	117 (11.5%)
IA	Iowa Army Ammunition Plant	511	222 (43.4%)
ID	Idaho National Laboratory (Construction Workers)	349	20 (5.7%)
ID	Idaho National Laboratory (Production Workers)	2,208	313 (14.2%)
IL	Argonne National Laboratory	183	7 (3.8%)
IL	Fermi National Accelerator Laboratory	16	1 (6.3%)
KY	Paducah GDP (Construction Workers)	370	20 (5.4%)
KY	Paducah GDP (Production Workers)	1,798	167 (9.3%)
MO	Kansas City Plant (Construction Workers)	227	6 (2.6%)
MO	Kansas City Plant (Production Workers)	538	53 (9.9%)
NM	Los Alamos National Laboratory	495	30 (6.1%)
NM	Sandia National Laboratories, NM	48	1 (2.1%)
NV	Nevada National Security Site	1,970	324 (16.4%)
NY	Brookhaven National Laboratory (Construction Workers)	232	3 (1.3%)
NY	Brookhaven National Laboratory (Production Workers)	108	7 (6.5%)
OH	Feed Materials Production Center (Construction Workers)	950	41 (4.3%)

State	Sites	Workers Screened	Obstructive Airways Dysfunction Detected
OH	Feed Materials Production Center (Production Workers)	596	44 (7.4%)
OH	Mound Plant (Construction Workers)	133	4 (3.0%)
OH	Mound Plant (Production Workers)	807	61 (7.6%)
OH	Portsmouth GDP (Construction Workers)	472	29 (6.1%)
OH	Portsmouth GDP (Production Workers)	1,909	263 (13.8%)
SC	Savannah River Site (Construction Workers)	1,523	71 (4.7%)
SC	Savannah River Site (Production Workers)	459	36 (7.8%)
TN	K-25 (Production Workers)	2,517	241 (9.6%)
TN	ORNL (Production Workers)	1,365	99 (7.3%)
TN	Oak Ridge Reservation ²³ (Construction Workers)	1,291	109 (8.4%)
TN	Y-12 (Production Workers)	2,379	241 (10.1%)
TX	Pantex Plant	420	42 (10.0%)
WA	Hanford Site (Construction Workers)	1,241	90 (7.3%)
WA	Hanford Site (Production Workers)	925	138 (14.9%)
	Other Sites ²⁴ (Construction Workers)	451	23 (5.1%)
	Other Sites ²⁵ (Production Workers)	31	4 (12.9%)
Grand Total		30,720	3,146 (10.2%)

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 2018, 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	105	2 (1.9%)	0 (0.0%)	1 (1.0%)
CA	Lawrence Berkeley National Laboratory	205	2 (1.0%)	7 (7.0%)	0 (0.0%)
CA	Lawrence Livermore National Laboratory	1,409	13 (0.9%)	29 (2.1%)	8 (0.6%)
CA	Sandia National Laboratories, CA	117	1 (0.9%)	3 (2.6%)	1 (0.9%)
CO	Rocky Flats Plant (Construction Workers)	845	6 (0.7%)	4 (0.5%)	0 (0.0%)
CO	Rocky Flats Plant (Production Workers)	2,730	25 (0.9%)	13 (0.5%)	13 (0.5%)
FL	Pinellas (Production Workers)	646	10 (1.5%)	22 (3.4%)	3 (0.5%)
IA	Ames Laboratory	2,071	28 (1.4%)	23 (1.1%)	6 (0.3%)
IA	Iowa Army Ammunition Plant	1,409	19 (1.3%)	12 (0.9%)	8 (0.6%)
ID	Idaho National Laboratory (Construction Workers)	1,070	14 (1.3%)	5 (0.5%)	7 (0.7%)
ID	Idaho National Laboratory (Production Workers)	4,791	36 (0.8%)	32 (0.7%)	14 (0.3%)
IL	Argonne National Laboratory	374	7 (1.9%)	2 (0.5%)	2 (0.5%)
IL	Fermi National Accelerator Laboratory	108	2 (1.9%)	1 (0.9%)	0 (0.0%)
KY	Paducah GDP (Construction Workers)	990	16 (1.6%)	8 (0.8%)	1 (0.1%)
KY	Paducah GDP (Production Workers)	3,044	37 (1.2%)	19 (0.6%)	7 (0.2%)

