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U.S. Department of Energy

Environmental Restoration and Waste Management Five-Year Plan

Student Edition

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Department of Energy
Washington, DC 20585

September 1992

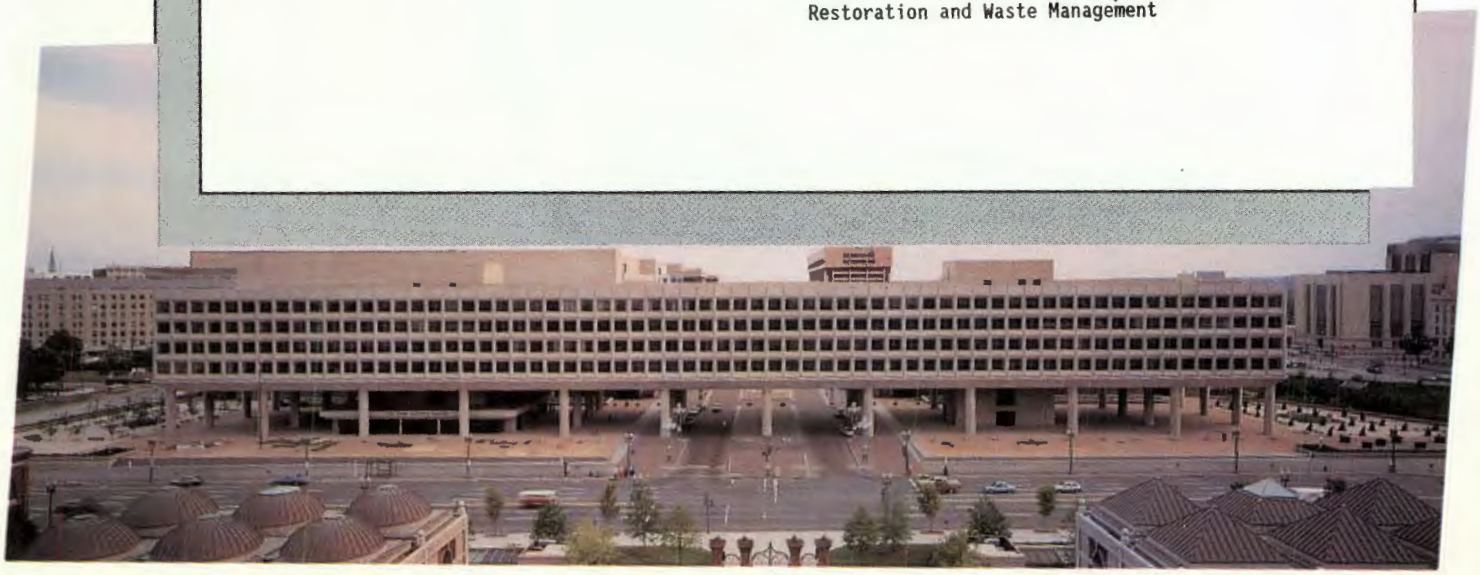
I am pleased to present this student version of the Department of Energy (DOE) Environmental Restoration and Waste Management Five-Year Plan for Fiscal Years 1994-1998. This plan was written and designed by four Washington, D.C. high school students who worked for the Department as DOE summer interns. It outlines major activities and challenges confronting the EM program, from their perspective.

This project was born as a result of last year's Five-Year Plan Student Review Program, in which these students and students from across the country evaluated our 737-page Five-Year Plan for FY 1993-1997. The student comments were extremely insightful and have helped us develop a more readable version of the plan. Based on this critique of the Five-Year Plan, we asked the students to create a document that communicated the highlights of the document in language that is easy to understand.

I believe this student program has a special significance for DOE, because these students represent the future hopes of DOE's environmental program. As Secretary of Energy James D. Watkins has emphasized, we must continue to search for ways to spark students' interest in math and science, and environmental science and engineering to ensure that we will have enough trained technical personnel to carry out DOE's environmental cleanup mission. Waste management may not be considered an attractive topic by most people, but the problems created by the generation, treatment, and disposal of waste are confounding this country, and the solutions, like it or not, will be the challenges of these students and their children and grandchildren.

This document represents many long hours and great effort on the part of the students. They have produced a quality document that will help the public better understand what DOE is doing in managing waste and cleaning up the environment. I would like to thank the students and their coordinators and mentors for a wonderfully written document. I would also like to thank all of the students and teachers who participated in the Five-Year Plan educational programs. If the quality of work these students have produced in the past year is an indication of what we have to look forward to in the future, I feel very confident knowing they will complete the task that we have only begun.

Leo P. Duffy
Assistant Secretary for Environmental
Restoration and Waste Management



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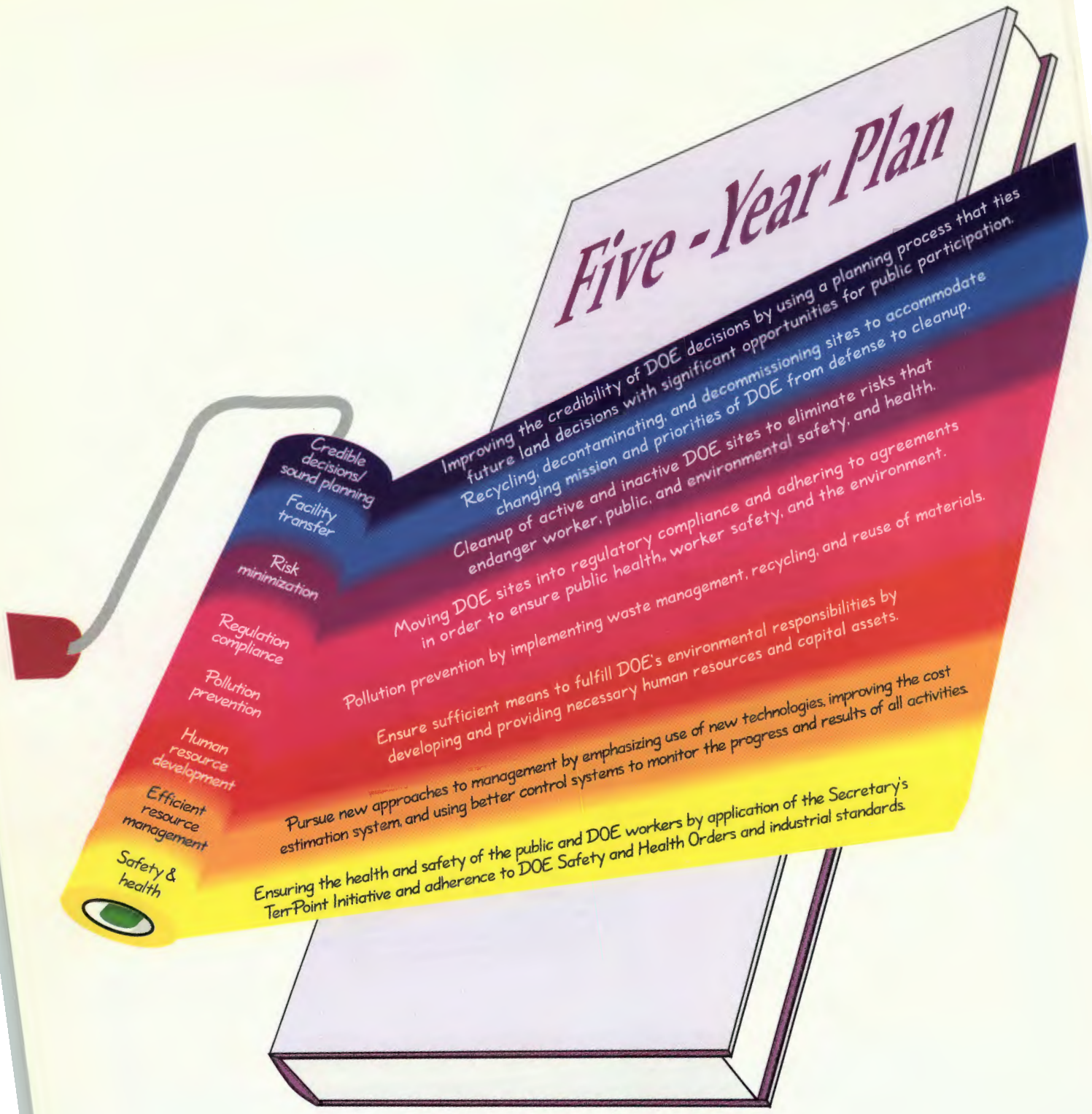

The Environmental Restoration and Waste Management Five-Year Plan is based on eight objectives that are critical to achieving DOE's cleanup goals.

