

ENVIRONMENTAL MANAGEMENT SYSTEM

Integrated Safety Management System (ISMS) Implementation

A plan to integrate environmental, safety, and health (ES&H) management programs at the West Valley Demonstration Project (WVDP or Project) was developed and initiated in 1998. Implementation of an ISMS at the WVDP was verified by the United States (U.S.) Department of Energy (DOE) in November 1998. Environmental subject matter experts routinely participate in a site-wide work review group to review work plans, identify ES&H concerns, and specify practices that ensure work is performed safely. For the purposes of this policy, the term "safety" includes environmental, radiological, industrial/chemical, and nuclear safety and health and encompasses the public, workers, and the environment.

Environmental Management System (EMS)

During the development of the ISMS, the environmental management system (EMS) was identified as an integral part of the ISMS. The WVDP EMS satisfies the requirements of DOE Order 450.1, "Environmental Protection Program." The EMS is also in compliance with the "Code of Environmental Management Principles" (CEMP) for federal agencies and the International Organization for Standardization 14001, Environmental Management Systems: "Specification for Guidance and Use," which is being implemented worldwide. Following the principles and performance objectives of the CEMP helps to ensure that a federal facility's environmental performance is proactive, flexible, cost-effective, and sustainable.

The Project's EMS provides the basic policy and direction for work at the WVDP through procedures that support proactive management, environmental stewardship, and the integration of appropriate technologies throughout all aspects of work. The environmental monitoring program is an important component of the EMS and accomplishment of its mission.

As the Western New York Nuclear Service Center is no longer an active nuclear fuel reprocessing facility, the environmental monitoring program at the WVDP

focuses on measuring radioactivity and chemical constituents associated with the aged residual by-products of former Nuclear Fuel Services Inc. operations, the Project's former high-level radioactive waste (HLW) treatment operations, and the current operations for management of HLW, transuranic waste, and low-level radioactive waste (LLW). On June 29, 2007, the DOE awarded a new four-year contract for the management and operation of the WVDP. West Valley Environmental Services LLC (WVES) was awarded the WVDP Interim End-State Contract (Contract DE-AC30-07CC30000) that includes in its scope waste disposition, decontamination, deactivation, disposition of facilities, and infrastructure/landlord activities.

Elements of the WVDP EMS implementation are summarized in Table 1-1.

The Project's ISMS and EMS policies are integrated into all aspects of work at the WVDP. The following sections depict accomplishments at the WVDP associated with specific 2007 EMS activities.

Environmental Policy

Activities at the WVDP during 2007 were conducted in full compliance with applicable environmental statutes, DOE directives, executive orders, and state laws and regulations. All environmental permits, licenses and agreements were transitioned from West Valley Nuclear Services Company, Inc. (WVNSCO) to WVES as appropriate. Refer to Table ECS-1, "Environmental Compliance Status Summary for the WVDP in 2007," for details.

Environmental Aspects and Impacts

Since the Project work scope currently encompasses waste disposition, decontamination, deactivation, disposition of facilities, and infrastructure reduction, the significant environmental aspects of current site activities are related to decommissioning and demolition activities. For each facility or structure that is under consideration for demolition, the base environmental aspects have been identified. These aspects are addressed during work planning

TABLE 1-1
Elements of the Environmental Management System (EMS) at the WVDP

<i>EMS Element</i>	<i>WVDP Implementation</i>
Environmental Policy	The environmental policy at the West Valley Demonstration Project (WVDP) is to conduct all activities, including design, construction, testing, startup, commissioning, operation, maintenance, and decontamination and decommissioning in a manner appropriate to the nature, scale, and environmental impacts of these activities. West Valley Environmental Services LLC (WVES) is committed to full compliance with applicable federal and New York State laws and regulations for the protection of the environment, continual improvement, the prevention and/or minimization of pollution, and public outreach, including stakeholder involvement.
Environmental Aspects and Impacts	When operations have an environmental aspect, WVES implements the EMS to minimize or eliminate any adverse potential impact. Implementation of an EMS is a prerequisite for the United States (U.S.) Environmental Protection Agency (EPA) National Environmental Performance Track (P-Track) awarded by the EPA to the WVDP. Using the EMS, WVDP employees evaluate operations, identify the aspects of operations that can impact the environment, and determine those impacts that are significant. The following operational aspects have been determined to have the potential to affect the environment: <ul style="list-style-type: none"> • Waste generation, management, and decontamination activities; • Atmospheric emissions and liquid effluents; • Storage or use of chemicals and radioactive materials; • Natural resource usage and noise disturbance; and • Disturbances to soil and to endangered species/protected habitats.
Legal and Other Requirements	WVES has implemented an environmental regulatory review and assessment process to deliver WVDP-level requirements and guidance to all staff. New or revised requirements (e.g., new regulations) are analyzed to determine their applicability to the WVDP and to identify whether actions are required to achieve compliance. This may involve developing or revising WVDP documents or operating procedures, implementing administrative controls, providing training, installing engineered controls, or increasing monitoring.
Objectives and Targets	The performance-based management system is designed to develop, align, balance, and implement the strategic objectives for the WVDP, including environmental objectives. Objectives and targets are developed by calendar year (CY). For the three-year period of CY 2007–2009, WVES defined four commitments under the EPA P-Track. These commitments, and progress toward achieving the objectives, are presented later in this chapter.
Environmental Management Program	A pollution prevention program to conserve resources and minimize waste generation is implemented at the WVDP. The budgeting system is designed to ensure that priorities are balanced and that resources essential to the implementation and control of the EMS are provided.
Structure and Responsibility	All employees at the WVDP have specific roles and responsibilities in key areas, including environmental protection. Environmental and waste management technical support personnel assist the line organization with their environmental responsibilities.
Training, Awareness, and Competence	Training on EMS requirements has been provided to staff whose responsibilities include environmental protection. The training program includes general environmental awareness for all employees, regulatory compliance training for select staff, and specific courses for managers, internal assessors, EMS implementation teams, and operations personnel whose work can impact the environment.