State	Sites	Workers Screened	1 Abnormal	2 Abnormal	1 Abnormal and 1+ Borderline
MO	Kansas City Plant (Construction Workers)	680	4 (0.6%)	12 (1.8%)	3 (0.4%)
MO	Kansas City Plant (Production Workers)	2,600	38 (1.5%)	24 (0.9%)	10 (0.4%)
NM	Los Alamos National Laboratory	3,093	45 (1.5%)	35 (1.1%)	22 (0.7%)
NM	Sandia National Laboratories, NM	403	12 (3.0%)	3 (0.7%)	3 (0.7%)
NV	Nevada National Security Site	2,941	26 (0.9%)	30 (1.0%)	10 (0.3%)
NY	Brookhaven National Laboratory (Construction Workers)	505	5 (1.0%)	24 (4.8%)	0 (0.0%)
NY	Brookhaven National Laboratory (Production Workers)	515	5 (1.0%)	20 (3.9%)	7 (1.4%)
OH	Feed Materials Production Center (Construction Workers)	2,107	8 (0.4%)	13 (0.6%)	4 (0.2%)
OH	Feed Materials Production Center (Production Workers)	1,170	7 (0.6%)	6 (0.5%)	2 (0.2%)
OH	Mound Plant (Construction Workers)	381	0 (0.0%)	2 (0.5%)	0 (0.0%)
OH	Mound Plant (Production Workers)	1,622	20 (1.2%)	15 (0.9%)	4 (0.2%)
OH	Portsmouth GDP (Construction Workers)	1,096	16 (1.5%)	3 (0.3%)	1 (0.1%)
OH	Portsmouth GDP (Production Workers)	3,405	21 (0.6%)	11 (0.3%)	4 (0.1%)
SC	Savannah River Site (Construction Workers)	4,665	33 (0.7%)	41 (0.9%)	13 (0.3%)
SC	Savannah River Site (Production Workers)	3,385	70 (2.1%)	24 (0.7%)	10 (0.3%)
TN	K-25 (Production Workers)	4,778	93 (1.9%)	90 (1.9%)	24 (0.5%)
TN	ORNL (Production Workers)	2,330	22 (0.9%)	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)	3,529	28 (0.8%)	25 (0.7%)	11 (0.3%)
TN	Y-12 (Production Workers)	4,300	62 (1.4%)	70 (1.6%)	14 (0.3%)
TX	Pantex Plant	1,588	14 (0.9%)	5 (0.3%)	1 (0.1%)
WA	Hanford Site (Construction Workers)	3,734	43 (1.2%)	34 (0.9%)	7 (0.2%)
WA	Hanford Site (Production Workers)	5,290	114 (2.2%)	40 (0.8%)	18 (0.3%)
	Other Sites ²⁷ (Construction)	877	3 (0.3%)	3 (0.3%)	1 (0.1%)
	Other Sites ²⁸ (Production)	251	3 (1.2%)	2 (0.8%)	0 (0.0%)
Grand Total		75,159	910 (1.2%)	742 (1.0%)	253 (0.3%)

Table 13. Results of Beryllium Lymphocyte Proliferation Tests (BeLPT) by DOE Site on Re-screening (1997 through September 2018)

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	44	0 (0.0%)	1 (2.3%)	1 (2.3%)

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	552	10 (1.8%)	11 (2.0%)	1 (0.2%)
CA	Sandia National Laboratories, CA	41	2 (4.9%)	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)	1,021	4 (0.4%)	2 (0.2%)	1 (0.1%)
FL	Pinellas (Production Workers)	194	1 (0.5%)	1 (0.5%)	2 (1.0%)
IA	Ames Laboratory	966	7 (0.7%)	4 (0.4%)	1 (0.1%)
IA	Iowa Army Ammunition Plant	789	12 (1.5%)	4 (0.5%)	4 (0.5%)
ID	Idaho National Laboratory (Construction Workers)	233	2 (0.9%)	0 (0.0%)	0 (0.0%)
ID	Idaho National Laboratory (Production Workers)	1,747	10 (0.6%)	15 (0.9%)	11 (0.6%)
IL	Argonne National Laboratory	107	2 (1.9%)	0 (0.0%)	0 (0.0%)
IL	Fermi National Accelerator Laboratory	15	0 (0.0%)	0 (0.0%)	0 (0.0%)
KY	Paducah GDP (Construction Workers)	290	0 (0.0%)	2 (0.7%)	0 (0.0%)
KY	Paducah GDP (Production Workers)	1,562	10 (0.6%)	6 (0.4%)	11 (0.7%)
MO	Kansas City Plant (Construction Workers)	226	5 (2.2%)	1 (0.4%)	0 (0.0%)
MO	Kansas City Plant (Production Workers)	534	1 (0.2%)	2 (0.4%)	1 (0.2%)
NM	Los Alamos National Laboratory	534	7 (1.3%)	1 (0.2%)	0 (0.0%)
NM	Sandia National Laboratories, NM	48	2 (4.2%)	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	1,331	20 (1.5%)	12 (0.9%)	10 (0.8%)
NY	Brookhaven National Laboratory (Construction Workers)	217	7 (3.2%)	2 (0.9%)	1 (0.5%)
NY	Brookhaven National Laboratory (Production Workers)	96	0 (0.0%)	2 (2.1%)	0 (0.0%)
OH	Feed Materials Production Center (Construction Workers)	577	4 (0.7%)	0 (0.0%)	0 (0.0%)
OH	Feed Materials Production Center (Production Workers)	472	1 (0.2%)	5 (1.1%)	2 (0.4%)
OH	Mound Plant (Construction Workers)	90	0 (0.0%)	0 (0.0%)	0 (0.0%)
OH	Mound Plant (Production Workers)	581	1 (0.2%)	11 (1.9%)	7 (1.2%)
OH	Portsmouth GDP (Construction Workers)	355	1 (0.3%)	0 (0.0%)	0 (0.0%)
OH	Portsmouth GDP (Production Workers)	1,741	8 (0.5%)	8 (0.5%)	6 (0.3%)
SC	Savannah River Site (Construction Workers)	1,146	15 (1.3%)	3 (0.3%)	3 (0.3%)
SC	Savannah River Site (Production Workers)	460	2 (0.4%)	1 (0.2%)	1 (0.2%)
TN	K-25 (Production Workers)	2,213	29 (1.3%)	36 (1.6%)	18 (0.8%)
TN	ORNL (Production Workers)	961	5 (0.4%)	27 (2.1%)	7 (0.5%)
TN	Oak Ridge Reservation ³¹ (Construction Workers)	1,275	10 (0.8%)	7 (0.5%)	3 (0.2%)
TN	Y-12 (Production Workers)	1,717	16 (0.9%)	37 (2.2%)	19 (1.1%)

