ENVIRONMENTAL MONITORING

Monitoring Program

The goal of the West Valley Demonstration Project (WVDP or Project) environmental monitoring program is to ensure that public health and safety and the environment continue to be protected with respect to releases from site activities. To achieve this goal, possible exposure pathways are monitored.

The primary focus of the monitoring program is on surface water and air pathways, as these are the principal means by which potential contaminants are transported off site. Samples are collected from water, air, and other environmental media and measured for radiological and nonradiological constituents. A description of and schedule for the sampling program at each location and discussion of the environmental monitoring program drivers and rationale are presented in Appendix A, as well as on maps showing the 2010 sampling locations. In accordance with United States (U.S.) Department of Energy (DOE) Order 450.1A, the monitoring program includes both effluent monitoring and environmental surveillance.

Effluent Monitoring. Liquid effluents and air emissions are monitored by collecting samples at locations on site where radioactivity or chemical pollutants are (or might be) released. Release points include discharge outfalls, storm water outfalls, site drainage points, and plant ventilation stacks. At some points, direct measurements (e.g., radioactivity or flow rates) are also taken. The WVDP maintains required permits and/or certificates from regulatory agencies applicable to releases to air and water, as listed in Table ECS-3.

Environmental Surveillance. Surface water, drinking water, air, sediment, soil, venison, fish, and milk are collected at locations where the highest concentrations of transported contaminants might be expected. Samples are also collected at remote locations to provide background data for comparison with data from on-site and near-site samples. Direct radiation is monitored on site, at the site perimeter, and at a remote background location.

Data Evaluation. Data are assessed to determine whether the constituents of interest are present and, if so, their concentrations. Data from each sampling location are compared with regulatory or guidance limits (if applicable) to identify any exceedances. Guidance levels for radiological constituents in air and water are listed in Table UI-4 in the "Useful Information" section of this report. Regulatory limits for nonradiological constituents in discharges to surface water, additional water quality standards, and potable water standards are listed in Appendix B-1[CD].

Data from near-site locations are compared with background concentrations using standard statistical methods as a means of assessing possible site impacts to the environment. Results from each location are also compared with historical data from that location to determine if any trends, such as increasing constituent concentrations, are occurring. If indicated, follow-up actions are evaluated and implemented as warranted.

Effluent Monitoring

Liquid Effluents. The Project is drained by several small streams. Franks Creek enters from the south and receives drainage from the south plateau. As it flows northward, Franks Creek is joined by Erdman Brook, which receives effluent from the low-level waste treatment facility (LLW2) and the site sewage treatment plant. After leaving the Project at the site security fence, Franks Creek receives drainage from the north and northeast swamp areas on the north plateau and from Quarry Creek. Franks Creek then flows into Buttermilk Creek, which, after flowing northward through the Western New York Nuclear Service Center (WNYNSC), enters Cattaraugus Creek and leaves the WNYNSC. (See Figures A-2 and A-5.)

- Radiological Releases

  Two locations, the lagoon 3 weir at outfall 001 (WNSP001 on Figure A-2) and a natural drainage from the northeast swamp (monitoring point WNSWAMP on Figure A-2), are the primary sources of radionuclide releases to surface waters. (Note that two other liquid release points, the sewage treatment outfall [point WNSP007] and another

drainage point on the north plateau [the north swamp, point WNSW74A] are also evaluated each year. Releases from these points are minor and are not included in this discussion. However, they are addressed in Chapter 3, Dose Assessment.)

Discharge through the lagoon 3 weir at SPDES outfall WNSP001 into Erdman Brook is the primary controlled point source of liquid release from the Project. Six batch releases totaling about 10.3 million gallons (gal) (39.1 million liters [L]) were discharged from WNSP001 in 2010. Drainage from the WNSWAMP location in calendar year (CY) 2010 was estimated to be approximately 37.7 million gal (143 million L). Estimates of curies released from these two sources in 2010 and average radionuclide concentrations are summarized in Tables 2-1 and 2-2.

TABLE 2-1
Total Radioactivity Discharged at Lagoon 3 (WNSP001) in 2010 and Comparison of Concentrations with DOE DCGs

Isotope [a]	*Discharge Activity* [b] *(Ci)*	*Radioactivity* [c] *(Becquerels)*	*Average Concentration (µCi/mL)*	*DCG* [d] *(µCi/mL)*	*Ratio of Concentration to DCG*
Gross Alpha	9.88±0.89E-04	3.65±0.33E+07	2.53±0.23E-08	NA[e]	NA
Gross Beta	1.68±0.03E-02	6.21±0.11E+08	4.29±0.08E-07	NA[e]	NA
H-3	2.84±0.08E-02	1.05±0.03E+09	7.25±0.21E-07	2E-03	0.0004
C-14	2.43±5.46E-04	0.90±2.02E+07	0.62±1.40E-08	7E-05	<0.0002
K-40	-4.85±8.00E-04	-1.80±2.96E+07	-1.24±2.05E-08	NA[f]	NA
Co-60	1.78±3.08E-05	0.66±1.14E+06	4.55±7.87E-10	5E-06	<0.0002
Sr-90	7.29±0.11E-03	2.70±0.04E+08	1.86±0.03E-07	1E-06	0.186
Tc-99	5.76±0.41E-04	2.13±0.15E+07	1.47±0.10E-08	1E-04	0.0001
I-129	3.00±1.61E-05	1.11±0.60E+06	7.67±4.12E-10	5E-07	0.0015
Cs-137	1.69±0.08E-03	6.24±0.31E+07	4.31±0.21E-08	3E-06	0.0144
U-232[g]	2.50±0.11E-04	9.26±0.41E+06	6.40±0.28E-09	1E-07	0.064
U-233/234[g]	1.85±0.09E-04	6.84±0.34E+06	4.73±0.24E-09	5E-07	0.0095
U-235/236[g]	1.23±0.25E-05	4.54±0.93E+05	3.13±0.64E-10	5E-07[h]	0.0006
U-238[g]	1.34±0.08E-04	4.94±0.29E+06	3.41±0.20E-09	6E-07	0.0052
Pu-238	4.86±1.22E-06	1.80±0.45E+05	1.24±0.31E-10	4E-08	0.0031
Pu-239/240	3.50±1.02E-06	1.30±0.38E+05	8.95±2.60E-11	3E-08	0.003
Am-241	6.21±1.26E-06	2.30±0.47E+05	1.59±0.32E-10	3E-08	0.0053
Sum of Ratios					**0.29**

Note: Radiological measurements are expressed as a result term plus or minus (±) an uncertainty term. Result terms may be positive or negative. If the uncertainty term is larger than the result, the radionuclide was not detected. For more detail, see the "Data Reporting" discussion in the "Useful Information" section.

NA - Not applicable

[a] Half-lives are listed in Table UI-4.

[b] Total volume released: 3.91E+10 milliliters (mL) (1.03E+07 gal)

[c] 1 curie (Ci) = 3.7E+10 becquerels (Bq): 1 Bq = 2.7E-11 Ci: 1 microcurie (µCi) = 1E-06 Ci:

[d] DCGs are listed for reference only. DCGs are applicable at the point at which water is available for ingestion by the public (i.e., at the site boundary), but not to release point concentrations, as might be inferred from their inclusion in this table.

[e] DOE DCGs are not established for gross alpha and beta. Where there are no radionuclide-specific data, the DCGs for the most restrictive alpha and beta emitters at the WVDP (americium-241 and strontium-90, respectively) are used as a conservative basis for comparison.

[f] The DCG is not applied to potassium-40 (K-40) activity because of its natural origin.

[g] Total uranium (grams [g]) = 4.40±0.04E+02; average uranium concentration (micrograms [µg]/mL) = 1.13±0.01E-02

[h] The DCG for U-236 is used for this comparison.

