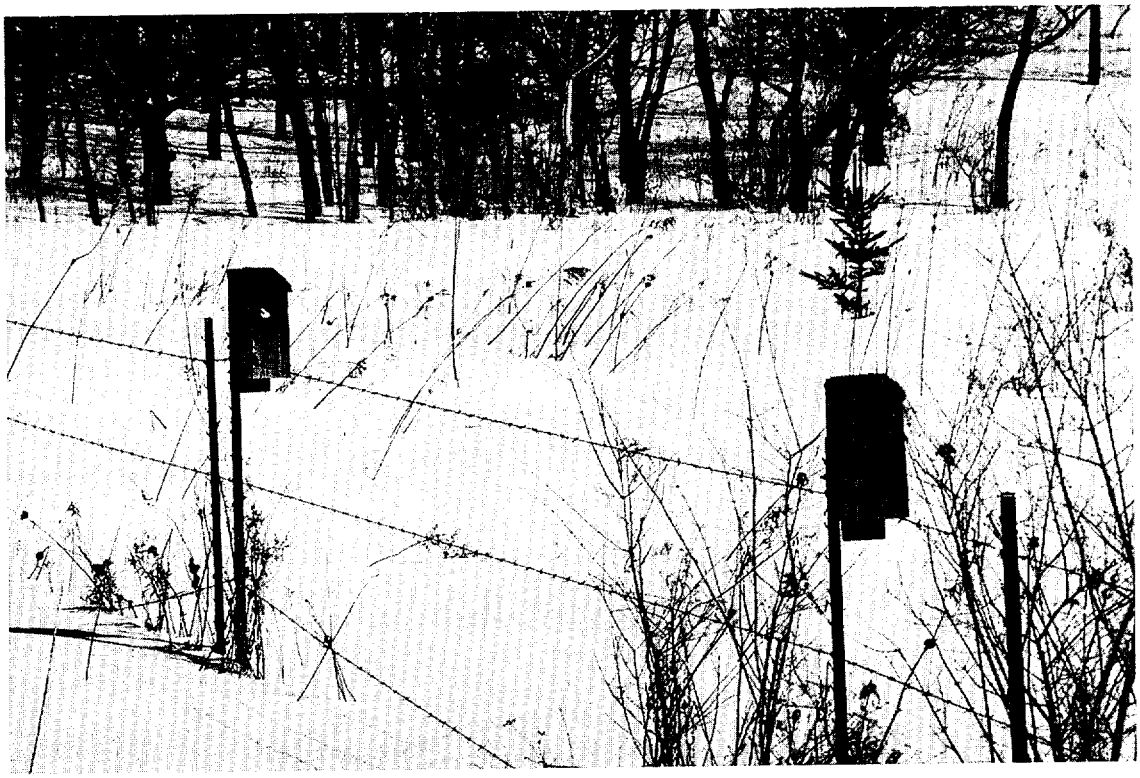
Appendix B

1998 Environmental Monitoring Program



The WVDP Supports a Bluebird and Wood Duck Nesting-box Program Sponsored by the Springville Field and Stream Club

1998 Environmental Monitoring Program

The following schedule represents the West Valley Demonstration Project (WVDP) routine environmental monitoring program for 1998. This schedule met or exceeded the minimum program specifications needed to satisfy the requirements of DOE Order 5400.1. It also met the requirements of DOE 5400.5 and DOE/EH-0173T. Specific methods and recommended monitoring program elements are found in DOE/EP-0096, *Effluent Monitoring*, and DOE/EP-0023, *Environmental Surveillance,* which were the bases for selecting most of the schedule specifics. Additional monitoring was mandated by air and water discharge permits (40 CFR 61 and SPDES), which also required formal reports. Specifics are identified in the schedule under Monitoring/Reporting Requirements.

Results from all locations except groundwater monitoring points were summarized in Quarterly Environmental Monitoring Data Reports (QEMDRs); groundwater monitoring data are summarized in quarterly groundwater monitoring reports. A computerized environmental data-screening system identifies analytical data that exceed pre-set limits. All locations are checked monthly for trends or notable results in accordance with criteria established in Documentation and Reporting of Environmental Monitoring Data (West Valley Nuclear Services Co., Inc. August 19, 1998). Reportable results are then described in the Monthly Trend Analysis Report (MTAR) together with possible causes and corrective actions, if indicated. A WVDP Effluent Summary Report (ESR) is transmitted with each MTAR.

Schedule of Environmental Sampling

The index on pp. B-v through B-vii is a list of the codes used to identify the various sampling locations, which are shown on Figures A-1 through A-12 (pp.A-3 through A-14 in Appendix A). The schedule of environmental sampling at the WVDP is found in this appendix on pages B-1 through B-44. Table headings in the schedule are as follows:

- *Sample Location Code.* Describes the physical location where the sample is collected. The code consists of seven or eight characters: The first character identifies the sample medium as Air, Water, Soil/Sediment, Biological, or Direct Measurement. The second character specifies oN-site or oFf-site. The remaining characters describe the specific location (e.g., **AFGRVAL** is Air oFf-site at GReat VALley).

- *Monitoring/Reporting Requirements.* Notes the bases for monitoring the location, any additional references to permits, and the reports that are generated from the sample data. Routine reports cited in this appendix are the Effluent Summary Report (ESR), the Monthly Trend Analysis Report (MTAR), the Quarterly Environmental Monitoring Data Report (QEMDR), the Air Emissions Report (NESHAP), and the annual Site Environmental Report (SER).

- *Sampling Type/Medium.* Describes the collection method and the physical characteristics of the medium.

- *Collection Frequency.* Indicates how often the samples are collected or retrieved.

- *Total Annual Sample Collections.* Specifies the number of discrete physical samples collected annually for each group of analytes.

- *Analyses Performed/Composite Frequency.* Notes the type of analyses of the samples taken at each collection, the frequency of composite, and the analytes determined for the composite samples.

Summary of Monitoring Program Changes in 1998

Location Code	Description of Changes
Effluent points (all)	The annual (radioactive) Effluent Information System/On-site Discharge Information System report (EIS/ODIS) and the Quarterly Environmental Monitoring Report have been discontinued. Data previously contained in these reports are now evaluated in the MTAR and are summarized in full in the annual SER.
WNURRAW	Utility room raw water. Sampled at entry point and used for various site purposes (process water, firefighting, drinking water). Also sampled for SPDES compliance.
ANSUPCV	This air monitoring point was discontinued after the supercompactor was decomissioned and shipped off-site in May 1998.
ANLLWTVC	This effluent point was discontinued in 1998 because the processes housed in the O2 building were transferred to the new LLW2 facility.
ANLLW2V	This monitoring point is associated with the new LLW2 facility. It was added to the program in April 1998.
DFTLD and DNTLD	Selected co-located NRC monitoring points used to independently verify environmental radiation levels were discontinued in 1998.

Index of Environmental Monitoring Program Sample Points

Air Effluent and On-site Ambient Air (Fig. A-4 [p. A-6])

ANSTACK	Main Plant	B-1
ANSTSTK	Supernatant Treatment System	B-1
ANCSSTK	01-14 Building	B-1
ANCSRFK	Size-reduction Facility	B-1
ANCSPFK	Container Sorting and Packaging Facility	B-1
ANVITSK	Vitrification Heating, Ventilation, and Air Conditioning Exhaust	B-1
ANSEISK	Seismic Sampler (Vitrification backup)	B-1
OVEs/PVUs	Outdoor Ventilated Enclosures/Portable Ventilation Units*	B-3
ANLLW2V	Low-level Waste Treatment and Ventilation (new)	B-5
ANLLWTVH	Low-level Waste Treatment Ventilation (radioactive operations)	B-5
ANLAUNV	Contaminated Clothing Laundry Ventilation	B-5
ANLAGAM	Lag Storage Area (ambient air)	B-5
ANNDAAM	NDA Area (ambient air)	B-5
ANSDAT9	SDA Trench 9 (ambient air)	B-5

Liquid Effluent and On-site Water (Figs.A-2 [p. A-4], A-3 [p.A-5], and A-12 [p. A-14])

WNSP001	Lagoon 3 Weir Point	B-7
WNSP006	Facility Main Drainage	B-9
WNURRAW	Utility Room Raw Water*	B-9
WNSP007	Sanitary Waste Discharge	B-9
WNSWAMP	Northeast Swamp Drainage Point	B-11
WNSW74A	North Swamp Drainage Point	B-11
WN8D1DR	Waste Farm Underdrain	B-11
WNSDADR	SDA Run-off	B-11
WNSP008	French Drain LLWTF Area	B-13
WNSP005	South Facility Drainage	B-13
WNCOOLW	Cooling Tower	B-13
WNFRC67	Frank's Creek East	B-15
WNERB53	Erdman Brook	B-15
WNNDADR	Disposal Area Drainage	B-15
WNDCELD	Drum Cell Drainage	B-15
WNNDATR	NDA Trench Interceptor Project	B-15
WNSTAW Series	Standing Water	B-17
WNDNK Series	Site Potable Water*	B-19

** Not detailed on map*

Index of Environmental Monitoring Program Sample Points

(continued)

On-site Groundwater and Seeps (Fig.A-6 [p.A-8])

SSWMU #1	Low-level Waste Treatment Facility Wells	B-21
SSWMU #2	Miscellaneous Small Units Wells	B-21
SSWMU #3	Liquid Waste Treatment System Wells	B-21
SSWMU #4	HLW Storage and Processing Tank Wells	B-23
SSWMU #5	Maintenance Shop Leach Field Wells	B-23
SSWMU #6	Low-level Waste Storage Area Wells	B-23
SSWMU #7	CPC Waste Storage Area Wells	B-23
SSWMU #8	CDDL Wells	B-25
SSWMU #9	NDA Unit Wells and NDATR	B-25
SSWMU #10	IRTS Drum Cell Wells	B-25
SSWMU #11	SDA Unit Wells	B-27
North Plateau Seeps	Northeastern Edge of North Plateau	B-27
Well Points	Downgradient of Main Plant	B-27
WNWNB1S	North Plateau Background Well	B-27

Off-site Surface Water (Fig.A-3 [p.A-5])

WFBCTCB	Buttermilk Creek at Thomas Corners	B-29
WFFELBR	Cattaraugus Creek at Felton Bridge	B-29
WFBCBKG	Buttermilk Creek near Fox Valley (background)	B-29
WFBIGBR	Cattaraugus Creek at Bigelow Bridge (background)	B-29

Off-site Drinking Water (Figs.A-9 [p.A-11] and A-12 [p.A-14])

WFWEL Series	Private Local Wells	B-31

Off-site Ambient Air (Figs.A-5 [p.A-7] and A-12 [p.A-14])

AFFXVRD	Fox Valley Sampler	B-33
AFTCORD	Thomas Corners Sampler	B-33
AFRT240	Route 240 Sampler	B-33
AFSPRVL	Springville Sampler	B-33
AFWEVAL	West Valley Sampler	B-33
AFNASHV	Nashville Sampler (background)	B-33
AFBOEHN	Dutch Hill Road Sampler	B-33
AFRSPRD	Rock Springs Road Sampler	B-33
AFGRVAL	Great Valley Sampler (background)	B-33
AFBLKST	Bulk Storage Warehouse Sampler	B-33

Index of Environmental Monitoring Program Sample Points
(concluded)

Fallout, Sediment, and Soil (Figs A-2 [p.A-4], A-3 [p.A-5], A-4 [p.A-6], A-5 [p.A-7], and A-12 [p.A-14])

AFDHFOP	Dutch Hill Fallout	B-35
AFFXFOP	Fox Valley Fallout	B-35
AFTCFOP	Thomas Corners Fallout	B-35
AF24FOP	Route 240 Fallout	B-35
ANRGFOP	Rain Gauge Fallout	B-35
SF Soil Series	Air Sampler Area Soil	B-35
SFCCSED	Cattaraugus Creek at Felton Bridge, Sediment	B-35
SFSDSED	Cattaraugus Creek at Springville Dam, Sediment	B-35
SFBISED	Cattaraugus Creek at Bigelow Bridge, Background Sediment	B-35
SFTCSED	Buttermilk Creek at Thomas Corners, Sediment	B-35
SFBCSED	Buttermilk Creek at Fox Valley Road, Background Sediment	B-35
SN On-site Soil Series:	On-site Soils	B-35
SNSW74A		
SNSWAMP		
SNSP006		

Off-site Biological (Figs. A-9 [p. A-11] and A-12 [p. A-14])

BFFCATC	Cattaraugus Creek Fish, Downstream	B-37
BFFCTRL	Cattaraugus Creek Fish, Background	B-37
BFFCATD	Cattaraugus Creek Fish, Downstream of Springville Dam	B-37
BFMREED	NNW Milk	B-37
BFMCOBO	WNW Milk	B-37
BFMCTLS	Milk, South, Background	B-37
BFMCTLN	Milk, North, Background	B-37
BFMWIDR	Southeast Milk, Near-site	B-37
BFMSCHT	South Milk, Near-site	B-37
BFVNEAR	Produce, Near-site	B-39
BFVCTRL	Produce, Background	B-39
BFHNEAR	Forage, Near-site	B-39
BFHCTLS	Forage, South, Background	B-39
BFHCTLN	Forage, North, Background	B-39
BFBNEAR	Beef, Near-site	B-39
BFBCTRL	Beef, Background	B-39
BFDNEAR	Venison, Near-site	B-39
BFDCTRL	Venison, Background	B-39

Direct Measurement Dosimetry (Figs. A-10 [p. A-12], A-11 [p. A-13], and A-12 [p. A-14])

DFTLD Series	Off-site Dosimetry	B-41
DNTLD Series	On-site Dosimetry	B-43

1998 Monitoring Program
On-site Effluent Monitoring

Air Effluents

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
ANSTACK *Main Plant Ventilation Exhaust Stack* **ANSTSTK** *Supernatant Treatment System (STS) Ventilation Exhaust* **ANCSSTK** *01-14 Building Ventilation Exhaust* **ANCSRFK** *Contact Size-reduction Facility Exhaust* **ANCSPFK** *Container Sorting and Packaging Facility Exhaust* **ANVITSK** *Vitrification HVAC Exhaust*	Airborne radioactive effluent points, including LWTS and vitrification off-gas Required by: • 40 CFR 61 Reported in: • ESR • MTAR • QEMDR • SER • Air Emissions Annual Report (NESHAP)	Continuous off-line air particulate monitors	Continuous measurement of fixed filter; replaced weekly	NA	Real-time alpha and beta monitoring
		Continuous off-line air particulate filters	Weekly	52 each location	Gross alpha/beta, gamma isotopic*
				Weekly filters composited to 4 each location	Quarterly composite for Sr-90, Pu/U isotopic, total U, Am-241, gamma isotopic
		Continuous off-line desiccant columns for water vapor collection	Weekly	52 at each of two locations	H-3 (**ANSTACK** and **ANSTSTK** only)
		Continuous off-line charcoal cartridges	Weekly	Weekly cartridges composited to 4 each location	Quarterly composite for I-129
ANSEISK *Seismic Sampler, Vitrification Backup*	Airborne radioactive effluent point Required by: • 40 CFR 61 Reported in: • ESR • MTAR • QEMDR • SER	Continuous off-line air particulate filter	Weekly	52	Filters for gross alpha/ beta, gamma isotopic* upon collection

* Weekly gamma isotopic only if gross activity rises significantly.
NA Not applicable.

Sampling Rationale

ANSTACK DOE/EH-0173T, 3.0; DOE/EP-0096, 3.3

Monitors and samples HEPA-filtered ventilation from most process areas, including cell ventilation, vessel off-gas, fuel receiving and storage (FRS), head end ventilation, and an analytical aisle. Requires continuous effluent monitoring per 40 CFR Subpart H, Section 61.93(b) because potential emissions may exceed 0.1 mrem limit.

ANSTSTK DOE/EH-0173T, 3.0; DOE/EP-0096, 3.3

Monitors and samples HEPA-filtered ventilation from building areas involved in treatment of high-level waste supernatant. Requires continuous effluent monitoring per 40 CFR Subpart H, Section 61.93(b) because potential emissions may exceed 0.1 mrem limit.

ANCSSTK DOE/EH-0173T, 3.0; DOE-EP-0096, 3.3

Monitors and samples HEPA-filtered ventilation from 01-14 building, which houses equipment used to treat ceramic melter off-gas. Requires continuous effluent monitoring per 40 CFR Subpart H, Section 61.93(b) because potential emissions may exceed 0.1 mrem limit.

ANCSRFK DOE/EH-0173T, 3.0; DOE-EP-0096, 3.3

Monitors and samples HEPA-filtered ventilation from process area where radioactive tanks, pipes, and other equipment are reduced in volume by cutting up with a plasma torch.

ANCSPFK DOE/EH-0173T, 3.0; DOE-EP-0096, 3.3

Monitors and samples ventilation from lag storage area 4, the container sorting and packaging facility.

ANVITSK DOE/EH-0173T, 3.0; DOE-EP-0096, 3.3

Vitrification facility heating, ventilation, and air conditioning (HVAC) effluent exhaust stack. Sampler brought on-line in late 1995 when nonradioactive operations began. Radioactive operation began with first high-level waste transfer in June 1996 and vitrification startup in July 1996.

ANSEISK DOE/EH-0173T, 3.0; DOE-EP-0096, 3.3

Vitrification system back-up filter for catastrophic-event monitoring in case the primary vitrification HVAC stack ventilation fails.

■ Sampling locations are shown on Figure A-4 (p.A-6).

1998 Monitoring Program
On-site Effluent Monitoring

Air Effluents

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
OVEs/PVUs *Outdoor Ventilated Enclosures/Portable Ventilation Units*	Airborne radioactive effluent points Required by: • 40 CFR 61 Reported in: • ESR • MTAR • QEMDR • SER • Air Emissions Annual Report (NESHAP)	Continuous off-line air particulate filter →	As required →	1 each location →	Filters for gross alpha/ beta, gamma isotopic* upon collection
				Collected filters** composited to 4 →	Quarterly composites for Sr-90, Pu/U isotopic, total U, Am-241, gamma isotopic

* Gamma isotopic only if gross activity rises significantly.

** If gross determination of individual filter is significantly higher than background, individual sample would be submitted immediately for isotopic analysis.

Sampling Rationale

OVEs/PVUs DOE/EH-0173T, 3.0; DOE/EP-0096, 3.3

Outdoor ventilated enclosures; portable ventilation units used for handling radioactive materials or for decontamination in areas without containment ventilation.

- Sampling locations are not shown on figures.

1998 Monitoring Program
On-site Effluent Monitoring

Air Effluents and On-site Ambient Air

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
ANLLW2V *Low-level Waste Treatment and Ventilation (new facility)* **ANLLWTVH** *Low-level Waste Treatment and Ventilation, "hot" side (old facility)* **ANLAUNV** *Laundry Change Room Ventilation*	Airborne radioactive effluent point Required by: • 40 CFR 61 Reported in: • ESR • MTAR • QEMDR • SER • Air Emissions Annual Report (NESHAP)	Continuous off-line air particulate filter	→ Monthly (April - Sept.)	→ 6	Gross alpha/beta, gamma isotopic* upon collection
			Quarterly (Oct. - Dec.)	→ 2	
		Continuous off-line air particulate filter	→ Weekly	→ 52	
		Continuous off-line air particulate filter	→ Monthly	→ 12	
ANLAGAM *Lag Storage Area Ambient Air* **ANNDAAM** *NDA Ambient Air*	Ambient "diffuse source" air emissions Reported in: • MTAR • QEMDR • SER • Air Emissions Annual Report (NESHAP)	Continuous air particulate filter	→ Weekly	→ 52 each location →	Gross alpha/beta
				Weekly filter composited to 4 each location →	Quarterly composite for Sr-90, gamma isotopic, Pu/U isotopic, total U, Am-241
ANSDAT9** *SDA Trench 9 Ambient Air*	Ambient "diffuse source" air emissions Reported in: • MTAR • QEMDR • SER • Reported to NYSERDA	Continuous air particulate filter	→ Weekly	→ 52 →	Gross alpha/beta
				Weekly filter composited to 4 →	Quarterly composite for gamma isotopic
		Continuous off-line desiccant columns for water vapor	→ Weekly	→ 52 →	H-3
		Continuous off-line charcoal cartridges	→ Monthly	→ Monthly cartridges composited to 4 →	Quarterly composite for I-129

* Gamma isotopic only if gross activity rises significantly.
** Sampling frequency and analytical parameters as directed by NYSERDA.

Sampling Rationale

ANLLW2V DOE/EH-0173T, 3.0; DOE/EP-0096, 3.3

Samples ventilation exhaust from the new low-level waste treatment facility. System started up in April 1998.

ANLLWTVH DOE/EH-0173T, 3.0; DOE/EP-0096, 3.3

Samples radioactive side of ventilation exhaust from old low-level waste treatment facility.

ANLAUNV DOE/EH-0173T, 3.0; DOE/EP-0096, 3.3

Samples ventilation from contaminated clothing laundry.

ANLAGAM DOE/EH-0173T, 3.3.2

Monitors ambient air in the lag storage area, a possible diffuse source of air emissions.

ANNDAAM DOE/EH-0173T, 3.3.2

Monitors ambient air in the NDA area, a possible diffuse source of air emissions.

ANSDAT9 DOE/EH-0173T, 3.3.2

Monitors ambient air by SDA trench 9, a possible diffuse source of air emissions. WVDP support of NYSERDA.

- Sampling locations are shown on Figure A-4 (p. A-6).

1998 Monitoring Program
On-site Effluent Monitoring

Liquid Effluents

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WNSP001 *Lagoon 3 Discharge Weir*	Primary point of liquid effluent batch release Required by: • SPDES permit Reported in: • Monthly SPDES DMR • ESR • MTAR • QEMDR • SER	Grab liquid →	Daily, during lagoon 3 discharge* →	40-80 →	Daily for gross beta, conductivity, flow
				7-12 →	Every 6 days a sample is analyzed for gross alpha/ beta, H-3, Sr-90, gamma isotopic
				Composite of daily samples for each discharge, 4-8 →	Weighted composite for gross alpha/beta, H-3, C-14, Tc-99, Sr-90, I-129, gamma isotopic, Pu/U isotopic, total U, Am-241 for each month of discharge
		Composite liquid →	Twice during discharge, near start and near end →	8-16 →	Two 24-hour composites for BOD_5, suspended solids, SO_4, NO_3, NO_2, NH_3, total Al, Fe, and Mn, total recoverable Cd, Cr, Cu, Ni, Pb, and Zn, dissolved As and Cu, dissolved sulfide
		Grab liquid →	Twice during discharge, near start and near end →	8-16 →	Settleable solids, total dissolved solids, pH, cyanide amenable to chlorination, oil & grease, surfactant (as LAS), total recoverable Co, Cr^{+6}, Se, and V, dichlorodifluoromethane, trichlorofluoromethane, 3,3-dichlorobenzidine, tributyl phosphate, hexachlorobenzene, alpha-BHC, heptachlor, xylene, 2-butanone
		Composite liquid →	Semiannual →	2 →	A 24-hour composite for titanium
		Composite liquid →	Annual →	1 →	A 24-hour composite for Ba and Sb
		Grab liquid →	Semiannual →	2 →	Bis(2-ethylhexyl) phthalate, 4-dodecene
		Grab liquid →	Annual →	1 →	Chloroform

* Lagoon 3 is discharged four to eight times per year, as necessary, averaging seven days per discharge.

Sampling Rationale

WNSP001

DOE 5400.5; DOE/EH-0173T, 2.3.3; SPDES permit no. NY0000973

By DOE Order all liquid effluent streams from DOE facilities shall be evaluated and their potential for release of radionuclides addressed.

These requirements for radiological parameters are met by daily grab sampling during periods of lagoon 3 discharge. Sampling for chemical constituents is performed near the beginning and end of each discharge period to meet the site SPDES permit. Both grab samples and 24-hour composite samples are collected.

■ Sampling location is shown on Figure A-2 (p. A-4).

1998 Monitoring Program
On-site Effluent Monitoring

Liquid Effluents

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WNSP006 *Frank's Creek at the Security Fence*	Combined facility liquid discharge Required by: • SPDES Permit Reported in: • Monthly SPDES DMR • MTAR • QEMDR • SER	Timed continuous composite liquid	→ Weekly	→ 52	→ Gross alpha/beta, H-3, pH, conductivity
				Weekly samples composited to 12	→ Monthly composite for gamma isotopic and Sr-90 (shared with NYSDOH)
				Weekly samples composited to 4	→ Quarterly composite for C-14, I-129, Pu/U isotopic, total U, Am-241, Tc-99
		Grab liquid	→ Twice during lagoon 3 discharge, once near start and once near end	→ 8-16	→ TDS
		Grab liquid	→ Semiannual	→ 2	→ NPOC, TOX, Ca, Mg, Na, K, Ba, Mn, Fe, Cl, SO_4, NO_3+NO_2-N, F, HCO_3, CO_3
WNURRAW *Utility Room Raw Water*	Source water Required by: • SPDES Permit Reported in: • Monthly SPDES DMR	Grab liquid	→ Weekly	→ 52	→ Total Fe
		Grab liquid	→ Twice during lagoon 3 discharge, once near start and once near end	→ 8-16	→ TDS
WNSP007 *Sanitary Waste Discharge*	Liquid effluent point for sanitary and utility plant combined discharge Required by: • SPDES Permit Reported in: • Monthly SPDES DMR • ESR • MTAR • QEMDR • SER	24-hour composite liquid	→ 3 each month	→ 36	→ Gross alpha/beta, H-3, pH, suspended solids, NH_3,NO_2-N, BOD_5, total Fe
				Monthly samples composited to 4	→ Quarterly composite for gamma isotopic
		Grab liquid	→ 3 each month	→ 36	→ Oil & grease
		Grab liquid	→ Weekly	→ 52	→ pH, settleable solids, total residual chlorine
		Grab liquid	→ Annual	→ 1	→ Chloroform

Sampling Rationale

WNSP006 DOE/EH-0173T, 5.10.1.1; SPDES permit no. NY0000973

By DOE Order all liquid effluent streams from DOE facilities shall be evaluated and their potential for release of radionuclides addressed.

In accordance with the WVDP SPDES permit no. NY0000973, outfall 116 (pseudo-monitoring point) uses flow data from WNSP006. Flow augmentation parameters (flow and total dissolved solids [TDS]) are monitored at location WNSP006; calculated TDS and flow data related to sample point WNSP006 are reported for pseudo-monitoring point 116 in the monthly SPDES Discharge Monitoring Report (DMR).

WNURRAW SPDES permit no. NY0000973

TDS is measured near the beginning and end of each lagoon 3 discharge. Results are used for outfall 116 calculations. (See **WNSP006**, above.)

WNSP007 DOE 5400.5; DOE/EH-0173T, 2.3.3

Sampling rationale is based on New York State SPDES permit no. NY0000973 and DOE 5400.5 criteria.

■ Sampling locations are shown on Figure A-2 (p. A-4).

1998 Monitoring Program
Environmental Surveillance

On-site Surface Water

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WNSWAMP *Northeast Swamp Drainage*	Site surface drainage Reported in: • ESR • MTAR • QEMDR • SER	Timed continuous composite liquid	Weekly	52	Gross alpha/beta, H-3, pH, conductivity
				Weekly samples composited to 12	Monthly composite for gamma isotopic and Sr-90 (shared with NYSDOH)
				Weekly samples composited to 4	Quarterly composite for C-14, I-129, Pu/U isotopic, total U, Am-241
		Grab liquid	Semiannual	2	NPOC, TOX, Ca, Mg, Na, K, Ba, Mn, Fe, Cl, SO_4, NO_3+NO_2-N, F, HCO_3, CO_3
WNSW74A *North Swamp Drainage*	Site surface drainage Reported in: • ESR • MTAR • QEMDR • SER	Timed continuous composite liquid	Weekly	52	Gross alpha/beta, H-3, pH, conductivity
				Weekly samples composited to 12	Monthly composite for gamma isotopic and Sr-90
				Weekly samples composited to 4	Quarterly composite for C-14, I-129, Pu/U isotopic, total U, Am-241
		Grab liquid	Semiannual	2	NPOC, TOX, Ca, Mg, Na, K, Ba, Mn, Fe, Cl, SO_4, NO_3+NO_2-N, F, HCO_3, CO_3
WN8D1DR *High-level Waste Farm Underdrain*	Drains subsurface water from HLW storage tank area Reported in: • MTAR • QEMDR • SER	Grab liquid	Weekly	52	Gross alpha/beta, H-3, pH
				Weekly samples composited to 12	Monthly composite for gamma isotopic and Sr-90
WNSDADR *SDA Run-off*	Surface water run-off from south portion of SDA Required by: • Interim Measures Compliance Reported in: • MTAR • QEMDR • SER • Reported to NYSERDA	Grab liquid	Monthly	12 maximum	pH, total suspended solids, oil & grease, flow, gross alpha/beta, H-3, gamma isotopic

Sampling Rationale

WNSWAMP DOE/EH-0173T, 5.10.1.1

Northeast site surface water drainage; provides for the sampling of this discrete drainage path for uncontrolled surface waters just before they leave the site's controlled boundary. Waters represent surface and subsurface drainages from the construction and demolition debris landfill (CDDL), old hardstand areas, and other possible north plateau sources of radiological or nonradiological contamination.

WNSW74A DOE/EH-0173T, 5.10.1.1

North site surface water drainage; provides for the sampling of this discrete drainage path for uncontrolled surface waters just before they leave the site's controlled boundary. Waters represent surface and subsurface drainages from lag storage areas and other possible north plateau sources of radiological or nonradiological contamination.

WN8D1DR DOE/EH-0173T, 5.10.1.3

Monitors the potential influence on subsurface drainage surrounding the high-level waste tank farm.

WNSDADR NYSERDA interim measures compliance.

WVDP support of NYSERDA. Monitors surface water run-off from south portion of the SDA.

■ Sampling locations are shown on Figure A-2 (p. A-4).

1998 Monitoring Program
Environmental Surveillance

On-site Surface Water

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WNSP008 *French Drain*	Drains subsurface water from LLWTF lagoon area Required by: • SPDES Permit Reported in: • Monthly SPDES DMR • MTAR • QEMDR • SER	Grab liquid	Monthly	12	Gross alpha/beta, H-3, pH
		Grab liquid	3 each month	36	Conductivity, pH, BOD-5, total Fe, total recoverable Cd and Pb
		Grab liquid	Annual	1	As, Cr, total Ag and Zn
WNSP005 *Facility Yard Drainage*	Combined drainage from facility yard area Reported in: • MTAR • QEMDR • SER	Grab liquid	Monthly	12	Gross alpha/beta, H-3, pH
WNCOOLW *Cooling Tower Basin*	Cools plant utility steam system water Reported in: • MTAR • QEMDR • SER	Grab liquid	Monthly	12	Gross alpha/beta, H-3, pH
				Monthly samples composited to 4	Quarterly composite for gamma isotopic

Sampling Rationale

WNSP008 DOE/EH-0173T, 5.10.1.3; SPDES permit no. NY0000973

French drain of subsurface water from lagoon (LLWTF) area. SPDES permit also provides for the sampling of this discrete drainage path for uncontrolled subsurface waters before these waters flow into Erdman Brook. Waters represent subsurface drainages from downward infiltration around the LLWTF and lagoon systems. This point would also monitor any subsurface spillover from the overfilling of lagoons 2 and 3. Sampling of significance for both radiological and nonradiological contamination.

WNSP005 Facility yard surface water drainage; generally in accordance with DOE/EH-0173T, 5.10.1.1. Previously in accordance with SPDES permit no. NY0000973.

Provides for the sampling of this discrete drainage path for uncontrolled surface waters after outfall 007 discharge into the drainage and before these waters flow into Erdman Brook. Waters represent surface and subsurface drainages primarily from the main plant yard area. Historically, this point was used to monitor sludge pond and utility room discharges to the drainage. These two sources have been rerouted. Migration of residual site contamination around the main plant dictates surveillance of this point, primarily for radiological parameters.

WNCOOLW Facility cooling tower circulation water; generally in accordance with DOE/EH-0173T, 5.10.1.1.

Operational sampling carried out to confirm no migration of radiological contamination into the primary coolant loop of the HLWTF and/or plant utility steam systems. Migration from either source might indicate radiological control failure.

■ Sampling locations are shown on Figure A-2 (p. A-4).

1998 Monitoring Program
Environmental Surveillance

On-site Surface Water

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WNFRC67* *Frank's Creek East of the SDA*	Drains NYS Low-level Waste Disposal Area Reported in: • MTAR • QEMDR • SER • Reported to NYSERDA	Grab liquid	→ Monthly	→ 12	→ Gross alpha/beta, H-3, pH
WNERB53* *Erdman Brook North of Disposal Areas*	Drains NYS and WVDP disposal areas Reported in: • MTAR • QEMDR • SER • Reported to NYSERDA	Grab liquid	→ Weekly	→ 52	→ Gross alpha/beta, H-3, pH
WNNDADR *Drainage between NDA and SDA*	Drains WVDP disposal and storage area Reported in: • MTAR • QEMDR • SER • Reported to NYSERDA	Timed continuous composite liquid	→ Weekly	→ 52	→ pH
				Weekly samples composited to 12	→ Monthly composite for gross alpha/beta, gamma isotopic, H-3
				Weekly samples composited to 4	→ Quarterly composite for Sr-90, I-129
		Grab liquid	→ Semiannual	→ 2	→ NPOC, TOX
WNDCELD *Drainage South of Drum Cell*	Drains WVDP storage area Reported in: • MTAR • QEMDR • SER • Reported to NYSERDA	Grab liquid	→ Monthly	→ 12	→ pH, gross alpha/beta
				Monthly samples composited to 4	→ Quarterly composite for Sr-90, I-129, gamma isotopic, H-3
WNNDATR** *NDA Trench Interceptor Project*	On-site groundwater interception Reported in: • MTAR • QEMDR • SER	Grab liquid	→ Monthly	→ 12	→ Gross alpha/beta, H-3, gamma isotopic, NPOC, TOX
				Monthly samples composited to 4	→ Quarterly composite for I-129

* Monthly sample shared with NYSDOH.
** Coordinated with Waste Management Operations.

Sampling Rationale

WNFRC67 DOE/EH-0173T, 5.10.1.1

Monitors the potential influence of both the SDA and drum cell drainage into Frank's Creek east of the SDA and upstream of its confluence with Erdman Brook.

WNERB53 DOE/EH-0173T, 5.10.1.1

Monitors the potential influence of the drainages from the SDA and the WVDP storage and disposal area into Erdman Brook upstream of its confluence with Frank's Creek.

WNNDADR DOE/EH-0173T, 5.10.1.1

Monitors the potential influence of the drainages from the SDA and the WVDP storage and disposal area into Lagoon Road Creek upstream of the creek's confluence with Erdman Brook.

WNDCELD DOE/EH-0173T, 5.10.1.1

Monitors the potential influence of drum cell drainage into Frank's Creek south of the SDA and upstream of WNFRC67.

WNNDATR DOE/EH-0173T, 5.10.1.1

Monitors groundwater in the vicinity of the NDA interceptor trench project. The grab sample is taken directly from the trench collection system.

■ Sampling locations are shown on Figure A-2 (p. A-4).

1998 Monitoring Program
Environmental Surveillance

On-site Surface Water

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WNSTAW Series *On-site standing water ponds not receiving effluent* **WNSTAW4** *Border Pond Southwest of AFRT240* **WNSTAW5** *Border Pond Southwest of DFTLD13* **WNSTAW6** *Borrow Pit Northeast of Project Facilities* **WNSTAW9** *North Reservoir near Intake* **WNSTAWB** *Background Pond at Sprague Brook Maintenance Building*	Water within vicinity of airborne or water effluent from the plant Reported in: • MTAR • QEMDR • SER	Grab liquid →	Annual →	1 each location* →	Gross alpha/beta, H-3, pH, conductivity, Cl, Fe, Mn, Na, NO_3+NO_2-N, SO_4

* Sampling depends upon on-site ponding conditions during the year.

Sampling Rationale

WNSTAW Series DOE/EH-0173T, 5.10.1.1

Monitoring of on- and off-site standing waters at locations listed below. Although none receive effluent directly, the potential for contamination is present except at the background location. Former collecting sites 1,2,3,7, and 8 were deleted from the monitoring program because they were either built over or are now dry.

WNSTAW4 Border pond located south of AFRT240. Chosen as a location for showing potentially high concentrations, based on meteorological data. Perimeter location adjacent to a working farm. Drainage extends through private property and is accessible by the public.

WNSTAW5 Border pond located west of Project facilities near the perimeter fence and DFTLD13. Chosen as a location for showing potentially high concentrations, based on meteorological data. Location is next to a private residence and potentially accessible by the general public.

WNSTAW6 Borrow pit northeast of Project facilities just outside of inner security fence. Considered the closest standing water to the main plant and high-level waste facilities. (Used in lieu of WNSTAW1.)

WNSTAW9 North reservoir near intake. Chosen to provide data in the event of potentially contaminated site potable water supply. Location is south of main plant facilities.

WNSTAWB Pond located near the Sprague Brook maintenance building. Considered a background location; approximately 14 kilometers north of the WVDP.

■ Sampling locations are shown on Figures A-2, A-3, and A-12 (pp. A-4, A-5, and A-14).

1998 Monitoring Program
Environmental Surveillance

On-site Potable Water

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WNDNK Series *Site Potable Water*	Sources of potable water within site perimeter	Grab liquid	→ Monthly	→ 12 per location	→ Gross alpha/beta, H-3, pH, conductivity
WNDNKMS *Maintenance Shop Drinking Water*	Reported in: • MTAR • QEMDR • SER • Also reported to Cattaraugus County				
WNDNKMP *Main Plant Drinking Water*					
WNDNKEL *Environmental Laboratory Drinking Water*					
WNDNKUR *Utility Room (EP-1) Potable Water Storage Tank*		Grab liquid*	→ Annual	→ 1	→ As, Ba, Cd, Cr, Hg, Se, fluoride, NO_3

* WNDNKUR only. Sample for NO_3 to be collected in March. Pb and Cu also are sampled at this site based upon Cattaraugus County Health Department guidance.

Sampling Rationale

WNDNK Series	Site drinking water; generally according to DOE/EH-0173T, 5.10.1.2 Potable-water sampling to confirm no migration of radiological and/or nonradiological contamination into the site's drinking water supply.
WNDNKMS	Potable water sampled at the maintenance shop in order to monitor a point that is at an intermediate distance from the point of potable water generation and that is used heavily by site personnel.
WNDNKMP	Same rationale as WNDNKMS but sampled at the break room sink.
WNDNKEL	Potable water sampled at the Environmental Laboratory.
WNDNKUR	Sampled at the utility room potable water storage tank before the site drinking water distribution system. Sample location is entry point EP-1.

■ Sampling locations are within the site facilities and are not detailed on figures.

1998 Monitoring Program
Environmental Surveillance

On-site Groundwater

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
Low-level Waste Treatment Facilities *(SSWMU #1)* 103 104 C 105 C 106 107 108 110 111 116 C 8604 C 8605 **Miscellaneous Small Units** *(SSWMU #2)* 201 U 203 204 U 205 206 C 208 **Liquid Waste Treatment System** *(SSWMU #3)* 301 U 302 U	Groundwater monitoring points around site super solid waste management units (SSWMUs) Reported in: • SER • Quarterly Groundwater Reports	Grab liquid →	4 times per year (generally)* →	4 each well (generally)* →	Gross alpha, gross beta, H-3 *
		Direct field measurement of sample discharge water →	Each sampling event* →	Twice each sampling event →	Conductivity, pH

NOTE: "U" designates upgradient, "B" designates background, and "C" designates crossgradient wells. The remainder are downgradient.

* Sampling frequency and analytes vary from point to point. See Table 3-1 (p.3-6) for a summary sampling schedule and a listing of analytes. See Table E-1 (Appendix E, p. E-3) for a listing of analytes monitored at each location. See Appendix E for results from each location.

Sampling Rationale

On-site Groundwater

DOE Order 5400.1, IV.9; DOE/EH-0173T, 5.10.1.3; 40 CFR Parts 264 and 265, Subpart F

The on-site WVDP groundwater monitoring program provides for the determination of water quality, focusing on radiological and chemical surveillance of both active and inactive super solid waste management units (SSWMUs). In addition, using wells situated hydraulically upgradient (background) and downgradient of SSWMUs allows both detection of groundwater contamination and evaluation of the effects associated with the individual SSWMUs. Groundwater protection is addressed in the Groundwater Protection Plan, WVDP-091. Groundwater monitoring is detailed in the Groundwater Monitoring Plan, WVDP-239.

SSWMU #1 Low-level waste treatment facilities, including four active lagoons — lagoons 2, 3, 4, and 5 — and an inactive, filled-in lagoon — lagoon 1.

SSWMU #2 Miscellaneous small units, including the sludge pond, the solvent dike, the paper incinerator, the equalization basin, and the kerosene tank.

SSWMU #3 Liquid waste treatment system containing effluent from the supernatant treatment system.

■ Sampling locations are shown on Figures A-6 and A-7 (pp. A-8 and A-9).

1998 Monitoring Program
Environmental Surveillance

On-site Groundwater

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
HLW Storage and Processing Tank *(SSWMU #4)* 401 U 402 U 403 U 405 C 406 408 409 **Maintenance Shop Leach Field** *(SSWMU #5)* 501 U 502 **Low-level Waste Storage Area** *(SSWMU #6)* 602 604 605 8607 U 8609 U **Chemical Process Cell Waste Storage Area** *(SSWMU #7)* 704 706 U 707 C	Groundwater monitoring points around site super solid waste management units (SSWMUs) Reported in: • SER • Quarterly Groundwater Reports	Grab liquid	→ 4 times per year (generally)*	→ 4 each well (generally)*	→ Gross alpha, gross beta, H-3 *
		Direct field measurement of sample discharge water	→ Each sampling event*	→ Twice each sampling event	→ Conductivity, pH

NOTE: "U" designates upgradient, "B" designates background, and "C" designates crossgradient wells. The remainder are downgradient.

* Sampling frequency and analytes vary from point to point. See Table 3-1 (p. 3-6) for a summary sampling schedule and a listing of analytes. See Table E-1 (Appendix E, p. E-3) for a listing of analytes monitored at each location. See Appendix E for results from each location.

Sampling Rationale

On-site Groundwater

DOE Order 5400.1, IV.9; DOE/EH-0173T, 5.10.1.3; 40 CFR Parts 264 and 265, Subpart F

The on-site WVDP groundwater monitoring program provides for the determination of water quality, focusing on radiological and chemical surveillance of both active and inactive super solid waste management units (SSWMUs). In addition, using wells situated hydraulically upgradient (background) and downgradient of SSWMUs allows both detection of groundwater contamination and evaluation of the effects associated with the individual SSWMUs. Groundwater protection is addressed in the Groundwater Protection Plan, WVDP-091. Groundwater monitoring is detailed in the Groundwater Monitoring Plan, WVDP-239.

SSWMU #4 High-level waste storage and processing area, including the high-level radioactive waste tanks, the supernatant treatment system, and the vitrification facility.

SSWMU #5 Maintenance shop sanitary leach field, formerly used by NFS and the WVDP to process domestic sewage generated by the maintenance shop.

SSWMU #6 Low-level waste storage area; includes metal and fabric structures housing low-level radioactive waste being stored for future disposal.

SSWMU #7 Chemical process cell (CPC) waste storage area, which contains packages of pipes, vessels, and debris from decontamination and cleanup of the chemical process cell in the former reprocessing plant.

■ Sampling locations are shown on Figures A-6 and A-7 (pp.A-8 and A-9).

1998 Monitoring Program
Environmental Surveillance

On-site Groundwater

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
Construction and Demolition Debris Landfill (CDDL) *(SSWMU #8)* 801 U 802 803 804 8603 U 8612 **NRC-licensed Disposal Area (NDA)** *(SSWMU #9)* 901 U 902 U 903 906 908 U 909 910 8610 8611 NDATR **IRTS Drum Cell** *(SSWMU #10)* 1005 U 1006 1007 1008b B 1008c B	Groundwater monitoring points around site super solid waste management units (SSWMUs)	Grab liquid →	4 times per year (generally)* →	4 each well (generally)* →	Gross alpha, gross beta, H-3 *
	Reported in: • SER • Quarterly Groundwater Reports	Direct field measurement of sample discharge water →	Each sampling event* →	Twice each sampling event →	Conductivity, pH

NOTE: "U" designates upgradient, "B" designates background, and "C" designates crossgradient wells. The remainder are downgradient.

* Sampling frequency and analytes vary from point to point. See Table 3-1 (p.3-6) for a summary sampling schedule and a listing of analytes. See Table E-1 (Appendix E, p. E-3) for a listing of analytes monitored at each location. See Appendix E for results from each location.

Sampling Rationale

On-site Groundwater

DOE Order 5400.1, IV.9; DOE/EH-0173T, 5.10.1.3; 40 CFR Parts 264 and 265, Subpart F

The on-site WVDP groundwater monitoring program provides for the determination of water quality, focusing on radiological and chemical surveillance of both active and inactive super solid waste management units (SSWMUs). In addition, using wells situated hydraulically upgradient (background) and downgradient of SSWMUs allows both detection of groundwater contamination and evaluation of the effects associated with the individual SSWMUs. Groundwater protection is addressed in the Groundwater Protection Plan, WVDP-091. Groundwater monitoring is detailed in the Groundwater Monitoring Plan, WVDP-239.

SSWMU #8 The construction and demolition debris landfill (CDDL); used by NFS and the WVDP to dispose of nonhazardous and nonradioactive materials.

SSWMU #9 The NRC-licensed disposal area (NDA); contains radioactive wastes generated by NFS and the WVDP.

SSWMU #10 The integrated radioactive waste system (IRTS) treatment drum cell; stores cement-stablized low-level radioactive waste.

■ Sampling locations are shown on Figures A-6 and A-8 (pp.A-8 and A-10).

1998 Monitoring Program
Environmental Surveillance

On-site Groundwater and Seeps

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
State-licensed Disposal Area *(SSWMU #11)** 1101a U 1101b U 1101c U 1102a 1102b 1103a 1103b 1103c 1104a 1104b 1104c 1105a 1105b 1106a U 1106b U 1107a 1108a U 1109a U 1109b U 1110a 1111a	Groundwater monitoring points around site super solid waste management units (SSWMUs) Reported in: • SER	Grab liquid →	Per NYSERDA →	Per NYSERDA →	Per NYSERDA
North Plateau Seeps *(Not in a SSWMU)* GSEEP SP02 SP04 SP05 SP06 SP11 SP12 SP18 SP23	Groundwater seepage points along the northeastern edge of the north plateau Reported in: • SER • Quarterly Groundwater Reports	Grab liquid →	Semiannual →	2 each seep →	Gross alpha/beta, H-3 (pH, conductivity, and VOCs at SP12)
Miscellaneous *Well Points* *(Not in a SSWMU)* WP-A WP-C WP-H ***NB1S*** *(Former background well)*	Well points downgradient of main plant and the former sand and gravel unit back-ground well Reported in: • SER • Quarterly Groundwater Reports	Grab liquid → Field measurement →	Annual → Quarterly →	1 each well → 4 →	Gross alpha/beta, H-3 pH, conductivity

NOTE: "U" designates upgradient, "B" designates background, and "C" designates crossgradient wells. The remainder are downgradient.
* SSWMU #11 is sampled by NYSERDA under a separate program.

Sampling Rationale

On-site Groundwater	DOE Order 5400.1, IV.9; DOE/EH-0173T, 5.10.1.3; 40 CFR Parts 264 and 265, Subpart F
	The on-site WVDP groundwater monitoring program provides for the determination of water quality, focusing on radiological and chemical surveillance of both active and inactive super solid waste management units (SSWMUs). In addition, using wells situated hydraulically upgradient (background) and downgradient of SSWMUs allows both detection of groundwater contamination and evaluation of the effects associated with the individual SSWMUs. Groundwater protection is addressed in the Groundwater Protection Plan, WVDP-091. Groundwater monitoring is detailed in the Groundwater Monitoring Plan, WVDP-239.
SSWMU #11	The New York State-licensed disposal area (SDA) was operated by NFS as a commercial low-level disposal facility; it also received wastes from NFS reprocessing operations.
North Plateau Seeps	Monitor groundwater emanating from the ground surface along the edge of the site's north plateau.
Well Points	Monitor groundwater of known subsurface contamination in the north plateau area. All well points are downgradient of the main plant.
WNWNB1S	Background well on north plateau.

- Sampling locations are shown on Figures A-6 and A-8 (pp.A-8 and A-10).

1998 Monitoring Program
Environmental Surveillance

Off-site Surface Water

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WFBCTCB* *Buttermilk Creek Upstream of Confluence with Cattaraugus Creek at Thomas Corners Road*	Restricted surface waters receiving plant effluents Reported in: • MTAR • QEMDR • SER	Timed continuous composite liquid	→ Weekly	→ 52	→ pH, conductivity
				Weekly samples composited to 12	→ Monthly composite for gross alpha/beta, H-3
				Weekly samples composited to 4	→ Quarterly composite for gamma isotopic and Sr-90
WFFELBR* *Cattaraugus Creek at Felton Bridge*	Unrestricted surface waters receiving plant effluents Reported in: • MTAR • QEMDR • SER	Timed continuous composite liquid	→ Weekly	→ 52	→ Gross alpha/beta, H-3, pH
				Weekly samples composited to 12	→ Flow-weighted monthly composite for gamma isotopic and Sr-90, gross alpha/beta, H-3
WFBCBKG* *Buttermilk Creek near Fox Valley (background)*	Unrestricted surface water, background Reported in: • MTAR • QEMDR • SER • Reported to NYSERDA	Timed continuous composite liquid	→ Weekly	→ 52	→ pH, conductivity
				Weekly samples composited to 12	→ Monthly composite for gross alpha/beta, H-3
				Weekly samples composited to 4	→ Quarterly composite for gamma isotopic, Sr-90, C-14, I-129, Pu/U isotopic, total U, Am-241, Tc-99
		Grab liquid	→ Semiannual	→ 2	→ NPOC, TOX, Ca, Mg, Na, K, Ba, Mn, Fe, Cl, SO_4, NO_3-NO_2-N, F, HCO_3, CO_3
WFBIGBR *Cattaraugus Creek at Bigelow Bridge (background)*	Unrestricted surface water, background Reported in: • MTAR • QEMDR • SER	Grab liquid	→ Monthly	→ 12	→ Gross alpha/beta, H-3, Sr-90, gamma isotopic

* Monthly composites are also sent to NYSDOH.

Sampling Rationale

WFBCTCB DOE/EH-0173T, 5.10.1.1

Buttermilk Creek is the surface water receiving all WVDP effluents. WFBCTCB monitors the potential influence of WVDP drainage into Buttermilk Creek upstream of Buttermilk Creek's confluence with Cattaraugus Creek.

WFFELBR DOE/EH-0173T, 5.10.1.1

Because Buttermilk Creek empties into Cattaraugus Creek, WFFELBR monitors the potential influence of WVDP drainage into Cattaraugus Creek directly downstream of the Cattaraugus Creek confluence with Buttermilk Creek.

WFBCBKG DOE/EH-0173T, 5.10.1.1

Monitors background conditions of Buttermilk Creek upstream of the WVDP; allows comparison to downstream conditions.

WFBIGBR DOE/EH-0173T, 5.10.1.1

Monitors background conditions of Cattaraugus Creek at Bigelow Bridge, upstream of the WVDP; allows comparison to downstream conditions.

■ Sampling locations are shown on Figure A-3 (p. A-5).

1998 Monitoring Program
Environmental Surveillance

Off-site Drinking Water

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
WFWEL Series *Wells outside the WNYNSC perimeter but near the WVDP* **WFWEL01** *3.0 km West-Northwest* **WFWEL02** *1.5 km Northwest* **WFWEL03** *3.5 km Northwest* **WFWEL04** *3.0 km Northwest* **WFWEL05** *2.5 km Southwest* **WFWEL06** *(background)* *29 km South* **WFWEL07** *4.4 km North-Northeast* **WFWEL08** *2.5 km East-Northeast* **WFWEL09** *3.0 km Southeast* **WFWEL10** *7.0 km North*	Drinking water supply; groundwater near facility* Reported in: • MTAR • QEMDR • SER	Grab liquid	→ Annual	→ 1 each location	→ Gross alpha/beta, H-3, gamma isotopic, pH, conductivity

* No drinking water wells are located in hydrogeological units affected by site activity.

Sampling Rationale

Off-site Drinking Water WFWEL Series

DOE 5400.1, IV.9; DOE/EH-0173T, 5.10.1.2

Eight of the ten listed off-site private residential drinking water wells represent the nearest unrestricted uses of groundwater close to the WVDP. The ninth sample (**WFWEL10**) is taken from a public water supply from deep wells. The tenth drinking water well, **WFWEL06**, is located 29 kilometers south of the Project and is considered a background drinking water source.

■ Sampling locations are shown on Figures A-9 and A-12 (pp. A-11 and A-14).

1998 Monitoring Program
Environmental Surveillance

Off-site Air

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
AFFXVRD *3.0 km South-Southeast at Fox Valley* **AFTCORD** *3.7 km North-Northwest at Thomas Corners Road* **AFRT240*** *2.0 km Northeast on Route 240* **AFSPRVL** *9.4 km North at Springville* **AFWEVAL** *3.9 km South-Southeast at West Valley* **AFNASHV** *39.8 km West at Village of Nashville, Town of Hanover (background)* **AFBOEHN** *2.3 km Southwest on Dutch Hill Road* **AFRSPRD** *1.5 km Northwest on Rock Springs Road* **AFGRVAL** *30.9 km South at Great Valley (background)* **AFBLKST** *Bulk Storage Warehouse 2.2 km East-Southeast at Buttermilk Road*	Particulate air samples around WNYNSC perimeter Reported in: • MTAR • QEMDR • SER	Continuous air particulate filter	Weekly	52 each location	Gross alpha/beta
				Weekly filters composited to 4 each location	Quarterly composite for Sr-90, gamma isotopic, total U, U/Pu isotopic (plus Am-241 at **AFRSPRD** and **AFGRVAL** only)
		Continuous desiccant column for water vapor collection **AFRSPRD** and **AFGRVAL** only	Weekly	52 each location	H-3
		Continuous charcoal cartridge **AFRSPRD** and **AFGRVAL** only	Monthly	12 composited to 4 each location	Quarterly composite for I-129

* Filter from duplicate sampler sent to NYSDOH.