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	217	2 (0.9%)	5 (2.3%)	0 (0.0%)
WA	Hanford Site (Construction Workers) (0.5%)	831	8 (1.0%)	4 (0.5%)	0 (0.0%)
WA	Hanford Site (Production Workers)	857	9 (1.1%)	1 (0.1%)	2 (0.2%)
	Other Sites ³³ (Construction Workers)	192	2 (1.0%)	1 (0.5%)	1 (0.5%)
	Other Sites ³⁴ (Production Workers)	25	0 (0.0%)	0 (0.0%)	0 (0.0%)
Grand Total		24,493	216 (0.9%)	212 (0.9%)	114 (0.5%)

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 2018)

State	Sites	Workers Screened	Noise Induced Hearing Loss (NIHL)
AK	Amchitka Island Test Site	1,152	770 (66.8%)
CA	Lawrence Berkeley National Laboratory	280	101 (36.1%)
CA	Lawrence Livermore National Laboratory	1,249	517 (41.4%)
CA	Sandia National Laboratories, CA	92	42 (45.7%)
CO	Rocky Flats Plant (Construction Workers)	817	529 (64.7%)
CO	Rocky Flats Plant (Production Workers)	3,982	2,344 (58.9%)
FL	Pinellas (Production Workers)	643	248 (38.6%)

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	207	61 (29.5%)
IA	Iowa Army Ammunition Plant ³⁶	107	88 (82.2%)
ID	Idaho National Laboratory (Construction Workers)	1,028	679 (66.1%)
ID	Idaho National Laboratory (Production Workers)	4,970	2,165 (43.6%)
IL	Argonne National Laboratory	770	271 (35.2%)
IL	Fermi National Accelerator Laboratory	166	65 (39.2%)
KY	Paducah GDP (Construction Workers)	931	708 (76.0%)
KY	Paducah GDP (Production Workers)	3,466	1,423 (41.1%)
MO	Kansas City Plant (Construction Workers)	655	387 (59.1%)
MO	Kansas City Plant (Production Workers)	2,625	1,229 (46.8%)
NM	Los Alamos National Laboratory	2,833	1,656 (58.5%)
NM	Sandia National Laboratories, NM	357	202 (56.6%)
NV	Nevada National Security Site	4,812	2,709 (56.3%)
NY	Brookhaven National Laboratory (Construction Workers)	528	343 (65.0%)
NY	Brookhaven National Laboratory (Production Workers)	512	256 (50.0%)
OH	Feed Materials Production Center (Construction Workers)	2,097	1,067 (50.9%)
OH	Feed Materials Production Center (Production Workers)	1,327	325 (24.5%)
OH	Mound Plant (Construction Workers)	367	232 (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)	1,609	654 (40.6%)
OH	Portsmouth GDP (Construction Workers)	1,131	812 (71.8%)
OH	Portsmouth GDP (Production Workers)	3,723	1,504 (40.4%)
SC	Savannah River Site (Construction Workers)	4,772	2,839 (59.5%)
SC	Savannah River Site (Production Workers)	3,794	2,139 (56.4%)
TN	K-25 (Production Workers)	4,385	2,231 (50.9%)
TN	ORNL (Production Workers)	2,336	1,129 (48.3%)
TN	Oak Ridge Reservation ³⁷ (Construction Workers)	3,157	2,217 (70.2%)
TN	Y-12 (Production Workers)	4,256	2,384 (56.0%)
TX	Pantex Plant ³⁸	117	50 (42.7%)
WA	Hanford Site (Construction Workers)	2,951	2,061 (69.8%)
WA	Hanford Site (Production Workers)	4,976	2,463 (49.5%)
	Other Sites ³⁹ (Construction Workers)	1,069	674 (63.0%)
	Other Sites ⁴⁰ (Production Workers)	413	205 (49.6%)
Grand Total		74,662	39,779 (53.3%)

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/>