EXECUTIVE SUMMARY

The West Valley Demonstration Project (WVDP) conducts a comprehensive environmental monitoring program to ensure public health and safety. Results from both on-site and off-site radiological and non-radiological measurements confirm that WVDP activities conducted in 1988 were well within Federal and State regulatory limits.

INTRODUCTION

This annual report presents a summary of environmental monitoring data collected at the WVDP during 1988. The report is published in accordance with the requirements of United States Department of Energy (DOE) Orders 5484.1 and 5400.1. In addition to DOE requirements, the site's environmental monitoring program fulfills regulatory requirements of the United States Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC). In so doing, the program demonstrates that public health and safety are being protected with respect to activities on the site and the waste materials stored there.

In 1976, Nuclear Fuel Services, Inc. (NFS) notified the New York State Energy Research and Development Authority (NYSERDA) of its intention to terminate its lease on the nuclear fuel reprocessing facility at the Western New York Nuclear Service Center (WNYNSC). In 1980, the U.S. Congress directed the DOE (through Public Law 96-368) to carry out a high-level liquid nuclear waste management demonstration project at the WNYNSC facility. DOE assumed control of the portion of the Center which is now the WVDP site in early 1982. The objectives are to solidify 2.2 million litres (580,000 gallons) of liquid high-level radioactive waste (HLW) stored at the site, develop containers for the solidified HLW, transport the solidified HLW to a federal repository, dispose of Project low-level and transuranic waste, and decontaminate and decommission the Project facilities.

Through the mid-1980's West Valley Nuclear Services (WVNS), as prime contractor to DOE, constructed and secured environmental approval of various subsystems making possible the successful startup of the Integrated Radwaste Treatment System (IRTS) in May of 1988. In the first year of operation 523,000 liters (138,000 gals.) of liquid from the high-level waste tanks were processed through the IRTS.

Liquid discharges associated with project activities in 1988 totalled 21 million liters (8 million gals.). Total radioactivity released, through air and water, was reduced 20.5 percent from 1987 levels to 27 millicuries (gross alpha plus gross beta). During 1988, the environmental surveillance plan was expanded to provide continued monitoring of additional effluent points and areas of active waste management (see Appendix A).

The activities described above are being carried out at the WVDP site which is approximately 50 kilometers (30 miles) south of Buffalo, New York. The site is composed of a 63-hectare (156-acre) securely fenced area within a 1350-hectare (3300-acre) reservation (WNYNSC). Land immediately adjacent to the reservation is primarily used for farming. The site is located wholly within the Cattaraugus Creek drainage basin.

ENVIRONMENTAL MONITORING

The 1988 environmental monitoring program provided for radiological and non-radiological measurement of site effluent discharges and other on- and off-site samples. Collection of air and surface water samples allowed for monitoring of the two major pathways by which radioactive or hazardous material could migrate off-site. Analysis of animal, soil and vegetation samples from the facility environs provided data from which the risk of exposure through ingestion pathways could be determined. Control or background samples were taken to compare with on- or near-site samples. In 1988, the site recorded no abnormal radiological releases, and no special investigations of environmental radiological conditions were initiated.

During 1988, airborne particulate radioactivity was sampled continuously at five site perimeter and

four remote locations. Sample filters were collected weekly and analyzed for gross alpha and beta radioactivity. Airborne gross activity around the site boundary was, in all cases, indistinguishable from background concentrations measured at the remote locations and well below DOE regulatory limits (see Appendix B). Direct monitoring of airborne effluents, at the main stack and other permitted release points, showed all discharges to be well below DOE or EPA effluent limitations.

Four automatic samplers collected surface water at locations along site drainage channels most likely to intercept off-site migration of radioactive material. Samples were analyzed for gross alpha, beta and gamma activity and for tritium and strontium-90. Average gross radioactivity concentrations continued to be higher in Buttermilk Creek below the WVDP site than at the upstream background sample point as a result both of historical and continuing treated liquid releases. However, average concentrations below the site in Cattaraugus Creek cannot be differentiated from background (upstream of the site). Concentrations of cesium-137, strontium-90, and tritium were all below DOE guidelines at all locations, including Frank's Creek at the inner security fence over three miles from Cattaraugus Creek. The largest single source of radioactivity released to surface water is from the Low-Level Waste Treatment Facility (LLWTF) through the Lagoon 3 weir. In 1988, five batch releases were made with average concentrations less than 40 percent of the release limit guidelines. Downstream sediment concentrations of cesium-137 have remained constant with time at any given sampling point.