TABLE 1-1 (*concluded*)
Elements of the Environmental Management System (EMS) at the WVDP

<i>EMS Element</i>	<i>WVDP Implementation</i>
Communication and Community Involvement	The WVDP representatives continue to improve processes for internal and external communications on environmental issues. Communications with the local community include monthly meetings with the local Citizen Task Force and meetings with the general public on a quarterly basis. Project information, including this entire Annual Site Environmental Report, is available on the internet at http://www.wv.doe.gov . Notable community involvement activities by the WVDP personnel in 2007 included participation in the United Way Day of Caring and the mentoring program with local schools.
EMS Documentation	Comprehensive, up-to-date environmental policies are written to describe the EMS. These procedures and manuals inform staff how to control processes and perform work at the WVDP in a manner that protects the environment.
Document Control	A comprehensive electronic document control system to ensure the effective management of procedural documents is maintained. When facilities require additional procedures to control their work, document-control protocols are implemented to ensure that workers have access to the current version of procedures.
Operational Control	Operations are evaluated for the adequacy of current controls to prevent impacts to the environment. As needed, additional administrative or engineered controls are identified and plans for upgrades and improvements are developed and implemented.
Emergency Preparedness and Response	An emergency preparedness and response program with specialized staff provides timely response to hazardous material releases or other environmental emergencies. This program includes procedures for preventing, as well as responding to, emergencies.
Monitoring and Measurement	Liquid effluent and air-emission monitoring helps ensure the effectiveness of controls, adherence to regulatory requirements, and timely identification and implementation of corrective measures. A comprehensive, sitewide environmental monitoring program is in place at the WVDP. Results are reported to regulatory agencies and summarized in this ASER. In addition, monitoring data are assessed for adverse trends to determine site performance, impacts from site conditions, and the need for preventative or corrective measures.
Nonconformance and Corrective and Preventive Actions	The WVDP employees continue to implement processes that identify and correct problems. This includes a lessons learned program to prevent recurrences, robust self-assessment and environmental assessment programs, and an electronic action tracking system.
Records	EMS-related records, including audit and training records, are maintained to ensure integrity, facilitate retrieval, and protection from loss.
EMS Audit	To periodically verify that the EMS is operating as intended, assessments are conducted by the DOE and its contractors. These assessments are designed to ensure that nonconformances are identified and addressed. In addition, compliance with regulatory requirements is verified through routine inspections, operational evaluations, and periodic assessments and self-assessments.
Management Review	In addition to audits, a management review process has been established to involve top management in the overall assessment of environmental performance, the EMS, and progress toward achieving environmental goals. This review also identifies, as necessary, the need for changes to and continual improvement of the EMS.

with the assistance of the Hazard Control Specialists. In addition, before a building may be demolished, a Demolition Readiness Checklist which captures many of these environmental aspects, must be completed.

Legal Requirements

Requirements contained in DOE orders and directives are incorporated into the new WVDP Interim End-State Contract with WVES as specific terms and conditions. The WVES Environmental Affairs (EA) Department conducts environmental regulatory reviews to identify, evaluate, and document changes to applicable environmental regulations. Items that have an effect upon compliance activities at the WVDP are communicated to EA and other Project personnel.

Objectives and Targets

National Environmental Performance Track. In 2000, the U.S. Environmental Protection Agency (EPA) recognized the WVDP as a charter member of the Performance Track (P-Track) Program for implementation of its EMS. The focus of the P-Track is to ensure that the EMS has sufficient programs in place to perform effectively, and to identify and address opportunities to improve environmental performance.

The WVDP has completed two rounds of environmental commitments under the EPA P-Track. Four initial commitments were accomplished over a three-year period from calendar year (CY) 2001 to CY 2003 with CY 2000 as the baseline. Three additional performance goals were accomplished over the next three-year period from CY 2004 through CY 2006, using CY 2003 as the baseline.

To maintain certification in the P-Track program, annual reports are submitted to the EPA. The reports include topics such as EMS audits, issues and corrective actions, progress toward commitments, reporting, and public outreach. WVES renewed its application to the program by identifying four new commitments for 2007. WVES, in conjunction with the DOE, submitted the P-Track annual performance report to the EPA in March 2008, for CY 2007, demonstrating the facility's progress toward its performance commitments and to maintaining qualifications under the program. The commitments (to be met by the end of CY 2009 with CY 2006 as the baseline) and the 2007 annual reporting accomplishments were to reduce the following:

- total non-transportation energy usage by 5%: total energy usage was reduced by 15.6% in CY 2007;
- amount of liquid nitrogen used by 10%: liquid nitrogen usage was reduced by 45.3% in CY 2007;
- amount of resins used for the treatment of radio logically contaminated wastewater generated by plant operations by 10%: this goal is in the planning stages with engineering and design efforts complete in CY 2007 and planning for implementation in CY 2008; and
- amount of SO_x air emissions from non-transportation purposes by 10%: SO_x emissions were reduced by 61.4% in CY 2007.

