



The Department of Energy

Former Worker Medical Surveillance Program



January 2008



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Abbreviations Used in This Report

| | |
|---------|---|
| AEC | Atomic Energy Commission |
| AFL-CIO | American Federation of Labor and Congress of Industrial Organizations |
| ANL | Argonne National Laboratory |
| AT&T | American Telephone and Telegraph Company |
| BAECP | Burlington Atomic Energy Commission Plant |
| BeLPT | Beryllium Lymphocyte Proliferation Test |
| BNL | Brookhaven National Laboratory |
| CARET | Carotene and Retinol Efficacy Trial |
| CBD | Chronic Beryllium Disease |
| C.F.R. | Code of Federal Regulations |
| CI | Confidence Interval |
| CPWR | Center to Protect Workers' Rights |
| CT | Computed Tomography |
| DOE | Department of Energy |
| DOL | Department of Labor |
| EEIOCPA | Energy Employees Occupational Illness Compensation Program Act |
| ERDA | Energy Research and Development Administration |
| FEV | Forced Expiratory Volume |
| FVC | Forced Vital Capacity |
| FWP | Former Worker Program |

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Prolog

February 1, 2008

The Former Worker Program, through its outreach and medical screening activities, has made significant contributions and provided valuable diagnostic health information to numerous former workers since the program began in 1996. These accomplishments are largely due to a comprehensive system of dedicated medical experts from a consortium of universities, unions, and trade associations.

However, there are still many former workers who have not been served by this program, either through initial medical screening or through re-screening after their initial evaluation. It is the responsibility of all of us who manage and implement this program to ensure that we continue to reach out to as many former workers as possible and redouble our efforts to assist all the workers who wish to take advantage of this program's benefits.

The Former Worker Program is a testimony of our collective commitment to all those who served our nation through the important work conducted by the Department of Energy and its predecessor agencies. It is also important that our current workforce see that the Department is not forgetting those who previously worked here, and that they too will be eligible for this program's benefits after their employment ends with the Department.

As the Chief Health, Safety and Security Officer for the Department of Energy, I will ensure that the Office of Health, Safety and Security continues to meet this commitment and that we, together with the consortia, will strengthen this program's implementation using the path forward identified in this report.

Glenn S. Podonsky
Chief Health, Safety and Security Officer
U.S. Department of Energy

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Executive Summary

The U.S. Department of Energy (DOE) Former Worker Medical Surveillance Program, otherwise known as the Former Worker Program (FWP), provides for the conduct of medical screenings for former employees to identify adverse health conditions that may have resulted from working at DOE facilities. Mandated by Congress in the Defense Authorization Act of 1993 (PL 102-484), the FWP conducts preliminary site assessments to identify groups of former at-risk DOE federal and contractor/subcontractor workers and DOE site-specific exposures. It also provides medical screening, including examinations, to check for adverse health effects that could be related to occupational exposures to radiation, noise, beryllium, asbestos, silica, lead, cadmium, chromium, and solvents.

The program, managed by the DOE Office of Health Safety and Security, uses independent health experts through cooperative agreements held by consortia of universities, labor unions, and commercial organizations throughout the United States with expertise in administration of medical programs. Initiated in 1996, the FWP now provides medical screening services at all DOE sites for the more than 600,000 former construction and production workers who were involved in the nuclear weapons program. As of November 2007, over 455,000 former workers have been contacted, and over 51,000 comprehensive medical screening examinations have been provided to those who volunteer to

participate in the program. In addition, follow-up re-screening exams have been provided to over 5,700 former workers.

The approach that DOE has used to establish and implement the FWP has resulted in recognition of the program's credibility by former workers, participating physicians and other medical providers, and other U.S. Government agencies, e.g., the Department of Labor. The program's strengths include the use of the best available, evidenced-based approach to determine possible causality of disease; the involvement of national occupational medicine leaders and use of independent organizations to administer the medical screenings; aggressive and multi-faceted outreach programs; uniformity of protocol and equity of access across DOE sites; and a respect for the confidentiality of former worker medical screening information.

DOE intends to further improve upon the demonstrated strengths of the FWP by enhancing communications; ensuring cost-effectiveness; improving program planning, reporting, and budgeting; and sharing and applying knowledge throughout the FWP to ensure that the best implementation methods are used. DOE will also explore additional ways that the FWP can benefit former workers and will further study the use of computed tomography within the FWP. Finally, DOE plans to thoroughly review the FWP program structure and operation to increase the number of medical screenings conducted within budget constraints.

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The Department of Energy (DOE) Former Worker Medical Surveillance Program, or Former Worker Program (FWP), was mandated by the Defense Authorization Act of 1993 (PL-102-484, Section 3162). The FWP is managed by the Department's Office of Health, Safety and Security (HSS). The FWP applies basic principles and a state-of-the-art methodology of general medical screening tests to a set of occupational health conditions that arise among DOE workers in order to provide early detection of work-related diseases and conditions. This program directly benefits former DOE workers by promoting early identification of health problems and improving the understanding of health risks that former workers may face because of possible workplace exposures during their prior employment with DOE.

Since 1996, DOE has made great strides in addressing the occupational health legacy of its 50 years of nuclear weapons design and production. The Department has successfully demonstrated the feasibility and value of conducting targeted medical screening programs for occupational diseases among DOE workers by using third-party medical experts who provide high-quality services, resulting in high credibility with worker populations. These screening programs have been highly responsive to the directives of Congress and to the needs and concerns of DOE workers.

DOE places a high priority on continuing the work required by the Defense Authorization Act of 1993 to establish and carry out a program for the identification and ongoing medical evaluation of its current and former employees who may be subject to significant health risks from possible exposure to hazardous or radioactive substances. The Department has developed the programmatic and institutional infrastructure to provide initial medical screening to all DOE workers. This infrastructure includes designated regional centers located near major DOE sites, as well as a supplemental program to ensure that all former workers have ready access to screening, regardless of their previous worksite or location. This nationwide, comprehensive system of medical screening, constructed through

considerable effort by DOE in conjunction with universities and other organizations, represents tangible evidence of the Department's commitment to its former workers.

The DOE FWP also plays a vital role in assisting other efforts undertaken by Congress and the Department to address the needs of DOE workers. For example, in 2000, Congress passed the Energy Employees Occupational Illness Compensation Program Act (EEOICPA), administered by the Department of Labor (DOL), to compensate current and former workers for illness and injuries that resulted from their work at DOE facilities. The DOE FWP complements EEOICPA, as it provides DOE workers with medical evaluations conducted by expert occupational medicine physicians and laboratories that provide both claimants and the claims evaluators with defensible information for decision-making about the appropriateness of compensation.

The purpose of this report is to provide an overview of the history, goals, accomplishments, and future direction of the FWP.

1.1 Historical Background

From the earliest days of the Manhattan Project in the 1940s, DOE and its predecessor organizations, the Atomic Energy Commission (AEC) and the Energy Research and Development Administration (ERDA), developed a nuclear weapons arsenal through a nationwide industrial complex working with hazardous materials and processes. The nuclear weapons industry was unlike any other industry: it utilized materials that did not exist in any other industry and, therefore, had no established exposure framework to ensure the long-term health of the personnel working with these materials.

As the Cold War ramped down in the early 1990s, the U.S. Government realized it had a commitment to remediate its nuclear production facilities and address the health risks of the more than 600,000 construction and production former workers who were involved in the nuclear weapons programs.

In order to address the legacy of the Cold War era and to ensure that current and future workers would be provided a higher level of protection, Congress and DOE implemented three major programs: 1) establishing medical screening for former DOE workers; 2) compensating former DOE workers who had developed diseases as a result of working at DOE facilities; and 3) implementing new regulations concerning worker safety to ensure that mistakes of the past were not repeated.

The first of these programs was initiated in 1992, when Congress passed the Defense Authorization Act of 1993. Section 3162 of this Act authorized DOE to:

...establish and carry out a program for the identification and on-going medical evaluation of its current and 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.

The program provides a process to:

- a. Identify the hazardous substances and radioactive substances to which current and former DOE employees may have been exposed as a result of such employment.
- b. Identify employees who received a level of exposure with significant health risks under Federal and State occupational, health, and safety standards.
- c. Determine the appropriate number, scope, and frequency of medical evaluations and laboratory tests to be provided to employees who have received a level of exposure with significant health risks under Federal and State occupational, health, and safety standards to permit the Secretary to evaluate fully the extent, nature, and medical consequences of such exposure.
- d. Make available the evaluations and tests to the employees.
- e. Ensure that privacy is maintained with respect to medical information that personally identifies any such employee.
- f. Ensure that employee participation in the program is voluntary.