Radioactivity in the food chain was measured by analyzing samples of milk, beef, hay, corn, tomatoes, apples, fish and venison collected during 1988. Strontium-90 determinations showed some variations from the previous year in background and near-site samples of fish and venison. No difference from background was noted for corn, apple and tomato samples collected near the site and analyzed for tritium and various gamma emitting isotopes. Near-site apple samples from within the WNYNSC showed strontium-90 detectable above background, but at levels far below any regulatory limits.

Direct environmental radiation was measured quarterly in 1988, as in previous years, using thermoluminescent dosimeters (TLDs). Monitoring is carried out at 40 points distributed around the site perimeter and access road, at the waste management units, at the inner facility fence and at various remote locations. No significant differences were noted among exposure rates measured at background and WNYNSC perimeter locations. Some TLD data were also collected within the restricted area boundary to monitor the higher-than-background exposure from nearby radioactive waste handling and storage facilities.

Regulation of non-radiological discharges from the site is a responsibility of NYSDEC. Because NYSDEC does not consider any on-site stationary sources of non-radiological airborne effluents to be of significant quantity, they do not require special monitoring and reporting. Liquid effluents are monitored as a requirement of the State Pollution Discharge Elimination System (SPDES), also administered by NYSDEC. Liquid discharges may occur at any of three permitted "outfalls," or points of final release to an unrestricted waterway. Project effluents were monitored for biochemical oxygen demand (BOD), suspended solids, ammonia, iron, pH, oil and grease, and other water quality factors. Monitoring indicated that liquid discharges had no significant effect on the environment.

GROUNDWATER MONITORING

The WVDP is underlain directly by layers of glacial sand, gravel and clay and/or by layers of deposited lake and stream materials. Underlying bedrock is primarily Devonian shales and sandstone. Non-uniformity of deposited material across the site results in uneven groundwater flow and seepage rates.

The 1988 groundwater monitoring program included on-site wells for waste management unit surveillance and off-site wells for drinking water monitoring. An on-site system of 14 wells, plus one groundwater seep and a french drain (an underground, gravel-filled drainage channel) provide upgradient and downgradient monitoring of the LLWTF lagoons, the high-level waste tank farm

complex, and the NRC-licensed Disposal Area. All wells comprising the waste management unit groundwater monitoring program were sampled three times in 1988. A number of additional on-site wells provided semiannual data. After initial physical measurements at each well, samples were collected and analyzed for a variety of radiological and water quality parameters. The range of analyses performed was determined by regulatory requirements and specific concerns. Statistical tests were performed to define real differences between upgradient and downgradient wells.

The potential impact of project activities on near-site groundwater is monitored by biennial sampling of a group of designated private drinking water wells. Half of these wells are monitored each year primarily for the presence of radionuclides.

Data from groundwater monitoring around the LLWTF lagoons indicate that radionuclides from previous plant operation, most significantly tritium, have had an influence on groundwater quality. Historically, the level of tritium contamination in the groundwater around the lagoon system has steadily decreased, as indicated primarily by measurements at the french drain outfall. Gross beta measurements have confirmed that residual radioactivity (other than tritium) has remained essentially constant in this area. Other measured parameters, such as pH and conductivity, have shown significant difference between upgradient and downgradient locations. These differences do not reflect any degradation in water quality.

Data from around the waste tank farm do not indicate any impact of the stored high-level radioactive waste on the groundwater. Lack of significant differences between upgradient and downgradient samples around the NRC-licensed Disposal Area also indicate there is no discernible migration of groundwater contamination from this source. Data from other, older wells on site indicate localized tritium contamination north of the disposal area. Finally, monitoring of drinking water wells off site showed no detectable tritium, which is considered to be the most sensitive indicator of groundwater contamination from the WVDP.

RADIOLOGICAL DOSE ASSESSMENT

Potential doses to the public from airborne and liquid effluent releases of radioactivity from the site during 1988 were estimated using computer models. Potential radiation doses from ingestion of locally produced foods were also calculated and compared to results derived from the computer models.