Environmental Management Program

An environmental management program is a key element to the successful implementation of an EMS. An integral part of the WVDP environmental management program is the "Waste Minimization and Pollution Prevention Awareness Plan" (WMin/P2). The plan established the strategic framework for integrating waste minimization and pollution prevention into waste generation and reduction activities, the procurement of recycled products, the reuse of existing products, and the use of methods that conserve energy. The program is a comprehensive and continual effort to prevent or minimize pollution, with the overall goals of reducing health and safety risks, and protecting the environment. Refer to the EPA P-Track progress and renewed commitments described above. Also refer to the Environmental Compliance Summary Table ECS-6, "Pollution Prevention Progress for FY 2007," and Table ECS-7, "Affirmative Procurement Accomplishments for FY 2007."

Training, Awareness, and Competence

Until April 2007, the WVNSCO teams and subcontractors had attained a remarkable safety record by achieving nearly 5 million consecutive safe work hours over a period of more than 4½ years without a lost time accident or illness. However, a personal injury event at the WVDP in April 2007, coupled with an increase in first-aid cases, triggered an investigation of the series of incidents.

Management initiated a comprehensive root cause analysis and an overall assessment of the ISMS implementation across site-wide operations. Independent subject matter personnel from Washington

Group international and representatives of the DOE-HQ Environmental Management-62 (EM-62) organization were brought to the site to review the events. The reviews from both the internal and external assessments indicated that human performance and behaviors were at the heart of the personal injury events. As a result, the key element of the corrective action plan was to reinstitute human performance/behavior-based safety (HP/BBS) training across the site. The initiative included training of all Project personnel to HP/BBS concepts and practices, followed by HP/BBS observer technique training for safety department and safety observers.

In addition, more emphasis was placed on self-assessment activities as one of the corrective actions for attaining improved worker safety. Accordingly, an enhanced Conduct of Operations self-assessment schedule was established and implemented.

Voluntary Protection Program (VPP) STAR Status. In May 2000, WVNSCO received its first certification of the WVDP as a VPP STAR Site for recognition of excellent worker safety and health programs. The safety policy is to conduct its business in a manner that ensures the safety and well-being of employees and subcontractors. The goals are zero unsafe acts, injuries, occupational illnesses, unsafe conditions, environmental insults, or radiological contaminations. WVES management continues to focus on strengthening the ISMS/EMS as work scopes change and intends on continued participation in the VPP program.

10 Code of Federal Regulations (CFR) 851, "Worker Safety and Health Program." 10 CFR 851 became effective in February 2007, with full implementation at the WVDP by May, 2007. The law supersedes DOE Order 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees," which directed compliance with specific Occupaton Safety and Health (OSHA) requirements.

Similar to OSHA, the rule establishes the framework for an effective worker safety and health program that provides DOE contractor workers with a safe and healthful workplace in which workplace hazards are abated, controlled or otherwise mitigated in a matter that provides reasonable assurance that workers are adequately protected from identified hazards. To accomplish this objective, the law established program requirements specific to management responsibilities, worker rights, hazard identification and prevention, safety and health standards, required training, recordkeeping and reporting.

In compliance, WVDP personnel revised procedures and programs to comply with 10 CFR 851, and issued the "WVDP Worker Safety and Health Plan" for DOE approval. Any modification, addition, or deletion that could invalidate a portion of the worker health and safety program requires approval by the DOE. The significant impacts to the workforce are: (1) WVES is subject to inspection by the DOE and can be cited and fined for any violation, (2) fire protection inspection frequencies increased to weekly or monthly from the current schedule, (3) WVDP-310, Addendum 1, "Worker Safety and Health Plan," was developed, which describes how the WVDP complies with 10 CFR 851, and (4) violations to 10 CFR 851 are tracked.

Any person working at the WVDP who has a personal photo badge allowing unescorted access to administrative areas of the site receives general employee training that covers health and safety, emergency response, and environmental compliance issues. All visitors to the WVDP receive a site-specific briefing on safety and emergency procedures.

Hazardous waste operations and emergency response regulations require that employees at treatment, storage, and disposal facilities receive training appropriate to their job function and responsibilities. The WVDP environmental, health, and safety training matrix identifies the specific training requirements for such employees.

Training programs include, but are not limited to:

- 24-hour/40-hour hazardous waste operations;
- emergency spill-response training;
- decontamination techniques;
- waste minimization and pollution prevention;
- the WVDP environmental management program;
- radiation hazards and warnings;
- dosimetry and respiratory protection;
- medical emergency response training; and
- electrical safety and fire protection.

Training programs have evolved into a comprehensive curriculum of knowledge and skills necessary to maintain the health and safety of employees and ensure the continued compliance of the WVDP with applicable regulations and requirements.

Safety-Trained Supervisor (STS) Program. Since November 2003, WVNSCO/WVES has maintained an STS certification program whereby employees complete an extensive program to become safety-certified. Certification and renewal requirements include

at least 30 hours of safety-related training and successful completion of a certification exam. Standards, established by the Council on Certification of Health, Environmental, and Safety Technologists, ensure that certified individuals have a broad understanding of industrial safety. The benefits at the site include increased safety awareness among employees, an improved site safety culture, and increased confidence when dealing with safety and health matters during the planning and field phases of work. Currently there are 63 certified WVES safety-trained supervisors at the WVDP.