The simplicity and common sense conveyed by Section 3162 belied the challenges that DOE faced in bringing this directive to reality. The primary challenges have been: 1) identifying and locating the vast majority of the former workers who had worked within the DOE complex but were no longer employed; 2) overcoming the distrust of former workers who felt that DOE had deceived them about the nature of the risks that they faced; and 3) bringing the needed occupational health expertise to DOE communities, most of which are located in rural areas with few, if any, occupational medicine physicians.

From the start, DOE recognized that a special approach would be needed for some groups but especially for construction workers who had been employed intermittently by subcontractors. The estimated number of such workers was very large—exceeding 600,000. For many of these workers, DOE had no records of employment or even of the employers, and therefore the only way to reach these workers was frequently through the unions where they were members. In addition, exposure records for these employees are likely not to exist or to be incomplete, making it difficult to determine overall exposure levels. Therefore, the screening programs for these workers had to follow a model, in which the first step was a detailed work history interview made specifically for construction work tasks. Interviews were used to establish the kinds of risks to which these workers had been exposed, so that medical exams could be tailored to those risks.

Two pilot projects for construction workers—Hanford and Oak Ridge—were started in 1996 by the Center to Protect Workers' Rights (CPWR) and the University of Cincinnati using identical protocols. In 2005, these two individual projects were merged into one national program which is called The Building Trades National Medical Screening Program. Gradually the protocol was adopted in projects covering other sites.

DOE has forged unique relationships with universities and trade groups throughout the country to administer the FWP protocol. These are shown in the box on the next page. A debt of gratitude is owed to this group for their dedication to this program.

- Boston University School of Public Health
- Drexel University
- Duke University
- Johns Hopkins Bloomberg School of Public Health
- Medical University of South Carolina
- Oak Ridge Associated Universities
- Queens College of the City University of New York
- University of California, San Francisco
- University of Cincinnati
- University of Colorado Health Sciences Center
- University of Iowa College of Public Health
- University of Texas Health Science Center at Tyler
- University of Washington
- Atomic Trades and Labor Council
- Center to Protect Workers' Rights
- Comprehensive Health Services, Occupational HealthLink
- Creative Pollution Solutions, Inc.
- National Jewish Medical and Research Center
- Southern Nevada Building and Construction Trades Council
- United Steel Workers
- Zenith Administrators

1.2 Program Description

The FWP has four interrelated program goals:

1. Identify and contact DOE workers who may have been exposed in the course of DOE employment.
2. Conduct appropriate medical screening of former workers who wish to participate in the program.
3. Provide information and assistance to affected workers in gaining medical care and compensation for work-related illnesses.
4. Use the collected information to implement controls for current operations in order to prevent or reduce negative health effects for current and future employees.

These goals have the dual effect of demonstrating DOE's fulfillment of Congress' mandate and gaining the confidence of its workforce that it is both meeting its obligations to former workers and protecting its current workers from preventable injury and illness.

In designing and conducting the FWP, the Department has purposefully integrated a set of core principles that promote program excellence by:

- Ensuring that the medical aspects of the program are designed and overseen by occupational medicine experts
- Utilizing a broad range of outreach methods to ensure maximum participation of former workers

- Utilizing state-of-the-art medical screening techniques and analyses, when possible
- Ensuring the confidentiality and safeguarding of workers' personal and medical data.

The FWP includes two major components: 1) a needs assessment phase to identify groups of at-risk workers and site-specific exposures of concern; and 2) a medical screening phase, which includes notification of members of the at-risk groups and medical screening examinations for interested individuals. The health conditions that are targeted through a uniform national medical protocol are chronic lung disease and other major organ damage that may be associated with occupational exposures to such hazards as noise, radiation, beryllium, asbestos, silica, welding fumes, lead, cadmium, chromium, and solvents.

In order to initiate efficient and inclusive screening programs, rosters of former employees from site contractors and DOE site offices are obtained. Invitations are sent to employees on the rosters, using the most recently known addresses. When addresses are found to be outdated or inaccurate, supplemental methods are used; these include Internal Revenue Service mailings or address-update services. A second method of reaching out to former DOE workers is through personal contact and program visibility within DOE communities. Building and Construction Trade Councils, construction contractors, and local unions are also involved in identifying potential FWP participants. The labor unions that have been centrally involved in administering FWP employ former workers to contact individuals, attend group meetings (e.g., retiree clubs, Lions Clubs, fairs), contact local media, and publish articles in union newsletters to increase awareness of

the FWP. Newspaper ads and public service radio announcements are also used. These outreach methods have the added benefit of making current workers and families of DOE workers aware of this beneficial activity undertaken by DOE.

The medical screening examinations are comprehensive and include physical examinations, occupational and medical history questionnaires, chest x-rays with interpretation for occupational lung disease (B reading), spirometry, beryllium lymphocyte proliferation tests (BeLPT), blood chemistry tests, urinalyses, and audiometry tests. In addition, at certain sites, workers with a history of additional exposures

have received specialized testing (e.g., bladder cancer testing at Oak Ridge K-25, mercury exposure testing for construction workers at Oak Ridge National Laboratory, silicosis testing at the Nevada Test Site). All individuals sign an informed consent and Health Insurance Portability and Accountability Act (HIPPA) authorization prior to participation.

All medical information that is collected as part of this program is managed as confidential, and all FWP activities are conducted with the approval of the Institutional Review Boards (Human Subjects Committees) of DOE and involved universities.

2.1 Program Strengths

The approach that DOE has used to establish and implement the FWP has resulted in recognition of the program's credibility by former workers, participating physicians and other medical providers, and other U.S. Government agencies, e.g., DOL. The strengths are:

- Use of best available, evidenced-based approach to determine possible occupational causality of disease
- Independence of project consortia
- Aggressive and multi-faceted outreach programs
- Involvement of national leaders in occupational medicine
- Uniformity of protocol and equity of access across DOE sites
- Respect for the confidentiality of former workers' medical screening information.

2.2 Achievement of Stated Goals

1. Identify and contact DOE workers who may have been exposed in the course of DOE employment.

Workers eligible for this program include all former DOE Federal and contractor employees from all facilities. To establish an efficient nationwide medical screening program, DOE entered into cooperative agreements with universities, labor unions, and commercial organizations with expertise in administration of occupational medical programs. Over 450,000 potential FWP participants have been contacted as of November 2007. Table 4.1 illustrates the number of former workers by site that the FWP service providers have attempted to contact.

2. Conduct appropriate medical screening of former workers who wish to participate in the program.

Site and population-specific medical screening was initiated on a pilot basis at 12 sites in 1996-1997 and was gradually expanded to provide medical screening at all DOE sites. The DOE sites, sponsoring organizations, and the year that screening was initiated are provided in Table 4.2. As of November 2007, 51,294 individuals have undergone at least one medical screening examination (Table 4.3). In addition, 5,706 people have undergone re-screening three years after their initial screening and evaluation.

Two important program developments occurred in 2005-2006 to address the special needs of sub-populations of DOE workers. Construction workers throughout the DOE complex are now served by a part of the FWP that is structured to meet the requirements of former workers who have had many different employers, job-related exposures, and unions (more than is typical of full-time workers for DOE prime contractors). Secondly, a supplemental program was created to find and offer medical screening to former workers who have retired to locations distant from their worksites and to workers whose site medical screening programs had been phased out or, in some cases, were never established.

The results of the medical screening conducted thus far are as follows:

- Chest x-ray evidence of occupational lung disease for DOE production, maintenance, and research personnel ranges from 0 to 26 percent. For DOE construction workers, between 17 and 59 percent indicate evidence of occupational lung disease (Table 4.3). Such diseases are principally asbestosis (scarring of the lung and/or pleural tissue) and silicosis, which are both virtually always caused by workplace exposures.
- Approximately 9,599 people, or 21.3 percent of those screened, had evidence of obstructive

airways disease as indicated by spirometry (Table 4.3). Such findings typically indicate chronic obstructive airways disease (or emphysema) and/or asthma. While smoking is the prime cause of chronic obstructive airways disease, occupational exposures to irritants at DOE sites likely contributed to the development of this disorder as well.

- Hearing loss is extremely common among DOE former workers, with 63.3 percent, or 23,426 workers, meeting the definition of noise-induced hearing loss (Table 4.3). Given that the average age of the former worker population screened is 62, hearing impairment in a large percentage of these individuals is most likely a combination of age and noise exposure.
- Beryllium, a light metal that has been heavily used at DOE facilities, sometimes causes sensitivity that may lead to chronic beryllium disease. Table 4.4 illustrates beryllium testing findings.

