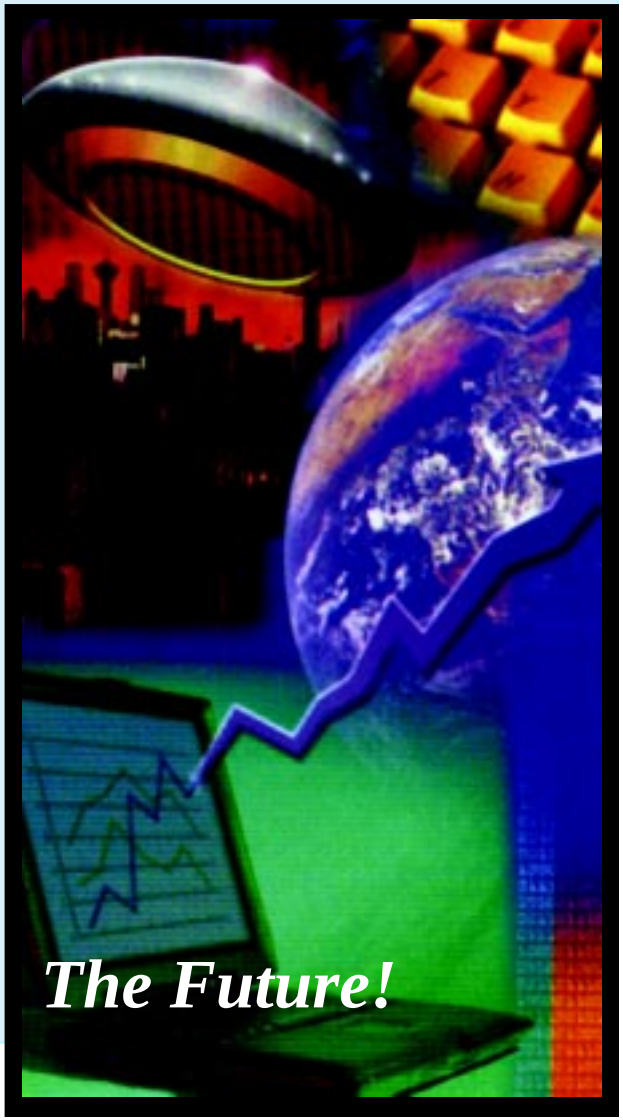
SPECIAL EDITION OF
The Hanford REACH

November 26, 2001

HANFORD PROGRESS

A PUBLICATION OF THE U.S. DEPARTMENT OF ENERGY FOR ALL HANFORD SITE EMPLOYEES.



Keeping an eye on outcomes guides Hanford's cleanup mission

"We will restore the river corridor. We will transition the central plateau. And we will put Hanford assets to work on future problems of national and global significance." — Keith Klein, Manager, Department of Energy Richland Operations Office.

"Although we are two separate entities, we work closely together, sharing information, resources and common goals — cleaning up Hanford and protecting the Columbia River." — Harry Boston, Manager, Department of Energy Office of River Protection.

Hanford's vision statement with its three "outcomes" — the river...the plateau...the future — have put the efforts of DOE's Richland Operations Office, the Office of River Protection and the Hanford contractors into sharp focus.

More than just a rallying cry, the three outcomes have given us a measuring stick for gauging our progress. How are we doing at protecting the Columbia River? Did our work today put us a step closer to transitioning the central plateau toward its long-term waste management role? And did we do something of significance to prepare Hanford or the nation for the future?

Since our last progress issue of the *Reach*, Hanford workers can honestly say they've brought us much closer to those outcomes. In the past six to eight months we have moved spent fuel away from the river, stabilized plutonium, remediated old waste sites, prepared the tank farms for the transfer of waste to the future Waste Treatment Plant, completed the infrastructure for the treatment plant itself, and so much more. Inside is the report of our progress through fiscal year 2001. ✦

The *Hanford Reach* is published weekly for all employees of the U.S. Department of Energy's Hanford Site.

Hanford Reach, B3-30
Fluor Hanford, P.O. Box 1000
Richland, WA 99352
Fax: 376-5704
e-mail: Hanford_Reach@rl.gov
Phone: (509) 376-4639

Distribution: Jantec, 375-5170

Harry Boston, Manager
DOE Office of River Protection

DOE Office of River Protection
Diane Stock, H6-60, 376-4751, fax 372-1215

CH2M HILL Hanford Group
Ace Etheridge, H7-07, 372-8058, fax 372-8036

Bechtel National, Inc.
John Britton, 371-3677

Keith Klein, Manager
DOE Richland Operations Office

Fluor Hanford
Jerry Holloway

Staff members:
Dennis Cresswell, editor, 376-4639
Cornelia Brim, associate editor
Sally Green, designer

Pacific Northwest National Laboratory
Katie Larson, K1-55, 375-3698, fax 375-2221

Hanford Environmental Health Foundation
Jon Davidson, H1-04, 376-2710, fax 373-8036

Bechtel Hanford, Inc.
Sue Kuntz, H0-09, 375-4673, fax 372-9115

See the *Hanford Reach* on the Web at:
www.Hanford.gov/reach/index.html

Printed on recycled and recyclable paper.

A banner year for VPP

With five contractors and projects named as recipients of the Department of Energy Voluntary Protection Program Gold Star, Hanford currently accounts for 28 percent of the DOE-VPP Gold Star organizations nationwide.

Hanford DOE-VPP Gold Star winners are Day & Zimmermann Protection Technology Hanford, DynCorp Tri-Cities Services, the Fast Flux Test Facility, Fluor Federal Services and the Pacific Northwest National Laboratory. Although the DynCorp contract with Fluor Hanford was not renewed, the company earned the prestigious DOE-VPP Gold Star while providing site services at Hanford. The majority of these workers and their safety program have transitioned to Fluor Hanford. The quest for DOE-VPP Gold Stars continues across the DOE complex with Fluor Hanford's River Corridor Project now in the final stages of the award process.

The Occupational Safety and Health Administration Voluntary Protection Program affects 750,000 American workers. The DOE Voluntary Protection Program is a specialized portion of the program for those who work on federal projects. Four percent of all VPP participants, about 30,000 employees, participate through the DOE-VPP, striving to achieve the level of safety program excellence that will earn DOE-VPP Gold Star status.

The Voluntary Protection Program expands traditional safety and health programs by encouraging employee involvement in a partnership with labor to reduce injuries and obtain superior safety performance. VPP workplaces have average overall lost/away workday rates 50 percent below the industry average.

Companies that make the commitment to seek VPP star status must work hand-in-hand with their employees and labor representatives to ensure that employees own the safety and health program, are involved in hazard prevention and recognition, and assist in the continuous improvement process. Once such a partnership is forged and the safety systems are successfully reducing injuries, the company is ready to apply for star status to OSHA or to DOE. ✦

Spent Nuclear Fuel Project advances up steep production curve

The Spent Nuclear Fuel Project has made extraordinary progress over the past several months. Since March 26, the date of the last progress issue of the *Hanford Reach* covering SNF activities, 27 Multi-Canister Overpacks of irradiated fuel have been removed from the Columbia River shoreline.

These 27 loads contained just over 4 million curies of radioactivity in nearly 130 tons of irradiated fuel, and represent about 6.2 percent of the total amount of SNF in the K Basins when fuel movement began. Thirty-two MCOs of fuel have been removed, dried and placed into safe, interim storage since fuel movement began nearly one year ago. Thus, the job is about 8 percent complete.

However, the fuel removal rate, or the project's production curve, is accelerating rapidly. According to Bob Heck, Fluor Hanford vice president for the SNF Project, this acceleration points to rapid progress ahead.

Project metrics good

At the K West Basin, where fuel is loaded underwater into new baskets and MCOs and the MCOs are sealed and lifted from the water, the "processing interval" now stands at about 38 hours per MCO, well below the project's target of 45 hours. The processing interval refers to that time period between the completion of loading one MCO and the completion of loading another MCO. Also at K West Basin, the "shipping interval," or that time period between MCO shipments, is quickly dropping from earlier levels toward the desired project goal of 45 hours.