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For additional information, please write:

U. S. Department of Energy
Office of Environmental Restoration and Waste Management
EM-14
1000 Independence Ave. S. W.
Washington, D. C. 20585

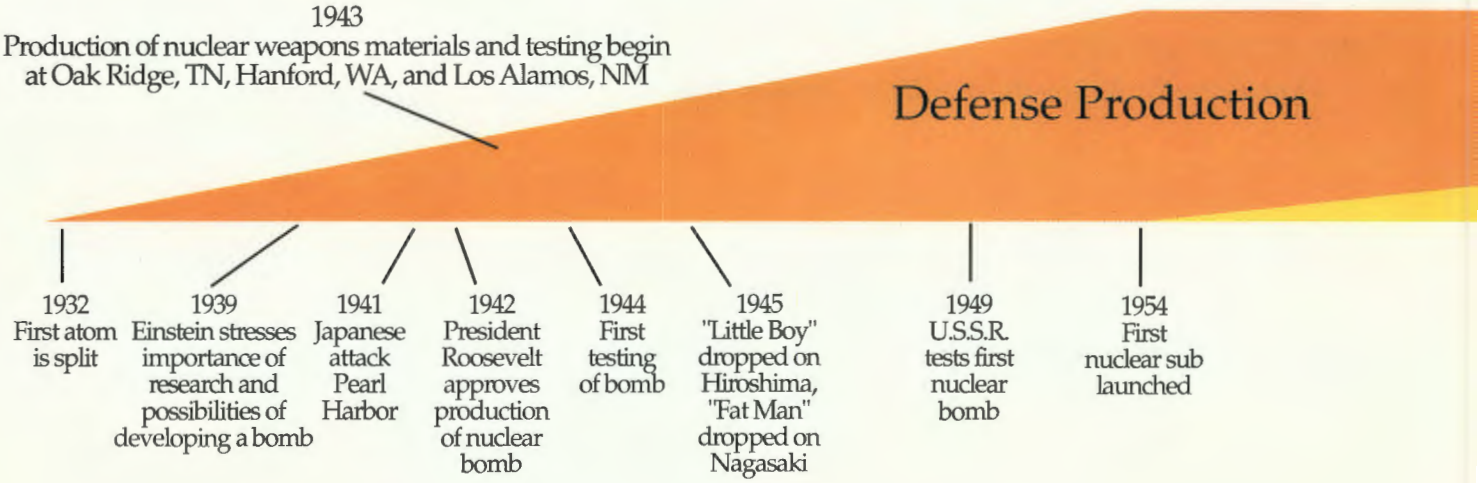
Introduction

What Is the Cleanup Problem and Where Did It Come From?

For more than 45 years, the United States has manufactured and stored nuclear weapons and the materials used in their production. Since 1945, when they were used to bring an end to World War II, atomic weapons have been mass-produced and stockpiled by the United States and former Soviet Union for military defense purposes. In the United States, these weapons were made under top secret conditions and were stored at various sites across the country. Recently, dramatic changes in the world political order - particularly the breakup of the Soviet Union - have caused the United States to reconsider the need for such a large number of nuclear weapons. However, now that the United States has decided to cut back its production of nuclear weapons, it is faced with the sizeable task of cleaning up the nuclear waste left behind as a result of these production activities.

In 1977, Congress created the U.S. Department of Energy (DOE) to manage the country's energy resources and to oversee energy research and conservation. DOE also assumed responsibility from the Atomic Energy Commission for the production of all nuclear weapons and materials. For the next decade, DOE continued to operate its nuclear production facilities under the same conditions of secrecy that had existed since 1945. However, even before the Soviet Union began to show signs of its breakup, DOE was concerned with cleaning up the waste created by its defense production activities. In 1989, in an effort to better inform

"Fat Man," the plutonium implosion bomb that was dropped on Nagasaki in 1945.



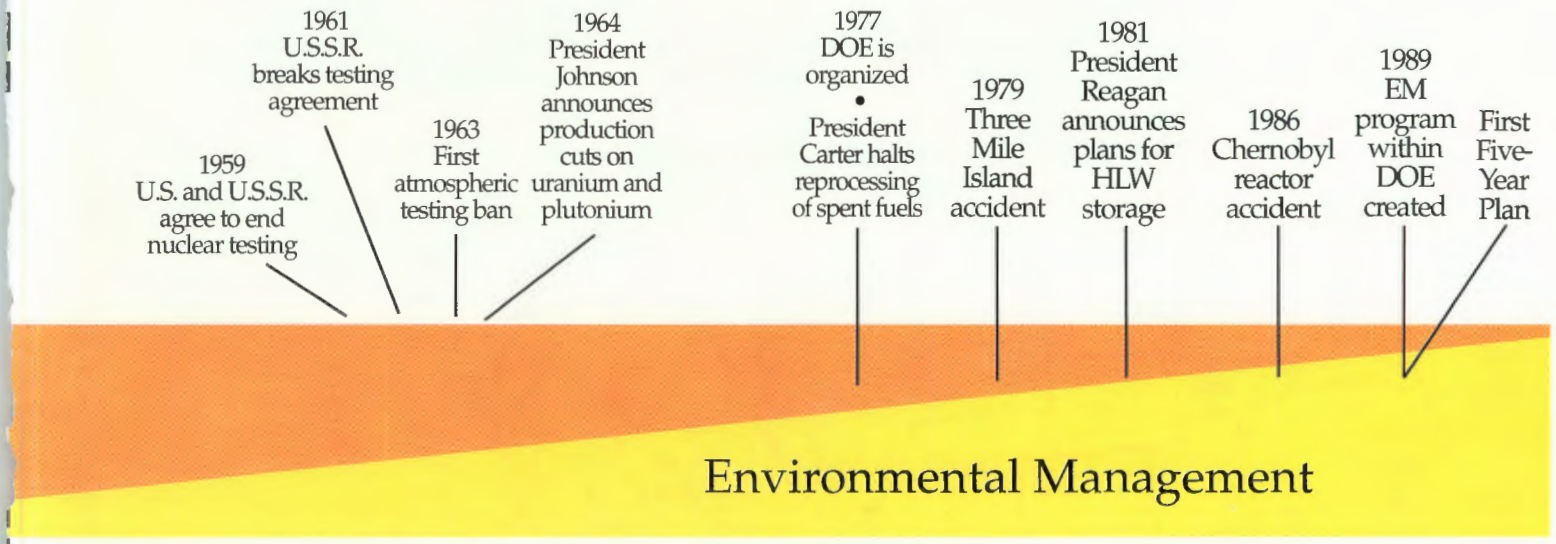
the public on issues that were once kept secret, Secretary of Energy James D. Watkins announced the Department's intent to produce a five-year plan detailing the steps DOE would take to clean up its nuclear waste from research and defense activities. Also in 1989, the Secretary announced the creation of a new DOE organization, the Office of Environmental Restoration and Waste Management (EM), to oversee production of the Five-Year Plan and to manage the cleanup at all DOE facilities.

What Is the Five-Year Plan?

The Five-Year Plan is used to outline the challenges facing the environmental cleanup program for the next five years and to document accomplishments. The plan also focuses on the Department's goal of shutting down and decontaminating facilities that are no longer being used. The first Five-Year Plan was released in August 1989 with input from a number of State and Tribal organizations that have DOE facilities located in their jurisdictions. In this plan, DOE committed to cleaning up the 1989 inventory of inactive sites in 30 years, or by the year 2019.

DOE is only now beginning to realize the size and scope of its cleanup task. Two reasons for the complexity of the cleanup process are the discoveries of additional contaminated sites and the transfer of additional facilities to be cleaned up. In the beginning years of nuclear production, there was a lack of understanding about the types of waste generated by these activities and the effects they would have on the environment. Therefore, these wastes were simply buried in the ground and in many cases, records were not kept as to where they were located. In DOE's cleanup process, these old waste burial sites are often uncovered and, subsequently, the number of sites becomes larger. EM also continues to receive new sites and facilities that require waste management from DOE defense programs. These sites are transferred to EM because the defense program no longer needs them due to the recent reduction in nuclear weapons production.