Between 2000 and 2006, the FWP servicing the gaseous diffusion plants used state-of-the-art computed tomography (CT) scanning to screen 6,220 former and current gaseous diffusion plant workers to detect small, early lung malignancies. In 2006-2007 1,608 former workers from the Y-12 National Security Complex and the Oak Ridge National Laboratory were screened using CT scanning.

While some uncertainty remains about the benefits of CT scan screening to reduce lung cancer mortality, the Department provides this type of screening for participants who meet eligibility requirements in order to gather the data needed to make a final determination as to whether or how this type of testing will be administered within the FWP.

3. Provide information and assistance to affected workers in gaining medical care and compensation for work-related illnesses.

The FWP requires that follow-up activities be conducted when medical screening tests indicate adverse medical findings. Individuals who are found to have adverse medical findings are referred to their personal physicians for follow-up care. They are also informed about the availability of EEOICPA benefits and are referred to DOL resource centers that administer the EEOICPA program. Participants with abnormal beryllium blood test results are urged to avail

themselves of the follow-up diagnostic testing that is funded through the EEOICPA.

4. Use the collected information to implement controls for current operations in order to prevent or reduce negative health effects for current and future employees.

As a result of the FWP, DOE has incorporated significant workplace hazard controls and analysis methods have been enhanced in the areas of maintenance, construction and decontamination and demolition operations.

As a direct result of the data gathered through the FWP, DOE initiated the Chronic Beryllium Disease Prevention Program, codified in Title 10 C.F.R., Part 850, for its current workforce. This program requires DOE sites to inventory and assess beryllium exposure hazards to determine whether employees are at risk for chronic beryllium disease. Sites that identify employees at risk due to ongoing or past work must implement chronic beryllium disease prevention programs that include reporting health and exposure data to the DOE Beryllium-Associated Worker Registry. These sites are required to submit summary data in semi-annual progress reports. Health data are collected through medical surveillance programs for current workers at 20 DOE sites. Exposure data are collected through industrial hygiene programs at 15 sites that had continuing beryllium operations.

2.3 Overall Accomplishments

The program has resulted in a high level of satisfaction among participating former DOE workers. A rating of satisfactory was obtained for no less than 85% of customer satisfaction surveys received from FWP participants who receive medical screening over the past several years, as indicated by records maintained by HSS.

The program has been able to match national occupational medical expertise with local parties throughout the DOE complex. To overcome both the longstanding shortage of occupational medicine expertise in DOE communities and the perceived lack of objectivity of local physicians expressed by some DOE workers, DOE has attracted renowned occupational medicine physicians from across the country to develop and conduct the FWP medical screening program. These physicians worked with local clinical facilities and local labor unions to ensure

highly accessible and appropriate medical screening services and follow-up.

The program has created goodwill among former DOE workers and local DOE communities.

The implementation of the FWP has demonstrated good will and has overcome the distrust of former workers who felt that DOE deceived them concerning the nature of the risks that they faced while working for the Department. The FWP has also instilled a sense of trust in the current workforce. It has resulted

in the identification of pre-cancerous conditions and cancers at early stages, allowing successful treatment and, in some cases, the elimination of the disease, substantially improving the health and well being of many former workers. A valuable added benefit of the medical screenings provided through the FWP is the identification of non-occupational health conditions, such as uncontrolled high blood pressure, diabetes, and highly elevated cholesterol levels.

3.0 Path Forward

The FWP has made significant contributions and provided valuable diagnostic health information to numerous former workers since its inception. To assure that the Department continues to meet its obligation and to learn from conducting the FWP, DOE intends to conduct the following activities:

- 1. Maintain the current features of the FWP.** Maintain the implementation of those elements that account for the program's high degree of success.
- 2. Build on current successes.**
 - a. Improve communication with participants and stakeholders.
 - b. Ensure that the most cost-effective means are used to obtain program results while achieving program goals.
 - c. Enhance FWP planning, reporting, and budgeting processes.
 - d. Share and apply knowledge throughout the FWP to ensure that the best methods for

implementing outreach, notification, medical assessment, and follow-up processes are being used.

- 3. Explore additional ways that the FWP can benefit former DOE workers. For example, consider:**
 - a. Evaluating criteria for re-screening former workers
 - b. Informing current workers as they leave DOE employment that they are eligible for FWP benefits.
- 4. Review the use of CT scanning.** Conduct a review to determine whether and how CT scanning should be administered in the FWP.
- 5. Assess program structure and operation.** Conduct a thorough review of the FWP to identify and implement process changes to improve efficiency of operations and increase the number of medical screenings conducted within budget constraints.

4.0 Tables

Tables 4.1 through 4.4 summarize the detailed results of FWP operations to date.

Table 4.1. Former Workers Contacted

| Site | Former Workers Contacted |
|---|--------------------------|
| Amchitka Island Test Site | 4,010 |
| Ames Laboratory | 7,975 |
| Argonne NL | 458 |
| Brookhaven NL | 8,674 |
| Fermi National Accelerator Laboratory | 13 |
| Fernald (Construction workers) | 2,264 |
| Fernald (Production workers) | 51,219 |
| Hanford Site (Construction workers) | 5,148 |
| Hanford Site (Production workers) | 53,034 |
| Idaho NL (Construction workers) | 56,496 |
| Idaho NL (Production workers) | 42,125 |
| Iowa Army Ammunition Plant | 16,029 |
| Kansas City Plant (Construction workers) | 1,955 |
| Kansas City Plant (Production workers) | 1,820 |
| Lawrence Berkeley NL | 35 |
| Lawrence Livermore NL | 1,334 |
| Los Alamos NL | 34,651 |
| Misc. small sites (Construction workers) | 5,699 |
| Mound (Construction workers) | 4,665 |
| Mound (Production workers) | 13,481 |
| Nevada Test Site | 13,422 |
| Oak Ridge (K-25, Y-12, NL Construction workers) | 2,201 |
| Oak Ridge K-25 (Production workers) | 26,853 |
| Oak Ridge NL (Production workers) | 4,152 |
| Oak Ridge Y-12 (Production workers) | 6,918 |
| Paducah GDP (Construction workers) | 4,808 |
| Paducah GDP (Production workers) | 6,110 |
| Pantex Plant | 3,889 |
| Pinellas Plant (Construction workers) | 1,540 |
| Pinellas Plant (Production workers) | 178 |
| Portsmouth GDP (Construction workers) | 5,140 |
| Portsmouth GDP (Production workers) | 12,909 |
| Princeton Plasma Physics Laboratory | 514 |
| Rocky Flats (Construction workers) | 3,250 |
| Rocky Flats (Production workers) | 15,063 |
| Sandia NL, CA | 34 |
| Sandia NL, NM | 2,035 |
| Savannah River Site (Construction workers) | 4,831 |
| Savannah River Site (Production workers) | 30,713 |
| TOTAL | 455,645 |

Table 4.2. Implementing Organizations

| DOE Site ¹ | Location | Year Screening Initiated | Organization | Key Personnel |
|---------------------------------------|------------|--------------------------|---|---|
| Amchitka Island Test Site | Alaska | 2000 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Ames Laboratory | Iowa | 2006 | University of Iowa College of Public Health | Laurence Fuortes, MD, MS |
| Argonne NL | Illinois | 2005 | Oak Ridge Associated Universities, Comprehensive Health Services, and Occupational HealthLink | Donna Cragle, PhD John McInerney, MD Lee Newman, MD |
| Brookhaven NL (Construction workers) | New York | 2006 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Brookhaven NL (Production workers) | New York | Pending | Queens College of the City University of New York | Steven Markowitz, MD |
| Fermi National Accelerator Laboratory | Illinois | 2005 | Oak Ridge Associated Universities, Comprehensive Health Services, and Occupational HealthLink | Donna Cragle, PhD John McInerney, MD Lee Newman, MD |
| Fernald (Construction workers) | Ohio | 2005 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Fernald (Production workers) | Ohio | 2006 | Queens College of the City University of New York and Atomic Trades & Labor Council | Steven Markowitz, MD Ray Beatty |
| Hanford Site (Construction workers) | Washington | 1998 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Hanford Site (Production workers) | Washington | 1998 | University of Washington | Jordan Firestone, MD, PhD, MPH |
| Idaho NL (Construction workers) | Idaho | 2005 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |

¹ Sites listed are primary sites served, but multiple small sites are also served by CPWR for construction workers and ORAU for production workers.