Communication

During 2007, internal communications increased as the new four-year WVDP Interim End-State Contract was awarded to WVES. Transition activities and determination of a baseline for the four-year contract required extensive turnover communications and input.

Concurrently, the Core Team member communications involving the EPA, the Nuclear Regulatory Commission (NRC), the New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Health (NYSDOH), the New York State Energy Research and Development Authority (NYSERDA), and DOE site managers increased throughout 2007. These communications resulted in a determination, and presentation to public stakeholders, of a recommendation for a draft preferred alternative for the decommissioning Environmental Impact Statement (EIS) that would be implemented in two phases (phased decisionmaking). See the Environmental Compliance Summary for further discussion.

Operational Control

NRC-Licensed Disposal Area (NDA) Interceptor Trench and Pretreatment System. Radioactively contaminated n-dodecane, in combination with tributyl phosphate (TBP), was discovered in groundwater at the northern boundary of the NDA in 1983, shortly after the DOE assumed control of the WVDP. To mitigate subsurface migration of this radioactive organic mixture, an interceptor trench and liquid pre-treatment system (LPS) were installed.

As in previous years, n-dodecane/TBP contamination was not detected in the trench water; therefore, no water was treated by the LPS in 2007. Approximately 390 thousand gallons (1.48 million liters) of radio-

logically contaminated water were pumped and transferred from the interceptor trench to the low-level waste treatment facility (LLW2) during CY 2007. Refer to the Environmental Compliance Summary for a discussion of the interim measure to construct a cap over the NDA. Refer also to Chapter 4, "Groundwater Protection Program," under "Groundwater Sampling Observations on the South Plateau: Weathered Lavery Till and the NDA" for a discussion of results of surface and groundwater monitoring in the vicinity of the trench .

Process Sewer Integrity Evaluation. Video inspection of camera-accessible process sewer lines was initiated in 2003, and a breach was identified in a tributary line allowing laundry wastewater to discharge to subsurface soil. Wastewater from the laundry was immediately directed through an alternate pipeline to the LLW2, and the breached line was taken out of service. Following full investigations and reporting to NYSDEC, a New York State-licensed professional engineer (PE) performed an integrity evaluation of the process sewer system and prepared a final report that identified actions to be implemented. The initial recommendations of the PE have been completed. The final recommendation, to perform routine cleaning and reinspection of accessible main service lines and operational clean-out risers, is to be fully implemented by November 2009.

Environmental Monitoring and Measurement

Human beings are exposed to radioactivity from site activities primarily through air, water, and food. All three potential exposure pathways are monitored at the WVDP, but air and surface water pathways are the two primary means by which radioactive material can move off site.

The on-site and off-site monitoring program at the WVDP includes measuring the concentration of alpha and beta radioactivity, conventionally referred to as "gross alpha" and "gross beta," in air and water effluents. Measuring the total alpha and beta radioactivity from key locations produces a comprehensive picture of on-site and off-site levels of radioactivity from all sources. For a DOE site such as the WVDP, frequent updating and tracking of the overall radioactivity levels in effluents is an important tool in maintaining acceptable operations.

More-detailed measurements are also made for specific radionuclides.

The radionuclides monitored at the Project are those that might produce relatively higher doses or that are most abundant in air and water effluents. Because man-made sources of radiation at the Project have been decaying for more than 35 years, the monitoring program does not routinely include short-lived radionuclides, that is, isotopes with a half-life of less than two years, which would be present at less than 1/100,000 of the original radioactivity levels.

The WVDP monitoring program includes monitoring wastewater discharges and storm water for nonradiological water quality and chemical constituents. See Appendix A for the schedule of sample locations and analytical requirements and Chapter 2 for a discussion of nonradiological program information.

Environmental Management of Wastewater. Water containing radioactive material from site process operations is collected and treated in the LLW2, which includes the LLW treatment building and associated holding lagoons.

Treated process water is held, sampled, and analyzed before its release through a New York State Pollutant Discharge Elimination System (SPDES)-permitted outfall. In 2007, about 10.8 million gallons (40.7 million liters) of water were treated in the LLW2 system and discharged through outfall 001, the lagoon 3 weir. Table 1-2 summarizes the estimated releases of radioactivity in the 2007 discharge waters, as compared to the previous 10-year average. (Also, see Table 2-1 in Chapter 2.) Note that releases of tritium and gross alpha and beta activity through outfall 001 were below the 10-year averages.

Effective operation of the site wastewater treatment facilities is indicated by compliance with the applicable discharge limits regulated by the SPDES permit. Approximately 60 chemical and water quality constituents are monitored regularly. The analytical results are reported to NYSDEC via Discharge Monitoring Reports, required under the SPDES program. There were no SPDES effluent limit exceptions for chemical constituents during 2007. Historical limit exceptions are discussed in previous ASERs. Although the goal of the LLW2 and sanitary wastewater treatment facility operations is to maintain effluent water quality consistently within the permit requirements, if SPDES permit limit exceptions occur, the exceptions are evaluated to determine their cause and to identify corrective measures.

**TABLE 1-2
2007 Radioactivity Releases Versus 10-Year Averages^a**

Radionuclide	10-Year Average Curies	2007 Curies	% of 10-Year Average
Aqueous Discharge LLW2			
Tritium	0.16	0.053	34%
Gross Alpha and Beta	0.016	0.011	72%
Airborne Discharge ANSTACK			
<i>Gaseous</i>			
Tritium	0.029	0.0021	7.0%
Iodine-129	0.0017	0.000027	1.6%
<i>Particulate</i>			
Gross Alpha and Beta	0.00024	0.000013	5.5%

^a All numbers were rounded to two significant digits after calculations were complete. Percentages based on the above total curie values may not exactly match those in the table.