The 'Konan' manipulator arm readies spent nuclear fuel for loading into baskets and canisters for removal from the K West Basin.

At the Cold Vacuum Drying Facility, processing times (the total door-to-door time that each MCO spends in the facility) have averaged four to five hours below the project target of 90 hours since August. Learning curves and operating experience are also shortening cycle times at the Canister Storage Building. At this facility, the cycle time between the arrival of an MCO and its placement into below-ground tube storage averages just 13 hours, well below the project goal of 18 hours.

Continued on page 5.

Additional good news at the SNF Project is that radiation dose rates on the outside of the fully loaded MCOs are significantly lower than planning estimates. The lower dose rates have led to some promising ideas and tests to streamline operations further.

Times of change

Changes came in rapid succession throughout the last several months at the SNF Project. In late March, regulators and the Department of Energy approved an "alternate fuel transfer strategy" that changed 17 Tri-Party Agreement milestones and will bring all of the K East Basin fuel into the K West Basin for processing. Other changes quickly cascaded from this major shift, accelerating sludge removal from the more contaminated K East Basin by a year, avoiding duplicate equipment installation in that basin, and combining the planned sludge and water treatment systems into a more efficient new design.

The Fluor Hanford Construction Projects group also located a new type of sludge container with a self-contained filter system that will allow a simpler de-watering process. The new sludge containers also are much larger, so that fewer trips will be needed between the K Basins and the interim sludge storage location in Hanford's T Plant. The sludge changes alone are expected to save $9 million.

In another major change, the deactivation schedule for the K Basins themselves, the Cold Vacuum Drying Facility, the equipment in these buildings and approximately 45 other facilities being used by the SNF Project, was brought forward by 10 months. The project now expects to complete deactivation of these facilities by September 2006, thereby saving another $31 million.

Other SNF successes

Despite the challenges and unknowns inherent in working with Hanford's SNF, the project attained 3 million safe hours in June and has now reached over 3.5 million hours without a workday lost due to an injury. According to Steve Veitenheimer, director of the DOE Richland Operations Office of Spent Nuclear Fuels, "The excellent safety record compiled by the SNF project workers is a tribute to their professionalism and dedication, and it's also the best news that we as a project could have. We want every single person to go home safely every day."

I n July, for the second year in a row, the SNF Project was rated "excellent" in all of the criteria evaluated by quality assurance auditors from DOE's National SNF Program. This past summer, the project also installed and began operating two new process tables in the K West Basin. Project staff members also successfully fabricated hundreds of fuel baskets under strict quality controls.

Additionally, the SNF Project completed readiness to begin the transport and acceptance of 72 irradiated fuel assemblies from the Shippingport, Pa., reactor that now lie in wet storage in T Plant. The start of Shippingport fuel drying in T Plant is expected in December, and the first dried assemblies are scheduled to move into interim safe storage in the Canister Storage Building that same month. This is an important step in the SNF Project mission to consolidate all Hanford Site spent nuclear fuel.

The SNF Project also held its first three regular maintenance outages in April, July and October, accomplishing work with speed, efficiency and safety.

In an all-project message in October, Heck congratulated SNF employees on a job "very well done over these last months. Moving spent fuel safely is a *team* effort of the entire project. Every person, no matter what his or her job, contributes to our success. And I want to recognize and thank every single one of you. Let's not forget that the spent fuel in the K Basins, along with sludge, contaminated water and debris, represents about 95 percent of the radioactivity in Hanford's 100 Areas. Removing this fuel is important work, and I am proud of each one of you." ✦

River Corridor Project focuses on deactivations

For nearly 50 years, the 300 Area, just 1.5 miles north of Richland and along the west bank of the Columbia River, was the location of Hanford's radiological research and fuel fabrication facilities. Those activities resulted in highly contaminated facilities, a large inventory of radioactive materials and contaminated soil waste sites.

One of the highest Hanford cleanup priorities is to safely deactivate contaminated buildings and ship radioactive and hazardous waste out of the 300 Area to compliant storage away from Richland and the river. The work is being done by the River Corridor Project managed by Fluor Hanford.

Progress in the 300 Area has focused on deactivation successes at the 324 and 327 Buildings — highly radioactive facilities that contain heavily shielded enclosures called hot cells — and the removal of excess uranium from storage in 300 Area buildings. The hot cells were once used to examine and test reactor fuel elements and other radiological or hazardous materials.

The cleanout of B Cell and shipment of the mixed waste and equipment to the 200 Area burial grounds met a key Tri-Party Agreement milestone for 300 Area cleanup. B Cell is a shielded concrete room where highly radioactive material was remotely handled. While it was operating, B Cell was considered the largest operating hot cell west of the Mississippi River and is one of Hanford's most challenging cleanout efforts.

"Removing this equipment and debris from B Cell eliminates a major risk," said Beth Bilson, assistant manager for the River Corridor in the DOE Richland Operations Office. "We used innovative techniques and equipment to successfully complete this very complicated task."

Experts estimated that B Cell contained nearly 3 million curies of radioactive material. All equipment removal activities had to be conducted using hot-cell manipulators and other remotely handled devices. To remove the equipment and debris, workers used a technology new to Hanford — a robotic crawler known as the Dispersible Removal System, or DRS, to help collect and vacuum the loose contaminated debris from the B Cell floor.

Workers operated the DRS remotely, using TV cameras and looking through 4-foot-thick shielded windows. Once the waste was collected, workers packaged the material into waste containers that were shipped to Hanford's 200 Area.

Project workers also were a week early in meeting a DOE milestone for removing a vault waste treatment system in the 324 Building's D Cell. In addition, fabrication of the robotic lifting fixture and the support stand were completed in support of the pipe trench cleanout in the Radiochemical Engineering Cell airlock.

Key radiological inventory reductions were also completed elsewhere in the 300 Area. As part of the 327 Building deactivation, waste was loaded into drums for shipment or consolidated into A Cell for later packaging. Fissile and irradiated material were removed from the dry storage carousel and packaged into drums. Also about 380 metric tons of uranium were moved away from the 300 Area Fuel Supply Shutdown facilities, including 240 metric tons of fuel sent to other DOE sites and 140 metric tons of scrap buried in Hanford's Low-Level Burial Grounds.

In a related success, the project saved taxpayers more than $1 million by sending uranium dioxide crystals to the Oak Ridge National Laboratory and transferring thorium to the Pacific

Continued on page 7.

Northwest National Laboratory. Both labs can use the materials in research programs, avoiding disposal costs for Hanford.

Another successful project for the 300 Area was the accelerated "skyline reduction" initiative that included the demolition of two water towers in the 300 Area. Another part of the project was the demolition of the 303-K Building, a former radioactive and mixed-waste storage facility.

The first of four "tall well" railcars was shipped from Hanford to Memphis, Tenn. The 150,000-pound specialty cars were once used to transport fuel from the reactors near the Columbia River to the processing plants in the 200 Area. Instead of burying them as mixed waste, the cars are being recycled, which leaves no mixed waste, saving taxpayers at least $100,000 per car. ✦

ERC team continues 'cocooning' surplus reactors

Some of the most visible progress in the Columbia River corridor is the Environmental Restoration Contractor team's work on "cocooning" Hanford's retired reactors. Cocooning involves demolishing all parts of the reactor building except for the 5-foot concrete shield walls surrounding the core. Then all the exterior openings are sealed and a 75-year roof is placed over the building.

Eight of Hanford's nine surplus plutonium production reactors will be placed into interim safe storage for up to 75 years. With the exception of the 100 K, N and C areas, all that essentially remain are reactor buildings containing highly radioactive cores. C Reactor is already cocooned.

Bechtel Hanford, Inc., the Department of Energy Richland Operations Office's Environmental Restoration Contractor, and its pre-selected subcontractors CH2M HILL Hanford, Inc. and Eberline Services Hanford, Inc. are at work to place the retired reactors in interim safe storage.