Table 4.2. Implementing Organizations (continued)

| DOE Site ¹ | Location | Year Screening Initiated | Organization | Key Personnel |
|--|------------|--------------------------|--|---|
| Idaho NL (Production workers) | Idaho | 2000 | United Steel Workers, Queens College of the City University of New York, and Creative Pollution Solutions, Inc. | Jim Frederick Steven Markowitz, MD |
| Iowa Army Ammunition Plant | Iowa | 2002 | University of Iowa College of Public Health | Laurence Fuortes, MD, MS |
| Kansas City Plant (Construction workers) | Missouri | 2005 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Kansas City Plant (Production workers) | Missouri | 2005 | Oak Ridge Associated Universities, Comprehensive Health Services, and Occupational HealthLink | Donna Cragle, PhD John McInerney, MD Lee Newman, MD |
| Lawrence Berkeley NL | California | 2008 | Boston University School of Public Health and University of California, San Francisco | Lewis Pepper, MD, MPH Robert Harrison, MD, MPH |
| Lawrence Livermore NL | California | 2007 | Boston University School of Public Health and University of California, San Francisco | Lewis Pepper, MD, MPH Robert Harrison, MD, MPH |
| Los Alamos NL | New Mexico | 2000 | Johns Hopkins Bloomberg School of Public Health | Brian Schwartz, MD, MS Patrick Breyse, PhD, CIH |
| Mound (Construction workers) | Ohio | 2005 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Mound (Production workers) | Ohio | 2006 | United Steel Workers, Queens College of the City University of New York, Creative Pollution Solutions, Inc. | Jim Frederick Steven Markowitz, MD |
| Nevada Test Site and Other Las Vegas Locations | Nevada | 1997 | Boston University School of Public Health, University of California, San Francisco, and the Southern Nevada Building and Construction Trades Council | Lewis Pepper, MD, MPH Robert Harrison, MD, MPH |
| Oak Ridge K-25 (Production workers) | Tennessee | 1996 | United Steel Workers, Queens College of the City University of New York, Creative Pollution Solutions, Inc. | Jim Frederick Steven Markowitz, MD |

Table 4.2. Implementing Organizations (continued)

| DOE Site ¹ | Location | Year Screening Initiated | Organization | Key Personnel |
|---|------------|--------------------------|---|---|
| Oak Ridge K-25, Y-12 and NL, (Construction workers) | Tennessee | 1999 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Oak Ridge NL (Production workers) | Tennessee | 2005 | Queens College of the City University of New York and Atomic Trades & Labor Council | Steven Markowitz, MD Garry Whitley |
| Oak Ridge Y-12 (Production workers) | Tennessee | 2005 | Queens College of the City University of New York and Atomic Trades & Labor Council | Steven Markowitz, MD Garry Whitley |
| Paducah GDP (Construction workers) | Kentucky | 2004 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Paducah GDP (Production workers) | Kentucky | 1999 | United Steel Workers and Queens College of the City University of New York | Jim Frederick Steven Markowitz, MD |
| Pantex Plant | Texas | 2005 | Drexel University and The University of Texas Health Science Center at Tyler | Arthur Frank, MD, PhD |
| Pinellas Plant (Construction workers) | Florida | 2005 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Pinellas Plant (Production workers) | Florida | 2005 | Oak Ridge Associated Universities, Comprehensive Health Services, and Occupational HealthLink | Donna Cragle, PhD John McInerney, MD Lee Newman, MD |
| Portsmouth GDP (Construction workers) | Ohio | 2004 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Portsmouth GDP (Production workers) | Ohio | 1999 | United Steel Workers, Queens College of the City University of New York, Creative Pollution Solutions, Inc. | Jim Frederick Steven Markowitz, MD |
| Princeton Plasma Physics Laboratory | New Jersey | 2005 | Oak Ridge Associated Universities, Comprehensive Health Services, and Occupational HealthLink | Donna Cragle, PhD John McInerney, MD Lee Newman, MD |

Table 4.2. Implementing Organizations (continued)

| DOE Site ¹ | Location | Year Screening Initiated | Organization | Key Personnel |
|---|----------------|--------------------------|---|---|
| Rocky Flats (Construction workers) | Colorado | 2006 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Rocky Flats (except beryllium and radiation workers) ² | Colorado | 1999 | University of Colorado Health Sciences Center and the National Jewish Medical and Research Center | James Ruttenger, PhD, MD (deceased) |
| Rocky Flats (Production workers – beryllium and radiation) | Colorado | 2005 | Oak Ridge Associated Universities, Comprehensive Health Services, and Occupational HealthLink | Donna Cragle, PhD John McInerney, MD Lee Newman, MD |
| Sandia NL | California | 2007 | Boston University School of Public Health and University of California San Francisco | Lewis Pepper, MD, MPH Robert Harrison, MD, MPH |
| Sandia NL | New Mexico | 2006 | Johns Hopkins Bloomberg School of Public Health | Maureen Cadorette, PhD Patrick Breyse, PhD, CIH |
| Savannah River Site (Construction workers) | South Carolina | 1999 | Center to Protect Workers' Rights, University of Cincinnati, Duke University, and Zenith Administrators | Knut Ringen, DrPH, MHA, MPH |
| Savannah River Site (Production workers) | South Carolina | 1999 | Medical University of South Carolina | David Hoel, PhD |

² This cohort was transferred to ORAU in 2006.

Table 4.3. Health Findings

| DOE Site ¹ | Total Participants | Spirometry | | | Audiograms | | |
|--|--------------------|--------------------|---|------|------------------|-----------------------|------|
| | | Tested | Obstructive Airways Disease Detected ² | | Tested | Hearing Loss Detected | |
| | | | (No.) | (%) | | (No.) | (%) |
| Amchitka Island Test Site | 1,340 | 1,261 | 199 | 15.8 | 993 | 631 | 63.5 |
| Ames Laboratory | 358 | 346 | 93 | 26.9 | N/A ³ | | |
| Brookhaven NL (Construction workers) | 314 | 250 | 30 | 12.0 | 249 | 129 | 51.8 |
| Fernald (Construction workers) | 926 | 827 | 201 | 24.3 | 814 | 319 | 39.2 |
| Fernald (Production workers) | 550 | 414 | 50 | 12.1 | 424 | 118 | 27.8 |
| Hanford Site (Construction workers) | 3,055 | 2,446 | 674 | 27.6 | 1,410 | 933 | 66.2 |
| Hanford Site (Production workers) ⁴ | 3,037 | 3,548 | 531 | 15.0 | 2,057 | 1,030 | 50.1 |
| Idaho NL (Construction workers) | 374 | 282 | 84 | 29.8 | 251 | 148 | 59.0 |
| Idaho NL (Production workers) | 4,584 | 3,181 | 583 | 18.3 | 3,010 | 2,054 | 68.2 |
| Iowa Army Ammunition Plant | 982 | 976 | 425 | 43.5 | 87 | 75 | 86.2 |
| Kansas City Plant (Construction workers) | 289 | 250 | 45 | 18.0 | 236 | 120 | 50.8 |
| Kansas City Plant (Production workers) | 1,562 | 1,526 | 330 | 21.6 | 1,524 | 686 | 45.0 |
| Los Alamos NL | 2,409 | 1,447 ⁵ | 89 | 6.2 | 2,067 | 1,197 | 57.9 |
| Mound (Construction workers) | 219 | 206 | 57 | 27.7 | 196 | 104 | 53.1 |
| Mound (Production workers) | 791 | 656 | 154 | 23.5 | 672 | 326 | 48.5 |
| Nevada Test Site and Other Las Vegas Locations | 3,792 | 3,792 | 1,233 | 32.5 | 3,412 | 2,798 | 82.0 |

1 Data not included for projects where the number of individuals screened to date is less than 100.

2 Using CARET (1997) criteria; obstructive=FVC > 95% CI of predicted, and FEV1 /FVC < 95% CI of predicted. In addition, people with a mixed obstructive and restrictive pattern (FVC < 95% CI of predicted, and FEV1 /FVC < 95% CI of predicted) are included.

3 This project has not provided audiograms, to date.

4 This cohort transferred to ORAU the end of 2007.

5 This project does not use the CARET criteria at this time. The numbers include former workers with a FVC < 80% based on Knudson Prediction Equations.