- North Plateau Groundwater Recovery System (NPGRS)

The NPGRS operated throughout 2007, recovering groundwater from an area near the leading edge of the strontium-90 plume on the north plateau. Approximately 3.02 million gallons (11.5 million liters) were recovered during 2007. For a more-detailed discussion of the plume and the NPGRS, see "Groundwater Sampling Observations on the North Plateau" and "Strontium-90 Plume Remediation Activities" in Chapter 4.

Environmental Management of Airborne Emissions. During operations, ventilated air from the various WVDP facilities is continuously sampled for radioactivity in gases and particulate matter. Ventilated air is monitored and an alarm is activated if particulate matter radioactivity increases above preset levels. Samples are analyzed in the laboratory for the specific radionuclides that are present in the radioactive materials being handled in the facilities. (See "Air Emissions" in Chapter 2.)

Ventilation air through facilities undergoing radioactive material cleanup passes through high-efficiency filters before being released to the atmosphere. The filters are generally more effective

for particulate matter than for gaseous radioactivity. For this reason, facility air treatment tends to remove a lesser percentage of gaseous radioactivity (e.g., tritium and iodine-129) than radioactivity associated with particulate matter (e.g., strontium-90 and cesium-137). However, gaseous radionuclide emissions still remain so far below the most restrictive regulatory limits for public safety that additional treatment technologies beyond those already provided are not necessary.

Table 1-2 shows the gaseous and particulate matter radioactivity emissions from the main plant (location ANSTACK) in 2007 compared to averages from the previous 10-year period. These 2007 values are low in comparison with the 10-year average that includes several years when the vitrification system was operating.

Environmental Performance Measures

Performance measures can be used to evaluate effectiveness, quality, timeliness, safety, or other areas that reflect achievements related to organization or process goals, and can be used as tools to identify the need to institute changes.

Dose Assessment. As an overall assessment of Project activities and the effectiveness of the as-low-as-reasonably-achievable policy, the low potential radio-

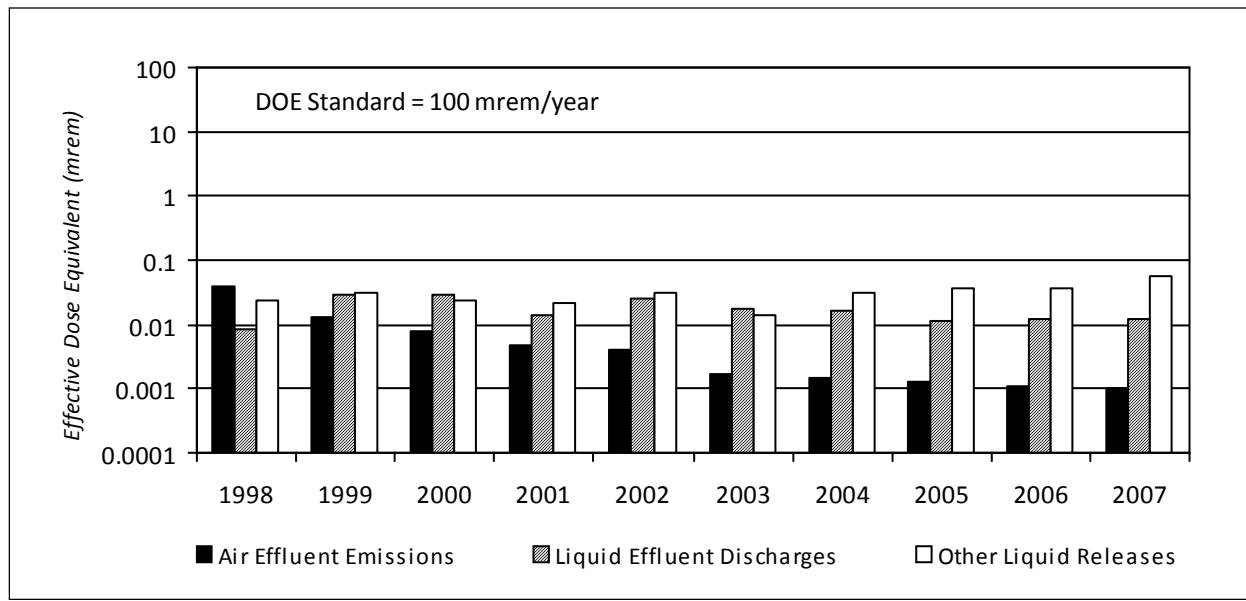
logical dose to the maximally exposed off-site individual (MEOSI) is an indicator of well-managed radiological operations.

The relative dose equivalents for radiological air emissions, liquid effluent discharges, and other liquid releases (such as swamp drainage) from 1998 through 2007 are graphed on Figure 1-1. Note that, when summed, the total is well below the DOE standard of 100 mrem per year. The consistently low effluent results indicate that radiological activities at the site are well-controlled. (See also Table 3-2 in Chapter 3, "Dose Assessment.")

Groundwater Monitoring. The groundwater program is implemented at the WVDP according to Resource Conservation and Recovery Act §3008(h) Administrative Order on Consent requirements, as approved by NYSDEC and the EPA. Monitoring continued during 2007. Refer to Chapter 4, "Groundwater Protection Program," for details.