This is the status of interim safe storage for four reactors:

H Reactor – 19 percent complete. Pre-demolition work was completed including hazardous material removal, asbestos abatement, liquid pipe checks and equipment removal along with the backfill of the valve pit/supply fan area. Cocooning is scheduled to be complete in fiscal year 2005.

D Reactor – 47 percent complete. Demolition of major building complex portions was completed including the fan and valve pit areas. Cocooning is scheduled to be complete in FY 2003.

DR Reactor – 90 percent complete. All openings in the shield wall were sealed, the final stage before installing the roof. A subcontract to design and install the roof was awarded with most of the design completed. Cocooning is scheduled to be complete in FY 2002.

F Reactor – 77 percent complete. Unlike other reactors, the fuel storage basin was filled with sand before it was cleaned out and drained during deactivation. Visible progress included removing 17 feet of clean fill from the basin and planning to remove the remaining 3 feet that is known to contain radioactive sludge and other debris, including spent fuel elements and fragments. The ERC team improved safety plans and began fill removal using a specialized remotely controlled Brokk excavator that was custom-built in Sweden. Cocooning is scheduled to be complete in FY 2003. ✦

In July, an excavator removes a contaminated outfall structure that once released cooling water into the river from B and C reactor effluent-retention basins. The ERC team has removed 3.2 million tons of such contaminated materials from the river corridor.

Environmental Restoration Contractor accelerates cleanup in FY 2001

In fiscal year 2001, the Environmental Restoration Contractor team and non-ERC cleanup activities safely removed 610,000 tons of waste from the Columbia River corridor, 13 percent more than planned. In fact, the ERC team led by Bechtel Hanford has exceeded quantities planned for the past six years. By the end of FY 2001, the ERC team had removed 3.2 million tons of radioactively and chemically contaminated materials from the river corridor, 30 percent of the estimated total volume.

100F Area

At F Reactor, 370,000 tons of contaminated material were removed in FY 2001 as the ERC team cleaned up concrete, steel and soil from liquid waste sites. These sites included effluent piping, drainage and sewer systems, along with unplanned-release areas.

A visible, highly contaminated site

At N Reactor, representing the most radiological contaminated areas in the river corridor, the ERC team removed nearly 102,000 tons of highly contaminated material. The challenge began in July 2000 and focused on removing highly contaminated material from the N-3 crib and trench. Cribs and trenches dissipated liquids discharged from reactor-cooling systems into the soil. Liquid waste spread through layers of silt, gravel and rock. Conditions prompted on-site improvements to techniques for protecting the environment and reducing workers' exposure to potential radiological hazards. The use of these innovative technologies and techniques will ensure safety for cleanup at Hanford's remaining liquid waste sites.

Columbia River contaminants

In FY 2001, over 85,000 tons of contaminated soil were excavated at the 100 B/C Area to access concrete and steel effluent piping systems and three outfall boxes that led directly to the Columbia River. The effluent piping and outfall structures carried water from cooling ponds into the river during B and C Reactor operations.

Also in FY 2001, a cleanup project at the JA Jones landfill remediated nearly 29,000 tons of contaminated material.

Backfilling with clean soil

While the ERC team was cleaning up waste sites, operations were accelerated at the 100D, DR and H areas. Twenty-two former waste sites and effluent pipelines were backfilled with clean soil at D and DR Reactors. The work was completed five months ahead of schedule, which allowed for more cleanup work at other reactor areas. At H Reactor, 10 sites and effluent pipelines were backfilled two months ahead of schedule. ✦

Continued on page 9.

ERC team stabilizes surplus facilities, reduces worker risk

A key part of the Environmental Restoration Contractor team's work involves safeguarding and maintaining inactive Hanford facilities while reducing risk to workers and public health. The Surveillance/Maintenance and Transition Project, part of the Environmental Restoration contractor team led by Bechtel Hanford, maintains, inspects and stabilizes inactive facilities, mitigating potential hazards.

During FY 2001, project personnel completed roof inspections and repaired exhaust systems at the inactive PUREX plant and reduced the plant's overall maintenance costs. They completed interim stabilization at sites surrounding PUREX and three 200 Area waste sites containing two retention basins and one burial ground.

They also completed the Canyon Disposition Initiative feasibility study. The study gives decision-makers information they need to determine cleanup options for the five massive inactive chemical processing plants at Hanford, known as canyon facilities. The Canyon Disposition Initiative was supported by extensive fieldwork at U Plant, the host facility.

Canyon disposition options range from completely removing the immense facilities to using the structures themselves as waste disposal facilities. During FY 2002, stakeholders will use the Canyon Disposition Initiative fieldwork data to determine preferred alternatives for Hanford's five canyons.

B Reactor, on the other hand, is a historic landmark. It was the world's first full-scale nuclear production reactor, and the ERC team has worked to clean up and maintain the reactor building and support safe, escorted public tours. More than 1,200 people visited B Reactor, including Russian treaty officials, the media and members of Congress. ✦

Integration Project brings together information for Hanford cleanup

The Groundwater/Vadose Zone Integration Project was established in 1997 to coordinate and integrate a wide range of activities affecting Hanford's groundwater and vadose zone — the soil between the ground surface and the groundwater. In fiscal year 2001, the Integration Project continued to gain momentum in integrating site-wide applications of fieldwork, science and technology and public involvement. The Integration Project's goal is to provide the sound technical basis for making and supporting cleanup decisions at Hanford.

Bechtel Hanford, Inc., the site's Environmental Restoration Contractor, manages the Integration Project. In addition to BHI, team members include CH2M HILL Hanford Group, the Pacific Northwest National Laboratory and Fluor Hanford, and they receive support from other national laboratories and universities.

In FY 2001, the Groundwater/Vadose Zone Integration Project:

- Accelerated fieldwork to collect radioactive and chemical samples from some of the most hazardous waste sites
- Completed investigation near an aging radioactive burial site for tritium contamination within the groundwater
- Completed first evaluation of the System Assessment Capability, a suite of computer models and cleanup analysis techniques used to predict the movement and fate of remaining contaminants after site closure
- Integrated information into a virtual library, an evolving, user-friendly Intranet site for Hanford workers to review and use site-wide environmental data
- Obtained valuable feedback from citizens, regulatory agencies and tribes at monthly public meetings.

To find out more about the Groundwater/Vadose Zone Integration Project, visit: **www.bhi-erc.com/projects/vados**e. ✦

The River Protection Project — doing a tough job better and smarter

Office of River Protection

Sixty percent of our nation's high-level nuclear waste is stored at Hanford. The waste — the legacy of more than four decades of plutonium production for the national defense — is located in underground tanks just seven miles from the Columbia River.

The plan to solve this problem is straightforward: remove the waste from the tanks, vitrify the waste (turn it into glass logs) and close the tank farms. Vitrification is the technology that has been used to turn the radioactive tank waste into glass at two Department of Energy sites in the U.S. — West Valley and Savannah River — and numerous other worldwide sites including two in France and one each in the Unite Kingdom and Belgium.

The U.S. Department of Energy's Office of River Protection was established in 1998 to complete the Hanford tank cleanup. ORP manages all aspects of Hanford's River Protection Project, including tank-farm operations, waste retrieval, construction, commissioning and operation of the vitrification plant, disposal or storage of the glass and closing the tank farms.

The River Protection Project includes ORP and its prime contractors CH2M HILL Hanford Group, Inc. and Bechtel National, Inc., as well as DOE's Pacific Northwest National Laboratory (operated by Battelle Memorial Institute) for science and technology coordination. With an annual budget of approximately $1 billion, the River Protection Project is DOE's single largest and most challenging environmental cleanup project.

The River Protection Project made much important progress during fiscal year 2001. ORP, however, is not content with the status quo and is thinking about how to improve the plans for completing waste treatment and tank-farm closure. The goal is to complete the mission in a way that protects health and the environment and complies with regulations much sooner and at much lower cost.

