
EXECUTIVE SUMMARY

Purpose of This Report

This Annual Site Environmental Report for the West Valley Demonstration Project (WVDP or Project) is published to inform those with interest about environmental conditions at the WVDP. In accordance with U.S. Department of Energy (DOE) Order 231.1A, Environment, Safety, and Health Reporting, the report summarizes calendar year (CY) 2003 environmental monitoring data so as to describe the performance of the WVDP's environmental management system (EMS), confirm compliance with standards and regulations, and highlight important programs.

Project Description

During 2003, cleanup of radioactive waste from the former nuclear fuels reprocessing plant that shut down operations in the 1970s was continued at the WVDP. The Project is located in western New York State, about 30 miles south of Buffalo, within the New York State-owned Western New York Nuclear Service Center (WNYNSC). The WVDP is being conducted in cooperation with the New York State Energy Research and Development Authority.

Work activities at the WVDP during 2003 included:

- maintaining canisters of vitrified high-level waste in a shielded facility
- shipping low-level radioactive waste off-site for disposal
- shipping packaged spent nuclear fuel assemblies to Idaho National Engineering and Environmental Laboratory
- constructing a facility where large high-activity components can be safely size-reduced and packaged for disposal
- decontaminating the fuel storage pool and the cask unloading pool
- decontaminating the general purpose cell and the process mechanical cell (also referred to as the head end cells)

A reader opinion survey has been inserted in this report. If it is missing, please contact the Community Relations Department at (716) 942-2152. Additional Project information is available on the internet at <http://www.wv.doe.gov>.

- cleanup of waste in the plutonium purification cell (south) and extraction cell number 2 in the main plant
- planning for decontamination and dismantlement of the vitrification facility
- continuing preparation of the Decommissioning and/or Long-Term Stewardship Environmental Impact Statement
- monitoring the environment and managing contaminated areas within the Project facility premises.

Compliance

Management at the WVDP continued to provide strong support for environmental compliance in 2003. DOE Orders and applicable state and federal statutes and regulations are integrated into the Project's compliance program. Highlights of the 2003 compliance program were:

- No notices of violation or inspection findings from any environmental regulatory agencies were received by the WVDP in 2003.
- Inspections by the New York State Department of Environmental Conservation (NYSDEC) and the local department of health verified Project compliance with the applicable environmental and health regulations.
- The WVDP continued to successfully monitor specific waste management areas at the site in order to comply with the Resource Conservation and Recovery Act §3008(h) Administrative Order on Consent.
- The Project met the requirements of the Emergency Planning and Community Right-to-Know Act by collecting information about hazardous materials used at the Project and making this information available to the local community.

- The New York State Pollutant Discharge Elimination System (SPDES) Permit currently identifies five permitted liquid outfalls (for example, a pipe outlet where treated process water or storm water flows into a stream) at the Project. In August 2003, the WVDP filed an application with NYSDEC for renewal of the SPDES Permit. In September 2003 NYSDEC renewed the permit, which will expire in 2009.

- In fulfilling the requirements of the Site Treatment Plan developed under the Federal Facility Compliance Act, all important events in calendar year 2003 for the characterization, treatment, and disposition of mixed waste at the WVDP were completed.

- Among other pollution-prevention accomplishments, waste minimization goals for 2003 were met or exceeded in three of five specified waste categories. Although low-level radioactive waste generation did not decline by the targeted 70% reduction set in the one-year goals statement, generation was reduced by 65%. Sanitary waste generation was reduced by 50%, whereas the goal was 70%.

Environmental Monitoring Program

In 2003, Project environmental scientists continued to sample and monitor effluent air and water, groundwater, surface streams, soil, sediment, vegetation, meat, milk, and game animals, and to measure environmental radiation. More than 13,500 samples were collected in 2003 to assess the effect of site activities on public health, safety, and the environment.

The Project's environmental monitoring network is evaluated and updated to ensure that all the locations and sample types that would be sensitive to process-related changes are monitored.

Samples are tested for radioactivity and/or nonradioactive substances using approved laboratory procedures. Both the laboratory test results and direct measurement data are reviewed at several stages for quality and are compared with historical data from the same locations, with background data, and with data from similar locations.

The environmental data are entered into a controlled database and are automatically matched against high and low values within an expected range. Data points above or below these values are brought to the attention of WVDP scientists for further investigation. WVDP scientists periodically assess the data and evaluate the importance of trends at each location.

Radiation doses to the public are calculated using approved computer modeling codes. Dose calculations predict the impacts of air and water releases and the potential effects from consumption of game animals and locally-grown food.