TABLE 2-2
Total Radioactivity Released at Northeast Swamp (WNSWAMP) in 2010 and Comparison of Concentrations with DOE DCGs

Isotope [a]	*N*	*Discharge Activity* [b] *(Ci)*	*Radioactivity* [c] *(Becquerels)*	*Average Concentration (µCi/mL)*	*DCG* [d] *(µCi/mL)*	*Ratio of Concentration to DCG*
Gross Alpha	27	0.21±1.50E-04	0.77±5.55E+06	0.15±1.05E-09	NA[e]	NA
Gross Beta	27	6.83±0.07E-01	2.53±0.03E+10	4.79±0.05E-06	NA[e]	NA
H-3	27	5.83±2.13E-03	2.16±0.79E+08	4.09±1.49E-08	2E-03	<0.0001
C-14	2	1.13±3.38E-03	0.42±1.25E+08	0.79±2.37E-08	7E-05	<0.0003
Sr-90	12	3.58±0.01E-01	1.32±0.01E+10	2.51±0.01E-06	1E-06	2.51
I-129	2	0.02±1.24E-04	0.08±4.59E+06	0.16±8.69E-10	5E-07	<0.0017
Cs-137	12	1.26±0.78E-04	4.66±2.89E+06	8.84±5.48E-10	3E-06	0.0003
U-232[f]	2	-0.53±3.05E-06	-0.20±1.13E+05	-0.37±2.14E-11	1E-07	<0.0002
U-233/234[f]	2	1.07±0.63E-05	3.94±2.33E+05	7.47±4.42E-11	5E-07	0.0002
U-235/236[f]	2	1.02±3.19E-06	0.38±1.18E+05	0.72±2.24E-11	5E-07[g]	<0.0001
U-238[f]	2	1.86±0.84E-05	6.88±3.11E+05	1.30±0.59E-10	6E-07	0.0002
Pu-238	2	-0.21±2.25E-06	-0.77±8.33E+04	-0.15±1.58E-11	4E-08	<0.0004
Pu-239/240	2	-1.18±2.41E-06	-4.36±8.91E+04	-0.83±1.69E-11	3E-08	<0.0006
Am-241	2	-0.56±2.20E-06	-2.06±8.15E+04	-0.39±1.54E-11	3E-08	<0.0005
Sum of Ratios						**2.51**

Note: Radiological measurements are expressed as a result term plus or minus (±) an uncertainty term. Result terms may be positive or negative. If the uncertainty term is larger than the result, the radionuclide was not detected. For more detail, see the "Data Reporting" discussion in the "Useful Information" section.

Note: The average pH at this location was 7.17 standard units.

NA - Not applicable

[a] Half-lives are listed in Table UI-4.

[b] Total volume released: 1.43E+11 mL (3.77E+07 gal)

[c] 1 curie (Ci) = 3.7E+10 becquerels (Bq): 1 Bq = 2.7E-11 Ci

[d] DCGs are listed for reference only. DCGs are applicable at the point at which water is available for ingestion by the public (i.e., at the site boundary), but not to release point concentrations, as might be inferred from their inclusion in this table.

[e] DOE DCGs are not established for gross alpha and beta. Where there are no radionuclide-specific data, the DCGs for the most restrictive alpha and beta emitters at the WVDP (americium-241 and strontium-90, respectively) are used as a conservative basis for comparison.

[f] Total uranium (g) = 2.73±0.10E+01; average uranium concentration (µg/mL) = 1.91±0.07E-04

[g] The DCG for U-236 is used for this comparison.

DOE Order 5400.5 defines derived concentration guides (DCGs) as radionuclide concentrations that, under conditions of continuous exposure for one year by one exposure mode, would result in an effective dose equivalent of 100 millirem (1 millisievert). The DCGs are applicable only at locations where members of the public could be exposed to effluents containing contaminants. DCGs for radionuclides measured at the WVDP are listed in Table UI-4. Note that DCGs are not used for dose assessment. Methods for estimating dose from the liquid pathway are discussed in Chapter 3.

To evaluate each of the releases with respect to the DCGs, each annual average radionuclide concentration was divided by its respective DCG and the ratios from all nuclides were summed. As a DOE policy, the sum of the ratios (also called the "sum of fractions") should not exceed 1.0. That is, the sum of percentages should not exceed 100%. Tables 2-1 and 2-2 list the sum of ratios for each release point.

The sum of ratios for the release from WNSP001 in 2010 was approximately 0.29, below the 1.0 criterion. However, the sum of ratios from WNSWAMP was 2.51, above the DOE Order 5400.5 criterion. As in

past years, the elevated sum of ratios was almost entirely attributable to strontium-90.

Drainage at the WNSWAMP location largely consists of emergent groundwater. Elevated gross beta concentrations were first noted at this location in 1993. Subsequent investigations delineated a plume of strontium-90 contaminated groundwater on the north plateau.

Annualized average strontium-90 concentrations, which first exceeded the strontium-90 DCG (1E-06 microcurie [µCi]/mL) in 1995, again exceeded the DCG in 2010. (See Figure 4-7 in Chapter 4, "Groundwater Protection Program.") Activities to limit the migration of the strontium-90 groundwater plume, including installation of the 860-foot-long full-scale permeable treatment wall (PTW), are also discussed in Chapter 4.

Even though waters with elevated strontium-90 concentrations drain from WNSWAMP into Franks Creek, then into Buttermilk Creek, and ultimately into Cattaraugus Creek, concentrations of strontium-90 and gross beta in water collected from Cattaraugus Creek downstream of the WVDP at the first point of public access continue to show little or no difference from background concentrations. (See Table B-5A in Appendix B-5.)

State Pollutant Discharge Elimination System (SPDES) Permit-Required Monitoring. Liquid discharges from the WVDP are regulated for nonradiological constituents under a SPDES permit, as identified in Table ECS-3. The permit identifies compliance points from which liquid effluents are released to Erdman Brook (Figure A-2), and specifies the sampling and analytical requirements for each.

The conditions and requirements of the 2010 SPDES permit are summarized in Appendix B-1. The permit identifies 25 outfalls and compliance points with monitoring requirements and discharge limits. The monitored outfalls include:

- outfall 001 (monitoring point WNSP001), discharge from the LLW2;
- outfall 007 (monitoring point WNSP007), discharge from the sanitary wastewater treatment facility;
- outfall 008 (monitoring point WNSP008, closed in May 2001), a groundwater french drain near the LLW2 storage lagoons (closed in May 2001 but remained on the permit until July 2011);
- outfall 116 (pseudo-monitoring point WNSP116), a location in Franks Creek that represents the confluence of outfalls WNSP001, WNSP007, and WNSP008, as well as storm water runoff, groundwater seepage, and augmentation water. Samples from upstream sources are used to calculate total dissolved solids at this location and to demonstrate compliance with the SPDES permit limit for this parameter (outfall 116 is referred to as a "pseudo-monitoring" point on the SPDES permit);
- outfall 01B (monitoring point WNSP01B), an internal monitoring point for the liquid waste treatment system evaporator effluent, was monitored for flow and total mercury. No effluent was processed or released from this outfall in 2010; and
- Twenty storm water discharge outfalls that also receive flows from other minor sources, such as fire hydrant testing and groundwater seepage, being monitored on a rotational basis. The objectives of SPDES permit requirements for monitoring storm water runoff are to determine (1) the levels of water quality and specific chemicals in storm water discharges from specified locations on the WVDP, (2) the amount of rainfall, (3) duration of the storm event, and (4) the resulting flow at the outfalls. The 20 storm water outfalls at the WVDP are grouped into eight representative drainage basins that could potentially be influenced by industrial or construction activity runoff. One representative outfall from each of the eight outfall groups listed in Appendix A must be sampled on a semiannual basis.

The SPDES permit specifies the following conditions for a qualifying storm water event eligible for monitoring: (1) a period of 72 hours between the monitored event and the previous measurable event of 0.1 inches of precipitation; (2) a total rainfall of more than 0.1 inch; and (3) resultant storm discharge at the outfall.