This plan, for Fiscal Years 1994-1998, is the fourth Five-Year Plan DOE has produced. Although significant progress has been made since 1989, DOE faces a number of challenges in achieving its 30-year goal. This plan discusses those challenges, what DOE is currently doing about them, and what DOE needs to do in the future to overcome them.



Waste Management and Minimization

How Many Sites Are Contaminated?

DOE is responsible for waste management and cleanup of 120 sites across the Nation in 36 States and territories that are contaminated with nuclear and hazardous waste from weapons production and research programs. Certain facilities continue to generate waste as a result of normal operations, while other sites are used in cleanup, storage, and disposal activities. DOE handles the following types of wastes at its sites: high-level radioactive waste, low-level radioactive waste, transuranic waste, hazardous waste, mixed waste (containing both radioactive and hazardous waste), and sanitary waste.

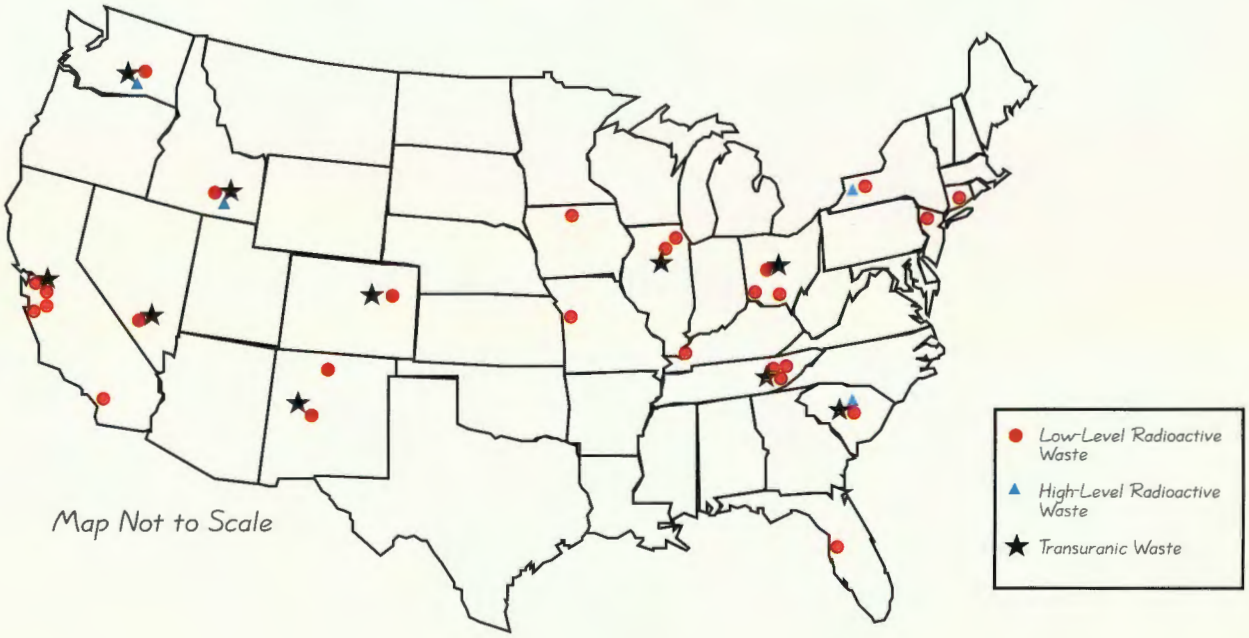
What Are We Doing with the Waste?

As the size and scope of the cleanup effort continue to grow, and as more sites are transferred to EM, one of the biggest tasks facing DOE is managing the different wastes throughout the DOE complex. DOE sites are contaminated with different types of waste. The challenge for waste management is to treat, store, and dispose of these different types of wastes in a way that protects human health, safety, and the environment. Treatment is the process of preparing the waste for safe storage, transportation, and disposal by reducing its toxicity and volume. Storage is defined as holding and monitoring waste in an easy-to-recover process. Disposal is the last step in the process, in which waste is securely placed to ensure that it is permanently isolated from the biosphere. Following is a discussion of the different wastes and how they are managed by DOE.

High-Level Radioactive Waste

High-level radioactive waste (HLW) is the material resulting from the reprocessing (or separation of reusable elements) of spent (or used) nuclear fuel or from defense production processes. It is most commonly found in a liquid form. Because it is so highly radioactive, most HLW is handled by robots and remote handling. HLW is currently stored in underground storage tanks at the Savannah River Site in South Carolina, the Idaho National Engineering Laboratory, the Hanford Site in Washington State, and at West Valley, New York. DOE monitors HLW storage tanks because they occasionally emit flammable, potentially explosive gases. The tanks are being evaluated to see if they pose a health threat and DOE is working to make them more secure. Regulations require that HLW be disposed of as a durable, stable solid waste form, so liquid HLW will go through a process called vitrification. Vitrification is the process of melting HLW and glass-forming particles to produce a glass-like solid that can then be stored. A vitrification facility was constructed at the Savannah River site in 1990 and is expected to begin operating in 1994. Work on a vitrification facility at Hanford began in 1992 and construction on a facility at West

DOE Waste Generation, Storage and Disposal Sites



radioactivity and radiation...

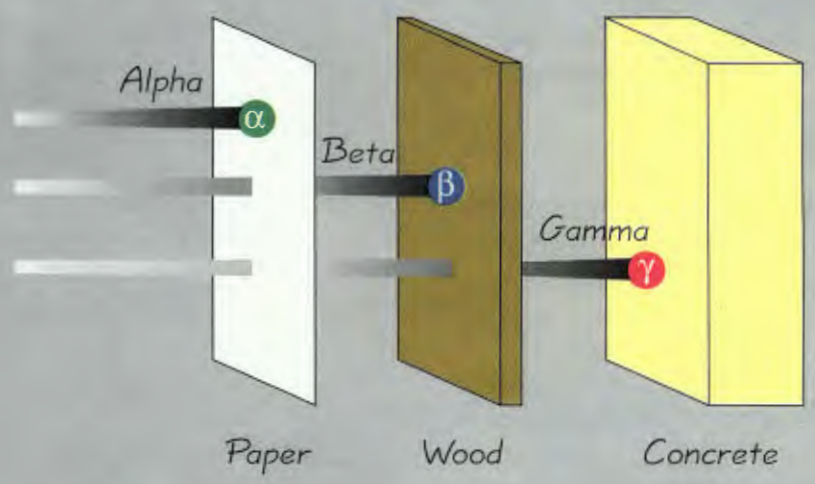
Nuclear waste is dangerous because it is radioactive. Radioactivity is the periodic release of particles or electromagnetic waves by the atom in order for the nucleus to become less fragile and more stable. There are three basic types of radioactivity: alpha, beta, and gamma.

Alpha radiation consists of particles periodically ejected from the nucleus during natural decay to make the nucleus more stable. Alpha particles usually consist of two protons and two neutrons and are very energetic. Transuranic waste usually gives off this type of radiation. They are stopped by such barriers as skin and paper.

Beta radiation consists of electrons. Found in low-level waste, these particles are smaller than alpha particles and can penetrate the skin. They can be stopped by wood and shallow water.

The third type of radiation, gamma, does not consist of particles. Gamma radiation is electromagnetic waves emitted by the source isotope. This type of radiation goes through body tissue, and is quite damaging to the vital body organs. High-level waste emits gamma radiation, which can be stopped by thick concrete, deep water, and lead.

The dosage of radiation a person receives is measured in REM (Roentgen Equivalent Man). The government has determined that an average person can take up to 50,000 millirem (5 REM) a year without noticeable ill effects. With a dosage of 500,000 millirem a year, a person begins to show signs of radiation sickness. The Nuclear Regulatory Commission has established standards for the nuclear industry specifying that all employees who handle radioactive material may be exposed to a maximum of 5,000 millirem a year. At most nuclear production and cleanup sites, the yearly exposure is much less.



Valley, New York, will be completed in 1993. The Nuclear Waste Policy Act of 1982 requires that HLW be disposed of in a geological repository (an underground mine built in rock). DOE is currently studying a site in Yucca Mountain, Nevada, to see if it is a suitable location for such a repository.