Sampling Rationale

AFFXVRD
AFTCORD
AFRT240

DOE/EH-0173T, 5.7.4

Air samplers put into service by NFS as part of the site's original monitoring program at perimeter locations chosen to obtain data from places most likely to provide highest concentrations. Choice of location based on meteorological data.

AFSPRVL

DOE/EH-0173T, 5.7.4; DOE/EP-0023, 4.2.3

Off-site (remote) sampler located on private property in nearby community within 15 kilometers of the site (north).

AFWEVAL

DOE/EH-0173T, 5.7.4; DOE/EP-0023, 4.2.3

Off-site (remote) sampler located on private property in nearby community within 15 kilometers of the site (southeast).

AFNASHV

DOE/EH-0173T, 5.7.4; DOE/EP-0023, 4.2.3

Off-site (remote) sampler considered representative of natural background radiation. Located 39.8 kilometers west of the site (upwind) on privately owned property.

AFBOEHN

DOE/EH-0173T, 5.7.4; DOE/EP-0023, 4.2.3

Perimeter location chosen to obtain data from the place most likely to provide the highest elevated release concentrations. AFBOEHN is located on NYSERDA property at the perimeter. Choice of location based on meteorological data.

AFRSPRD

DOE/EH-0173T, 5.7.4

Perimeter location chosen to obtain data from the place most likely to provide the highest ground-level release concentrations. AFRSPRD is on WNYNSC property outside the main plant operations fenceline. I-129 and H-3 are sampled here because the sampling trains were easy to incorporate and the location was most likely to receive effluent releases. Choice of location based on meteorological data.

AFGRVAL

DOE/EH-0173T, 5.7.4; DOE/EP-0023, 4.2.3

Off-site (remote) sampler considered representative of natural background radiation. Located on privately owned property 30.9 kilometers south of the site (typically upwind). I-129 and H-3 sampled here also.

AFBLKST

DOE/EH-0173T, 5.7.4

Off-site monitoring of bulk storage warehouse, near the site perimeter.

■ Sampling locations are shown on Figures A-5 and A-12 (pp. A-7 and A-14).

1998 Monitoring Program
Environmental Surveillance

Fallout, Sediment, and Soil

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
AFDHFOP *2.3 km Southwest* **AFFXFOP** *3.0 km South-Southeast* **AFTCFOP** *3.7 km North-Northwest* **AF24FOP** *2.0 km Northeast* **ANRGFOP** *Rain gauge on-site*	Collection of fallout particulates and precipitation around the WNYNSC perimeter Reported in: • MTAR • QEMDR • SER	Integrated precipitation →	Monthly →	12 each location →	Gross alpha/beta, H-3, pH, gamma isotopic
SF Soil Series *Surface soil at each of 10 air samplers*	Long-term fallout accumulation Reported in: • MTAR • QEMDR • SER	Surface plug composite soil →	Annual →	1 each location →	Gross alpha/beta, gamma isotopic, Pu-239/240, Sr-90, Am-241 plus U isotopic and total U at SFRSPRD, SFBOEHN, and SFGRVAL
SFCCSED *Cattaraugus Creek at Felton Bridge* **SFSDSED** *Cattaraugus Creek at Springville Dam* **SFBISED** *Cattaraugus Creek at Bigelow Bridge (background)* **SFTCSED** *Buttermilk Creek at Thomas Corners Road* **SFBCSED** *Buttermilk Creek at Fox Valley Road (background)*	Deposition in sediment downstream of facility effluents Reported in: • MTAR • QEMDR • SER	Grab stream sediment →	Annual (Split **SFSDSED** and **SFBCSED** with NYSDOH) →	1 each location →	Gross alpha/beta, gamma isotopic, Sr-90, U/Pu isotopic, total U, Am-241
SN On-site Soil Series: **SNSW74A** *(Near WNSW74A)* **SNSWAMP** *(Near WNSWAMP)* **SNSP006** *(Near WNSP006)*	Reported in: • MTAR • QEMDR • SER	Surface plug or grab →	Annual →	1 each location →	Gross alpha/beta, gamma isotopic, Sr-90, U-isotopic, total U, Pu-239/240, Am-241, Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn

Sampling Rationale

AFDHFOP
AFFXFOP
AFTCFOP
AF24FOP DOE/EP-0023, 4.7

Collection of fallout particles and precipitation around the site perimeter at established air sampling locations: AFDHFOP (Dutch Hill at Boehn Road), AFFXFOP (Fox Valley Road), AFTCFOP (Thomas Corners), AF24FOP (Route 240). Indicates short-term effects.

ANRGFOP Fallout particles and precipitation collected on-site by the Environmental Laboratory at the rain gauge. Indicates short-term effects.

SF Soil Series DOE/EH-0173T, 5.9.1

Off-site soils collected at air sampling locations. **SFWEVAL** (West Valley), **SFFXVRD** (Fox Valley Road), **SFSPRVL** (Springville), **SFTCORD** (Thomas Corners), **SFRT240** (Route 240), **SFNASHV** (Nashville), **SFBOEHN** (Boehn Road-Dutch Hill), **SFGRVAL** (Great Valley), **SFRSPRD** (Rock Springs Road), **SFBLKST** (bulk storage warehouse): Collection of long-term fallout data at established air sampler locations via soil sampling.

SFCCSED DOE/EH-0173T, 5.12.1

Sediment deposition at Cattaraugus Creek at Felton Bridge. Location is first point of public access to Cattaraugus Creek downstream of its confluence with Buttermilk Creek.

SFSDSED DOE/EH-0173T, 5.12.1

Sediment deposition in Cattaraugus Creek at Springville Dam. Reservoir provides ideal settling and collection location for sediments downstream of Buttermilk Creek confluence with Cattaraugus Creek. Located downstream of SFCCSED.

SFBISED DOE/EH-0173T, 5.12.1

Sediment deposition in Cattaraugus Creek at Bigelow Bridge. Location is upstream of the Buttermilk Creek confluence and serves as the Cattaraugus Creek background location.

SFTCSED DOE/EH-0173T, 5.12.1

Sediment deposition in Thomas Corners in Buttermilk Creek immediately downstream of all facility liquid effluents.

SFBCSED DOE/EH-0173T, 5.12.1

Sediment deposition in Buttermilk Creek upsteam of facility effluents (background).

SN Soil Series DOE/EH-0173T, 5.9.1.

On-site soil. (Samples may be partially composed of sediments.) **SNSW74A** (surface soil near WNSW74A), **SNSWAMP** (surface soil near WNSWAMP), and **SNSP006** (surface soil near WNSP006): Locations to be specifically defined by geographic coordinates. Correspond to site drainage pattern flows (i.e., most likely area of radiological deposition/ accumulation).

■ Sampling locations are shown on Figures A-2, A-3, A-4, A-5, and A-12 (pp.A-4, A-5, A-6, A-7, and A-14).

1998 Monitoring Program
Environmental Surveillance

Off-site Biological

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
BFFCATC *Fish from Cattaraugus Creek downstream of its confluence with Buttermilk Creek* **BFFCATD** *Fish from Cattaraugus Creek downstream of the Springville Dam*	Fish in waters up- and downstream of facility effluents Reported in: • MTAR • QEMDR • SER	Individual collection, biological	→ Semiannual (samples at **BFFCATC** and **BFFCTRL** shared with NYSDOH)	→ 20 fish each location	→ Gamma isotopic and Sr-90 in edible portions of each individual fish; % moisture
BFFCTRL *Control fish sample from nearby stream not affected by the WVDP (7 km or more upstream of site effluent point; background)*			Annual (**BFFCATD** only)	→ 10 fish	→ Gamma isotopic and Sr-90 in edible portions of each individual fish; % moisture
BFMREED *Dairy farm 3.8 km North-Northwest* **BFMCOBO** *Dairy farm 1.9 km West-Northwest* **BFMWIDR** *Dairy farm 3.0 km Southeast* **BFMSCHT** *Dairy farm 4.8 km South*	Milk from animals foraging around the facility perimeter and at background sites Reported in: • MTAR • QEMDR • SER	Grab biological	→ Monthly (Samples at **BFMREED** and **BFMCOBO** shared with NYSDOH)	→ 12 monthly samples composited to 4 each location	→ Quarterly composite for gamma isotopic, Sr-90, H-3, and I-129
BFMCTLS *Control location 25 km South (background)* **BFMCTLN** *Control location 30 km North (background)*	Milk from animals foraging around the facility perimeter and at background sites Reported in: • MTAR • QEMDR • SER	Grab biological	→ Annual	→ 1 each location	→ Gamma isotopic, Sr-90, H-3, and I-129

Sampling Rationale

BFFCATC **BFTCATD**	DOE/EH-0173T, 5.11.1.1 Radioactivity may enter a food chain in which fish are a major component and are consumed by the local population.
BFFCTRL	Control fish sample; provide background data for comparison with data from fish caught downstream of facility effluents.
BFMREED **BFMCOBO** **BFMWIDR** **BFMSCHT**	DOE/EH-0173T, 5.8.2.1 Milk from animals foraging around facility perimeter. Milk is consumed by all age groups and is frequently the most important food that could contribute to the radiation dose. Dairy animals pastured near the site and at two background locations allow adequate monitoring.
BFMCTLS **BFMCTLN**	Control milk samples collected far from the site to provide background data for comparison with data from near-site milk samples.

- Sampling locations are shown on Figures A-9 and A-12 (pp. A-11 and A-14).

1998 Monitoring Program
Environmental Surveillance

Off-site Biological

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
BFVNEAR *Nearby locations* **BFVCTRL** *Remote locations (16 km or more from facility; background)*	Fruit and vegetables grown near facility perimeter, downwind if possible Reported in: • MTAR • QEMDR • SER	Grab biological (fruits and vegetables)	→ Annual (at harvest)	→ 3 each (split with NYSDOH)	→ Gamma isotopic and Sr-90 analysis of edible portions, H-3 in free moisture; % moisture
BFHNEAR *Forage for beef cattle/ milk cows from near-site location* **BFHCTLS or BFHCTLN** *Forage for beef cattle/ milk cows from control location south or north (background)*	Forage (hay) grown near facility perimeter, downwind if possible Reported in: • MTAR • QEMDR • SER	Grab biological	→ Annual	→ 1 each location	→ Gamma isotopic, Sr-90
BFBNEAR *Beef animal from nearby farm in downwind direction* **BFBCTRL** *Beef animal from control location 16 km or more from facility (background)*	Meat (beef foraging near facility perimeter, downwind if possible) Reported in: • MTAR • QEMDR • SER	Grab biological	→ Semiannual	→ 2 each location	→ Gamma isotopic and Sr-90 analysis of meat, H-3 in free moisture; % moisture
BFDNEAR *Deer in vicinity of the site* **BFDCTRL** *Control deer 16 km or more from the facility (background)*	Venison (deer foraging near facility perimeter) Reported in: • MTAR • QEMDR • SER	Individual collection, biological	→ Annual, during hunting season (BFDNEAR sample split with NYSDOH) During year as available (BFDCTRL sample split with NYSDOH)	→ 3 → 3	Gamma isotopic and Sr-90 analysis of meat, H-3 in free moisture; % moisture

Sampling Rationale

BFVNEAR DOE/EH-0173T, 5.8.2.2

Fruits and vegetables (corn, apples, and beans or leafy vegetables, if available) collected from areas near the site. These samples are collected, if possible, from areas near the site predicted to have worst-case downwind concentrations of radionuclides in air and soil. Sample analysis reflects steady state/chronic uptake or contamination of foodstuffs as a result of site activities. Possible pathway directly to humans or indirectly through animals.

BFVCTRL DOE/EH-0173T, 5.8.2.2

Fruits and vegetables collected from an area remote from the site. Background fruits and vegetables collected for comparison with near-site samples. Collected in area(s) of no possible site effects.

BFHNEAR DOE/EH-0173T, 5.8.2.2

Hay collected from area near the site. Same as for near-site fruits and vegetables (**BFVNEAR**). Indirect pathway to humans through animals. Collected from same location as beef or milk sample.

BFHCTLS
BFHCTLN DOE/EH-0173T, 5.8.2.2

Hay collected from areas remote from the site. Background hay collected for comparison with near-site samples. Collected in area(s) of no possible effects from the site.

BFBNEAR DOE/EH-0173T, 5.8.2.3

Beef collected from animals raised near the site and foraging downwind of the site in areas of maximum probable effects. Following the rationale for vegetable matter collected near the site (**BFVNEAR** and **BFHNEAR**), edible flesh portion of beef animals is analyzed to determine possible radionuclide content passable directly to humans.

BFBCTRL DOE/EH-0173T, 5.8.2.3

Beef collected from animals raised far from the site. Background beef collected for comparison with near-site samples. Collected in area(s) of no possible site effects.

BFDNEAR DOE/EH-0173T, 5.8.3

Venison from deer herd found living near the site. Same as for beef (**BFBNEAR**).

BFDCTRL DOE/EH-0173T, 5.8.3

Venison from deer herd found living far from the site. Background deer meat collected for comparison with near-site samples. Collected in area(s) of no possible site effects.

■ Sampling locations are shown on Figures A-9 and A-12 (pp. A-11 and A-14).

1998 Monitoring Program
Environmental Surveillance

Off-site Direct Radiation

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
DFTLD Series *Thermoluminescent Dosimetry (TLD) Off-site:* **#1-#16** *Each of 16 Compass Sectors at Nearest Accessible Perimeter Point* **#17** *"5 points" Landfill 19.6 km Southwest (background)* **#20** *1,500 m Northwest (downwind receptor)* **#21** *Springville 9.4 km North* **#22** *West Valley 3.8 km South-Southeast* **#23** *Great Valley 30.9 km South (background)* **#37** *Nashville 39.8 km Northwest (background)* **#41** *Sardinia-Savage Road 15.5 km Northeast (background)*	Direct radiation around facility Reported in: • QEMDR • SER	Integrating LiF TLD →	Quarterly →	TLD cards at each of 23 locations collected 4 times per year →	Quarterly gamma radiation exposure

Sampling Rationale

Dosimetry Off-site

DOE/EH-0173T, 5.5; DOE/EP-0023, 4.6.3

TLDs offer continuous integrated environmental gamma-ray monitoring and have been deployed systematically about the site. Off-site TLDs are used to verify that site activities have not adversely affected the surrounding environs.

A biennial HPIC gamma radiation measurement is completed at all locations in order to confirm TLD measurements.

■ Sampling locations are shown on Figures A-11 and A-12 (pp. A-13 and A-14).

1998 Monitoring Program
Environmental Surveillance

On-site Direct Radiation

Sample Location Code	Monitoring/Reporting Requirements	Sampling Type/Medium	Collection Frequency	Total Annual Sample Collections	Analyses Performed/ Composite Frequency
DNTLD Series *Thermoluminescent Dosimetry (TLD) On-site:* **#18, #19, #33** *At three corners of the SDA* **#24, #26-#32, #34** *9 TLDS at the security fence around the site* **#35, #36, #38-#40** *5 TLDs on-site near operational areas* **#25** *Rock Springs Road 500 m North-Northwest of the plant* **#42** *SDA T-1 building* **#43** *SDA west perimeter fence*	Direct radiation around facility Reported in: • QEMDR • SER	Integrating LiF TLD	→ Quarterly	→ TLD cards at each of 20 locations collected 4 times per year	→ Quarterly gamma radiation exposure

Sampling Rationale

Dosimetry On-site

DOE/EH-0173T, 5.4 and 5.5

On-site TLDs monitor waste management units and verify that the potential dose rate to the general public (i.e., at Rock Springs Road) is below 100 mrem/year (1 mSv/year) from site activities.

A biennial HPIC gamma radiation measurement is completed at all locations in order to confirm TLD measurements.

Potential TLD sampling locations are continually evaluated with respect to site activities.

- Sampling locations are shown on Figure A-10 (p. A-12).

Appendix C

Summary of Water, Sediment, and Soil Monitoring Data

Collecting a Sample at a WVDP Stream Sampling Location

Table C - 1

Total Radioactivity (curies) of Liquid Effluents Released from Lagoon 3 (WNSP001) in 1998

Isotope	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Total
Alpha	2.56±1.14E-04	7.05±9.46E-05	6.63±4.79E-05	6.67±6.54E-05	4.59±1.69E-04
Beta	6.65±0.30E-03	2.99±0.21E-03	7.30±0.96E-04	1.03±0.12E-03	1.14±0.04E-02
H-3	7.86±0.22E-02	6.17±0.19E-02	2.87±0.12E-02	3.52±0.13E-02	2.04±0.03E-01
C-14	1.84±1.58E-04	1.45±0.64E-04	2.78±0.48E-04	1.19±0.32E-04	7.25±1.80E-04
K-40	0.00±6.44E-04	0.00±8.72E-04	0.00±4.74E-04	-5.70±8.40E-04	-0.57±1.45E-03
Co-60	0.00±5.19E-05	0.00±8.73E-05	0.00±3.85E-05	4.48±6.77E-05	0.45±1.28E-04
Sr-90	2.28±0.10E-03	1.04±0.06E-03	1.99±0.27E-04	2.20±0.35E-04	3.73±0.12E-03
Tc-99	3.58±0.09E-03	1.37±0.05E-03	3.25±0.24E-04	5.03±0.29E-04	5.78±0.11E-03
I-129	1.46±0.94E-05	3.23±1.22E-05	3.45±1.06E-05	4.70±1.05E-05	1.28±0.22E-04
Cs-137	3.02±0.47E-04	2.53±0.90E-04	5.56±2.78E-05	3.28±1.38E-04	9.39±1.73E-04
U-232	1.79±0.15E-04	1.41±0.13E-04	5.38±0.68E-05	6.48±1.24E-05	4.38±0.24E-04
U-233/234	1.03±0.06E-04	8.09±0.43E-05	2.85±0.26E-05	4.12±0.22E-05	2.53±0.08E-04
U-235/236	4.02±1.42E-06	2.74±0.83E-06	6.22±1.14E-07	1.82±0.45E-06	9.21±1.76E-06
U-238	5.66±0.47E-05	4.62±0.32E-05	1.52±0.19E-05	2.19±0.16E-05	1.40±0.06E-06
Total U (g)	1.70±0.02E+02	1.28±0.03E+02	4.33±0.12E+01	6.63±0.08E+01	4.08±0.04E+02
Pu-238	3.02±0.83E-06	4.88±3.55E-07	-0.90±2.08E-07	1.38±0.57E-06	4.80±1.08E-06
Pu-239/240	1.19±0.46E-06	6.77±3.91E-07	1.75±2.34E-07	6.59±4.06E-07	2.70±0.76E-06
Am-241	4.99±3.70E-07	5.99±4.04E-07	1.29±1.84E-07	6.65±4.77E-07	1.89±0.75E-06

Table C - 2

Comparison of 1998 Lagoon 3 (WNSP001) Liquid Effluent Radioactivity Concentrations with Department of Energy Guidelines

Isotope[a]	Discharge Activity[b] (Ci)	Radioactivity[c] (Becquerels)	Average Concentration (μCi/mL)	DCG (μCi/mL)	% of DCG
Alpha	4.59±1.69E-04	1.70±0.63E+07	1.06±0.39E-08	NA[d]	NA
Beta	1.14±0.04E-02	4.22±0.15E+08	2.62±0.09E-07	NA[d]	NA
H-3	2.04±0.03E-01	7.56±0.13E+09	4.69±0.08E-06	2E-03	0.23
C-14	7.25±1.80E-04	2.68±0.67E+07	1.67±0.41E-08	7E-05	0.02
K-40	-0.57±1.45E-03	-2.11±5.37E+07	-1.31±3.33E-08	NA[d]	NA
Co-60	0.45±1.28E-04	1.66±4.74E+06	1.03±2.94E-09	5E-06	<0.06
Sr-90	3.73±0.12E-03	1.38±0.05E+08	8.58±0.28E-08	1E-06	8.58
Tc-99	5.78±0.11E-03	2.14±0.04E+08	1.33±0.03E-07	1E-04	0.13
I-129	1.28±0.22E-04	4.75±0.79E+06	2.95±0.49E-09	5E-07	0.59
Cs-137	9.39±1.73E-04	3.47±0.64E+07	2.16±0.40E-08	3E-06	0.72
U-232[e]	4.38±0.24E-04	1.62±0.09E+07	1.01±0.06E-08	1E-07	10.07
U-233/234[e]	2.53±0.08E-04	9.36±0.31E+06	5.82±0.19E-09	5E-07	1.16
U-235/236[e]	9.21±1.76E-06	3.41±0.65E+05	2.12±0.40E-10	5E-07[f]	0.04
U-238[e]	1.51±0.07E-06	5.17±0.23E+06	3.21±0.14E-09	6E-07	0.54
Pu-238	4.80±1.08E-06	1.77±0.40E+05	1.10±0.25E-10	4E-08	0.28
Pu-239/240	2.70±0.76E-06	9.98±2.82E+04	6.20±1.75E-11	3E-08	0.21
Am-241	1.89±0.75E-06	7.00±2.77E+04	4.35±1.72E-11	3E-08	0.15
Total % of DCGs					**22.78**

[a] *Half-lives are listed in Table K-1.*
[b] *Total volume released: 4.35E+10 mL.*
[c] *1 Ci = 3.7E+10 Becquerels (Bq): 1 Bq = 2.7E-11 Ci.*
[d] *Derived concentration guides (DCGs) are not applicable (NA) to gross alpha and gross beta. Potassium-40 activity is not applicable because of its natural origin.*
[e] *Total U (g) = 4.08±0.04E+02; average U (μg/mL) = 9.38±0.09E-03*
[f] *DCG for U-236 is used for this comparison.*

Table C - 3

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water Facility Yard Drainage (WNSP005)

Month	Alpha	Beta	H-3	pH (standard units)
January	2.09±1.92E-09	1.70±0.09E-07	-0.27±8.09E-08	7.07
February	1.25±0.89E-09	3.16±0.38E-08	7.30±5.64E-08	7.60
March	0.73±3.33E-09	9.00±0.62E-08	1.74±0.82E-07	7.64
April	-1.58±4.92E-09	1.08±0.10E-07	-1.06±0.81E-07	7.39
May	2.13±1.54E-09	1.57±0.07E-07	9.79±7.87E-08	7.32
June	2.44±2.61E-09	8.98±0.70E-08	5.14±7.93E-08	7.55
July	1.86±1.47E-09	1.52±0.06E-07	1.02±0.80E-07	6.97
August	5.85±4.40E-09	5.82±0.64E-08	-1.60±7.96E-08	7.84
September	0.67±1.81E-09	2.42±0.51E-08	6.19±8.05E-08	7.85
October	3.00±4.20E-09	4.08±0.70E-08	1.23±0.81E-07	7.77
November	2.74±2.99E-09	3.97±0.70E-08	-4.44±8.30E-08	7.49
December	-1.20±2.45E-09	4.30±0.69E-08	0.70±7.99E-08	8.05

Table C - 4

1998 Radioactivity Concentrations (µCi/mL) in Surface Water Downstream of the WVDP at Frank's Creek (WNSP006)

Month	Alpha	Beta	H-3	Sr-90	Cs-137
*January**	1.67±0.98E-09	4.34±0.41E-08	2.52±0.86E-07	1.71±0.40E-08	0.00±1.52E-08
*February**	1.56±1.02E-09	4.39±0.42E-08	2.29±0.73E-07	1.57±0.31E-08	7.33±2.72E-08
March	3.64±9.43E-10	1.71±0.32E-08	6.41±7.70E-08	8.87±2.36E-09	0.00±1.01E-08
*April **	2.02±1.16E-09	3.50±0.33E-08	1.97±0.85E-07	1.53±0.21E-08	0.00±1.48E-08
May	1.44±1.04E-09	2.38±0.31E-08	0.17±7.60E-08	1.22±0.31E-08	0.00±1.12E-08
*June**	3.16±1.64E-09	4.86±0.41E-08	5.14±0.93E-07	2.16±0.30E-08	2.19±1.04E-08
July	2.03±1.45E-09	3.28±0.38E-08	1.04±7.82E-08	1.88±0.34E-08	1.76±1.12E-08
August	-0.08±1.49E-09	4.37±0.39E-08	9.08±8.10E-08	1.79±0.29E-08	0.00±1.79E-08
*September**	1.51±1.86E-09	5.28±0.43E-08	4.71±0.83E-07	2.12±0.27E-08	0.00±1.81E-08
October	0.77±1.55E-09	3.40±0.36E-08	4.37±8.24E-08	1.48±0.26E-08	0.00±1.56E-08
November	0.71±1.05E-09	1.56±0.31E-08	-3.33±8.08E-08	1.06±0.33E-08	0.00±1.77E-08
*December**	0.90±1.14E-09	2.51±0.35E-08	5.36±0.91E-07	1.45±0.32E-08	6.49±7.67E-09

Quarter	C-14	Tc-99	I-129	U-232	U-233/234
1st Quarter	0.09±5.42E-09	8.46±3.58E-09	1.76±4.39E-10	4.80±1.20E-10	3.85±0.87E-10
2nd Quarter	1.54±3.85E-09	3.37±1.83E-09	0.96±4.82E-10	3.42±1.95E-10	4.05±1.27E-10
3rd Quarter	0.82±5.31E-09	-0.54±1.76E-09	4.23±5.06E-10	5.01±1.54E-10	4.36±1.41E-10
4th Quarter	2.91±4.29E-09	1.02±1.68E-09	6.67±4.39E-10	4.25±0.77E-10	3.84±0.91E-10

	U-235/236	U-238	Total U (µg/mL)	Pu-238	Pu-239/240
1st Quarter	2.00±1.96E-11	2.80±0.74E-10	6.34±0.22E-04	8.22±4.45E-11	2.44±2.24E-11
2nd Quarter	0.94±4.45E-11	2.12±0.95E-10	6.78±0.95E-04	0.76±1.51E-11	0.75±1.07E-11
3rd Quarter	4.59±5.28E-11	2.81±1.13E-10	9.01±0.33E-04	0.30±2.36E-11	0.58±2.29E-11
4th Quarter	-0.02±2.91E-11	1.91±0.64E-10	8.96±0.20E-04	2.61±3.04E-11	0.86±2.76E-11

	Am-241
1st Quarter	5.94±3.58E-11
2nd Quarter	1.60±0.53E-10
3rd Quarter	0.74±1.84E-11
4th Quarter	6.23±6.35E-11

** Month of discharge from WNSP001. See Table C-27 for a summary of water quality data at WNSP006.*

Table C - 5

1998 Radioactivity Concentrations (µCi/mL) in Surface Water Sewage Treatment Facility (WNSP007)

Month	Alpha	Beta	H-3	Cs-137
January	3.60±4.58E-09	3.20±0.68E-08	-0.21±8.18E-08	
February	1.29±2.71E-09	2.10±0.59E-08	6.64±8.23E-08	
March	0.53±4.03E-09	2.32±0.58E-08	-1.42±8.11E-08	
1st Qtr				0.00±4.17E-09
April	0.06±3.28E-09	2.15±0.55E-08	-1.67±7.97E-08	
May	2.58±3.31E-09	2.01±0.56E-08	-2.08±8.01E-08	
June	0.73±1.69E-09	8.92±5.22E-09	0.65±7.94E-08	
2nd Qtr				0.00±4.56E-09
July	-0.74±2.09E-09	6.00±6.03E-09	-0.36±8.03E-08	
August	1.95±3.15E-09	1.90±0.51E-08	-3.79±8.05E-08	
September	-0.29±1.91E-09	1.32±0.50E-08	-0.25±8.29E-08	
3rd Qtr				0.00±7.33E-09
October	-0.17±2.51E-09	1.64±0.39E-08	-4.49±8.00E-08	
November	-0.14±3.00E-09	1.88±0.63E-08	-8.30±8.13E-08	
December	-1.61±3.22E-09	1.00±0.71E-08	-9.73±8.26E-08	
4th Qtr				0.00±4.59E-09

Table C - 6

1998 Radioactivity Concentrations (µCi/mL) in Surface Water French Drain (WNSP008)

Month	Alpha	Beta	H-3
January	0.70±1.67E-09	2.34±0.47E-08	1.17±0.10E-06
February	2.63±1.19E-09	2.42±0.26E-08	1.92±0.12E-06
March	-0.37±1.98E-09	2.00±0.35E-08	1.45±0.10E-06
April	0.23±1.88E-09	2.76±0.38E-08	1.47±0.11E-06
May	3.77±2.24E-09	1.68±0.43E-08	1.56±0.11E-06
June	1.15±1.54E-09	2.17±0.32E-08	2.12±0.12E-06
July	1.81±2.13E-09	1.74±0.47E-08	1.92±0.12E-06
August	-0.01±1.85E-09	1.97±0.35E-08	2.00±0.12E-06
September	0.11±2.41E-09	1.68±0.49E-08	2.58±0.13E-06
October	0.58±1.28E-09	1.91±0.24E-08	1.96±0.11E-06
November	2.60±1.89E-09	1.40±0.33E-08	1.70±0.11E-06
December	-0.68±1.78E-09	1.86±0.34E-08	1.62±0.11E-06

Table C - 7

1998 Radioactivity Concentrations (µCi/mL) in Surface Water Northeast Swamp (WNSWAMP)

Month	Alpha	Beta	H-3	Sr-90	Cs-137
January	1.97±1.28E-09	1.86±0.02E-06	1.22±0.80E-07	8.71±0.27E-07	0.00±6.85E-09
February	2.10±1.53E-09	2.42±0.03E-06	1.48±0.81E-07	1.15±0.02E-06	0.00±6.87E-09
March	0.69±1.29E-09	1.93±0.02E-06	1.24±0.81E-07	7.92±0.23E-07	0.00±4.26E-09
April	-0.10±1.13E-09	1.96±0.02E-06	6.88±8.09E-08	1.01±0.02E-06	0.00±4.20E-09
May	0.36±1.25E-09	2.44±0.03E-06	2.28±0.82E-07	1.26±0.03E-06	0.00±4.04E-09
June	0.55±1.44E-09	3.21±0.03E-06	2.23±0.80E-07	1.78±0.03E-06	0.00±6.69E-09
July	0.31±1.33E-09	2.92±0.03E-06	2.02±0.80E-07	1.48±0.03E-06	0.00±4.72E-09
August	0.55±1.58E-09	3.53±0.03E-06	1.79±0.81E-07	1.47±0.02E-06	0.00±6.55E-09
September	0.44±1.81E-09	4.24±0.03E-06	2.45±0.84E-07	2.25±0.03E-06	0.00±7.18E-09
October	0.08±1.31E-09	3.00±0.03E-06	5.74±7.34E-08	1.60±0.04E-06	0.00±7.20E-09
November	-0.29±1.18E-09	2.81±0.03E-06	1.76±0.79E-07	1.47±0.03E-06	0.00±4.89E-09
December	-0.64±1.03E-09	2.54±0.02E-06	1.07±0.80E-07	1.28±0.03E-06	2.09±4.21E-09

Quarter	C-14	I-129	U-232	U-233/234	U-235/236
1st Quarter	-0.40±2.23E-08	1.95±3.03E-10	2.47±7.26E-10	9.27±5.35E-10	1.38±1.90E-10
2nd Quarter	-2.08±5.50E-09	9.04±7.24E-10	-0.31±5.10E-11	1.22±0.52E-10	2.04±2.35E-11
3rd Quarter	7.15±6.75E-09	9.44±9.39E-10	2.99±4.25E-11	3.52±6.79E-11	0.01±1.92E-11
4th Quarter	1.70±4.58E-09	1.04±0.92E-09	9.76±7.16E-11	1.07±0.64E-10	2.73±3.88E-11

	U-238	Total U (µg/mL)	Pu-238	Pu-239/240	Am-241
1st Quarter	7.21±4.52E-10	0.00±9.50E-05	-0.75±4.62E-10	-1.50±2.60E-10	1.62±4.96E-10
2nd Quarter	7.55±4.34E-11	5.43±0.20E-04	-0.01±2.12E-10	0.30±2.02E-10	0.50±1.14E-10
3rd Quarter	3.97±4.43E-11	0.00±9.50E-05	0.02±2.96E-11	3.86±3.96E-11	-0.45±2.05E-11
4th Quarter	1.05±0.63E-10	7.92±0.19E-05	1.46±5.56E-11	3.63±4.37E-11	0.11±5.22E-11

See Table C-27 for a summary of water quality data at WNSWAMP.

Table C - 8

1998 Radioactivity Concentrations (µCi/mL) in Surface Water North Swamp (WNSW74A)

Month	Alpha	Beta	H-3	Sr-90	Cs-137
January	2.50±1.82E-09	8.76±2.49E-09	-7.69±8.14E-08	2.46±3.02E-09	0.00±2.36E-08
February	1.06±1.48E-09	6.72±2.38E-09	1.25±8.32E-08	3.03±2.16E-09	0.00±1.62E-08
March	-0.60±1.71E-09	6.71±2.26E-09	3.11±8.06E-08	2.07±1.67E-09	0.00±1.98E-08
April	0.26±1.28E-09	6.51±2.16E-09	-8.23±7.50E-08	4.34±2.01E-09	0.00±1.37E-08
May	0.90±1.12E-09	9.22±2.07E-09	-1.85±8.12E-08	2.91±2.14E-09	0.00±1.45E-08
June	0.73±1.36E-09	7.83±2.21E-09	-5.16±7.32E-08	2.77±1.58E-09	0.00±1.34E-08
July	0.70±1.18E-09	5.37±2.68E-09	-1.60±7.97E-08	4.10±2.62E-09	0.00±2.03E-08
August	0.26±1.40E-09	7.73±2.53E-09	-1.59±7.95E-08	3.81±1.66E-09	0.00±1.48E-08
September	0.76±1.48E-09	4.83±2.63E-09	-0.69±8.00E-08	1.64±1.30E-09	0.00±1.34E-08
October	0.10±1.02E-09	7.21±2.06E-09	-6.24±7.62E-08	2.90±1.59E-09	0.87±1.59E-08
November	0.27±1.02E-09	7.36±2.21E-09	-1.12±0.75E-07	3.39±2.51E-09	0.00±1.51E-08
December	-0.84±2.05E-09	8.35±3.36E-09	-5.33±7.80E-08	6.19±2.40E-09	-5.98±9.20E-09

Quarter	C-14	I-129	U-232	U-233/234	U-235/236
1st Quarter	0.79±5.64E-09	0.29±1.07E-09	1.35±3.64E-11	1.53±0.59E-10	0.76±1.94E-11
2nd Quarter	-3.06±7.40E-09	-1.57±7.70E-10	0.24±1.21E-10	9.64±6.66E-11	1.16±3.92E-11
3rd Quarter	1.43±6.04E-09	0.46±6.30E-10	-2.90±2.21E-11	7.58±5.68E-11	-0.78±2.12E-11
4th Quarter	7.05±4.60E-09	6.66±7.41E-10	4.25±2.68E-11	1.15±0.51E-10	0.14±1.21E-11

	U-238	Total U (µg/mL)	Pu-238	Pu-239/240	Am-241
1st Quarter	1.76±0.62E-10	1.60±0.14E-04	8.69±4.29E-11	0.89±1.67E-11	2.12±1.95E-11
2nd Quarter	7.06±5.78E-11	1.60±0.18E-04	1.50±2.16E-11	1.59±1.77E-11	1.96±2.19E-11
3rd Quarter	1.56±0.71E-10	2.04±0.34E-04	-3.40±6.82E-12	-3.39±6.81E-12	-0.01±1.84E-09
4th Quarter	7.67±4.00E-11	2.03±0.05E-04	8.42±5.22E-11	0.35±3.82E-11	0.68±1.36E-11

See Table C-27 for a summary of water quality data at WNSW74A.

Table C - 9

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water Frank's Creek East of the SDA (WNFRC67)

Month	Alpha	Beta	H-3	pH (standard units)
January	-2.58±6.09E-10	4.18±2.42E-09	2.60±8.11E-08	7.01
February	7.66±6.12E-10	1.10±2.32E-09	4.64±8.02E-08	7.41
March	-3.32±7.37E-10	1.40±2.40E-09	-1.02±0.80E-07	6.64
April	5.28±7.96E-10	-0.15±2.29E-09	-4.87±5.76E-08	6.77
May	4.74±7.56E-10	-0.10±3.18E-09	-8.37±8.10E-08	8.10
June	-5.44±8.12E-10	1.83±3.27E-09	0.44±7.95E-08	8.00
July	0.48±1.01E-09	-3.56±3.51E-09	0.28±8.03E-08	6.80
August	0.94±1.17E-09	1.72±3.54E-09	-4.21±7.95E-08	7.68
September	-0.58±1.13E-09	-2.74±3.76E-09	2.52±0.82E-07	8.10
October	7.00±5.64E-10	3.21±1.35E-09	1.95±0.82E-07	7.76
November	3.17±4.83E-10	3.08±1.41E-09	-3.36±8.37E-08	6.76
December	0.09±5.59E-10	2.04±1.31E-09	2.02±7.92E-08	8.25

Table C - 10

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water Erdman Brook (WNERB53)

Month	Alpha	Beta	H-3	pH (standard units)
January	4.76±8.71E-10	1.65±0.30E-08	-2.44±8.10E-08	7.47
February	1.14±0.94E-09	1.47±0.31E-08	1.23±0.82E-07	7.36
March	0.32±8.90E-10	1.87±0.28E-08	1.15±0.76E-07	7.23
April	6.12±9.89E-10	1.17±0.26E-08	-5.01±8.06E-08	6.92
May	0.61±1.02E-09	1.12±0.27E-08	-0.92±8.01E-08	7.61
June	0.98±1.29E-09	1.81±0.30E-08	-1.12±7.37E-08	7.44
July	0.75±1.30E-09	1.10±0.32E-08	2.59±8.13E-08	7.15
August	0.37±1.49E-09	1.46±0.31E-08	-0.23±8.01E-08	7.68
September	0.56±1.48E-09	1.82±0.32E-08	4.17±7.68E-08	7.45
October	0.67±1.32E-09	1.91±0.27E-08	4.76±8.22E-08	7.39
November	2.84±7.28E-10	1.85±0.23E-08	-1.67±8.18E-08	7.27
December	2.19±9.09E-10	1.39±0.24E-08	9.50±7.61E-08	7.82

Table C - 11

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water Cooling Tower Basin (WNCOOLW)

Month	Alpha	Beta	H-3	Cs-137	pH (standard units)
January	0.68± 1.35E-09	1.44± 0.44E-08	5.48± 8.06E-08		8.29
February	1.01± 1.01E-09	1.42± 0.31E-08	-0.05± 7.94E-08		8.35
March	-0.03± 1.66E-09	1.54± 0.44E-08	-8.38± 8.04E-08		7.75
1st Qtr				0.00± 1.40E-08	
April	0.51± 1.10E-09	2.26± 0.28E-08	-9.02± 8.21E-08		8.51
May	2.05± 1.82E-09	2.20± 0.45E-08	-9.72± 8.04E-08		8.58
June	2.62± 2.80E-09	3.43± 0.51E-08	0.94± 7.94E-08		8.48
2nd Qtr				0.00± 1.48E-08	
July	5.81± 3.76E-09	3.06± 0.54E-08	5.41± 5.50E-08		8.39
August	1.35± 2.93E-09	2.45± 0.50E-08	-2.29± 5.60E-08		8.90
September	-0.99± 3.14E-09	2.01± 0.51E-08	8.59± 8.12E-08		8.73
3rd Qtr				0.00± 1.18E-08	
October	-0.52± 2.07E-09	2.36± 0.48E-08	-9.47± 5.57E-08		8.72
November	-0.05± 1.72E-09	2.25± 0.45E-08	-9.09± 8.18E-08		8.70
December	0.23± 1.53E-09	1.79± 0.32E-08	4.27± 0.61E-07		8.66
4th Qtr				0.00± 1.32E-08	

Table C - 12

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water SDA Drainage (WNSDADR)

Month	Alpha	Beta	H-3	Cs-137	pH (standard units)
January	3.98±2.98E-10	1.58±0.75E-09	1.78±0.58E-07	0.00±1.32E-08	6.46
February	4.79±2.58E-10	2.13±0.78E-09	7.19±7.97E-08	0.00±1.30E-08	5.92
March	1.12±2.53E-10	3.01±0.86E-09	4.82±8.21E-08	0.00±1.45E-08	6.35
April	3.66±2.36E-10	1.18±0.75E-09	-7.56±7.99E-08	0.00±1.37E-08	5.39
May	5.07±1.90E-10	3.94±0.61E-09	1.81±0.57E-07	0.00±2.30E-08	6.81
June	2.62±2.22E-10	1.05±0.69E-09	8.73±7.95E-08	0.00±2.88E-08	5.31
July	5.51±3.18E-10	3.06±0.92E-09	-2.51±8.07E-08	9.02±9.99E-09	6.86
August	3.78±2.47E-10	1.52±0.84E-09	8.96±8.02E-08	0.00±1.96E-08	6.91
September	1.07±0.63E-09	1.62±0.96E-09	2.02±0.84E-07	0.00±2.30E-08	7.28
October	2.54±2.17E-10	1.75±0.78E-09	4.44±8.03E-08	0.00±1.44E-08	7.02
November	5.31±3.02E-10	3.44±0.87E-09	6.85±7.93E-08	0.00±1.68E-08	6.72
December	7.33±2.71E-10	3.71±0.88E-09	-1.25±0.77E-07	-0.10±1.13E-08	6.76

Table C - 13

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water Waste Tank Farm Underdrain (WN8D1DR)

Month	Alpha	Beta	H-3	Sr-90	Cs-137	pH (standard units)
January	3.73±3.61E-09	1.35±0.52E-08	-0.99±8.13E-08	8.39±2.54E-09	0.00±1.02E-08	7.34
February	2.66±4.31E-09	4.81±0.76E-08	2.85±0.85E-07	1.78±0.32E-08	0.00±1.53E-08	7.27
March	1.02±3.95E-09	3.05±0.67E-08	-1.00±6.98E-08	2.18±1.69E-09	0.00±1.43E-08	7.51
April	0.00±2.37E-09	7.92±4.44E-09	-1.04±0.75E-07	2.92±1.84E-09	0.00±2.00E-08	7.14
May	1.19±1.58E-09	4.53±4.17E-09	-2.25±7.90E-08	4.53±2.34E-09	0.00±2.17E-08	7.39
June	1.67±2.35E-09	3.65±4.58E-09	-2.21±7.30E-08	2.76±2.01E-09	1.64±2.35E-08	7.01
July	0.72±2.12E-09	-0.74±5.12E-09	-0.29±7.96E-08	1.56±2.34E-09	0.00±1.44E-08	7.13
August	0.14±2.00E-09	6.84±4.37E-09	-0.05±7.47E-08	3.08±1.57E-09	0.00±1.93E-08	7.10
September	0.15±2.01E-09	6.20±4.10E-09	-5.20±7.48E-08	1.64±1.30E-09	0.00±1.75E-08	7.20
October	-0.03±2.37E-09	1.28±0.38E-08	-1.26±0.75E-07	5.42±1.84E-09	0.00±1.33E-08	7.33
November	0.60±2.15E-09	1.14±0.42E-08	-8.14±7.53E-08	5.42±1.95E-09	0.00±1.84E-08	7.29
December	-0.84±2.07E-09	1.12±0.42E-08	-3.39±7.90E-08	7.34±2.54E-09	0.57±1.26E-08	7.25

Table C - 14

1998 Radioactivity Concentrations (µCi/mL) in Surface Water Drum Cell Drainage (WNDCELD)

Month	Alpha	Beta	H-3	Sr-90	I-129	Cs-137
January	2.95±3.41E-10	2.41±1.07E-09				
February	2.08±3.05E-10	1.87±0.88E-09				
March	2.77±3.09E-10	1.74±0.89E-09				
1st Qtr			4.87±8.04E-08	0.93±1.53E-09	-2.65±3.49E-10	0.00±1.50E-08
April	-3.50±3.97E-10	5.87±1.38E-09				
May	-2.33±6.30E-10	2.47±1.31E-09				
June	0.70±2.69E-10	6.24±1.48E-09				
2nd Qtr			-6.38±7.89E-08	0.22±1.54E-09	-3.40±6.22E-10	0.00±1.87E-08
July	4.28±7.98E-10	2.99±1.37E-09				
August	0.07±9.63E-10	2.92±1.38E-09				
September	7.67±8.07E-10	2.73±1.33E-09				
3rd Qtr			-1.62±7.93E-08	1.18±0.91E-09	0.97±6.35E-10	0.00±1.69E-08
October	3.20±5.96E-10	3.45±1.39E-09				
November	1.21±4.46E-10	1.96±1.22E-09				
December	-3.25±3.55E-10	0.61±1.21E-09				
4th Qtr			-1.37±0.76E-07	2.53±1.37E-09	1.60±4.87E-10	-0.55±1.24E-08

Table C - 15

1998 Radioactivity Concentrations (µCi/mL), pH, and Conductivity Environmental Laboratory Potable Water Sampling Location (WNDNKEL)

Month	Alpha	Beta	H-3	pH (standard units)	Conductivity (µmhos/cm@25°C)
January	2.45± 2.83E-10	1.43± 0.80E-09	-0.59± 5.65E-08	7.24	177
February	1.62± 2.61E-10	1.58± 0.79E-09	3.55± 7.89E-08	7.03	214
March	-0.07± 3.70E-10	1.34± 0.79E-09	-9.18± 8.00E-08	7.82	169
April	-1.42± 2.75E-10	9.05± 7.60E-10	-5.21± 8.16E-08	7.82	162
May	4.74± 3.24E-10	1.32± 0.74E-09	-1.16± 0.79E-07	8.05	180
June	0.12± 3.73E-10	1.77± 0.77E-09	-5.62± 7.73E-08	7.99	218
July	2.08± 4.38E-10	2.06± 0.89E-09	1.25± 0.80E-07	7.57	226
August	4.10± 5.88E-10	1.79± 0.85E-09	-1.84± 7.88E-08	7.83	254
September	-0.25± 5.84E-10	2.42± 8.57E-10	6.22± 7.87E-08	8.33	271
October	1.94± 5.30E-10	1.36± 0.82E-09	1.41± 0.80E-07	8.01	273
November	6.37± 5.17E-10	8.69± 8.34E-10	-1.38± 0.81E-07	8.13	273
December	-2.80± 4.68E-10	1.50± 0.83E-09	-1.22± 0.74E-07	8.27	261

Table C - 16

1998 Radioactivity Concentrations (µCi/mL), pH, and Conductivity Maintenance Shop Potable Water (WNDNKMS)

Month	Alpha	Beta	H-3	pH (standard units)	Conductivity (µmhos/cm@25°C)
January	2.37± 2.74E-10	1.20± 0.78E-09	-1.21± 0.79E-07	7.92	185
February	3.31± 2.83E-10	1.23± 0.77E-09	-3.04± 7.87E-08	7.29	227
March	-0.06± 3.63E-10	1.27± 0.79E-09	-8.86± 8.02E-08	7.46	170
April	0.12± 3.16E-10	8.17± 7.57E-10	-3.78± 8.10E-08	8.22	176
May	4.07± 3.13E-10	1.18± 0.73E-09	-8.46± 7.98E-08	8.05	178
June	0.58± 3.86E-10	1.98± 0.78E-09	-7.32± 7.72E-08	8.18	215
July	3.43± 4.03E-10	5.58± 8.11E-10	4.38± 7.99E-08	7.63	201
August	-0.55± 5.18E-10	9.31± 8.03E-10	0.74± 7.94E-08	7.89	264
September	-0.68± 3.64E-10	5.32± 6.08E-10	9.64± 8.11E-08	8.33	242
October	2.44± 5.34E-10	4.22± 0.96E-09	1.72± 0.81E-07	8.28	272
November	-1.25± 3.80E-10	1.02± 0.84E-09	-1.28± 0.80E-07	7.85	276
December	-2.68± 4.47E-10	1.10± 0.81E-09	-5.12± 7.54E-08	8.38	270

Table C - 17

1998 Radioactivity Concentrations (µCi/mL), pH, and Conductivity Main Plant Potable Water (WNDNKMP)

Month	Alpha	Beta	H-3	pH (standard units)	Conductivity (µmhos/cm@25°C)
January	1.06± 2.60E-10	1.25± 0.79E-09	-7.26± 7.90E-08	7.95	175
February	2.86± 2.86E-10	2.22± 0.83E-09	-4.19± 7.78E-08	7.14	213
March	-0.36± 3.61E-10	1.20± 0.79E-09	-2.76± 8.07E-08	8.02	168
April	-0.15± 3.07E-10	1.34± 0.79E-09	-9.88± 8.02E-08	8.27	166
May	2.52± 2.00E-10	1.14± 0.52E-09	-9.45± 5.62E-08	7.89	181
June	5.22± 4.74E-10	1.23± 0.74E-09	1.26± 7.87E-08	8.15	217
July	3.36± 4.42E-10	1.37± 0.86E-09	2.82± 7.84E-08	7.05	229
August	-0.03± 4.93E-10	1.52± 0.83E-09	-1.27± 7.90E-08	7.76	253
September	0.81± 6.23E-10	0.88± 8.54E-10	4.83± 7.83E-08	8.30	267
October	6.38± 5.80E-10	1.03± 0.80E-09	1.78± 0.80E-07	8.04	280
November	4.42± 5.05E-10	2.42± 0.81E-09	-1.33± 0.81E-07	8.18	271
December	-0.38± 4.90E-10	6.91± 7.85E-10	4.06± 7.77E-08	8.64	261

Table C - 18

1998 Radioactivity Concentrations (µCi/mL) and Water Quality Parameters
Utility Room Potable Water (WNDNKUR)

Month	Alpha	Beta	H-3	pH (standard units)	Conductivity (µmhos/cm@25°C)
January	2.79±2.94E-10	1.20±0.78E-09	-4.49±7.95E-08	8.62	177
February	2.68±2.68E-10	1.39±0.78E-09	-0.49±7.86E-08	7.69	217
March	-0.64±3.49E-10	1.57±0.80E-09	-1.21±0.80E-07	8.04	171
April	1.19±3.27E-10	9.97±7.66E-10	0.50±8.13E-08	7.50	162
May	7.61±3.77E-10	1.03±0.72E-09	1.12±0.78E-07	7.88	180
June	2.44±4.26E-10	2.00±0.78E-09	-3.72±7.73E-08	8.56	219
July	1.04±3.98E-10	1.11±0.85E-09	6.43±7.91E-08	7.99	230
August	1.46±5.26E-10	2.29±0.87E-09	1.06±7.93E-08	7.83	253
September	-0.25±6.02E-10	3.54±8.67E-10	1.08±0.80E-07	8.52	274
October	1.37±5.03E-10	4.94±0.99E-09	5.87±7.89E-08	7.87	276
November	-0.63±4.56E-10	2.08±0.80E-09	-3.35±8.19E-08	8.22	273
December	-2.28±4.68E-10	9.10±7.99E-10	-0.20±5.48E-08	7.93	270

Date	Fluoride (mg/L)	Nitrate-N (mg/L)	Arsenic *Total* (µg/L)	Barium *Total* (µg/L)	Cadmium *Total* (µg/L)
3/4/98	<0.2	0.45	<25	<200	<2

	Chromium *Total* (µg/L)	Mercury *Total* (µg/L)	Selenium *Total* (µg/L)
3/4/98	<10	<0.4	<2

Table C - 19

1998 Radioactivity Concentrations (µCi/mL) and Water Quality Parameters Storage and Disposal Area Drainage (WNNDADR)

Month	Alpha	Beta	H-3	Sr-90*	I-129*	Cs-137
January	7.23±8.35E-10	1.36±0.06E-07	9.12±0.94E-07			0.00±1.70E-08
February	1.91±1.75E-09	1.15±0.05E-07	9.70±0.94E-07			0.00±1.68E-08
March	1.05±1.04E-09	1.14±0.05E-07	9.51±0.94E-07			0.00±2.19E-08
1st Qtr				5.49±0.49E-08	-2.05±9.62E-10	
April	6.85±9.85E-10	1.34±0.04E-07	1.44±0.11E-06			0.00±9.42E-09
May	-0.16±1.13E-09	1.36±0.06E-07	2.54±0.13E-06			0.00±2.32E-08
June	1.42±1.23E-09	1.30±0.06E-07	2.08±0.12E-06			0.00±1.76E-08
2nd Qtr				6.99±0.42E-08	3.76±3.89E-10	
July	0.75±1.40E-09	1.34±0.06E-07	2.19±0.12E-06			0.00±2.67E-08
August	-0.43±1.09E-09	1.38±0.04E-07	3.08±0.15E-06			0.00±1.46E-08
September	0.85±1.18E-09	1.21±0.05E-07	2.11±0.12E-06			0.00±1.25E-08
3rd Qtr				7.02±0.46E-08	-1.60±6.16E-10	
October	0.46±1.26E-09	1.50±0.06E-07	1.92±0.11E-06			0.00±1.49E-08
November	1.34±1.30E-09	1.36±0.06E-07	1.25±0.10E-06			0.00±1.10E-08
December	0.33±1.16E-09	1.41±0.06E-07	1.41±0.10E-06			0.49±8.96E-09
4th Qtr				7.16±0.36E-08	4.10±4.50E-10	

	NPOC (mg/L)	TOX (µg/L)	pH** (standard units)
January	5.84	13.9	7.56
February	5.35	15.1	7.49
March	5.15	15.4	7.38
April	6.72	15.7	7.14
May	6.70	12.6	7.52
June	8.52	17.0	7.30
July	8.84	60.6	7.45
August	8.58	21.0	7.71
September	8.20	25.8	7.51
October	8.30	12.6	7.45
November	8.78	12.0	7.38
December	7.50	17.8	7.68