Surface Water Monitoring. Surface water is routinely sampled on the Project premises by automatic samplers: timed composite samples are collected at Frank's Creek where water exits the Project, at two other on-site points where water flows off-site, and at a surface drainage point near the former radioactive waste disposal areas. Samples are also collected at other points of drainage from facility areas. The data from these samples are used to determine the type, amount, and probable origin of both radiological and non-radiological contaminants.

Radiological Releases. The largest single, treated effluent source of radioactivity released to surface waters from the WVDP is the discharge from the low-level waste treatment facility (LLWTF) through the lagoon 3 outfall. The treated effluent water flows into Erdman Brook, which joins Frank's Creek just before exiting the Project's fenced area. Seven

treated batches totaling approximately 15.0 million gallons (56.7 million liters) were released periodically over the course of about 60 days in 2003.

The combined average concentration of all radionuclides in liquid releases from lagoon 3 in 2003 was approximately 29.3% of the DOE derived concentration guide (DCG), which is used to evaluate liquid process discharges. The average radioactivity concentrations from 1999 through 2002 were 32%, 34%, 33%, and 34% of the DCGs, respectively. The major dose contributors in the total combined liquid effluent in 2003 were strontium-90, cesium-137, and uranium-232.

Seepage of contaminated groundwater in an elongated plume across the north plateau was another source of strontium-90 radioactivity in surface water. Some of this contaminated groundwater enters a ditch upstream of surface drainage sampling location WNSWAMP and eventually flows into Frank's Creek. This location has been carefully monitored since gross beta contamination, originating from pre-Project operations, was identified in 1993. A groundwater recovery and treatment system is currently being used to reduce the migration of strontium-90 on the north plateau. Total strontium-90 curies released from WNSWAMP and average concentration of strontium-90 were both lower in 2003 than in 2002. The calculated hypothetical dose to a member of the public from strontium-90 at WNSWAMP in 2003 was far below 1% of the applicable DOE limit.

Dose Assessment. The dose to the maximally-exposed off-site individual (MEOSI) from the liquid pathway in 2003 was estimated to be 0.032 millirem (mrem) (0.00032 millisieverts [mSv]). Of this dose, 0.018 mrem (0.00018 mSv) was attributable to Project effluents, primarily from lagoon 3, and 0.014 mrem (0.00014 mSv) was contributed by the north plateau drainage.

Nonradiological Releases. Nonradiological contaminants, measured at three outfalls and calculated at one monitoring point, were below the WVDP SPDES Permit limits.

Soil and Stream Sediments. Surface soil is collected annually near each of the ten air sampler locations to track long-term deposition. Sediments from off-site creeks are collected annually from three downstream and two upstream locations. Soil and sediment from three on-site drainage channels are also sampled annually to track waterborne movement of contaminants.

Surface soil samples in 2003 showed little change from previous years. Except for one area that historically has shown average cesium-137 concentrations higher than background values, the concentrations of radionuclides normally present in soil from both worldwide fallout and from Project air emissions at near-site locations are indistinguishable from background concentrations found in the region away from the WVDP.

Because of pre-Project releases from nuclear fuel reprocessing activities, the concentrations of cesium-137 in downstream creek sediments have been historically higher than concentrations in the upstream sediments. Results from 2003 were consistent with historical results. Monitoring results for cesium-137 in sediments over the last ten years show no upward trends at either upstream or downstream points.

Groundwater Monitoring. Groundwater samples were collected as scheduled from 69 on-site locations in 2003. In addition to thorough data evaluation, computerized screening of the groundwater data facilitates early identification of potentially-changing conditions. Four monitoring wells were installed in 2003 to provide groundwater information in the area of the newly-constructed remote-handled waste facility. The 2003 ground-

water program continued to indicate that strontium-90 is still the major contributor to elevated gross beta values in the north plateau plume. The concentrations of other isotopes were below the DCG levels usually applied to surface water.

In addition to collecting samples from wells, groundwater was routinely collected from seeps on the bank above Frank's Creek along the northeastern edge of the north plateau. Results of radiological analyses indicate that gross beta activity from the north plateau plume has not migrated to these seepage areas.

Site groundwater also is tested for a number of nonradiological constituents. In 2003 there were no statistically remarkable changes in the concentrations measured.

Calendar year 2003 sample results from near-site residential water-supply wells were indistinguishable from results at background wells.

Air Monitoring. The WVDP airborne radiological monitoring program in 2003 included emissions from six routinely-operated permitted exhaust points and four exhausts excluded from permitting because of their low emission potential.

Six air samplers on the perimeter of the WNYNSC and four in more-distant locations continuously collect samples of air at the average human breathing height. These samples are tested for radioactivity carried by airborne particles. Samples are also collected for measurement of tritium and iodine-129 at two of the ten locations – the Rock Springs Road sampler near the site and the Great Valley background sampler.