Low-Level Radioactive Waste

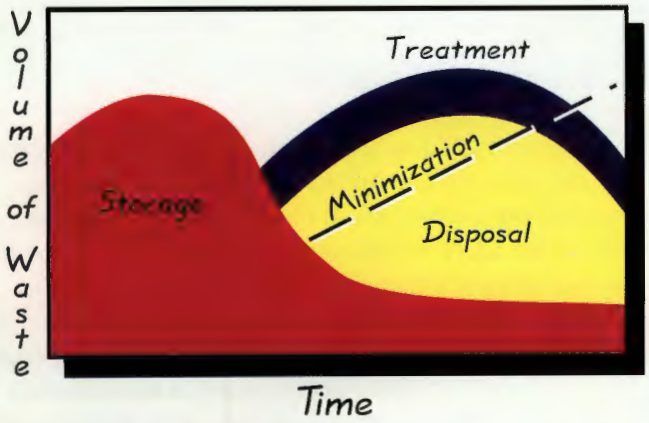
Low-level radioactive waste is generated at 30 DOE sites. Most LLW is radioactive material from nuclear research, industrial, and medical activities. It usually contains a small amount of radioactive substances and includes items such as rags, filters, and tools contaminated with radionuclides. LLW is generally not dangerous, but in some cases it requires protective measures. DOE is developing treatment methods for LLW to reduce the volume of the waste and to solidify it for easier handling. The waste is currently stored in drums on lined concrete pads to prevent water from reaching the waste. For disposal, LLW is tightly packaged and placed in lined burial grounds at the Savannah River Site, Oak Ridge National Laboratory in Tennessee, the Idaho National Engineering Laboratory, the Nevada Test Site, the Hanford Site, and Los Alamos National Laboratory in New Mexico.

Transuranic Waste

Transuranic (TRU) waste consists of manmade elements that are heavier than uranium (thus the term trans [or beyond] uranic) and result from weapons manufacturing and cleanup activities. TRU decays slowly and requires long-term isolation. Eight DOE sites have long-term storage facilities for TRU waste: the Hanford Site, the Idaho National Engineering Laboratory, the Nevada Test Site, Oak Ridge, the Savannah River Site, the Rocky Flats Plant in Colorado, Los Alamos National Laboratory, and the Mound Site in Ohio. The waste is temporarily stored in metal drums, or wooden or metal boxes. The containers are then placed on asphalt or concrete pads lined with clay and plastic to prevent leaks into the groundwater. Some of the storage containers have been stored for more than ten years and are corroded. Repackaging and relocating some of this waste will be required before shipment. The need to treat transuranic waste is currently being studied. A test facility for disposal and retrieval of transuranic waste, known as the Waste Isolation Pilot Plant (WIPP), has been completed near Carlsbad, New Mexico. WIPP will begin a test phase to determine its suitability when DOE receives Congressional approval.

Hazardous Waste

Hazardous waste is generated at most DOE sites and includes toxic, corrosive, reactive, or flammable substances. Materials like heavy metals, mercury, diesel fuel, asbestos, and toxic cleaning agents and solvents are all hazardous waste. The average household produces hazardous waste when it disposes of scouring powders and cleaning solutions. DOE uses



DOE's plans for hazardous waste management include avoiding production of waste, increasing disposal and treatment capabilities and reducing storage requirements.

WIPP

The Waste Isolation Pilot Plant (WIPP), located in a salt deposit in Carlsbad, New Mexico, is a research and development facility DOE will use to test the safe disposal and retrieval of transuranic (TRU) waste. WIPP consists of surface buildings over four vertical shafts that lead to a series of horizontal underground storage rooms and tunnels. In a remote corner of the underground area, DOE does tests to observe the effects of the proposed storage on the salt. Scientists agree that underground salt beds are well-suited for TRU waste disposal because:

- *large salt deposits are usually located in areas of little or no earthquake activity,*
- *salt deposits are not found near running groundwater (or else the salt would have been washed away),*
- *salt is relatively easy to mine, and*
- *salt has the ability to shift and fill any cracks that open up.*

An operator travels through a salt tunnel 2,150 feet under the ground at WIPP.

If waste is to be stored at WIPP, it will undergo rigorous safety procedures. DOE will conduct many inspections of the steel waste containers, record their contents, place them into underground storage containers, and document the storage area of each container. In this way, DOE will be able to account for all waste stored in the WIPP facility.

Safety is an extremely high priority at WIPP because the facility is designed to contain the waste for at least 10,000 years. There are several safety backups, including several extra cables on the lowering mecha-

Cross sectional view of TRU waste.

Drums designated for disposal at WIPP.

nisms (one cable is enough to support a load), many shafts to allow air circulation, and emergency response teams which can deal with any accidents should they occur. Currently, WIPP is waiting for approval from Congress to begin its test phase.

some of the same kinds of cleaning agents, but on a much larger scale. Hazardous wastes are stored at DOE sites and disposed of at commercial waste management facilities that are approved by the Environmental Protection Agency (EPA).

Mixed Low-Level Waste

Mixed waste is radioactive waste that is contaminated with hazardous waste. A large portion of DOE mixed waste, including hazardous and radioactive soil, is mixed low-level waste. Numerous regulations and requirements govern mixed waste. Complying with the requirements is one of the most significant problems facing DOE today. DOE operates facilities that treat certain mixed wastes. Current technologies must be improved and new technologies must be developed to properly treat other mixed wastes. DOE is applying for permits for mixed low-level waste disposal facilities at the Savannah River Site, the Hanford Site, the Nevada Test Site, and the Idaho National Engineering Laboratory. DOE stores mixed waste at the various sites that produce it.

Sanitary Waste

Along with the radioactive and hazardous waste produced at DOE sites, nearly all of the sites generate sanitary waste. There are two types of sanitary wastes, solid and liquid. DOE treats the liquid waste at sites until it meets EPA standards and is safe for discharge into local sewer systems. DOE disposes of the solid waste in landfills that meet regulatory standards.

What About the Waste We Are Generating Now?

Waste continues to be generated by defense production activities and also as a result of DOE cleanup efforts. Although a lot of this waste is unavoidable, DOE must ensure that the amount of waste it creates is kept to a minimum. DOE's policy of waste minimization involves four steps: (1) avoid or reduce waste generation at its source; (2) recycle or reuse waste that cannot be eliminated; (3) treat the remaining waste to reduce volume and toxicity before storage or disposal; and (4) dispose of residual waste in an environmentally safe manner. DOE currently recycles paper, metals, used oil, equipment, and other materials at many of its sites and is looking into expanding these efforts. DOE's waste minimization and recycling programs mean less waste is generated and, therefore, money is saved on waste disposal costs. DOE can then apply the savings elsewhere.

Cleanup

What Is Being Done to Clean Up the Waste?

In addition to effectively managing the waste, DOE must also develop methods of cleaning up its contaminated sites and bringing them into compliance with applicable laws. The overall goal of DOE is to minimize the risk to human health and the environment by cleaning up sites and their buildings. EM works with State, local, and Tribal governments to make plans for cleanup of contaminated sites in their specific areas.

A researcher installs an air filter in a solar powered air sampling unit at Idaho National Engineering Laboratory.

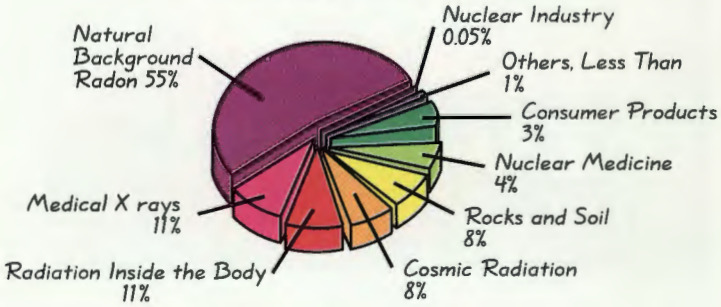
Corrective Activities, a program within EM, is responsible for updating facilities that were built in the 1940's and 1950's, a time when radiation's effects on health, safety, and the environment were less understood. Corrective Activities is working to renovate these facilities — improve them and make them safer for humans as well as the surrounding environment. Dangerous chemicals and unsafe practices have been replaced with newer, safer government-approved materials and procedures. For example, deteriorated sewer lines are being replaced and the chemical levels in discharged water from production plants are being reduced.

Cleanup activities mostly involve remedial actions and decontamination and decommissioning. Remedial actions include four basic steps: (1) finding the contaminated site and estimating the size of the problem; (2) identifying the type of waste at the site, reviewing cleanup options, and selecting the best one; (3) cleaning up and closing the site; and (4) monitoring the site. Most remedial actions are concerned with contaminated soil and groundwater.