* *Monthly samples are composited and analyzed quarterly.*

** *pH is the monthly average of weekly measurements.*

Table C - 20

1998 Radioactivity Concentrations (µCi/mL), NPOC, and TOX in Groundwater at the NDA Interceptor Trench (WNNDATR)

Month	Alpha	Beta	H-3	I-129	Cs-137
January	1.60±0.96E-09	1.43±0.06E-07	1.42±0.11E-06		0.00±7.50E-09
February	3.45±1.25E-09	1.36±0.04E-07	6.81±0.26E-06		0.00±2.30E-08
March	2.27±1.31E-09	1.22±0.05E-07	8.33±0.30E-06		0.00±1.93E-08
1st Qtr				1.00±1.42E-09	
April	1.65±1.76E-09	1.16±0.06E-07	5.24±0.21E-06		0.00±2.53E-08
May	5.58±2.35E-09	1.03±0.05E-07	1.44±0.05E-05		0.00±1.20E-08
June	8.15±3.20E-09	9.48±0.58E-08	1.10±0.04E-05		0.00±1.08E-08
2nd Qtr				1.93±1.36E-09	
July	1.96±1.92E-09	1.01±0.06E-07	5.34±0.21E-06		0.00±2.26E-08
August	2.85±2.50E-09	1.16±0.06E-07	1.22±0.04E-05		0.00±1.69E-08
September	1.06±2.37E-09	9.65±0.51E-08	1.31±0.04E-05		0.00±1.83E-08
3rd Qtr				1.35±0.86E-09	
October	0.56±1.10E-09	8.99±0.39E-08	9.26±0.22E-06		0.00±2.60E-08
November	2.97±1.88E-09	8.80±0.56E-08	9.36±0.31E-06		0.00±1.07E-08
December	1.12±1.57E-09	1.87±0.08E-07	5.59±0.20E-06		0.00±1.51E-08
4th Qtr				7.03±0.14E-09	

	NPOC (mg/L)	TOX (µg/L)
January	3.7	12.4
February	6.1	29.6
March	6.1	30.6
April	6.5	24.8
May	6.1	27.2
June	8.4	18.0
July	6.5	100.0
August	6.8	73.0
September	7.0	30.0
October	6.4	26.0
November	7.7	24.0
December	7.6	22.0

Table C - 21

1998 Radioactivity Concentrations (µCi/mL) and Water Quality Parameters in Surface Water at the Standing Water (WNSTAW-series) Sampling Locations

Location	Date	Alpha	Beta	H-3	pH (standard units)	Conductivity (µmhos/cm@25°C)
WNSTAW4	*10/13*	-2.40±6.45E-10	3.60±2.52E-09	-2.41±5.75E-08	6.71	97
WNSTAW5	*10/13*	3.69±7.08E-10	0.40±2.35E-09	-0.34±8.08E-08	6.24	66
WNSTAW6	*10/13*	-5.46±8.24E-10	2.03±2.48E-09	3.30±7.89E-08	8.01	223
WNSTAW9	*10/13*	-7.53±8.15E-10	0.24±2.38E-09	7.08±7.98E-08	7.63	242
WNSTAWB*	*10/13*	0.07±1.09E-09	0.89±2.45E-09	6.77±8.06E-08	7.61	357

	Date	Chloride (mg/L)	Nitrate+ Nitrite (mg/L)	Sulfate (mg/L)	Iron *Total* (µg/L)	Manganese *Total* (µg/L)	Sodium *Total* (µg/L)
WNSTAW4	*10/13*	6.0	<0.05	5.2	760	180	4,100
WNSTAW5	*10/13*	<1.0	<0.05	4.2	1800	200	1,100
WNSTAW6	*10/13*	2.7	<0.05	7.5	110	26	1,200
WNSTAW9	*10/13*	6.6	<0.05	15.5	215	88	5,700
WNSTAWB*	*10/13*	1.0	<0.05	9.0	190	230	12,000

** Background location.*

Table C - 22

*1998 Radioactivity Concentrations (µCi/mL) in Surface Water Upstream of the WVDP in Buttermilk Creek at Fox Valley (WFBCBKG)**

Month	Alpha	Beta	H-3
January	1.42±0.55E-09	3.15±1.27E-09	-1.15±0.79E-07
February	5.63±5.49E-10	2.33±1.26E-09	-1.06±8.04E-08
March	1.76±3.41E-10	2.10±0.85E-09	-8.82±8.09E-08
April	8.83±6.68E-10	2.25±1.20E-09	-8.09±8.02E-08
May	1.10±0.70E-09	2.00±1.26E-09	6.13±7.82E-08
June	1.00±0.56E-09	7.91±8.76E-10	-2.54±8.25E-08
July	3.82±7.12E-10	1.24±1.27E-09	-8.95±7.73E-08
August	-5.59±8.24E-10	1.69±1.32E-09	3.24±7.88E-08
September	7.96±7.75E-10	1.04±1.24E-09	9.14±8.08E-08
October	3.15±6.96E-10	0.25±1.24E-09	-0.62±8.02E-08
November	6.85±5.03E-10	2.73±0.92E-09	-2.12±7.77E-08
December	2.25±6.10E-10	1.08±1.26E-09	-1.89±0.75E-07

Quarter	C-14	Sr-90	Tc-99	I-129	Cs-137
1st Quarter	-3.93±5.56E-09	0.26±1.01E-09	1.23±1.16E-09	0.15±6.70E-10	0.00±6.70E-09
2nd Quarter	-0.24±4.72E-09	3.14±1.22E-09	2.64±1.74E-09	2.80±7.19E-10	0.00±6.52E-09
3rd Quarter	2.21±0.58E-08	3.86±5.78E-10	-2.79±1.69E-09	2.95±5.13E-10	0.00±6.94E-09
4th Quarter	6.50±5.84E-09	1.94±1.49E-09	-2.14±1.45E-09	0.97±5.68E-10	1.86±2.81E-09

	U-232	U-233/234	U-235/236	U-238	Total U (µg/mL)
1st Quarter	-0.02±2.51E-11	8.69±4.66E-11	1.54±2.13E-11	4.34±3.29E-11	1.24±0.09E-04
2nd Quarter	1.35±1.09E-10	1.63±1.24E-10	1.00±0.99E-10	4.00±1.73E-10	3.43±0.34E-04
3rd Quarter	-0.47±3.82E-11	1.03±0.62E-10	-0.39±1.99E-11	1.11±0.59E-10	0.00±9.50E-05
4th Quarter	3.04±3.47E-11	7.61±4.07E-11	0.00±1.47E-11	9.30±4.18E-11	2.35±0.07E-04

	Pu-238	Pu-239/240	Am-241
1st Quarter	0.70±1.84E-11	0.00±1.65E-11	3.27±6.18E-12
2nd Quarter	0.54±1.07E-11	0.00±4.24E-11	1.73±2.16E-11
3rd Quarter	2.24±3.61E-11	3.39±2.81E-11	1.20±0.67E-10
4th Quarter	0.74±1.49E-11	2.23±2.59E-11	3.58±3.24E-11

* *Background location. See Table C-27 for a summary of water quality data at WFBCBKG.*

Table C - 23

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water Downstream of the WVDP in Buttermilk Creek at Thomas Corners (WFBCTCB)

Month	Alpha	Beta	H-3	Sr-90	Cs-137	pH (standard units)
*January**	6.52±4.64E-10	6.70±1.46E-09	-2.23±7.98E-08			6.93
*February**	2.75±5.28E-10	5.37±1.43E-09	3.16±8.17E-08			6.99
March	3.72±5.27E-10	3.76±1.29E-09	1.23±0.81E-07			7.62
1st Qtr				2.71±1.76E-09	0.00±4.17E-09	
*April**	0.56±5.63E-10	4.41±1.32E-09	1.18±8.18E-08			7.06
May	1.51±0.76E-09	4.14±1.37E-09	8.77±7.82E-08			7.19
*June**	4.64±5.83E-10	3.98±1.45E-09	-5.08±7.90E-08			7.07
2nd Qtr				1.70±1.08E-09	0.00±4.57E-09	
July	8.23±9.67E-10	5.57±1.51E-09	-1.64±7.76E-08			7.67
August	-1.47±9.60E-10	5.60±1.52E-09	1.04±0.79E-07			7.37
*September**	1.42±0.94E-09	6.28±1.51E-09	-0.32±7.94E-08			7.28
3rd Qtr				2.58±1.05E-09	0.00±6.57E-09	
October	7.40±8.69E-10	6.97±1.59E-09	8.48±8.20E-08			7.44
November	8.14±7.93E-10	1.30±0.18E-08	-0.81±7.82E-08			7.77
*December**	0.69±5.96E-10	5.47±1.48E-09	-2.26±0.75E-07			7.84
4th Qtr				5.84±1.96E-09	-0.86±4.00E-09	

Table C - 24

1998 Radioactivity Concentrations (µCi/mL) and pH in Surface Water Downstream of the WVDP in Cattaraugus Creek at Felton Bridge (WFFELBR)

Month	Alpha	Beta	H-3	Sr-90	Cs-137	pH (standard units)
*January**	1.70±0.77E-09	4.29±1.38E-09	-1.69±0.87E-07	2.20±1.71E-09	0.00±4.46E-09	7.28
*February**	3.33±0.96E-09	3.56±0.99E-09	3.59±5.36E-08	1.01±0.94E-09	0.00±4.35E-09	7.22
March	9.00±7.80E-10	1.88±1.22E-09	2.77±8.27E-08	0.49±1.39E-09	0.00±4.05E-09	7.54
*April**	1.74±1.07E-09	2.36±1.26E-09	6.98±8.56E-08	0.80±1.22E-09	0.00±6.58E-09	7.19
May	0.11±5.22E-10	1.73±0.91E-09	5.22±8.03E-08	1.15±1.14E-09	0.00±4.19E-09	7.51
*June**	1.03±0.83E-09	3.08±1.44E-09	-4.18±7.92E-08	1.18±1.64E-09	0.00±4.18E-09	7.47
July	1.04±0.18E-08	4.19±1.46E-09	-1.94±0.94E-07	3.71±1.34E-09	0.00±4.32E-09	7.71
August	0.22±1.36E-09	3.77±2.04E-09	7.28±7.90E-08	1.84±0.86E-09	0.00±6.55E-09	7.54
*September**	3.40±1.66E-09	3.96±2.16E-09	-1.02±8.33E-08	2.27±1.17E-09	0.00±1.69E-08	7.45
October	2.23±1.31E-09	4.79±1.76E-09	-1.94±0.82E-07	1.05±0.78E-09	0.00±4.49E-09	7.64
November	3.33±1.78E-09	4.14±2.01E-09	-1.04±7.84E-08	2.15±1.66E-09	0.00±7.20E-09	7.82
*December**	7.76±7.76E-10	2.32±1.41E-09	-1.92±0.75E-07	2.60±1.37E-09	0.37±4.30E-09	7.68

** Month of discharge from WNSP001.*

Table C - 25

*1998 Radioactivity Concentrations (µCi/mL) in Surface Water Upstream of the WVDP in Cattaraugus Creek at Bigelow Bridge (WFBIGBR)**

Month	Alpha	Beta	H-3	Sr-90	Cs-137
January	1.43±0.72E-09	2.36±1.02E-09	-1.35±8.15E-08	2.91±2.20E-09	0.00±4.69E-09
February	2.57±5.82E-10	1.20±0.96E-09	7.05±8.06E-08	0.67±1.29E-09	0.00±4.19E-09
March	1.99±0.74E-09	2.05±0.95E-09	-6.70±7.89E-08	0.50±1.43E-09	0.00±4.75E-09
April	1.55±8.08E-10	2.57±1.01E-09	-0.45±7.94E-08	0.72±1.20E-09	0.00±4.21E-09
May	1.28±1.09E-09	2.12±1.07E-09	1.64±0.79E-07	1.43±0.83E-09	0.00±6.68E-09
June	1.26±0.75E-09	1.32±1.04E-09	-3.30±8.13E-08	1.57±1.88E-09	0.00±4.75E-09
July	5.17±7.38E-10	2.13±0.77E-09	-1.13±0.57E-07	1.06±1.61E-09	0.00±4.51E-09
August	0.48±1.27E-09	1.46±1.07E-09	6.57±7.84E-08	0.86±1.52E-09	0.00±7.14E-09
September	2.60±9.56E-10	8.38±9.96E-10	4.07±8.22E-08	1.54±7.88E-10	0.00±4.57E-09
October	3.53±6.97E-10	1.08±0.94E-09	1.53±8.06E-08	7.45±5.31E-10	0.00±4.44E-09
November	3.68±6.46E-10	4.03±0.92E-09	2.02±7.90E-08	2.22±1.96E-09	0.00±4.40E-09
December	6.92±5.93E-10	4.08±1.02E-09	-1.36±0.53E-07	1.07±1.33E-09	0.47±2.76E-09

Table C - 26

1998 Radioactivity Concentrations (µCi/mL), pH, and Conductivity in Potable Well Water around the WVDP

Well	Alpha	Beta	H-3	Cs-137	pH (standard units)	Conductivity (µmhos/cm@25°C)
WFWEL01	6.96±6.65E-10	1.36±1.33E-09	-7.14±7.85E-08	0.00±2.72E-08	7.71	409
WFWEL02	5.24±7.47E-10	-0.05±1.30E-09	1.06±7.77E-08	0.00±1.24E-08	7.12	416
WFWEL03	5.49±7.13E-10	3.58±1.33E-09	-4.23±7.83E-08	0.00±2.33E-08	6.83	585
WFWEL04	0.92±2.02E-09	2.08±2.10E-09	-5.74±7.67E-08	0.00±1.08E-08	8.03	1707
WFWEL05	6.57±5.06E-10	2.45±1.16E-09	4.45±5.56E-08	0.00±1.96E-08	6.56	299
WFWEL06*	0.76±4.31E-10	-2.10±8.38E-10	1.80±7.47E-08	0.00±2.23E-08	8.31	250
WFWEL07	2.72±7.37E-10	-1.94±1.80E-09	4.12±5.71E-08	0.00±1.81E-08	7.66	370
WFWEL08	7.28±9.75E-10	0.32±1.95E-09	-4.72±5.80E-08	0.00±1.46E-08	7.27	485
WFWEL09	6.07±7.81E-10	3.14±1.35E-09	-1.34±0.78E-07	0.00±2.54E-08	7.42	639
WFWEL10	-0.04±1.20E-09	1.40±2.34E-09	-2.69±5.42E-08	0.00±1.74E-08	7.49	678

* *Background location*

Table C - 27

1998 Surface Water Quality at Locations WFBCBKG, WNSP006, WNSWAMP, and WNSW74A*

Location	Date	pH** (standard units)	Conductivity** (µmhos/cm@25°C)	Bicarbonate Alkalinity (as $CaCo_3$) (mg/L)	Carbonate Alkalinity (as $CaCo_3$) (mg/L)	Chloride (mg/L)	Fluoride (mg/L)
WFBCBKG*	*5/18*	8.23	241	84	<1	8	<0.10
WFBCBKG*	*9/29*	7.08	326	120	<1	12	<0.10
WNSP006	*5/18*	7.69	650	120	<1	142	<0.10
WNSP006	*9/29*	7.64	1240	150	<1	160	<0.10
WNSW74A	*5/18*	6.99	900	184	<1	106	0.11
WNSW74A	*9/29*	7.27	761	170	<1	56	<0.10
WNSWAMP	*5/18*	7.08	777	198	<1	98	0.11
WNSWAMP	*9/29*	7.66	765	173	<1	89	0.08

		Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	NPOC (mg/L)	TOX (µg/L)	Barium *Total* (µg/L)	Calcium *Total* (µg/L)
WFBCBKG*	*5/18*	0.11	12.8	2.4	14.7	<200	31,300
WFBCBKG*	*9/29*	0.09	29.0	3.6	<5.0	<200	51,500
WNSP006	*5/18*	6.70	16.2	4.2	56.1	<200	48,000
WNSP006	*9/29*	13.00	76.0	8.0	79.0	<200	83,000
WNSW74A	*5/18*	0.79	33.0	4.0	30.2	<200	78,800
WNSW74A	*9/29*	0.56	67.0	5.0	17.0	<200	81,000
WNSWAMP	*5/18*	0.05	20.8	6.5	34.4	96	92,100
WNSWAMP	*9/29*	0.03	48.0	7.7	14.0	102	85,500

		Iron *Total* (µg/L)	Magnesium *Total* (µg/L)	Manganese *Total* (µg/L)	Potassium *Total* (µg/L)	Sodium *Total* (µg/L)
WFBCBKG*	*5/18*	7,380	6,150	283	2,120	9,500
WFBCBKG*	*9/29*	570	7,400	34	2,250	9,350
WNSP006	*5/18*	464	8,030	54	3,100	84,100
WNSP006	*9/29*	940	12,000	30	11,000	110,000
WNSW74A	*5/18*	625	10,500	80	1,290	60,100
WNSW74A	*9/29*	<100	9,800	27	1,500	34,000
WNSWAMP	*5/18*	80	11,600	505	274	44,600
WNSWAMP	*9/29*	35	10,600	42	1,720	45,300

** Backgound location*

*** pH and conductivity data are from a separate sample collected within one week of the sample analyzed for other nonradiological parameters.*

Table C - 28

1998 Radioactivity Concentrations (µCi/g dry weight from upper 5 cm) and Metals Concentrations (mg/kg dry) in On-site Soils/Sediments

Location	Alpha	Beta	K-40	Co-60	Sr-90	Cs-137
SNSP006	1.12±0.38E-05	4.68±0.51E-05	1.86±0.20E-05	4.04±2.55E-08	8.38±1.54E-07	2.72±0.30E-05
SNSW74A	1.22±0.31E-05	2.23±0.30E-05	1.46±0.15E-05	0.67±1.27E-08	2.10±0.11E-06	6.41±0.90E-07
SNSWAMP	2.00±0.62E-05	4.47±0.62E-05	1.67±0.20E-05	0.59±1.61E-08	2.28±0.59E-06	6.88±0.63E-06

	U-232	U-233/234	U-235/236	U-238	Total U (µg/g)	Pu-239/240
SNSP006	4.98±2.54E-08	6.02±0.91E-07	4.66±2.60E-08	5.82±0.90E-07	1.74±0.09E+00	0.68±1.40E-08
SNSW74A	1.79±1.99E-08	5.99±0.58E-07	4.60±1.64E-08	5.79±0.57E-07	1.64±0.05E+00	4.18±1.89E-08
SNSWAMP	2.30±3.50E-08	7.90±1.58E-07	4.89±4.26E-08	8.36±1.62E-07	2.01±0.08E+00	2.26±0.46E-07

	Am-241
SNSP006	8.40±4.32E-08
SNSW74A	5.58±2.03E-08
SNSWAMP	3.58±1.05E-07

	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
SNSP006	8,015	0.4	8.9	44.8	0.41	<0.5
SNSW74A	8,210	<6.0	8.6	57.5	0.37	<0.5
SNSWAMP	11,000	0.5	11.4	85.0	0.51	<0.5

	Calcium	Chromium	Cobalt	Copper	Iron	Lead
SNSP006	23,250	10.7	9.8	16.2	20,600	13.2
SNSW74A	4,610	9.6	6.4	22.6	20,000	13.8
SNSWAMP	4,170	13.5	8.6	25.3	24,000	25.0

	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
SNSP006	7,165	515	0.57	21.1	876	0.56
SNSW74A	3,030	500	0.17	15.7	699	0.38
SNSWAMP	4,060	768	0.45	20.8	1,120	0.81

	Silver	Sodium	Thallium	Vanadium	Zinc
SNSP006	0.31	92.6	< 1	14.0	64
SNSW74A	0.25	79.8	< 1	12.5	114
SNSWAMP	0.32	56.3	< 1	16.5	94

Table C - 29

1998 Radioactivity Concentrations (µCi/g dry weight from upper 5 cm) in Surface Soil Collected at Air Sampling Stations around the WVDP

Location	Alpha	Beta	K-40	Co-60
SFBLKST	1.60±0.34E-05	2.54±0.27E-05	1.96±0.21E-05	0.00±5.47E-08
SFBOEHN	1.41±0.30E-05	1.82±0.23E-05	1.56±0.20E-05	0.11±2.34E-08
SFFXVRD	1.26±0.29E-05	1.59±0.21E-05	1.40±0.15E-05	0.38±1.70E-08
SFGRVAL*	1.33±0.30E-05	1.66±0.22E-05	1.32±0.15E-05	-0.61±2.18E-08
SFNASHV*	1.88±0.38E-05	2.79±0.27E-05	2.42±0.28E-05	2.00±2.53E-08
SFRSPRD	1.29±0.31E-05	2.12±0.24E-05	1.51±0.18E-05	1.70±2.00E-08
SFRT240	1.47±0.35E-05	1.74±0.29E-05	1.18±0.14E-05	1.13±1.97E-08
SFSPRVL	1.73±0.40E-05	1.93±0.29E-05	1.43±0.16E-05	-0.29±1.89E-08
SFTCORD	1.35±0.37E-05	2.45±0.31E-05	2.13±0.26E-05	-2.63±2.32E-08
SFWEVAL	1.52±0.29E-05	1.84±0.20E-05	1.28±0.17E-05	1.55±2.89E-08

	Sr-90	Cs-137	Pu-239/240	Am-241
SFBLKST	-0.23±1.26E-07	2.88±0.59E-07	1.03±1.22E-08	1.82±3.65E-10
SFBOEHN	0.95±1.21E-07	5.60±0.71E-07	0.61±1.22E-08	1.62±1.34E-08
SFFXVRD	1.61±1.17E-07	1.81±0.36E-07	3.38±2.44E-08	1.42±2.87E-09
SFGRVAL*	1.56±1.19E-07	7.70±0.96E-07	1.77±2.07E-08	1.57±1.30E-08
SFNASHV*	-1.86±1.10E-07	8.94±3.70E-08	0.64±1.28E-08	7.73±8.99E-09
SFRSPRD	1.67±1.27E-07	1.14±0.13E-06	4.63±4.24E-08	1.81±1.39E-08
SFRT240	1.07±1.27E-07	9.09±1.32E-07	4.54±3.52E-08	1.78±1.63E-08
SFSPRVL	6.62±9.35E-08	5.49±0.72E-07	0.67±1.34E-08	2.72±1.99E-08
SFTCORD	-1.19±1.29E-07	2.69±0.48E-07	0.00±2.46E-08	4.07±4.10E-09
SFWEVAL	-0.23±1.94E-07	3.26±0.52E-07	5.25±3.58E-08	6.34±5.23E-09

	U-232	U-233/234	U-235/236	U-238	Total U (µg/g)
SFBOEHN	1.46±1.47E-08	7.32±1.01E-07	6.31±3.00E-08	8.29±1.07E-07	1.57±0.05E+00
SFGRVAL*	1.10±1.50E-08	6.46±0.93E-07	5.70±2.80E-08	6.49±0.92E-07	1.70±0.04E+00
SFRSPRD	-1.32±4.69E-08	7.96±1.20E-07	2.34±3.36E-08	7.46±1.14E-07	2.56±0.04E+00

** Background location.*

Table C - 30

1998 Radioactivity Concentrations (µCi/g dry weight from upper 15 cm) in Stream Sediments around the WVDP

Location	Alpha	Beta	K-40	Co-60	Sr-90	Cs-137
SFBCSED*	6.76±2.93E-06	1.70±0.36E-05	1.55±0.19E-05	-0.41±2.15E-08	0.83±3.09E-08	4.85±2.89E-08
SFBISED*	1.31±0.40E-05	1.71±0.36E-05	1.26±0.16E-05	0.54±1.37E-08	-5.39±2.97E-08	5.60±3.61E-08
SFCCSED	8.99±3.19E-06	1.54±0.37E-05	1.28±0.14E-05	0.47±1.11E-08	2.54±3.38E-08	2.17±0.34E-07
SFSDSED	1.26±0.37E-05	1.88±0.38E-05	1.56±0.16E-05	-0.49±1.39E-08	2.58±3.72E-08	0.08±2.00E-08
SFTCSED	6.38±2.78E-06	1.89±0.37E-05	1.20±0.14E-05	1.92±2.22E-08	5.09±3.72E-08	1.12±0.14E-06

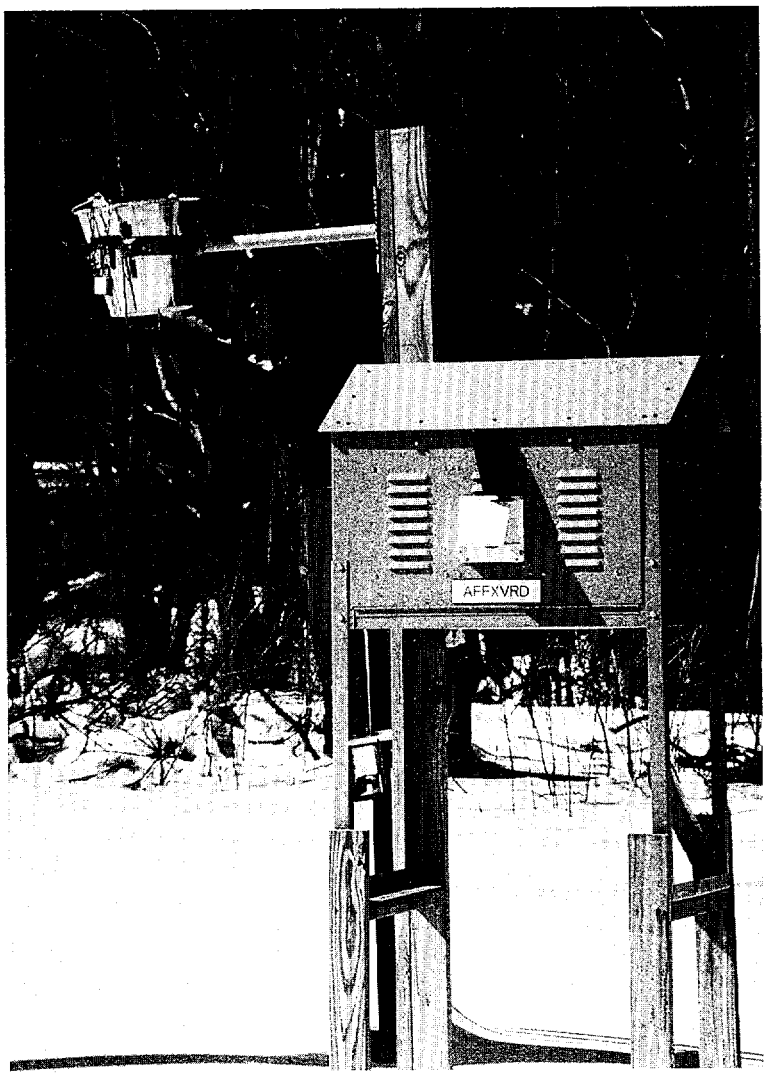
	U-232	U-233/234	U-235/236	U-238	Total U (µg/g)	Pu-238
SFBCSED*	0.46±1.65E-08	6.71±0.91E-07	3.64±2.17E-08	6.43±0.88E-07	1.49±0.04E-+00	6.14±3.25E-08
SFBISED*	-0.16±1.30E-08	5.27±0.76E-07	1.86±1.50E-08	5.81±0.80E-07	1.55±0.04E+00	4.31±2.59E-08
SFCCSED	0.74±1.30E-08	4.28±0.71E-07	4.13±2.26E-08	5.20±0.78E-07	1.02±0.02E+00	2.06±1.67E-08
SFSDSED	1.54±1.76E-08	7.46±0.93E-07	7.67±3.00E-08	7.83±0.96E-07	2.00±0.04E+00	3.54±2.66E-08
SFTCSED	0.80±1.61E-08	5.98±0.83E-07	4.50±2.70E-08	5.46±0.79E-07	1.45±0.03E+00	0.73±1.79E-08

	Pu-239/240	Am-241
SFBCSED*	0.36±1.25E-08	3.58±7.17E-09
SFBISED*	6.07±2.69E-08	3.75±7.51E-09
SFCCSED	0.23±1.02E-08	2.07±1.45E-08
SFSDSED	0.84±2.54E-08	0.57±1.04E-08
SFTCSED	1.09±1.94E-08	1.96±1.47E-08

** Background location.*

Appendix D

Summary of Air Monitoring Data



Ambient Air and Atmospheric Fallout Samples are Collected from Numerous Locations in the West Valley Area

Table D -1

1998 Airborne Radioactive Effluent Totals (curies) Released from the Main Ventilation Stack (ANSTACK)

Month	Alpha	Beta	H-3
January	1.93±2.03E-08	2.72±0.12E-06	5.63±0.11E-03
February	0.95±1.62E-08	8.46±0.17E-06	2.77±0.06E-03
March	1.87±1.83E-08	1.84±0.03E-05	1.37±0.06E-03
April	5.19±2.28E-08	2.41±0.03E-05	-0.17±1.25E-04
May	5.04±2.56E-08	3.10±0.04E-05	7.98±0.15E-03
June	8.98±2.80E-08	1.55±0.03E-05	1.65±0.15E-03
July	9.65±3.24E-08	1.96±0.03E-05	6.83±0.13E-03
August	8.60±3.12E-08	7.39±0.20E-06	4.65±0.12E-03
September	8.93±3.41E-08	9.29±0.23E-06	1.67±0.11E-03
October	1.15±0.29E-07	1.09±0.02E-05	9.83±0.86E-04
November	5.57±2.54E-08	5.40±0.16E-06	0.34±2.66E-05
December	6.97±2.62E-08	7.17±0.17E-06	9.41±0.29E-04
Annual Total	7.52±0.91E-07	1.60±0.01E-04	3.45±0.04E-02

Quarter	Co-60	Sr-90	I-129	Cs-137	Eu-154
1st Quarter	5.28±3.79E-08	4.33±0.48E-07	1.24±0.14E-03	4.09±0.44E-06	-0.80±9.77E-08
2nd Quarter	0.59±3.31E-08	3.34±0.52E-07	1.85±0.21E-03	6.09±0.71E-06	9.66±8.70E-08
3rd Quarter	0.85±4.38E-08	3.49±0.08E-06	1.52±0.18E-03	9.88±1.82E-06	0.51±1.23E-07
4th Quarter	4.37±4.03E-08	2.80±0.18E-06	3.51±0.41E-04	4.65±0.46E-06	-0.11±1.06E-07
Annual Total	1.11±0.78E-07	7.05±0.21E-06	4.97±0.31E-03	2.47±0.21E-05	1.28±2.08E-07

	U-232	U-233/234	U-235/236	U-238	Total U (g)
1st Quarter	-1.07±3.55E-09	1.51±0.49E-08	1.14±1.28E-09	1.17±0.44E-08	4.66±0.10E-02
2nd Quarter	2.72±2.50E-09	2.50±0.61E-08	1.15±1.60E-09	1.71±0.51E-08	5.26±0.08E-02
3rd Quarter	2.37±0.82E-08	2.14±0.69E-08	1.73±2.40E-09	1.82±0.66E-08	5.96±0.16E-02
4th Quarter	1.46±2.07E-09	1.92±0.38E-08	1.66±1.23E-09	1.55±0.34E-08	5.78±0.07E-02
Annual Total	2.68±0.95E-08	8.07±1.11E-08	5.69±3.39E-09	6.25±1.00E-08	2.17±0.02E-01

	Pu-238	Pu-239/240	Am-241
1st Quarter	1.07±0.30E-08	1.20±0.32E-08	2.65±0.67E-08
2nd Quarter	4.40±3.98E-09	1.16±0.61E-08	5.42±1.31E-08
3rd Quarter	3.95±1.04E-08	5.53±1.28E-08	1.28±0.28E-07
4th Quarter	3.53±0.67E-08	5.28±0.89E-08	9.78±1.69E-08
Annual Total	9.00±1.33E-08	1.32±0.17E-07	3.07±0.36E-07

Table D - 2

Comparison of 1998 Main Stack (ANSTACK) Exhaust Radioactivity Concentrations with Department of Energy Guidelines

Isotope[a]	Exhaust Activity[b] (Ci)	Radioactivity (Becquerels)[c]	Average Concentration (µCi/mL)	DCG[d] (µCi/mL)	% of DCG
Alpha	7.52±0.91E-07	2.78±0.34E+04	1.01±0.12E-15	NA[e]	NA
Beta	1.60±0.01E-04	5.92±0.03E+06	2.15±0.01E-13	NA[e]	NA
H-3	3.45±0.04E-02	1.28±0.01E+09	4.64±0.05E-11	1.E-07	0.05
Co-60	1.11±0.78E-07	4.10±2.88E+03	1.49±1.05E-16	8E-11	<0.01
Sr-90	7.05±0.21E-06	2.61±0.08E+05	9.50±0.28E-15	9E-12	0.11
I-129	4.97±0.31E-03	1.84±0.12E+08	6.69±0.42E-12	7E-11	9.56
Cs-137	2.47±0.21E-05	9.14±0.76E+05	3.33±0.28E-14	4E-10	0.01
Eu-154	1.28±2.08E-07	4.75±7.70E+03	1.73±2.80E-16	5E-11	<0.01
U-232[f]	2.68±0.95E-08	9.91±3.50E+02	3.61±1.28E-17	2E-14	0.18
U-233/234[f]	8.07±1.11E-08	2.99±0.41E+03	1.09±0.15E-16	9E-14	0.12
U-235/236[f]	5.69±3.39E-09	2.10±1.25E+02	7.66±4.57E-18	1E-13	0.01
U-238[f]	6.25±1.00E-08	2.31±0.37E+03	8.43±1.35E-17	1E-13	0.08
Pu-238	9.00±1.33E-08	3.33±0.49E+03	1.21±0.18E-16	3E-14	0.40
Pu-239/240	1.32±0.17E-07	4.87±0.63E+03	1.77±0.23E-16	2E-14	0.89
Am-241	3.07±0.36E-07	1.14±0.13E+04	4.14±0.48E-16	2E-14	2.07
Total % of DCGs					**13.50**

[a] *Half-lives are listed in Table K-1 (p. K-3).*
[b] *Total volume released at 50,000 cfm = 7.42E+14 mL/yr.*
[c] *1 Ci = 3.7E+10 Becquerels (Bq): 1 Bq = 2.7E-11 Ci.*
[d] *Derived concentration guides (DCGs) are listed for reference only. They are applicable to average concentrations at the site boundary but not to stack concentrations, as might be inferred from their inclusion in this table.*
[e] *DCGs are not specified for gross alpha and gross beta activity. (NA = Not applicable.)*
[f] *Total uranium = 2.17±0.02E-01 g; average = 2.92±0.03E-10 µg/mL.*

Table D - 3

1998 Airborne Radioactive Effluent Totals (curies) from the Vitrification System (HVAC) Ventilation Stack (ANVITSK)

Month	Alpha	Beta
January	-4.07±7.87E-09	-0.34±2.44E-08
February	0.10±9.70E-09	-0.43±2.63E-08
March	0.56±7.86E-09	-1.91±1.98E-08
April	8.94±7.83E-09	0.01±1.91E-08
May	-7.00±8.56E-09	0.08±2.12E-08
June	2.03±6.97E-09	-0.67±1.96E-08
July	-4.40±9.22E-09	-0.34±2.09E-08
August	-1.15±7.85E-09	0.15±1.86E-08
September	-4.73±7.36E-09	-0.21±1.84E-08
October	5.36±7.99E-09	1.38±2.20E-08
November	0.47±8.98E-09	-0.45±2.11E-08
December	-1.57±8.96E-09	0.78±1.84E-08
Annual Total	-0.54±2.87E-08	-1.95±7.25E-08

Quarter	Co-60	Sr-90	I-129	Cs-137	Eu-154
1st Quarter	0.20±1.53E-08	0.06±1.26E-08	2.49±2.54E-07	1.11±1.72E-08	1.23±4.39E-08
2nd Quarter	-0.08±1.48E-08	1.21±1.36E-08	6.99±9.02E-08	2.00±0.37E-07	0.26±4.09E-08
3rd Quarter	-0.65±1.59E-08	3.86±7.20E-09	8.91±5.09E-08	0.19±3.44E-08	4.07±3.68E-08
4th Quarter	1.05±1.55E-08	0.93±1.69E-08	7.72±5.57E-08	-0.22±1.62E-08	-1.66±4.87E-08
Annual Total	0.51±3.07E-08	2.59±2.60E-08	4.85±2.80E-07	2.11±0.56E-07	3.91±8.56E-08

	U-232	U-233/234	U-235/236	U-238	Total U (g)
1st Quarter	0.17±1.43E-09	1.00±0.29E-08	-0.18±1.18E-09	8.19±2.50E-09	2.32±0.05E-02
2nd Quarter	9.35±9.95E-10	8.88±2.50E-09	1.80±1.11E-09	7.45±2.29E-09	2.12±0.04E-02
3rd Quarter	1.14±9.94E-10	5.00±2.04E-09	2.88±5.67E-10	6.26±2.18E-09	2.05±0.06E-02
4th Quarter	1.21±1.11E-09	9.06±2.18E-09	1.12±8.80E-10	7.79±2.06E-09	2.75±0.03E-02
Annual Total	2.44±2.29E-09	3.30±0.48E-08	2.02±1.93E-09	2.97±0.45E-08	9.24±0.09E-02

	Pu-238	Pu-239/240	Am-241
1st Quarter	4.26±5.68E-10	-1.70±2.43E-10	1.59±1.14E-09
2nd Quarter	-0.49±1.18E-09	0.58±1.12E-09	2.78±1.55E-09
3rd Quarter	3.13±6.31E-10	2.09±4.19E-10	4.95±7.07E-10
4th Quarter	1.24±0.70E-09	1.01±0.76E-09	-0.89±1.78E-10
Annual Total	1.49±1.61E-09	1.63±1.44E-09	4.78±2.05E-09

Table D - 4

1998 Airborne Radioactive Effluent Totals (curies) from the Seismic Sampler (ANSEISK) for the Vitrification System (HVAC) Ventilation Stack

Month	Alpha	Beta
January	1.09±7.64E-09	0.08±2.22E-08
February	-4.03±7.11E-09	-0.49±2.04E-08
March	5.21±7.77E-09	-1.53±1.80E-08
April	0.72±5.68E-09	0.80±1.73E-08
May	-4.28±7.80E-09	0.61±1.90E-08
June	6.19±7.79E-09	-0.30±2.02E-08
July	-6.07±9.38E-09	2.64±2.28E-08
August	-1.36±8.02E-09	1.20±1.95E-08
September	-3.73±8.16E-09	0.90±2.04E-08
October	5.25±7.99E-09	0.18±2.14E-08
November	4.64±9.08E-09	-0.13±2.01E-08
December	-5.27±7.72E-09	2.45±1.80E-08
Annual Totals	-0.17±2.73E-08	6.40±6.93E-08

ANSEISK provides back-up samples for the primary vitrification sampler (ANVITSK).

Table D - 5

1998 Airborne Radioactive Effluent Totals (curies) from the O1-14 Building Ventilation Exhaust (ANCSSTK)

Month	Alpha	Beta
January	-1.82±3.21E-09	-0.93±1.01E-08
February	-3.15±2.85E-09	-1.53±8.83E-09
March	-3.35±2.46E-09	-9.12±7.53E-09
April	2.07±2.65E-09	2.89±7.11E-09
May	-0.21±3.79E-09	4.69±8.78E-09
June	2.19±3.01E-09	4.57±8.26E-09
July	-3.63±3.51E-09	1.19±0.90E-08
August	2.19±3.72E-09	2.24±8.04E-09
September	-0.23±3.38E-09	1.88±7.90E-09
October	0.80±3.26E-09	3.23±9.38E-09
November	-0.45±3.18E-09	-2.82±7.56E-09
December	-0.72±3.50E-09	1.54±0.79E-08
Annual Total	-0.63±1.12E-08	2.40±2.92E-08

Quarter	Co-60	Sr-90	I-129	Cs-137	Eu-154
1st Quarter	-2.08±5.91E-09	0.57±5.23E-09	2.46±1.02E-07	-2.19±6.16E-09	1.86±1.83E-08
2nd Quarter	-4.39±6.38E-09	3.22±4.97E-09	1.19±0.28E-07	1.49±6.42E-09	0.01±1.59E-08
3rd Quarter	-2.71±6.67E-09	-2.81±4.06E-09	9.29±3.24E-08	4.89±5.45E-09	-0.73±1.81E-08
4th Quarter	2.49±5.68E-09	1.58±5.53E-09	1.30±1.12E-07	0.23±5.97E-09	0.83±1.71E-08
Annual Total	-0.67±1.23E-08	2.56±9.96E-09	5.88±1.57E-07	0.44±1.20E-08	1.97±3.47E-08

	U-232	U-233/234	U-235/236	U-238	Total U (g)
1st Quarter	0.70±6.99E-10	1.92±0.72E-09	0.60±5.13E-10	1.20±0.72E-09	4.12±0.15E-03
2nd Quarter	8.58±7.17E-10	4.66±1.13E-09	7.78±4.59E-10	2.15±0.77E-09	7.36±0.19E-03
3rd Quarter	3.69±4.96E-10	2.87±0.98E-09	3.14±3.62E-10	3.30±1.04E-09	1.12±0.03E-02
4th Quarter	2.22±4.50E-10	2.97±0.67E-09	0.70±1.57E-10	3.24±0.69E-09	9.84±0.13E-03
Annual Total	1.52±1.20E-09	1.24±0.18E-08	1.22±0.79E-09	9.89±1.63E-09	3.26±0.04E-02

	Pu-238	Pu-239/240	Am-241
1st Quarter	2.42±2.51E-10	0.00±9.77E-11	3.66±3.01E-10
2nd Quarter	0.73±3.22E-10	0.80±1.59E-10	1.33±2.66E-11
3rd Quarter	0.00±2.77E-10	2.76±3.21E-10	1.61±1.62E-10
4th Quarter	1.50±1.51E-10	0.62±1.94E-10	-4.41±8.86E-12
Annual Total	4.65±5.16E-10	4.18±4.20E-10	5.35±3.43E-10

Table D - 6

1998 Airborne Radioactive Effluent Totals (curies) from the Contact Size-reduction Facility Ventilation Stack (ANCSRFK)

Month	Alpha	Beta
January	*NA*	*NA*
February	*NA*	*NA*
March	*NA*	*NA*
April	1.37±8.03E-10	-1.14±2.07E-09
May	*NA*	*NA*
June	*NA*	*NA*
July	*NA*	*NA*
August	*NA*	*NA*
September	*NA*	*NA*
October	*NA*	*NA*
November	*NA*	*NA*
December	*NA*	*NA*
Annual Total	1.37±8.03E-10	-1.14±2.07E-09

Quarter	Co-60	Sr-90	I-129	Cs-137	Eu-154
1st Quarter	*NA*	*NA*	*NA*	*NA*	*NA*
2nd Quarter	1.57±5.47E-09	-1.35±3.49E-09	4.42±3.67E-09	2.55±4.36E-09	0.00±1.25E-08
3rd Quarter	*NA*	*NA*	*NA*	*NA*	*NA*
4th Quarter	*NA*	*NA*	*NA*	*NA*	*NA*
Annual Total	1.57±5.47E-09	-1.35±3.49E-09	4.42±3.67E-09	2.55±4.36E-09	0.00±1.25E-08

	U-232	U-233/234	U-235/236	U-238	Total U (g)
1st Quarter	*NA*	*NA*	*NA*	*NA*	*NA*
2nd Quarter	0.55±4.86E-10	7.72±3.47E-10	2.04±1.78E-10	2.84±2.32E-10	3.69±0.08E-04
3rd Quarter	*NA*	*NA*	*NA*	*NA*	*NA*
4th Quarter	*NA*	*NA*	*NA*	*NA*	*NA*
Annual Total	0.55±4.86E-10	7.71±3.63E-10	2.04±1.83E-10	2.85±2.38E-10	3.69±0.08E-04

	Pu-238	Pu-239/240	Am-241
1st Quarter	*NA*	*NA*	*NA*
2nd Quarter	-3.41±6.81E-11	0.40±2.36E-10	1.89±3.85E-11
3rd Quarter	*NA*	*NA*	*NA*
4th Quarter	*NA*	*NA*	*NA*
Annual Total	-3.41±6.81E-11	0.40±2.36E-10	1.89±3.85E-11

NA - Not applicable. Ventilation was off.

Table D - 7

1998 Airborne Radioactive Effluent Totals (curies) from the Supernatant Treatment System Ventilation Stack (ANSTSTK)

Month	Alpha	Beta	H-3
January	0.10±1.76E-09	1.87±0.58E-08	4.49±0.52E-06
February	0.52±1.83E-09	8.58±5.04E-09	4.61±0.64E-06
March	-0.13±1.57E-09	4.98±4.52E-09	1.77±0.06E-05
April	-0.12±1.51E-09	5.78±0.66E-08	1.14±0.30E-06
May	0.10±1.96E-09	6.76±4.68E-09	3.17±1.25E-07
June	1.52±1.62E-09	3.65±0.56E-08	8.03±2.60E-07
July	-1.22±1.86E-09	1.64±0.09E-07	1.25±0.32E-06
August	-0.25±1.69E-09	4.39±0.58E-08	2.58±0.35E-06
September	-0.22±1.70E-09	3.73±0.55E-08	1.43±0.34E-06
October	0.25±1.54E-09	9.64±4.83E-09	3.93±0.12E-05
November	1.86±1.96E-09	0.04±4.08E-09	4.83±0.43E-06
December	-1.52±1.62E-09	1.22±0.42E-08	1.22±0.05E-05
Annual Total	0.90±5.98E-09	4.00±0.19E-07	9.06±0.19E-05

Quarter	Co-60	Sr-90	I-129	Cs-137	Eu-154
1st Quarter	3.73±8.21E-09	1.06±2.69E-09	1.76±0.22E-06	6.13±6.51E-09	2.06±8.92E-09
2nd Quarter	0.72±3.63E-09	2.96±2.90E-09	7.42±0.90E-07	7.00±1.06E-08	-0.74±1.09E-08
3rd Quarter	1.81±3.36E-09	8.46±3.26E-09	4.49±0.80E-07	1.58±0.18E-07	0.94±1.01E-08
4th Quarter	-0.18±3.33E-09	-1.58±2.67E-09	8.37±1.10E-07	1.47±3.93E-09	2.38±9.28E-09
Annual Total	0.61±1.01E-08	1.09±0.58E-08	3.79±0.27E-06	2.36±0.22E-07	0.65±1.96E-08

	U-232	U-233/234	U-235/236	U-238	Total U (g)
1st Quarter	-0.37±3.07E-10	1.37±0.44E-09	2.35±1.97E-10	1.37±0.44E-09	5.07±0.10E-03
2nd Quarter	3.06±3.14E-10	2.90±0.63E-09	2.98±2.08E-10	1.64±0.47E-09	5.65±0.09E-03
3rd Quarter	2.44±2.66E-10	2.13±0.62E-09	1.12±1.92E-10	3.58±0.79E-09	1.06±0.03E-02
4th Quarter	4.37±3.63E-10	1.32±0.32E-09	9.93±8.67E-11	1.68±0.36E-09	5.43±0.06E-03
Annual Total	9.49±6.29E-10	7.73±1.04E-09	7.44±3.55E-10	8.27±1.08E-09	2.68±0.03E-02

	Pu-238	Pu-239/240	Am-241
1st Quarter	1.01±1.35E-10	-4.05±5.75E-11	3.80±3.40E-10
2nd Quarter	3.22±3.81E-10	4.33±4.05E-10	2.24±6.07E-11
3rd Quarter	1.38±1.60E-10	0.23±1.03E-10	0.70±1.00E-10
4th Quarter	1.19±0.98E-10	1.98±3.98E-11	3.04±6.64E-11
Annual Total	6.79±4.46E-10	4.35±4.23E-10	5.03±3.65E-10

Table D - 8

1998 Airborne Radioactive Effluent Totals (curies) from the Container Sorting and Packaging Facility (ANCSPFK)

Month	Alpha	Beta
January	-0.83±3.74E-10	0.45±1.15E-09
February	-3.21±3.43E-10	-1.14±1.00E-09
March	-0.55±3.32E-10	-8.45±8.86E-10
April	-0.59±2.76E-10	1.02±0.92E-09
May	-2.94±3.49E-10	4.93±8.61E-10
June	-0.03±2.71E-10	-2.24±7.51E-10
July	-1.89±4.21E-10	9.29±9.95E-10
August	-1.35±3.68E-10	0.92±9.02E-10
September	1.26±4.01E-10	1.09±8.83E-10
October	6.85±4.34E-10	-0.92±9.94E-10
November	0.73±4.08E-10	1.44±9.60E-10
December	0.33±3.01E-10	5.52±6.35E-10
Annual Total	-0.22±1.25E-09	1.49±3.19E-09

Quarter	Co-60	Sr-90	I-129	Cs-137	Eu-154
1st Quarter	-6.52±9.99E-10	-3.10±5.93E-10	2.79±0.81E-08	-0.65±8.33E-10	2.09±6.25E-09
2nd Quarter	0.62±6.93E-10	-1.04±5.79E-10	4.71±2.27E-09	5.68±6.87E-10	-0.29±2.13E-09
3rd Quarter	-0.01±1.05E-09	1.44±3.04E-10	0.00±2.02E-09	0.25±1.13E-09	-2.05±3.05E-09
4th Quarter	1.64±7.21E-10	-0.50±3.61E-10	6.07±3.54E-09	-1.80±6.87E-10	-0.43±2.55E-09
Annual Total	-0.43±1.76E-09	-3.20±9.54E-10	3.87±0.94E-08	0.57±1.71E-09	-0.68±7.71E-09

	U-232	U-233/234	U-235/236	U-238	Total U (g)
1st Quarter	-0.84±6.94E-11	2.80±0.91E-10	1.47±2.04E-11	2.43±0.83E-10	7.05±0.15E-04
2nd Quarter	1.14±4.85E-11	3.06±1.03E-10	2.70±3.75E-11	2.62±0.95E-10	9.68±0.15E-04
3rd Quarter	-0.96±4.68E-11	4.23±1.26E-10	1.36±4.14E-11	2.76±1.01E-10	1.05±0.03E-03
4th Quarter	4.11±4.86E-11	3.04±0.75E-10	3.41±2.36E-11	2.84±0.69E-10	9.92±0.12E-04
Annual Total	0.35±1.08E-10	1.31±0.20E-09	8.95±6.40E-11	1.06±0.18E-09	3.71±0.04E-03

	Pu-238	Pu-239/240	Am-241
1st Quarter	4.18±3.17E-11	-0.38±1.32E-11	1.90±2.85E-11
2nd Quarter	1.36±0.65E-10	2.71±0.99E-10	3.61±4.29E-11
3rd Quarter	0.00±3.00E-11	2.00±2.84E-11	2.35±5.33E-11
4th Quarter	3.01±2.31E-11	-0.57±1.65E-11	3.14±3.18E-11
Annual Total	2.08±0.81E-10	2.81±1.05E-10	1.10±0.81E-10

Table D - 9

1998 Airborne Radioactive Effluent Totals (curies) from the Former Low-level Waste Treatment Facility Hot Side Ventilation (ANLLWTVH)

Month	Alpha	Beta
January	-0.40±1.05E-09	5.38±3.49E-09
February	0.07±1.11E-09	4.39±3.13E-09
March	0.99±1.14E-09	0.98±2.71E-09
April	1.01±1.00E-09	4.44±2.73E-09
May	-0.48±1.19E-09	6.13±3.07E-09
June	0.90±1.03E-09	3.79±2.83E-09
July	-0.56±1.26E-09	8.85±3.22E-09
August	-0.16±1.12E-09	1.01±0.31E-08
September	-1.09±0.98E-09	8.41±3.02E-09
October	-1.79±9.40E-10	7.18±3.17E-09
November	-3.29±7.88E-10	2.60±1.97E-09
December	3.31±7.18E-10	1.28±1.80E-09
Annual Total	0.12±3.59E-09	6.35±1.00E-08

Table D - 10

1998 Airborne Radioactive Effluent Totals (curies) from the New Low-level Waste Treatment Facility Ventilation (ANLLW2V)

Month	Alpha	Beta
January	*NA*	*NA*
February	*NA*	*NA*
March	*NA*	*NA*
April	0.54±1.66E-10	-2.01±4.09E-10
May	-0.27±1.38E-10	-2.22±3.99E-10
June	-0.27±1.58E-10	-0.68±4.39E-10
July	0.00±1.79E-10	-1.02±3.89E-10
August	*NA*	*NA*
September	0.29±1.88E-10	2.01±4.27E-10
October	*NA*	*NA*
November	*NA*	*NA*
December	0.00±1.35E-10	0.00±3.70E-10
Annual Total	0.29±3.97E-10	-3.92±9.95E-10

NA = Not applicable. Ventilation was not operating. This ventilation point came on-line in April 1998.