Radiological Releases. As anticipated, radioactive releases from the Project in 2003 were far below the applicable Environmental Protection Agency (EPA) and DOE limits that ensure public

health and safety. Radiological air releases in 2003 were less than those in 2002, coinciding with completion of the vitrification process.

Although several fission products contribute to airborne radiological releases, the most significant continues to be iodine-129, a long-lived radionuclide that exists in gaseous form. Iodine-129 is not fully removed during treatment of the air effluent. The CY 2003 levels of gaseous iodine-129 emissions were lower than 2002 levels.

Gross radioactivity in air samples (airborne particulate) from around the site's perimeter was within the historical range of radioactivity measured at remote background locations or nearby communities. Concentrations in samples from three on-site outdoor air samplers and two portable samplers located near waste storage facilities in operation during 2003 also were far below any applicable limits.

Dose Assessment. The dose from air emissions in calendar year 2003 was about 0.02% of the EPA and DOE radionuclide emissions standard of 10 mrem per year effective dose equivalent to the MEOSI. (In 2001 the dose from these emissions was about 0.05% and in 2002 the dose was about 0.04%.) More than 90% of the total 2003 calculated airborne dose to the MEOSI from main plant stack emissions was from iodine-129 emissions.

Nonradiological Releases. The WVDP has monitored nitrogen oxides and sulfur dioxide emissions as a condition of the New York State Facility Air Permit to demonstrate that emissions were well below the 99-ton limit for each. When melter operations came to an end, the vitrification process source of nitrogen oxides and sulfur dioxides, the primary source at the WVDP, was permanently shut down. With this shutdown, the WVDP is no longer required to submit reports of nitrogen and sulfur oxide emissions to NYSDEC.

Vegetation, Beef, Milk, Fish, and Game Animals. Calculated dose estimates based on the consumption of near-site foodstuffs are used as an independent confirmation of (not added to) computer-modeled estimates. Test results from near-site samples of beans, apples, corn, beef, milk, fish, and deer in 2003 were consistent with results noted in previous years. When near-site samples were compared with background samples, minimal or no site-related effects were noted. If near-site foods had been consumed in normal quantities by the same person in one year, that individual would have received less than 0.10 mrem (0.0010 mSv), the equivalent of about three hours of background radiation. No upward trends were observed.

Environmental Monitoring

The WVDP environmental monitoring program is designed to produce high-quality, reliable results. To maintain this standard, each scientist must give continuous attention to the details of sample handling, collection and analysis, data review, and evaluation procedures. Formal self-assessments were performed, and the WVDP Environmental Laboratory continued the practice of analyzing radiological crosscheck samples sent from a national laboratory. All (100%) of the on-site laboratory crosscheck results and 96% of the off-site commercial laboratory crosscheck results were within statistical acceptance limits for the year.

Test results from the crosscheck program and self-assessments indicate that high quality standards are being met.

The West Valley Nuclear Services Co. Environmental Affairs and Quality Assurance Departments also periodically conducted and documented reviews of program activities in 2003. Off-site laboratories are required to meet standards as outlined in the WVDP contracts. Any data defi-

ciencies were addressed under approved quality assurance programs.

Safety and Environmental Management Systems

In 2003 the WVDP continued to demonstrate its commitment to an all-inclusive approach to safety through implementation of its integrated safety management system (ISMS). As a key component of the ISMS, the sitewide work review group reviewed work plans, identified environmental safety and health concerns, and specified practices to ensure that work was performed safely. The environmental management system, an integral part of the WVDP ISMS, was coordinated with other safety management and work planning processes through the integrated environmental, health, and safety management program.

In recognition of excellence in safety and health, the WVDP has received the DOE STAR award each year from 2000 through 2003. The WVDP is also recognized as a top environmental leader as part of the EPA's National Environmental Performance Track.

Conclusion

The West Valley Demonstration Project conducts extensive monitoring of on-site facilities and the surrounding environment. This program fulfills federal and state requirements to assess the effect of WVDP activities on public health and safety and the environment. In 2003 the maximum predicted dose to a member of the public from the Project via all pathways was 0.03 mrem (0.0003 mSv), or 0.03% of the 100-mrem DOE limit. In comparison, the typical dose to a member of the public from natural background sources is 295 mrem per year.

The dose to the population within a 50-mile (80-kilometer) radius of the WVDP from DOE activities was 0.10 person-rem. This same population would have received approximately 453,000 person-rem from natural background radiation in 2003.

In addition to demonstrating compliance with environmental regulations and directives, evaluation of data collected in 2003 continued to indicate that WVDP activities pose no threat to public health or safety, or to the environment.