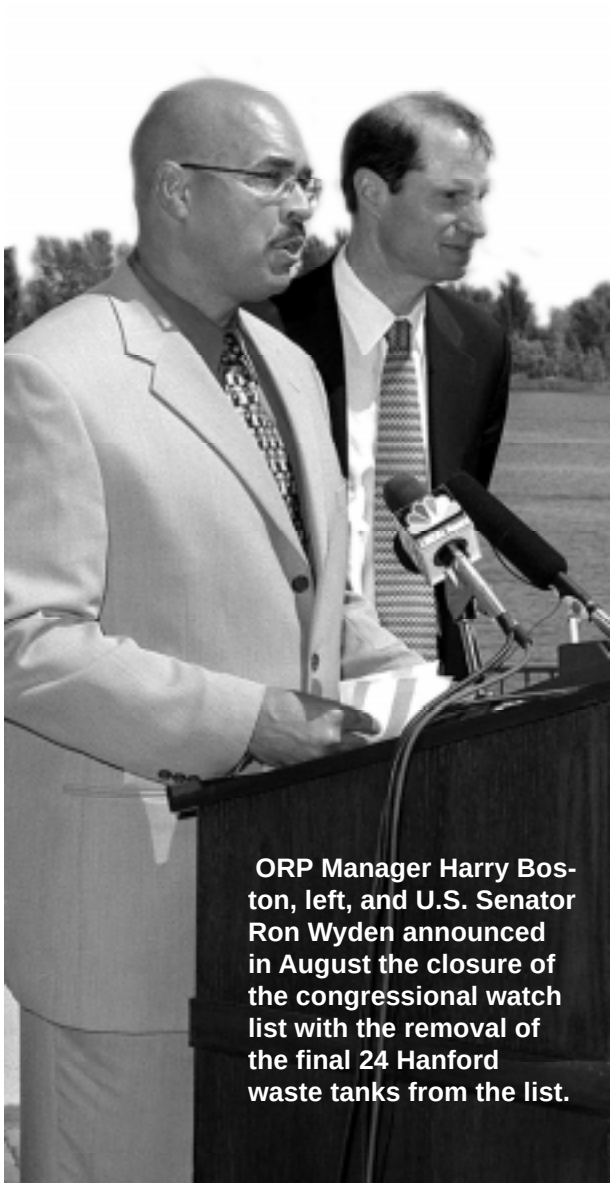
CH2M HILL progress has made the tank farms safer

The Hanford Site has been storing waste in underground tanks since creating radioactive waste products began during World War II.

- The site has 177 large underground tanks with approximately 53 million gallons of highly radioactive and hazardous waste.
- 149 single-shell tanks were built from 1943 to 1964.
- 28 double-shell tanks were built from 1968 to 1986.
- The tanks are grouped into 18 tank "farms."
- 67 of the single-shell tanks have leaked or are suspected of having leaked approximately 1 million gallons of waste in the past, including an estimated one million curies of radioactivity.

As the tank-farm contractor, CH2M HILL Hanford Group's responsibilities fall into four categories of work:

- Reducing risks through safe storage of tank waste
- Making preparations for retrieval of tank waste
- Preparing for tank waste treatment
- Preparing for disposal of treated tank waste
- Planning for closure of tanks.



ORP Manager Harry Boston, left, and U.S. Senator Ron Wyden announced in August the closure of the congressional watch list with the removal of the final 24 Hanford waste tanks from the list.

01080078-18cn

Congressional tank safety watch list closed

Office of River Protection Manager Harry Boston announced in August the resolution of significant safety issues resulting in the removal of the final 24 high-level waste tanks from the Wyden congressional safety watch list. Closure of the final safety issue completed a Tri-Party Agreement milestone more than a month early.

Oregon Senator Ron Wyden authored the law in the early 1990s requiring DOE to watchdog the most dangerous tanks at Hanford. As many as 54 tanks were on the list at one time because of concerns over generation of flammable gases, the presence of flammable organic chemicals and potentially explosive ferrocyanide, and high heat levels generated by certain types of wastes.

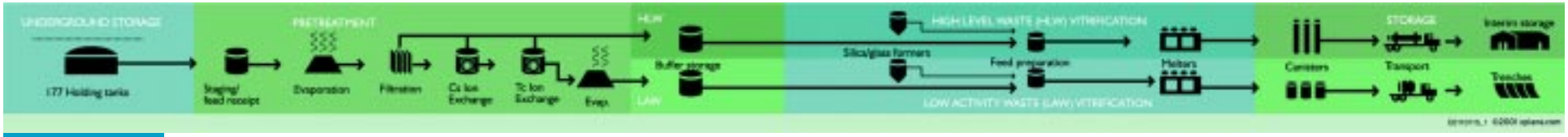
“We owe a special thanks to the Office of River Protection,” said Wyden, “because they’ve made it clear that they’re going to continue this effort of monitoring.”

“I, too, want to thank Harry Boston and the Office of River Protection, but also CH2M HILL, because it wouldn’t have worked without their perseverance and the workers out there getting the job done,” said Congressman Doc Hastings.

Famous ‘burping’ Tank SY-101 returned to service

Following safety reviews by the Department of Energy and its regulators and contractors, Hanford’s once-“burping” waste tank has been returned to service, marking the end of more than a decade of serious safety problems and a costly effort to solve those problems.

Tank SY-101 will be a key staging point for single-shell tank waste destined for the planned vitrification facility in the 200 East Area. Returning the million-gallon, double-shell tank to service closes the book on what was once Hanford’s and the Department of Energy’s top safety concern.



The Plateau. . .

Reducing the risk: safe tank waste storage, continued

Maintenance outage program begun

While double-shell tank farms continue their mission of safely storing radioactive and hazardous waste within aging facilities, those facilities are being upgraded and new systems constructed to prepare for delivering waste to the planned vitrification plant. Because of this dual role, those who perform daily tank-farm tasks and those on construction projects must vie for time and physical space within areas often quite crowded with equipment and workers.

To alleviate these conflicts and increase efficiency, CHG initiated a maintenance outage program, a common practice in the nuclear energy industry, for performing corrective and preventive maintenance in the double-shell tank farms. No construction project work is scheduled during these outages, and a dedicated team can then perform maintenance without interruption and free the tank farm for construction project work later.

Slowing the spread of contamination

Efforts to keep water out of areas where past tank leaks have contaminated the soil with radioactive and hazardous waste continue. Crews with ORP and CHG are cutting unneeded water pipes, building berms around tank storage areas, and installing drainage control on nearby roads to keep water from moving toward the tanks.

Sixty-seven of Hanford's older single-shell tanks have leaked or are assumed to have leaked an estimated 1 million gallons of waste into the ground in the past.

More than $1 billion in upgrades are under way in Hanford's tank farms, including installation of waste transfer pumps and pipelines and improvements to process pits that contain valves, pumps and other equipment. The upgrades will be needed to transfer millions of gallons of radioactive and hazardous waste to the planned vitrification facility.

Preparations for tank waste retrieval

ORP and CHG are making over $1 billion in upgrades to Hanford's tank farms to be ready for retrieving waste and sending it to the planned vitrification facility by 2006. The upgrades include installing thousands of feet of waste transfer piping and numerous tank mixing and transfer pumps. Other work includes preparations to remove solid waste from the aging single-shell tanks.

Single-shell tank preparations

While much of the liquid waste has been removed from Hanford's single-shell tanks, a major effort is under way to demonstrate technologies needed to remove the remaining solid waste.

The stage is set to demonstrate a prototype retrieval method in single-shell Tank U-107. Hanford crews are first pumping out a layer of liquid waste. Then they will begin to dissolve a portion of the underlying solid waste, or saltcake, by alternating gentle sprays of water with pumping. Over a three-month period, about 37,000 gallons of solid waste will be removed from the tank.

The demonstration will provide important information on the best and safest way to remove solid waste from other single-shell tanks. A regulatory milestone calls for ORP to remove enough waste with dilution water to fill at least 2 million gallons of double-shell tank space before October 2006.