Table 4.3. Health Findings (continued)

| DOE Site ¹ | Total Participants | Spirometry | | | Audiograms | | |
|--|--------------------|------------------|---|------|------------------|-----------------------|------|
| | | Tested | Obstructive Airways Disease Detected ² | | Tested | Hearing Loss Detected | |
| | | | (No.) | (%) | | (No.) | (%) |
| Oak Ridge K-25 (Production workers) | 4,728 | 4,042 | 834 | 20.6 | 3,713 | 2,562 | 69.0 |
| Oak Ridge NL (Production workers) | 686 | 607 | 142 | 23.4 | 606 | 391 | 64.5 |
| Oak Ridge Reservation (Construction workers) ⁶ | 2,143 | 2,032 | 443 | 21.8 | 1,572 | 1,074 | 68.3 |
| Oak Ridge Y-12 (Production workers) | 1,706 | 1,532 | 375 | 24.5 | 531 | 987 | 64.5 |
| Paducah Gaseous Diffusion Plant (Production workers) | 2,835 | 2,736 | 436 | 15.9 | 2,727 | 2,223 | 81.5 |
| Paducah GDP (Construction workers) | 650 | 571 | 172 | 30.1 | 530 | 386 | 72.8 |
| Pantex Plant | 455 | 428 | 110 | 25.7 | N/A ⁷ | | |
| Pinellas Plant (Production workers) | 154 | 146 | 47 | 32.2 | 148 | 45 | 30.4 |
| Portsmouth GDP (Construction workers) | 678 | 591 | 137 | 23.2 | 576 | 389 | 67.5 |
| Portsmouth GDP (Production workers) | 3,275 | 3,216 | 667 | 20.7 | 3,178 | 1,882 | 59.2 |
| Rocky Flats (Construction workers) | 293 | 232 | 91 | 39.2 | 222 | 129 | 58.1 |
| Rocky Flats (except beryllium and radiation workers) | 1,303 | 1,548 | 460 | 29.7 | N/A ⁸ | | |
| Rocky Flats (Production workers – beryllium and radiation) | 580 | 558 | 146 | 26.2 | 544 | 267 | 49.1 |
| Sandia NL (NM only) | 161 | 122 ⁷ | 6 | 4.9 | 134 | 62 | 46.3 |
| Savannah River Site (Construction workers) | 3,355 | 3,180 | 612 | 19.2 | 2,735 | 1,324 | 48.4 |
| Savannah River Site (Production workers) | 3,555 | 1,331 | 143 | 10.7 | 1,376 | 1,037 | 75.4 |

6 Findings not broken out by specific Oak Ridge facility for the construction project.

7 This project does not provide audiograms.

8 This project did not provide audiograms.

**Table 4.4. Beryllium Lymphocyte Proliferation
Test Results (through November 2007)**

| DOE Site ¹ | People who Received ≥1 Blood Test | People with 1+ positive test (No. (%)) |
|---|--------------------------------------|--|
| Ames Laboratory | 322 | 13 (4.0%) |
| Argonne NL | 64 | 2 (3.1%) |
| Brookhaven NL (Construction workers) | 290 | 18 (6.2%) |
| Fernald (Construction workers) | 900 | 13 (1.4%) |
| Fernald (Production workers) | 303 | 2 (0.7%) |
| Hanford Site (Construction workers) | 2,057 | 56 (2.7%) |
| Hanford Site (Production workers) | 2,398 | 84 (3.5%) |
| Idaho NL (Construction workers) | 321 | 7 (2.2%) |
| Idaho NL (Production workers) | 3,337 | 74 (2.2%) |
| Iowa Army Ammunition Plant | 942 | 34 (3.6%) |
| Kansas City Plant (Construction workers) | 276 | 12 (4.3%) |
| Kansas City Plant (Production workers) | 1,455 | 26 (1.8%) |
| Los Alamos NL | 2,297 | 64 (2.8%) |
| Mound (Construction workers) | 213 | 1 (0.5%) |
| Mound (Production workers) | 659 | 20 (3.0%) |
| Nevada Test Site and Other Las Vegas Locations | 2,035 | 45 (2.2%) |
| Oak Ridge K-25 (Production workers) | 4,125 | 205 (5.0%) |
| Oak Ridge NL (Production workers) | 616 | 23 (3.7%) |
| Oak Ridge Reservation (Construction workers) ² | 1,952 | 35 (1.8%) |
| Oak Ridge Y-12 (Production workers) | 1,558 | 82 (5.3%) |
| Paducah GDP (Construction workers) | 605 | 20 (3.3%) |
| Paducah GDP (Production workers) | 2,368 | 68 (2.9%) |
| Pantex Plant | 419 | 5 (1.2%) |
| Pinellas Plant (Production workers) | 139 | 2 (1.4%) |
| Portsmouth GDP (Construction workers) | 616 | 15 (2.4%) |
| Portsmouth GDP (Production workers) | 3,035 | 40 (1.3%) |
| Rocky Flats (Construction workers) | 287 | 3 (1.0%) |
| Rocky Flats (Production workers) | 543 | 12 (2.2%) |
| Sandia NL - NM | 129 | 5 (3.9%) |
| Savannah River Site (Construction workers) | 2,720 | 51 (1.9%) |
| Savannah River Site (Production workers) | 973 | 36 (3.7%) |

The sites addressed by the DOE FWP are briefly described below, along with activities and results to date.

- 1 Data not included for projects where the number of individuals screened to date is less than 100.
- 2 Findings not broken out by specific Oak Ridge facility for the construction project.

APPENDIX

INDIVIDUAL SITE PROJECT DESCRIPTIONS

Amchitka Island Test Site

Amchitka Island Test Site, located in the western Aleutian Islands, Alaska, was established in 1913 as a national wildlife refuge. In 1964, the AEC designated Amchitka as a nuclear testing facility. In 1965, 1969, and 1971, three large underground nuclear detonations were performed at Amchitka. The facility was closed in 1994 to undergo restoration and remediation of its radioactive, chemical, and hazardous waste.

The Building Trades National Medical Screening Program has screened former construction workers from Amchitka beginning in 2000. The project is being conducted by the Center to Protect Workers' Rights, an applied occupational health research and development center of the Building and Construction Trades Department of the AFL-CIO, in partnership with Duke University Medical Center and Zenith Administrators. To date, 1,340 workers have been screened. Results of the screening indicate 631 former workers show signs of hearing loss; 199 with obstructive airways disease, and 1 with abnormal BeLPT.

Ames Laboratory

The Ames Laboratory (Ames) is located in Ames, Iowa, on the Iowa State University (ISU) campus and was established in 1947 as an AEC research facility. ISU scientists initiated chemical research in 1942 following the U.S. government's request in 1939 for leading scientists to join in a consolidated national effort to develop atomic energy. Ames developed the most efficient process for producing high-purity uranium metal in large quantities for nuclear reactor purposes for the Manhattan Project during World War II. Throughout this time, Ames produced more than 2 million pounds (1,000 tons) of uranium, some of which is still in use today. Ames presently conducts a broad range of applied research in the chemical, materials, engineering, environmental, mathematical, and physical sciences under a variety of Federal contracts.

Medical monitoring of Ames former workers began in 2006 and is being conducted by the University of Iowa College of Public Health. To date, 358 workers

have been screened. The results indicate 93 former workers with obstructive airways disease and 13 with abnormal BeLPT. Audiograms are not provided for this site.

Argonne National Laboratory

Argonne National Laboratory (ANL) was the first national laboratory; it was chartered in 1946. ANL began as the University of Chicago's Metallurgical Laboratory, part of the Manhattan Project. It was at the Metallurgical Laboratory on December 2, 1942, that Enrico Fermi and his colleagues created the world's first controlled nuclear chain reaction in a racquets court at the University of Chicago. After the war, ANL was given the mission of developing nuclear reactors for peaceful purposes. Over the years, ANL's research expanded to include many other areas of science, engineering and technology.

Workers have been screened since 2005 by Oak Ridge Associated Universities in partnership with Comprehensive Health Services, and Occupational HealthLink. To date, 88 former workers have participated in the program. Results indicate 50 former workers with hearing loss; 26 with obstructive airways disease; and 2 with abnormal BeLPT.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is located in Upton, New York, on Long Island. The Brookhaven site, formerly Camp Upton army base during World War I and II, was established as a national laboratory to conduct atomic energy research in 1947. Over the years, BNL created three nuclear reactors. In the 1950s, BNL created the Cosmotron, a particle-physics accelerator that eventually led the laboratory to its first Nobel Prize in 1957. Later, the Alternating Gradient Synchrotron was built, leading to the award of additional Nobel Prizes. Presently, BNL conducts basic and applied research and is currently operated by Brookhaven Science Associates. They are also involved in the design, construction, and operation of large research facilities including particle accelerators, nuclear reactors, and synchrotron storage rings.