An EPA-approved computer program (AIRDOS, CAAC version) was used to calculate radiation doses from airborne effluents. The highest dose to a nearby resident was estimated to be 0.00035 mrem, which is 0.0014 percent of the EPA limit. The maximum organ dose (to the thyroid) was estimated to be 0.0039 mrem, or 0.0051 percent of the EPA limit. These doses are 35 and 59 percent lower, respectively, than the previous year's estimates.

Computer modeling was also used to estimate a hypothetical maximum radiation dose from liquid effluents. The highest dose to an individual was estimated to be 0.1 mrem, which is 0.1 percent of the DOE limit. This dose is 60 percent lower than last year's estimate. Overall, the average dose from air and liquid discharges to individuals within an 80-km (50-mi) radius from the site was estimated to be 0.000018 mrem.

Radiation doses estimated from maximum consumption rates of locally produced foods were in the range of 0.0053 mrem (venison) to 0.18 mrem (milk). These doses are similar in magnitude to the values reported in previous years.

The above conservatively high, calculated doses can be compared to an actual dose of 300 mrem per year to the average person from natural background radiation. The dose assessment described in Section 4.0 predicts an insignificant impact on the public's health as a result of radiological releases from the WVDP.

STANDARDS AND QUALITY ASSURANCE

The WVDP is regulated by both Federal and State agencies seeking to protect the environment and provide for the safety of Project workers and the

public. Laws and regulations that apply to the Project include: DOE Order 5480.1, "Requirements for Radiation Protection;" the Resource Conservation and Recovery Act (RCRA); Environmental Conservation Law of New York State; the National Emission Standards for Hazardous Air Pollutants (NESHAP); and many others.

The Quality Assurance (QA) Program overseeing environmental monitoring activities includes aspects which govern the production and analysis of data from both on- and off-site sources. Commercial contract laboratories and their own internal QA programs are routinely reviewed by site personnel. In addition, commercial laboratories must perform blind analyses of standard or duplicate samples submitted by the WVDP Environmental Laboratory.

On-site monitoring activities are subject to quality control checks from the time of sample collection through sample analysis and data reduction. Specific quality checks include: external review of sampling procedures, specific calibrations using primary standard materials; participation in formal laboratory cross check programs (for example, with EPA and DOE); outside auditing by organizations including the U.S. Nuclear Regulatory Commission (NRC) and Westinghouse Electric Corporation.

Environmental sample-sharing and co-location of measurement points with the New York State Department of Health (NYSDOH) and the NRC continued in 1988, assuring that selected samples and locations are routinely measured by two or more independent organizations.

Cross check program participation coupled with other internal quality control procedures and external laboratory checks verified the high overall quality of data gathered in 1988. Isolated problems involving inaccurate determinations by off-site contract laboratories and insensitivity of analytical methods used on site have been addressed and rectified.

COMPLIANCE

The West Valley Demonstration Project operates within the regulatory guidelines of the DOE Orders for protection of health, safety and the environment. Limits on radioactivity concentrations specified in the DOE Orders along with limits on the dose to the maximally exposed off-site individual from Project effluents act together to encourage high quality, low-activity air and water discharges. The Project did not exceed or even approach any regulatory limit on radioactivity or radiation dose in 1988.

Nonradiological plant effluents are controlled and permitted under NYSDEC and EPA regulations. Although there are periodic New York State inspections of air emission points, air effluent monitoring is not required because of the relatively innocuous nature of the discharges. Water quality, as measured by tests for pH, biochemical oxygen demand, and other chemical factors, is regulated by the NYSDEC. The SPDES permit identifies discharge quality limits which, if exceeded, require immediate corrective action. In 1988 there were 24 instances when individual water quality parameters exceeded permitted levels, out of a total of 372 measurements. The greater part of these excursions resulted from natural variations in the iron content of raw water entering the plant, or were related to the high concentrations of algae which thrived in the exceptionally warm weather of 1988. In each case, appropriate action was taken to stabilize the condition, and to notify the NYSDEC in accordance with permit conditions. These excursions resulted in no significant impact on the environment due to their innocuous nature, relatively short duration, and more than 10-fold dilution at Cattaraugus Creek, the first public access point that contains site discharges.

Finally, dose calculations for 1988 show that the WVDP is in compliance with the emission standards for radioactivity promulgated by the EPA. Non-radiological emissions of concern to the EPA are regulated directly by delegation to the State of New York.