Appendix B-2 presents process effluent data with SPDES permit limits provided for comparison. Appendix B-3 presents storm water runoff monitoring data for outfalls designated in the WVDP SPDES permit.

All samples were collected and analyzed in accordance with the permit in CY 2010.

Effective July 1, 2011, the New York State Department of Environmental Conservation issued a modified permit for the WVDP which identified the revised conditions of the permit. The new permit removed two

storm water outfalls (S02 and S40) which no longer exist as drainage basins. An additional storm water location (S43) was added that was tentatively identified in 2006 and characterized in 2007 near a wetland near the live-fire range on the WNYNSC.

Radiological Air Emissions. Federal law allows air containing small amounts of radioactivity to be released from plant ventilation stacks during normal operations. The releases must meet dose criteria specified in the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations to ensure that public health and safety and the environment are protected. At the WVDP, radiological releases have been measured and/or estimated from six permitted emission points (see Table ECS-3), five non-permitted points, and four diffuse sources (wastewater storage lagoons, stored waste containers, demolition activities, and installation of a passive groundwater treatment system). Sampling locations for air emissions are shown on Figure A-6 in Appendix A. Releases are evaluated and reported to the U.S. Environmental Protection Agency (EPA) in the annual NESHAP report.

Measured radionuclide concentrations in air are also compared with DOE DCGs. Unlike NESHAP dose criteria, the DOE DCGs are expressed in µCi/mL and can be directly compared with measurements from the monitoring program. Although the DOE DCGs are applicable only where the public may breathe air containing radionuclides, the DCGs are used at the WVDP as a tool for evaluating airborne emissions at the point of release. DCGs for radionuclides of interest at the WVDP are found in Table UI-4 in the "Useful Information" section at the end of this report. When only gross alpha and beta measurements are available, activity is assumed to come from americium-241 and strontium-90, respectively, because the DCGs for these radionuclides are the most limiting for major particulate emissions at the WVDP. No DCGs were exceeded by airborne emissions on an annualized basis during 2010. Locations with results statistically greater than background values are summarized in Table 2-4.

Ventilation and Emission Systems. The exhaust from each EPA-permitted ventilation system is continuously filtered and the permanent systems are monitored as air is released to the atmosphere. Because radionuclide concentrations in air emissions are quite low, a large volume of air must be sampled to measure the radionuclide quantity released from the facility. Emissions are sampled for radioactivity in both particulate (e.g., strontium-90 and americium-241) and gaseous forms (e.g., tritium and iodine-129). The total release of each radionuclide varies from year to year in response to changing site activities. For instance, releases of iodine-129 dropped sharply after vitrification was completed in 2002. Over the years, the annual calculated dose from air emissions at the WVDP has remained a small fraction of the NESHAP standard. (See "Predicted Dose From Airborne Emissions" in Chapter 3.)

- The Main Plant Process Building (MPPB) Ventilation Stack

  The primary controlled air emission point at the WVDP is the MPPB ventilation stack, monitoring location code ANSTACK, which vents to the atmosphere at a height of 208 feet (ft) (63.4 meters [m]). This stack has historically released ventilation exhaust from several MPPB facilities, including the liquid waste treatment system, the analytical laboratories, as well as off-gas from the former vitrification system. In 2010, the MPPB stack continued to release ventilation exhaust from a variety of facility spaces.

  Total curies released from the MPPB stack in 2010 are listed in Table 2-3, together with annual averages, maxima, and a comparison of average isotopic concentrations with the applicable DCGs. The sum of ratios for radiological concentrations from ANSTACK was 0.25, below the DOE guideline of 1.0. Airborne concentrations from the stack to the site boundary were further reduced by dispersion. Historical results from air samples taken near the site boundary have confirmed that WVDP operations have had no discernible effect on off-site air quality. (See "Ambient Air," later in this chapter.)

MPPB Stack Ventilation - Severe Storm Event. In August 2010, elevated levels of gross alpha and gross beta were observed in particulate air filter samples from the MPPB ventilation stack, ANSTACK. A few weeks earlier, a severe thunderstorm occurred between July 24 and 25, 2010, accompanied by a series of tornadoes which touched down in the western New York area. The WVDP experienced heavy rain (approximately 2.5 inches), along with moderately high temperatures and humidity. During this heavy rainfall, precipitation entered the MPPB through leaks in the roofing system. Rainfall migrated through contaminated ceiling overheads and finally onto the floors and stairwells. Many of these leaking areas had been previously identified with postings/precautions in place to preclude the spread of contamination. But in this instance, the heavy rain-

TABLE 2-3
Total Radioactivity Released at Main Plant Stack (ANSTACK) in 2010 and Comparison of Concentrations with DOE DCGs

Isotope [a]	*N*	*Total Activity Released* [b] *(Ci)*	*Average Concentration (µCi/mL)*	*Maximum Concentration (µCi/mL)*	*DCG* [c] *(µCi/mL)*	*Ratio of Concentration to DCG*
Gross Alpha	27	4.58±0.16E-06	5.94±0.21E-15	6.42E-14	--	--
Gross Beta	27	8.88±0.06E-05	1.15±0.01E-13	1.25E-12	--	--
H-3	27	2.78±0.05E-03	3.61±0.07E-12	1.24E-11	1E-07	<0.0001
Co-60	2	2.10±4.76E-08	2.73±6.18E-17	<1.02E-16	8E-11	<0.0001
Sr-90	2	2.61±0.10E-05	3.39±0.13E-14	5.59E-14	9E-12	0.0038
I-129	2	1.95±0.13E-05	2.53±0.17E-14	2.73E-14	7E-11	0.0004
Cs-137	2	2.95±0.12E-05	3.83±0.23E-14	6.51E-14	4E-10	0.0001
Eu-154	2	1.04±1.28E-07	1.35±1.66E-16	<3.48E-16	5E-11	<0.0001
U-232[d]	2	7.07±6.48E-09	9.17±8.41E-18	2.04E-17	2E-14	0.0005
U-233/234[d]	2	2.25±0.65E-08	2.91±0.84E-17	3.12E-17	9E-14	0.0003
U-235/236[d]	2	5.16±3.37E-09	6.69±4.37E-18	1.16E-17	1E-13	<0.0001
U-238[d]	2	1.88±0.62E-08	2.44±0.80E-17	2.53E-17	1E-13	0.0002
Pu-238	2	6.73±0.34E-07	8.73±0.45E-16	1.54E-15	3E-14	0.0291
Pu-239/240	2	1.23±0.05E-06	1.59±0.06E-15	2.78E-15	2E-14	0.0795
Am-241	2	2.13±0.18E-06	2.76±0.23E-15	4.85E-15	2E-14	0.138
Sum of Ratios						0.25

N - Number of samples

-- - DOE DCGs are not established for gross alpha and beta. Where there are no radionuclide-specific data, the DCGs for the most restrictive alpha and beta emitters at the WVDP (americium-241 and strontium-90, respectively) are used as a conservative basis for comparison.

[a] Half-lives are listed in Table UI-4.

[b] Total volume released at 50,000 cubic feet per minute = 7.71E+14 mL/year.

[c] DCGs are listed for reference only. DCGs are applicable at the point at which air could be inhaled by the public (i.e., at the site boundary) but not to release point concentrations, as might be inferred from their inclusion in this table.

[d] Total uranium (g) = 6.62±0.15E-02; average = 8.59±0.19E-11 µg/mL

fall caused leakage to spread outside the established contamination areas within the building. The WVDP experienced a power outage during this storm event, temporarily taking the ventilation fans off-line for approximately six hours. Loss of ventilation resulted in condensate in the ventilation ducts, as evidenced by condensate leakage from the off-gas duct.