FWP activities at BNL will begin to screen former production workers in 2008. This project will be conducted by Queens College of the City University of New York and Creative Pollution Solutions, Inc.

The Building Trades National Medical Screening Program began screening former construction workers in 2006. This program is being conducted by the Center to Protect Workers' Rights, the University of Cincinnati, Duke University, and Zenith Administrators. To date, 314 former workers have been screened. Results indicate 129 former workers with hearing loss; 30 with obstructive airways disease; and 18 with abnormal BeLPT.

Fermi National Accelerator Laboratory

Fermi National Accelerator Laboratory (Fermilab) began in 1967 and was originally called the National Accelerator Laboratory. It was renamed in 1974 in honor of the 1938 Nobel Prize winner Enrico Fermi, one of the preeminent physicists of the atomic age. Scientists at Fermilab carry out research in high-energy physics.

Workers have been screened since 2005 by Oak Ridge Associated Universities in partnership with Comprehensive Health Services, and Occupational HealthLink. To date, 10 workers have been screened. Results indicate 8 former workers with hearing loss; 1 with obstructive airways disease; and none with abnormal BeLPT.

Fernald

The Fernald facility, now the Fernald Closure Project, is a former uranium processing plant located in Fernald, Ohio. Fernald was established in 1951 to produce high-purity uranium, including slightly enriched and depleted uranium. Smaller amounts of thorium metal also were produced. From 1953 to 1989, Fernald produced these uranium metals and ceased production in 1989. Fernald is currently undergoing environmental restoration.

FWP screening for production workers at Fernald began in 2006 and is conducted by a group led by the Queens College of the City University of New York with the Atomic Trade & Labor Council of Fernald and Creative Pollution Solutions, Inc. To date, 550 former workers have been screened. Results indicate 118

former workers with hearing loss; 50 with obstructive airways disease; and 2 with abnormal BeLPT.

The Building Trades National Medical Screening Program began in 2005 to screen former construction workers. The project is conducted by a consortium led by the Center to Protect Workers' Rights, an applied occupational health research and development center of the Building and Construction Trades Department of the AFL-CIO, in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators. To date, 926 former workers have been screened. Results indicate 319 former workers with hearing loss; 201 with obstructive airways disease; and 13 with abnormal BeLPT.

Hanford Site

The Hanford Site (Hanford), located in Benton County, Washington, covers 586 square miles. It was established in 1943 as part of the Manhattan Project to create plutonium for nuclear weapons production. Between 1943 and 1963, nine plutonium production reactors, five chemical processing plants and various support facilities were constructed and operated. In 1987, the last remaining defense production reactor was shut down. Hanford is currently undergoing environmental remediation.

The Former Hanford Production Worker Medical Monitoring Program began in 1998 and is being conducted by the University of Washington. To date, 3,037 workers have been screened. Results indicate 1,030 former workers with hearing loss; 531 with obstructive airways disease; 84 with abnormal BeLPT.

The Building Trades National Medical Screening Program began in 1998. The project is being conducted by a consortium led by the Center to Protect Workers' Rights, an applied occupational health research and development center of the Building and Construction Trades Department of the AFL-CIO, in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators. To date, 3,055 workers have been screened. Results indicate 933 former workers with hearing loss; 674 with obstructive airways disease; and 56 with abnormal BeLPT.

Idaho National Laboratory

The Idaho National Laboratory (INL), formerly Idaho National Engineering and Environmental Laboratory, is located on a 890 square mile area of the former Naval Proving Grounds in Idaho Falls, Idaho. INL was established in 1949 as the National Reactor Testing Station for the AEC to build, test, and operate various types of nuclear reactors, allied plants, and other related equipment. For many years, INL had the highest concentration of nuclear reactors in the world. Since its inception, 52 nuclear reactors have been built including the U.S. Navy's first prototype nuclear propulsion plant. It is estimated that since inception, a total of approximately 105,000 workers have been employed at INL. The facility is currently undergoing remediation efforts.

FWP screening of production workers at INL began in 2000 and is led by the United Steel, Paper and Forestry, Rubber Manufacturing, Energy, Allied Industrial and Service Workers International Union; with Queens College of the City University of New York and Creative Pollution Solutions, Inc. To date, 4,584 former workers have participated in the program. Results indicate 2,054 former workers with hearing loss; 583 with obstructive airways disease; and 74 with abnormal BeLPT.

The Building Trades National Medical Screening Program for former construction workers began in 2005. The program is being conducted by a consortium led by the Center to Protect Workers' Rights, an applied occupational health research and development center of the Building and Construction Trades Department of the AFL-CIO, and in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators. To date, 374 former workers have participated in the program. Results indicate 148 former workers with hearing loss; 84 with obstructive airways disease; and 7 with abnormal BeLPT.

Iowa Army Ammunition Plant

The Iowa Army Ammunition Plant (IAAP) is located in Middletown, Iowa, and was established in 1941. Its principal mission was to load, assemble, and pack a variety of conventional ammunitions and fusing systems for the U.S. Department of Defense (the Division A portion of the Plant). However, between 1947 and 1975, nuclear weapons were assembled,

disassembled, modified, and tested at the IAAP for the AEC/DOE on what was known as Line 1/Division B/Burlington Atomic Energy Commission Plant (BAECP). In 1975, the nuclear weapons operations (Line 1/Division B) were shut down and transferred to the Pantex Plant in Amarillo, Texas. The IAAP continues to produce conventional weapons and is also currently involved in various remediation efforts, as the facility was placed on the Superfund National Priorities List in 1990.

Medical monitoring of BAECP former workers began in 2002 and is conducted by the University of Iowa College of Public Health. Medical screenings are for individuals who worked for the AEC in atomic weapons manufacturing on Line 1/Division B anytime between 1947 and 1975. To date, 990 former workers have been screened. Results indicate 75 former workers with hearing loss; 425 with obstructive airways disease; and 34 with abnormal BeLPT.

Kansas City Plant

The Kansas City Plant (KCP) is located in Kansas City, Missouri, and was established in 1949 to build non-nuclear components for nuclear weapons for the AEC. Honeywell operates the plant. Kansas City's current mission is to procure non-nuclear electric, electronic, electromechanical, mechanical, plastic, and non-fissionable metal components. The plant is also involved in environmental remediation efforts.

Production workers have been screened since 2005 by Oak Ridge Associated Universities in partnership with Comprehensive Health Services, and Occupational HealthLink. To date, 1,562 former workers have participated in the program. Results indicate 686 former workers with hearing loss; 330 with obstructive airways disease; and 26 with abnormal BeLPT.

Building Trades National Medical Screening Program at the KCP is conducted by a consortium led by the Center to Protect Workers' Rights, an applied occupational health research and development center of the Building and Construction Trades Department of the AFL-CIO, in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators. Screening began in 2005. To date, 289 former workers have participated in the program. Results indicate 120 former workers with hearing loss; 45 with obstructive airways disease; and 12 with abnormal BeLPT.

Lawrence Berkeley National Laboratory

The Lawrence Berkeley National Laboratory (LBNL), formerly the Radiation Laboratory in Berkeley, is located in Berkeley, California, on a 200-acre site adjacent to the University of California Berkeley campus. The facility was founded in 1931 by Ernest O. Lawrence as a site for physics research on the cyclotron, a circular particle accelerator. LBNL was involved in production of fissionable bomb material such as plutonium. The lab was also involved with nuclear medicine research. After World War II, the laboratory transitioned to basic research. Currently, LBNL conducts unclassified research across a wide range of scientific disciplines including chemical and earth sciences, materials sciences, life sciences, human genome, structural biology, accelerator and fusion research, and nuclear science and physics.

FWP activities at LBNL began in 2008 and are being conducted by Boston University School of Public Health and the University of California at San Francisco. This program is in the assessment phase.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL), located in Livermore, California, was established in 1952 as a nuclear weapons design laboratory. LLNL has worked alongside the Los Alamos National Laboratory to design nuclear weapons. More recently, LLNL was involved more in stockpile stewardship. The facility is part of the National Nuclear Security Administration (NNSA) and is managed by the University of California.

FWP activities at the LLNL began in 2007 and are being conducted by Boston University School of Public Health and the University of California at San Francisco. To date, 246 former workers have been screened. Results indicate 44 former workers with hearing loss; 33 with obstructive airways disease; and 5 with 1 or more abnormal BeLPT.