Decontamination and decommissioning (D&D) is the safe caretaking of surplus facilities after they have been shut down. The facilities are either decontaminated for reuse or they are completely decommissioned (completely removed). D&D activities include: (1) surveillance and maintenance (monitoring radiation emission levels); (2) assessment and characterization (assessing the size and scope of the problem); (3) environmental review (deciding how much the environment has been affected and how much of it needs to be cleaned); (4) engineering; (5) decontamination and decommissioning operations; and (6) closeout (shutdown). Most D&D activities deal with reactors, processing plants, and storage tanks.

Remediation and D&D activities involve a lot of planning and preparation by DOE. Currently, many DOE sites are in the planning stages for cleanup, which includes working with the public to develop schedules and prioritize cleanup activities. There have been many completed remediation activities, including: remediation of underground storage tanks and sludge-holding tank closures; cleanup of 246 locations contaminated with uranium wastes in Grand Junction, Colorado; and closure of the 58-acre Mixed Waste Management Facility at the Savannah River Site in compliance with safety and environmental regulations—the largest mixed waste site closed to date.

Sources of Radiation



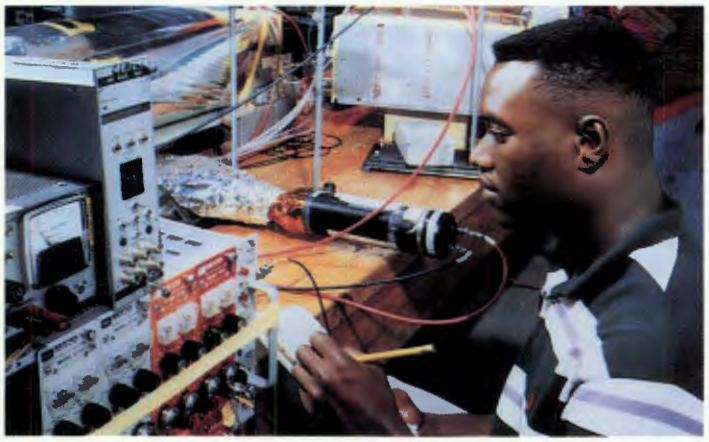
Although DOE has made progress, there are still a number of problems that it must overcome to reach its site cleanup goals. One problem is that cleanup activities are controlled by many laws and regulations that are often unclear or conflicting. This makes it difficult for DOE to schedule different cleanup activities. Another problem is that the available technology is sometimes inadequate and DOE must wait for approval for new and more efficient cleanup technologies to be developed. A third problem that DOE has to deal with is a possible shortage of trained personnel to carry out the cleanup. DOE must make sure that there are enough people available in the future to achieve its goals and has a number of educational and training programs in place to help recruit employees.

Facility Transition and Management

What Is Facility Transition?

Since the end of the Cold War and the breakup of the Soviet Union, there has been less emphasis in the United States on the production of nuclear weapons. In fact, several nuclear weapons programs have already been cancelled. This has brought a change to DOE because many once-important production facilities are no longer needed. DOE sites no longer used for production are transferred to DOE's environmental restoration and waste management program. Two sites recently transferred to this program are the former Feed Materials Production Center in Ohio and the Hanford Site in Washington State.

The period from when a facility is targeted for shutdown to the time EM becomes officially responsible for its cleanup is called the transition period. The Facility Transition and Management Group was established in 1992 to plan and support the transition of facilities and sites. Before this group was founded, facilities were moved to EM with little planning or

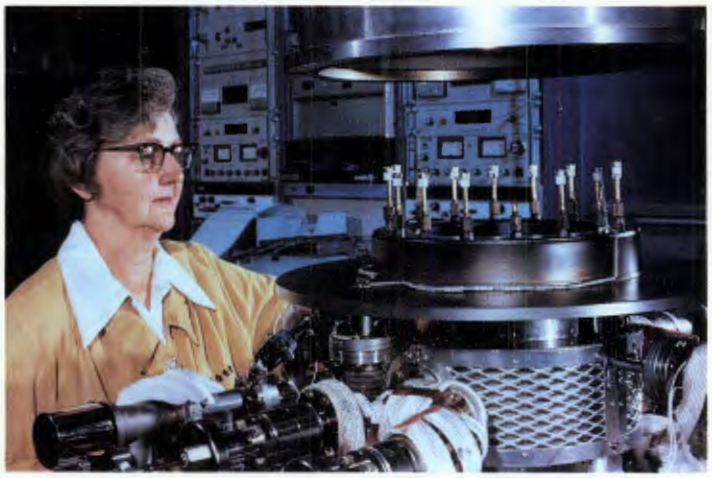


A worker in a Continuous Electron Beam Accelerator Facility (CEBAF).

preparation. This caused funding problems that often required using money slated for other, on-going cleanup projects to pay for transition activities.

The Facility Transition and Management Group must deal with a number of complex issues, including: human resources (retraining, skill enhancement); costs; future site use; public involvement; and health, safety, and environmental issues. Public involvement in facility transition activities is very important because DOE employs a large number of workers at these facilities, and plans must be made for retraining them to assist in the cleanup or to help them find other jobs. Many workers will be able to apply their skills to EM cleanup efforts. DOE is establishing worker retraining programs to ensure that these people are able to continue working within the DOE complex, if possible. For example, in a three week program at Fernald in 1991, workers participated in classroom lectures and hands-on training in environmental cleanup.

Along with worker retraining, additional help is needed to make the DOE environmental cleanup program a success. Thus, DOE is hiring excavators,



A worker at Pinellas, Florida, works with electrical switch tubes.

waste handlers, truck drivers, and people in other fields that will help strengthen the DOE work force and make a clean environment an attainable goal. DOE has established transition working groups at Pinellas, Florida and Mound, Ohio, and preliminary transition working groups at the Idaho National Engineering Laboratory, to work with the public throughout the transition process.

The public will also be very interested in suggesting future uses for the cleaned-up sites. Depending on a number of factors — including how contaminated a site is, whether DOE wants to keep using it for research or production uses, and what is required by environmental laws and regulations — different sites will be slated for different purposes. For example, some less-contaminated sites might be cleaned up enough that they can be used as public areas while sites that are very contaminated might be better used for waste storage or production purposes. DOE will work closely with the public and local planners in developing plans for future uses of these sites.