Following this ventilation failure and severe storm event, elevated gross alpha and gross beta activities were recorded from the biweekly ANSTACK air filter samples retrieved during the routine sample filter change-out on August 12 and again on August 25, 2010. Subsequent samples collected at this location during the following weeks showed that gross alpha and gross beta concentrations returned to expected levels. The semiannual air particulate filter composite (comprised of 26 biweekly filters) was analyzed for specific routine radionuclides, and showed elevated levels of activity for the last half of 2010. Both the primary alpha (americium-241, plutonium-238, and plutonium-239/240) and beta-emitting radionuclides (cesium-137 and strontium-90) showed increased concentrations over this period. Nevertheless, as discussed in the previous section, the total curies released from the ANSTACK and the sum of the ratios for radionuclide concentrations were well below DOE guidelines. Refer to Table 2-3 and the previous discussion of "The Main Plant Ventilation Stack."

During follow-up investigations into these observations, it was determined that these increased concentrations may have been due to several contributing factors: incorporation and evaporation of contaminated liquid and condensate into the ventilation system; ventilation system cycling as the power went off and then back on; and ongoing decontamination projects involving access to high-contamination areas to conduct decontamination and decommissioning (D&D) efforts in the MPPB.

Repair work to help seal the MPPB roof has been completed and D&D work continues. (See "Unplanned Radiological Airborne Release" in Chapter 3.)

During the preparation of this report, another increase in gross alpha and gross beta concentrations was observed at the MPPB stack in samples collected in March and April 2011. The investigation into these elevated gross alpha and beta observations is currently ongoing and has been attributable to cycling of the main stack ventilation system.

- Other On-Site Air Sampling Systems

  Sampling systems similar to those of the MPPB are used to monitor airborne effluents from the former vitrification heating, ventilation, and air-conditioning system (ANVITSK), the 01-14 building ventilation stack (ANCSSTK), the contact size-reduction facility ventilation stack (ANCSRFK), the supernatant treatment system ventilation stack (ANSTSTK), the container sorting and packaging facility ventilation stack (ANCSPFK), and the remote-handled waste facility stack (ANRHWFK) (Figure A-6).

  Permitted portable outdoor ventilation enclosures (OVEs) are used to provide the ventilation necessary for personnel safety working with radioactive materials in areas outside permanently ventilated facilities or in areas where permanent ventilation must be augmented for extra area-specific drawthrough. Air samples from OVEs are collected continuously while emission points are discharging, and data from these portable ventilation units are included in annual evaluations of airborne emissions.

  Appendix C[CD] presents total radioactivity released for specific radionuclides at each of the on-site air sampling locations, with the exception of ANCSRFK ventilation, which did not operate in 2010. Although this facility was used in 2010, it was ventilated with an OVE/portable ventilation unit (PVU) which was continuously sampled and reported with the other OVEs/PVUs.

  No results exceeding the DOE DCGs were noted at any of the air emission sampling locations. Most results showed no detectable radioactivity.

- Nonradiological Air Emissions

  Nonradiological air emissions at the WVDP are regulated under an air facility registration certificate that caps (limits) nitrogen and sulfur oxide emissions (NO_x and SO_2, respectively) from the facility at 49.5 tons per year each. (See Table ECS-3.) The certificate applies to two site utility steam boilers, which are the primary sources of NO_x and SO_2 at the site. Based on natural gas usage, the boilers are estimated to have released about 0.21 tons of NO_x and 0 tons of SO_2 in 2010, which is well below the capping limit.

  Other units with the potential to emit, such as generators listed in the certificate, are exempted with the understanding that each unit operates less than 500 hours per year.

Environmental Surveillance

Surface Water. On-site surface water drainage is routinely sampled at several points on the north and south plateaus, as shown in Appendix A, Figure A-2. Monitoring points are sited at locations where releases from possible source areas on the north and south plateaus could be detected. Appendices B-4[CD] through B-6[CD] present data for site surface drainage, subsurface drainage, contained water, ambient surface water, and potable (drinking) water monitoring locations. Off-site sampling locations are shown on Figure A-5. Results are presented in Appendix B-5[CD]. Also provided for side-by-side comparison with these data are reference values, where available, including background ambient water monitoring data and/or pertinent ambient water quality standards, guidelines, or maximum contaminant levels (MCLs).

Radiological and nonradiological results from surface water samples were compared with applicable water quality standards and guidelines. Radiological results from on-site and downstream locations on Franks and Buttermilk Creeks were also compared with results from the background location on Buttermilk Creek (WFBCBKG), upstream of the WVDP. (Nonradiological results were compared with historical background values from WFBCBKG, because sampling for chemical

TABLE 2-4
2010 Comparison of Environmental Monitoring Results With Applicable Limits and Backgrounds

Sample Type	*Number of Sampling Locations*	*Locations with Results Greater than Applicable Limits or Screening Levels [a] (Constituent)*	*Number of Locations with Results Greater Than Background*	*Locations with Results Statistically Greater than Background (Constituent)*
Air (1 background location)				
On-site air emission points	7	0	6	**ANSTACK** (H-3, Sr-90, I-129, Cs-137,U-232, Pu-238, Pu-239/240, Am-241); **ANSTSTK** (I-129); **ANCSSTK** (I-129); **ANCSPFK** (I-129); **ANVITSK** (I-129); **ANRHWFK** (I-129)
Surface water (2 background locations, one on Buttermilk Creek and one [historical] on Cattaraugus Creek)				
On-site controlled effluents	2	0	2	**WNSP001** (Gross alpha, Gross beta, H-3, Sr-90, Tc-99, Cs-137, U-232, U-233/234, U-235/236, U-238, Pu-238, Pu-239/240, Am-241, bromide, SO_4, NO_3-N, total B, Hg, dissolved Cu, surfactant (as LAS), total dissolved solids [TDS]); **WNSP007** (Gross beta)
On-site surface water	7	**WNSWAMP** (Sr-90)	6	**WNSP006** (Gross beta, Sr-90, U-233/234, U-238, TDS); **WNSP005** (Gross beta, Sr-90); **WNSWAMP** (Gross beta, H-3, Sr-90, U-238); **WNSW74A** (Gross beta, Sr-90); **WNNDADR** (Gross beta, H-3, Sr-90); **WNERB53** (Gross beta, Sr-90)
Off-site surface water	2	**WFBCTCB**[b] (total Fe[c], dissolved Hg[c])	2	**WFBCTCB** (Gross beta, Sr-90) **WFFELBR** (Gross beta)
Drinking water (1 background location) WNURRAW				
On-site drinking water	1	0	0	None
Soil (1 background location)				
Off-site soil	5	NS	NS	NS
Sediment (2 background locations, one on Buttermilk Creek and one [historical] on Cattaraugus Creek)				
On-site sediment/soil	3	NS	NS	NS
Off-site sediment	3	NS	NS	NS
Biologicals (3 background deer; 1 background per matrix for remainder)				
Fish	2	NA	NS	NS
Milk	1	NA	0	None
Deer	3	NA	1	**BFDNEAR** -1 (Cs-137)
Vegetables/fruits	3	NA	NS	NS
Environmental dosimetry (1 background)				
On-site, near facilities	8	NA	3	**DNTLDs #24, 38, 40**
Perimeter	17	NA	0	None

NA - No applicable regulatory, guidance, or screening limits are available.
NS - Not sampled in 2010.

[a] Applicable regulatory, guidance, or screening limits are listed in Table UI-4 (radionuclides in air and water) and Appendix B-1 (water).

[b] New York State Class C water quality standards were applied at WFBCTCB.

[c] Measurements at background location WFBCBKG have routinely exceeded the water quality standards.

constituents was discontinued at this location in 2008.) Results from Cattaraugus Creek near Felton Bridge (sampling point WFFELBR), were compared with historical results from the Cattaraugus Creek background at Bigelow Bridge (former sampling point WFBIGBR). Locations with results exceeding applicable limits and those with results statistically greater than background values are summarized in Table 2-4.