Los Alamos National Laboratory

The Los Alamos National Laboratory (LANL) is located in Los Alamos, New Mexico, and was founded in 1943 to build an atomic bomb. LANL was originally a secret Manhattan Project research laboratory and

was involved in nuclear weapons design. The work of the laboratory culminated in the creation of three atomic bombs, including those that were dropped on Hiroshima and Nagasaki, Japan. LANL also created the first hydrogen bomb. LANL is one of the largest multidisciplinary science institutions in the world and was operated by the University of California (UC) from 1943 until 2005, when UC lost the contract to Los Alamos National Security, LLC (LANS). LANS is a private, limited liability company formed between UC, Bechtel, BWX Technologies, and the Washington Group International. Currently, the Los Alamos mission is the safety, security, and reliability of the U.S. nuclear deterrent.

The FWP has screened LANL former workers employed from 1943 to the present. Screening for this program, conducted by the Johns Hopkins Bloomberg School of Public Health, began in 2000. To date, 2,409 former workers have been screened. Results indicate 1,197 former workers with hearing loss; 89 with obstructive airways disease; and 64 with abnormal BeLPT.

Mound

The Mound facility, now known as the Miamisburg Closure Project, is located in Miamisburg, Ohio, and was established in 1947 to produce detonation devices for nuclear weapons. Mound was also involved in nuclear fuels and isotope separation research. Later missions included process development, production engineering, manufacturing and surveillance of detonators, explosive timers, transducers, firing sets, explosive pellets, components, and specific test equipment. The site is currently in the process of decontamination and remediation.

FWP activities for production workers began at Mound in 2006. The project is conducted by a group led by the United Steel, Paper and Forestry, Rubber Manufacturing, Energy, Allied Industrial and Service Workers International Union, with Queens College of the City University of New York and Creative Pollution Solutions, Inc. To date, 791 former workers have been screened. Results indicate 326 former workers with hearing loss; 154 with obstructive airways disease; and 20 with abnormal BeLPT.

Building Trades National Medical Screening Program for former Mound construction workers began in 2005. The project is conducted by a consortium led by the Center to Protect Workers' Rights, an applied occupational health research and development center

of the Building and Construction Trades Department of the AFL-CIO, in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators. To date, 219 former workers have been screened. Results indicate 104 former workers with hearing loss; 57 with obstructive airways disease; and 1 with abnormal BeLPT.

Nevada Test Site

The Nevada Test Site (NTS) is located on former proving grounds in southern Nevada and was established in 1951 for nuclear weapons testing. From 1951-1992, NTS was the primary location for nuclear testing. During this time, 928 nuclear tests were conducted, including 100 atmospheric tests between 1951 and 1958. After 1961, most tests took place in shafts, drill holes, and underground tunnels that were mined, drilled, and constructed for this purpose. From 1961 to 1992, more than 800 tests were conducted, mostly above ground.

FWP activities began at NTS in 1998. The project is being conducted by investigators from Boston University School of Public Health, the University of California at San Francisco, and the Southern Nevada Building and Construction Trades Council. To date, 3,792 former workers have been screened. Results indicate 2,798 former workers with hearing loss; 1,233 with obstructive airways disease; and 45 with abnormal BeLPT.

Oak Ridge K-25 Gaseous Diffusion Plant

Oak Ridge K-25 Gaseous Diffusion Plant, (K-25) located in Oak Ridge, Tennessee, was established as part of the Manhattan Project during World War II to supply enriched uranium for nuclear weapons production. Until 1964, the site was used primarily for the production of highly enriched uranium for nuclear weapons and was also involved in the large-scale separation of uranium-235. The site was also involved in production of uranium to generate electric power. From 1959-1969, K-25 began producing more commercial-grade, low-enrichment uranium. Currently, the site is undergoing remediation and is involved in waste management activities.

FWP activities for production workers began at K-25 in 1996. This project is conducted by a group led by the United Steel, Paper and Forestry, Rubber Manufacturing, Energy, Allied Industrial and Service

Workers International Union, with Queens College of the City University of New York and Creative Pollution Solutions, Inc. To date, 4,728 former workers have been screened. Results indicate 2,562 former workers with hearing loss; 834 with obstructive airways disease; and 205 with abnormal BeLPT. Lung cancer screening detected 19 lung cancers, 79% at an early stage.

See results below for the Building Trades National Medical Screening Program at the Oak Ridge Reservation for information regarding the former construction worker project at K-25.

Oak Ridge National Laboratory and Y-12 National Security Complex

The Oak Ridge National Laboratory (ORNL) and the Y-12 National Security Complex (Y-12) were established as part of the Manhattan Project in 1943. ORNL was established to pioneer a method for producing and separating plutonium. During the 1950s and 1960s, ORNL was an international center for the study of nuclear energy and related research in the physical and life sciences. ORNL also performs other work for DOE, including isotope production, information management, and technical program management, and provides research and technical assistance to other organizations. Y-12's primary mission was the separation of uranium-235 from natural uranium by the electromagnetic separation process. Y-12 remains active in the nuclear weapons program including the receipt, storage, and protection of uranium and lithium materials and parts.

FWP activities for production workers began at ORNL and Y-12 in 2005. This project is conducted by investigators from the Queens College of the City University of New York and the Atomic Trades & Labor Council. To date, 2,392 former workers have been screened. Results indicate 1,378 former workers with hearing loss; 517 with obstructive airways disease; and 105 with abnormal BeLPT.

Oak Ridge Reservation (K-25, Y-12 and ORNL)

The Oak Ridge Building Trades Medical Screening Program began in 1999 and is led by the University of Cincinnati along with the Center to Protect Workers' Rights, Duke University, and Zenith Administrators. To date, 2,143 former workers have been screened. Results indicate 1,074 former workers with hearing

loss; 443 with obstructive airways disease; and 35 with abnormal BeLPT.

Paducah Gaseous Diffusion Plant

The Paducah Gaseous Diffusion Plant (Paducah) is located in Paducah, Kentucky. Paducah was established in 1952 to create enriched uranium to fuel military reactors and produce nuclear weapons. In the 1960s, the plant switched from its military focus and began supplying enriched uranium to electric utilities operating nuclear power plants. It is currently operated and leased by the United States Enrichment Corporation and is the only operating uranium enrichment facility in the U.S.

FWP activities for former production workers at Paducah began in 1999. The project is being conducted by a group led by the United Steel, Paper and Forestry, Rubber Manufacturing, Energy, Allied Industrial and Service Workers International Union, with Queens College of the City University of New York and Creative Pollution Solutions, Inc. To date, 2,835 former workers have been screened. Results indicate 2,223 former workers with hearing loss; 436 with obstructive airways disease; and 68 with abnormal BeLPT. Lung cancer results include 8 lung cancers detected, 88% at an early stage.

The Oak Ridge Building Trades Medical Screening Program led by the University of Cincinnati along with the Center to Protect Workers' Rights, Duke University, and Zenith Administrators was extended in 2003 to include construction workers at the Paducah Gaseous Diffusion Plant. This program was incorporated into the Building Trades National Medical Screening program led by the Center to Protect Workers' Rights in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators in 2006. To date, 650 former workers have been screened. Results indicate 386 former workers with hearing loss; 172 with obstructive airways disease; and 20 with abnormal BeLPT.

Pantex Plant

In 1942, the U.S. Army constructed the original Pantex Ordnance Plant on 16,000 acres, located 17 miles northeast of Amarillo, Texas, in Carson County. In 1951, Pantex was reopened and refurbished for nuclear weapons, high explosive and non-nuclear component assembly operations. By 1960, Pantex Plant had taken on a new high explosives development

mission in support of Lawrence Livermore National Laboratory. Between 1965 and 1975, the Atomic Energy Commission moved various weapons modification, assembly and high explosives missions to the Plant from other facilities around the country. Today, Pantex Plant is charged with maintaining the safety, security and reliability of the nation's nuclear weapons stockpile. The facility is managed and operated by BWXT Pantex for the U.S. Department of Energy/National Nuclear Security Administration. Work performed at Pantex includes support of the life extension programs, weapon dismantlement, the development, testing and fabrication of high explosive components and interim storage and surveillance of plutonium pits.

FWP activities began at Pantex in 2005 and are being conducted by investigators from Drexel University and The University of Texas Health Science Center at Tyler. To date, 455 former workers have been screened. Results indicate 110 former workers with obstructive airways disease; and 5 with abnormal BeLPT. Audiograms are not provided at this site.