Hanford Cold Test Facility

CHG awarded a $2.4 million contract to Los Alamos Technical Associates to design and build a test facility that will include a large simulated waste tank. The facility is needed to ensure that new technologies and cleanup systems work well before they're put in the highly radioactive and hazardous environment of a Hanford tank. The facility will cover nearly 10 acres near the HAMMER training facility and is expected to be ready for equipment development and testing in the summer of 2002.

Upgrading and new construction

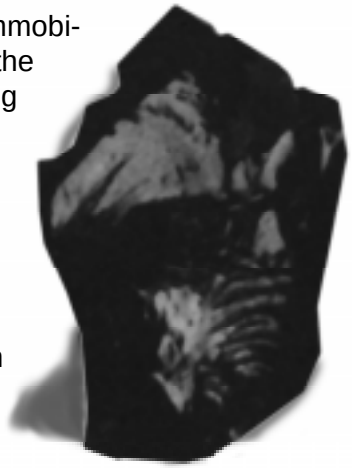
Upgrades and new construction are under way in the tank farms to prepare for retrieving waste and delivering it to the planned vitrification plant. A portion of this work includes refurbishment of tank-farm process pits, which contain valves, pumps and other equipment used to transfer radioactive waste in and out of the tanks. Four of these pits were upgraded in fiscal year 2001, with 32 more scheduled beginning in fiscal year 2002.

The pits are opened only when necessary to reduce the risk of spreading contamination to the environment and employees, and because it is very costly to do so. Over the decades since they were built, some deterioration has occurred. CHG is applying polyurea, a substance similar to a spray-on truck bed liner, to make process pit upgrades safer, easier and less costly. Polyurea provides a liner that is easy to decontaminate, resists abrasion and will stretch with any settling of the concrete, thus serving as secondary containment to protect the environment.

Other ongoing and recently completed construction work includes a new valve pit being built in AZ Tank Farm, a new valve manifold and coverblocks for a process pit in AW Tank Farm, installation of 10,000 feet of waste transfer pipeline, and replacement of the SY Tank Farm annulus exhauster.

CH2MHILL
Hanford Group, Inc.

Vitrification:
Immobilizing radioactive waste in glass



Vitrification is a proven technology to immobilize radioactive waste and isolate it from the environment. In the process, glass-making materials such as silica are added to the waste. The mixture is then heated to 2,100 degrees Fahrenheit in an electric melter. The result is an exceptionally sturdy and stable form of glass.

Vitrification has been proven to work on radioactive waste at other Department of Energy sites and in other countries, most notably in England and France. At West Valley, N.Y., vitrification is being used to immobilize radioactive wastes left over from a commercial nuclear fuel reprocessing plant. The technology has also been used for several years at DOE's Savannah River Site in South Carolina.

Before it is vitrified, the waste must be pretreated to separate the high-level radioactive waste from the low-activity waste. Once the high-level and low-activity wastes are separated, filtered and chemically altered, silica and other glass-forming materials are added to form a slurry.

The waste slurry is sent to separate vitrification plants for the high-level and low-activity wastes. The slurry is fed into melters where it is heated by passing electricity through it. This is known as joule heating.

Low-activity waste can be processed much faster than high-level waste. Vitrifying low-activity waste takes about two-and-a-half days, while the high-level waste mixture must remain in the melter for more than six- and-a-half days.

Once the waste is completely dissolved in the molten glass, the glass is poured into large stainless steel canisters. The canisters must cool for a few days before being welded shut and decontaminated.

High-level waste canisters will be stored in Hanford's existing Canister Storage Building until they are eventually shipped to a federal geologic repository for permanent underground disposal. Low-activity waste canisters will be buried in concrete-lined trenches at a Hanford waste disposal facility well away from the Columbia River. ✦

Preparing for tank waste treatment

Vit plant infrastructure ready

The infrastructure that will provide electricity, water and roads for the vitrification plant is complete. The project features an electrical substation and 230-kilovolt transmission lines to supply the vitrification melters, which will operate continuously at 2,100 degrees Fahrenheit.

Three miles of pipeline that will deliver water for vitrification processes and for drinking and firefighting have been installed. A separate 2.5-mile piping system will transport liquid effluent byproducts to existing treatment and disposal facilities on the Hanford Site.

The intersection at Route 4 South and Canton Avenue in the 200 East Area was widened and reinforced to accommodate heavy construction traffic, and streetlights were added. A new road also encircles the 65-acre area where Bechtel National will build the Waste Treatment Plant.

CHG and its subcontractors completed the infrastructure project more than a year ahead of schedule and $9 million under budget.

On his first visit to Hanford earlier this month, Secretary of Energy Spencer Abraham, left, views the Hanford tank farms with Fran DeLozier, president of CH2M HILL Hanford Group, and Harry Boston, manager of the Office of River Protection.

Preparing for disposal of treated tank waste

CHG will also be responsible for storage of the highly radioactive, but more easily managed, glass logs until permanent disposal facilities are available. High-level waste glass, containing more than 99 percent of the radioactivity in the tanks, will be stored in the Hanford Site's Canister Storage Building until a permanent repository is established.

CHG and ORP are preparing to apply for a permit to retrofit two existing vaults in the building to provide storage capacity for 880 canisters of high-level waste. Preparations will include adding storage tubes and ventilation systems, and adding or modifying handling equipment and a receiving area.

Low-activity waste glass will be disposed of in subsurface trenches in the 200 East Area between PUREX and the steam plant. Initial design efforts have provided a concept of the trenches and an estimate of the cost and schedule involved.

Plans call for building one double-lined trench for the first phase of cleanup, with supporting infrastructure for a total of six trenches. Each trench would be almost the length of three football fields, nearly 90 yards wide and 33 feet deep. Leak detection and runoff collection systems would be contained in the double liner. Each trench would have the capacity to hold 13,500 containers of low-activity waste glass.

Mobilization for Waste Treatment Plant Project begins

Limited construction activities on the Waste Treatment Plant site were started in early October. During this limited construction period, excavation is just the first of many tasks to be completed, including concrete work, installation of underground utilities and erection of modular office space. Work on the underground utilities will begin in early December.

Construction of the Waste Treatment Plant, the world's largest plant of its kind, was mobilized in late September. By the time the first structural concrete on the plant's three major nuclear facilities is placed next year, 10 percent of the overall construction will have been completed. Some 18,849 cubic yards of concrete will have been placed, 157,717 feet of piping installed and 995,489 feet of electrical cable pulled.

The Waste Treatment Plant's three major facilities — pretreatment, high-level waste vitrification and low-activity waste vitrification — along with a variety of operations and maintenance buildings, analytical laboratories, utility services and administrative buildings make up the $4 billion project.

The pretreatment facility will take the tank waste feed and separate it into two separate streams: low-activity radioactive waste and high-level radioactive waste.

The low-activity waste vitrification facility will have three melters, and the high-level waste vitrification facility features a single melter.

Processes, equipment and facilities must be designed to operate at significantly increased production rates when compared to current U.S. and international facilities. Applied research and technology programs are under way to support the increased efficiency of the plants. The work must all be done on an aggressive schedule to meet Tri-Party Agreement commitments. Construction will begin in 2002, with operations scheduled for late 2007. The facilities will be in full operation and ready to turn over to an operations contractor by 2011.

By 2018, a minimum of 10 percent of the waste, representing 25 percent of the radioactivity in the tank waste, will be vitrified.

To meet this schedule, Waste Treatment Plant Project team members have set ambitious goals for every aspect of the project, including planning, permitting,

Continued on page 17.

Mobilization for Waste Treatment Plant Project begins, cont.

construction and commissioning — all the while maintaining a commitment to safety and a zero-accident philosophy.

The sheer size of the project is a challenge, according to Project Manager Ron Naventi, senior vice president of Bechtel National, Inc.

"If you look at the quantity of materials we need for this project — concrete, structural steel, piping and electrical cable — it's akin to building a two-unit nuclear power plant station."