Table D - 11

1998 Airborne Radioactive Effluent Totals (curies) from the Laundry Change Room (ANLAUNV)

Month	Alpha	Beta
January	-0.99±5.14E-10	1.77±1.84E-09
February	1.23±7.98E-10	1.64±2.11E-09
March	-3.06±4.47E-10	0.47±1.72E-09
April	1.66±5.14E-10	-0.42±1.29E-09
May	1.64±5.08E-10	0.55±1.35E-09
June	0.72±4.68E-10	0.96±1.28E-09
July	-4.20±9.09E-10	0.12±2.30E-09
August	0.00±3.99E-10	-0.11±1.10E-09
September	-1.69±4.68E-10	1.50±1.34E-09
October	4.31±4.87E-10	0.35±1.27E-09
November	-2.65±5.20E-10	1.45±1.47E-09
December	0.00±4.68E-10	1.24±1.40E-09
Annual Total	-0.30±1.95E-09	9.56±5.48E-09

Table D - 12

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Lag Storage Area Air Sampler (ANLAGAM)

Month	Alpha	Beta
January	3.44±6.17E-16	1.19±0.23E-14
February	5.91±7.21E-16	1.70±0.26E-14
March	8.75±7.45E-16	1.29±0.23E-14
April	8.56±6.76E-16	1.64±0.24E-14
May	4.16±6.92E-16	1.59±0.24E-14
June	6.29±6.51E-16	1.24±0.23E-14
July	1.11±0.86E-15	1.79±0.26E-14
August	6.26±7.04E-16	1.95±0.26E-14
September	7.73±7.56E-16	2.28±0.27E-14
October	5.82±6.32E-16	1.76±0.25E-14
November	6.51±7.61E-16	1.79±0.26E-14
December	6.03±7.87E-16	2.32±0.28E-14

Quarter	K-40	Co-60	Sr-90	Cs-137
1st Quarter	5.09±4.13E-15	-0.58±2.20E-16	-0.54±1.25E-16	0.29±1.54E-16
2nd Quarter	2.55±2.25E-15	0.03±1.79E-16	1.16±1.36E-16	0.32±1.90E-16
3rd Quarter	3.70±4.83E-15	0.71±2.24E-16	-0.87±1.31E-16	0.45±2.26E-16
4th Quarter	0.00±2.58E-15	0.76±1.58E-16	3.47±0.90E-16	0.36±1.84E-16

	U-232	U-233/234	U-235/236	U-238	Total U (µg/mL)
1st Quarter	1.62±1.81E-17	7.32±2.61E-17	1.15±1.00E-17	7.32±2.76E-17	2.59±0.05E-10
2nd Quarter	1.74±1.94E-17	7.51±2.39E-17	9.77±8.54E-18	9.36±2.65E-17	2.51±0.05E-10
3rd Quarter	-0.11±1.03E-17	9.16±2.92E-17	-1.19±9.47E-18	6.95±2.51E-17	2.59±0.07E-10
4th Quarter	1.74±1.60E-17	7.30±1.74E-17	4.89±5.31E-18	8.12±1.78E-17	2.51±0.03E-10

	Pu-238	Pu-239/240	Am-241
1st Quarter	1.35±0.77E-17	-1.04±3.60E-18	9.68±8.73E-18
2nd Quarter	-1.39±2.79E-18	0.74±1.28E-17	-2.38±0.37E-18
3rd Quarter	-0.02±5.49E-18	5.57±8.08E-18	-0.82±5.64E-18
4th Quarter	6.56±6.80E-18	3.48±3.51E-18	8.48±7.55E-18

Table D - 13

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the NDA Air Sampler (ANNDAAM)

Month	Alpha	Beta
January	4.80±6.55E-16	1.60±0.25E-14
February	5.22±6.70E-16	1.59±0.24E-14
March	7.08±6.78E-16	1.26±0.22E-14
April	9.47±6.64E-16	1.57±0.23E-14
May	2.76±6.26E-16	1.52±0.23E-14
June	5.90±6.11E-16	1.30±0.22E-14
July	1.30±0.85E-15	1.61±0.24E-14
August	6.17±6.93E-16	1.84±0.25E-14
September	6.61±7.15E-16	2.08±0.26E-14
October	5.49±6.23E-16	1.64±0.25E-14
November	9.61±8.16E-16	1.84±0.26E-14
December	3.35±7.17E-16	2.19±0.27E-14

Quarter	K-40	Co-60	Sr-90	Cs-137
1st Quarter	1.26±3.96E-15	-0.32±1.60E-16	-0.89±1.16E-16	2.24±4.30E-16
2nd Quarter	2.71±4.23E-15	0.48±1.52E-16	0.28±1.28E-16	-0.17±1.50E-16
3rd Quarter	6.05±2.77E-15	-0.66±2.70E-16	-0.13±1.07E-16	0.96±4.92E-16
4th Quarter	3.07±3.52E-15	1.48±1.66E-16	0.88±7.39E-17	0.00±3.16E-16

	U-232	U-233/234	U-235/236	U-238	Total U (µg/mL)
1st Quarter	-0.65±2.86E-17	7.69±2.38E-17	5.26±5.93E-18	7.34±2.27E-17	2.17±0.05E-10
2nd Quarter	1.01±1.67E-17	1.09±0.28E-16	1.63±1.07E-17	6.43±2.14E-17	2.24±0.04E-10
3rd Quarter	-0.05±8.61E-18	8.68±2.70E-17	1.06±4.71E-18	7.40±2.49E-17	2.38±0.06E-10
4th Quarter	2.12±1.53E-17	7.15±1.67E-17	8.82±7.28E-18	7.83±1.80E-17	2.42±0.03E-10

	Pu-238	Pu-239/240	Am-241
1st Quarter	4.81±5.11E-18	0.00±2.72E-18	7.89±8.59E-18
2nd Quarter	-1.29±2.58E-18	2.80±8.58E-18	1.30±1.02E-17
3rd Quarter	-1.06±2.12E-18	1.04±4.69E-18	-0.02±5.63E-16
4th Quarter	5.00±4.52E-18	7.99±5.73E-18	4.88±2.02E-17

Table D - 14

1998 Airborne Radioactivity Concentrations (µCi/mL) at the SDA Trench 9 Air Sampler (ANSDAT9)

Month	Alpha	Beta	H-3
January	-0.33±1.82E-15	1.46±0.68E-14	4.35±5.95E-13
February	1.95±9.11E-16	1.64±0.34E-14	1.48±0.22E-12
March	0.67±1.08E-15	1.18±0.34E-14	1.56±0.26E-12
April	3.71±8.66E-16	1.51±0.34E-14	6.24±3.84E-13
May	0.04±1.03E-15	1.36±0.34E-14	1.71±0.62E-12
June	5.65±8.67E-16	1.23±0.30E-14	8.97±6.96E-13
July	1.31±1.66E-15	1.72±0.44E-14	1.14±0.85E-12
August	0.98±1.10E-15	1.90±0.34E-14	1.07±0.83E-12
September	1.20±1.16E-15	2.00±0.34E-14	1.04±0.68E-12
October	3.64±8.05E-16	1.56±0.32E-14	8.22±5.68E-13
November	0.57±1.02E-15	2.10±0.35E-14	1.20±0.37E-12
December	0.48±1.04E-15	2.28±0.35E-14	7.27±4.29E-13

Quarter	K-40	Co-60	I-129	Cs-137
1st Quarter	7.95±7.23E-15	0.42±5.10E-16	2.31±3.15E-16	0.96±2.73E-16
2nd Quarter	4.43±6.16E-15	-0.47±2.92E-16	0.93±1.87E-16	-1.31±3.02E-16
3rd Quarter	4.25±6.26E-15	0.15±2.97E-16	1.12±2.10E-16	1.09±2.64E-16
4th Quarter	5.33±3.35E-15	-0.55±2.29E-16	1.24±3.03E-16	0.36±2.54E-16

Table D - 15

1998 Airborne Radioactive Effluent Totals (curies) from Outdoor Ventilation Enclosures/Portable Ventilation Units

Month	Alpha	Beta
January	-0.27±1.39E-10	2.29±4.77E-10
February	0.00±1.22E-10	3.76±4.07E-10
March	-1.14±1.95E-10	-0.38±7.31E-10
April	-0.26±1.45E-10	7.99±4.51E-10
May	0.86±2.18E-10	-2.22±4.35E-10
June	0.79±2.19E-10	1.79±5.44E-10
July	-0.23±4.40E-10	-1.22±9.56E-10
August	*NA*	*NA*
September	*NA*	*NA*
October	5.31±9.18E-11	-0.55±2.95E-10
November	*NA*	*NA*
December	0.97±1.10E-10	-2.63±2.52E-10
Annual Total	1.26±6.34E-10	0.88±1.64E-09

Quarter	Co-60	Sr-90	Cs-137	Eu-154
1st Quarter	-5.26±7.83E-10	3.81±9.22E-10	0.68±1.30E-09	1.78±1.54E-09
2nd Quarter	-0.19±2.57E-10	-1.50±2.22E-10	1.49±2.86E-10	-4.16±7.61E-10
3rd Quarter	0.61±1.07E-09	5.68±5.92E-10	0.34±3.00E-09	2.66±5.53E-09
4th Quarter	1.33±5.20E-10	-0.16±2.15E-10	0.80±1.17E-09	0.84±1.55E-09
Annual Total	0.19±1.45E-09	0.78±1.14E-09	1.96±3.49E-09	4.86±5.99E-09

	U-232	U-233/234	U-235/236	U-238
1st Quarter	0.82±6.80E-11	6.49±5.92E-11	1.62±3.17E-11	1.05±0.61E-10
2nd Quarter	3.62±1.83E-11	1.36±0.42E-10	3.85±2.18E-11	6.87±3.07E-11
3rd Quarter	5.14±8.47E-11	1.41±1.13E-10	3.15±4.35E-11	1.88±1.13E-10
4th Quarter	0.29±2.98E-11	4.07±2.43E-11	0.23±1.01E-11	4.65±2.55E-11
Annual Total	0.99±1.14E-10	3.83±1.36E-10	8.85±5.90E-11	4.09±1.34E-10

	Total U (g)	Pu-238	Pu-239/240	Am-241
1st Quarter	2.34±0.05E-04	0.41±2.14E-11	0.81±1.15E-11	4.27±3.78E-11
2nd Quarter	1.95±0.04E-04	1.32±1.58E-11	0.83±1.21E-11	2.55±2.00E-11
3rd Quarter	8.35±0.22E-04	1.14±2.27E-11	2.27±3.22E-11	0.91±3.93E-11
4th Quarter	1.33±0.02E-04	1.08±1.09E-11	0.77±1.26E-11	2.47±3.52E-12
Annual Total	1.40±0.02E-03	3.95±3.67E-11	4.67±3.84E-11	7.97±5.82E-11

NA = Not applicable: no OVEs/PVUs were operated during this month.

Table D - 16

1998 Airborne Radioactivity Concentrations (µCi/mL) at the Rock Springs Road Air Sampler (AFRSPRD)

Month	Alpha	Beta	H-3
January	1.24±7.88E-16	1.43±0.32E-14	-2.14±2.81E-13
February	0.65±1.01E-15	1.56±0.33E-14	3.98±2.60E-13
March	6.98±9.64E-16	1.12±0.29E-14	-0.21±3.21E-13
April	7.75±8.74E-16	1.66±0.32E-14	0.25±3.98E-13
May	0.51±1.06E-15	1.46±0.32E-14	-0.39±5.36E-13
June	1.12±1.01E-15	1.28±0.30E-14	2.09±8.08E-13
July	1.15±1.16E-15	1.73±0.32E-14	2.77±9.77E-13
August	0.58±1.00E-15	1.91±0.34E-14	8.36±8.53E-13
September	0.85±1.08E-15	2.24±0.36E-14	-1.03±9.81E-13
October	6.49±8.74E-16	1.71±0.32E-14	-2.80±6.34E-13
November	0.53±1.00E-15	1.74±0.33E-14	0.77±4.18E-13
December	0.71±1.10E-15	2.08±0.34E-14	-1.83±4.65E-13

Quarter	K-40	Co-60	Sr-90	I-129	Cs-137
1st Quarter	3.61±5.62E-15	0.84±2.64E-16	0.33±2.06E-16	2.91±3.37E-16	1.16±2.49E-16
2nd Quarter	6.53±3.90E-15	-1.93±3.18E-16	-0.55±2.13E-16	0.25±1.73E-16	0.73±3.10E-16
3rd Quarter	1.76±5.28E-15	1.40±2.83E-16	-2.45±1.54E-16	1.05±1.06E-16	-0.38±2.47E-16
4th Quarter	5.35±3.40E-15	-1.99±2.22E-16	-1.05±2.22E-16	0.27±1.20E-16	-1.48±2.46E-16

	U-232	U-233/234	U-235/236	U-238	Total U (µg/mL)
1st Quarter	0.55±2.45E-17	1.33±0.38E-16	0.80±1.16E-17	7.98±3.30E-17	3.11±0.06E-10
2nd Quarter	-3.68±3.86E-17	1.80±0.45E-16	2.44±1.71E-17	1.16±0.36E-16	3.57±0.06E-10
3rd Quarter	0.63±2.01E-17	1.69±0.50E-16	1.81±1.58E-17	1.32±0.44E-16	3.92±0.11E-10
4th Quarter	2.31±2.62E-17	9.09±2.41E-17	0.93±1.06E-17	1.16±0.27E-16	3.97±0.05E-10

	Pu-238	Pu-239/240	Am-241
1st Quarter	0.90±1.13E-17	0.00±4.51E-18	4.32±2.36E-17
2nd Quarter	-0.23±1.39E-17	0.17±1.27E-17	5.66±8.32E-18
3rd Quarter	5.07±7.19E-18	7.57±8.82E-18	2.20±2.31E-17
4th Quarter	7.56±6.82E-18	1.93±1.21E-17	2.00±1.44E-17

Table D - 17

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Dutch Hill Air Sampler (AFBOEHN)

Month	Alpha	Beta	Sr-90	Cs-137
January	3.62±8.62E-16	1.66±0.34E-14		
February	3.43±9.45E-16	2.15±0.37E-14		
March	0.56±1.27E-15	1.30±0.38E-14		
1st Qtr			3.78±2.44E-16	3.64±6.68E-16
April	1.08±1.03E-15	2.04±0.36E-14		
May	0.42±1.02E-15	1.86±0.34E-14		
June	1.38±1.13E-15	1.63±0.34E-14		
2nd Qtr			-0.71±1.15E-16	0.82±2.34E-16
July	0.73±1.16E-15	2.14±0.37E-14		
August	1.03±1.18E-15	2.30±0.38E-14		
September	1.34±1.26E-15	2.71±0.40E-14		
3rd Qtr			-3.79±2.25E-16	0.90±2.27E-16
October	5.99±8.92E-16	2.12±0.36E-14		
November	1.01±1.09E-15	2.39±0.36E-14		
December	0.59±1.04E-15	2.71±0.37E-14		
4th Qtr			1.69±2.39E-16	1.28±2.52E-16

Table D - 18

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Fox Valley Air Sampler (AFFXVRD)

Month	Alpha	Beta	Sr-90	Cs-137
January	5.80±9.29E-16	1.72±0.34E-14		
February	4.81±9.92E-16	1.99±0.36E-14		
March	7.15±9.89E-16	1.49±0.32E-14		
1st Qtr			0.14±2.51E-16	0.45±2.41E-16
April	1.23±0.99E-15	1.70±0.32E-14		
May	-0.05±8.32E-16	1.08±0.27E-14		
June	6.80±8.66E-16	1.18±0.29E-14		
2nd Qtr			0.83±1.10E-16	2.06±1.97E-16
July	1.47±9.59E-16	1.66±0.32E-14		
August	6.09±9.72E-16	1.67±0.31E-14		
September	0.91±1.05E-15	2.06±0.33E-14		
3rd Qtr			1.18±1.82E-16	2.02±2.19E-16
October	5.72±8.37E-16	1.69±0.32E-14		
November	0.77±1.04E-15	2.23±0.36E-14		
December	0.70±1.08E-15	2.52±0.36E-14		
4th Qtr			-0.33±2.19E-16	-2.66±2.36E-16

Table D - 19

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Bulk Storage Warehouse Air Sampler (AFBLKST)

Month	Alpha	Beta	Sr-90	Cs-137
January	3.71±8.72E-16	1.26±0.31E-14		
February	0.54±1.00E-15	1.44±0.33E-14		
March	4.86±9.24E-16	1.09±0.29E-14		
1st Qtr			1.04±2.08E-16	-0.44±2.29E-16
April	8.03±8.97E-16	1.41±0.31E-14		
May	3.14±9.16E-16	1.43±0.30E-14		
June	2.76±7.45E-16	1.21±0.29E-14		
2nd Qtr			-6.46±8.52E-17	0.21±2.01E-16
July	1.27±1.38E-15	1.63±0.36E-14		
August	5.21±9.49E-16	1.89±0.33E-14		
September	5.36±9.59E-16	1.91±0.33E-14		
3rd Qtr			-1.43±2.32E-16	-3.55±2.46E-16
October	6.31±8.62E-16	1.62±0.32E-14		
November	0.68±1.16E-15	1.89±0.38E-14		
December	0.35±9.21E-16	2.20±0.34E-14		
4th Qtr			-0.56±2.32E-16	1.81±2.98E-16

Table D - 20

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Route 240 Air Sampler (AFRT240)

Month	Alpha	Beta	Sr-90	Cs-137
January	1.96±8.24E-16	1.34±0.32E-14		
February	1.62±9.08E-16	1.68±0.34E-14		
March	0.89±1.23E-15	1.17±0.35E-14		
1st Qtr			0.61±2.03E-16	0.21±2.34E-16
April	7.57±9.65E-16	1.64±0.34E-14		
May	1.01±1.45E-15	1.65±0.40E-14		
June	1.20±1.16E-15	1.23±0.34E-14		
2nd Qtr			-0.71±1.18E-16	8.20±2.68E-16
July	0.73±1.16E-15	1.75±0.35E-14		
August	1.06±1.11E-15	2.25±0.36E-14		
September	1.32±1.18E-15	2.38±0.36E-14		
3rd Qtr			2.10±2.02E-16	2.10±6.20E-16
October	7.62±9.22E-16	2.02±0.35E-14		
November	0.57±1.02E-15	2.14±0.36E-14		
December	1.17±1.20E-15	2.76±0.38E-14		
4th Qtr			-2.04±1.81E-16	-0.30±2.23E-16

Table D - 21

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Thomas Corners Road Air Sampler (AFTCORD)

Month	Alpha	Beta	Sr-90	Cs-137
January	2.34±8.83E-16	1.37±0.34E-14		
February	0.41±1.03E-15	1.61±0.35E-14		
March	4.84±9.78E-16	1.23±0.32E-14		
1st Qtr			0.57±1.72E-16	-1.59±3.85E-16
April	1.18±1.02E-15	1.71±0.33E-14		
May	4.92±9.89E-16	1.45±0.30E-14		
June	4.09±8.06E-16	1.38±0.31E-14		
2nd Qtr			-0.83±1.01E-16	-0.13±2.47E-16
July	1.28±1.18E-15	1.72±0.32E-14		
August	3.55±9.43E-16	2.11±0.35E-14		
September	1.06±1.11E-15	2.20±0.35E-14		
3rd Qtr			2.17±1.82E-16	1.54±2.58E-16
October	8.60±9.17E-16	1.70±0.32E-14		
November	6.60±9.97E-16	1.82±0.33E-14		
December	0.39±8.96E-16	2.29±0.34E-14		
4th Qtr			-0.36±1.11E-16	1.29±5.73E-16

Table D - 22

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the West Valley Air Sampler (AFWEVAL)

Month	Alpha	Beta	Sr-90	Cs-137
January	2.70±8.43E-16	1.47±0.33E-14		
February	0.64±1.03E-15	1.89±0.35E-14		
March	4.20±9.06E-16	1.38±0.31E-14		
1st Qtr			0.27±2.04E-16	1.77±2.86E-16
April	9.42±9.30E-16	1.89±0.34E-14		
May	0.60±1.02E-15	1.77±0.33E-14		
June	1.13±1.01E-15	1.48±0.32E-14		
2nd Qtr			0.10±2.08E-16	1.79±2.33E-16
July	1.05±1.14E-15	1.98±0.34E-14		
August	0.88±1.07E-15	2.42±0.37E-14		
September	0.97±1.10E-15	2.48±0.37E-14		
3rd Qtr			0.57±1.73E-16	-3.19±5.18E-16
October	7.39±9.99E-16	1.96±0.37E-14		
November	1.00±1.10E-15	2.10±0.35E-14		
December	0.39±1.01E-15	2.42±0.36E-14		
4th Qtr			0.58±2.04E-16	-0.82±2.49E-16

Table D - 23

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Springville Air Sampler (AFSPRVL)

Month	Alpha	Beta	Sr-90	Cs-137
January	2.43±8.32E-16	1.31±0.32E-14		
February	0.57±1.00E-15	1.43±0.33E-14		
March	3.22±8.75E-16	1.18±0.30E-14		
1st Qtr			1.75±2.49E-16	-0.89±3.12E-16
April	1.09±0.96E-15	1.57±0.31E-14		
May	-0.08±8.64E-16	1.39±0.30E-14		
June	5.13±8.14E-16	1.24±0.29E-14		
2nd Qtr			0.18±1.10E-16	2.83±5.22E-16
July	0.65±1.00E-15	1.63±0.30E-14		
August	1.27±1.11E-15	1.73±0.32E-14		
September	7.15±9.93E-16	2.12±0.33E-14		
3rd Qtr			1.21±2.14E-16	-0.36±3.57E-16
October	5.70±9.15E-16	1.83±0.35E-14		
November	0.80±1.08E-15	1.79±0.34E-14		
December	0.57±1.09E-15	2.09±0.34E-14		
4th Qtr			0.40±1.71E-16	0.00±4.54E-16

Table D - 24

1998 Airborne Radioactivity Concentrations (µCi/mL) at the Great Valley Background Air Sampler (AFGRVAL)

Month	Alpha	Beta	H-3
January	1.14±7.96E-16	1.36±0.32E-14	-3.04±3.54E-13
February	5.03±9.88E-16	1.61±0.34E-14	3.12±2.76E-13
March	1.10±1.07E-15	1.17±0.30E-14	1.81±3.24E-13
April	1.24±1.00E-15	1.69±0.32E-14	1.57±4.86E-13
May	0.87±1.08E-15	1.58±0.31E-14	1.12±5.94E-13
June	9.24±9.58E-16	1.48±0.32E-14	1.44±7.73E-13
July	0.56±1.04E-15	1.79±0.33E-14	0.94±1.04E-12
August	0.97±1.09E-15	1.86±0.33E-14	-1.84±9.37E-13
September	1.12±1.13E-15	2.20±0.35E-14	-0.88±9.40E-13
October	6.29±8.84E-16	1.85±0.34E-14	-0.11±6.34E-13
November	0.81±1.06E-15	2.08±0.35E-14	0.75±3.68E-13
December	0.80±1.11E-15	2.34±0.35E-14	-7.48±7.32E-13

Quarter	K-40	Co-60	Sr-90	I-129	Cs-137
1st Quarter	2.93±6.77E-15	0.38±2.70E-16	0.85±1.94E-16	0.26±2.72E-16	-1.63±2.53E-16
2nd Quarter	2.53±7.25E-15	0.61±3.39E-16	-0.73±2.09E-16	1.04±1.19E-16	2.99±7.54E-16
3rd Quarter	8.09±5.46E-15	-1.18±2.63E-16	-0.16±1.14E-16	0.23±1.04E-16	2.79±3.21E-16
4th Quarter	9.31±4.94E-15	-3.32±3.35E-16	-1.82±2.62E-16	0.31±1.21E-16	3.32±2.89E-16

	U-232	U-233/234	U-235/236	U-238	Total U (µg/mL)
1st Quarter	0.54±4.95E-17	9.86±5.46E-17	0.99±2.72E-17	1.13±0.54E-16	3.37±0.07E-10
2nd Quarter	6.28±3.85E-17	2.19±0.71E-16	3.81±3.08E-17	1.40±0.56E-16	3.48±0.05E-10
3rd Quarter	3.32±4.29E-17	1.48±0.67E-16	1.49±2.06E-17	1.19±0.58E-16	3.93±0.11E-10
4th Quarter	1.90±2.13E-17	1.04±0.26E-16	4.62±5.21E-18	9.02±2.36E-17	3.74±0.04E-10

	Pu-238	Pu-239/240	Am-241
1st Quarter	0.29±1.92E-17	0.29±1.30E-17	5.06±7.17E-18
2nd Quarter	0.00±2.67E-17	0.00±1.63E-17	1.00±1.47E-17
3rd Quarter	1.17±1.67E-17	2.35±2.37E-17	1.16±1.04E-17
4th Quarter	1.22±0.87E-17	1.06±0.81E-17	-0.04±1.06E-16

Table D - 25

1998 Radioactivity Concentrations (µCi/mL) in Airborne Particulates at the Nashville Background Air Sampler (AFNASHV)

Month	Alpha	Beta	Sr-90	Cs-137
January	4.89±9.02E-16	1.60±0.33E-14		
February	0.70±1.04E-15	1.69±0.34E-14		
March	1.93±8.41E-16	1.33±0.31E-14		
1st Qtr			0.16±2.16E-16	-1.06±2.44E-16
April	1.03±0.95E-15	1.50±0.31E-14		
May	0.84±1.07E-15	1.56±0.31E-14		
June	6.06±8.65E-16	1.41±0.31E-14		
2nd Qtr			0.41±1.09E-16	1.42±2.97E-16
July	0.73±1.07E-15	1.80±0.33E-14		
August	1.05±1.10E-15	1.86±0.33E-14		
September	1.49±1.20E-15	1.99±0.34E-14		
3rd Qtr			0.96±1.47E-16	3.45±4.98E-16
October	6.92±8.89E-16	1.85±0.33E-14		
November	0.88±1.08E-15	2.16±0.36E-14		
December	0.93±1.15E-15	2.36±0.36E-14		
4th Qtr			-1.26±1.90E-16	-0.69±2.42E-16

Table D - 26

1998 Radioactivity (nCi/m²/month) and pH in Fallout Dutch Hill (AFDHFOP)

Month	Alpha	Beta	H-3 (µCi/mL)	K-40	Cs-137	pH (standard units)
January	5.48±1.53E-02	1.07±0.08E-00	-1.09±0.79E-07	0.00±2.76E+01	0.00±1.62E+00	3.77
February	7.63±4.82E-03	2.83±0.28E-01	-0.89±7.91E-08	0.00±9.46E+00	0.00±9.63E-01	5.70
March	1.89±0.75E-02	4.69±0.38E-01	-5.35±7.88E-08	0.00±1.15E+01	0.00±1.18E+00	4.15
April	1.34±0.48E-02	2.91±0.23E-01	2.06±8.10E-08	0.00±7.20E+00	0.00±5.14E-01	6.47
May	5.00±1.25E-02	4.38±0.41E-01	-6.00±8.16E-08	0.00±1.03E+01	0.00±8.68E-01	6.65
June	6.14±1.71E-02	9.09±0.72E-01	4.46±8.36E-08	0.00±2.22E+01	0.00±1.48E+00	6.48
July	2.45±1.49E-02	1.01±0.06E-00	-4.52±8.95E-08	0.00±1.24E+01	0.00±7.95E-01	7.55
August	1.75±1.10E-02	6.76±0.42E-01	-2.16±0.87E-07	0.00±1.58E+01	0.00±1.07E+00	7.06
September	3.59±0.86E-02	5.44±0.30E-01	-6.52±8.41E-08	0.00±8.13E+00	0.00±1.06E+00	6.87
October	1.76±0.72E-02	8.60±0.47E-01	4.36±8.01E-08	0.00±1.43E+01	0.00±1.42E+00	4.30
November	3.33±0.59E-02	4.87±0.25E-01	-1.02±0.78E-07	0.00±5.68E+00	0.00±4.58E-01	4.01
December	1.14±0.47E-02	3.40±0.26E-01	-1.03±0.75E-07	2.61±6.13E+00	6.81±5.26E-01	4.07

Table D - 27

1998 Radioactivity (nCi/m²/month) and pH in Fallout Rain Gauge (ANRGFOP)

Month	Alpha	Beta	H-3 (µCi/mL)	K-40	Cs-137	pH (standard units)
January	6.12±1.81E-02	1.27±0.10E-00	-9.10±5.63E-08	0.00±4.33E+01	0.00±3.63E+00	3.85
February	9.95±5.51E-03	1.16±0.20E-01	6.72±8.01E-08	0.00±9.36E+00	0.00±6.84E-01	7.51
March	1.89±1.02E-02	3.23±0.44E-01	2.54±7.98E-08	0.00±2.23E+01	0.00±1.89E+00	5.42
April	3.01±1.06E-02	1.68±0.29E-01	2.71±7.88E-08	0.00±1.60E+01	0.00±1.47E+00	7.94
May	3.32±0.74E-02	1.89±0.18E-01	1.94±7.95E-08	0.00±5.53E+00	0.00±5.38E-01	9.02
June	6.13±1.84E-02	7.81±0.84E-01	0.17±8.02E-08	0.00±2.61E+01	0.00±2.71E+00	5.00
July	8.27±1.54E-02	7.26±0.51E-01	-0.65±5.68E-08	0.00±1.58E+01	0.00±1.03E+00	4.17
August	1.83±1.05E-02	5.22±0.43E-01	-3.82±5.71E-08	0.00±1.27E+01	0.00±1.05E+00	4.28
September	2.49±0.68E-02	4.44±0.31E-01	7.23±8.20E-08	0.00±1.08E+01	0.00±5.90E-01	4.00
October	1.49±0.94E-02	3.23±0.46E-01	1.26±0.79E-07	0.00±3.41E+01	0.00±2.55E+00	4.97
November	3.98±0.78E-02	6.56±0.36E-01	-1.04±0.78E-07	0.00±1.08E+01	0.00±1.38E+00	4.40
December	2.25±0.78E-02	3.93±0.37E-01	-1.29±7.63E-08	0.15±1.13E+01	2.86±8.08E-01	4.22

Table D - 28

1998 Radioactivity (nCi/m²/month) and pH in Fallout Route 240 (AF24FOP)

Month	Alpha	Beta	H-3 (μCi/mL)	K-40	Cs-137	pH (standard units)
January	4.03±1.40E-02	8.24±0.78E-01	-6.72±7.97E-08	0.00±3.91E+01	0.00±2.77E+00	3.82
February	7.42±4.38E-03	3.03±0.26E-01	1.04±0.80E-07	0.00±7.30E+00	0.00±6.89E-01	4.73
March	1.28±0.68E-02	3.89±0.37E-01	-1.48±7.90E-08	0.00±1.80E+01	0.00±1.27E+00	4.01
April	3.00±1.03E-02	3.25±0.37E-01	3.11±7.92E-08	0.00±5.06E+00	0.00±9.24E-01	7.23
May	3.12±0.83E-02	3.21±0.24E-01	5.26±8.36E-08	0.00±4.31E+00	0.00±3.77E-01	6.86
June	6.21±1.86E-02	1.00±0.09E-00	3.11±7.89E-08	0.00±2.86E+01	0.00±2.05E+00	4.30
July	4.44±1.08E-02	6.34±0.42E-01	-6.14±8.18E-08	0.00±1.24E+01	0.00±9.94E-01	3.83
August	3.18±0.93E-02	4.27±0.35E-01	3.09±8.11E-08	0.00±1.49E+01	0.00±1.35E+00	4.11
September	1.20±0.42E-02	3.15±0.22E-01	0.97±8.13E-08	0.00±6.31E+00	0.00±7.01E-01	4.27
October	2.60±1.04E-02	2.80±0.38E-01	7.03±7.98E-08	0.00±1.62E+01	0.00±9.79E-01	4.44
November	3.16±0.63E-02	4.51±0.25E-01	-8.21±7.96E-08	0.00±6.80E+00	0.00±4.88E-01	4.20
December	9.22±4.67E-03	3.03±0.26E-01	-4.74±7.61E-08	-0.77±4.46E+00	2.20±4.26E-01	4.08

Table D - 29

1998 Radioactivity (nCi/m²/month) and pH in Fallout Thomas Corners Road (AFTCFOP)

Month	Alpha	Beta	H-3 (μCi/mL)	K-40	Cs-137	pH (standard units)
January	3.22±1.42E-02	7.93±0.83E-01	-3.00±8.03E-08	0.00±2.54E+01	0.00±2.10E+00	3.94
February	6.26±5.74E-03	1.26±0.22E-01	8.45±8.08E-08	0.00±8.86E+00	0.00±6.76E-01	7.56
March	1.74±1.08E-02	2.88±0.44E-01	0.61±7.94E-08	0.00±2.36E+01	0.00±1.32E+00	6.26
April	2.05±0.63E-02	1.51±0.20E-01	-2.31±5.66E-08	0.00±1.63E+01	0.00±1.15E+00	8.18
May	3.88±0.85E-02	2.80±0.19E-01	-0.84±8.27E-08	0.00±5.55E+00	0.00±3.67E-01	8.04
June	6.10±1.74E-02	1.08±0.09E-00	3.26±7.86E-08	0.00±4.08E+01	0.00±3.53E+00	4.30
July	5.44±1.20E-02	7.30±0.48E-01	0.84±7.96E-08	0.00±9.54E+00	0.00±6.11E-01	3.88
August	1.63±0.84E-02	4.12±0.37E-01	-6.39±7.98E-08	0.00±1.19E+01	0.00±1.28E+00	4.35
September	1.15±0.34E-02	2.07±0.15E-01	7.21±5.68E-08	0.00±5.38E+00	0.00±5.99E-01	4.55
October	-2.26±7.10E-03	2.77±0.44E-01	7.24±7.98E-08	0.00±2.39E+01	0.00±2.11E+00	4.80
November	2.55±0.64E-02	5.60±0.34E-01	-7.09±5.53E-08	0.00±1.02E+01	0.00±7.39E-01	3.93
December	1.56±0.57E-02	3.46±0.29E-01	-1.82±7.61E-08	-1.41±4.67E+00	0.43±3.67E-01	4.19

Table D - 30

1998 Radioactivity (nCi/m²/month) and pH in Fallout Fox Valley Road (AFFXFOP)

Month	Alpha	Beta	H-3 (µCi/mL)	K-40	Cs-137	pH (standard units)
January	6.31±1.84E-02	6.94±0.82E-01	-1.23±0.79E-07	0.00±3.77E+01	0.00±3.19E+00	4.20
February	4.89±3.64E-03	1.15±0.16E-01	-2.42±5.63E-08	0.00±9.55E+00	0.00±7.53E-01	7.37
March	1.04±0.85E-02	3.06±0.42E-01	1.33±8.00E-08	0.00±1.56E+01	0.00±1.24E+00	5.94
April	2.93±0.84E-02	2.11±0.28E-01	2.00±8.07E-08	0.00±1.02E+01	0.00±1.29E+00	7.75
May	2.06±0.79E-02	1.93±0.28E-01	6.12±8.09E-08	0.00±5.60E+00	0.00±4.17E-01	5.97
June	6.81±1.60E-02	9.04±0.74E-01	8.72±7.87E-08	0.00±2.36E+01	0.00±1.83E+00	4.35
July	3.13±1.10E-02	6.50±0.51E-01	3.04±8.01E-08	0.00±1.42E+01	0.00±1.32E+00	4.55
August	2.04±1.02E-02	3.79±0.42E-01	-7.62±7.99E-08	0.00±1.96E+01	0.00±1.48E+00	4.38
September	2.27±0.57E-02	2.63±0.23E-01	5.54±8.24E-08	0.00±8.28E+00	0.00±5.77E-01	5.45
October	4.34±1.54E-02	1.17±0.07E-00	-4.96±8.16E-08	0.00±1.70E+01	0.00±1.18E+00	7.15
November	4.00±0.78E-02	5.20±0.33E-01	-2.44±7.86E-08	0.00±9.98E+00	0.00±7.77E-01	4.41
December	4.19±0.89E-02	4.40±0.35E-01	-1.19±0.75E-07	2.35±5.57E+00	0.61±5.29E-01	4.31

Appendix E

Summary of Groundwater Monitoring Data

Table E-1

Groundwater Monitoring Network: Super Solid Waste Management Units

SSWMUs and Constituent SWMUs	Well ID Number [1]		Additional Analytes Measured in 1998 [2]	Well ID Number [1]		Additional Analytes Measured in 1998 [2]
SSWMU #1 - Low-Level Waste Treatment Facilities:						
	103*	(S:D)	V	110*	(T:D)	V
• Former Lagoon 1	104	(S:U)	SV, V	111*	(S:D)	S, SV, V, M33
• LLWTF Lagoons	105	(S:D)	V	114	(T:D)	*p*
• LLWTF Building	106	(S:D)	M, V	115	(T:U)	*p*
• Interceptors	107	(T:D)	V	116*	(S:U)	M, M33, S, V
• Neutralization Pit	108	(T:D)	V	8604	(S:U)	V
	109	(T:D)	*p*	8605*	(S:D)	M33, S, SV, V
SSWMU #2 - Miscellaneous Small Units:						
	201	(S:U)	M	206	(TS:D)	
• Sludge Ponds	202	(TS:U)	*p*	207	(S:D)	*p*
• Solvent Dike	203	(S:D)	M	208	(TS:D)	V
• Equalization Mixing Basin	204*	(TS:U)		8606	(S:D)	*p*
• Paper Incinerator	205	(S:D)	M			
SSWMU #3 - Liquid Waste Treatment System:						
• Liquid Waste Treatment System	301*	(S:B)	M, M33	307	(S:D)	*p*
• Cement Solidification System	302	(TS:U)				
• Main Process Bldg. (specific areas)	305	(S:D)	*p*			
SSWMU #4 - HLW Storage and Processing Area:						
• Vitrification Facility	401*	(S:B)	M, M33, R	405	(T:C)	
• Vitrification Test Tanks	402	(TS:U)		406*	(S:D)	R, V
• HLW Tanks	403	(S:U)	M, V	408*	(S:D)	M, M33, R, V
• Supernatant Treatment System	404	(TS:U)	*p*	409	(T:D)	

** Monitoring for certain parameters is required by the RCRA 3008(h) Order on Consent.*

[1] Hydrogeologic unit monitored and well position in SSWMU follow the well ID in parentheses. Hydrogeologic units monitored are: WT (weathered Lavery till); T (unweathered Lavery till); S (sand and gravel); K (Kent recessional sequence); TS (till-sand). Well position in SSWMU: U (upgradient); D (downgradient); B (background); C (crossgradient). Example: 401 (S:B) monitors background conditions in the sand and gravel unit.*

[2] See Table 3-1 (p. 3-6) for a description of codes and analytes. The parameters listed in this table, Table E-1, are in addition to the contamination indicator parameters (I) and radiological indicator parameters (RI) routinely scheduled for 1998. Wells measured for potentiometric (water-level) data only are designated by p.

Table E-1 (continued)

Groundwater Monitoring Network: Super Solid Waste Management Units

SSWMUs and Constituent SWMUs	Well ID Number [1]		Additional Analytes Measured in 1998 [2]	Well ID Number [1]		Additional Analytes Measured in 1998 [2]
SSWMU #5 - Maintenance Shop Leach Field:						
• *Maintenance Shop Leach Field*	501*	(S:U)	S, V	502*	(S:D)	M33, S, SM, V
SSWMU #6 - Low-level Waste Storage Area:						
• Hardstands (old & new)	601	(S:D)	M	605	(S:D)	M, S
• Lag Storage	602	(S:D)	S	8607*	(S:U)	V
• Lag Storage Additions	603	(S:U)	*p*	8608	(S:U)	*p*
(LSAs 1, 2, 3, 4)	604	(S:D)		8609*	(S:U)	S, V
SSWMU #7 - CPC Waste Storage Area:						
	701	(TS:U)	*p*	705	(T:C)	*p*
• CPC Waste Storage Area	702	(T:C)	*p*	706*	(S:B)	
	703	(T:D)	*p*	707	(T:D)	
	704	(T:D)	V			
SSWMU #8 - Construction and Demolition Debris Landfill:						
	801*	(S:U)	S, V	804*	(S:D)	V
• Former Construction and Demolition	802	(S:D)	V	8603	(S:U)	S
Debris Landfill	803*	(S:D)	SV, V	8612*	(S:D)	SV, V

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[1] Hydrogeologic unit monitored and well position in SSWMU follow the well ID in parentheses. Hydrogeologic units monitored are: WT (weathered Lavery till); T (unweathered Lavery till); S (sand and gravel); K (Kent recessional sequence); TS (till-sand). Well position in SSWMU: U (upgradient); D (downgradient); B (background); C (crossgradient). Example: 401 (S:B) monitors background conditions in the sand and gravel unit.*

[2] See Table 3-1 (p. 3-6) for a description of codes and analytes. The parameters listed in this table, Table E-1, are in addition to the contamination indicator parameters (I) and radiological indicator parameters (RI) routinely scheduled for 1998. Wells measured for potentiometric (water-level) data only are designated by p.

Table E-1 (continued)

Groundwater Monitoring Network: Super Solid Waste Management Units

SSWMUs and Constituent SWMUs	Well ID Number [1]		Additional Analytes Measured in 1998 [2]	Well ID Number [1]		Additional Analytes Measured in 1998 [2]
SSWMU #9 - NRC-licensed Disposal Area:						
• NRC-licensed Disposal Area	901*	(K:U)		908*	(WT:U)	
• Container Storage Area	902*	(K:U)		909*	(WT:D)	M33, R, V, SV
• Trench Interceptor Project	903*	(K:D)		910*	(T:D)	
	904	(T:D)	*p*	8610*	(K:D)	
	905	(S:D)	*p*	8611*	(K:D)	
	906*	(WT:D)		NDATR*	(Interceptor Trench Manhole Sump:D)	M33, R, V, SV
	907	(WT:D)	*p*			
SSWMU #10 - IRTS Drum Cell:						
• IRTS Drum Cell	1001	(K:U)	*p*	1006*	(WT:D)	
• Background (south plateau)	1002	(K:D)	*p*	1007	(WT:D)	
	1003	(K:D)	*p*	1008B	(K:B)	
	1004	(K:D)	*p*	1008C*	(WT:B)	
	1005*	(WT:U)				
SSMUW #11 - State-licensed Disposal Area:						
• State-licensed Disposal Area (SDA) [NYSERDA]	1101A	(WT:U)	See Appendix L	1105A	(WT:D)	See Appendix L
	1101B	(T:U)		1105B	(T:D)	
	1101C	(K:U)		1106A	(K:U)	
NOTE: The SDA is sampled by NYSERDA under an independent monitoring program.	1102A	(WT:D)		1106B	(T:U)	
	1102B	(T:D)		1107A	(T:D)	
	1103A	(WT:D)		1108A	(WT:U)	
	1103B	(T:D)		1109A	(T:U)	
	1103C	(K:D)		1109B	(WT:U)	
	1104A	(WT:D)		1110A	(WT:D)	
	1104B	(T:D)		1111A	(WT:D)	
	1104C	(K:D)				

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[1] Hydrogeologic unit monitored and well position in SSWMU follow the well ID in parentheses. Hydrogeologic units monitored are: WT (weathered Lavery till); T (unweathered Lavery till); S (sand and gravel); K (Kent recessional sequence); TS (till-sand). Well position in SSWMU: U (upgradient); D (downgradient); B (background); C (crossgradient). Example: 401 (S:B) monitors background conditions in the sand and gravel unit.*

[2] See Table 3-1 (p. 3-6) for a description of codes and analytes. The parameters listed in this table, Table E-1, are in addition to the contamination indicator parameters (I) and radiological indicator parameters (RI) routinely scheduled for 1998. Wells measured for potentiometric (water-level) data only are designated by p.

Table E-1 (concluded)

Groundwater Monitoring Network: Super Solid Waste Management Units

SSWMUs and Constituent SWMUs	ID Number [1]	Analytes Measured in 1998 [2]	ID Number [1]	Analytes Measured in 1998 [2]
Main Plant Area Well Points: (Monitor groundwater at various locations north and east of the main plant. Not in a SSWMU.)	WP-A (S) WP-C (S)	RI RI	WP-H (S)	RI
Sand and Gravel Background: (Well originally used for background; replaced by a combination of wells 301, 401, and 706. [Not in a SSWMU].)	NBIS (S:B)	I, RI		
North Plateau Groundwater Seeps (Monitor groundwater emanating from seeps along the north plateau edge. Not in a SSWMU.)	SP02 (S) SP04 (S) SP05 (S) SP06 (S) SP11 (S)	RI RI RI RI RI	SP12 (S) SP18 (S) SP23 (S) GSEEP* (S)	I, RI, V RI RI I, RI, V

** Monitoring for certain parameters is required by the RCRA 3008(h) Order on Consent.*

[1] Hydrogeologic unit monitored and well position in SSWMU follow the well ID in parentheses. Hydrogeologic units monitored are: WT (weathered Lavery till); T (unweathered Lavery till); S (sand and gravel); K (Kent recessional sequence); TS (till-sand). Well position in SSWMU: U (upgradient); D (downgradient); B (background); C (crossgradient). Example: 401 (S:B) monitors background conditions in the sand and gravel unit.*

[2] See Table 3-1 (p. 3-6) for a description of codes and analytes.

Table E - 2

1998 Contamination Indicator and Radiological Indicator Results for the Sand and Gravel Unit

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
301	UP(1)	6.89	662	0.05±1.50E-09	4.72±3.16E-09	-8.54±7.83E-08
301	UP(2)	7.24	500	-2.02±7.99E-10	4.93±2.34E-09	1.91±8.01E-08
301	UP(3)	7.10	1010	-0.87±1.67E-09	6.67±2.76E-09	5.32±7.59E-08
301	UP(4)	7.17	1286	0.53±1.90E-09	1.54±2.77E-09	0.30±7.92E-08
401	UP(1)	6.98	2030	-2.47±3.73E-09	1.02±0.59E-08	-2.17±7.93E-08
401	UP(2)	7.07	2270	1.04±2.61E-09	1.20±0.44E-08	-0.96±7.89E-08
401	UP(3)	6.87	2285	1.00±4.77E-09	2.16±4.68E-09	1.73±7.57E-08
401	UP(4)	6.77	1786	1.57±3.78E-09	3.30±4.25E-09	-9.10±8.08E-08
403	UP(1)	7.27	957	-0.67±2.05E-09	5.48±3.83E-09	1.24±0.82E-07
403	UP(2)	7.51	805	1.71±1.47E-09	4.78±2.70E-09	-5.51±7.93E-08
403	UP(3)	6.96	959	0.11±2.26E-09	6.80±3.23E-09	6.34±7.91E-08
403	UP(4)	7.21	1231	1.26±1.79E-09	9.06±2.19E-09	-5.59±5.71E-08
706	UP(1)	6.60	526	-0.30±1.21E-09	1.23±0.28E-08	1.02±8.00E-08
706	UP(2)	6.44	424	7.83±8.18E-10	6.12±1.91E-09	-4.13±7.87E-08
706	UP(3)	6.59	489	1.74±1.21E-09	8.91±2.23E-09	7.89±7.80E-08
706	UP(4)	6.63	581	2.28±1.42E-09	7.06±2.17E-09	-1.39±0.79E-07
NB1S	UP(1)	6.83	511	3.57±1.28E-09	2.16±1.91E-09	-0.05±5.79E-08
NB1S	UP(2)	6.73	560	-4.72±7.46E-10	2.81±1.38E-09	-8.04±7.96E-08
NB1S	UP(3)	6.86	842	1.22±1.89E-09	3.50±1.74E-09	6.12±5.38E-08
NB1S	UP(4)	7.04	651	3.98±1.15E-09	2.94±0.81E-09	-8.62±7.90E-08
201	DOWN - B(1)	6.44	1603	2.69±3.42E-09	3.00±0.65E-08	-1.75±0.57E-07
201	DOWN - B(2)	6.68	1568	2.50±1.82E-09	3.06±0.35E-08	4.67±7.97E-08
201	DOWN - B(3)	6.70	1400	0.24±2.83E-09	2.26±0.46E-08	8.83±7.66E-08
201	DOWN - B(4)	6.93	1959	2.40±4.14E-09	2.73±0.51E-08	-0.16±7.84E-08
103	DOWN - C(1)	10.55	2450	5.74±6.71E-09	2.88±0.69E-08	1.16±0.81E-07
103	DOWN - C(2)	10.94	4490	1.25±1.17E-08	5.62±1.04E-08	1.70±0.81E-07
103	DOWN - C(3)	8.73	3640	1.24±5.90E-09	1.27±0.08E-07	1.10±0.78E-07
103	DOWN - C(4)	8.86	2060	0.20±3.34E-09	5.43±0.59E-08	-1.05±5.70E-08
104	DOWN - C(1)	7.26	1145	5.50±4.40E-09	1.71±0.01E-05	6.18±0.88E-07
104	DOWN - C(2)	7.55	1071	1.56±3.05E-09	1.70±0.02E-05	6.54±0.86E-07
104	DOWN - C(3)	7.26	1035	-3.13±4.34E-09	1.68±0.02E-05	5.57±0.84E-07
104	DOWN - C(4)	6.88	1122	-1.52±2.98E-09	2.09±0.02E-05	4.61±0.86E-07
111	DOWN - C(1)	6.62	580	3.63±4.10E-09	5.57±0.10E-06	3.72±0.84E-07
111	DOWN - C(2)	6.38	458	2.04±2.82E-09	3.62±0.08E-06	3.13±0.83E-07
111	DOWN - C(3)	6.70	566	-1.14±3.86E-09	6.09±0.10E-06	7.97±0.87E-07
111	DOWN - C(4)	6.49	680	6.06±6.28E-09	7.58±0.12E-06	2.88±0.83E-07

Sample collection quarter noted in parenthesis next to hydraulic position.

Table E - 2 (*continued*)

1998 Contamination Indicator and Radiological Indicator Results for the Sand and Gravel Unit

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
203	DOWN - C(1)	6.65	3365	*NS*	*NS*	*NS*
203	DOWN - C(2)	6.56	1016	*NS*	*NS*	*NS*
203	DOWN - C(3)	6.90	4320	*NS*	*NS*	*NS*
203	DOWN - C(4)	6.84	3230	*NS*	*NS*	*NS*
205	DOWN - C(1)	6.95	1058	1.92±2.68E-09	3.12±5.69E-09	1.30±0.81E-07
205	DOWN - C(2)	7.16	1569	2.65±2.72E-09	1.02±0.43E-08	-5.48±7.93E-08
205	DOWN - C(3)	7.11	1966	-1.21±3.99E-09	1.70±0.52E-08	4.30±7.57E-08
205	DOWN - C(4)	6.72	1882	3.17±3.90E-09	1.74±0.48E-08	3.91±5.57E-08
406	DOWN - C(1)	6.99	556	7.53±9.90E-10	8.63±1.85E-09	4.78±0.86E-07
406	DOWN - C(2)	6.64	662	0.71±1.22E-09	4.92±1.90E-09	3.16±0.87E-07
406	DOWN - C(3)	7.04	595	0.04±1.15E-09	7.05±2.17E-09	1.27±0.86E-07
406	DOWN - C(4)	7.14	571	1.96±1.27E-09	7.41±2.17E-09	2.28±0.61E-07
408	DOWN - C(1)	7.49	1638	2.85±0.44E-08	5.64±0.00E-04	4.37±1.20E-07
408	DOWN - C(2)	6.96	1618	-0.43±1.41E-09	5.32±0.00E-04	1.26±0.87E-07
408	DOWN - C(3)	6.97	1778	-0.28±3.99E-09	5.63±0.01E-04	1.60±1.02E-07
408	DOWN - C(4)	7.03	1841	-3.37±0.99E-08	5.37±0.06E-04	1.94±1.16E-07
501	DOWN - C(1)	7.64	1331	0.00±5.66E-09	1.98±0.01E-04	9.20±8.13E-08
501	DOWN - C(2)	6.96	1223	3.45±4.78E-09	1.56±0.01E-04	1.62±0.81E-07
501	DOWN - C(3)	6.98	1374	-2.04±6.92E-09	1.97±0.01E-04	1.46±0.79E-07
501	DOWN - C(4)	6.93	1516	0.00±5.26E-09	1.89±0.01E-04	1.04±0.81E-07
502	DOWN - C(1)	7.61	1316	2.29±4.49E-09	1.43±0.01E-04	1.93±0.83E-07
502	DOWN - C(2)	7.09	1225	0.96±4.41E-09	1.31±0.00E-04	1.88±0.81E-07
502	DOWN - C(3)	6.94	1313	3.79±9.10E-09	1.47±0.01E-04	2.30±0.80E-07
502	DOWN - C(4)	7.00	1380	0.90±5.55E-09	1.61±0.01E-04	1.45±0.81E-07
602	DOWN - C(1)	6.66	669	0.98±1.91E-09	1.94±0.38E-08	4.77±0.14E-06
602	DOWN - C(2)	6.58	651	0.30±1.16E-09	2.56±0.34E-08	3.04±0.18E-06
602	DOWN - C(3)	6.73	665	0.69±1.29E-09	1.72±0.23E-08	5.74±0.22E-06
602	DOWN - C(4)	7.08	680	1.55±1.41E-09	2.00±2.64E-09	5.77±0.25E-06
604	DOWN - C(1)	6.49	612	-0.78±1.13E-09	5.73±2.49E-09	2.19±8.04E-08
604	DOWN - C(2)	6.49	584	0.49±1.01E-09	5.21±1.91E-09	2.97±7.96E-08
604	DOWN - C(3)	6.51	672	-1.39±1.34E-09	4.48±2.02E-09	1.65±7.73E-08
604	DOWN - C(4)	6.35	794	2.04±1.51E-09	6.99±2.19E-09	0.27±7.84E-08
8605	DOWN - C(1)	7.50	957	1.74±1.03E-08	1.58±0.02E-05	8.04±0.90E-07
8605	DOWN - C(2)	7.34	842	2.72±3.76E-09	1.62±0.02E-05	1.27±0.10E-06
8605	DOWN - C(3)	6.68	1042	1.24±1.05E-08	1.42±0.02E-05	8.58±0.88E-07
8605	DOWN - C(4)	6.68	1188	9.37±8.66E-09	9.72±0.13E-06	2.83±0.83E-07

Sample collection quarter noted in parenthesis next to hydraulic position.
NS - Not sampled.