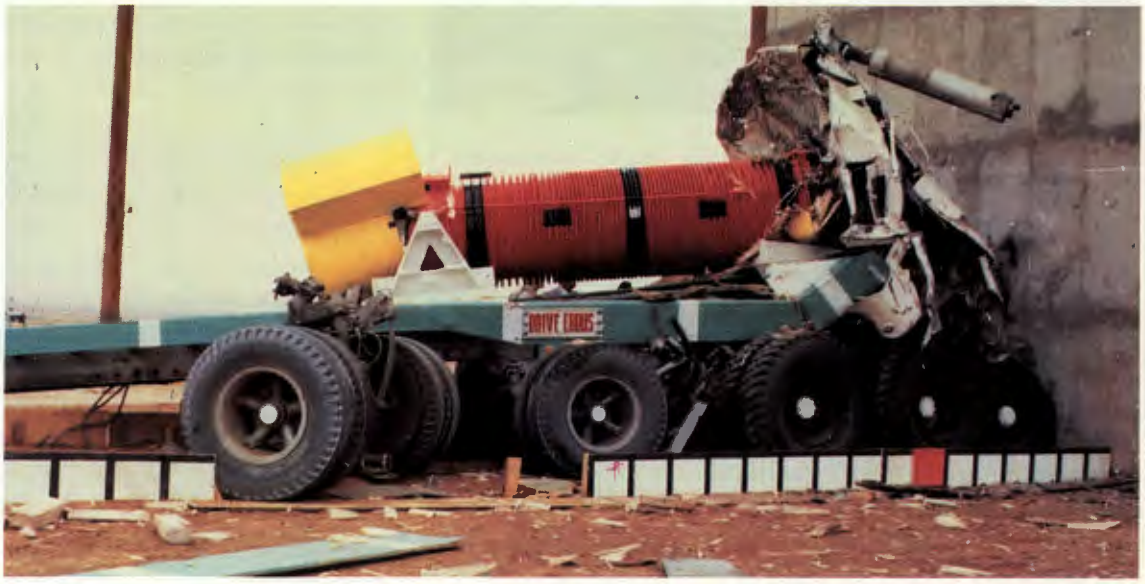
Transportation

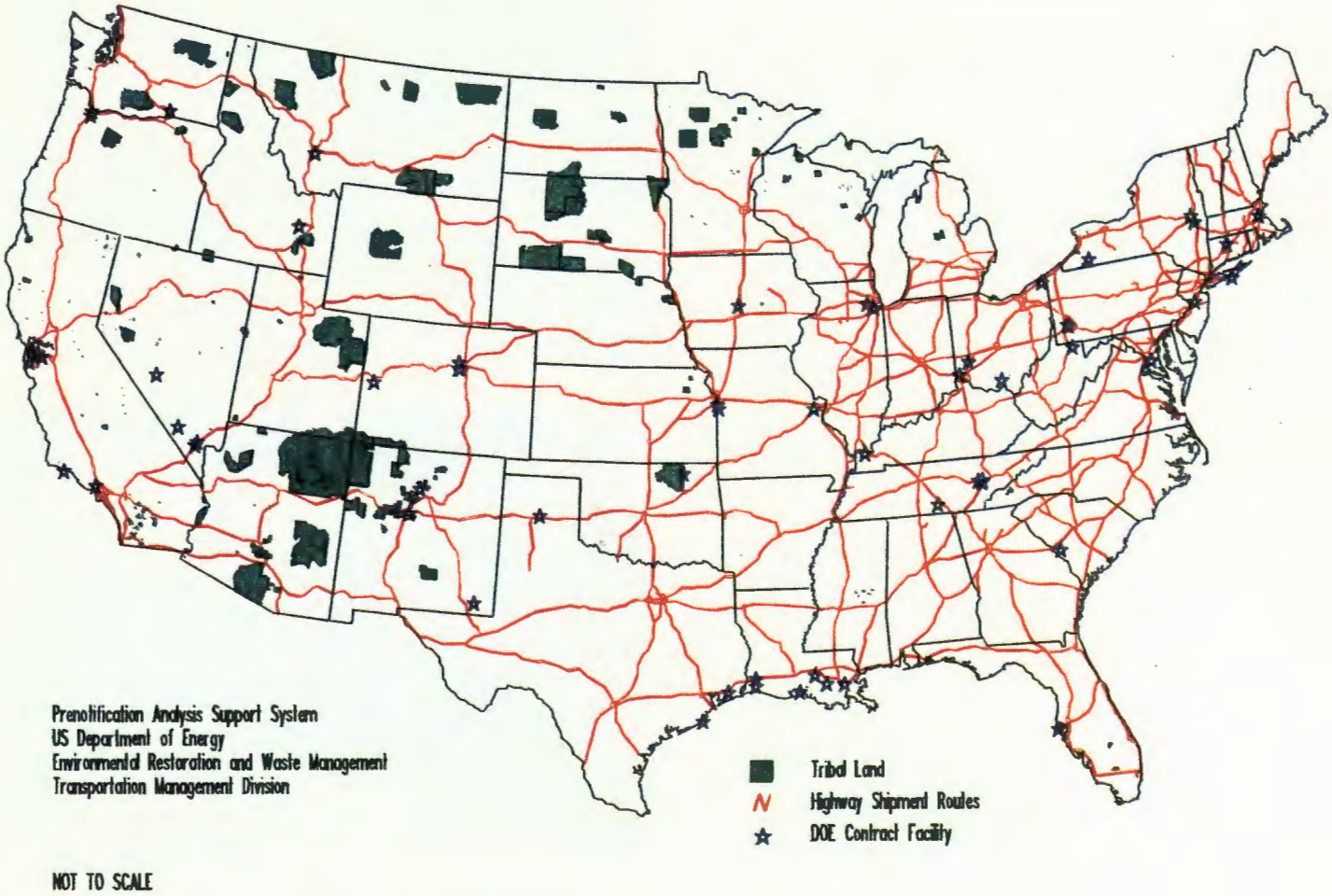
How Will Waste Be Transported?

Another DOE goal is to transport contaminated materials in a safe, effective manner. This requires safe methods of packaging and transporting waste. For example, TRU waste is carried in a container (or cask) system called TRUPACT-II, which is very strong and can withstand a serious accident. TRU-PACT-II undergoes harsh testing such as dropping it from a height of 30 feet to show that the package retains its contents. HLW is carried in a spent fuel cask and other containment systems that also undergo stringent testing similar to the TRUPACT-II containers. LLW is also transported in sturdy, heavily tested materials that include boxes made of wood and strong cardboard.

Waste is loaded into transportation containers and then shipped via truck, plane, or train to disposal sites. TRU waste will be transported to the Waste Isolation Pilot Plant in New Mexico when it is opened; HLW will be transported to a geologic repository once it has been developed; and LLW is currently transported to the Savannah River Site, Oak Ridge National Laboratory, the Idaho National Engineering Laboratory, the Nevada Test Site, the Hanford Site, and Los Alamos National Laboratory.

Top Right: A TRU-PACT-II container is tested by being dropped from 30 feet above the ground. Right: Crash testing of a spent fuel transportation cask. Above: Three TRU-PACT-II containers loaded onto a specially designed carrier.





Highway Shipment Routes, Tribal Lands, and DOE Contract Facilities

Great measures are taken to ensure that any accidents pose minimal risks to the public and the environment. For example, a mock accident was conducted by DOE involving three TRUPACT-II containers. In the "accident," known as TRANSAX-90, a TRUPACT-II trailer was involved in a collision with another vehicle. The container received only minor damages and, if it had contained waste, none of the waste would have been released. DOE has an Emergency Management Plan and an Operational Emergency Management Team to handle similar situations should they occur.

TRANSCOM, a satellite-aided tracking system, was also used in the mock accident. TRANSCOM will allow officials, the drivers, and others involved to know of any transportation problems by giving the exact location of the truck shipping TRU wastes. TRANSAX-90 was a proven success and similar training will continue in order to keep personnel prepared in the event of a real accident.

During DOE's environmental cleanup, the safe transportation of hazardous and radioactive materials is vital. Engineers and planners have created safe packaging products and have developed plans with emergency prevention and backup to reduce the risk of radiation leaks during transportation.

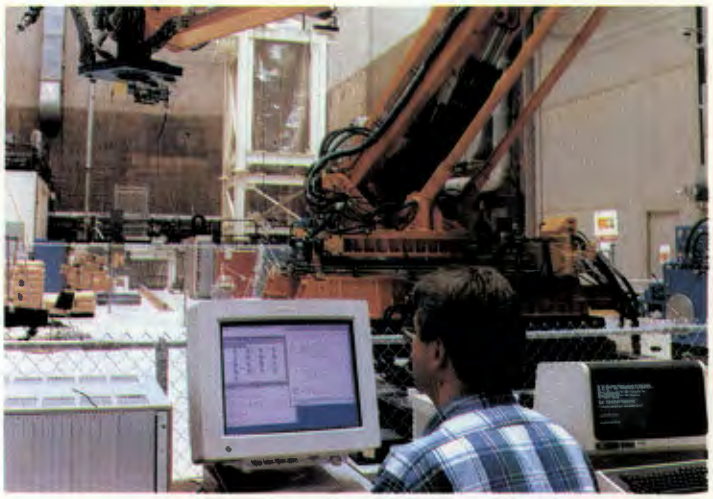
Technology Development

What New Technologies Are Being Developed to Assist in the Cleanup and Disposal of Waste?

DOE is making efforts to develop new technologies and improve current technologies to speed cleanup activities, eliminate unnecessary risks, lower overall cleanup cost, and reduce the need for future cleanup. When DOE develops new technologies, they must meet regulatory standards and requirements and should be more cost efficient than current technologies. The goal of technology development is to have the program pay for itself by developing techniques that will ultimately save more money than it costs to develop them.

An example of cost efficient technology application in the cleanup process is a ground penetrating radar system that is being used at the Savannah River Site to select locations for wells that monitor groundwater contamination. Use of this technology has already saved DOE nearly $2.4 million by reducing the number of wells required. Another technology, robotics, is being used at several different sites for waste retrieval from underground storage tanks. Robots are also used for basic handling of high-level waste and some TRU waste. This lowers worker health risk by keeping contact with the waste at a minimum.

Another technological advancement that is being utilized by DOE is vitrification. As discussed earlier, vitrification is the process of melting high-level waste and glass-forming particles to produce a glass-like solid. Vitrification can even be applied to buried waste. This process, called in situ (on-site) vitrification, saves money because DOE does not have to dig up waste and transport it to another location. It can be treated and left in that glassy state permanently. These are just a few of the many technologies that the DOE is using and researching further to make cleanup safer and more efficient.