- South Plateau

  Two inactive underground radioactive waste disposal areas (the U.S. Nuclear Regulatory Commission-licensed disposal area [NDA], under the control of the U.S. DOE, and the New York State-licensed disposal area [SDA], under the control of the New York State Energy Research and Development Authority [NYSERDA]), lie on the south plateau. These disposal sites are possible contaminant sources to surface water. Areas of the south plateau are being used to store radioactive vessels removed from site facilities and to temporarily store and stage containers of radioactive waste before they are shipped. Also located on the south plateau is the drum cell, a building formerly used to store drums of processed low-level radioactive waste (LLW). The drum cell has been empty since 2007, when the waste drums were shipped off site.

  Surface water drainage downstream of the NDA is monitored at location WNNDADR, immediately north of the NDA, and further downstream at location WNERB53 on Erdman Brook. Some drainage from the western and northwestern portions of the SDA is also captured at WNNDADR and WNERB53. Although no radionuclide concentrations are greater than (or even approach) DOE DCGs, gross beta and strontium-90 concentrations have routinely exceeded background concentrations at both WNNDADR and WNERB53, as have tritium concentrations at WNNDADR. Residual soil contamination from past waste burial activities is thought to be the source.

  As part of an interim measure (IM) to limit infiltration of groundwater, surface water, and precipitation into the NDA, a geomembrane cap and slurry wall were constructed at the NDA. The IM was completed in December 2008. (See Chapter 4, “Interim Measures” under the discussion of “Groundwater Sampling Observations on the South Plateau: Weathered Lavery Till and the NDA” for more detail.)

  Figure 2-1 is a plot of average gross beta and strontium-90 concentrations in surface water at sample points WNNDADR and WNERB53 before and after completion of the IM. In CY 2010, average concentrations were between 50% and 75% lower than historical concentrations, indicating the IM has been effective in reducing groundwater migration through the NDA, which affects infiltration into and surface water drainage at these points.

  Although tritium concentrations at WNNDADR in CY 2010 remained above background, concentrations continued to trend downward, as noted in previous Annual Site Environmental Reports and as shown on Figure 2-2. Because the half-life of tritium is slightly longer than 12 years, decreasing tritium concentrations may be partially attributable to radioactive decay.

  North of the SDA, Franks Creek is sampled to monitor drainage downstream of the drum cell and the eastern and southern borders of the SDA (point WNFRC67, on Figure A-2). In 2010, radionuclide concentrations at this point were indistinguishable from background.

- North Plateau

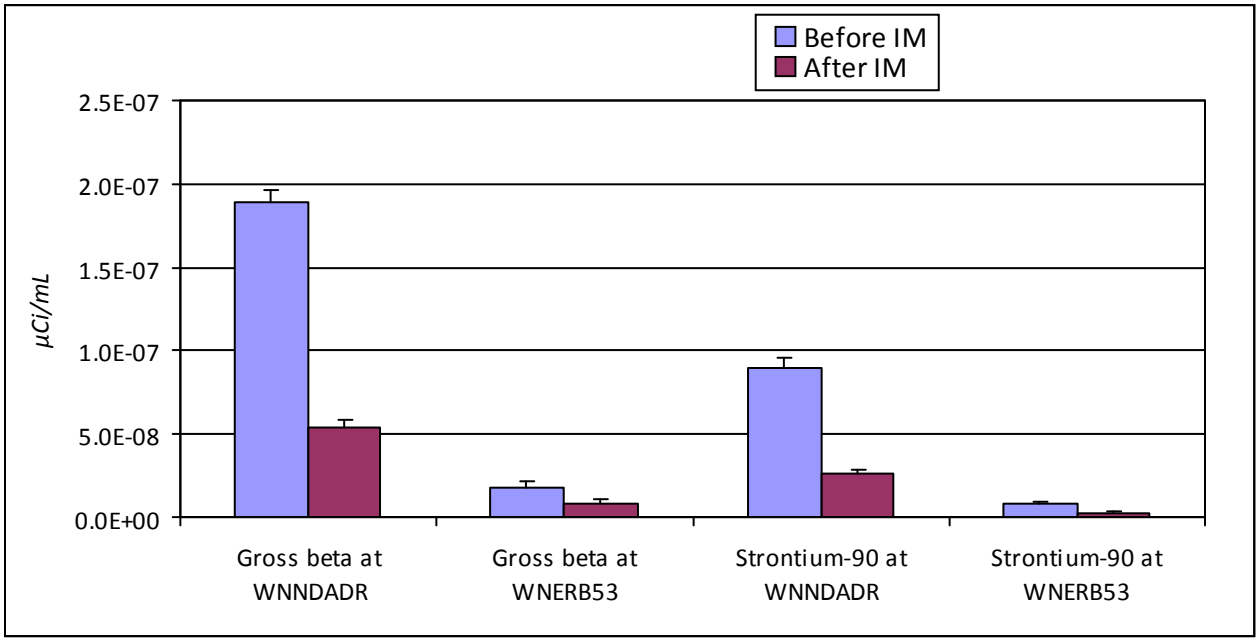
  Besides the effluent and drainage locations discussed earlier in the liquid effluents section, a location on the east side of the MPPB (point WNSP005) monitors surface drainage on the north plateau. Annual average gross beta and strontium-90 concentrations statistically exceeded background concentrations at this sampling location during CY 2010. One other sample point, WNSP006, is sampled at Franks Creek at the security fence. WNSP006 is downgradient of the Lagoon 3 outfall (point WNSP001). In 2010, background concentrations of gross beta, strontium-90, uranium-233/234, uranium-238, and total dissolved solids were also exceeded at WNSP006.

  On the north plateau, possible contaminant sources that could affect surface water include the high-level waste tanks, MPPB, the lagoon system associated with the LLW2, and waste handling and storing facilities.

- Off-Site Surface Water

  Surface water samples are collected at three off-site locations: one upstream background location and one downstream location on Buttermilk Creek and one downstream location on Cattaraugus Creek.

FIGURE 2-1
Average Gross Beta and Strontium-90 Concentrations in Surface Water on the South Plateau at WNNDADR[a] and WNERB53[b] Before and After the NDA Interim Measure (IM) was Installed

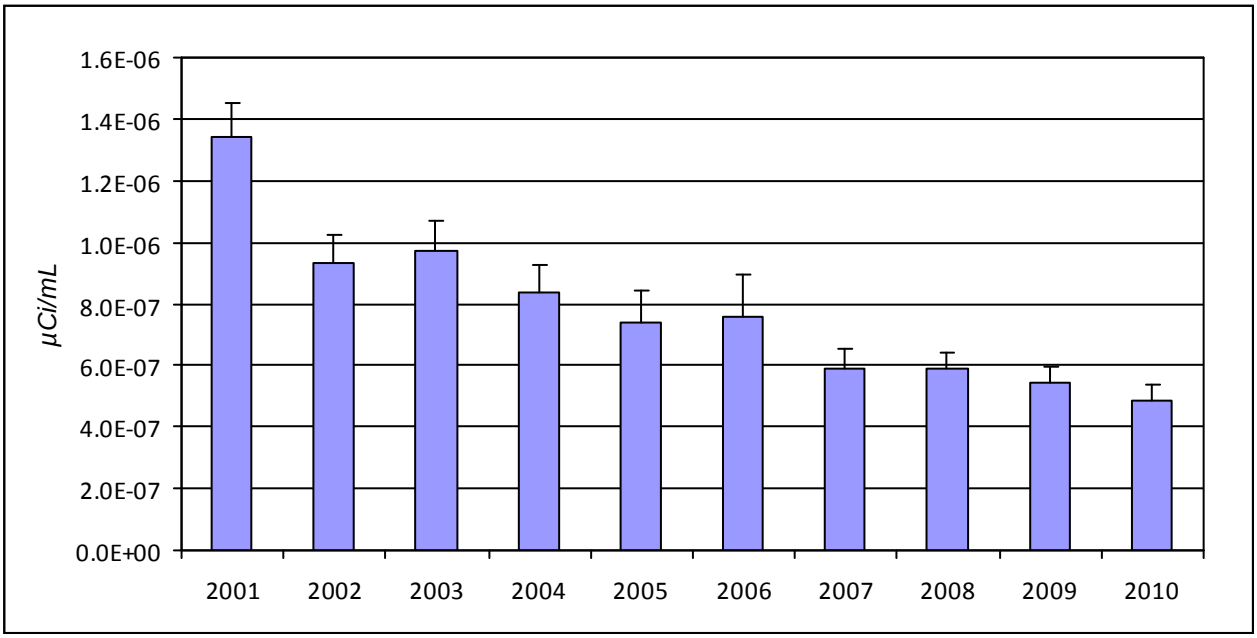


Note: The upper limit of the uncertainty term is indicated with each point. Average gross beta and strontium-90 background concentrations in Buttermilk Creek (WFBCBKG) in CY 2010 were 2.06±1.82E-09 and 0.79±1.06E-09 µCi/mL, respectively.