Table E - 2 (continued)

1998 Contamination Indicator and Radiological Indicator Results for the Sand and Gravel Unit

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
8607	DOWN - C(1)	6.33	704	0.16±1.35E-09	1.08±0.34E-08	4.17±8.01E-08
8607	DOWN - C(2)	6.32	1059	0.78±1.62E-09	1.21±0.29E-08	-5.47±7.95E-08
8607	DOWN - C(3)	6.62	1251	0.96±2.18E-09	9.61±2.95E-09	5.06±7.88E-08
8607	DOWN - C(4)	6.64	1204	0.05±1.54E-09	1.12±0.32E-08	-2.89±8.05E-08
8609	DOWN - C(1)	7.18	897	0.60±1.67E-09	5.25±0.07E-07	7.04±0.76E-07
8609	DOWN - C(2)	7.19	890	0.22±1.57E-09	4.60±0.12E-07	6.28±0.89E-07
8609	DOWN - C(3)	7.12	933	-0.26±1.90E-09	5.02±0.13E-07	7.68±0.88E-07
8609	DOWN - C(4)	7.06	1051	0.61±1.16E-09	5.75±0.09E-07	6.88±0.90E-07
GSEEP	DOWN - D(1)	6.44	825	-1.41±1.43E-09	5.58±3.22E-09	8.43±0.92E-07
GSEEP	DOWN - D(2)	6.75	827	0.23±8.77E-10	5.04±1.72E-09	6.70±0.87E-07
GSEEP	DOWN - D(3)	7.28	920	-0.01±1.70E-09	7.11±2.80E-09	7.08±0.85E-07
GSEEP	DOWN - D(4)	6.30	975	0.57±1.54E-09	2.99±2.75E-09	7.65±0.90E-07
105	DOWN - D(1)	7.11	1434	-0.35±1.86E-09	6.81±0.32E-08	7.25±0.90E-07
105	DOWN - D(2)	7.34	1438	2.29±1.96E-09	1.09±0.05E-07	6.09±0.88E-07
105	DOWN - D(3)	7.14	1385	0.07±1.79E-09	1.74±0.04E-07	6.30±0.84E-07
105	DOWN - D(4)	7.10	1339	0.51±2.12E-09	2.98±0.07E-07	7.09±0.91E-07
106	DOWN - D(1)	7.06	1187	1.32±2.59E-09	5.16±3.00E-09	2.37±0.13E-06
106	DOWN - D(2)	7.31	1215	4.45±2.30E-09	6.73±2.26E-09	1.65±0.11E-06
106	DOWN - D(3)	7.09	1200	1.04±2.26E-09	5.61±2.25E-09	1.46±0.10E-06
106	DOWN - D(4)	7.11	1043	3.08±2.25E-09	1.05±0.25E-08	1.72±0.12E-06
116	DOWN - D(1)	7.03	847	1.68±2.18E-09	6.55±0.44E-08	1.50±0.82E-07
116	DOWN - D(2)	7.50	777	2.94±1.52E-09	5.30±0.35E-08	6.17±8.08E-08
116	DOWN - D(3)	7.22	903	0.69±1.87E-09	5.59±0.36E-08	3.54±0.57E-07
116	DOWN - D(4)	7.16	907	1.73±1.80E-09	5.60±0.37E-08	2.21±0.58E-07
601	DOWN - D(1)	6.78	511	*NS*	*NS*	*NS*
601	DOWN - D(2)	7.54	648	*NS*	*NS*	*NS*
601	DOWN - D(3)	6.71	596	*NS*	*NS*	*NS*
601	DOWN - D(4)	6.60	664	*NS*	*NS*	*NS*
605	DOWN - D(1)	6.73	432	0.32±1.12E-09	5.86±0.50E-08	0.48±5.62E-08
605	DOWN - D(2)	6.96	546	3.50±9.30E-10	8.82±0.53E-08	-1.49±7.98E-08
605	DOWN - D(3)	7.26	684	3.74±1.72E-09	4.14±0.42E-08	2.05±5.42E-08
605	DOWN - D(4)	6.81	797	1.60±1.45E-09	5.31±0.39E-08	6.49±7.92E-08
801	DOWN - D(1)	7.06	904	1.62±3.18E-09	6.22±0.10E-06	2.89±0.84E-07
801	DOWN - D(2)	7.59	1080	3.08±3.02E-09	7.19±0.08E-06	3.18±0.83E-07
801	DOWN - D(3)	7.01	1105	3.43±8.23E-09	6.79±0.11E-06	3.80±0.81E-07
801	DOWN - D(4)	6.59	1089	0.01±2.91E-09	6.94±0.08E-06	3.23±0.85E-07

Sample collection quarter noted in parenthesis next to hydraulic position.
NS - Not sampled.

Table E - 2 (concluded)

1998 Contamination Indicator and Radiological Indicator Results for the Sand and Gravel Unit

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
802	DOWN - D(1)	6.92	444	-5.94±9.98E-10	2.46±2.31E-09	1.42±0.81E-07
802	DOWN - D(2)	7.08	210	0.72±5.04E-10	0.62±1.56E-09	1.68±0.57E-07
802	DOWN - D(3)	6.55	285	5.49±8.28E-10	7.16±2.08E-09	3.82±7.60E-08
802	DOWN - D(4)	7.10	831	3.97±1.88E-09	2.07±1.93E-09	2.20±0.84E-07
803	DOWN - D(1)	6.94	1403	-0.86±2.63E-09	8.16±3.12E-09	3.61±0.85E-07
803	DOWN - D(2)	7.00	1303	1.36±1.89E-09	8.21±2.30E-09	3.26±0.83E-07
803	DOWN - D(3)	6.85	1398	0.20±3.01E-09	1.18±0.26E-08	3.31±0.80E-07
803	DOWN - D(4)	6.73	1453	0.87±2.62E-09	1.50±0.27E-08	3.19±0.85E-07
804	DOWN - D(1)	6.85	578	0.61±1.40E-09	2.08±0.08E-07	1.60±0.81E-07
804	DOWN - D(2)	6.86	877	1.60±1.54E-09	2.37±0.08E-07	1.18±0.80E-07
804	DOWN - D(3)	6.30	733	0.96±1.45E-09	1.86±0.08E-07	1.82±0.78E-07
804	DOWN - D(4)	6.60	685	1.98±1.40E-09	2.20±0.07E-07	-0.32±8.12E-08
8603	DOWN - D(1)	8.01	1490	2.21±4.33E-09	1.13±0.01E-05	4.76±0.86E-07
8603	DOWN - D(2)	7.62	1490	6.29±7.12E-09	1.24±0.01E-05	4.71±0.84E-07
8603	DOWN - D(3)	7.31	1536	0.86±1.19E-08	1.62±0.02E-05	3.82±0.82E-07
8603	DOWN - D(4)	6.94	1372	5.63±8.23E-09	1.88±0.02E-05	5.23±0.86E-07
8604	DOWN - D(1)	7.54	1432	0.00±5.75E-09	4.00±0.03E-05	4.43±0.85E-07
8604	DOWN - D(2)	6.96	1387	0.00±5.09E-09	3.63±0.02E-05	5.80±0.61E-07
8604	DOWN - D(3)	7.36	1278	9.00±8.02E-09	3.86±0.02E-05	5.81±0.84E-07
8604	DOWN - D(4)	6.96	1273	3.20±6.28E-09	3.43±0.02E-05	3.86±0.85E-07
8612	DOWN - D(1)	7.33	1124	-0.35±2.45E-09	8.03±0.47E-08	7.44±0.88E-07
8612	DOWN - D(2)	7.37	1148	-0.54±1.25E-09	5.23±2.18E-09	6.87±0.88E-07
8612	DOWN - D(3)	7.21	1147	0.41±2.42E-09	1.85±2.14E-09	8.46±0.86E-07
8612	DOWN - D(4)	7.27	1150	0.67±2.03E-09	5.91±2.31E-09	7.01±0.90E-07

Sample collection quarter noted in parenthesis next to hydraulic position.

Table E - 3

1998 Contamination Indicator and Radiological Indicator Results for the Till-sand Unit

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
302	UP(1)	7.21	2215	0.95±3.72E-09	8.38±4.20E-09	-5.86±7.80E-08
302	UP(2)	7.17	2155	1.50±2.85E-09	6.22±4.18E-09	-1.05±0.78E-07
302	UP(3)	7.22	2205	-0.61±4.93E-09	2.82±4.70E-09	5.15±7.60E-08
302	UP(4)	7.15	2250	3.88±5.26E-09	3.85±4.38E-09	6.52±8.08E-08
402	UP(1)	7.15	2250	0.71±4.06E-09	2.16±5.89E-09	2.88±8.37E-08
402	UP(2)	7.17	2050	7.15±4.13E-09	8.33±4.29E-09	-6.53±8.05E-08
402	UP(3)	7.18	2270	4.35±5.98E-09	-1.62±4.59E-09	2.47±7.80E-08
402	UP(4)	7.20	2275	0.30±2.58E-09	-0.98±5.19E-09	-3.88±8.12E-08
202	DOWN - B(1)	10.35	282	*NS*	*NS*	*NS*
204	DOWN - B(1)	7.95	897	-0.85±2.00E-09	1.71±3.12E-09	3.21±7.95E-08
204	DOWN - B(2)	7.88	913	1.18±1.73E-09	1.75±2.26E-09	2.15±7.96E-08
204	DOWN - B(3)	7.47	940	3.10±1.57E-09	3.34±1.82E-09	9.24±7.69E-08
204	DOWN - B(4)	7.81	997	2.33±1.92E-09	3.28±2.57E-09	1.16±7.86E-08
206	DOWN - C(1)	7.68	952	-0.86±2.03E-09	2.95±3.19E-09	1.56±0.57E-07
206	DOWN - C(2)	7.56	987	-0.79±1.40E-09	1.99±2.30E-09	-5.91±7.92E-08
206	DOWN - C(3)	7.39	1010	0.60±2.47E-09	2.78±2.58E-09	8.18±7.65E-08
206	DOWN - C(4)	7.49	1012	1.04±1.17E-09	-0.65±1.82E-09	7.22±7.94E-08
208	DOWN - C(1)	7.96	298	9.26±7.63E-10	0.48±1.51E-09	-5.82±7.82E-08
208	DOWN - C(2)	8.06	297	-1.09±5.69E-10	1.82±1.10E-09	-9.49±7.87E-08
208	DOWN - C(3)	7.87	293	1.32±0.55E-09	1.44±0.87E-09	1.00±7.79E-08
208	DOWN - C(4)	7.92	265	1.95±0.79E-09	1.81±1.25E-09	-4.80±5.48E-08

Sample collection quarter noted in parenthesis next to hydraulic position.
NS - Not sampled.

Table E - 4

1998 Contamination Indicator and Radiological Indicator Results for the Weathered Lavery Till Unit

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
908	UP(1)	6.92	2660	9.47±6.64E-09	1.60±0.62E-08	1.68±5.62E-08
908	UP(3)	6.88	3725	9.43±7.58E-09	1.17±0.52E-08	-1.58±5.49E-08
1005	UP(1)	7.29	790	1.17±2.00E-09	4.45±3.22E-09	4.38±8.24E-08
1005	UP(3)	7.08	771	1.72±1.98E-09	3.60±2.62E-09	-2.37±7.76E-08
1008C	UP(1)	7.62	595	1.70±1.40E-09	0.75±1.91E-09	-9.55±8.06E-08
1008C	UP(3)	7.46	576	0.13±1.48E-09	1.77±1.59E-09	-1.47±7.77E-08
906	DOWN - B(1)	7.40	645	1.03±1.79E-09	4.26±2.48E-09	2.64±8.05E-08
906	DOWN - B(3)	7.21	604	4.18±1.92E-09	5.07±2.10E-09	2.57±7.64E-08
1006	DOWN - B(1)	6.92	2360	4.85±4.91E-09	3.62±5.96E-09	-6.70±8.20E-08
1006	DOWN - B(3)	6.86	2375	-0.20±5.25E-09	3.54±4.82E-09	-8.96±7.78E-08
1007	DOWN - B(1)	6.89	1215	3.12±3.38E-09	4.60±3.17E-09	1.18±0.84E-07
1007	DOWN - B(3)	6.88	1273	4.48±3.20E-09	4.88±2.28E-09	-6.02±7.74E-08
NDATR	DOWN - C(1)	8.02	688	1.36±1.77E-09	9.13±0.59E-08	4.12±0.18E-06
NDATR	DOWN - C(2)	7.98	960	2.99±2.09E-09	1.15±0.06E-07	8.19±0.29E-06
NDATR	DOWN - C(3)	6.85	1014	2.36±2.35E-09	1.05±0.06E-07	1.04±0.04E-05
NDATR	DOWN - C(4)	7.50	1015	3.78±2.06E-09	1.06±0.06E-07	1.29±0.04E-05
909	DOWN - C(1)	6.81	1531	0.66±3.28E-09	3.96±0.10E-07	2.97±0.15E-06
909	DOWN - C(2)	6.91	1553	6.00±3.33E-09	3.53±0.09E-07	2.78±0.15E-06
909	DOWN - C(3)	6.61	1564	0.50±2.83E-09	4.39±0.08E-07	3.48±0.16E-06
909	DOWN - C(4)	7.29	1675	5.16±4.69E-09	4.18±0.13E-07	3.55±0.17E-06

Sample collection quarter noted in parenthesis next to hydraulic position.

Table E - 5

1998 Contamination Indicator and Radiological Indicator Results for the Unweathered Lavery Till Unit

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
405	UP(1)	7.37	861	1.06±2.07E-09	7.41±3.00E-09	1.08±0.82E-07
405	UP(2)	7.04	777	1.23±0.86E-09	4.38±1.47E-09	3.41±8.16E-08
405	UP(3)	7.08	783	0.26±1.53E-09	5.24±2.18E-09	-0.60±7.80E-08
405	UP(4)	7.26	1004	4.43±2.27E-09	5.79±2.28E-09	3.69±8.25E-08
110	DOWN - B(1)	7.43	563	1.14±1.29E-09	2.95±0.30E-08	1.52±0.11E-06
110	DOWN - B(2)	7.63	537	0.50±1.10E-09	2.04±1.36E-09	1.55±0.11E-06
110	DOWN - B(3)	7.55	500	0.96±1.31E-09	3.43±1.64E-09	1.66±0.11E-06
110	DOWN - B(4)	7.43	558	2.85±1.35E-09	1.49±1.52E-09	1.32±0.10E-06
704	DOWN - B(1)	6.59	889	1.46±1.32E-09	2.02±0.24E-08	-3.45±8.06E-08
704	DOWN - B(2)	6.75	635	0.75±1.15E-09	1.28±0.24E-08	-1.40±0.89E-07
704	DOWN - B(3)	6.78	804	2.23±2.00E-09	1.14±0.24E-08	9.08±7.73E-08
704	DOWN - B(4)	6.75	910	1.72±1.94E-09	1.34±0.25E-08	-0.05±8.11E-08
707	DOWN - B(1)	6.52	310	2.50±6.98E-10	4.10±1.96E-09	-2.19±7.88E-08
707	DOWN - B(2)	7.12	316	-1.74±5.88E-10	4.93±1.46E-09	-6.13±8.08E-08
707	DOWN - B(3)	7.11	526	-0.20±1.36E-09	4.04±1.71E-09	4.11±5.52E-08
707	DOWN - B(4)	6.84	551	4.40±1.63E-09	4.42±1.70E-09	-3.14±8.05E-08
107	DOWN - C(1)	7.25	794	2.13±1.55E-09	4.81±2.28E-09	1.21±0.10E-06
107	DOWN - C(2)	7.32	729	2.40±8.42E-10	3.91±1.66E-09	8.87±0.92E-07
107	DOWN - C(3)	7.08	731	0.58±1.87E-09	5.01±2.60E-09	8.54±0.87E-07
107	DOWN - C(4)	7.30	777	5.64±1.53E-09	4.06±1.83E-09	9.85±0.95E-07
108	DOWN - C(1)	7.39	635	1.63±0.95E-09	2.52±1.40E-09	2.62±7.95E-08
108	DOWN - C(2)	7.61	613	1.24±0.83E-09	2.99±1.00E-09	1.22±0.57E-07
108	DOWN - C(3)	7.41	584	1.84±1.02E-09	2.98±1.15E-09	9.04±7.60E-08
108	DOWN - C(4)	7.56	573	3.88±1.49E-09	2.46±1.58E-09	9.19±8.17E-08
409	DOWN - C(1)	8.02	357	1.50±0.79E-09	3.50±1.64E-09	-1.02±0.81E-07
409	DOWN - C(2)	8.11	350	1.42±0.84E-09	4.26±1.25E-09	-5.58±5.56E-08
409	DOWN - C(3)	8.04	343	7.59±8.48E-10	2.67±1.33E-09	-3.02±5.28E-08
409	DOWN - C(4)	8.23	336	2.10±0.82E-09	3.31±1.34E-09	-5.33±7.91E-08
910	DOWN - C(1)	7.35	1261	2.57±2.76E-09	6.33±0.44E-08	-3.84±7.85E-08
910	DOWN - C(2)	7.33	1168	2.86±1.81E-09	1.26±0.05E-07	-1.28±0.79E-07
910	DOWN - C(3)	6.96	1192	1.91±2.36E-09	5.94±0.38E-08	2.60±7.90E-08

Sample collection quarter noted in parenthesis next to hydraulic position.

Table E - 6

1998 Contamination Indicator and Radiological Indicator Results for the Kent Recessional Sequence

Location Code	Hydraulic Position	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
901	UP(1)	8.10	273	1.06±0.70E-09	4.58±1.68E-09	-1.76±8.17E-08
901	UP(3)	7.45	307	6.18±8.01E-10	3.26±1.37E-09	1.11±7.84E-08
902	UP(1)	8.01	449	3.13±0.93E-09	3.74±1.21E-09	-1.19±0.81E-07
902	UP(3)	8.16	447	0.59±1.16E-09	4.23±1.46E-09	-3.33±7.80E-08
1008B	UP(1)	7.98	312	5.66±6.97E-10	2.70±1.61E-09	-1.08±0.81E-07
1008B	UP(3)	7.98	309	-5.48±7.29E-10	9.18±1.66E-09	3.52±7.55E-08
903	DOWN - B(1)	7.71	886	-1.81±1.85E-09	2.27±2.45E-09	-1.42±0.80E-07
903	DOWN - B(3)	7.58	884	3.58±2.09E-09	2.28±1.95E-09	-1.35±0.78E-07
8610	DOWN - B(1)	7.78	993	0.99±1.95E-09	4.86±2.52E-09	-1.20±0.79E-07
8610	DOWN - B(3)	8.03	887	0.49±1.99E-09	9.66±2.35E-09	-6.38±7.74E-08
8611	DOWN - B(1)	7.21	999	0.30±2.06E-09	5.99±3.29E-09	-4.69±7.83E-08
8611	DOWN - B(3)	7.43	915	1.62±1.86E-09	3.38±2.58E-09	-7.03±7.69E-08

Sample collection quarter noted in parenthesis next to hydraulic position.

Table E - 7

1998 Contamination Indicator and Radiological Indicator Results at North Plateau Seep Monitoring Locations

Location Code	Sampling Quarter	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
SP02	1	*NS*	*NS*	-0.76±1.45E-09	5.64±3.23E-09	9.12±0.81E-07
SP02	3	*NS*	*NS*	2.00±2.87E-09	1.19±0.31E-08	6.32±0.89E-07
SP02	4	*NS*	*NS*	1.84±1.67E-09	3.24±2.76E-09	7.60±0.88E-07
SP04	1	*NS*	*NS*	-0.46±1.64E-09	8.27±3.00E-09	3.50±0.85E-07
SP04	3	*NS*	*NS*	6.17±2.41E-09	1.52±0.22E-08	3.38±0.88E-07
SP04	4	*NS*	*NS*	1.75±1.63E-09	8.19±2.04E-09	3.82±0.72E-07
SP05	1	*NS*	*NS*	0.45±1.08E-09	4.60±2.04E-09	1.31±0.82E-07
SP05	3	*NS*	*NS*	0.74±1.67E-09	5.05±1.80E-09	2.95±0.81E-07
SP06	1	*NS*	*NS*	2.17±1.14E-09	5.11±1.75E-09	7.43±8.18E-08
SP06	3	*NS*	*NS*	-5.47±9.83E-10	3.59±1.27E-09	1.58±0.77E-07
SP11	1	*NS*	*NS*	-1.14±1.53E-09	6.72±3.31E-09	2.27±0.82E-07
SP11	3	*NS*	*NS*	0.80±2.30E-09	6.84±2.79E-09	1.05±0.79E-07
SP12	1	7.06	916	0.32±2.07E-09	2.47±2.87E-09	6.11±0.76E-07
SP12	3	7.54	890	1.75±1.81E-09	6.65±2.23E-09	4.48±0.82E-07
SP12	4	7.23	1078	1.41±2.23E-09	9.30±2.43E-09	9.26±0.95E-07
SP18	1	*NS*	*NS*	3.77±3.96E-10	4.18±1.62E-09	3.36±8.03E-08
GSEEP	DOWN - D(1)	6.44	825	-1.41±1.43E-09	5.58±3.22E-09	8.43±0.92E-07
GSEEP	DOWN - D(2)	6.75	827	0.23±8.77E-10	5.04±1.72E-09	6.70±0.87E-07
GSEEP	DOWN - D(3)	7.28	920	-0.01±1.70E-09	7.11±2.80E-09	7.08±0.85E-07
GSEEP	DOWN - D(4)	6.30	975	0.57±1.54E-09	2.99±2.75E-09	7.65±0.90E-07

Table E - 8

1998 Contamination Indicator and Radiological Indicator Results at Well Points

Location Code	Date Collected	pH	Conductivity µmhos/cm@25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
WP-A	*10/28/98*	9.01	97	1.82±0.83E-09	4.87±0.42E-08	9.22±0.30E-06
WP-C	*10/28/98*	7.46	120	5.21±6.71E-10	1.19±0.06E-07	4.09±0.12E-05
WP-H	*10/28/98*	7.05	582	6.16±1.80E-09	2.78±0.03E-06	6.54±0.23E-06

NS - Not sampled.

Table E - 9

1998 Detections of Volatile Organic Compounds at Selected Groundwater Monitoring Locations

Location Code	Sampling Quarter	1,1,1-TCA (µg/L)	1,1-DCA (µg/L)	DCDFMeth (µg/L)	1,2-DCE(total) (µg/L)	TCE (µg/L)
SP12	1	< 5.0	< 5.0	< 5.0	*NS*	< 5.0
	3	< 5.0	< 5.0	< 5.0	*NS*	< 5.0
803	1	< 5.0	< 5.0	2.0*	*NS*	< 5.0
	2	< 5.0	< 5.0	2.8*	*NS*	< 5.0
	3	< 5.0	< 5.0	< 5.0	*NS*	< 5.0
	4	< 5.0	< 5.0	< 5.0	*NS*	< 5.0
8609	1	< 5.0	< 5.0	< 5.0	*NS*	< 5.0
8612	1	2.0*	30.5	4.5*	23.5	< 5.0
	2	3.0*	29.0	5.0	23.0	< 5.0
	3	3.7*	23.5	< 5.0	25.0	< 5.0
	4	3.2*	25.0	6.4	28.0	< 5.0

Note: Samples are collected according to different schedules (annual, semiannual, or quarterly).
** Compound was detected below the practical quantitation limit (PQL of 5 µg/L).*
NS - Not sampled.

Table E - 10

1998 Tributyl Phosphate Sampling Results at Selected Groundwater Monitoring Locations

Location Code	Date	Tributyl Phosphate (TBP) *(µg/L)*
111	*12/10/97*	4.2*
	12/22/97	2.2*
	06/02/98	< 10.0
8605	*12/09/97*	475
	12/22/97	460
	06/02/98	534

Note: Samples are collected according to different schedules (annual, semiannual, or quarterly).
** Compound was detected below the practical quantitation limit (PQL) of 10 µg/L.*

Table E - 11

1998 Appendix 33 Metals (µg/L) Sampling Results

Location Code	Hydraulic Position	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
Sand and Gravel									
301	UP(4)	< 10	< 10	200	< 1	< 5	330	< 50	< 25
401	UP(4)	< 10	20	480	< 1	5.3	690	< 50	66.0
111	DOWN - C(1)	< 60	< 10	67	< 5	< 5	< 10	8.7	< 20
408	DOWN - C(4)	2.5	4.0	345	< 1	1.1	94	2.8	5.8
502	DOWN - C(1)	*NS*	< 10	290	*NS*	< 2	420	8.5	4.1
502	DOWN - C(3)	*NS*	< 10	302	*NS*	< 5	398	1.3	< 25
502	DOWN - C(4)	2.5	4.1	333	< 1	1.1	876	3.0	5.8
8605	DOWN - C(1)	< 60	< 10	96	< 5	< 5	< 10	< 50	11.7
116	DOWN - D(4)	< 10	< 10	<200	< 1	< 5	22	< 50	< 25
Weathered Till									
NDATR	DOWN - C(1)	< 10	< 10	<200	< 1	< 5	< 5	< 50	< 25
NDATR	DOWN - C(2)	< 10	< 10	<200	< 1	< 5	< 5	< 50	< 25
NDATR	DOWN - C(3)	< 10	< 10	<200	< 1	< 5	< 10	< 50	< 25
NDATR	DOWN - C(4)	< 10	< 10	<200	< 1	< 5	< 10	< 50	< 25
909	DOWN - C(1)	< 10	10.5	<200	1	< 5	< 5	< 50	< 25

Sample collection quarter noted in parenthesis next to hydraulic position.
NS - Not sampled.

Table E - 11 (concluded)

1998 Appendix 33 Metals (µg/L) Sampling Results

Location Code	Hydraulic Position	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Tin	Vanadium	Zinc
Sand and Gravel										
301	UP(4)	4.6	< 0.2	240	6.35	< 10	< 10	< 3000	< 50	41.0
401	UP(4)	30.0	< 0.2	860	5.70	< 10	< 10	< 3000	< 50	170.0
111	DOWN -C(1)	< 3	< 0.2	< 40	< 5	< 10	*NS*	< 100	< 50	6.0
408	DOWN - C(4)	2.1	< 0.2	217	2.40	2.0	4	141	3.00	13.6
502	DOWN - C(1)	< 3	< 0.2	23	< 5	< 10	*NS*	*NS*	< 50	< 20
502	DOWN - C(3)	< 2	< 0.2	24	< 5	3.5	*NS*	*NS*	0.78	4.9
502	DOWN - C(4)	1.5	< 0.2	40	2.40	2.0	4	< 3000	2.35	9.2
8605	DOWN - C(1)	< 3	< 0.2	< 40	< 5	< 10	*NA*	< 100	< 50	< 20
116	DOWN - D(4)	3.2	< 0.2	< 40	7.20	< 10	< 10	< 3000	< 50	21.0
Weathered Till										
NDATR	DOWN - C(1)	<3	< 0.2	< 5	< 5	< 10	< 10	< 3000	< 50	42.4
NDATR	DOWN - C(2)	< 4	< 0.2	< 5	< 5	< 10	< 10	< 3000	< 50	27.6
NDATR	DOWN - C(3)	4.1	< 0.2	< 40	< 5	< 10	< 5	< 3000	< 50	29.0
NDATR	DOWN - C(4)	6.6	< 0.2	< 40	< 5	< 10	< 10	< 3000	< 50	68.5
909	DOWN - C(1)	< 3	< 0.2	14	< 5	< 10	< 10	< 3000	< 50	24.2

Sample collection quarter noted in parenthesis next to hydraulic position.
NS - Not sampled

Table E - 12

1998 Appendix 33 Metals (µg/L) Sampling Results from the WVDP Pilot Program Investigating Chromium and Nickel in the Sand and Gravel Unit

Location Code	Hydraulic Position	Chromium *(Total)*	Nickel *(Total)*
301	UP(1)	87	173
301	UP(2)	22	66
301	UP(3)	33	117
401	UP(1)	193	292
401	UP(2)	115	247
401	UP(3)	584	335
403	UP(1)	808	249
403	UP(2)	1170	91
403	UP(3)	953	92
403	UP(4)	2210	379
201	DOWN(1)	<5	12
201	DOWN(2)	<5	10
201	DOWN(3)	<5	8
201	DOWN(4)	<10	<40
203	DOWN(1)	177	285
203	DOWN(2)	80	194
203	DOWN(3)	399	714
203	DOWN(4)	255	1230
205	DOWN(1)	50	26
205	DOWN(2)	103	120
205	DOWN(3)	109	43
205	DOWN(4)	<10	<40
408	DOWN(1)	52	120
408	DOWN(2)	205	245
408	DOWN(3)	153	238
502	DOWN(1)	439	19
106	DOWN(1)	1550	405
106	DOWN(2)	149	67
106	DOWN(3)	432	142
106	DOWN(4)	1480	1300
116	DOWN(1)	434	183
116	DOWN(2)	565	95
116	DOWN(3)	359	154
601	DOWN(1)	1120	66
601	DOWN(2)	731	41
601	DOWN(3)	1230	557
601	DOWN(4)	285	322
605	DOWN(1)	<5	32
605	DOWN(2)	<5	16
605	DOWN(3)	22	181
605	DOWN(4)	105	360

Note: These analyses were used in the chromium and nickel investigation.(See Chapter 3.)

Table E - 13

1998 Sampling Parameters at Early Warning Monitoring Wells (µg/L)

Location Code	Sample Round	Aluminum *Total*	Iron *Total*	Manganese *Total*
502	(1)	37.0	4100	17
	(3)	46.3	2840	12

Table E - 14

1998 Alpha- Beta- and Gamma-emitting Radioisotopic Results (µCi/mL)

Location Code	Hydraulic Position	C-14	I-129	Cs-137
Sand and Gravel				
401	UP(1)	-0.65±1.36E-11	5.64±9.01E-10	0.00±1.48E-08
406	DOWN(1)	-0.69±1.36E-11	-5.74±7.20E-10	0.00±2.61E-08
408	DOWN(1)	-4.28± 6.71E-11	1.11±1.35E-09	0.00±5.27E-09
Weathered Till				
NDATR	DOWN(1)	-0.52± 1.35E-11	1.55±7.52E-10	0.00±1.90E-08
NDATR	DOWN(2)	*NS*	1.38±1.67E-09	*NS*
NDATR	DOWN(3)	1.33± 0.39E-08	2.81±1.73E-09	0.00±1.70E-08
909	DOWN(1)	0.97± 1.50E-11	1.04±0.22E-08	0.00±1.51E-08
909	DOWN(2)	*NS*	7.17±2.04E-09	*NS*

Sample collection quarter noted in parenthesis next to hydraulic position.
NS - Not sampled.

Table E - 14 (continued)

1998 Alpha- Beta- and Gamma-emitting Radioisotopic Results (µCi/mL)

Location Code	Hydraulic Position	Sr-90	Tc-99	Ra-226	Ra-228	U-232
Sand and Gravel						
401	UP(1)	3.80±2.16E-09	-4.88±1.69E-09	7.42±3.79E-10	3.20±0.44E-09	-0.34±1.64E-10
111	DOWN(1)	2.68±0.04E-06	*NS*	*NS*	*NS*	*NS*
406	DOWN(1)	3.62±1.52E-09	8.48±1.51E-09	1.77±2.45E-10	2.62±0.35E-09	1.41±1.01E-10
408	DOWN(1)	2.73±0.00E-04	2.89±0.22E-08	0.81±1.17E-08	3.09±3.22E-08	2.05±5.42E-11
501	DOWN(1)	9.84±0.03E-05	*NS*	*NS*	*NS*	*NS*
502	DOWN(1)	7.29±0.02E-05	*NS*	*NS*	*NS*	*NS*
602	DOWN(1)	1.13±0.26E-08	*NS*	*NS*	*NS*	*NS*
602	DOWN(3)	1.04±0.28E-08	*NS*	*NS*	*NS*	*NS*
8605	DOWN(1)	7.11±0.06E-06	*NS*	*NS*	*NS*	*NS*
8609	DOWN(1)	2.48±0.10E-07	*NS*	*NS*	*NS*	*NS*
8609	DOWN(3)	2.72±0.10E-07	*NS*	*NS*	*NS*	*NS*
105	DOWN(2)	5.30±0.55E-08	*NS*	*NS*	*NS*	*NS*
116	DOWN(1)	3.67±0.41E-08	*NS*	*NS*	*NS*	*NS*
116	DOWN(3)	2.80±0.38E-08	*NS*	*NS*	*NS*	*NS*
605	DOWN(1)	2.94±0.37E-08	*NS*	*NS*	*NS*	*NS*
605	DOWN(3)	2.20±0.30E-08	*NS*	*NS*	*NS*	*NS*
801	DOWN(1)	3.24±0.05E-06	*NS*	*NS*	*NS*	*NS*
801	DOWN(2)	3.79±0.04E-06	*NS*	*NS*	*NS*	*NS*
801	DOWN(3)	3.57±0.04E-06	*NS*	*NS*	*NS*	*NS*
801	DOWN(4)	3.30±0.04E-06	*NS*	*NS*	*NS*	*NS*
8603	DOWN(1)	5.24±0.06E-06	*NS*	*NS*	*NS*	*NS*
8603	DOWN(3)	7.61±0.04E-06	*NS*	*NS*	*NS*	*NS*
Weathered Till						
NDATR	DOWN(1)	4.53±0.31E-08	-7.04±1.65E-09	2.63±2.66E-10	2.56±0.42E-09	0.38±1.41E-10
NDATR	DOWN(2)	5.78±0.57E-08	2.16±1.62E-09	*NS*	*NS*	*NS*
NDATR	DOWN(3)	4.88±0.43E-08	0.12±1.46E-09	6.58±2.95E-10	2.62±0.42E-09	-1.40±7.37E-11
NDATR	DOWN(4)	5.16±0.40E-08	*NS*	*NS*	*NS*	0.74±1.28E-10
909	DOWN(1)	1.92±0.10E-07	-5.56±1.66E-09	2.88±1.99E-10	4.05±0.47E-09	2.16±2.36E-10
909	DOWN(2)	1.62±0.09E-07	1.32±1.60E-09	*NS*	*NS*	2.79±9.93E-11
909	DOWN(4)	*NS*	*NS*	*NS*	*NS*	0.78±1.43E-10

Sample collection quarter noted in parenthesis next to hydraulic position.
NS - Not sampled.

Table E - 14 (concluded)

1998 Alpha- Beta- and Gamma-emitting Radioisotopic Results (µCi/mL)

Location Code	Hydraulic Position	U-233/234	U-235/236	U-238	Total U (µg/mL)
Sand and Gravel					
401	UP(1)	3.46±7.34E-11	3.92±8.40E-11	7.95±9.76E-11	7.04±0.60E-05
406	DOWN(1)	1.86±1.20E-10	6.21±7.35E-11	1.95±1.27E-10	2.00±0.08E-04
408	DOWN(1)	3.49±0.13E-10	0.95±2.32E-11	2.27±0.70E-10	4.07±0.13E-04
Weathered Till					
NDATR	DOWN(1)	7.60±2.52E-10	6.99±8.26E-11	6.29±2.23E-10	2.00±0.05E-03
NDATR	DOWN(3)	1.76±0.31E-09	9.37±7.20E-11	1.54±0.29E-09	4.10±0.05E-03
NDATR	DOWN(4)	1.90±0.39E-09	5.68±8.61E-11	1.44±0.33E-09	4.36±0.07E-03
909	DOWN(1)	1.25±0.39E-09	0.92±1.09E-10	9.07±3.28E-10	2.25±0.13E-03
909	DOWN(2)	1.11±0.26E-09	4.51±6.26E-11	9.55±2.36E-10	2.59±0.08E-03
909	DOWN(4)	1.16±0.33E-09	3.42±6.71E-11	1.03±0.30E-09	2.29±0.12E-03

Table E - 15

Modified Practical Quantitation Limits (PQLs) in µg/L for Appendix 33 Parameters

COMPOUND	PQL	COMPOUND	PQL
Appendix 33 Volatiles		*Appendix 33 Volatiles*	
Acetone	10	Methacrylonitrile	5
Acetonitrile	100	Methyl ethyl ketone	10
Acrolein	5	Methyl iodide	5
Acrylonitrile	5	Methyl methacrylate	5
Allyl chloride	5	4-Methyl-2-pentanone	10
Benzene	5	Methylene bromide	10
Bromodichloromethane	5	Methylene chloride	5
Bromoform	5	Pentachloroethane	5
Bromomethane	10	Propionitrile	50
Carbon disulfide	10	Styrene	5
Carbon tetrachloride	5	1,1,1,2-Tetrachloroethane	5
Chlorobenzene	5	1,1,2,2-Tetrachloroethane	5
Chloroethane	10	Tetrachloroethylene	5
Chloroform	5	Toluene	5
Chloromethane	10	1,1,1-Trichloroethane	5
Chloroprene	5	1,1,2-Trichloroethane	5
1,2-Dibromo-3-chloropropane	5	1,2,3-Trichloropropane	5
Dibromochloromethane	5	Vinyl acetate	10
1,2-Dibromoethane	5	Vinyl chloride	10
Dichlorodifluoromethane	5	Xylene (total)	5
1,1-Dichloroethane	5	cis-1,3-Dichloropropene	5
1,2-Dichloroethane	5	trans-1,2-Dichloroethylene	5
1,1-Dichloroethylene	5	trans-1,3-Dichloropropene	5
1,2-Dichloropropane	5	trans-1,4-Dichloro-2-butene	5
Ethyl benzene	5	Trichloroethylene	5
Ethyl methacrylate	5	Trichlorofluoromethane	5
2-Hexanone	10		
Isobutyl alcohol	100		
Metals		*Metals*	
Aluminum	200	Manganese	15
Antimony	10	Lead	3
Arsenic	10	Mercury	0.2
Barium	200	Nickel	5 or 40**
Beryllium	1	Selenium	5
Cadmium	5	Silver	10
Chromium	5 or 10**	Thallium	10
Cobalt	50	Tin	3000
Copper	25	Vanadium	50
Iron	100	Zinc	20

*** Ni and Cr - Lower PQL per WVDP-266, Field Data Collection Plan (West Valley Nuclear Services Co., Inc. and Dames & Moore December 1996)*

Note: Specific quantitation limits are highly matrix-dependent and may not always be achievable.

Table E - 15 (*continued*)

Modified Practical Quantitation Limits (PQLs) in µg/L for Appendix 33 Parameters

COMPOUND	PQL
Appendix 33 Semivolatiles	
Acenaphthene	10
Acenaphthylene	10
Acetophenone	10
2-Acetylaminofluorene	10
4-Aminobiphenyl	10
Aniline	10
Anthracene	10
Aramite	10
Benzo[a]anthracene	10
Benzo[a]pyrene	10
Benzo[b]fluoranthene	10
Benzo[ghi]perylene	10
Benzo[k]fluoranthene	10
Benzyl alcohol	10
Bis(2-chlorethyl)ether	10
Bis(2-chloroethoxy)methane	10
Bis(2-chloroisopropyl)ether	10
Bis(2-ethylhexyl)phthalate	10
Bis(2-chloro-1- methylethyl) ether	10
4-Bromophenyl phenyl ether	10
Butyl benzyl phthalate	10
Chlorobenzilate	10
2-Chloronaphthalene	10
2-Chlorophenol	10
4-Chlorophenyl phenyl ether	10
Chrysene	10
Di-n-butyl phthalate	10
Di-n-octyl phthalate	10
Diallate	10
Dibenz[a,h]anthracene	10
Dibenzofuran	10
3,3-Dichlorobenzidine	10
2,4-Dichlorophenol	10
2,6-Dichlorophenol	10
Diethyl phthalate	10
Dimethoate	10
7, 12-Dimethylbenz[a]anthracene	10
3,3-Dimethylbenzidine	20
2,4-Dimethylphenol	10
Dimethyl phthalate	10
4,6-Dinitro-o-cresol	25
2,4-Dinitrophenol	25

COMPOUND	PQL
Appendix 33 Semivolatiles	
2,4-Dinitrotoluene	10
2,6-Dinitrotoluene	10
Diphenylamine	10
Ethyl methanesulfonate	10
Famphur	10
Fluoranthene	10
Fluorene	10
Hexachlorobenzene	10
Hexachlorobutadiene	10
Hexachlorocyclopentadiene	10
Hexachloroethane	10
Hexachlorophene	500
Hexachloropropene	10
Indeno(1,2,3,-cd)pyrene	10
Isodrin	10
Isophorone	10
Isosafrole	10
Kepone	70
Methapyrilene	10
Methyl methanesulfonate	10
3-Methylcholanthrene	10
2-Methylnaphthalene	10
1,4-Naphthoquinone	10
1-Naphthylamine	10
2-Naphthylamine	10
Nitrobenzene	10
5-Nitro-o-toluidine	10
4-Nitroquinoline 1-oxide	50
N-Nitrosodi-n-butylamine	10
N-Nitrosodiethylamine	10
N-Nitrosodipropylamine	10
N-Nitrosodimethylamine	10
N-Nitrosodipropylamine	10
N-Nitrosodiphenylamine	10
N-Nitrosomethylethylamine	10
N-Nitrosomorpholine	10
N-Nitrosopiperidine	10
N-Nitrosopyrrolidine	10
Naphthalene	10
0,0,0-Triethyl phosphorothioate	10
0,0-Diethyl 0-2-pyrazinyl- phosphorothioate	10

Note: Specific quantitation limits are highly matrix-dependent and may not always be achievable.

Table E - 15 (concluded)

Modified Practical Quantitation Limits (PQLs) in µg/L for Appendix 33 Parameters

COMPOUND	PQL	COMPOUND	PQL
Appendix 33 Semivolatiles		*Appendix 33 Semivolatiles*	
p-(Dimethylamino)azobenzene	10	2,3,4,6-Tetrachlorophenol	10
p-Chloroaniline	10	Tetraethyl dithiopyrophosphate	10
p-Chloro-m-cresol	10	1,2,4-Trichlorobenzene	10
p-Cresol	10	2,4,5-Trichlorophenol	25
p-Dichlorobenzene	10	2,4,6-Trichlorophenol	10
p-Nitroaniline	25	alpha,alpha-Dimethylphenethylamine	50
p-Nitrophenol	25	m-Cresol	10
p-Phenylenediamine	20	m-Dichlorobenzene	10
Parathion	10	m-Dinitrobenzene	10
Pentachlorobenzene	10	m-Nitroaniline	25
Pentachloronitrobenzene	10	o-Cresol	10
Pentachlorophenol	25	o-Dichlorobenzene	10
Phenacetin	10	o-Nitroaniline	25
Phenanthrene	10	o-Nitrophenol	10
Phenol	10	o-Toluidine	10
Pronamide	10	sym-Trinitrobenzene	10
Pyrene	10	2-Picoline	10
Safrole	10	Pyridine	10
1,2,4,5-Tetrachlorobenzene	10	1,4-Dioxane	10

Note: Specific quantitation limits are highly matrix-dependent and may not always be achievable.

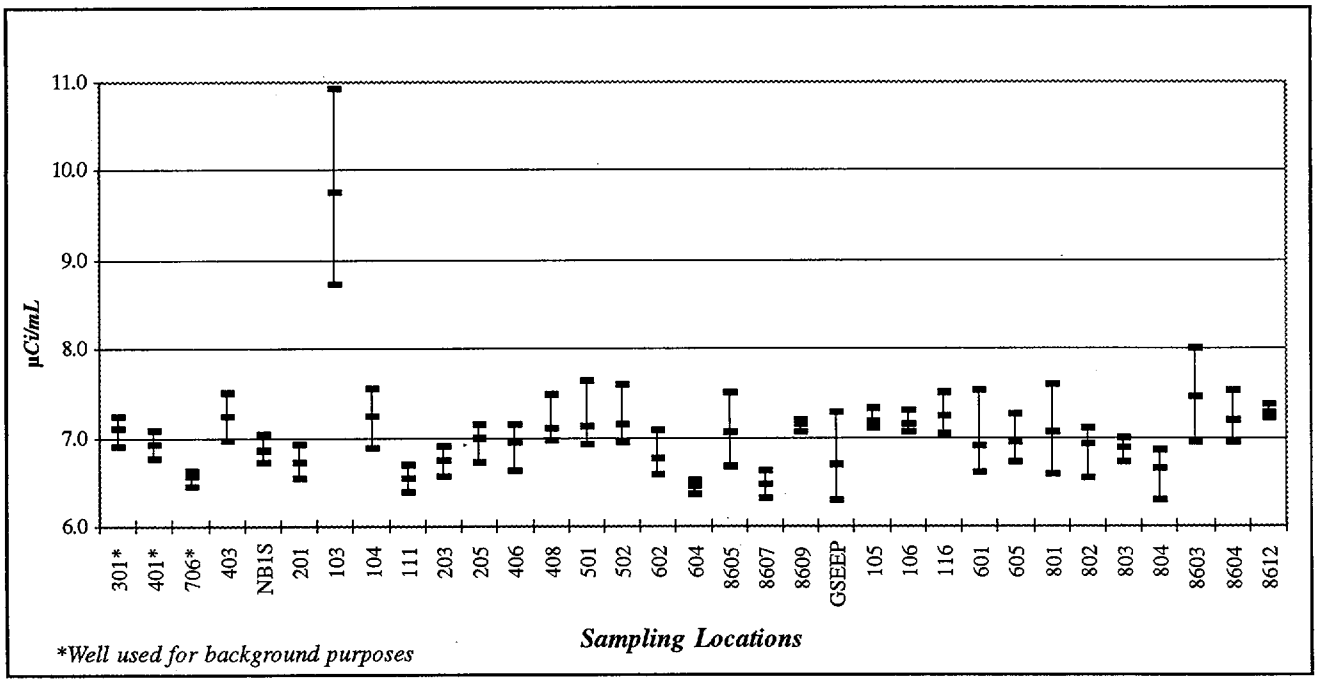


Figure E-1. pH in Groundwater Samples from the Sand and Gravel Unit

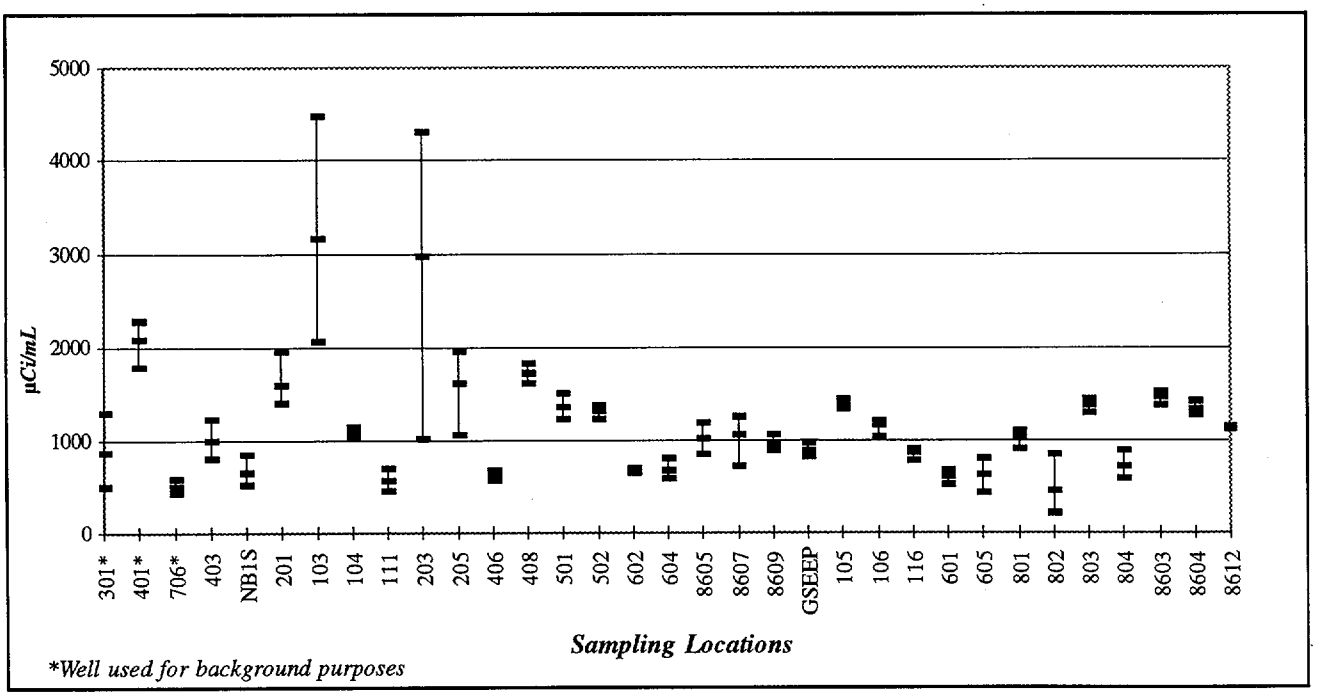


Figure E-2. Conductivity (µmhos/cm@25°C) in Groundwater Samples from the Sand and Gravel Unit

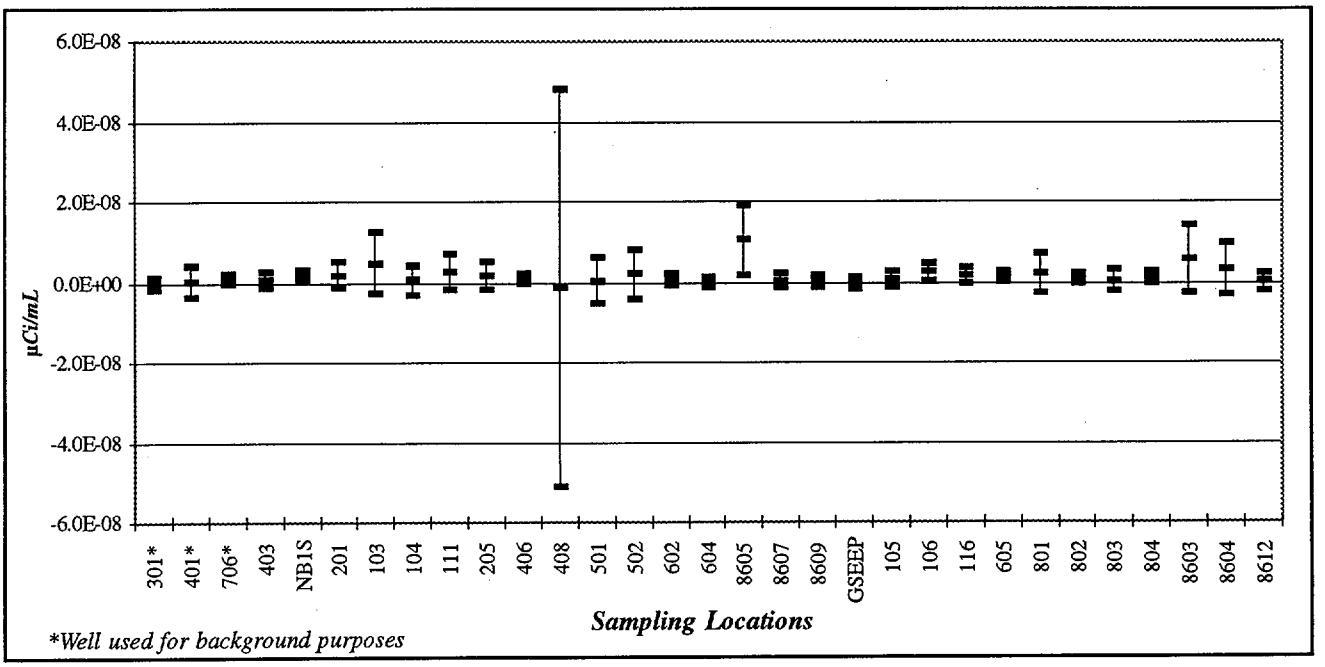


Figure E-3. Gross Alpha (µCi/mL) in Groundwater Samples from the Sand and Gravel Unit (Fig. E-3a follows with magnified scale.)

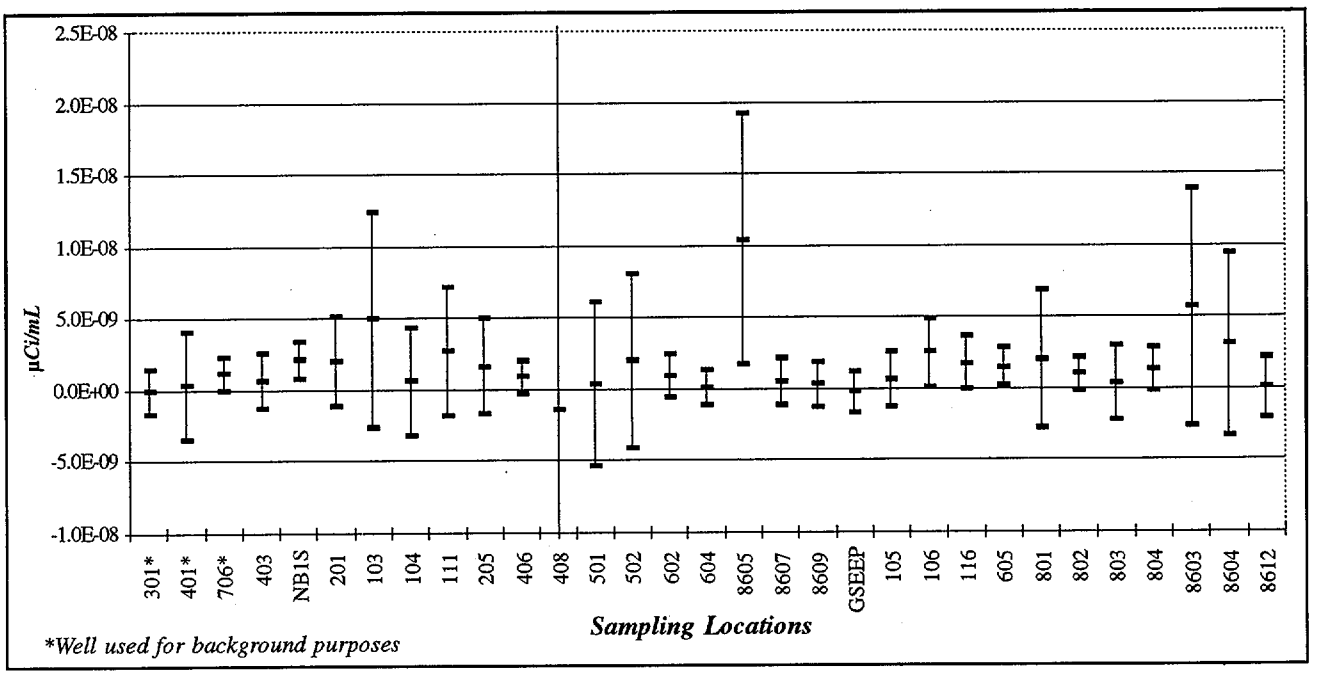


Figure E-3a. Gross Alpha (µCi/mL) in Groundwater Samples from the Sand and Gravel Unit (magnified scale of Fig. E-3)

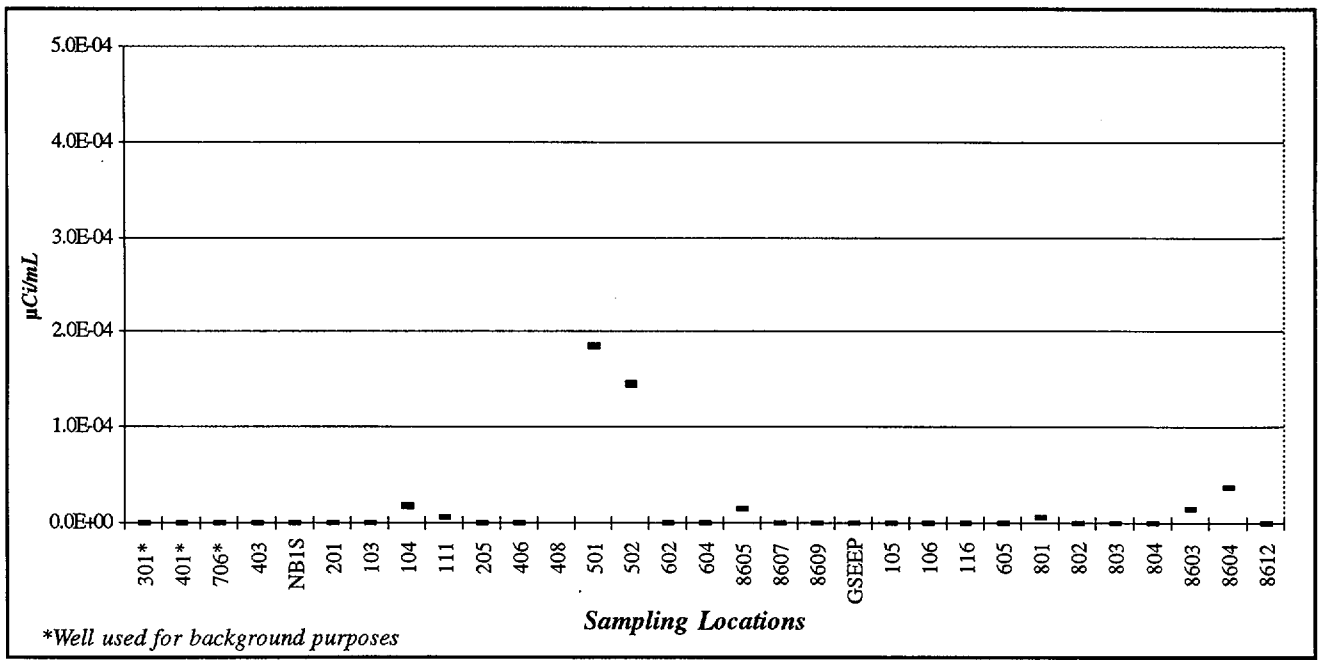


Figure E-4. Gross Beta (µCi/mL) in Groundwater Samples from the Sand and Gravel Unit (Fig. E-4a follows with magnified scale.)