Technologies used at DOE sites include: (Top) the view inside a conveyer alley where remote handling of uranium and plutonium carbide compounds takes place (Middle) solar detoxification of water at Sandia National Laboratory in New Mexico; (Bottom) a worker controls a robot arm at Sandia National Laboratory in New Mexico.

Resources

What Kind of Workers Will Be Needed to Complete the Cleanup?

DOE needs workers and sufficient funds to complete its cleanup program and is currently assessing the work force it will need to guide future efforts. The EM scientific, engineering, and technical work force is expected to grow from 13,800 workers in 1991 to 20,000 by 1997. DOE will need several different types of scientists, engineers, and technicians, including chemical, mechanical, and environmental engineers, waste processors, and health physics technicians.

In addition to the worker retraining efforts discussed in the Facility Transition section, DOE is working closely with teachers and students — from kindergarten through graduate school — in math and science programs to encourage students toward environmental career opportunities. Other education and training programs include certificate and associate degree programs for environmental technicians; university scholarships and fellowships; internships; and academic partnerships with universities to develop environmental educational materials. The goal of these programs is to ensure that DOE will have enough trained and skilled workers to carry out the cleanup of the DOE complex.

How Much Will the Cleanup Cost?

DOE's budget for environmental restoration and waste management activities has tripled over the last three years. DOE estimates that it will cost $6.0 billion for these activities in fiscal year 1994. Sixty-two percent of this amount is designated for activities that are required by environmental laws, 24 percent is required by DOE regulations and 14 percent is classified as essential activities, such as improved business management practices. This amount is based on estimates of program activities but could change due to uncertainties such as the availability of new technologies and changes in regulatory requirements.

Tracking Progress

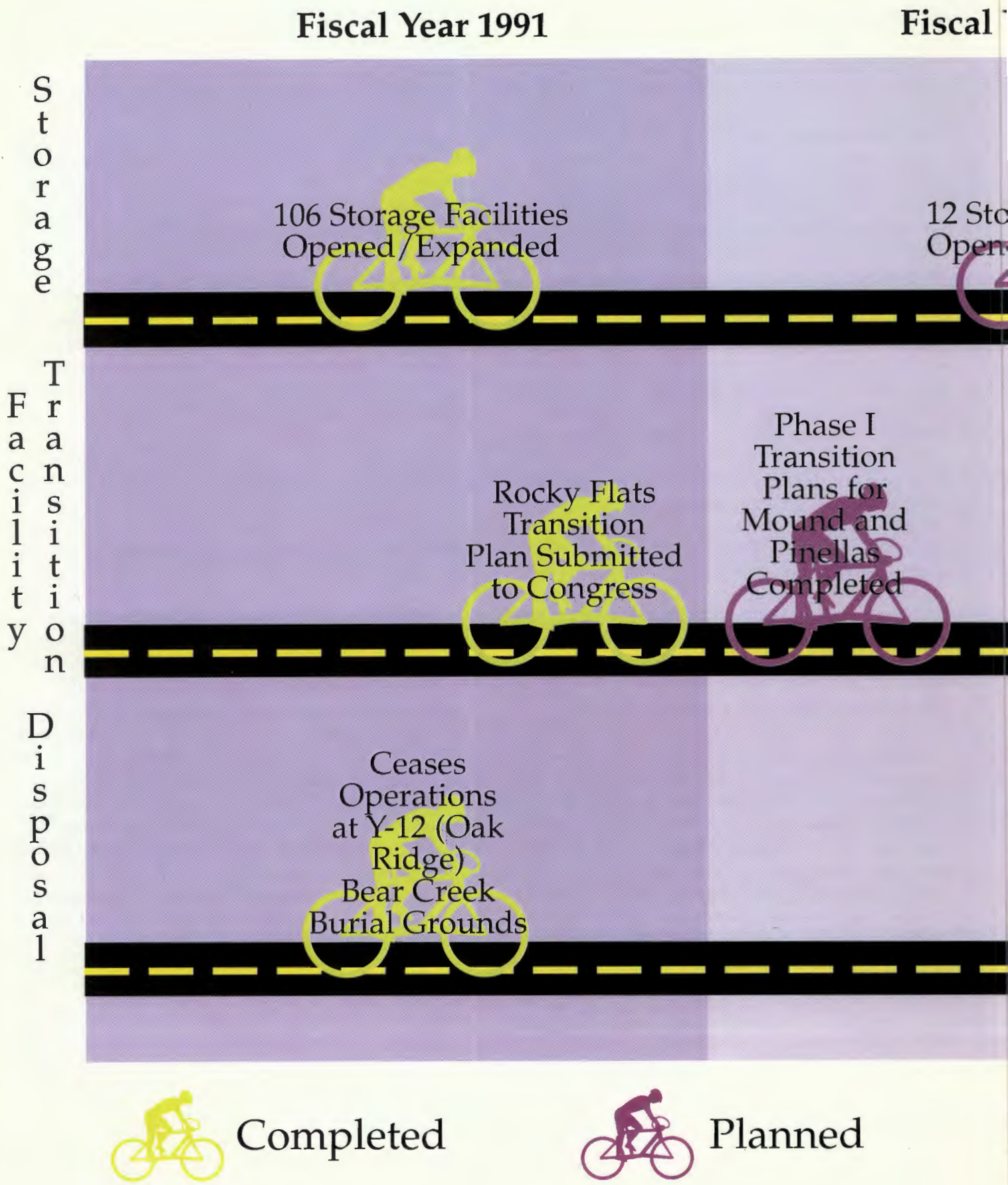
How Does DOE Track Its Progress in Environmental Restoration and Waste Management?

Since EM was created in 1989, DOE has allocated a lot of money and manpower to environmental cleanup. DOE is accountable for its actions and must be able to show the public how its money has been spent. DOE uses the Five-Year Plan to map out future activities and track its accomplishments. One way in which this is done is through the National Progress Chart. The National Progress Chart uses milestones (future goals) to show the overall status of DOE cleanup efforts. It summarizes which efforts have succeeded and which activities have been delayed (and provides reasons for the delay). For example, this year's chart shows that 12 storage sites were opened in Fiscal Year 1992. In this way, the Progress Chart acts as a report card on DOE progress.

EM is committed to ensuring that it produces quality work. This is done by constant self-assessment and by having other DOE organizations oversee its activities. These steps are taken to make sure DOE follows all safety laws and regulations and operates in an efficient and cost-effective manner.

DOE is also held accountable for its actions through review by various external organizations. Estimates regarding the cost of DOE activities are evaluated by external organizations such as the Office of Management and Budget and the Army Corps of Engineers. Outside groups like the State and Tribal Government Working Group also review DOE planning documents such as the Five-Year Plan. Federal and State regulators oversee DOE compliance with various laws, regulations, and agreements. If DOE does not meet these legal requirements, it could face a number of penalties and fines. Most importantly, Congress constantly reviews the cleanup program to ensure that it is carried out effectively and efficiently.