[a] Sample point WNNDADR is located downstream, immediately north of the NDA.

[b] Sample point WNERB53 is located farther downstream on Erdman Brook.

FIGURE 2-2
Average Concentration of Tritium in Surface Water at WNNDADR: 2001–2010



Note: The upper limit of the uncertainty term is indicated with each point. Average background tritium concentration in Buttermilk Creek (WFBCBKG) in CY 2010 was <4.60E-08 µCi/mL.

- Buttermilk Creek receives surface drainage from the WNYNSC. The background monitoring point is located upstream of the WVDP at Fox Valley Road (WFBCBKG) and the downstream point is located at Thomas Corners Bridge (WFBCTCB), just before where Buttermilk Creek enters Cattaraugus Creek.

- Background samples were collected from Cattaraugus Creek at Bigelow Bridge, at Route 240, before the point where Buttermilk Creek flows into Cattaraugus Creek. Data from this location from 1991 through 2007 have been used to establish an upstream background. Sampling was discontinued in 2008. Downstream of that point, samples are collected at Felton Bridge (WFFELBR), the first point of public access below the WVDP.

Applicable guidance levels were exceeded at two of 11 on-site and off-site surface water monitoring locations affected by the WVDP in 2010.

The New York State Class C and D water quality limit for total iron, 0.3 milligrams per liter (mg/L), was exceeded at location WFBCTCB, with a maximum concentration of 1.46 mg/L. However, the limit was also exceeded at background location WFBCBKG in eight of the 10 years of measurement before sampling for metals was discontinued in 2008. Background results ranged from 0.16 mg/L to 7.4 mg/L. These fluctuating, elevated levels of iron are thought to reflect natural variability of stream conditions, and are not related to WVDP activities. The Class C water quality limit for dissolved mercury (0.0007 micrograms per liter [µg/L]) was exceeded at point WFBCTCB, with a maximum concentration of 0.0025 µg/L. As seen with iron, the Class C limit for mercury was also exceeded at background location WFBCBKG, which ranged from 0.0005 to 0.0062 µg/L, reflecting natural variability.

A DOE DCG was exceeded at the northeast swamp (WNSWAMP), where the average strontium-90 concentration was 2.51E-06 µCi/mL. (The strontium-90 DCG is 1E-06 µCi/mL.) Refer to the WNSWAMP discussion earlier in this chapter and Chapter 4, "Strontium-90 Plume on the North Plateau."

Consistent with historical data, concentrations of radiological constituents above background values, usually gross beta and strontium-90, were noted at several on-site surface water monitoring locations. However, results from samples taken downstream at the first point of public access were statistically indistinguishable from background or, as with gross beta concentrations, only slightly higher than background, indicating little Project influence downstream.

The highest average gross beta result at WFFELBR over the last 10 years (5.99E-09 µCi/mL in 2006) was only about 0.6% of the DOE DCG for strontium-90 (1E-06 µCi/mL). The average result in 2010 (3.42E-09 µCi/mL) was about 0.3% of the DOE DCG.

Drinking Water. Project drinking water (potable water) and utility water is drawn from two on-site surface water reservoirs. This water is sampled at select locations for both radiological and nonradiological constituents. It is monitored at the distribution entry point (WNDNKUR) and at other site tap water locations to verify compliance with EPA and New York State Department of Health (NYSDOH) and Cattaraugus County Health Department (CCHD) regulations. Results from 2010 indicated that no radiological contaminants were found in on-site drinking water and that the Project's drinking water continued to remain below the MCLs and drinking water standards of the EPA, NYSDOH, and the CCHD. The results are presented in Appendix B-6.

Ambient Air. In 2010, samples for radionuclides in air were collected at one background location at Great Valley (AFGRVAL), 18 miles (29 kilometers) south of the site. (See Figure A-12.) This location is considered representative of regional air with no potential to be affected by radiological releases from the WVDP.

Until 2008, ambient air was routinely sampled at near-site locations and at locations in nearby communities. Although variability from year to year was observed from nearly 17 years of monitoring, results from near-site monitoring locations were statistically the same as those from the Great Valley background location. The historical data suggests no evidence of adverse site influence on ambient air quality.

Sediment and Soil. Airborne particulates may be deposited onto soil by wind or precipitation. Particulate matter in streams can adsorb radiological constituents in liquid effluents and settle on the stream bottom as sediment. Soils and sediment may subsequently be eroded or resuspended, especially during periods of high winds or high stream flow. The resuspended particles may provide a pathway for radiological constituents to reach humans either directly via exposure or indirectly through the food pathway. As part of the monitoring program, on-site sediment/soil samples are collected at three loca-

tions on the north plateau where drainage has the potential to be contaminated (SNSP006, SNSWAMP, and SNSW74A on Figure A-2). Off-site sediment samples are collected at one background location on Buttermilk Creek and at two downstream locations, one on Buttermilk and one on Cattaraugus Creek (SFBCSED, SFTCSED, and SFCCSED, respectively [see Figure A-5]). Soil samples are collected at one background and three former near-site air sampling locations and are analyzed for radiological constituents (Figures A-5 and A-12). In 2008, frequency of sampling for sediments and soils was reduced to every five years. In accordance with this schedule, no samples have been collected since 2007, and the next sampling will be done in 2012.

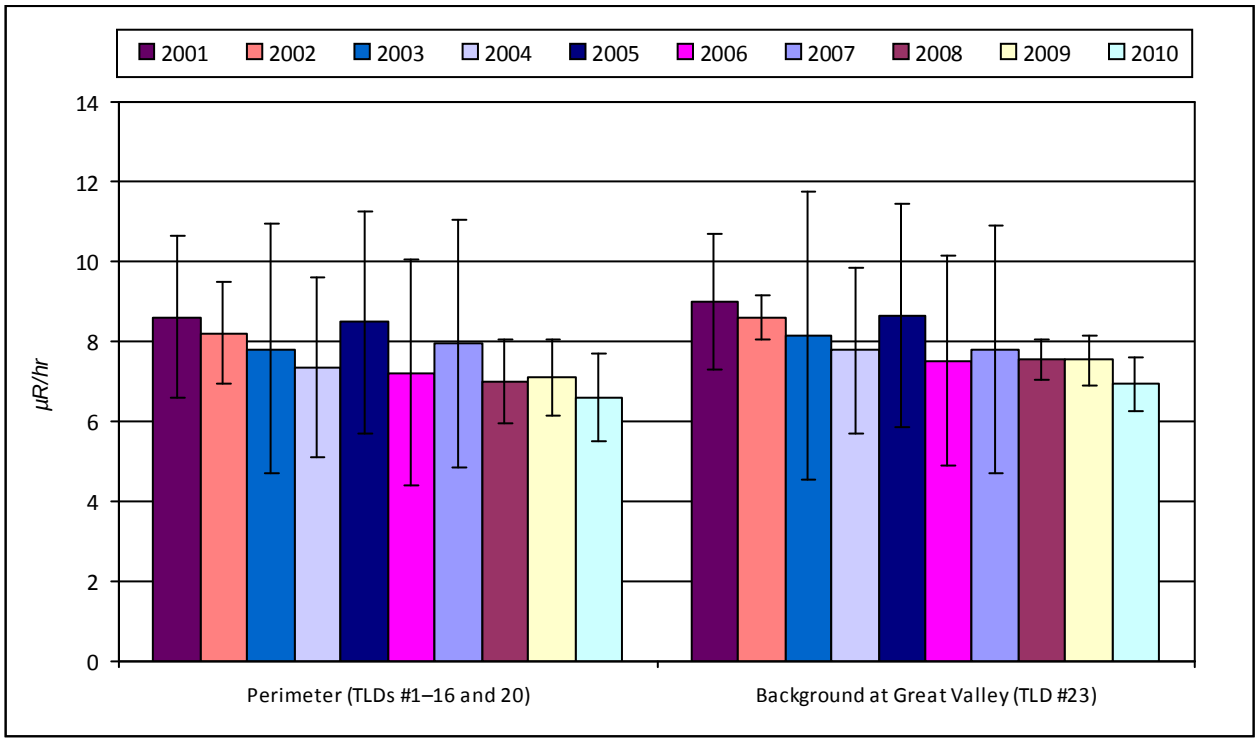
Food. Food samples are collected from locations near the site (Figure A-9) and from remote locations (Figure A-12). Milk and deer are collected annually. Other food items are collected every five years. Fish and deer are collected during periods when they would normally be taken by sportsmen. Corn, apples, and beans are collected at the time of harvest. Edible portions are analyzed for radionuclides. 2010 data are presented in Appendix E[CD].