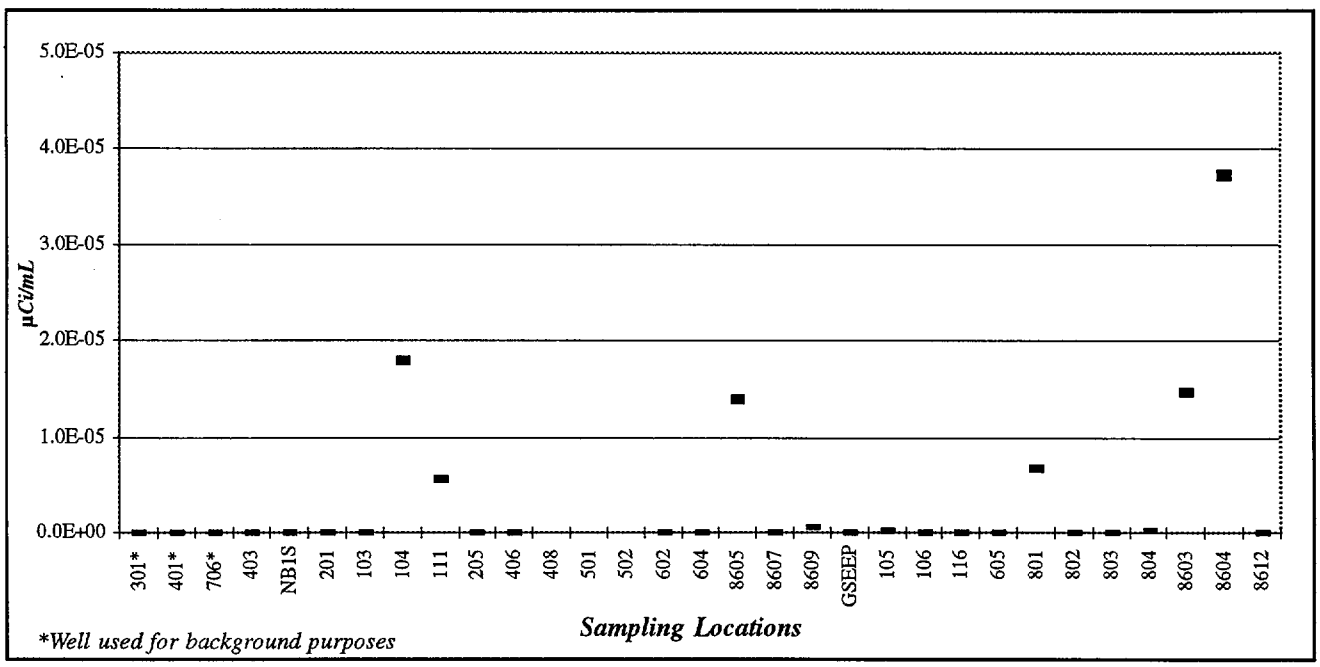


Figure E-4a. Gross Beta (µCi/mL) in Groundwater Samples from the Sand and Gravel Unit (magnified scale of Fig. E-4)*

** Wells with results greater than the maximum value of the Y-axis are not shown in Fig. E-4a. Please refer to Fig. E-4.*

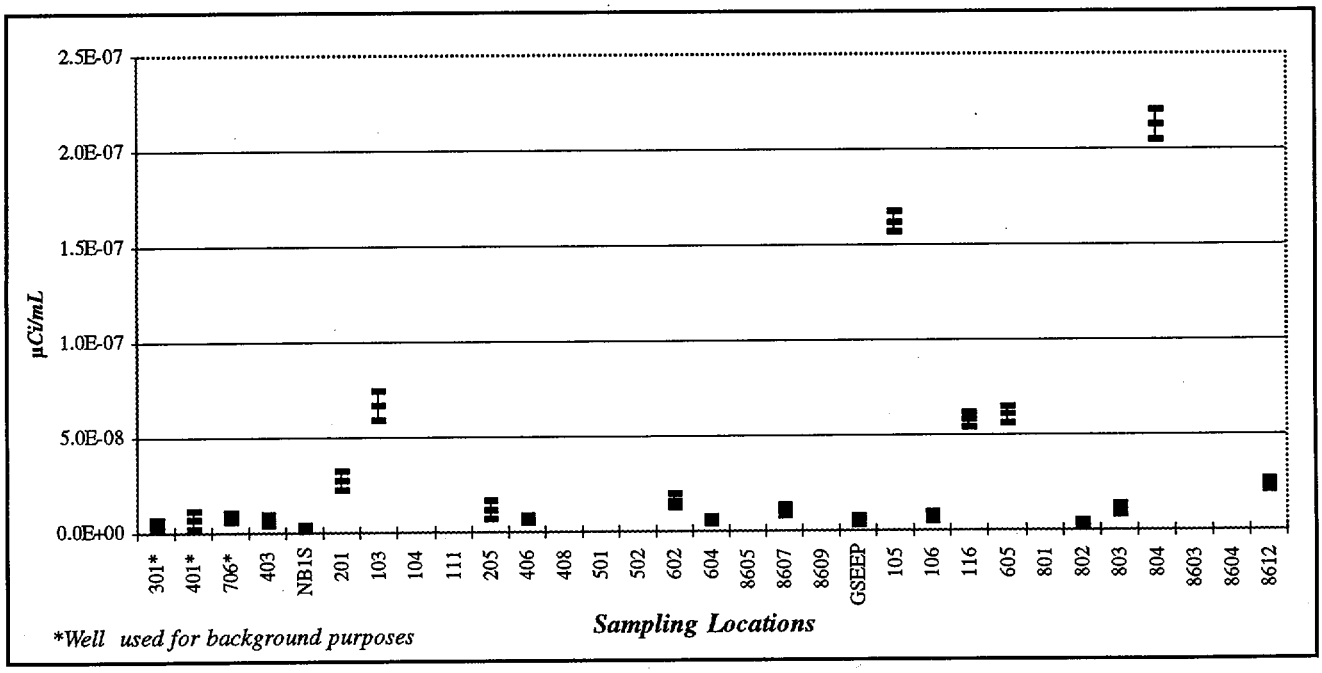


Figure E-4b. Gross Beta (µCi/mL) in Groundwater Samples from the Sand and Gravel Unit (magnified scale of Fig. E-4a)*

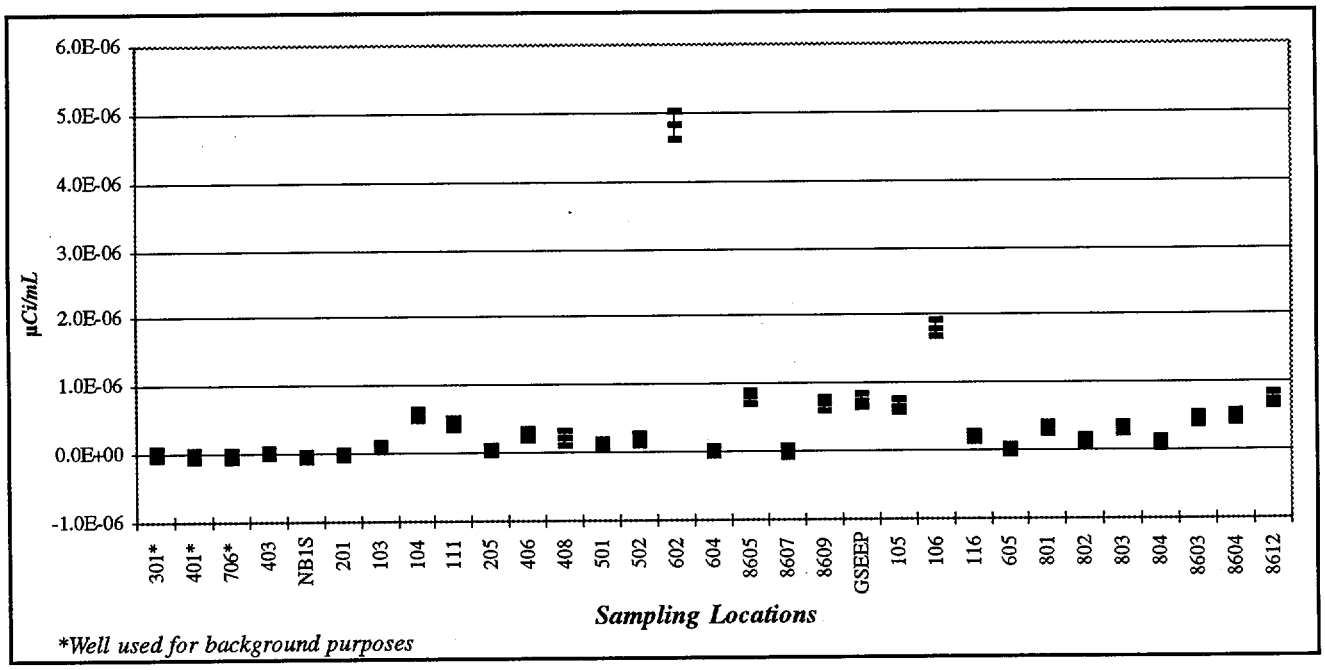


Figure E-5. Tritium Activity (µCi/mL) in Groundwater Samples from the Sand and Gravel Unit (Fig. E-5a follows with magnified scale.)

** Wells with results greater than the maximum value of the Y-axis are not shown in Fig. E-4b. Please refer to Fig. E-4 and E-4a.*

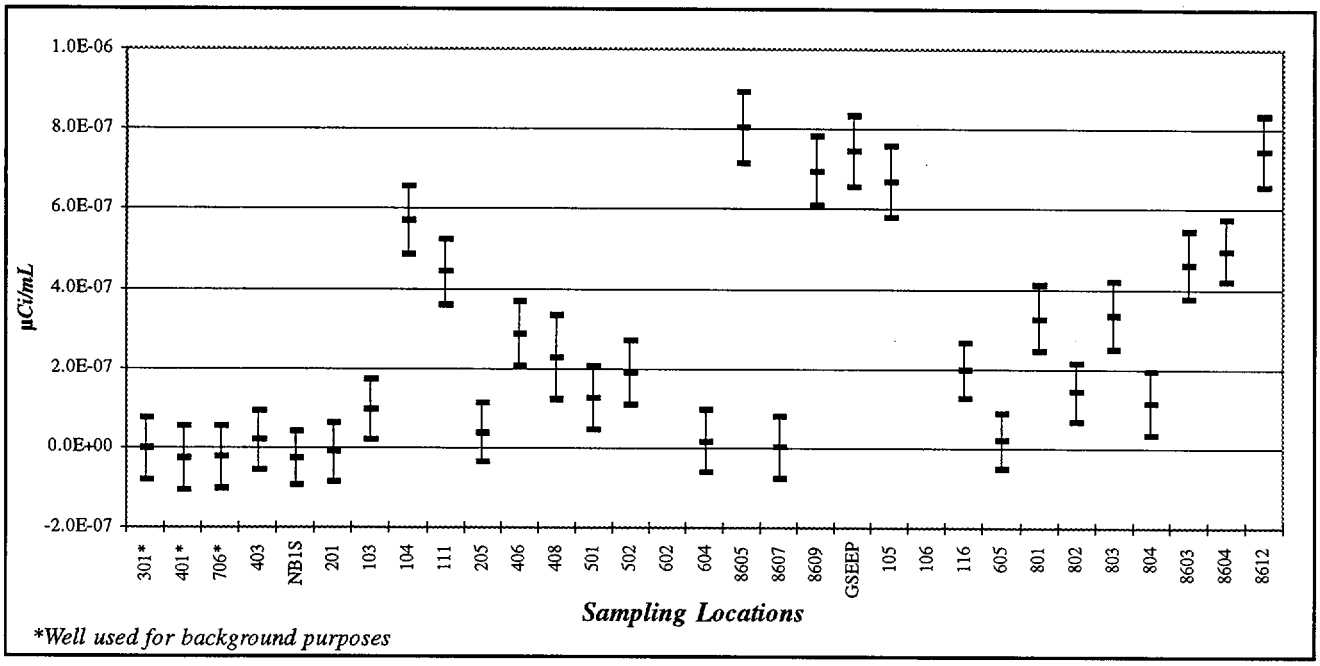


Figure E-5a. Tritium Activity (µCi/mL) in Groundwater Samples from the Sand and Gravel Unit (magnified scale of Fig. E-5)*

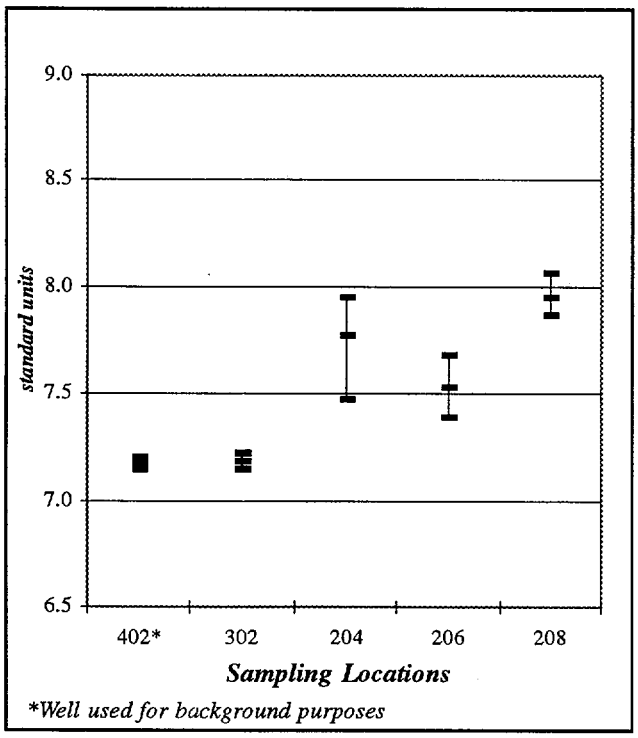


Figure E-6. pH of Groundwater Samples from the Till-sand Unit

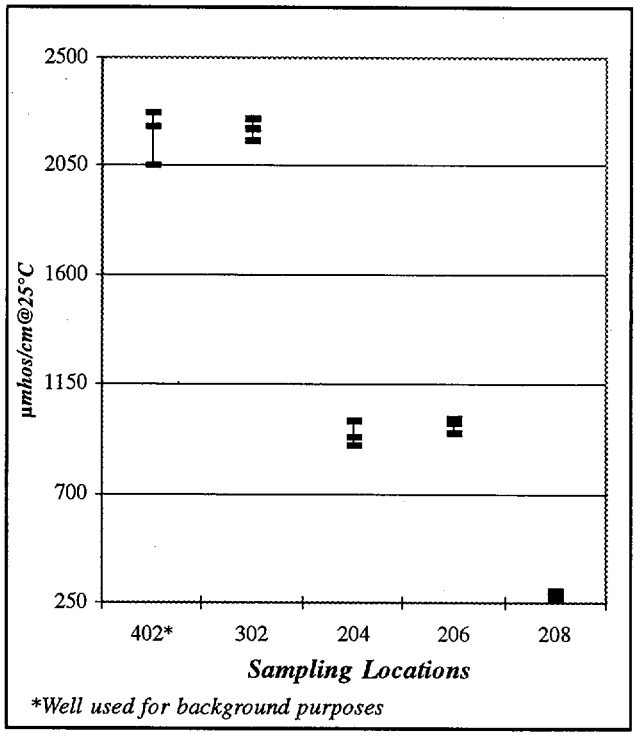


Figure E-7. Conductivity (µmhos/cm@25°C) of Groundwater Samples from the Till-sand Unit

** Wells with results greater than the maximum value of the Y-axis are not shown in Fig. E-5a. Please refer to Fig. E-5.*

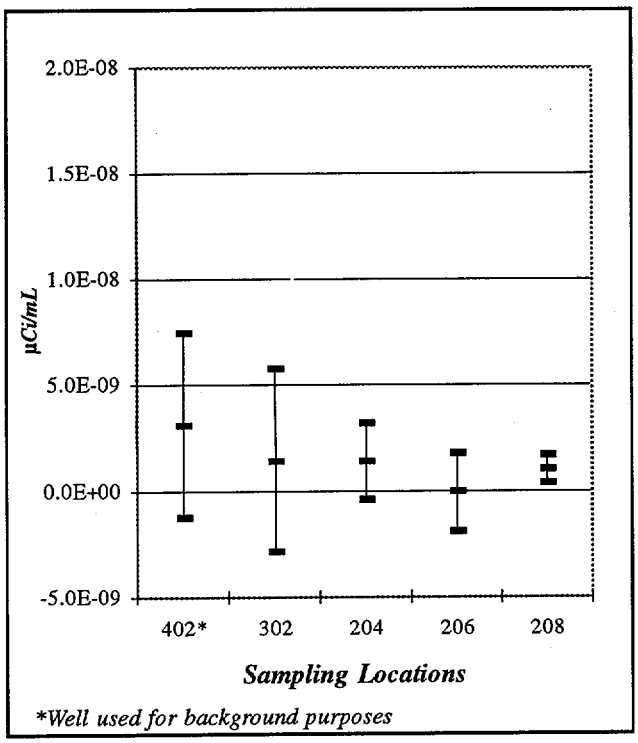


Figure E-8. Gross Alpha (µCi/mL) in Groundwater Samples from the Till-sand Unit

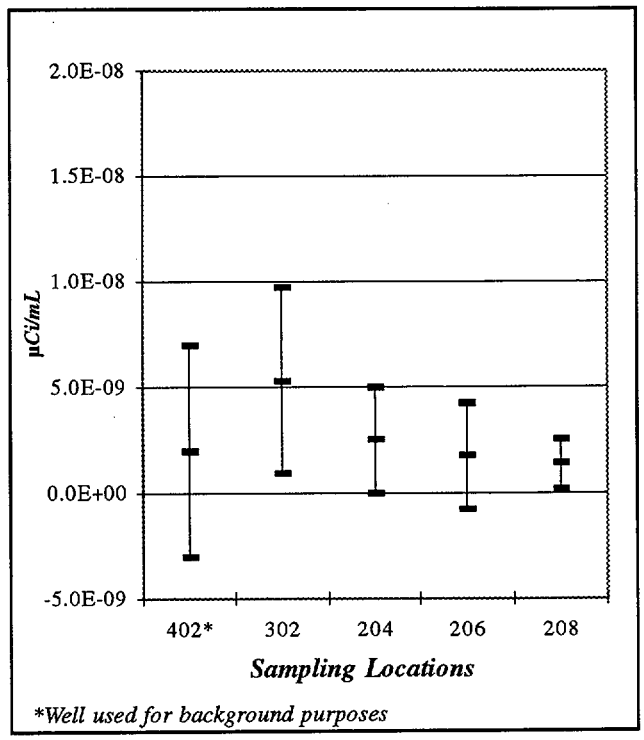


Figure E-9. Gross Beta (µCi/mL) in Groundwater Samples from the Till-sand Unit

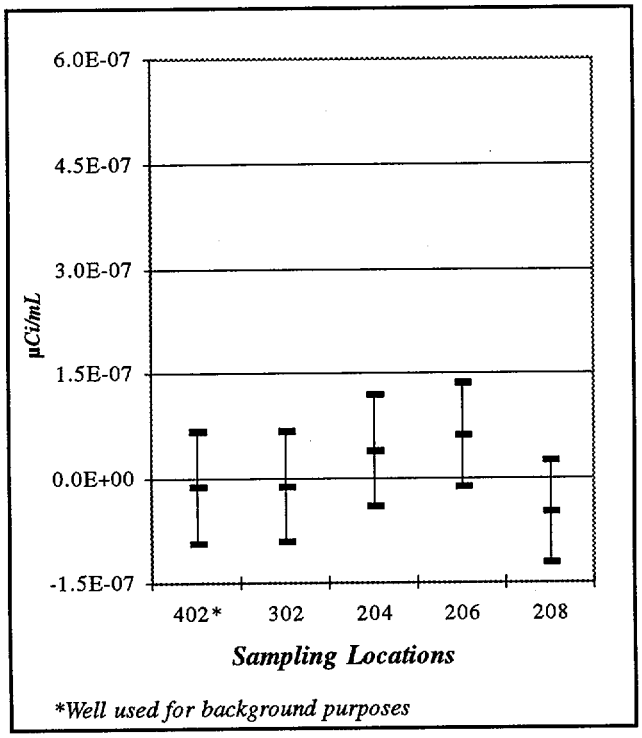


Figure E-10. Tritium Activity (µCi/mL) in Groundwater Samples from the Till-sand Unit

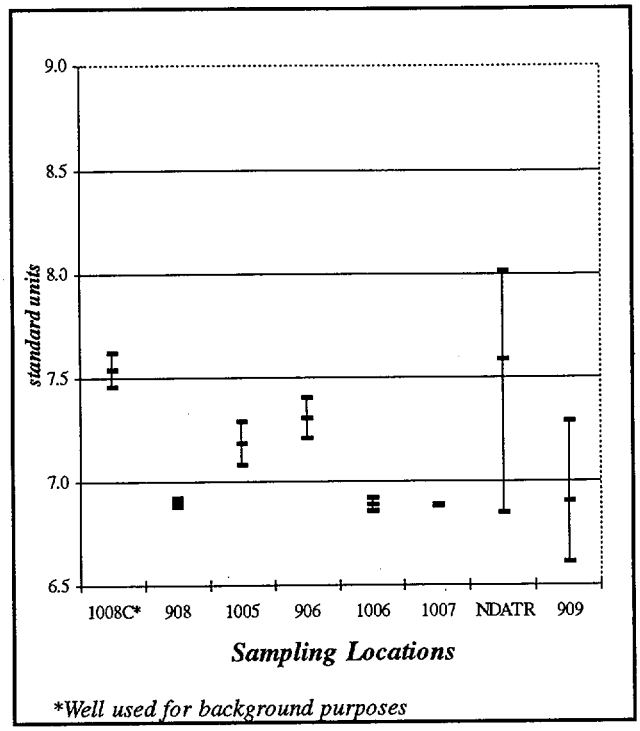


Figure E-11. pH of Groundwater Samples from the Weathered Lavery Till Unit

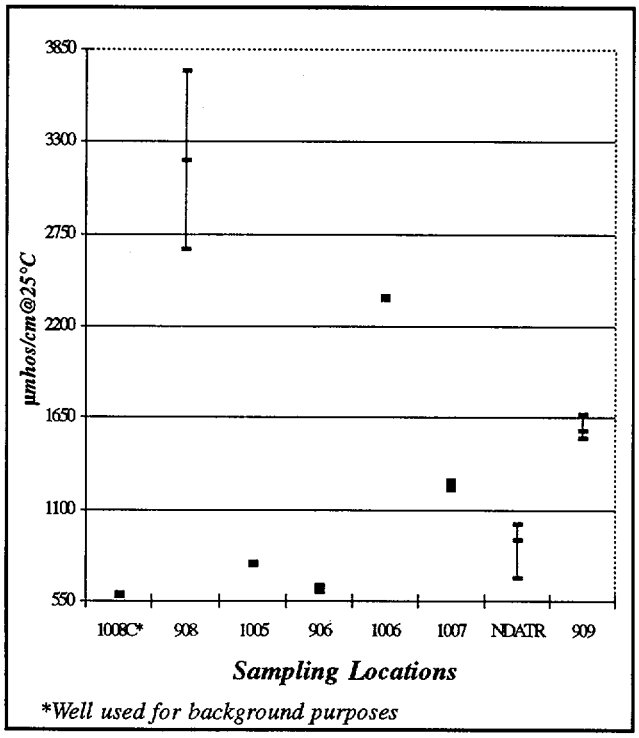


Figure E-12. Conductivity (µmhos/cm@25°C) of Groundwater Samples from the Weathered Lavery Till Unit

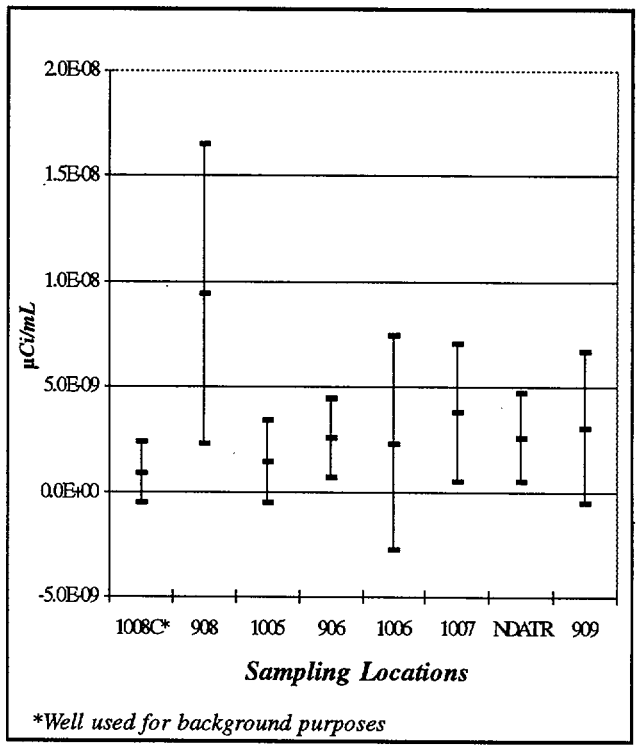


Figure E-13. Gross Alpha (µCi/mL) in Groundwater Samples from the Weathered Lavery Till Unit

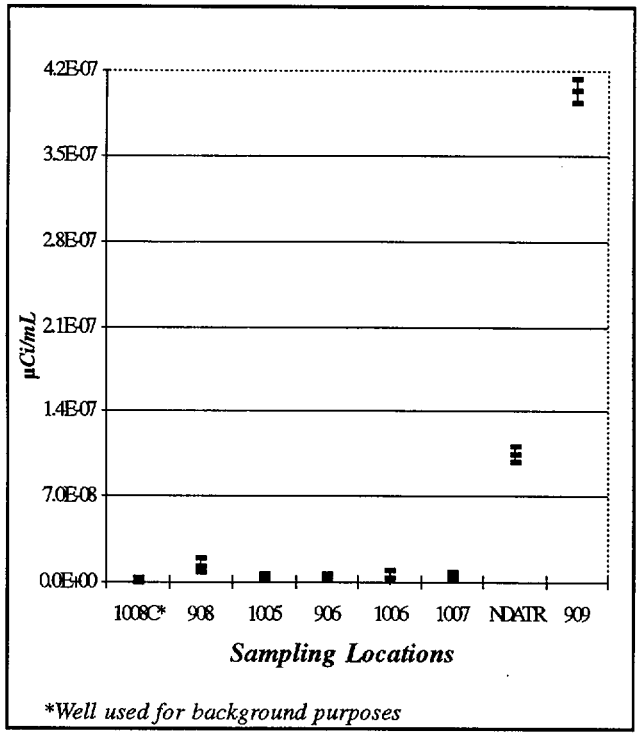


Figure E-14. Gross Beta (µCi/mL) in Groundwater Samples from the Weathered Lavery Till Unit (Fig. E-14a follows with magnified scale)

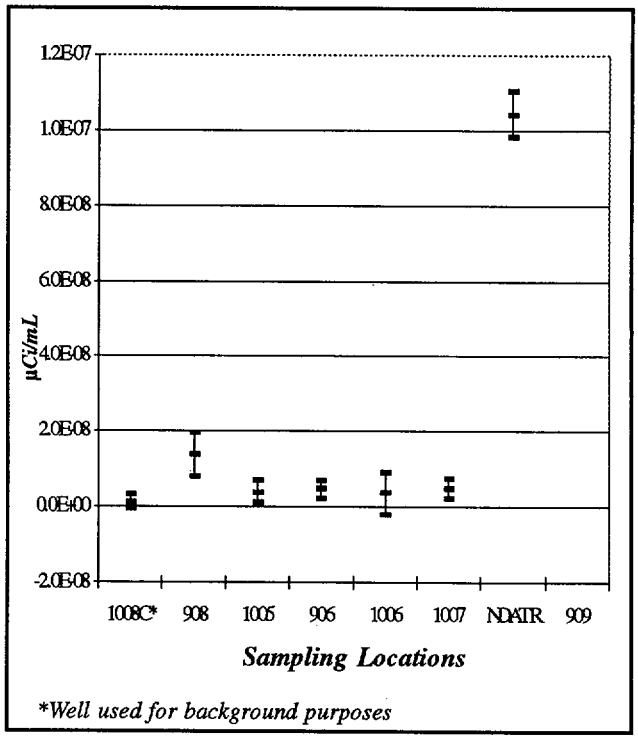


Figure E-14a. Gross Beta (µCi/mL) in Groundwater Samples from the Weathered Lavery Till Unit (magnified scale of Fig. E-14)*

** Wells with results greater than the maximum value of the Y-axis are not shown in Fig. E-14a. Please refer to Fig. E-14.*

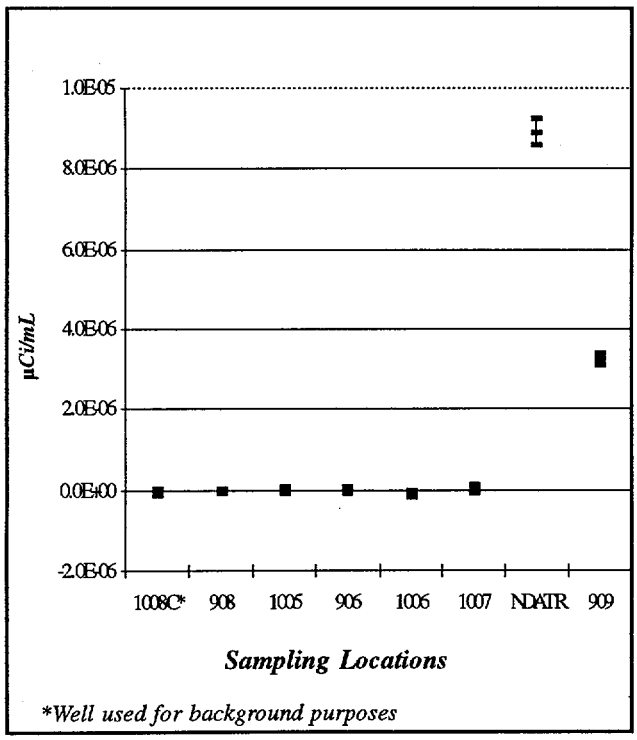


Figure E-15. Tritium Activity (µCi/mL) in Groundwater Samples from the Weathered Lavery Till Unit

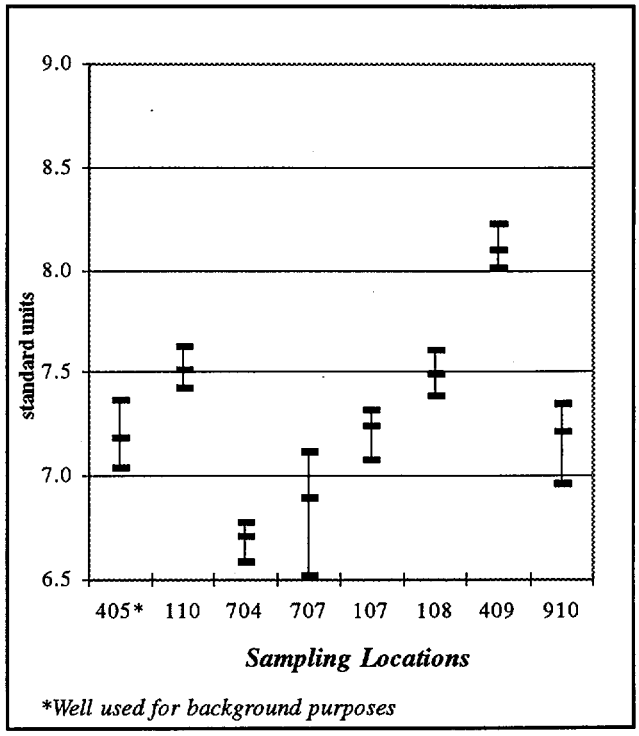


Figure E-16. pH of Groundwater Samples from the Unweathered Lavery Till Unit

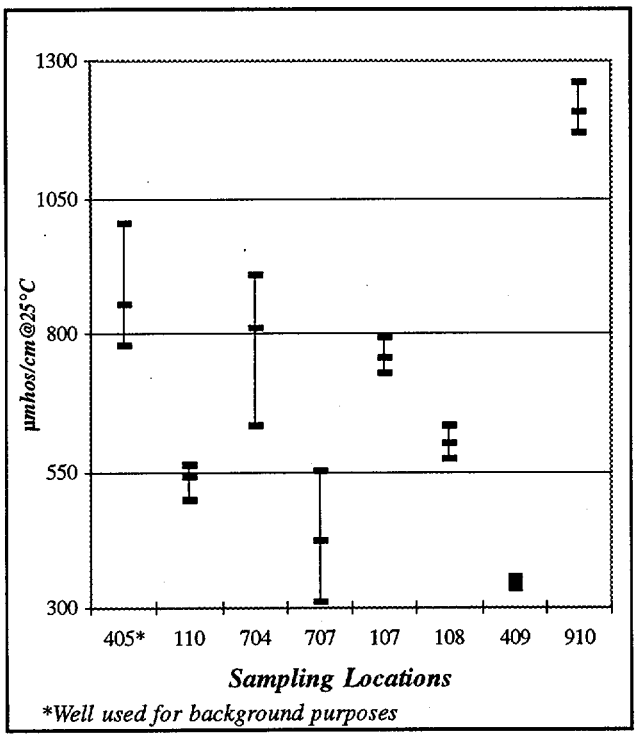


Figure E-17. Conductivity (µmhos/cm@25°C) of Groundwater Samples from the Unweathered Lavery Till Unit

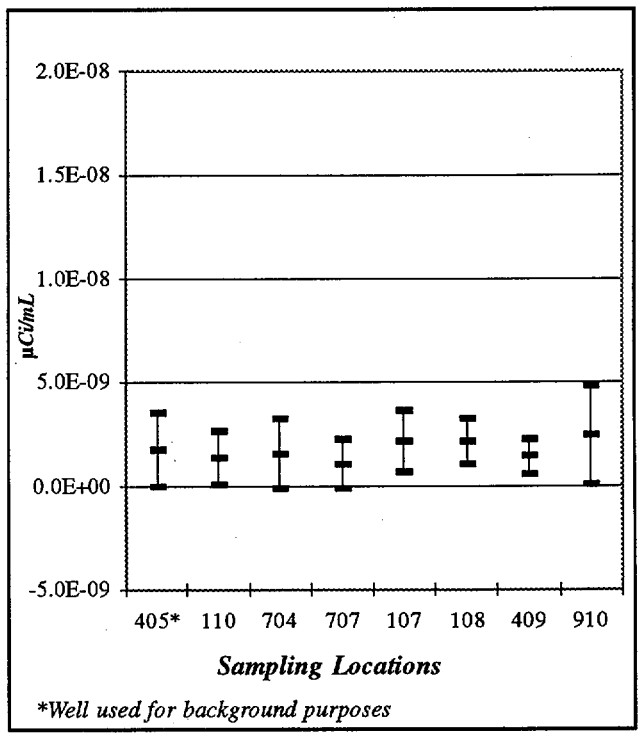


Figure E-18. Gross Alpha (µCi/mL) in Groundwater Samples from the Unweathered Lavery Till Unit

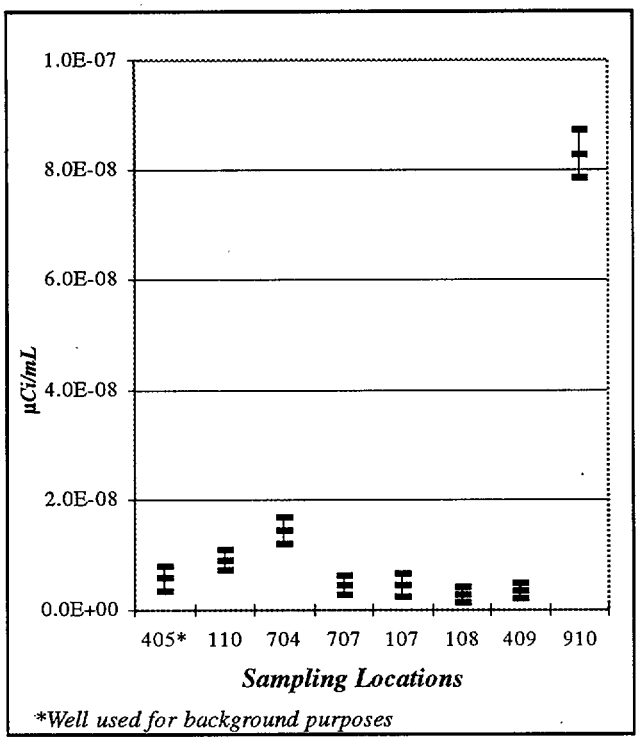


Figure E-19. Gross Beta (µCi/mL) in Groundwater Samples from the Unweathered Lavery Till Unit (Fig. E-19a follows with magnified scale)

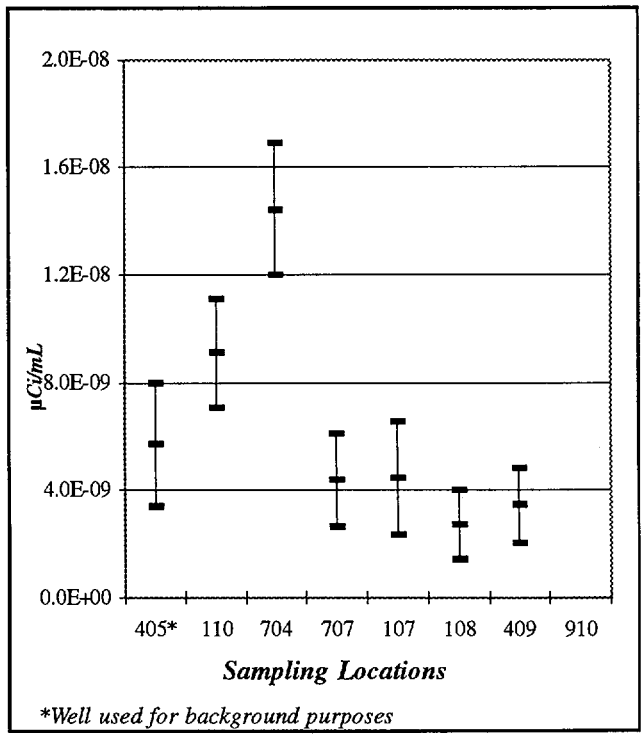


Figure E-19a. Gross Beta (µCi/mL) in Groundwater Samples from the Unweathered Lavery Till Unit (magnified scale of Fig. E-19)*

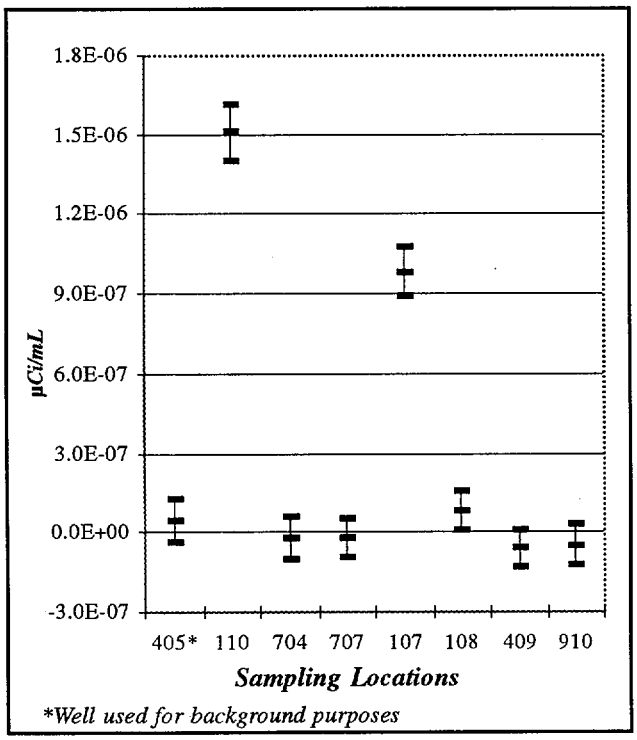


Figure E-20. Tritium Activity (µCi/mL) in Groundwater Samples from the Unweathered Lavery Till Unit

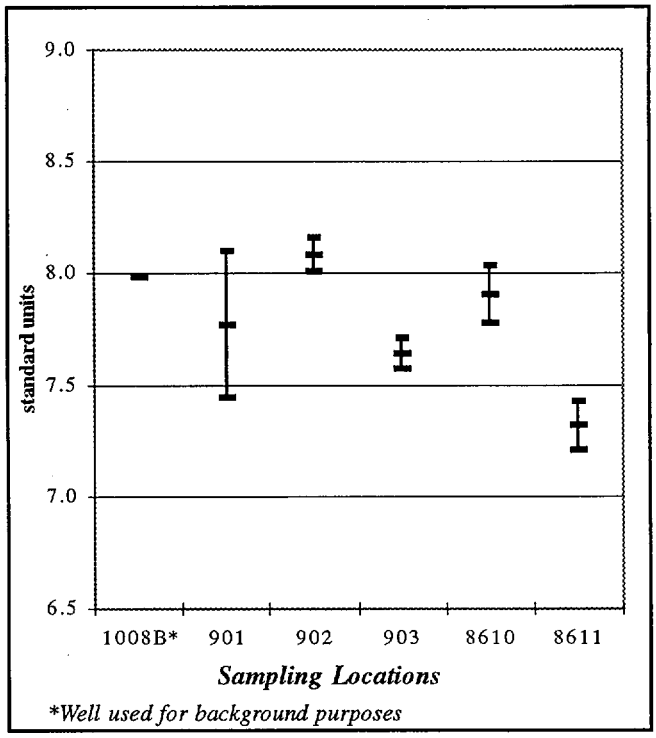


Figure E-21. pH of Groundwater Samples from the Kent Recessional Sequence

** Wells with results greater than the maximum value of the Y-axis are not shown in Fig. E-19a. Please refer to Fig. E-19.*

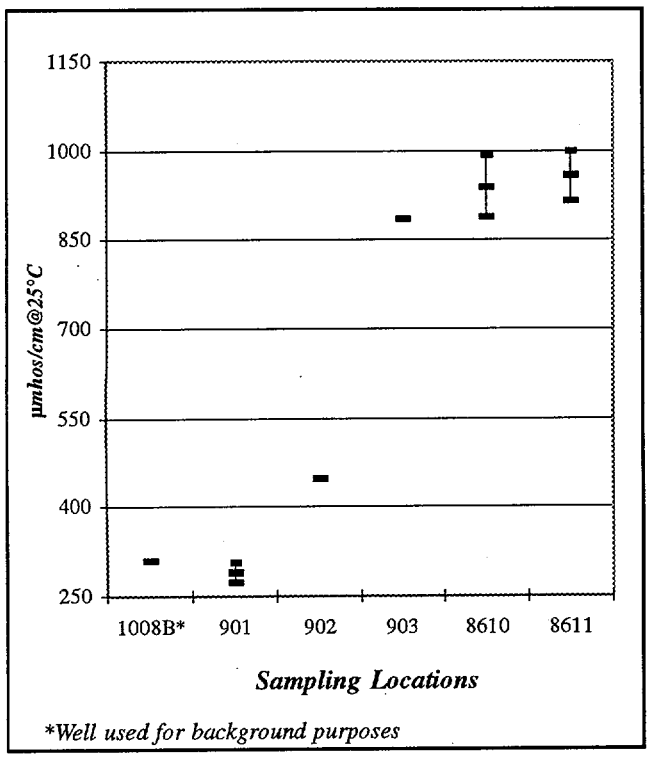


Figure E-22. Conductivity (µmhos/cm@25°C) of Groundwater Samples from the Kent Recessional Sequence

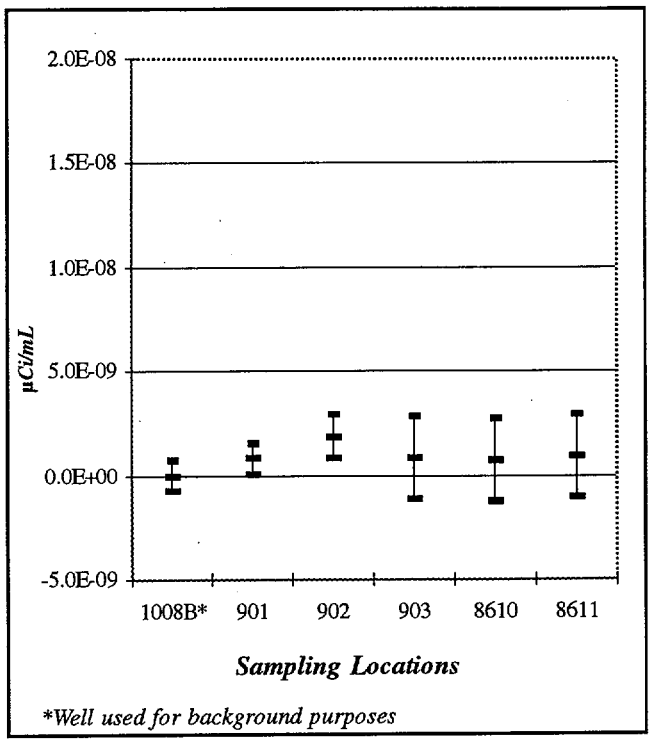


Figure E-23. Gross Alpha (µCi/mL) in Groundwater Samples from the Kent Recessional Sequence

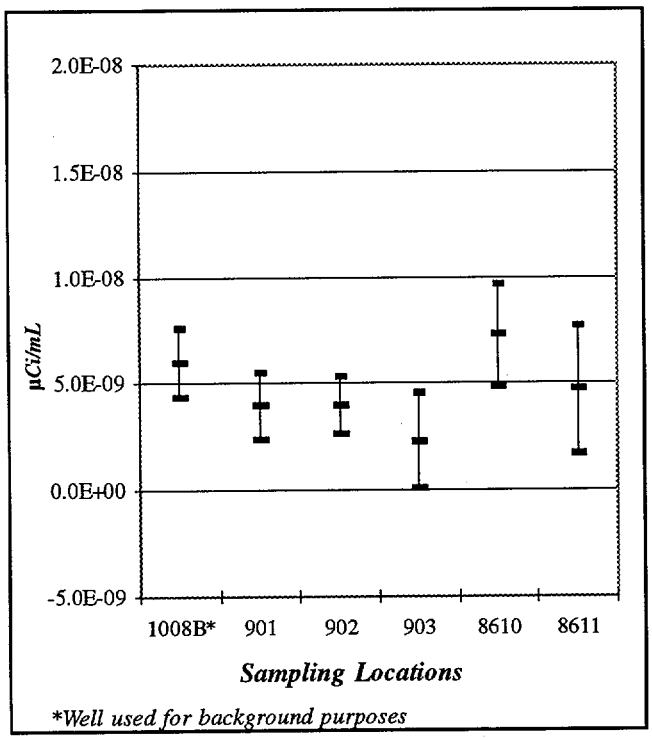


Figure E-24. Gross Beta (µCi/mL) in Groundwater Samples from the Kent Recessional Sequence

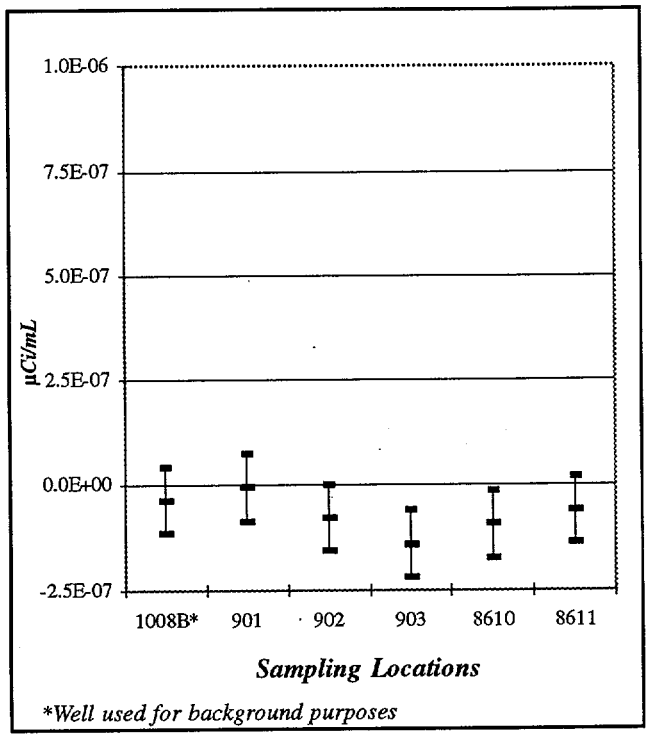


Figure E-25. Tritium Activity (µCi/mL) in Groundwater Samples from the Kent Recessional Sequence

Appendix F

Summary of Biological Data

Milk and Meat Samples are Collected from Local Bovine Herds

Table F - 1

1998 Radioactivity Concentrations (µCi/mL) in Milk

Location	H-3	K-40	Sr-90	I-129	Cs-137
BFMCOBO (WNW Farm)					
1st Quarter	3.12±1.08E-07	1.48±0.18E-06	9.18±4.25E-10	0.02±6.66E-10	0.72±2.18E-09
2nd Quarter	2.03±1.11E-07	9.43±1.08E-07	5.06±0.41E-09	-0.56±2.26E-10	0.43±1.65E-09
3rd Quarter	1.86±0.94E-07	1.41±0.15E-06	3.90±0.99E-09	1.98±3.20E-10	0.89±1.69E-09
4th Quarter	0.00±8.15E-08	1.44±0.15E-06	1.22±0.28E-09	3.91±4.77E-10	0.87±1.59E-09
BFMCTLN (Control)					
1st Quarter	5.78±1.19E-07	1.51±0.18E-06	6.82±5.64E-10	2.76±6.13E-10	0.55±2.16E-09
2nd Quarter	2.31±1.09E-07	1.24±0.14E-06	1.14±0.31E-09	0.60±1.85E-10	0.11±1.69E-09
3rd Quarter	2.76±0.96E-07	1.47±0.16E-06	2.82±0.74E-09	-0.06±2.37E-10	1.31±1.62E-09
4th Quarter	0.00±8.14E-08	1.35±0.15E-06	8.78±3.10E-10	0.96±1.99E-10	1.05±1.71E-09
BFMCTLS (Control)					
1st Quarter	4.03±1.10E-07	1.43±0.17E-06	1.02±0.43E-09	2.20±6.80E-10	-0.27±2.25E-09
2nd Quarter	1.37±1.09E-07	9.86±1.14E-07	1.53±0.29E-09	-0.45±1.92E-10	-0.81±1.70E-09
3rd Quarter	2.38±0.92E-07	1.46±0.16E-06	3.29±0.99E-09	1.82±2.66E-10	0.21±1.75E-09
4th Quarter	-3.00±8.01E-08	1.40±0.15E-06	7.58±2.49E-10	-0.49±2.01E-10	0.77±1.71E-09
BFMREED (NNW Farm)					
1st Quarter	-0.33±1.01E-07	1.35±0.16E-06	1.45±0.52E-09	4.46±6.47E-10	-0.92±2.30E-09
2nd Quarter	2.60±1.42E-07	1.16±0.13E-06	1.64±0.40E-09	0.89±2.01E-10	-0.45±1.57E-09
3rd Quarter	3.27±9.38E-08	1.35±0.15E-06	2.11±0.17E-08	0.82±2.01E-10	0.58±1.56E-09
4th Quarter	-2.98±7.95E-08	1.30±0.14E-06	2.51±0.38E-09	5.34±6.72E-10	-0.06±1.56E-09
BFMSCHT (S Farm)					
Annual	3.09±8.89E-08	1.24±0.14E-06	5.56±1.22E-09	2.88±4.29E-10	0.12±1.66E-09
BFMWIDR (SE Farm)					
Annual	-6.20±8.59E-08	1.29±0.14E-06	1.16±0.69E-09	1.43±3.99E-10	1.74±2.65E-09

Table F - 2

1998 Radioactivity Concentrations (µCi/g - Dry) in Meat

1998 Radioactivity Concentrations in Beef

Location	% Moisture	H-3 (µCi/mL)	K-40	Sr-90	Cs-137
Beef Flesh Background (BFBCTRL 06/98)	76.7	2.97±1.11E-07	1.63± 0.17E-05	1.65± 2.53E-09	0.18±1.20E-08
Beef Flesh Background (BFBCTRL 10/98)	63.5	-6.75± 9.59E-08	7.55±1.07E-06	2.87±1.74E-09	-0.01±1.69E-08
Beef Flesh Near-Site (BFBNEAR 06/98)	73.2	2.32±1.09E-07	1.04±0.14E-05	1.83±1.91E-09	0.33±1.76E-08
Beef Flesh Near-Site (BFBNEAR 10/98)	56.7	-6.30± 8.95E-08	7.93±1.13E-06	4.99±0.92E-09	2.46±1.87E-08

1998 Radioactivity Concentrations in Venison

Location	% Moisture	H-3 (µCi/mL)	K-40	Sr-90	Cs-137
Deer Flesh Background (BFDCTRL)	70.7	-3.00±7.77E-08	1.04±0.13E-05	9.78±1.79E-09	5.19±2.78E-08
Deer Flesh Background (BFDCTRL)	72.3	-6.00±7.66E-08	1.37±0.17E-05	2.45±1.28E-09	9.24±2.83E-08
Deer Flesh Background (BFDCTRL)	72.7	0.00±7.90E-08	2.14±0.65E-06	3.72±9.68E-10	1.67±1.87E-08
Deer Flesh Near-site (BFDNEAR)	74.6	-3.03±7.87E-08	1.21±0.14E-05	4.25±1.73E-09	2.03±1.97E-08
Deer Flesh Near-site (BFDNEAR)	72.1	0.00±7.89E-08	1.27±0.14E-05	4.93±1.51E-09	3.67±0.47E-07
Deer Flesh Near-site (BFDNEAR)	64.5	0.00±7.91E-08	1.37±0.16E-05	-0.02±1.42E-09	6.48±2.71E-08

Table F - 3

1998 Radioactivity Concentrations (µCi/g-Dry) in Food Crops

Location	% Moisture	H-3 (µCi/mL)	K-40	Co-60	Sr-90	Cs-137
CORN						
Background (BFVCTRC)	72.4	2.87±8.26E-08	8.68±1.32E-06	1.70±5.41E-08	-1.16±2.03E-09	0.00±4.26E-08
Near-Site (BFVNEAC)	82.3	0.00±8.24E-08	1.60±0.24E-05	4.07±4.40E-08	1.30±0.31E-08	3.08±4.52E-08
BEANS						
Background (BFVCTRB)	91.4	-0.37±1.03E-07	2.66±0.33E-05	2.40±4.78E-08	1.61±0.09E-07	1.94±4.60E-08
Near-Site (BFVNEAB)	90.2	0.00±9.78E-08	2.37±0.36E-05	2.78±7.89E-08	5.90±0.48E-08	-2.07±6.94E-08
APPLES						
Background (BFVCTRA)	84.9	-5.71±7.91E-08	7.52±2.13E-06	0.73±7.32E-08	2.15±0.40E-08	-0.78±5.97E-08
Near-Site (BFVNEAAF)	78.5	0.00±8.14E-08	1.02±0.17E-05	-1.67±4.01E-08	1.65±0.22E-08	1.35±3.58E-08
HAY						
Background (BFHCTRLS)	*NA*	*NA*	8.81±2.84E-06	-0.38±1.27E-07	1.17±0.04E-07	-2.03±9.45E-08
Near-Site (BFHNEAR)	*NA*	*NA*	1.36±0.31E-05	-0.78±1.10E-07	5.95±0.31E-08	0.41±1.04E-07

NA - Not applicable.