The workforce will peak at about 4,300 people in 2004. Once the Waste Treatment Plant is fully operational, staff levels will settle at about 600 employees.

"Our success will also be measured on how safely, efficiently and cost-effectively the plant operates," said Naventi. "As we move closer to construction, we are focusing on minimizing the total installed cost and maximizing the return on investment to DOE and the taxpayers."

There are four initiatives in place to minimize cost and maximize the return on investment:

- Evolving the design with the target of saving $300 million in the project cost and saving $500 million of the life-cycle cost

- Using a quality control plan called Six Sigma to provide process improvements to save $100 million in capital costs

- Devising plant optimizations to improve life-cycle operations and accelerate completion of the mission

- Delivering the best available, proven technology.

When fully operational in 2011, the Waste Treatment Plant will have but one mission: to finally solve Hanford's tank waste problem by immobilizing the wastes in a sturdy glass that will remain stable and impervious to the environment while its radioactivity dissipates over a period ranging from hundreds to thousands of years. ✦

U.S. Senator Patty Murray and Congressman Doc Hastings review plans for construction of the Waste Treatment Plant with ORP Manager Harry Boston, right.

PFP Nuclear Material Stabilization Project team on a roll

Allen Ostby performs routine surveillance on the W460 glovebox.

The Nuclear Material Stabilization Project at the Plutonium Finishing Plant has come a long way since starting up the thermal stabilization process in January 1999. Using two muffle furnaces inside a glovebox, project staff members began heating plutonium residues and oxides to drive off water and volatile chemicals to convert the materials into a stable form for long-term storage.

Subsequently, project staff members also designed, installed and brought on line the rest of the processes needed to stabilize and package all of the PFP plutonium forms including metals, solutions, oxides, alloys, residues and polycubes.

In fiscal year 2000, the Nuclear Material Stabilization Project team met the Department of Energy Richland Operations Office Manager Keith Klein's challenge to quadruple the plutonium stabilized in 1999. This year, according to George Jackson, Fluor Hanford vice president for the Nuclear Material Stabilization Project, the project has already quadrupled the 2000 amount.

Solutions stabilization

Since the start-up of solutions stabilization in October 2000, the team has made steady progress on stabilizing PFP's inventory of over 4,200 liters of plutonium-bearing solutions. The team has processed about 22 percent of the total volume of the solutions that contained over 50 percent of the plutonium. The project has purposely chosen the best-integrated safety approach by processing solutions with the lowest volume but highest plutonium content, thus mitigating the highest risk first.

Moisture measurement is a vital part of ensuring the integrity of the plutonium storage container by making sure that there will not be a buildup of pressure within the container that could potentially cause container failure.

Klein commended PFP staff members for their work in discovering the analytical bias in DOE-approved methods of moisture measurement. "Specifically, I commend Scott Barney, Thurman Cooper, Rich Szempruch and Ted Venetz of the Plutonium Finishing Plant staff," Klein said. "Their timely detection of this problem will save DOE and its contractors thousands of hours and millions of dollars by avoiding flawed moisture measurement in packaging plutonium."

Through a recent acceleration initiative, PFP has gained DOE and Defense Nuclear Facilities Safety Board approval to directly

Continued on page 19.

dispose of some of the low purity plutonium solutions.
Implementation of the direct discard process has accelerated stabilization of the entire solutions inventory by over two months. It also reduces unnecessary processing, radiation risk and costs. Solutions stabilization at PFP is now on schedule to be completed in July 2002.

Metals stabilization

In September, the PFP staff completed stabilizing and repackaging the inventory of plutonium metals and the small amount of corrosion products from disintegrated metals, attaining a key goal set by the DNFSB. A significant efficiency was realized through metals brushing, which left a stable metal that was repackaged into the new storage containers. Only the powdered oxides brushed off the metal and the corrosion products required thermal stabilization before packaging.

Alloys

Disposition of the material group identified as alloys proved to be quite challenging. The greatly varied alloy group was divided into two groups: residues that could be disposed of directly and those materials requiring stabilization and packaging for long-term storage. The residues team repackaged 31 alloy residue items for shipment to the Waste Isolation Pilot Plant, and the thermal stabilization team completed brushing and packaging of 11 alloy items into the new stainless steel canisters. The remaining alloy items will be stabilized and packaged after an adequate moisture measurement technique is developed and approved.

3013 Plutonium storage canisters

Start-up operation of the outer can welder on April 10 made Hanford the first DOE site to fully comply with the new DOE national standard for safe, long-term storage of plutonium by completing the welding of the inner and outer canisters with the stainless steel “convenience” can inside. PFP continues to set the pace for the complex with both the variety of materials packaged and the speed at which they are being produced.

Residues

The residues team began repackaging Hanford plutonium ash in early April and shipped the first batch of the packaged ash to the Central Waste Complex on May 17. The team took a break from residues repackaging to package the alloys for shipment to the WIPP. The team is now recovering schedule in the repackaging of Hanford ash to be completed in January 2002.

W460

The Material Packaging team recently completed an Operational Readiness Review to allow hot start-up of the new processing system by the end of November. The Nuclear Material Stabilization Project will more than double the stabilization and packaging capabilities when the W460 Project is brought on line. This system will have four large furnaces and processes to package and weld material into both the inner and the outer canister all in the same location.

New technology in the vault

Fluor Hanford, Pacific Northwest National Laboratory and DOE teamed to develop and apply an innovative PNNL technology to remotely monitor the new canisters. PNNL’s radio-frequency tag is linked with a pressure monitor developed by Vista Engineering Technologies, a local firm. The integrated system will provide continuous monitoring of pressure, temperature and safeguards information for each canister. Cost savings and avoidances are projected to exceed $10 million.

Safety

Despite accelerated schedules and many technical challenges, the PFP team has achieved more than 2.3 million hours and 700 days without a lost-workday accident case. However, there is an increased focus on the incidence of Occupational Safety and Health Administration recordable incidents. Management and staff take these incidents very seriously.✦

Project manages variety of waste in many facilities

Progress is the key word for the Fluor Hanford Waste Management Project. As Hanford's transuranic waste is shipped off-site, T Plant prepares to accept K Basins sludge and the burial grounds manage waste receipts from cleanup activity across the site, the Waste Management Project adds daily to its record of over 2.9 million work hours without a lost-time accident. In addition, the Waste Management Project finished fiscal year 2001 by completing all Tri-Party Agreement milestones on or ahead of schedule.

TRU shipments

During FY 2001, the Fluor Hanford TRU Program certified, packaged and sent more shipments of Hanford's transuranic waste to the Waste Isolation Pilot Plant near Carlsbad, N. M. Cost savings and efficient operation enabled the project to send seven shipments, two more than originally planned and funded. Ten shipments to WIPP have been made since the shipments began in the summer of 2000.

Last summer, the TRU Program was re-certified to continue shipping TRU waste to WIPP. The requirements for disposal of waste at the WIPP are expected to change as operating experience is gained and as discussions continue with regulatory agencies.

T Plant

T Plant began operation 57 years ago and will serve the nation again when it begins storing spent fuel sludge from the cleaning of the K Basins and supports other Hanford Site missions.

To support these future missions, T Plant personnel must first remove the Shippingport Atomic Power Plant spent nuclear fuel from protective cells in the massive canyon area. The assemblies from this decommissioned Pennsylvania power plant have been stored in water in two T Plant cells since the 1970s.

A grouted container bearing remote-handled waste is removed from a shipping cask for placement into a high-integrity container in the 200 Area Burial Grounds.

Upon successful completion in FY 2002 of a contractor and DOE Operational Readiness Review, work will begin to lift the fuel assemblies from the pool cells for placement into Shippingport spent fuel containers. These containers then go to the Canister Storage Building to be safely stored and monitored until the opening of a national repository for high-level waste.

A large amount of stored material and some large equipment have been removed from the deck to make room for the fuel removal equipment and to support spent fuel sludge storage. Up to eight T Plant canyon cells must be cleaned out to receive both wet and dry sludge from the K Basins.