In 2010, milk and deer were collected. Fish, apples, beans, and corn were last collected in 2007 and will next be collected in 2012. Data have consistently demonstrated that the Project has little or no effect on local food sources. Dose calculations based on results from food sources have consistently confirmed low dose estimates modeled on the basis of results from air and water monitoring. (See Chapter 3, "Dose Assessment.")

Environmental Radiation. Thermoluminescent dosimeters (TLDs) are placed on site at waste management units, at the WVDP security fence, around the WNYNSC perimeter and the access road, and at a background location remote from the site. The TLDs directly measure radiation in the environment.

Results at perimeter locations were statistically the same as results from the background TLDs, indicating no measurable dose from Project activities at these locations. Figure 2-3 presents a graph of average annual exposure rates (in microroentgen per hour) over the last 10 years at background and perimeter locations. As shown, results at perimeter locations are comparable to background. In addition, no discernible trends over time are evident. Historical measurements at community locations (discon-

FIGURE 2-3
10-Year Trends of Environmental Radiation Levels at Perimeter and Background Thermoluminescent Dosimeters (TLDs)



Note: The upper and lower limits of the uncertainty term are plotted with each result.

tinued in 2008) also showed no difference from background. Perimeter TLD locations (off site) are shown on Figure A-11 in Appendix A, and the data are presented in Table F-1 in Appendix F[CD].

Consistent with historical data, results from three of eight TLDs located near on-site waste storage facilities on the north plateau in 2010 were generally higher than background results. These locations are well within the WNYNSC boundary and are not accessible by the public. On the south plateau, on-site TLD results remained at background levels. On-site TLD locations are shown on Figure A-10 in Appendix A, and the data are presented in Table F-2 in Appendix F[CD].

Meteorological Monitoring. Meteorological monitoring at the WVDP provides representative and verifiable data that characterize the local climatology. These data are used to assess potential effects of routine and nonroutine releases of airborne radioactivity and to provide input to dispersion models used to calculate dose to off-site residents. The on-site 197-ft (60-m) meteorological tower (Figure A-1) continuously monitors wind speed, wind direction, and temperature at both the 197-ft (60-m) and 33-ft (10-m) elevations. Precipitation is monitored near the Environmental Laboratory (ELAB). Monthly CY 2010 precipitation totals compared with 10-year monthly averages are presented in Table 2-5.

TABLE 2-5
WVDP 2010 Monthly Precipitation Totals Compared With 10-Year Monthly Averages

Month	*Monthly Total (inches)*	*10-Year Monthly Average (2000 through 2009)*
January	2.19	2.97
February	1.93	2.32
March	1.61	2.89
April	1.61	3.09
May	2.57	3.02
June	5.77	3.25
July	4.85	4.28
August	3.79	4.09
September	5.91	3.55
October	3.10	3.36
November	3.46	3.59
December	2.67	3.83
Total (inches)	39.5	40.2
(Centimeters)	100.2	102.2

Barometric pressure is measured with instrumentation located in the ELAB. The meteorological tower supplies data to the primary digital and analog data acquisition systems located within the ELAB. The systems are provided with either uninterruptible or standby power backup in the event of site power failures. In 2010, the data recovery rate (the time valid data were logged versus the total elapsed time) was 95.0%.

Documentation, such as meteorological system calibration records, site log books, and analog strip charts, is stored in protected archives. “Wind roses” showing the predominant wind direction as measured at the meteorological tower (60-m and 10-m elevations) are shown on Figure 2-4. As shown, wind measurements at the 60-m elevation are predominantly from the west-northwest or south-southeast. Those measured at the 10-m elevation are predominantly from the northwest or the south-southeast, apparently influenced by the orientation of the topography around the site. As expected, wind speeds measured at the 10-m elevation were the lowest, while those from the 60-m elevation were the highest.

Because dispersive capabilities of the atmosphere are dependent upon wind speed, wind direction, and atmospheric stability (which includes a function of the difference in temperature between two elevations), these parameters are closely monitored and are available to the emergency response organization at the WVDP. If an air release occurred, meteorological data would be used to predict the direction of plume migration.

Special Projects

Special projects may be conducted outside the scope of the routine environmental monitoring program to address topics of environmental interest. The following special projects were performed by NYSERDA during 2010:

Seismometer Installed at West Valley Central School. Seismologists from the Lamont-Doherty Earth Observatory of Columbia University have joined with the West Valley Central School (WVCS) District and NYSERDA to install a modern, broadband seismographic station at the WVCS. The project is designed to increase awareness and understanding of the earth by scientists, teachers, students, and the public in

surrounding communities. The new station, West Valley, New York (WVNY), is part of the Lamont Cooperative Seismographic Network (LCSN), and has increased earthquake monitoring capability in western New York. The LCSN can detect, locate, and characterize earthquakes in the northeast. The WVNY station is also part of a national network of stations used by the U.S. Geological Survey to provide authoritative earthquake information to emergency medical first responders, emergency managers, the public, and other stakeholders. The seismic monitoring station records thousands of measurements every minute and transmits them wirelessly to the internet. Access to data and further information about the LCSN can be obtained at www.ldeo.columbia.edu/LCSN/.

Meteorological Station at the SDA. In May 2010, NYSERDA completed the installation of a suite of meteorological instruments at the SDA. Included in the suite are instruments to measure total precipitation (i.e., rain, snow, and sleet); temperature, relative humidity; barometric pressure; wind speed; and wind direction. The instruments are equipped with a battery-powered backup system to ensure data continuity during power outages. Precipitation data have been uninterrupted since June 1, 2010. Configuration and testing of the remaining parameters was completed in the summer of 2010, and data have been uninterrupted since October 1, 2010. Data are logged at the station every 10 minutes and transmitted via cellular modem to NYSERDA's office. NYSERDA maintains an interactive meteorological database for the SDA station on the internet at: http://v4.wqdata.com/webdblink/nyserda.php.