Table F - 4

1998 Radioactivity Concentrations (µCi/g - Dry) in Fish Flesh from Cattaraugus Creek

Cattaraugus Creek above the Springville Dam (BFFCATC)

1st Half 1998

Species	% Moisture	Sr-90	Cs-137
Hog-nosed Sucker	79.2	6.24±7.81E-09	6.87±7.16E-08
Hog-nosed Sucker	80.3	6.59±9.26E-09	2.02±7.88E-08
Hog-nosed Sucker	81.0	0.44±1.08E-08	1.17±0.74E-07
Hog-nosed Sucker	79.0	7.28±9.81E-09	7.03±7.63E-08
Hog-nosed Sucker	80.4	4.91±6.78E-09	1.03±0.66E-07
Hog-nosed Sucker	81.0	-1.30±1.29E-08	1.84±6.96E-08
Hog-nosed Sucker	80.2	0.73±6.82E-09	4.79±5.54E-08
Brown Trout	79.3	-0.42±2.21E-08	-0.19±1.51E-07
Brown Trout	78.3	-0.40±1.07E-08	0.52±1.64E-07
Hog-nosed Sucker	81.3	0.50±1.17E-08	6.12±9.14E-08
Average % Moisture	80.0		
Median		<1.01E-08	<8.51E-08
Maximum		<2.21E-08	1.17E-07
Minimum		<6.78E-09	<5.54E-08

2nd Half 1998

Species	% Moisture	Sr-90	Cs-137
Hog-nosed Sucker	80.7	1.43±1.46E-08	4.33±5.84E-08
Hog-nosed Sucker	81.5	-0.42±2.03E-08	4.04±6.93E-08
Hog-nosed Sucker	86.0	0.84±1.77E-08	3.98±6.97E-08
White Sucker	81.6	-0.40±7.27E-09	3.99±4.79E-08
Hog-nosed Sucker	79.3	5.88±2.14E-08	2.44±4.64E-08
Hog-nosed Sucker	79.9	2.55±1.70E-08	0.00±1.36E-07
Hog-nosed Sucker	82.2	-0.48±1.79E-08	-0.78±9.14E-08
Hog-nosed Sucker	82.0	1.86±1.70E-08	2.79±5.80E-08
Hog-nosed Sucker	79.9	1.06±1.95E-08	1.17±0.71E-07
Hog-nosed Sucker	81.5	*NA*	4.24±7.66E-08
Average % Moisture	81.5		
Median		<1.86E-08	<6.95E-08
Maximum		5.88E-08	1.17E-07
Minimum		<7.27E-09	<4.64E-08

NA - Not available.

Table F - 4 (continued)

1998 Radioactivity Concentrations (µCi/g - Dry) in Fish Flesh from Cattaraugus Creek

Cattaraugus Creek Background (BFFCTRL)

1st Half 1998

Species	% Moisture	Sr-90	Cs-137
Brown Trout	76.7	1.39±1.75E-08	-0.71±1.03E-07
Hog-nosed Sucker	81.4	-0.86±1.88E-08	-2.06±8.39E-08
Brown Trout	79.5	-0.43±1.48E-08	-0.62±1.03E-07
Hog-nosed Sucker	80.0	0.22±5.88E-09	0.00±7.71E-08
Hog-nosed Sucker	79.6	5.40±6.63E-09	-1.19±4.16E-08
Hog-nosed Sucker	79.9	1.79±9.61E-09	3.36±6.74E-08
Hog-nosed Sucker	80.4	-0.78±1.12E-08	4.22±6.47E-08
Hog-nosed Sucker	79.6	-2.38±4.68E-09	-0.72±3.75E-08
Brown Trout	79.0	-0.02±1.31E-08	7.02±9.72E-08
Brown Trout	77.9	4.80±6.33E-09	-3.16±3.38E-08
Average % Moisture	79.4		
Median		<1.04E-08	<7.23E-08
Maximum		<1.88E-08	<1.03E-07
Minimum		<4.68E-09	<3.38E-08

2nd Half 1998

Species	% Moisture	Sr-90	Cs-137
Hog-nosed Sucker	79.3	1.28±1.07E-08	2.22±2.82E-08
Hog-nosed Sucker	78.8	0.50±1.54E-08	5.86±5.84E-08
Hog-nosed Sucker	81.6	-0.39±1.08E-08	0.00±8.87E-08
Hog-nosed Sucker	80.7	-1.87±1.51E-08	0.00±1.38E-07
Brown Trout	79.8	0.35±1.06E-08	1.23±6.65E-08
Hog-nosed Sucker	80.9	-0.80±1.18E-08	7.12±6.22E-08
Hog-nosed Sucker	80.3	0.48±1.20E-08	3.56±5.86E-08
Brown Trout	78.9	1.50±1.83E-08	1.57±4.82E-08
Brown Trout	78.9	-0.79±1.91E-08	2.72±5.63E-08
Brown Trout	79.4	-0.23±1.80E-08	2.82±5.52E-08
Average % Moisture	79.9		
Median		<1.39E-08	<5.86E-08
Maximum		1.28E-08	7.12E-08
Minimum		<1.06E-08	<2.82E-08

Table F - 4 (concluded)

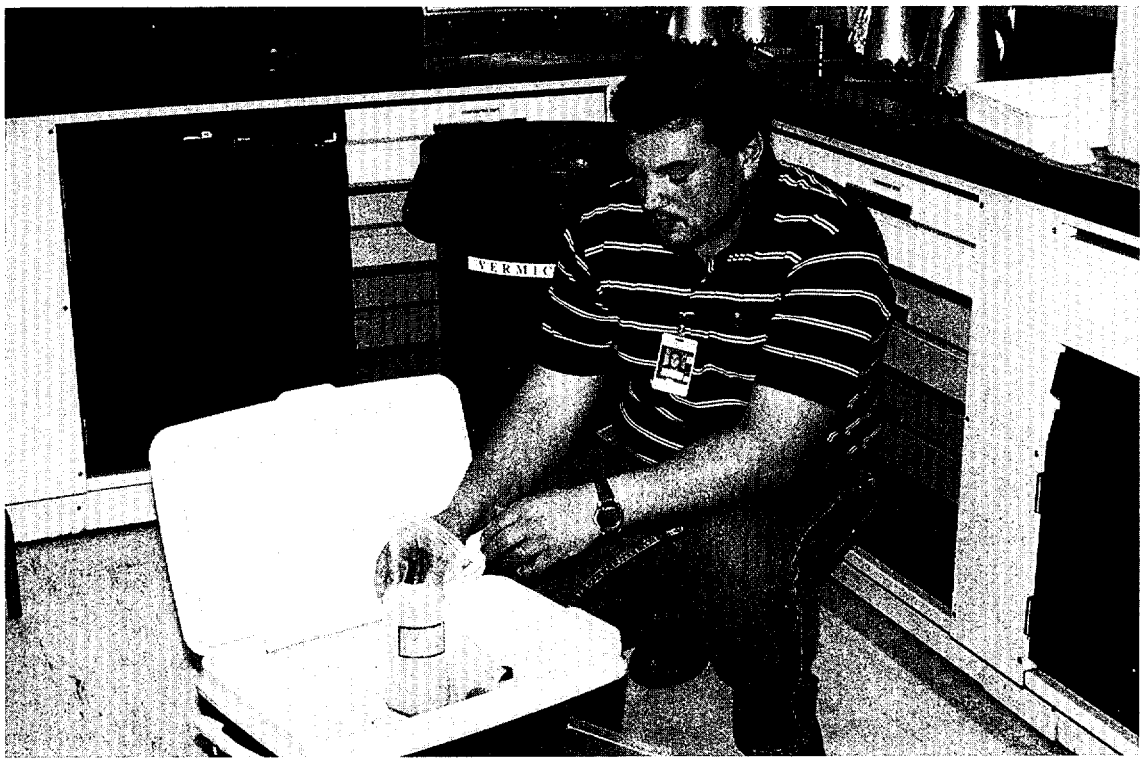
1998 Radioactivity Concentrations (µCi/g - Dry) in Fish Flesh from Cattaraugus Creek

Cattaraugus Creek below the Springville Dam (BFFCATD)

		Annual	
Species	**% Moisture**	**Sr-90**	**Cs-137**
Chinook Salmon	84.5	-1.51±2.77E-09	5.50±2.00E-08
Steelhead Trout	76.1	3.96±2.26E-09	1.93±3.01E-08
Steelhead Trout	74.0	3.16±5.93E-09	2.42±1.83E-08
Steelhead Trout	71.1	2.81±2.28E-09	1.24±1.28E-08
Steelhead Trout	75.1	4.09±4.10E-09	4.99±1.63E-08
Chinook Salmon	81.7	1.00±1.78E-09	8.12±2.71E-08
Steelhead Trout	69.8	1.63±3.22E-09	1.23±2.53E-08
Steelhead Trout	71.1	2.35±3.39E-09	0.00±2.17E-08
Steelhead Trout	61.4	2.48±4.15E-09	5.06±2.43E-08
Steelhead Trout	70.5	-1.01±3.43E-09	5.79±1.94E-08
Average % Moisture	73.5		
Median		<3.41E-09	4.00E-08
Maximum		3.96E-09	8.12E-08
Minimum		<1.78E-09	<1.28E-08

Appendix G

Summary of Nonradiological Monitoring Data



Shipping Water Samples to Off-site Laboratories for Analysis

Table G - 1

West Valley Demonstration Project State Pollutant Discharge Elimination System (SPDES) Sampling Program

Outfall	Parameter	Daily Maximum* Limit	Sample Frequency
001 (Process and Storm Wastewater)	Flow	Monitor	2 per discharge
	Aluminum, total	14.0 mg/L	2 per discharge
	Ammonia (NH_3)	Monitor	2 per discharge
	Arsenic, dissolved	0.15 mg/L	2 per discharge
	BOD_5	10.0 mg/L	2 per discharge
	Iron, total	Monitor	2 per discharge
	Zinc, total recoverable	0.48 mg/L	2 per discharge
	Suspended solids	45.0 mg/L	2 per discharge
	Cyanide, amenable to chlorination	0.022 mg/L	2 per discharge
	Settleable solids	0.30 mL/L	2 per discharge
	pH (range)	6.5 - 8.5	2 per discharge
	Oil and grease	15.0 mg/L	2 per discharge
	Sulfate	Monitor	2 per discharge
	Sulfide, dissolved	0.4 mg/L	2 per discharge
	Manganese, total	2.0 mg/L	2 per discharge
	Nitrate	Monitor	2 per discharge
	Nitrite	0.1 mg/L	2 per discharge
	Chromium, total recoverable	0.3 mg/L	2 per discharge
	Chromium, hexavalent, total recoverable	0.011 mg/L	2 per discharge
	Cadmium, total recoverable	0.002 mg/L	2 per discharge
	Copper, total recoverable	0.030 mg/L	2 per discharge
	Copper, dissolved	Monitor	2 per discharge
	Lead, total recoverable	0.006 mg/L	2 per discharge
	Nickel, total recoverable	0.14 mg/L	2 per discharge
	Dichlorodifluoromethane	0.01 mg/L	2 per discharge
	Trichlorofluoromethane	0.01 mg/L	2 per discharge
	3,3-dichlorobenzidine	0.01 mg/L	2 per discharge
	Tributyl phosphate	32 mg/L	2 per discharge
	Vanadium, total recoverable	0.014 mg/L	2 per discharge
	Cobalt, total recoverable	0.005 mg/L	2 per discharge
	Selenium, total recoverable	0.004 mg/L	2 per discharge
	Hexachlorobenzene	0.02 mg/L	2 per discharge
	Alpha - BHC	0.00001 mg/L	2 per discharge
	Heptachlor	0.00001 mg/L	2 per discharge
	Surfactant (as LAS)	0.4 mg/L	2 per discharge
	Xylene	0.05 mg/L	2 per discharge
	2-butanone	0.5 mg/L	2 per discharge
	Total Dissolved Solids	Monitor	2 per discharge
	Barium	0.5 mg/L	annual
	Antimony	1.0 mg/L	annual
	Chloroform	0.3 mg/L	annual
	Bis(2-ethylhexyl)phthalate	1.6 mg/L	semiannual
	4-Dodecene	0.6 mg/L	semiannual
	Titanium	0.65 mg/L	semiannual

** Daily average limitations are also identified in the permit but require only monitoring for all parameters except total aluminum (daily average limit - 7.0 mg/L); suspended solids (daily average limit - 30.0 mg/L); BOD-5 for the sum of outfalls 001, 007, and 008 (daily average limit - 5.0 mg.L); and ammonia for the sum of outfalls 001 and 007 (daily average limit - 1.49 mg/L).*

Table G - 1 (concluded)

West Valley Demonstration Project State Pollutant Discharge Elimination System (SPDES) Sampling Program

Outfall	Parameter	Daily Maximum* Limit	Sample Frequency
007 (Sanitary and Utility Wastewater)	Flow	Monitor	3 per month
	Ammonia (as NH_3)	Monitor	3 per month
	BOD_5	10 mg/L	3 per month
	Iron, total	Monitor	3 per month
	Solids, suspended	45.0 mg/L	3 per month
	Solids, settleable	0.3 mL/L	weekly
	pH (range)	6.5 - 8.5	weekly
	Nitrite (as N)	0.1 mg/L	3 per month
	Oil and grease	15 mg/L	3 per month
	Chlorine, total residual	0.1 mg/L	weekly
	Chloroform	0.20 mg/L	annual
008 (French Drain Wastewater)	Flow	Monitor	3 per month
	BOD_5	5.0 mg/L	3 per month
	Iron, total	Monitor	3 per month
	pH (range)	6.5 - 8.5	3 per month
	Cadmium, total recoverable	0.002 mg/L	3 per month
	Lead, total recoverable	0.006 mg/L	3 per month
	Silver, total	0.008 mg/L	annual
	Zinc, total	0.100 mg/L	annual
	Arsenic	0.17 mg/L	annual
	Chromium	0.13 mg/L	annual
Sum of Outfalls 001, 007, and 008	Iron, total	0.30 mg/L	3 per month
	BOD_5	Monitor	3 per month
Sum of Outfalls 001 and 007	Ammonia (NH_3)	2.1 mg/L	3 per month
Pseudo-monitoring point (116)	Solids, total dissolved	500 mg/L	2 per discharge

** Daily average limitations are also identified in the permit but require only monitoring for all parameters except total aluminum (daily average limit - 7.0 mg/L); suspended solids (daily average limit - 30.0 mg/L); BOD-5 for the sum of outfalls 001, 007, and 008 (daily average limit - 5.0 mg/L); and ammonia for the sum of outfalls 001 and 007 (daily average limit - 1.49 mg/L).*

Table G - 2

West Valley Demonstration Project 1998 SPDES Noncompliance Episodes

Date	Outfall	Parameters	Limit	Value	Comments
There were no episodes of noncompliance in 1998.					

Table G - 3A

1998 SPDES Results for Outfall 001 (WNSP001)
Water Quality

	Ammonia (as NH_3) (mg/L)		BOD_5 [a] (mg/L)		Cyanide [a] (mg/L)		Discharge Rate (MGD)	
Permit Limit	Monitor		10.0 mg/L daily maximum		0.022 mg/L daily maximum		Monitor	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	0.12	0.12	<2.0	<2.0	<0.010	<0.010	0.419	0.508
February	0.14	0.17	<2.0	<2.0	<0.010	<0.010	0.346	0.462
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	<0.06	0.06	<2.0	<2.0	<0.010	<0.010	0.353	0.780
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	<0.16	<0.25	<2.7	3.4	<0.010	<0.010	0.330	0.553
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.11	0.16	<2.0	<2.0	<0.010	<0.010	0.245	0.723
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	<0.08	0.11	<2.0	<2.0	<0.010	<0.010	0.357	0.416

	Nitrate (as N) (mg/L)		Nitrite (as N) [a] (mg/L)		Oil & Grease [a] (mg/L)	
Permit Limit	Monitor		0.1 mg/L daily maximum		15.0 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	2.75	2.80	<0.05	<0.05	<5.0	<5.0
February	2.6	2.7	<0.04	<0.05	<5.0	<5.0
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	1.4	1.5	<0.05	<0.05	<5.0	<5.0
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	0.11	0.14	<0.05	<0.05	6.0	6.9
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.05	<0.05	<0.05	<0.05	<5.0	<5.0
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	0.59	0.60	<0.08	<0.1	<5.0	<5.0

[a] *No results exceeded the permit limits.*
NA = Not applicable. No discharge this month.

Table G - 3A (concluded)

1998 SPDES Results for Outfall 001 (WNSP001)
Water Quality

	pH [a] (standard units)		**Solids** [a] Settleable (mL/L)		**Solids** Total Dissolved (mg/L)		**Solids** [a] Total Suspended (mg/L)	
Permit Limit	6.5 to 8.5		0.30 mL/L daily maximum		Monitor		30.0 mg/L daily average; 45.0 mg/L daily maximum	
Month	**Min**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	7.9	8.1	<0.1	<0.1	604	630	5.2	5.6
February	7.6	7.8	<0.1	<0.1	584	595	6.3	9.0
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	6.9	7.6	<0.1	<0.1	568	596	5.6	6.6
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	7.5	7.9	<0.1	<0.1	581	601	5.7	6.2
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	7.4	8.1	<0.1	<0.1	537	538	5.3	7.4
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	7.4	8.2	<0.1	<0.1	626	651	10.8	13.0

	Sulfate (as S) (mg/L)		**Sulfide** *(as S)* [a] Dissolved (mg/L)		**Surfactants as LAS** [a] (mg/L)	
Permit Limit	Monitor		0.4 mg/L daily maximum		0.4 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	24	25	<0.2	<0.2	<0.1	<0.1
February	50	50	<0.2	<0.2	<0.1	<0.1
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	62	70	<0.2	<0.2	<0.1	<0.1
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	37	37	<0.2	<0.2	<0.1	<0.1
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	27	29	<0.2	<0.2	<0.1	<0.1
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	48	50	<0.26	0.31	<0.1	<0.1

[a] *No results exceeded the permit limits.*
NA = Not applicable. No discharge this month.

Table G - 3B

1998 SPDES Results for Outfall 001 (WNSP001)
Metals

	Aluminum [a] (mg/L)		**Arsenic** [a] Dissolved (mg/L)		**Cadmium** [a] Total Recoverable (mg/L)		**Cobalt** [a] Total Recoverable (mg/L)	
Permit Limit	7.0 mg/L daily average;14.0 mg/L daily maximum		0.15 mg/L daily maximum		0.002 mg/L daily maximum		0.005 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	0.295	0.320	<0.003	<0.003	<0.001	<0.001	<0.004	<0.004
February	0.370	0.440	<0.003	<0.003	<0.001	<0.001	<0.004	<0.004
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	0.505	0.730	<0.003	<0.003	<0.001	<0.001	<0.004	<0.004
May	*NA*	*NA*	NA	*NA*	*NA*	*NA*	*NA*	*NA*
June	<0.445	0.690	<0.005	<0.0073	<0.001	<0.001	<0.004	<0.004
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.200	<0.200	0.004	0.0046	<0.001	<0.001	<0.004	<0.004
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	0.435	0.570	<0.004	0.006	<0.001	0.002	<0.004	<0.004

	Chromium [a] Total Recoverable (mg/L)		**Chromium VI** [a] Total Recoverable (mg/L)		**Copper** Dissolved (mg/L)	
Permit Limit	0.3 mg/L daily maximum		0.011 mg/L daily maximum		Monitor	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
February	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	<0.010	<0.010	<0.010	0.010	<0.010	<0.010

[a] *No results exceeded the permit limits.*
NA = Not applicable. No discharge this month.

Table G - 3B (concluded)

1998 SPDES Results for Outfall 001 (WNSP001)
Metals

	Copper [a] Total Recoverable (mg/L)		Iron Total (mg/L)		Lead [a] Total Recoverable (mg/L)		Manganese [a] Total (mg/L)	
Permit Limit	0.030 mg/L daily maximum		Monitor		0.006 mg/L daily maximum		2.0 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	<0.010	<0.010	0.225	0.230	<0.002	0.0026	0.012	0.013
February	<0.010	<0.010	0.275	0.300	<0.002	0.002	0.012	0.014
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	<0.010	<0.010	0.245	0.280	<0.002	0.003	0.028	0.037
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	<0.010	<0.010	0.150	0.170	<0.002	<0.002	0.052	0.064
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.010	<0.010	0.120	0.140	<0.002	<0.002	0.066	0.100
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	<0.013	0.015	0.440	0.480	<0.002	<0.002	0.030	0.030

	Nickel [a] Total Recoverable (mg/L)		Selenium [a] Total Recoverable (mg/L)		Vanadium [a] Total Recoverable (mg/L)		Zinc [a] Total Recoverable (mg/L)	
Permit Limit	0.14 mg/L daily maximum		0.004 mg/L daily maximum		0.014 mg/L daily maximum		0.48 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	<0.040	<0.040	<0.003	<0.003	<0.010	<0.010	<0.010	<0.010
February	<0.040	<0.040	<0.003	<0.003	<0.010	<0.010	<0.065	0.12
March	*NA*	*NA*	NA	*NA*	*NA*	*NA*	*NA*	*NA*
April	<0.040	<0.040	<0.003	<0.003	<0.010	<0.010	0.032	0.038
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	<0.040	<0.040	<0.003	<0.003	<0.010	<0.010	<0.042	0.074
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.040	<0.040	<0.003	<0.003	<0.010	<0.010	0.026	0.028
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	<0.040	<0.040	<0.003	<0.003	<0.010	<0.010	0.020	0.026

[a] No results exceeded the permit limits.
NA = Not applicable. No discharge this month.

Table G - 3C

1998 SPDES Results for Outfall 001 (WNSP001)
Organics

VOLATILES

	2-Butanone [a] (mg/L)		Dichlorodifluoromethane [a] (mg/L)		Trichlorofluoromethane [a] (mg/L)		Xylene [a] (mg/L)	
Permit Limit	0.5 mg/L daily maximum		0.01 mg/L daily maximum		0.01 mg/L daily maximum		0.05 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
February	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	<0.008	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

SEMIVOLATILES

	Alpha-BHC [a] (mg/L)		3,3'-Dichlorobenzidine [a] (mg/L)		Hexachlorobenzene [a] (mg/L)	
Permit Limit	0.00001 mg/L daily maximum		0.01 mg/L daily maximum		0.02 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	<0.000009	<0.000009	<0.0099	<0.0099	<0.010	<0.010
February	<0.000009	<0.000009	<0.0099	<0.0099	<0.010	<0.010
March	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
April	<0.000009	<0.000009	<0.0099	<0.0099	<0.010	<0.010
May	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
June	<0.000009	<0.000009	<0.0098	<0.0099	<0.010	<0.010
July	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
September	<0.000009	<0.000009	<0.0099	<0.0099	<0.010	<0.010
October	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
December	<0.000009	<0.000009	<0.0099	<0.0099	<0.010	<0.010

[a] *No results exceeded the permit limit.*
NA = Not applicable. No discharge this month.

Table G - 3C (concluded)

1998 SPDES Results for Outfall 001 (WNSP001)
Organics

***SEMIVOLATILES** (concluded)*

	Heptachlor[a] (mg/L)		**Tri-n-butyl-phosphate[a]** (mg/L)	
Permit Limit	0.00001 mg/L daily maximum		32 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**
January	<0.000009	<0.000009	<0.010	<0.010
February	<0.000009	<0.000009	<0.010	<0.010
March	*NA*	*NA*	*NA*	*NA*
April	<0.000009	<0.000009	<0.010	<0.010
May	*NA*	*NA*	*NA*	*NA*
June	<0.000009	<0.000009	<0.010	<0.010
July	*NA*	*NA*	*NA*	*NA*
August	*NA*	*NA*	*NA*	*NA*
September	<0.000009	<0.000009	<0.010	<0.010
October	*NA*	*NA*	*NA*	*NA*
November	*NA*	*NA*	*NA*	*NA*
December	<0.000009	<0.000009	<0.010	<0.010

[a] *No results exceeded the permit limit.*
NA = Not applicable. No discharge this month.

Table G - 4

1998 SPDES Results for Outfall 007 (WNSP007)
Water Quality and Iron

	Ammonia (mg/L)		BOD_5 [a] (mg/L)		Chlorine [a] Total Residue (mg/L)		Discharge Rate Total (MGD)		Iron (mg/L)	
Permit Limit	Monitor		10 mg/L daily maximum		0.1 mg/L daily maximum		Monitor		Monitor	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	0.13	0.14	<2.0	<2.0	0.03	0.04	0.016	0.023	<0.049	0.079
February	0.137	0.170	<2.0	<2.0	0.02	0.03	0.015	0.022	<0.061	0.120
March	0.096	0.120	<2.0	<2.0	0.02	0.02	0.012	0.019	<0.030	<0.030
April	0.163	0.180	<2.6	3.9	0.02	0.03	0.012	0.018	<0.048	0.081
May	0.16	0.19	<2.2	2.5	0.02	0.03	0.009	0.010	<0.03	<0.03
June	0.173	0.210	<2.0	<2.0	0.02	0.02	0.009	0.014	<0.03	<0.03
July	0.29	0.63	<2.0	2.1	0.02	0.02	0.009	0.016	<0.03	<0.03
August	0.117	0.130	3.2	3.5	0.02	0.02	0.007	0.011	<0.03	<0.03
September	0.115	0.140	<2.7	3.0	0.02	0.03	0.008	0.013	<0.039	0.058
October	0.110	0.130	<2.1	2.2	0.01	0.02	0.010	0.016	<0.035	0.045
November	<0.066	0.097	<2.0	2.1	0.02	0.03	0.008	0.013	<0.030	<0.030
December	<0.050	<0.050	2.4	2.6	0.02	0.02	0.010	0.011	<0.040	0.059

	Nitrite *(as N)* [a] (mg/L)		Oil & Grease [a] (mg/L)		pH [a] (standard units)		Solids [a] Settleable (mL/L)		Solids [a] Total Suspended (mg/L)	
Permit Limit	0.1 mg/L daily maximum		15 mg/L daily maximum		6.5 to 8.5		0.3 mL/L daily maximum		30.0 mg/L daily average 45.0 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Min**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	<0.05	<0.05	<5.0	<5.0	7.6	8.0	<0.1	<0.1	<2.0	<2.0
February	<0.04	<0.05	<5.0	<5.0	7.1	7.7	<0.1	<0.1	<3.7	6.8
March	<0.05	<0.05	<5.0	<5.0	7.7	7.8	<0.1	<0.1	<2.0	<2.0
April	<0.05	<0.05	<5.1	5.4	7.6	8.0	<0.1	<0.1	<2.0	<2.0
May	<0.05	<0.05	<5.0	<5.0	7.7	7.8	<0.1	<0.1	<2.0	<2.0
June	<0.05	<0.05	<5.0	<5.0	7.3	7.8	<0.1	<0.1	<2.0	<2.0
July	<0.05	<0.05	<5.6	6.6	7.6	7.8	<0.1	<0.1	<2.0	<2.0
August	<0.05	<0.05	<4.3	7.0	7.5	8.0	<0.1	<0.1	<2.1	2.4
September	<0.05	<0.05	<7.3	12.0	7.8	8.0	<0.1	<0.1	<2.0	<2.0
October	<0.05	<0.05	<5.0	<5.0	7.7	8.0	<0.1	<0.1	<2.0	<2.0
November	<0.05	<0.05	<5.0	<5.0	7.6	8.1	<0.1	<0.1	<2.0	<2.0
December	<0.05	<0.05	<5.0	<5.0	7.8	8.0	<0.1	<0.1	<2.7	3.6

[a] *No results exceeded the permit limit.*

Table G - 5

1998 SPDES Results for Outfall 008 (WNSP008)
Water Quality

	BOD_5 [a] (mg/L)		**Discharge Rate** (GPD)		**pH [a]** (standard units)	
Permit Limit	5.0 mg/L daily maximum		Monitor		6.5 to 8.5	
Month	**Avg**	**Max**	**Avg**	**Max**	**Min**	**Max**
January	<2.0	<2.0	2547	2881	6.8	7.2
February	<2.0	<2.0	2340	2434	6.9	7.2
March	<2.0	<2.0	2619	2956	6.9	7.2
April	<2.0	<2.0	2343	2846	6.9	7.3
May	<2.0	<2.0	1938	2306	6.9	7.6
June	<2.0	<2.0	1335	1382	6.9	7.1
July	<2.0	<2.0	2293	3639	6.7	7.8
August	<2.0	<2.0	1489	1649	6.8	7.1
September	<2.0	<2.0	1273	1291	7.0	7.2
October	<2.0	<2.0	2061	2841	6.9	7.1
November	<2.0	<2.0	1577	1857	6.9	7.1
December	<2.0	<2.0	1410	1606	7.0	7.3

Metals

	Cadmium[a] Total Recoverable (mg/L)		**Iron** Total (mg/L)		**Lead [a]** Total Recoverable (mg/L)	
Permit Limit	0.002 mg/L daily maximum		Monitor		0.006 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	<0.001	<0.001	<0.034	0.040	<0.002	<0.002
February	<0.001	<0.001	<0.034	0.041	<0.002	<0.002
March	<0.001	<0.001	<0.033	0.038	<0.002	<0.002
April	<0.001	<0.001	<0.030	<0.030	0.003	0.004
May	<0.001	<0.001	<0.033	0.040	<0.002	0.002
June	<0.001	<0.001	<0.03	<0.03	<0.002	0.002
July	<0.001	<0.001	<0.052	0.097	<0.002	0.0021
August	<0.001	<0.001	<0.03	<0.03	<0.002	<0.002
September	<0.001	<0.001	<0.030	<0.030	<0.002	0.003
October	<0.001	<0.001	<0.074	0.160	<0.002	<0.002
November	<0.001	<0.001	<0.060	0.110	<0.002	0.003
December	<0.001	<0.001	<0.031	0.033	<0.002	0.003

[a] *No results exceeded the permit limits.*

Table G - 6

1998 SPDES Results for Sums of Outfalls 001, 007, and 008 Water Quality

	Ammonia* [a] Flow-Weighted Average (mg/L)		BOD_5 [a] (mg/L)		Iron [a] Flow-Weighted Average (mg/L)
Permit Limit	1.49 mg/L daily average; 2.1 mg/L daily maximum		5.0 mg/L daily average		0.30 mg/L daily average
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**
January	0.13	0.14	<2.0	<2.0	0.00
February	0.14	0.17	<2.0	<2.0	0.00
March	0.096	0.120	<2.0	<2.0	0.00
April	0.099	0.18	<2.0	<2.1	0.00
May	0.16	0.19	<2.2	<2.4	0.00
June	<0.15	<0.25	<2.4	<3.3	0.00
July	0.29	0.63	<2.0	<2.1	0.00
August	0.117	0.130	<3.0	<3.2	0.00
September	<0.12	0.16	<2.3	<2.9	0.00
October	0.110	0.130	<2.1	<2.2	0.00
November	<0.066	0.097	<2.0	<2.1	0.00
December	<0.07	<0.11	<2.2	<2.5	0.00

1998 SPDES Results for Outfall 116 Water Quality

	Total Dissolved Solids [a] (mg/L)	
Permit Limit	500 mg/L daily maximum	
Month	**Avg**	**Max**
January	386	456
February	316	325
March	*NA*	NA
April	332	341
May	*NA*	*NA*
June	378	403
July	*NA*	*NA*
August	*NA*	*NA*
September	362	408
October	*NA*	*NA*
November	*NA*	*NA*
December	380	382

[a] *No results exceeded the permit limits.*
NA = Not applicable. No discharge this month.
* *Sum of outfalls 001 and 007 only*

Table G - 7

1998 Annual/Semiannual SPDES Results for Outfall 001 (WNSP001)

Water Quality

Measured Annually:	**Chloroform** [a] (mg/L)
Permit Limit	0.3 mg/L daily maximum
Monitoring period	**Max**
2/1/98 - 1/31/99	<0.005

Metals

Measured annually or semiannually:	**Antimony** [a] Total (mg/L)	**Barium** [a] Total (mg/L)	**Titanium** [a] Total (mg/L)
Permit Limit	1.0 mg/L daily maximum	0.5 mg/L daily maximum	0.65 mg/L daily maximum
Monitoring Period	**Max**	**Max**	**Max**
2/1/98 - 1/31/99	<0.060	<0.050	<0.050
2/1/98 - 1/31/99	*NA*	*NA*	<0.050

Organics

Measured semiannually:	**bis (2-Ethylhexyl) phthalate**[a] (mg/L)	**Dodecene, 4**[a] (mg/L)
Permit Limit	1.6 mg/L daily maximum	0.6 mg/L daily maximum
Monitoring period	**Max**	**Max**
2/1/97 - 7/31/98	<0.010	<0.06
8/1/98 - 1/31/99	<0.006	<0.06

[a] *No results exceeded the permit limits.*
NA - Not analyzed during this monitoring period.

Table G - 8

1998 Annual SPDES Results for Outfall 007 (WNSP007) and Outfall 008 (WNSP008)

Outfall 007

Water Quality

Measured annually:	**Chloroform** [a] (mg/L)
Permit Limit	0.20 mg/L daily maximum
Monitoring Period	**Max**
2/1/98 - 1/31/99	<0.005

Outfall 008

Water Quality

Measured annually:	**Arsenic** [a] Total (mg/L)	**Chromium** [a] Total (mg/L)	**Silver** [a] Total (mg/L)	**Zinc** [a] Total (mg/L)
Permit Limit	0.17 mg/L daily maximum	0.13 mg/L daily maximum	0.008 mg/L daily maximum	0.100 mg/L daily maximum
Monitoring Period	**Max**	**Max**	**Max**	**Max**
2/1/98 - 1/31/99	<0.003	<0.010	<0.003	0.100

[a] *No results exceeded the permit limits.*

Appendix H

Summary of Direct Radiation Monitoring Data

An Environmental TLD Package

Table H - 1

Summary of 1998 Quarterly Averages of Off-site TLD Measurements
(mR ± 3 SD/Quarter)

Location Number*	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Location Average
DFTLD01	15±2.8	20±12.9	19±4.8	18±5.0	18±6.4
DFTLD02	18±6.2	23±4.4	19±2.7	18±3.9	20±4.3
DFTLD03	16±2.6	16±5.1	16±5.9	17±3.2	16±4.2
DFTLD04	18±7.2	18±5.4	17±1.9	21±3.8	19±4.6
DFTLD05	16±2.8	22±4.9	16±4.0	19±2.3	18±3.5
DFTLD06	13±3.4	16±5.5	16±2.6	16±1.1	15±3.2
DFTLD07	13±4.5	17±4.1	17±7.5	18±3.3	16±4.9
DFTLD08	14±3.5	17±6.1	16±2.3	20±3.4	17±3.8
DFTLD09	14±6.5	16±5.0	18±6.9	18±3.6	17±5.5
DFTLD10	16±3.4	17±3.9	17±2.6	18±4.4	17±3.6
DFTLD11	12±1.4	16±6.3	13±2.8	15±3.3	14±3.5
DFTLD12	13±1.5	14±3.1	18±4.7	21±6.2	17±3.9
DFTLD13	17±2.6	19±6.2	19±0.9	19±1.2	19±2.7
DFTLD14	18±5.5	21±5.4	17±2.4	20±2.1	19±3.9
DFTLD15	14±4.3	17±7.4	15±3.3	19±3.8	16±4.7
DFTLD16	17±5.4	21±8.7	16±1.0	20±8.9	19±6.0
DFTLD17**	18±5.3	21±5.7	18±3.4	20±3.3	19±4.4
DFTLD20	14±1.8	20±12.3	15±3.3	17±3.8	17±5.3
DFTLD21	14±2.1	18±7.2	20±3.7	19±3.8	18±4.2
DFTLD22	14±3.1	16±6.4	19±2.7	19±1.9	17±3.5
DFTLD23**	16±5.2	19±5.7	18±1.8	18±2.5	18±3.8
DFTLD37**	16±2.2	18±4.6	18±3.8	18±4.6	18±3.8
DFTLD41**	14±4.1	23±5.4	15±1.6	22±8.2	19±4.8

** Off-site locations are shown on Figures A-11 (p. A-13) and A-12 (p. A-14).*
*** Background measurements are provided by off-site TLDs 17, 23, 37, and 41.*

Table H - 2

Summary of 1998 Quarterly Averages of On-site TLD Measurements
(mR ± 3 SD/Quarter)

Location Number*	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Location Average
DNTLD18	28±5.2	36±3.4	27±2.6	30±3.8	30±3.8
DNTLD19	18±3.0	25±9.1	20±5.6	21±4.8	21±5.6
DNTLD24	713±18.1	717±30.1	662±27.7	660±23.0	688±24.7
DNTLD25	23±4.9	29±6.0	23±1.7	28±4.2	26±4.2
DNTLD26	19±3.2	30±1.2	21±3.7	24±4.7	24±3.2
DNTLD27	16±1.0	20±1.4	20±4.6	20±2.7	19±2.4
DNTLD28	16±2.3	26±9.4	21±3.1	22±2.7	21±4.4
DNTLD29	17±3.1	23±6.3	21±4.6	19±2.9	20±4.2
DNTLD30	23±5.6	23±6.9	23±3.9	22±2.9	23±4.8
DNTLD31	20±1.5	20±8.3	18±5.9	19±7.2	19±5.7
DNTLD32	25±3.8	30±2.9	28±3.6	36±9.0	30±4.8
DNTLD33	29±2.9	33±5.8	30±3.3	32±4.1	31±4.0
DNTLD34	50±6.4	56±4.7	49±6.7	53±5.7	52±5.9
DNTLD35	83±11.0	80±2.3	79±5.6	78±5.0	80±6.0
DNTLD36	34±2.4	40±5.0	36±4.1	39±4.1	37±3.9
DNTLD38	29±2.4	33±6.2	30±2.9	33±5.9	31±4.4
DNTLD39	47±6.1	52±2.5	48±3.1	51±2.8	50±3.6
DNTLD40	106±4.4	120±14.9	136±4.2	175±5.3	134±7.2
DNTLD42	100±14.0	91±9.0	82±4.9	86±3.1	90±7.8
DNTLD43	29±5.0	31±4.6	27±2.6	31±5.5	30±4.4

** On-site locations are shown on Figure A-10 (p. A-12).*

Table H - 3

3rd Quarter 1998 TLD Results and Instantaneous Dose Readings (μR/hr) with a High-pressure Ion Chamber (HPIC) at Each Monitoring Location

Off-site Location Number	*3rd Quarter TLD Result*	*August 1998 HPIC Results*	*On-site Location Number*	*3rd Quarter TLD Result*	*August 1998 HPIC Results*
DFTLD01	8.71	9.67	DNTLD18	12.4	16.2
DFTLD02	8.70	8.87	DNTLD19	9.16	11.2
DFTLD03	7.33	8.60	DNTLD24	303	420
DFTLD04	7.78	8.40	DNTLD25	10.5	12.2
DFTLD05	7.33	9.77	DNTLD26	9.61	11.0
DFTLD06	7.33	9.40	DNTLD27	9.16	9.60
DFTLD07	7.78	8.43	DNTLD28	9.61	9.43
DFTLD08	7.32	9.17	DNTLD29	9.61	10.5
DFTLD09	8.24	9.17	DNTLD30	10.5	11.7
DFTLD10	7.78	9.10	DNTLD31	8.24	10.1
DFTLD11	5.95	9.47	DNTLD32	12.8	16.4
DFTLD12	8.24	9.17	DNTLD33	13.7	15.6
DFTLD13	8.70	9.03	DNTLD34	22.4	27.3
DFTLD14	7.78	8.90	DNTLD35	36.2	41.3
DFTLD15	6.87	8.73	DNTLD36	16.5	17.3
DFTLD16	7.32	8.53	DNTLD38	13.7	16.9
DFTLD17	8.24	8.80	DNTLD39	21.0	24.1
DFTLD20	6.87	9.20	DNTLD40	62.2	63.2
DFTLD21	9.14	8.97	DNTLD42	37.5	13.2
DFTLD22	8.70	10.4	DNTLD43	12.4	14.3
DFTLD23	8.24	9.63			
DFTLD37	8.24	9.33			
DFTLD41	6.87	8.80			

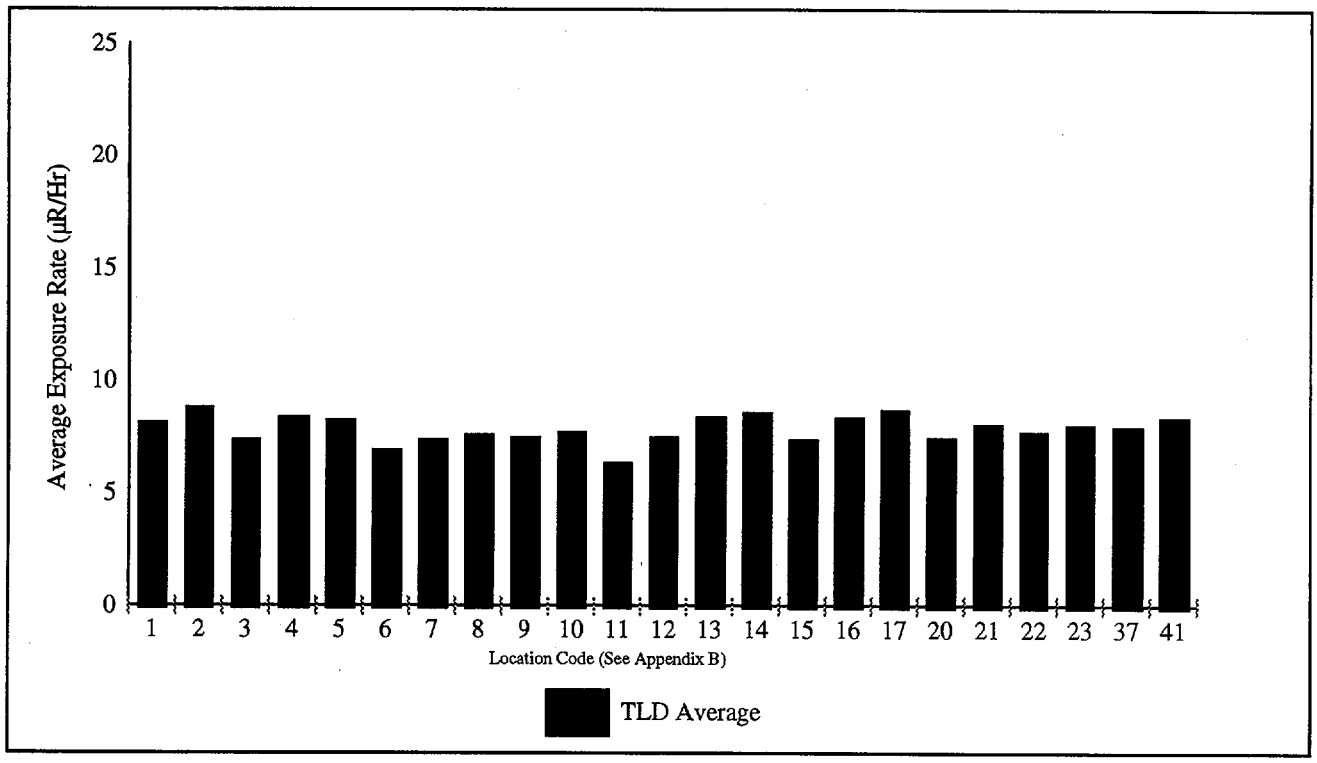


Figure H - 1

1998 Average Yearly Gamma Exposure Rates around the West Valley Demonstration Project Site

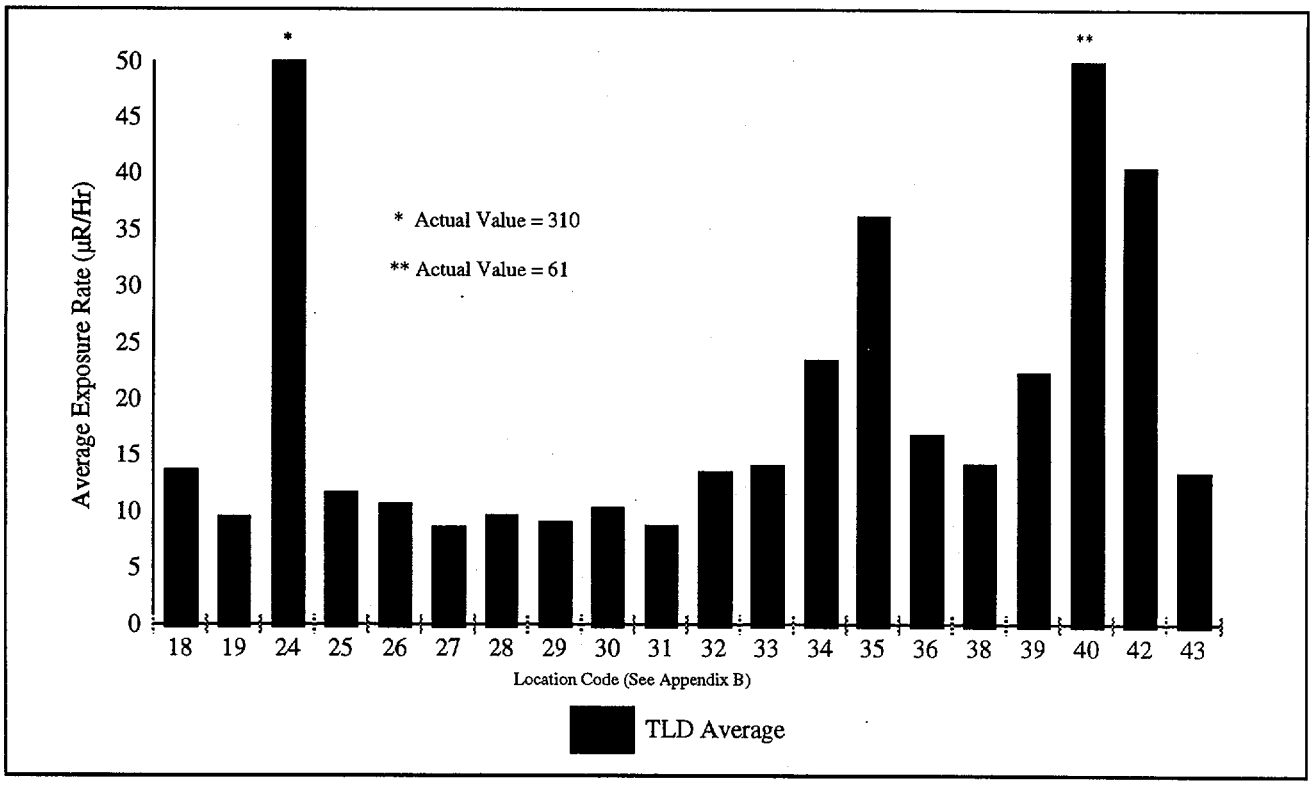
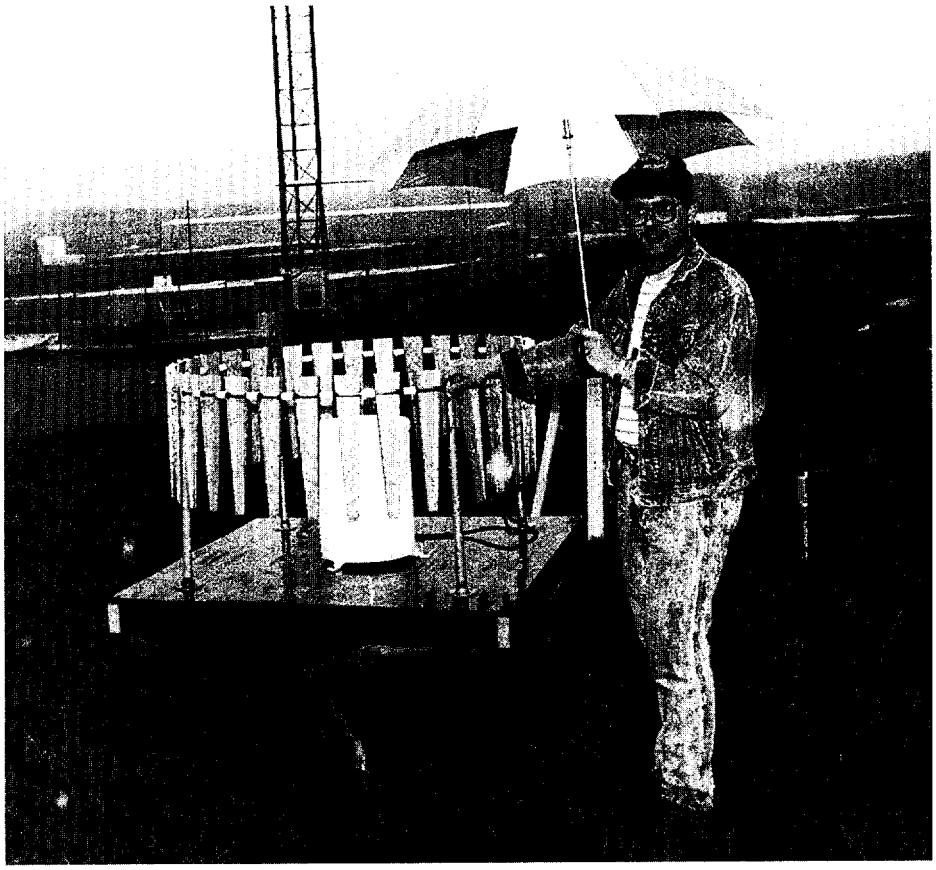