Environmental Management of Radiation Exposure. Environmental radiation is measured with thermoluminescent dosimeters (TLDs) at on-site and off-site locations. See Figures A-11 through A-14 for the locations of on-site and off-site TLD monitoring points. Although exposure rates at most on-site locations in 2007 were elevated with respect to background, results from perimeter TLDs that would be more representative of exposure to the public were statistically

FIGURE 1-1
Annual Effective Dose Equivalent to the Maximally Exposed Off-Site Individual



indistinguishable from background results. (See "Environmental Radiation" in Chapter 2.)

Quality Assurance (QA) Program

The QA program at the WVDP provides for and documents consistency, precision, and accuracy in collecting and analyzing environmental samples and in interpreting and reporting environmental monitoring data. Under contract with the DOE, WVES implements the QA program at the WVDP. Subcontractor laboratories providing analytical services for the environmental monitoring program are contractually required to maintain a QA program consistent with WVES requirements.

10 CFR Part 830, Subpart A, "Quality Assurance Requirements," Section 830.122, "Quality Assurance Criteria," and DOE Order 414.1C, "Quality Assurance" (DOE, 2005), document the QA program policies and requirements applicable to activities at the WVDP. The WVDP QA program serves to implement the DOE Order 450.1 requirement to provide "a consistent system for collecting, assessing, and documenting environmental data of known and documented quality." The integrated QA program also incorporates the requirements from the consensus standard "Quality Assurance Program Requirements for Nuclear Facilities" (American Society of Mechanical Engineers NQA-1, 1989). Controlled documents specific to the WVDP are used to implement the integrated QA program.

General areas addressed by the QA program include the following:

Responsibility. Responsibilities for overseeing, managing, and conducting an activity must be clearly defined. Personnel who verify that an activity has been completed correctly must be independent of those who performed it. Managers of programs, projects, and tasks at the WVDP are responsible for ensuring that QA requirements applicable to activities under their cognizance are implemented.

Planning. Work activities must be planned beforehand, the plan followed, and activities documented. Purchases of quality-affecting equipment or items must be planned, specified precisely, and verified for correctness upon receipt.

Training. Anyone performing an activity in support of the WVDP environmental monitoring program must be trained in the appropriate procedures and qualified accordingly before carrying out the activity.

Control of Design, Procedures, Items, and Documents. Any activity, equipment, or construction must be clearly described or defined and tested. Changes in the design must be tested and documented. Procedures must clearly state how activities will be conducted. New procedures must be developed each time an activity is added to the monitoring program. Procedures are reviewed periodically, updated when necessary, and are controlled so that only approved and current procedures are used.

Equipment or particular items affecting the quality of environmental data must be identified, inspected, calibrated, and tested before use. Calibration status must be clearly indicated. Items that do not conform to requirements must be identified as nonconforming and segregated so as to prevent inadvertent use.

Corrective Action. Conditions adverse to quality must be promptly identified, a corrective action planned, responsibility assigned, and the problem remedied.

Documentation. Records of all activities must be kept to verify what was done and by whom. Records must be clearly traceable to an item or activity. Records such as field data sheets, chain-of-custody forms, requests for analysis, sample shipping documents, sample logs, data packages, training records, and weather measurements, in addition to other records in both paper and electronic form, are maintained as documentation for the environmental monitoring program.

Quality Control (QC)

The QC practices, an integral part of the WVDP QA program, are used to ensure that samples are collected and analyzed in a consistent and repeatable manner. QC methods are applied both in the field and in the laboratory.

Field QC. Procedures are defined for collecting each type of sample, such as surface water, groundwater, soil, and air. Trained Environmental Laboratory (ELAB) field personnel collect the samples. Field sampling locations are clearly marked to ensure that routine samples are collected in the same location each time. Collection equipment that remains in the field is routinely inspected, calibrated, and maintained, and automated sampling stations are kept locked to prevent tampering. Samples are collected into certified pre-cleaned containers of an appropriate material and capacity. Containers are labeled with information about the sample, such as date and time of collection, sample collection personnel, and

special field conditions. Collection information is documented and kept as part of the sample record.

Chain-of-custody documentation is maintained so as to trace sample possession from time of collection through analysis. Samples are stored in a locked, secure location before analysis or shipping. Samples sent off site for analysis are accompanied by an additional chain-of-custody form. Subcontract laboratories are required by contract to maintain internal chain-of-custody records and to store the samples under secure conditions.

Special field QC samples are collected and analyzed to assess the sampling process. Duplicate field samples are used to assess sample homogeneity and sampling precision. Field and trip blanks (laboratory-deionized water in sample containers) are used to detect contamination potentially introduced during sampling or shipping. Environmental background samples (samples of air, water, vegetation, venison, and milk taken from locations remote from the WVDP) are collected and analyzed to provide baseline information for comparison with on-site or near-site samples so that site influences can be evaluated.

Laboratory QC. In 2007, samples were collected by personnel from the URS ELAB. On-site analyses were performed at the ELAB or the Wastewater Treatment Facility Laboratory. Off-site analyses were performed by General Engineering Laboratories (GEL, in Charleston, South Carolina), Test America Laboratories, Inc. (formerly Severn Trent Laboratories, in Buffalo, New York), Lionville Laboratory, Inc. (in Lionville, Pennsylvania), and CH2M-WG Idaho, LLC (at the Idaho National Laboratory). As samples were collected, shipped, and analyzed, chain-of-custody documentation was maintained to track sample possession from time of collection through analysis and data reporting. All laboratories are required to maintain relevant certifications, to participate in applicable crosscheck programs, and to maintain a level of QC as defined in their contracts.