Continued on page 21.

Burial grounds

The Low Level Burial Grounds provide storage and disposal services for various Hanford waste streams. The burial grounds have recently accepted 21 grouted containers of waste from the B Cell cleanout of the 324 Building. The 300 Area cleanup work spearheaded by the River Corridor Project has been closely and successfully coordinated with the disposal operations in the burial grounds.

The burial grounds accepted the first shipment of waste returning to Hanford under a thermal treatment contract with a local commercial vendor. Personnel disposed of over 7,500 cubic meters of low-level waste and 160 cubic meters of mixed waste during FY 2001.

The burial grounds received the 102nd reactor compartment from the U. S. Navy for disposal. Additional steel tracking was installed in the reactor trench to allow the massive compartments to be off-loaded safely and efficiently and placed to optimize the use of trench space.

The burial grounds also hold thousands of drums, which are stored on special pads to await future evaluation for retrieval and disposal at the WIPP. Retrieval operations are underway on the uncovered drums. During FY 2001, more than 250 drums were surveyed and classified to identify those that should go to WIPP for disposal. Challenges will increase as the operation moves to the covered drums.

Strong performance

The Waste Management Project has been busy in other areas as well. The Liquid Waste Processing Facility processed more than 26 million gallons of wastewater. The 242-A Evaporator processed more than 800,000 gallons of tank waste for the Office of River Protection, on an accelerated schedule without a safety issue and at a decreased cost because resources were shared with the Liquid Waste Processing Facility.

The Central Waste Complex serves as the staging area for transuranic and mixed waste receipts and operations. Its inventory is the equivalent of approximately 43,000 55-gallon drums. The CWC also received 355 pipe overpack containers from the Nuclear Material Stabilization Project in addition to a large number of routine shipments. The Waste Encapsulation and Storage Facility completed a significant electrical safety upgrade. ✦

Restoration contractor triples planned 233-S vessel cleanup in FY 2001

In fiscal year 2001, the Environmental Restoration Contractor team, led by Bechtel Hanford, Inc., removed six more process vessels than planned at the highly contaminated 233-S Plutonium Concentration Facility. Three process vessels were originally scheduled for removal, but efficiencies by the ERC team allowed for faster cleanup while maintaining an excellent safety record. The 233-S vessel cleanup comprised the following tasks:

- Removal of nine highly contaminated process vessels
- Removal of 1,613 feet of process-hood piping
- 3,382 entries into the 233-S facility without a radiological uptake
- Completion of nondestructive assay on 753 waste packages
- ERC team's first transuranic waste shipment to Hanford's Central Waste Complex. ✦

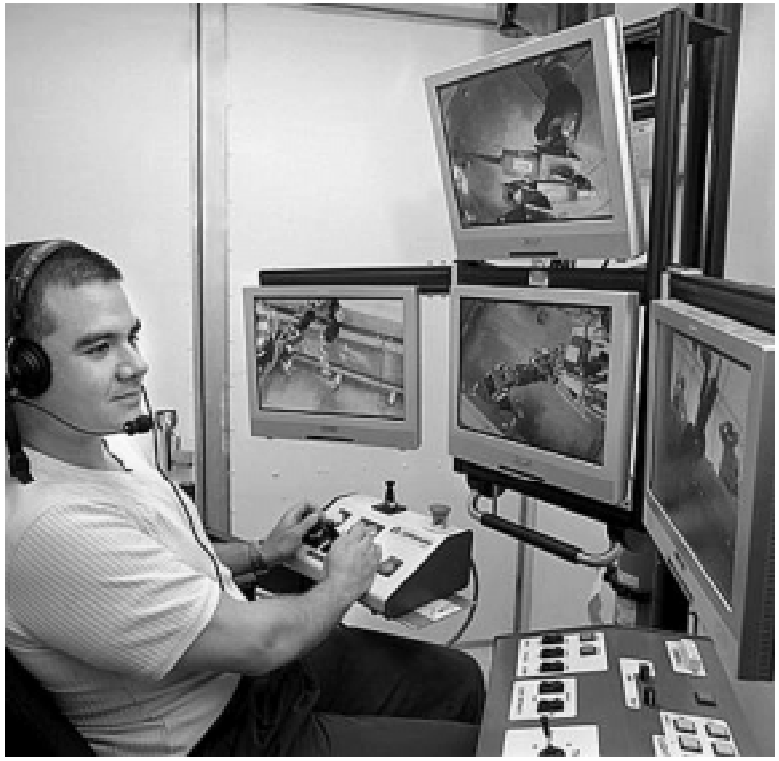
HAMMER continues to grow and serve on-site and off-site workers at unique facilities

During fiscal year 2001, the Volpentest HAMMER Training and Education Center continued to focus on its primary mission — serving Hanford cleanup activities through high-quality training programs for site workers.

The facility's cumulative Hanford/non-Hanford on-site student day grand total reached 126,046 by the end of September. Of the 40,522 Hanford/non-Hanford on-site student days accumulated, 31,169 were for Hanford workers. While experiencing its highest growth year since first opening the doors to the new facility, HAMMER continued to operate in a safe and effective manner. HAMMER students are very satisfied with their courses, and consistently rate their training with an average of 4.6 out of 5 points. For 750,000 work-hours without a lost-workday injury, HAMMER earned a three-star award from the Fluor Corporatation.

Hanford use of HAMMER for mock-ups, simulations and similar activities increased during FY 2001. Representative examples include 300 Area, T Plant and polyurea mock-ups; a Pit Viper simulation; and a tower reduction demonstration. Pit Viper officials estimated they saved $250,000 and six months by modifying the HAMMER Waste Tank Prop, rather than building a new facility for training.

HAMMER staged 348 respiratory classes, 186 hazardous waste operations and emergency response regulations classes, 224 radiation worker classes and 122 basic first-aid classes for Hanford workers during the fiscal year. The facility also achieved $350,000 in annual savings and "one-stop-shopping" for Hanford workers by moving the Training Requirements and Standards staff, Mask Fit Station and Basic Skills Lab from the Hanford Training Center to the HAMMER location.



PNNL senior development engineer Michael Catalan demonstrates the remotely controlled Pit Viper robotic arm.

HAMMER brokered or supported 186 class sessions for Hanford Site special needs training at the facility during FY 2001. A total of 3,047 Hanford Site employees and contractors participated. The Department of Energy Richland

Continued on page 23.

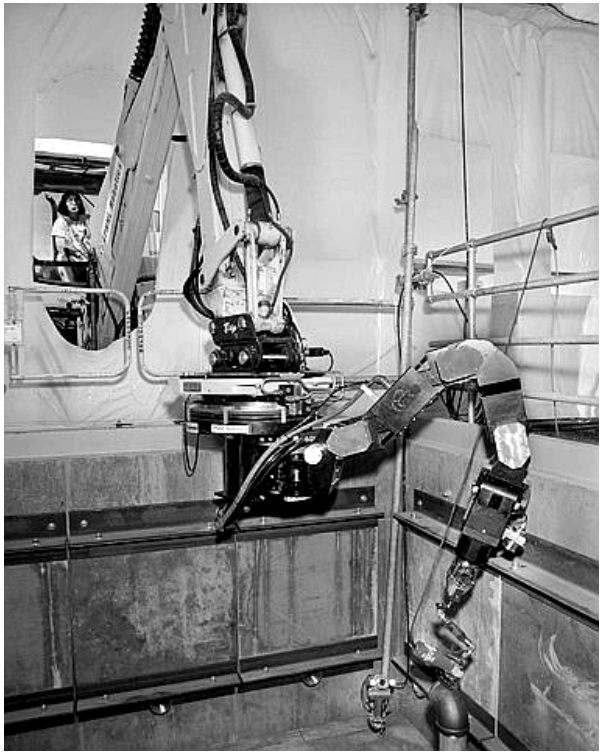
Operations Office and Office of River Protection, Pacific Northwest National Laboratory, Bechtel Hanford, Inc., CH2M HILL Hanford Group and other contractors requested the sessions.