Light Detection and Ranging (LiDAR) Mapping and Orthophotography. In 2010, NYSERDA (jointly funded by DOE) conducted an aerial LiDAR mapping and orthoimagery project. After an extensive ground control survey in October, the entire Buttermilk Creek watershed (including the WNYNSC and SDA) was mapped and photographed from a small airplane on November 1st and 2nd. A detailed topographic map of the Buttermilk Creek watershed was developed with a resolution (grid size) of 1.0 meter. For the WNYNSC and the SDA, a resolution of 0.5 meters was achieved. A high-quality topographic map of the SDA and the surrounding area was derived from a subset of the LiDAR data. This project represents the most accurate and comprehensive large-scale topographic mapping of the Buttermilk Creek Watershed, including the WNYNSC, ever completed.

In conjunction with the LiDAR mapping, high-resolution digital photographs were acquired of the Buttermilk Creek watershed. From these images, rectified orthophotographs were produced with a pixel size of three inches (for the WNYNSC and SDA), and six inches (for the balance of the Buttermilk Creek watershed). These photographs have more than 100 times the resolution of the most recent orthophotographs available of the site, which were collected in 2007 by New York State over Cattaraugus County. NYSERDA is using the topographic data and aerial photographs for erosion and hydrologic analysis and modeling, change detection, erosion mitigation design and construction, and mapping of existing and planned infrastructure.

SDA Replacement Geomembrane Cover. Recent laboratory testing confirmed that the very low-density polyethylene (VLDPE) geomembrane cover over trenches 12 to 14 of the SDA, including an inactive lagoon, was approaching the end of its useful life. NYSERDA, with the assistance of its engineering contractor, evaluated a number of replacement alternatives and decided to place new XR-5 geomembrane on the existing VLDPE cover. The project design included replacing the steel-perforated corrugated metal pipe and manholes in the perimeter trench with new high-density polyethylene (HDPE) storm water piping.

Additional engineering analysis was requested by NYSDEC to determine whether stresses due to frictional forces between the two unlike geomembranes could shorten the useful life of the new geomembrane. Additional testing was performed in the laboratory and, based on the frictional analysis of the two materials, it was concluded that placing the new XR-5 geomembrane directly on the VLDPE geomembrane would not present performance problems in the future.

Upon completing the engineering design, construction commenced in October. The project took two months to complete, and included placing approximately 145,000 square ft of XR-5 material, 1,200 lineal ft of walkway material, and approximately 1,000 lineal ft of HDPE storm water piping in the perimeter collection trench. During the design process, NYSERDA developed a new walkway material that would resist ultraviolet (UV) degradation by utilizing precut patterns of the XR-5 material with a factory-applied yellow-colored aggregate material. This new material was found to have superior adhesive qualities, UV resistance, and a nonslip surface compared to walkway material previously used at the SDA. The estimated life expectancy of this newly installed geomembrane is 20 to 25 years.

Tank T-1 Removal Project. In late November 2009, NYSERDA safely and successfully completed the removal of over 8,000 gal (30,370 L) of leachate in tank T-1, located in the SDA. In the summer of 2010, the second phase of this project was completed. NYSERDA sampled all solid wastes to ensure the waste was not hazardous, and removed the empty tank T-1 and all stored solid wastes in storage at the SDA. The process began by removing the roof hatch on top of the T-1 building with a crane. The tank was secured with rigging, and lifted out of the building through the roof hatch and onto a "low boy" trailer. The empty tank and the miscellaneous solid wastes were safely shipped from the SDA on July 1, 2010 and they arrived at the Pacific Northwest Facility in Richland, Washington, on July 6, 2010, where they were treated and size-reduced. In 2011, the waste will be shipped with other LLW to a disposal facility in Clive, Utah. On November 17, 2010, NYSERDA submitted the Resource Conservation and Recovery Act Closure Plan and Closure Certification Report for the WNYNSC SDA Tank T-1 Building. Final closure is expected to occur in 2011.

Monitoring Program Changes

There were no changes to the routine air, surface water, soil, biological, or TLD monitoring program during CY 2010. However, the groundwater monitoring program and the north plateau PTW monitoring program were enhanced significantly. Four replacement wells were installed downgradient of the MPPB to supplement the strontium-90 source area monitoring. In addition, after installing the north plateau PTW, 66 new groundwater wells were installed within and adjacent to the full-scale PTW to monitor performance of the wall. Refer to Chapter 4, "Groundwater Protection Program" for discussion.

Summary

As in the past, although concentrations of certain radiological and nonradiological constituents from samples collected within the security fence exceeded comparison limits or background concentrations, few results from near-site or downstream locations accessible to the public did. (See Table 2-4.)

Monitoring results from CY 2010 continued to demonstrate minimal or no adverse effects of the WVDP on the surrounding environment and confirmed the effectiveness of radiological control measures practiced at the WVDP.

FIGURE 2-4
Wind Frequency and Speed from the Meteorological Tower (10-m and 60-m Elevations)
January 1–December 31, 2010

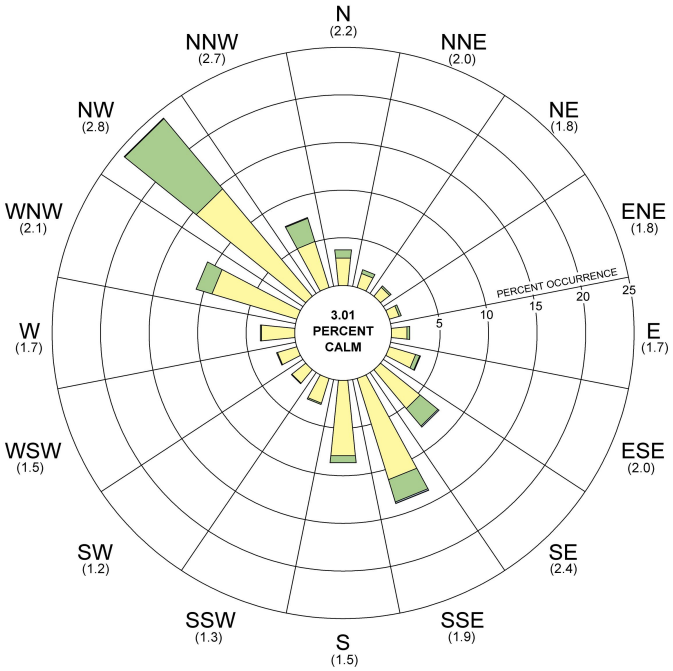
Key:

Numbers indicate sector mean wind speed.

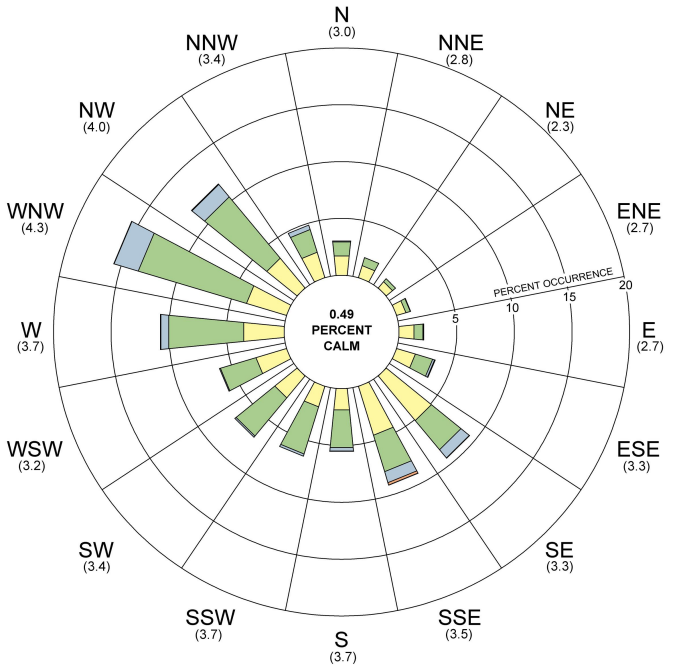
Sectors are directions from which the wind is blowing.

Wind Speed Range (m/sec)

- 0.5–3.0
- 3.0–6.0
- 6.0–9.0
- 9.0–12.0
- >12.0



Meteorological Tower (10-m)



Meteorological Tower (60-m)