Pinellas Plant

The Pinellas Plant (Pinellas), located in Largo, Florida, was established in 1957 to develop and produce neutron generators for the production of bombs and nuclear weapons. Pinellas has been involved in the design, development, and manufacture of special electronic and mechanical nuclear weapons components, such as neutron-generating devices, neutron detectors, and associated product testers. In 1994, Pinellas stopped producing nuclear weapons components and is no longer involved in defense-related work.

Production workers have been screened since 2005 by Oak Ridge Associated Universities in partnership with Comprehensive Health Services, and Occupational HealthLink. To date, 154 former workers have participated in the program. Results indicate 45 former workers with hearing loss; 47 with obstructive airways disease; and 2 with abnormal BeLPT.

The Building Trades National Medical Screening Program for Pinellas Construction Workers began in 2005. The project is being conducted by a group led by the Center to Protect Workers' Rights, an applied occupational health research and development center of the Building and Construction Trades Department of the AFL-CIO, in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators. To date, 35 former

workers have been screened. Results indicate 14 former workers with hearing loss; 2 with obstructive airways disease; and none with abnormal BeLPT.

Portsmouth Gaseous Diffusion Plant

The Portsmouth Gaseous Diffusion Plant (Portsmouth) is located in Piketon, Ohio, and was created in 1954 to produce highly enriched uranium to fuel military reactions and weapons. The plant also worked with its sister plant in Paducah, Kentucky, to produce low-enriched uranium to fuel commercial nuclear power plants. Portsmouth ceased uranium enrichment operations in 2001. Portsmouth is leased and operated by the United States Enrichment Corporation and is currently involved in restoration and waste management activities.

FWP activities for production workers began at Portsmouth in 1999. This project is conducted by a group led by the United Steel, Paper and Forestry, Rubber Manufacturing, Energy, Allied Industrial and Service Workers International Union, with Queens College of the City University of New York and Creative Pollution Solutions, Inc. To date, 3,275 former workers have been screened. Results indicate 1,882 former workers with hearing loss; 667 with obstructive airways disease; and 40 with abnormal BeLPT. Lung cancer screening results indicate 18 lung cancers detected, 78% at an early stage.

The Oak Ridge Building Trades Medical Screening Program led by the University of Cincinnati along with the Center to Protect Workers' Rights, Duke University, and Zenith Administrators was extended in 2003 to include construction workers at the Portsmouth Gaseous Diffusion Plant. This program was incorporated into the Building Trades National Medical Screening Program led by the Center to Protect Workers' Rights in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators in 2006. To date, 678 former workers have been screened. Results indicate 389 former workers with hearing loss; 137 with obstructive airways disease; and 15 with abnormal BeLPT.

Princeton Plasma Physics Laboratory

Princeton Plasma Physics Laboratory is a collaborative national center for plasma and fusion

science. Its primary mission is to develop the scientific understanding and the key innovations which will lead to an attractive fusion energy source. Associated missions include conducting world-class research along the broad frontier of plasma science and technology, and providing the highest quality of scientific education.

Former workers have been screened since 2005 by Oak Ridge Associated Universities in partnership with Comprehensive Health Services, and Occupational HealthLink. To date, 41 former workers have been screened. Results indicate 9 former workers with hearing loss; 6 with obstructive airways disease; and none with abnormal BeLPT.

Rocky Flats Environmental Technology Site

The Rocky Flats Environmental Technology Site (Rocky Flats), formerly a nuclear weapons facility, is located in Golden, Colorado, 16 miles from Denver. Rocky Flats made components for nuclear weapons using various radioactive and hazardous materials, including plutonium, uranium, and beryllium. Rocky Flats is designated as a Superfund remediation site. Currently, Rocky Flats is a DOE environmental remediation and closure project that is operated by the Kaiser-Hill Company.

FWP activities (excluding beryllium and radiation workers) began at Rocky Flats in 1999. The project was conducted by investigators from the University of Colorado Health Sciences Center and the National Jewish Medical and Research Center. Rocky Flats screened workers at risk from asbestos and non-radiation (other than beryllium) hazards. To date, 1,303 former workers have been screened. Results indicate 460 with obstructive airways disease. Audiograms or BeLPTs were not provided at this site.

Beginning in 2005, production workers were screened by Oak Ridge Associated Universities in partnership with Comprehensive Health Services, and Occupational HealthLink. To date, 580 former workers have participated in the program. Results indicate 267 former workers with hearing loss; 146 with obstructive airways disease; and 12 with abnormal BeLPT.

Building Trades National Medical Screening Program for the Rocky Flats construction workers began in 2006. This project is led by the Center to protect Workers' Rights along with the University of Cincinnati, Duke University, and Zenith Administrators. To date, 293 former workers have been screened.

Results indicate 129 former workers with hearing loss; 91 with obstructive airways disease; and 3 with abnormal BeLPT.

Sandia National Laboratories (NM and CA)

SNL has two primary facilities, the New Mexico site (SNL-NM) and the California site (SNL-CA). Sandia National Laboratories (SNL) began in 1945 on Sandia Base in Albuquerque, New Mexico. SNL was originally Z Division, a part of the Manhattan Project in what has evolved into the Los Alamos National Laboratory. The mission of SNL at that time was ordnance design, testing, and assembly. The site is located on the Kirtland Air Force Base in Albuquerque, New Mexico. In 1949, at the request of President Truman, the American Telephone and Telegraph Company (AT&T) took over the management of the site and continued to do so for 44 years. The SNL-CA site in Livermore, California, was established in 1956. SNL provides engineering design for all non-nuclear components of nuclear weapons and national security research and development. Lockheed Martin Corporation has managed SNL since October 1, 1993.

FWP activities began at SNL-NM in 2006 and are being carried out by Johns Hopkins Bloomberg School of Public Health. To date, 161 former workers have been screened. Results indicate 62 former workers with hearing loss; 6 with obstructive airways disease; and 5 with abnormal BeLPT.

FWP activities began at SNL-CA in 2007 and are being conducted by Boston University School of Public Health and the University of California at San Francisco. To date, 11 former workers have been screened. Results indicate no former workers with hearing loss; 1 with obstructive airways disease; and none with abnormal BeLPT.

Savannah River Site

The Savannah River Site (SRS) is located on a 310 square-mile area near Aiken, South Carolina, along the Savannah River. SRS was built in the early 1950s to create tritium and plutonium-239 for the production of nuclear materials. The original site had five nuclear reactors, two chemical-separation facilities, a heavy water extraction plant, a nuclear fuel and target fabrication plant, and support and waste management facilities. The reactors produced nuclear materials by irradiating target materials with neutrons. In 1981, environmental remediation activities began, and all reactors have been shut down since then. Currently, SRS is involved in nuclear materials stabilization, vitrification of nuclear waste, and radioactive operations at the Tritium Replacement Facility.

FWP activities for production workers began at SRS in 1999; and are being conducted by investigators from the Medical University of South Carolina. To date, 3,555 former workers have been screened. Results indicate 1,037 former workers with hearing loss; 143 with obstructive airways disease; and 36 with abnormal BeLPT.

Building Trades National Medical Screening Program began in 1999. The project is being conducted by a consortium led by the Center to Protect Workers' Rights, an applied occupational health research and development center of the Building and Construction Trades Department of the AFL-CIO, in partnership with Duke University Medical Center, University of Cincinnati Medical Center, and Zenith Administrators. To date, 3,355 former workers have been screened. Results indicate 1,324 former workers with hearing loss; 612 with obstructive airways disease; and 51 with abnormal BeLPT.

Abbreviations Used in This Report
(continued from inside front cover)

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| GDP | Gaseous Diffusion Plant |
| HIPPA | Health Insurance Portability and Accountability Act |
| HSS | Office of Health, Safety and Security |
| IAAP | Iowa Army Ammunition Plant |
| INL | Idaho National Laboratory |
| ISU | Iowa State University |
| KCP | Kansas City Plant |
| LANL | Los Alamos National Laboratory |
| LANS | Los Alamos National Security, LLC |
| LBNL | Lawrence Berkeley National Laboratory |
| LLNL | Lawrence Livermore National Laboratory |
| NL | National Laboratory or Laboratories |
| NTS | Nevada Test Site |
| ORAU | Oak Ridge Associated Universities |
| ORNL | Oak Ridge National Laboratory |
| SNL | Sandia National Laboratories |
| SNL-CA | Sandia National Laboratories – California |
| SNL-NM | Sandia National Laboratories – New Mexico |
| SRS | Savannah River Site |
| UC | University of California |
| U.S. | United States |