To analyze environmental samples from the state of New York, both on-site and subcontract analytical laboratories are required to maintain the relevant NYSDOH Environmental Laboratory Approval Program certification.

Laboratory QC practices specific to each analytical method are described in approved references or procedures. QC practices include proper training of analysts, maintaining and calibrating measuring

equipment and instrumentation, and routinely processing laboratory QC samples such as standards and spikes (to assess method accuracy), duplicates and replicates (to assess precision), and blanks (to assess the possibility of contamination). Standard reference materials (materials with known quantities or concentrations of constituents of interest) traceable to the National Institute of Standards and Technology are used to calibrate counting and test instruments and to monitor their performance.

Crosschecks. Crosscheck samples (performance evaluation samples) contain a concentration of a constituent of interest known to the agency conducting the crosscheck, but unknown to the participating laboratory. Crosscheck programs provide an additional means of testing accuracy of environmental measurements. Subcontract laboratories are required to perform satisfactorily on crosschecks, defined as having at least 80% of reported results falling within control limits. Crosscheck results that fall outside of control limits are addressed by formal corrective actions to determine any conditions that could adversely affect sample data and to ensure that actual sample results are reliable.

The WVDP participates in formal crosscheck programs for both radiological and nonradiological analyses.

- Radiological Crosschecks

Organizations performing radiological analyses as part of effluent or environmental monitoring are encouraged by the DOE to participate in formal crosscheck programs to test the quality of environmental measurements being reported to the DOE by its contractors. Crosscheck samples for radiological constituents are analyzed on site by the ELAB and off site by GEL. In 2007, the WVDP participated in the DOE Radiological Environmental Sciences Laboratory Mixed Analyte Performance Evaluation Program (MAPEP). Results are listed in Appendix H¹⁰.

- Nonradiological Crosschecks

As a New York State Pollutant Discharge Elimination System (SPDES) Permittee, the WVDP is required to participate in the U.S. EPA Discharge Monitoring Report - QA performance evaluation studies for the National Pollutant Discharge Elimination System. Samples from this program are analyzed both on site and by subcontract labo-

ratories. In addition, subcontract laboratories performing nonradiological analyses of samples that contain radiological contamination participate in the DOE MAPEP program. This mixed analyte program provides performance evaluation samples for both radiological and nonradiological constituents.

In 2007, nonradiological crosschecks were analyzed by the WVDP Wastewater Treatment Facility Laboratory, the ELAB, LVLI, GEL, and TestAmerica. Results are summarized in Appendix H⁶⁹.

Results for 2007 from all laboratories that analyzed samples from the WVDP monitoring program are summarized in Table 1-3. As presented, 98.7% of the crosschecks performed in 2007 were acceptable.

TABLE 1-3
Summary of Crosschecks Completed in 2007

Type	Number Reported	Number Within Acceptance Limits	Percent Within Limits
Radiological	37	36	97.3%
Nonradiological	115	114	99.1%
All types	152	150	98.7%

Data Management

The Environmental Laboratory Information Management System (LIMS) is a database system used at the WVDP for establishing sample identification number, maintaining the sample data log, tracking samples, managing field and analytical data, and recording status and results of data validation. The LIMS is used as a controlled-source database for generating reports and statistical evaluations of data sets to support environmental surveillance activities. Subcontract laboratories are requested to provide data in electronic format for direct entry into the LIMS by WVDP personnel.

All software packages used to generate data are verified and validated before use. All analytical data produced in the ELAB at the bench level are reviewed and signed off by a qualified person other than the one who performed the analysis. A similar in-house review is contractually required from subcontractor laboratories.

Data Verification and Validation

Data validation is the process by which analytical data from both on-site and off-site laboratories are reviewed to verify proper documentation of sample processing and data reporting, and to determine the quality and usability of the data. A graded approach is applied that, based upon data quality objectives, dictates the rigor of review of the documentation associated with sample collection and/or sample analysis. In the WVDP environmental program, each data point is validated per approved standard procedures before it is assigned approval status and made ready for data assessment.

Data Assessment and Reporting

Validated analytical data, field information, and historical project data are integrated and evaluated to determine whether the constituents of interest are actually present and, if so, at what concentrations. Data problems identified at this level are investigated and appropriately resolved.

Data from the environmental monitoring program are then evaluated to assess the effect, if any, of the site operations and activities on the environment and the public. Data from each sampling location are compared with historical results from the same location, with comparable background measurements, and (if applicable) with regulatory limits or guidance standards. Standard statistical methods are used to evaluate the data.

Before each technical report is issued, the final document is comprehensively reviewed by one or more persons who are knowledgeable in the technical aspects of the work.

Audits and Assessments

Audits and assessments must be conducted to verify compliance with all aspects of the QA program and to determine its effectiveness. The WVDP environmental monitoring program is subjected to audits by external agencies and to internal management and self-assessments.

Environmental Monitoring Program Self-Assessments.

Two monitoring program self-assessments were completed in 2007. The first was focused on the WVDP meteorology program and the second on safety conditions and practices during routine and non-routine sample collection activities. No findings or

observations were noted. (Note: A "finding" is a non-compliance of a program element or an item to a specification, procedure, or commitment. An "observation" is a condition that, if left uncorrected, could lead to a "finding.") Good practices above and beyond those required by procedural compliance were noted, and some recommended actions (such as training additional personnel to provide backup) were identified to improve the program.