Progress Trac



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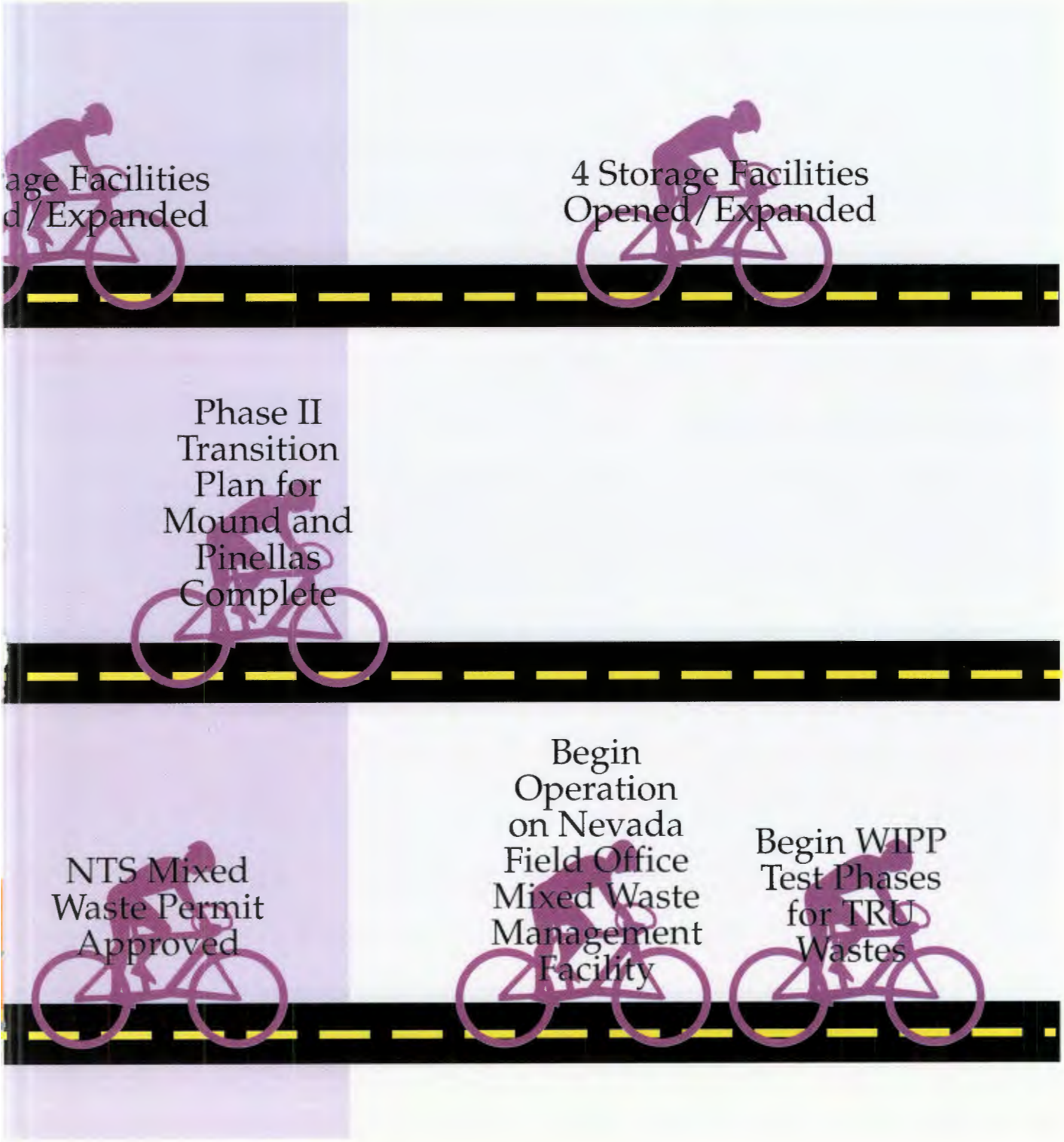

Regulations

What Laws Govern Cleanup and Disposal Activities?

DOE's nuclear waste cleanup program must comply with a number of national laws. Complying with these laws means that these sites will meet current safety, health, and environmental standards.

One law that guides DOE efforts is the Resource Conservation and Recovery Act (RCRA). This law authorizes the Environmental Protection Agency and the States to monitor and control hazardous waste during the waste management cycle, from treatment to storage to disposal. RCRA establishes a permit system for waste treatment and disposal sites. It also requires waste generators to fully document the nature of all wastes before sending them to disposal or processing centers.

Another law that DOE must comply with is the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or "Superfund." Its goals are to identify and clean up sites contaminated with hazardous waste and see that the responsible parties pay for damages and cleanup.

Other laws also apply to the DOE sites. The Atomic Energy Act outlines the responsibilities for controlling nuclear materials. The Clean Air Act sets standards for air pollution in the United States. The Toxic Substances Control Act requires testing and restrictions on certain chemicals. The National Environmental Policy Act requires a review of possible environmental impacts before any action is taken that might affect the environment. The Clean Water Act controls the introduction of pollutants into water.

In addition to these laws, DOE sets pollution control standards for itself that these laws may not have covered. These self-imposed guidelines set standards for treatment, storage, and disposal of wastes; guarantee that waste sites and cleanup activities follow local, State, and Federal laws; establish safety standards in waste containment and transport; and set standards of conduct and containment in case of emergency.

One of the problems DOE faces in complying with these laws is that it is also required to obey many of the State and local regulations that apply to its sites. These regulations often conflict with the requirements established by the national laws, which sometimes makes DOE's job harder. In most cases, DOE resolves this problem by working out agreements, known as Memoranda of Understanding and Compliance Agreements, that are acceptable to all parties involved.

Worker Health and Safety

How Are Workers Protected During Cleanup and Waste Management Activities?

Another challenge facing DOE is to provide a safe workplace for its employees. DOE is strengthening policies and increasing guidance for occupational safety and health. DOE has required that EM offices develop state-of-the-art worker safety and health programs. Some of the procedures put in place to ensure occupational safety and health are control of physical and toxic hazard identification, posting danger signs, and supplying safety instructional materials.

DOE's basic safety operations include general maintenance of equipment, double checking of procedures, ensuring that safety standards are applied to packaging and certifications, inspection of emergency equipment and sites, and emergency response training. DOE is also expanding current radiation protection programs. Radiation measures include maintenance of measuring instruments and shielding devices and personal dosimeter monitoring.

A worker studying the effects of airborne noxious particle inhalation.

DOE also carries out a number of medical monitoring activities to ensure the health of its workers. These activities include epidemiological studies and health surveillance programs at many sites. In addition, a team of doctors and nurses evaluate the quality of DOE's health programs every year.

Recent assessments of safety and health have shown great improvements throughout DOE. To go along with the improvements in worker safety, the Secretary has ordered each DOE program office to produce a five-year plan for safety and health. These program plans will be compiled into a complete DOE plan that will discuss important DOE-wide safety and health activities, including operations (nuclear safety), packaging, transportation, emergency preparedness, and radiation protection.

worker safety

While DOE is not required to comply with Occupational Safety and Health Administration (OSHA) regulations, it does set its own stringent worker safety standards to implement OSHA regulations. Workers are required to wear dosimeters, small credit card sized instruments that absorb radiation to monitor the radiation dosage a worker receives. Full body radiation tests are performed upon entry and exit from the cleanup site and additional testing is performed upon entry and exit from buildings.

Visitors at the Rocky Flats Site in Colorado wear radiation protective clothing while overseeing robotics operations.

Public Participation

How Is the Public Involved in DOE Cleanup Activities?

DOE has made progress in its environmental restoration and waste management efforts since 1989. However, the scope of the problem continues to grow and change with outside events. If DOE is to successfully achieve its long-term goals, it must first find a way to overcome the problems and challenges presented in this plan.

Perhaps the first step is to work on improving ways to involve the general public in DOE's environmental cleanup program. If the people who are affected by DOE's actions are allowed to participate in deciding what activities are carried out at which sites, they will be more interested in the program's success. They will also help by telling DOE which plans and activities are useful and which ones should be changed.

DOE has already established a number of effective programs for public involvement. At the national level, DOE relies on formal review groups such as the State and Tribal Government Working Group and the Stakeholders' Forum for comments and feedback on the Five-Year Plan and related planning documents. These groups include representatives from Indian tribes; Federal and State agencies; labor, business, and environmental organizations, and other public interest groups. DOE also received comments on the Five-Year Plan from the general public which were responded to in a Comment Response Document. These suggestions resulted in revisions to the Five-Year Plan.

At the local level, DOE has tried to include the public in its site-specific activities through working groups, public workshops, and advisory boards. Some of these efforts have been successful while others have not. DOE is currently working on public involvement plans that will set up activities based on each individual site's needs.

DOE has also developed programs that get high school students involved in its planning process. Last year the Department sponsored a student review of the Five-Year Plan. In this program, students from Washington, D.C.; Fernald, Ohio; Savannah River, South Carolina; Richland, Washington; and Oak Ridge, Tennessee, reviewed the plan for "readability." The students came up with some good suggestions for making the plan easier for the public to read. These suggestions were followed in the development of this year's plan. The students were also taken on a field trip to Oak Ridge, to see first hand how DOE cleanup operations are performed. Four of the Washington, D.C. students in the review program joined DOE for a summer internship that involved the writing of this version of the Five-Year Plan.

Public support, public action and input, education, and interest are all extremely important to the success of the Five-Year Plan. It is also important that DOE continues to emphasize public participation instead of public information. While DOE realizes that education is a major step, it also needs input from an informed public. DOE therefore provides opportunities for open discussion of new programs and activities while they are still in the planning stages so that the public can take an early, active role in guiding DOE's cleanup efforts.