HAMMER continued to work with the Occupational Safety and Health Administration to provide rigorous performance-based OSHA Training Institute and University of Washington OSHA Region X Education Center courses to Hanford workers. Of those students completing the spring 2001 Health and Safety Specialist certificate program through the University of Washington, nine were from the Hanford Site.

The Hanford Fire Department and mutual aid fire departments conducted 76 classes at the HAMMER facility's main campus during the fiscal year, while the Hanford Patrol conducted 839 Security Police Officer II student days and 764 Security Police Officer III student days at the HAMMER Law Enforcement and Security Training Center. A total of 27 half-day Hanford Site Emergency Preparedness initial training courses were also presented for 211 students.

Through its secondary mission, HAMMER continues to avail non-Hanford customers of its excess capacity. HAMMER remains remarkably successful at fulfilling this goal.

During the four years it has been in operation, HAMMER was able to charge $888,000 in costs to customers beyond Hanford. HAMMER was also been able to spread more than $2 million of Fluor company-level overhead to customers beyond Hanford. In effect, this has reduced the amount of company-level overhead the Hanford projects (the Spent Nuclear Fuel Project, for instance) have had to pay.

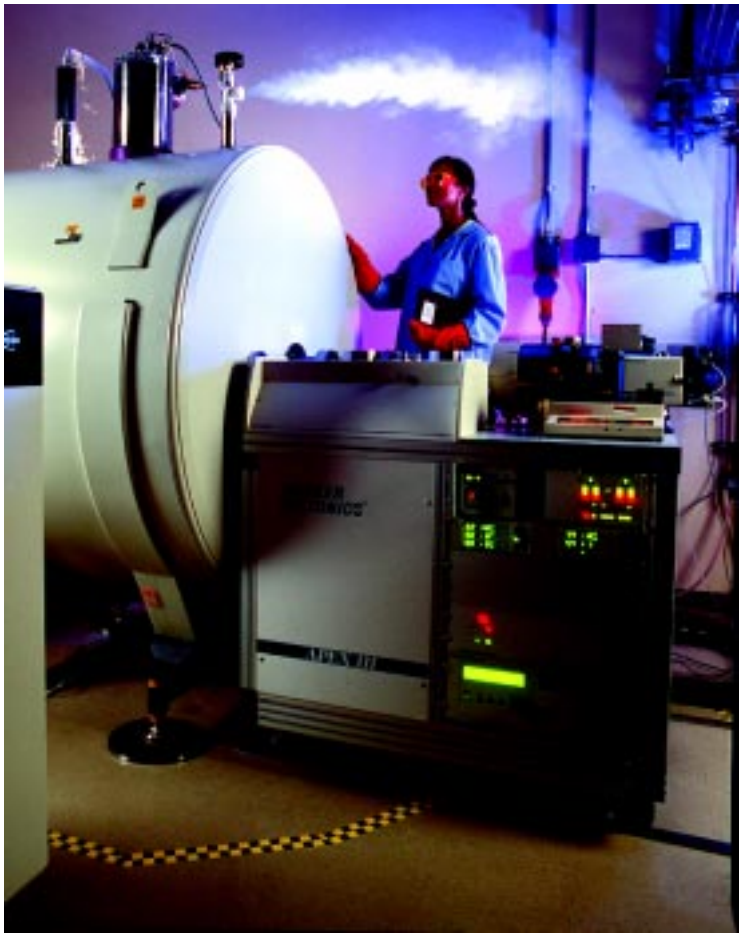


The Pit Viper maneuvers in the HAMMER modified waste tank prop.

In addition, reimbursements from customers renting the facility reached a total of $627,000 after four years of operation. In short, the HAMMER facility's support of external customers has generated more than $3.6 million of financial benefit to the Hanford Site in the past four years.

HAMMER was actively planning future operations with homeland security forces such as the Washington Army National Guard and U.S. Marine Corps Chemical Biological Incidence Response Force before the terrorist attacks of Sept. 11. Since that date, HAMMER's unique capabilities position the facility to conduct anti-terrorism and domestic preparedness training on an even greater scale. A major CBIRF/Hanford Patrol training session took place in October. Sam Volpentest, HAMMER founder and champion, has taken the lead to promote the training center for other similar activities. ✦

PNNL is building bridges to the future



The 9.4 Tesla Fourier transform ion cyclotron mass spectrometer is the latest addition to research instrumentation at the William R. Wiley Environmental Molecular Sciences Laboratory located at PNNL. The device weighs peptides, a key capability in determining the roles proteins play in cells and living systems.

At Pacific Northwest National Laboratory, 2001 has been a year of visionary planning, new partnerships, prestigious recognition and impressive progress in science and technology.

Laboratory leaders have been putting the final touches on "PNNL 2010," a comprehensive plan designed to sharpen the laboratory's vision, mission and strategy through the decade. PNNL 2010 builds upon PNNL's science base, better defines research missions and roles, and enhances intellectual property development. Other parts of the plan address workforce and workplace issues, facilities and infrastructure and PNNL's role in the region and community. Elements of PNNL 2010 have been incorporated into fiscal year 2002 business plans.

Over the past year, PNNL established three new research partnerships with:

- The University of Maryland, forming the Joint Global Change Research Institute in College Park, Md. to investigate the scientific, social and economic implications of climate change.

- The University of Washington to establish the Joint Institute for Nanoscience and Nanotechnology, a collaborative effort to study the "world of the very small," an area of science that could dramatically change the way we live.

- The Oregon University system and the Oregon Health and Science University for several joint projects focused on human health, sustainable industrial practices and promotion of high-tech businesses in the Northwest.

In June, the *Discover Magazine* Innovation Award in the Health category was presented to PNNL for its combined optical and magnetic resonance microscope. In addition, as part of the *Discover* awards program, researcher Dick Craig received a $100,000

Continued on page 25.

Christopher Columbus Foundation fellowship for the development of the Timed Neutron Detector, which offers improved approaches for locating metal and plastic landmines.

PNNL won four R&D 100 Awards for:

- A plasma-catalysis technology that significantly reduces oxides of nitrogen from the exhaust of next-generation energy-efficient vehicles

- A suite of analysis procedures, software and hardware that can reduce life-cycle operations and maintenance costs by as much as 25 to 50 percent

- A long-range, semi-passive radio frequency system that can identify, locate and even determine the condition of any item to which a tagging device is attached, a capability useful for assorted inventory applications

- A high-temperature viscosity measurement technology for process monitoring of hot molten materials such as those in glass manufacturing and metals refining.

During the year, three research initiatives were launched to strengthen PNNL's science base and provide the foundation for innovative, 21st century contributions to DOE missions.

- The Biomolecular Networks Initiative will explore new technologies and approaches to the study of important biological problems in the post-genomic era.

The fight against bioterrorism is gaining a new ally. The Biodetection Enabling Analyte Delivery System, or BEADS, is a sample preparation system developed at PNNL that will play an important role in putting bacteria detectors into the field. BEADS breaks apart environmental samples, such as soil, into a form for use by pathogen detectors. It can be used in chemical, protein, nucleic acid or whole-cell detectors.

- The second initiative is focused on the exciting new research field of nanoscience and nanotechnology, and will benefit from the partnership with the University of Washington.

- The third initiative, Computational Sciences and Engineering, recognizes that computation is integral to every aspect of research and will seek to develop PNNL into one of the world's premier computational science institutions.

PNNL researchers continued to assist with Hanford Site activities, including development of a system comprising sensors and wireless communications to monitor plutonium products that will be stored in individual, protective canisters. In the area of energy efficiency, progress continued in the development of fuel cell systems and vehicle emissions applications.

The September terrorist attacks focused the spotlight on PNNL's substantial national security capabilities and expertise. National Security Division staff members were interviewed by members of the media about potential threats of bioterrorism, technologies being developed to detect biological and chemical attacks and counter-terrorism measures. ✦