NYSDEC SPDES Audit. NYSDEC performed an annual inspection of the SPDES program at the WVDP on April 26, 2007. The inspection included facility walkdowns of select storm water outfalls, the NDA, the sewage treatment plant, the Lagoon 3 discharge weir, plus operational discussions. No findings or observations were identified. During the inspection, one action was initiated to provide the geotechnical report to NYSDEC, regarding the "Lagoon 3 Embankment Stability Study," which was performed in March 2006. Responses to NYSDEC comments on the geotechnical report were satisfactorily addressed by WVES, and actions were incorporated into a standard operating procedure that provides for periodic inspection of the lagoon 3 embankment for stability, and for recording water level measurements.

WVES QA Department Off-Site Audit. The WVES QA department conducted an audit of off-site laboratory GEL which performs radiobioassay for the WVDP, in October 2007. The audit of GEL focused on laboratory compliance with contractual QA requirements of the contract. One finding, incomplete documentation of training for two employees, was noted. Corrective action was taken by GEL in January 2008, when GEL provided complete training documentation to resolve the issues identified during the audit.

WVES QA Audit of the ELAB. The WVES QA department conducted an audit of the URS ELAB in December 2007. The ELAB audit focused on compliance with relevant requirements from the WVDP Quality Management Manual, the WVDP Environmental Laboratory Approval Program (ELAP) Quality Manual, and National Environmental Laboratory Accreditation Conference (NELAC), Chapter 5. One observation was noted during the audit of the ELAB, that one employee had not documented completion of required training within the allotted time. The condition was corrected within days of the audit and the audit was closed.

NYSDOH Audit. In April 2007, NYSDOH conducted an audit of the ELAB by reviewing procedures for which the laboratory is NYSDOH ELAP-certified. This was

the first audit of the laboratory since NYSDOH ELAP accreditation of radiological procedures was obtained. All methods of certification were reviewed (chemical, radiological, and asbestos testing), as well as sample receipt, storage, and preservation. No findings were noted.

NESHAP Audit. Also in April 2007, DOE conducted a surveillance of the draft National Emissions Standards for Hazardous Air Pollutants (NESHAP) report for 2006 and of the "Proposal for a Modified NESHAP Airborne Radionuclide Monitoring Program for the WVDP." No findings or observations were noted. However, several comments were included in the surveillance report that summarized items discussed during the surveillance and clarifications that had been made concerning the two documents as a result.

EMS Program Assessment. Prior to contract transition to WVES, Washington Regulatory and Environmental Services (WRES) performed an assessment of the WVNSCO EMS from June 18 to June 29, 2007. The assessment was performed to assess the adequacy and effectiveness of the WVDP EMS relative to:

- WVNSCO environmental policy commitments;
- EMS requirements necessary for the company's continued participation in the EPA P-Track program; and
- requirements of the DOE 450.1 portion of the ISMS annual review.

The assessment demonstrated that the WVNSCO EMS is adequate and effective in meeting its policy commitments and is in conformance with the P-Track and DOE O 450.1 requirements. There were no nonconformances identified. A core benefit to an EMS is the application of the continuous improvement cycle. As a result of the assessment, there were three recommendations for improvement. The first related to clearly defining the process used for ranking significance of aspects. The second recommendation was to update the Waste Minimization/Pollution Prevention Awareness Plan. While the program was still relevant and applicable structurally, goals past fiscal year 2005 had not been incorporated into the plan even though P-Track commitments have been in place and have been achieved. The third recommendation was to improve awareness and recognition of the EMS as a key part of the ISMS and of the base environmental aspects.

WVES continues the EMS policy at the WVDP and all recommendations were implemented before the end of 2007.

Lessons Learned. Lessons learned data from audits, appraisals, and self-assessments are shared internally and externally through the WVDP lessons learned program. The WVDP maintains this system to promote the recurrence of desirable events and to minimize the recurrence of undesirable events.

Summary. Although areas for improvement were identified in the course of audits and assessments, nothing was found that would compromise the quality of the data in this report or the environmental monitoring program in general.

Changes in the 2007 Environmental Monitoring Program

Over the last few years, activities on site have focused on dismantlement and decontamination of facilities, demolition of unnecessary structures, and processing and shipping of waste. Hazards on site are being reduced, as are potential pollutant sources. In late 2007 the environmental monitoring program was thoroughly evaluated and changes were identified to streamline the program in response to changing Project activities.

Each sampling location was evaluated on several bases: (1) regulatory requirements or other drivers, (2) pathways and hazard conditions, (3) a statistical evaluation of up to 16 years of monitoring data at each location, and (4) a determination of the need for additional data and/or ongoing monitoring for each constituent. The statistical evaluations indicated that the frequency of sampling and the number of constituents at some locations could be reduced without any reduction in the quality of the Environmental Monitoring Program. As a result, sampling at several locations was discontinued altogether, frequency of sampling at other locations was cut back, and the number of constituents monitored at some locations was reduced.

Environmental monitoring program modifications were implemented in January of 2008. The maps in Appendix A have been color-coded to show those locations at which sampling has remained unchanged, those locations at which sampling has been modified, and those locations at which sampling is no longer necessary. Specific program changes in CY

2007 and in CY 2008 at each location, with the rationale for the change, are summarized in Appendix A.

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