Figure H - 2

1998 Average Yearly Gamma Exposure Rates on the West Valley Demonstration Project Site

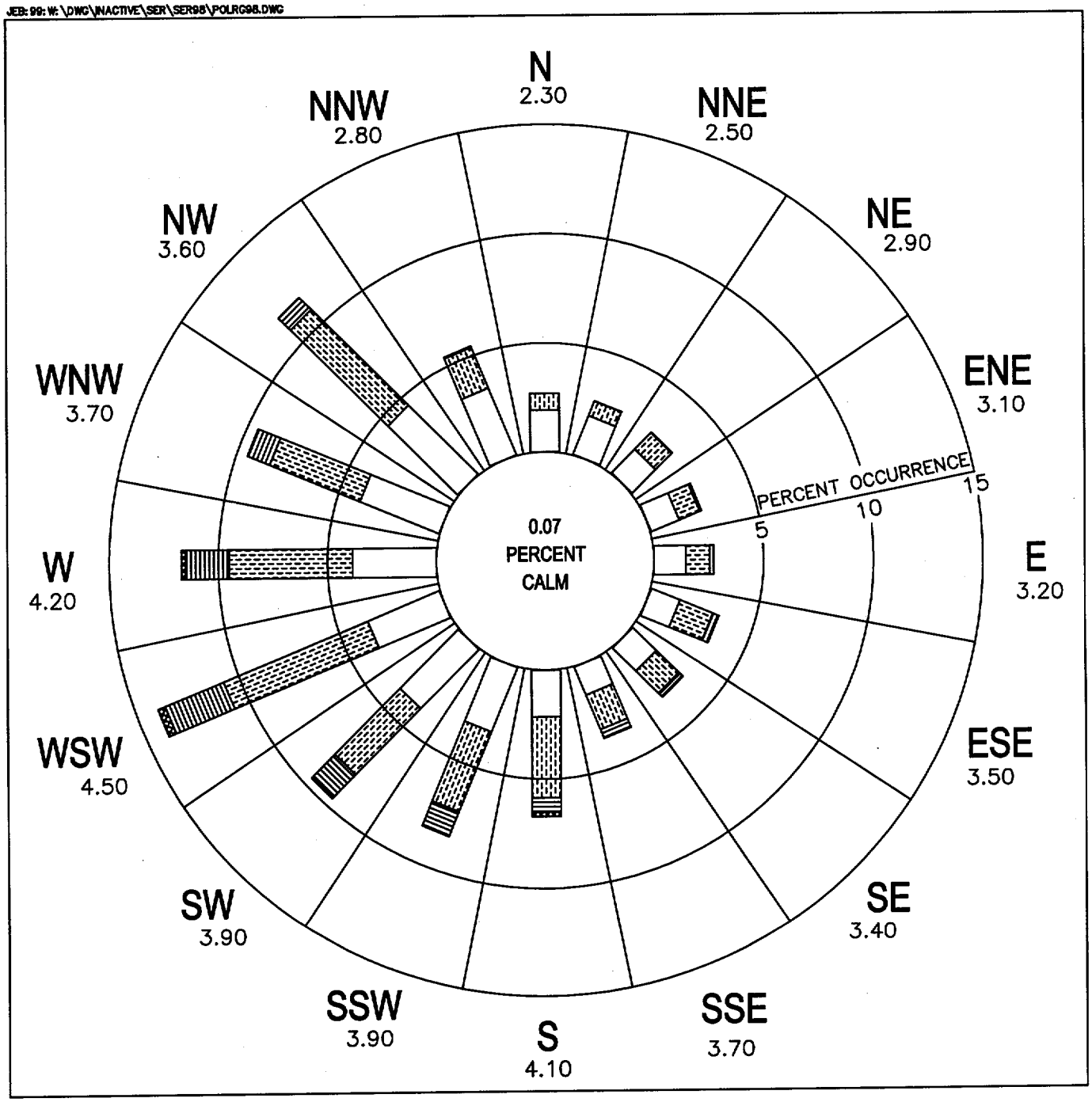
Appendix I

Summary of Meteorological Data



On-site Meteorological Tower and Rain Gauge

JEB: 99: W: \DWG\INACTIVE\SER\SER98\POLRG98.DWG



WIND SPEED RANGE

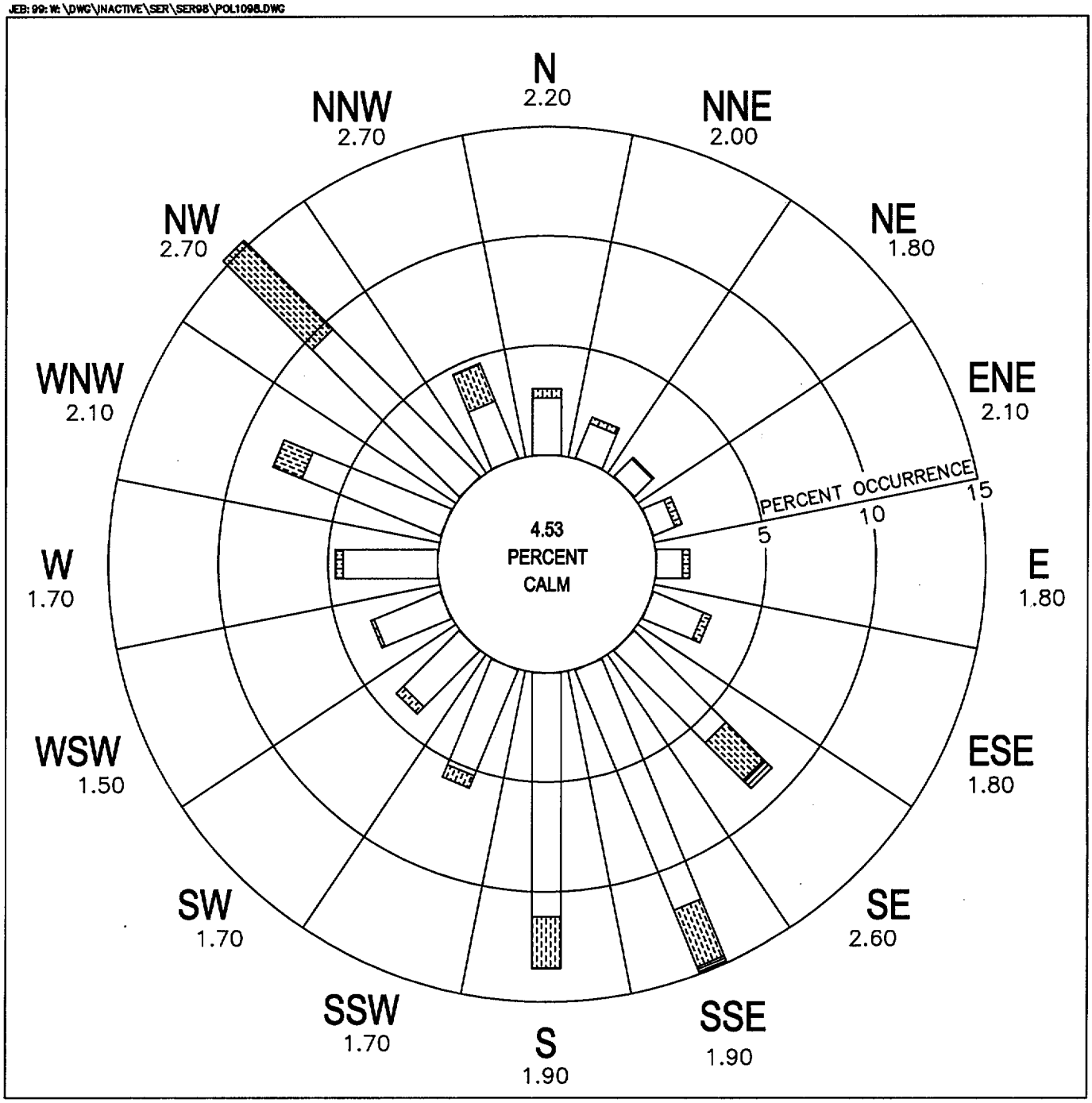
- 0.5 - 3.0 M/SEC
- >3.0 - 6.0
- >6.0 - 9.0
- >9.0 - 12.0
- >12.0

CALM <0.5

NUMBERS INDICATE SECTOR MEAN WIND SPEED
SECTORS ARE DIRECTIONS FROM WHICH THE WIND IS BLOWING

West Valley Nuclear Services Co., Inc.
Regional Monitoring Station
West Valley, New York
Figure I-1
10.0-Meter Wind Frequency Rose

JEB: 99: W: \DWG\INACTIVE\SER\SER98\POL1098.DWG



WIND SPEED RANGE

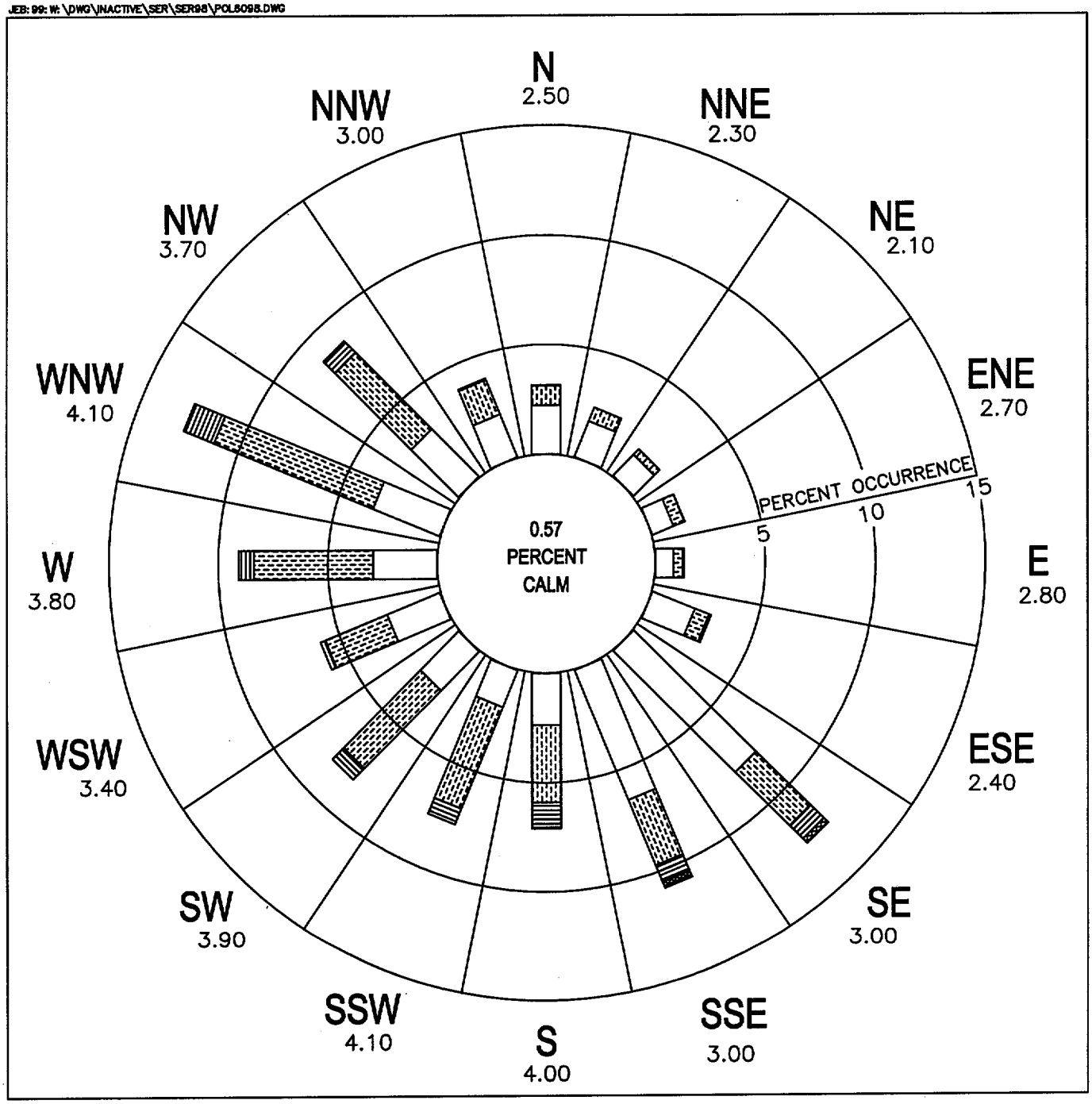
- 0.5 - 3.0 M/SEC
- >3.0 - 6.0
- >6.0 - 9.0
- >9.0 - 12.0
- >12.0

CALM <0.5

NUMBERS INDICATE SECTOR MEAN WIND SPEED
SECTORS ARE DIRECTIONS FROM WHICH THE WIND IS BLOWING

West Valley Nuclear Services Co., Inc.
Primary Monitoring Station
West Valley, New York
Figure I-2
10.0-Meter Wind Frequency Rose

JEB: 99: W: \DWG\INACTIVE\SER\SER98\POL8098.DWG



WIND SPEED RANGE

- 0.5 - 3.0 M/SEC
- >3.0 - 6.0
- >6.0 - 9.0
- >9.0 - 12.0
- >12.0

CALM <0.5

NUMBERS INDICATE SECTOR MEAN WIND SPEED
SECTORS ARE DIRECTIONS FROM WHICH THE WIND IS BLOWING

West Valley Nuclear Services Co., Inc.
Primary Monitoring Station
West Valley, New York
Figure I-3
60.0-Meter Wind Frequency Rose

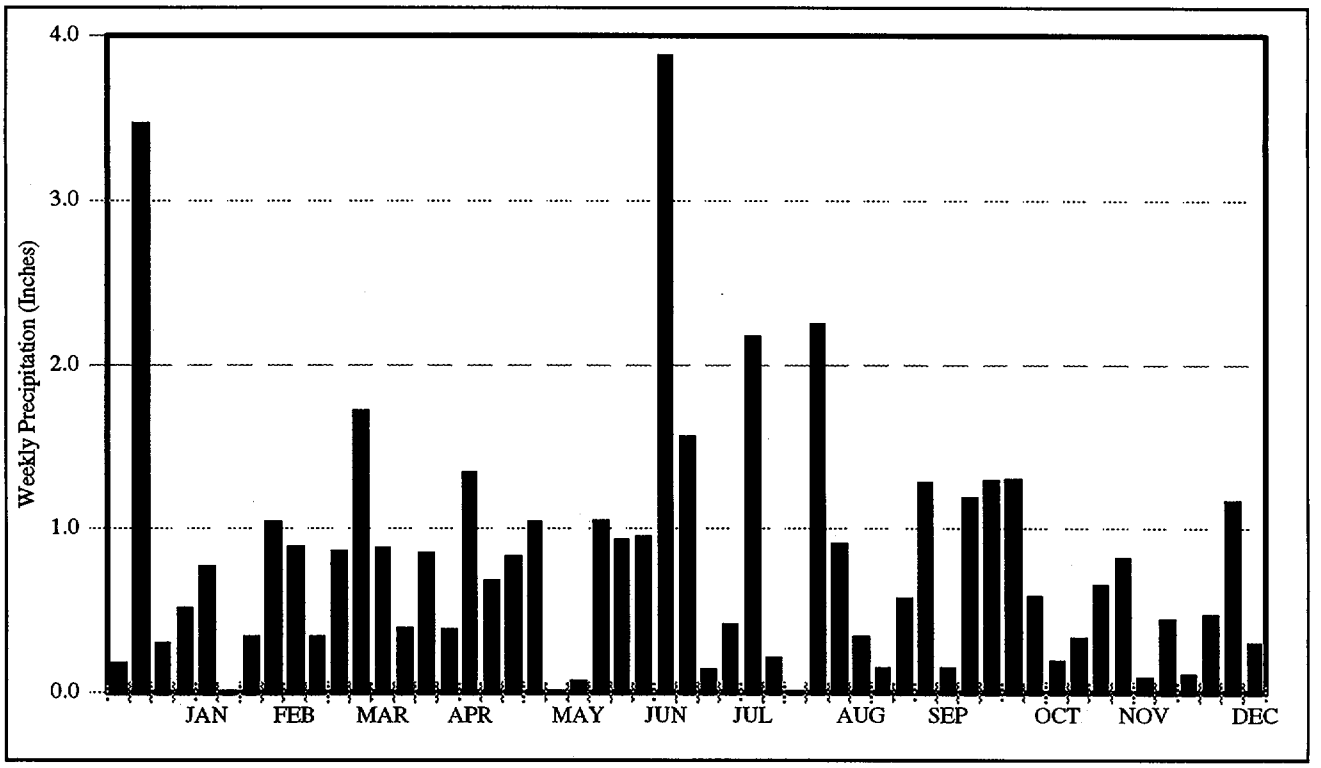


Figure I - 4. 1998 Weekly Precipitation

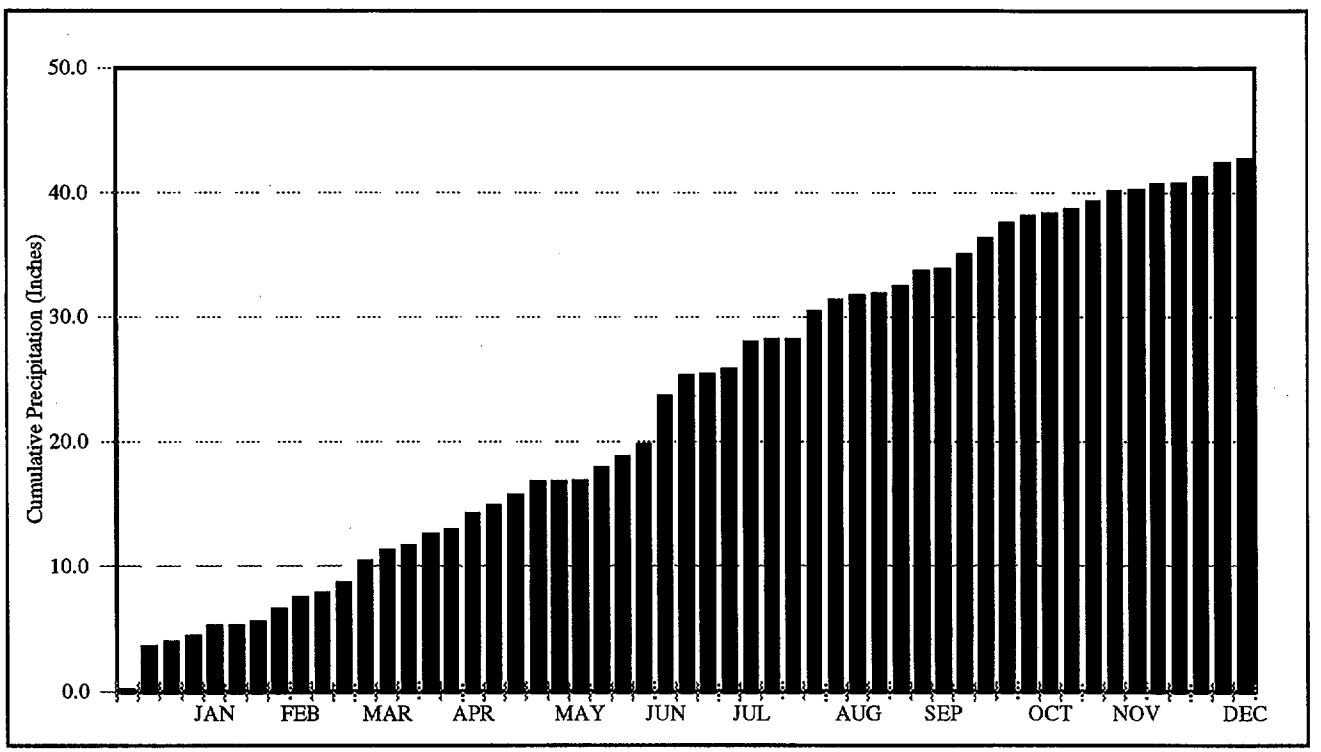


Figure I - 5. 1998 Cumulative Precipitation

Table I - 1

1998 Site Precipitation Collection Data

Week Ending	Weekly (inches)	Cumulative (inches)	Week Ending	Weekly (inches)	Cumulative (inches)
January 3	0.18	0.18	July 11	0.14	25.39
January 10	3.47	3.65	July 18	0.41	25.80
January 17	0.30	3.95	July 25	2.17	27.97
January 24	0.51	4.46	August 1	0.21	28.18
January 31	0.77	5.23	August 8	0.00	28.18
February 7	0.00	5.23	August 15	2.25	30.43
February 14	0.34	5.57	August 22	0.91	31.34
February 21	1.04	6.61	August 29	0.34	31.68
February 28	0.89	7.50	September 5	0.15	31.83
March 7	0.34	7.84	September 12	0.57	32.40
March 14	0.86	8.70	September 19	1.28	33.68
March 21	1.72	10.42	September 26	0.15	33.83
March 28	0.88	11.30	October 3	1.19	35.02
April 4	0.39	11.69	October 10	1.29	36.31
April 11	0.85	12.54	October 17	1.30	37.61
April 18	0.38	12.92	October 24	0.58	38.19
April 25	1.34	14.26	October 31	0.19	38.38
May 2	0.68	14.94	November 7	0.33	38.71
May 9	0.83	15.77	November 14	0.65	39.36
May 16	1.04	16.81	November 21	0.82	40.18
May 23	0.00	16.81	November 28	0.09	40.27
May 30	0.07	16.88	December 5	0.44	40.71
June 6	1.05	17.93	December 12	0.11	40.82
June 13	0.93	18.86	December 19	0.47	41.29
June 20	0.95	19.81	December 26	1.17	42.46
June 27	3.88	23.69	December 31	0.30	42.76
July 4	1.56	25.25			

Table I - 2

1998 Annual Temperature Summary at tbe 10-meter Primary Meteorological Tower

Month	Average Temperature °C	Average Temperature °F	Maximum Temperature °C	Maximum Temperature °F	Minimum Temperature °C	Minimum Temperature °F
January	-0.3	31.5	14.5	58.1	-13.7	7.3
February	0.3	32.5	14.9	58.8	-13.8	7.2
March	2.6	36.7	25.9	78.6	-14.2	6.4
April	7.1	44.8	20.4	68.7	-4.5	23.9
May	15.7	60.3	29.6	85.3	2.0	35.6
June	16.7	62.1	29.8	85.6	2.2	36.0
July	19.2	66.6	27.7	81.9	8.5	47.3
August	19.7	67.5	29.2	84.6	5.2	41.4
September	16.6	61.9	28.3	82.9	2.2	36.0
October	9.7	49.5	24.2	75.6	-3.3	26.1
November	4.7	40.5	18.5	65.3	-5.5	22.1
December	1.4	34.5	19.2	66.6	-14.2	6.4
Annual Average	9.4	49.0	23.5	74.3	-4.1	24.6

Table I - 3

1998 Annual Barometric Pressure Summary
(station pressure - inches of mercury)

Month	Average Pressure	Maximum Pressure	Minimum Pressure
January	28.44	28.87	27.91
February	28.39	28.87	27.87
March	28.39	28.94	27.68
April	28.38	28.83	27.95
May	28.35	28.60	27.98
June	28.32	28.65	27.85
July	28.44	28.71	28.10
August	28.53	28.83	28.20
September	28.40	28.64	28.12
October	28.57	28.95	28.09
November	28.49	28.83	28.07
December	28.54	28.92	27.93
Annual Average	28.44	28.80	27.98

Appendix J

Summary of Quality Assurance Crosscheck Analyses

Keeping Up With Regulatory Changes

Table J - 1

Comparison of Radiological Results with Known Results of Crosscheck Samples from the DOE Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP) 48; EML-596 QAP 9803; July 1998

Analyte	Matrix	Actual	Reported	Ratio	Accept?	Analyzed by:
Am-241	Air filter	6.87E-02	1.34E-01	1.955	Pass	GEL
Ce-144	Air filter	8.21E+00	7.51E+00	0.914	Yes	GEL
Co-57	Air filter	1.11E+01	1.07E+01	0.960	Yes	GEL
Co-60	Air filter	9.09E+00	9.01E+00	0.991	Yes	GEL
Cs-134	Air filter	1.97E+01	1.83E+01	0.926	Yes	GEL
Cs-137	Air filter	1.19E+01	1.16E+01	0.976	Yes	GEL
Gross Alpha	Air filter	1.40E+00	1.38E+00	0.983	Yes	GEL
Gross Beta	Air filter	1.96E+00	1.94E+00	0.987	Yes	GEL
Mn-54	Air filter	5.44E+00	5.40E+00	0.992	Yes	GEL
Pu-238	Air filter	6.95E-02	6.57E-02	0.945	Yes	GEL
Pu-239	Air filter	6.24E-02	7.14E-02	1.145	Yes	GEL
Sb-125	Air filter	1.22E+01	1.32E+01	1.087	Yes	GEL
Sr-90	Air filter	1.76E+00	1.03E+00	0.583	No	GEL
U-234	Air filter	3.08E-02	3.41E-02	1.107	Yes	GEL
U-238	Air filter	3.05E-02	3.48E-02	1.142	Yes	GEL
U (µg)	Air filter	2.47E+00	2.93E+00	1.187	Yes	GEL
Gross Alpha	Air filter	1.40E+00	1.15E+00	0.821	Pass	EL
Gross Beta	Air filter	1.96E+00	2.18E+00	1.112	Yes	EL
Cs-137	Soil	3.30E+02	3.53E+02	1.072	Yes	GEL
K-40	Soil	3.14E+02	3.54E+02	1.129	Yes	GEL
Pu-239	Soil	5.30E+00	5.42E+00	1.022	Yes	GEL
Sr-90	Soil	1.31E+01	1.13E+01	0.862	Yes	GEL
U-234	Soil	3.11E+01	2.70E+01	0.867	Yes	GEL
U-238	Soil	3.19E+01	2.75E+01	0.863	Yes	GEL
U (µg)	Soil	2.58E+00	9.50E-01	0.368	No	GEL
Am-241	Veg	1.11E+00	1.43E+00	1.296	Yes	GEL
Cm-244	Veg	2.17E+00	2.66E+00	1.226	Yes	GEL
Co-60	Veg	1.06E+01	1.11E+01	1.053	Yes	GEL
Cs-137	Veg	1.82E+02	1.89E+02	1.044	Yes	GEL
K-40	Veg	7.08E+02	8.13E+02	1.148	Yes	GEL
Pu-239	Veg	1.77E+00	2.28E+00	1.286	Pass	GEL
Sr-90	Veg	3.59E+02	3.40E+02	0.947	Yes	GEL

Units for air filters: Bq/filter; units for soil and vegetation: Bq/kg; units for water: Bq/L. Units for elemental uranium: µg/filter, µg/g, or µg/mL. Samples were analyzed by the WVDP Environmental Laboratory (EL) or General Engineering Laboratory (GEL, formerly Environmental Physics, Inc. [EPI]).

Acceptance is based on reported-to-actual ratio, assigned statistically on a case-by-case basis. ***Yes*** *indicates a ratio within warning limits;* ***Pass*** *indicates a ratio within control limits but outside warning limits;* ***No*** *indicates a ratio outside control limits.*

Table J - 1 (concluded)

Comparison of Radiological Results with Known Results of Crosscheck Samples from the DOE Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP) 48; EML-596 QAP 9803; July 1998

Analyte	Matrix	Actual	Reported	Ratio	Accept?	Analyzed by:
Am-241	Water	1.23E+00	1.36E+00	1.108	Yes	GEL
Co-60	Water	1.36E+01	1.47E+01	1.083	Yes	GEL
Cs-137	Water	4.60E+01	5.16E+01	1.122	Yes	GEL
Fe-55	Water	2.03E+02	2.60E+02	1.284	Yes	GEL
Gross Alpha	Water	1.42E+03	1.65E+03	1.162	Pass	GEL
Gross Beta	Water	2.20E+03	2.16E+03	0.980	Yes	GEL
H-3	Water	2.18E+02	2.12E+02	0.971	Yes	GEL
Mn-54	Water	5.70E+01	6.32E+01	1.109	Yes	GEL
Pu-238	Water	2.53E+00	2.32E+00	0.919	Yes	GEL
Pu-239	Water	1.65E+00	1.59E+00	0.966	Yes	GEL
Sr-90	Water	4.36E+00	4.52E+00	1.037	Yes	GEL
U-234	Water	3.96E-01	3.85E-01	0.971	Yes	GEL
U-238	Water	3.96E-01	3.92E-01	0.990	Yes	GEL
U (µg)	Water	3.20E-02	3.47E-02	1.085	Yes	GEL
Co-60	Water	1.36E+01	1.49E+01	1.096	Yes	EL
Cs-137	Water	4.60E+01	4.86E+01	1.057	Yes	EL
Gross Alpha	Water	1.42E+03	1.23E+03	0.864	Yes	EL
Gross Beta	Water	2.20E+03	2.39E+03	1.087	Yes	EL
H-3	Water	2.18E+02	2.34E+02	1.072	Yes	EL
Mn-54	Water	5.70E+01	6.19E+01	1.086	Yes	EL
Sr-90	Water	4.36E+00	4.52E+00	1.037	Yes	EL

Units for air filters: Bq/filter; units for soil and vegetation: Bq/kg; units for water: Bq/L. Units for elemental uranium: µg/filter, µg/g, or µg/mL. Samples were analyzed by the WVDP Environmental Laboratory (EL) or General Engineering Laboratory (GEL, formerly Environmental Physics, Inc. [EPI].)

Acceptance is based on reported-to-actual ratio, assigned statistically on a case-by-case basis. ***Yes*** *indicates a ratio within warning limits;* ***Pass*** *indicates a ratio within control limits but outside warning limits;* ***No*** *indicates a ratio outside control limits.*

Table J - 2

Comparison of Radiological Results with Known Results of Crosscheck Samples from the DOE Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP) 49; EML-600 QAP 9809; December 1998

Analyte	Matrix	Actual	Reported	Ratio	Accept?	Analyzed by:
Am-241	Air filter	5.10E-01	5.49E-01	1.08	Yes	GEL
Co-60	Air filter	9.16E+00	9.18E+00	1.00	Yes	GEL
Cs-137	Air filter	2.25E+01	2.26E+01	1.01	Yes	GEL
Gross Alpha	Air filter	1.65E+00	1.63E+00	0.99	Yes	GEL
Gross Beta	Air filter	2.16E+00	1.78E+00	0.82	Pass	GEL
Mn-54	Air filter	4.92E+00	5.30E+00	1.08	Yes	GEL
Pu-238	Air filter	4.60E-01	5.09E-01	1.11	Yes	GEL
Pu-239	Air filter	4.20E-01	4.61E-01	1.10	Yes	GEL
Sb-125	Air filter	8.89E+00	2.72E+00	0.31	No	GEL
Sr-90	Air filter	1.12E+00	1.18E+00	1.06	Yes	GEL
U-234	Air filter	2.60E-01	2.42E-01	0.93	Yes	GEL
U-238	Air filter	2.60E-01	2.46E-01	0.94	Yes	GEL
U (µg)	Air filter	2.10E+01	1.69E+01	0.81	Pass	GEL
Gross Alpha	Air filter	1.65E+00	1.53E+00	0.93	Yes	EL
Gross Beta	Air filter	2.16E+00	2.17E+00	1.00	Yes	EL
Ac-228	Soil	5.26E+01	5.36E+01	1.02	Yes	GEL
Am-241	Soil	7.47E+00	6.96E+00	0.93	Yes	GEL
Bi-212	Soil	5.83E+01	3.18E+01	0.54	Yes	GEL
Cs-137	Soil	9.54E+02	9.81E+02	1.03	Yes	GEL
K-40	Soil	3.14E+02	3.50E+02	1.12	Yes	GEL
Pb-212	Soil	5.28E+01	5.65E+01	1.07	Yes	GEL
Pb-214	Soil	2.91E+01	3.26E+01	1.12	Yes	GEL
Pu-239	Soil	1.31E+01	1.22E+01	0.93	Yes	GEL
Ra-226	Soil	2.90E+01	3.00E+01	1.03	Yes	GEL
Sr-90	Soil	3.96E+01	3.29E+01	0.83	Yes	GEL
Th-228	Soil	5.27E+01	5.36E+01	1.02	Yes	GEL
Th-234	Soil	1.14E+02	1.09E+02	0.96	Yes	GEL
U-234	Soil	1.13E+02	1.03E+02	0.91	Yes	GEL
U-238	Soil	1.20E+02	1.17E+02	0.98	Yes	GEL
Am-241	Veg	2.33E+00	2.69E+00	1.15	Yes	GEL
Cm-244	Veg	1.76E+00	2.04E+00	1.16	Yes	GEL
Co-60	Veg	2.00E+01	1.93E+01	0.97	Yes	GEL
Cs-137	Veg	3.90E+02	3.78E+02	0.97	Yes	GEL
K-40	Veg	4.60E+02	4.68E+02	1.02	Yes	GEL
Pu-239	Veg	3.72E+00	5.03E+00	1.35	Pass	GEL
Sr-90	Veg	6.06E+02	5.88E+02	0.97	Yes	GEL

Units for air filters: Bq/filter; units for soil and vegetation: Bq/kg; units for water: Bq/L. Units for elemental uranium: µg/filter, µg/g, or µg/mL. Samples were analyzed by the WVDP Environmental Laboratory (EL) or General Engineering Laboratory (GEL, formerly Environmental Physics, Inc. [EPI]).

Acceptance is based on reported-to-actual ratio, assigned statistically on a case-by-case basis. ***Yes*** *indicates a ratio within warning limits;* ***Pass*** *indicates a ratio within control limits but outside warning limits;* ***No*** *indicates a ratio outside control limits.*

Table J - 2 (concluded)

Comparison of Radiological Results with Known Results of Crosscheck Samples from the DOE Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP) 49; EML-600 QAP 9809; December 1998

Analyte	Matrix	Actual	Reported	Ratio	Accept?	Analyzed by:
Am-241	Water	1.25E+00	1.23E+00	0.98	Yes	GEL
Co-60	Water	4.94E+01	5.35E+01	1.08	Yes	GEL
Cs-137	Water	5.00E+01	5.26E+01	1.05	Yes	GEL
Fe-55	Water	1.39E+02	1.17E+02	0.84	Yes	GEL
Gross Alpha	Water	1.08E+03	1.12E+03	1.04	Yes	GEL
Gross Beta	Water	1.42E+03	1.23E+03	0.87	Yes	GEL
H-3	Water	7.62E+01	9.19E+01	1.21	Yes	GEL
Mn-54	Water	3.24E+01	3.64E+01	1.12	Yes	GEL
Ni-63	Water	9.57E+01	5.54E+01	0.58	Yes	GEL
Pu-238	Water	1.10E+00	1.14E+00	1.03	Yes	GEL
Pu-239	Water	1.41E+00	1.46E+00	1.04	Yes	GEL
Sr-90	Water	2.11E+00	2.01E-01	0.10	No	GEL
U-234	Water	5.10E-01	5.40E-01	1.06	Yes	GEL
U-238	Water	5.20E-01	5.18E-01	1.00	Yes	GEL
U (µg)	Water	4.00E-02	4.05E-02	1.01	Yes	GEL
Co-60	Water	4.94E+01	5.21E+01	1.05	Yes	EL
Cs-137	Water	5.00E+01	5.06E+01	1.01	Yes	EL
Gross Alpha	Water	1.08E+03	8.48E+02	0.79	Pass	EL
Gross Beta	Water	1.42E+03	1.28E+03	0.90	Yes	EL
H-3	Water	7.62E+01	8.09E+01	1.06	Yes	EL
Mn-54	Water	3.24E+01	3.63E+01	1.12	Yes	EL
Sr-90	Water	2.11E+00	2.43E+00	1.15	Yes	EL

Units for air filters: Bq/filter; units for soil and vegetation: Bq/kg; units for water: Bq/L. Units for elemental uranium: µg/filter, µg/g, or µg/mL. Samples were analyzed by the WVDP Environmental Laboratory (EL) or General Engineering Laboratory (GEL, formerly Environmental Physics, Inc. [EPI]).

Acceptance is based on reported-to-actual ratio, assigned statistically on a case-by-case basis. ***Yes*** *indicates a ratio within warning limits;* ***Pass*** *indicates a ratio within control limits but outside warning limits;* ***No*** *indicates a ratio outside control limits.*

Table J - 3

Comparison of Radiological Results with Known Results of Crosscheck Samples from the EPA National Exposure Research Laboratory, Environmental Sciences Division (NERL-ESD)

Sample	Analyte	Matrix	Actual	Reported	Accept?	Analyzed By:
ABW (January 1998)	Alpha	Water	30.5	22.30	Yes	EL
	Alpha	Water	30.5	19.30	Pass	GEL
	Beta	Water	3.9	7.33	Yes	EL
	Beta	Water	3.9	6.70	Yes	GEL
ABW (July 1998)	Alpha	Water	7.2	6.73	Yes	EL
	Alpha	Water	7.2	6.17	Yes	GEL
	Beta	Water	12.8	15.17	Yes	EL
	Beta	Water	12.8	10.30	Yes	GEL
ABW (November 1998)	Alpha	Water	47.2	37.63	Yes	EL
	Alpha	Water	47.2	27.63	Pass	GEL
	Beta	Water	3.5	6.73	Yes	EL
	Beta	Water	3.5	5.77	Yes	GEL
TRW (March 1998)	H-3	Water	2155	2208.00	Yes	EL
	H-3	Water	2155	2041.67	Yes	GEL
TRW (August 1998)	H-3	Water	17996	18376.33	Yes	EL
	H-3	Water	17996	16460.00	Yes	GEL
PE-A (October 1998)	Alpha	Water	30.1	28.60	Yes	EL
	Alpha	Water	30.1	31.77	Yes	GEL
	Ra-226	Water	4.5	7.60	No	GEL
	Ra-228	Water	1.5	1.87	Yes	GEL
	U(Nat)	Water	18.1	16.37	Yes	GEL

Units are in pCi/L.

Samples were analyzed by the WVDP Environmental Laboratory (EL) or General Engineering Laboratory (GEL, formerly Environmental Physics, Inc. [EPI]) as indicated.

Explanation of code(s): PE-A = performance evaluation (alpha); PE-B = performance evaluation (beta); GAM = gamma in water; TRW = tritium in water; ABW = alpha and beta in water.

*Acceptance limits are statistically defined by NERL-ESD for individual analytes and matrices. **Yes** indicates a ratio within warning limits; **Pass** indicates a ratio within control limits but outside warning limits; **No** indicates a ratio outside control limits.*

Table J - 3 (concluded)

Comparison of Radiological Results with Known Results of Crosscheck Samples from the EPA National Exposure Research Laboratory, Environmental Sciences Division (NERL-ESD)

Sample	Analyte	Matrix	Actual	Reported	Accept?	Analyzed By:
PE-B (October 1998)	Beta	Water	94.0	98.23	Yes	EL
	Beta	Water	94.0	87.97	Yes	GEL
	Sr-89	Water	19.0	12.67	Pass	GEL
	Sr-90	Water	8.0	5.33	Yes	GEL
	Co-60	Water	21.0	26.00	Yes	EL
	Co-60	Water	21.0	23.67	Yes	GEL
	Cs-134	Water	6.0	6.33	Yes	EL
	Cs-134	Water	6.0	6.33	Yes	GEL
	Cs-137	Water	50.0	51.67	Yes	EL
	Cs-137	Water	50.0	50.00	Yes	GEL
GAM (June 1998)	Co-60	Water	12.0	13.00	Yes	EL
	Co-60	Water	12.0	14.00	Yes	GEL
	Zn-65	Water	104.0	110.33	Yes	EL
	Zn-65	Water	104.0	115.00	Yes	GEL
	Cs-134	Water	31.0	25.67	Yes	EL
	Cs-134	Water	31.0	26.67	Yes	GEL
	Cs-137	Water	35.0	35.67	Yes	EL
	Cs-137	Water	35.0	35.67	Yes	GEL
	Ba-133	Water	40.0	38.67	Yes	EL
	Ba-133	Water	40.0	40.33	Yes	GEL
GAM (November 1998)	Co-60	Water	38.0	38.33	Yes	EL
	Co-60	Water	38.0	40.00	Yes	GEL
	Zn-65	Water	131.0	139.67	Yes	EL
	Zn-65	Water	131.0	140.00	Yes	GEL
	Cs-134	Water	105.0	91.67	No	EL
	Cs-134	Water	105.0	89.00	No	GEL
	Cs-137	Water	111.0	112.67	Yes	EL
	Cs-137	Water	111.0	114.67	Yes	GEL
	Ba-133	Water	56.0	51.67	Yes	EL
	Ba-133	Water	56.0	55.33	Yes	GEL

Units are in pCi/L.

Samples were analyzed by the WVDP Environmental Laboratory (EL) or General Engineering Laboratory (GEL, formerly Environmental Physics, Inc. [EPI]) as indicated.

Explanation of code(s): PE-A = performance evaluation (alpha); PE-B = performance evaluation (beta); GAM = gamma in water; TRW = tritium in water; ABW = alpha and beta in water.

Acceptance limits are statistically defined by NERL-ESD for individual analytes and matrices. ***Yes*** *indicates a ratio within warning limits;* ***Pass*** *indicates a ratio within control limits but outside warning limits;* ***No*** *indicates a ratio outside control limits.*

Table J - 4

Comparison of Water Quality Parameters in Crosscheck Samples between the West Valley Demonstration Project and the EPA's 1998 Discharge Monitoring Report-Quality Assurance (DMR-QA) Study 18 for the National Pollutant Discharge Elimination System (NPDES)

Analyte	Units	Actual	Reported	Accept?	Analyzed by:
Aluminum	µg/L	3105	3140	Yes	E&E
Arsenic	µg/L	160	168	Yes	E&E
Cadmium	µg/L	170	190	Pass	E&E
Chromium	µg/L	650	711	Pass	E&E
Cobalt	µg/L	503	560	Pass	E&E
Copper	µg/L	700	764	Yes	E&E
Iron	µg/L	834	1080	No	E&E
Lead	µg/L	70.6	72.1	Yes	E&E
Manganese	µg/L	240	263	No	E&E
Mercury	µg/L	1.15	1.01	Yes	E&E
Nickel	µg/L	2501	2950	No	E&E
Selenium	µg/L	260	298	No	E&E
Vanadium	µg/L	4202	4370	Yes	E&E
Zinc	µg/L	631	718	No	E&E
pH	SU	8.60	8.66	Yes	WVNS
Total cyanide	mg/L	0.140	0.142	Yes	E&E
Non-filterable residue (TSS)	mg/L	64	37.8	Yes	E&E
Oil and grease	mg/L	19.1	23.4	Yes	E&E
Total phenolics	mg/L	0.067	0.022	No	E&E
Total residual chlorine	mg/L	0.93	1.10	Yes	WVNS
Ammonia-nitrogen	mg/L	4.80	4.55	Yes	E&E
Nitrate-nitrogen	mg/L	12.0	12.0	Yes	E&E
BOD_5	mg/L	37.6	33.4	Yes	E&E

Analyses were conducted by Ecology & Environment, Inc. (E&E) or WVNS, as indicated.

*Acceptance limits are determined by the EPA: **Yes** indicates a result within warning limits; **Pass** indicates a result within control limits but outside warning limits; **No** indicates a result outside control limits.*

Appendix K

Environmental Regulations, Orders, Standards, and Permits

Table K-1
Department of Energy Radiation Protection Standards and Derived Concentration Guides [1]

Effective Dose Equivalent Radiation Standard for Protection of the Public

Continuous exposure of any member of the public from routine activities: All exposure pathways: 100 mrem/year (1 mSv/yr) effective dose equivalent

Department of Energy Derived Concentration Guides (DCGs) for Inhaled Air or Ingested Water (µCi/mL)

Radionuclide	*Half-life* [2] *(years)*	*In Air*	*In Water*	*Radionuclide*	*Half-life* [2] *(years)*	*In Air*	*In Water*
H-3*	1.23E+01	1E-07	2E-03	**Eu-152**	1.36E+01	5E-11	2E-05
C-14*	5.73E+03	6E-09	7E-05	**Eu-154***	8.80E+00	5E-11	2E-05
K-40	1.28E+09	9E-10	7E-06	**Eu-155**	4.96E+00	3E-10	1E-04
Fe-55	2.70E+00	5E-09	2E-04	**Th-232**	1.40E+10	7E-15	5E-08
Co-60*	5.27E+00	8E-11	5E-06	**U-232***	7.20E+01	2E-14	1E-07
Ni-59	7.50E+04	4E-09	7E-04	**U-233***	1.59E+05	9E-14	5E-07
Ni-63	1.00E+02	2E-09	3E-04	**U-234***	2.44E+05	9E-14	5E-07
Sr-90*	2.86E+01	9E-12	1E-06	**U-235***	7.04E+08	1E-13	6E-07
Y-90	7.31E-03	1E-09	1E-05	**U-236***	2.34E+07	1E-13	5E-07
Zr-93	1.53E+06	4E-11	9E-05	**U-238***	4.47E+09	1E-13	6E-07
Nb-93m	1.46E+01	4E-10	3E-04	**Np-239**	6.45E-03	5E-09	5E-05
Tc-99*	2.13E+05	2E-09	1E-04	**Pu-238***	8.78E+01	3E-14	4E-08
Ru-106	1.01E+00	3E-11	6E-06	**Pu-239***	2.41E+04	2E-14	3E-08
Cd-113m	1.37E+01	8E-12	9E-07	**Pu-240***	6.57E+03	2E-14	3E-08
Sn-126	1.00E+05	1E-10	8E-06	**Pu-241**	1.44E+01	1E-12	2E-06
Sb-125	2.77E+00	1E-09	5E-05	**Am-241***	4.32E+02	2E-14	3E-08
Te-125m	1.59E-01	2E-09	4E-05	**Am-242m**	1.52E+02	2E-14	3E-08
I-129*	1.57E+07	7E-11	5E-07	**Am-243**	7.38E+03	2E-14	3E-08
Cs-134*	2.06E+00	2E-10	2E-06	**Cm-243**	2.85E+01	3E-14	5E-08
Cs-135	2.30E+06	3E-09	2E-05	**Cm-244**	1.81E+01	4E-14	6E-08
Cs-137*	3.02E+01	4E-10	3E-06	**Gross Alpha (as Am-241)**	*NA*	2E-14	3E-08
Pm-147	2.62E+00	3E-10	1E-04				
Sm-151	9.00E+01	4E-10	4E-04	**Gross Beta (as Sr-90)**	*NA*	9E-12	1E-06

[1] *DOE Order 5400.5 (February 8, 1990). Effective May 8, 1990. (See Derived Concentration Guides, p. 1-5, in Chapter 1, Environmental Monitoring Information.)*

[2] *U.S. Department of Energy. 1981. Radioactive Decay Tables. Washington, D.C.: Technical Information Center, U.S. Department of Energy.*

** Radionuclides measured in WVDP effluent.*

NA - Not applicable.

Table K - 2
Environmental Regulations, Orders, and Standards

The following environmental standards and laws are applicable, in whole or in part, to the West Valley Demonstration Project:

Atomic Energy Act of 1954, 42 USC§ 2011 *et seq.*

DOE Order 231.1, September 30, 1995. *Environment, Safety, and Health Reporting*, including Change 2 (November 7, 1996).

DOE Order 232.1A, August 1, 1997. *Occurrence Reporting and Processing of Operations Information.*

DOE Order 5400.1, November 9, 1988. *General Environmental Protection Program*, including Change 1 (June 29, 1990).

DOE Order 5480.1B, September 23, 1986. *Environment, Safety, and Health Program for DOE Operations*, including Change 5 (May 10, 1993).

DOE Order 5484.1, February 24, 1981. *Environmental Protection, Safety, and Health Protection Information Reporting Requirements*, including Change 7 (October 17, 1990).

DOE Regulatory Guide DOE/EH-0173T, January 1991. *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance.*

Clean Air Act (CAA). Pub. L. No. 84-159. 42 USC§ 7401 *et seq.*, as amended, and implementing regulations.

Federal Water Pollution Control Act [Clean Water Act (CWA)]. Pub. L. No. 95-217. 33 USC §1251 *et seq.*, as amended, and implementing regulations.

Resource Conservation and Recovery Act (RCRA). Pub. L. No. 94-580. 42 USC §6901 *et seq.*, as amended, and implementing regulations.

National Environmental Policy Act (NEPA) of 1969. Pub. L. No. 91-190. 42 USC §4321 *et seq.*, as amended, and implementing regulations.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Pub. L. No. 96-510. 42 USC §9601 *et seq.* (including Superfund Amendments and Reauthorization Act of 1986), and implementing regulations.

Toxic Substances Control Act (TSCA). Pub. L. No. 94-469. 15 USC §2601 *et seq.*, as amended, and implementing regulations.

Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986. Pub. L. No. 99-499. 42 USC §11001 *et seq.*, and implementing regulations.

Safe Drinking Water Act (SDWA). Pub. L. No. 93-523. 42 USC §300*f et seq.*, as amended, and implementing regulations.

Environmental Conservation Law of New York State and implementing regulations (NYCRR).

The standards and guidelines applicable to releases of radionuclides from the West Valley Demonstration Project are found in DOE Order 5400.5 (February 8, 1990), including Change 2 (January 7, 1993).

Water quality standards contained in the State Pollutant Discharge Elimination System (SPDES) permit issued for the facility are listed in Table G-1. Airborne emissions are regulated by the Environmental Protection Agency under the National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR §61 Subpart H (December 15, 1989).

The above list covers the major activities at the West Valley Demonstration Project but does not constitute a comprehensive enumeration.

Table K-3
West Valley Demonstration Project Environmental Permits

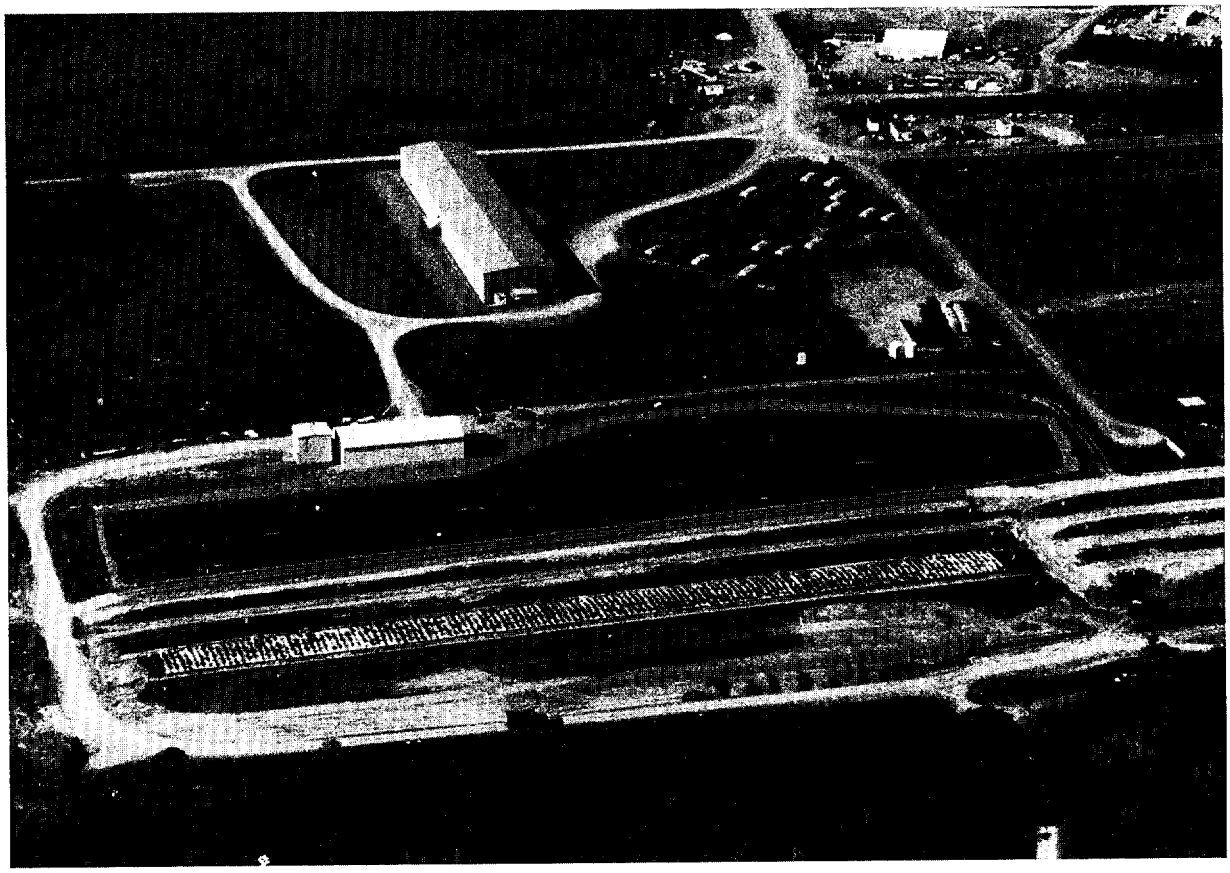
Permit Name and Number	Agency/Permit Type	Description	1998 Changes	Status
West Valley Demonstration Project Part A Permit Application	NYSDEC	Provides Interim Status under RCRA for treatment and storage of hazardous waste	None	No expiration date.
Article 19 Air State Facility Permit 90422-00005	NYSDEC	Includes 2 new boilers that began operation in 1998	Several sources removed from Modification Application because of exempt status;WVDP awaiting approval	Effective 1/23/98. Modification Application to incorporate remaining COs submitted 12/31/97
Boilers (042200-0114-00002 and (042200-0114-00003)	NYSDEC/ Certificate to Operate (CO) an Air Emission Source (2 COs)	Old boilers in utility room - backup for new boilers. Existing permit includes two boilers installed in 1997.	None	COs issued 11/30/90. No expiration date. Extended indefinitely in accordance with revised Title 6 NYCRR § 201, which went into effect 7/7/96.
Cold chemical solids transfer system (042200-0114-CTS02) Cold chemical vessel vent system (042200-0114-CTS03) Cold chemical vessel dust collection hood (042200-0114-CTS04)	NYSDEC/CO (3 COs)	Cold chemical facility. Dry or solid chemical emissions from solids transfer system and dust collection hood and from mix-tank vent for vitrification operations.	None	Solids transfer system CO (-CTS02) and vessel dust collection hood CO (-CTS04) issued 1/8/92. Vessel vent system CO (-CTS03) issued 10/26/95. No expiration date. Extended indefinitely in accordance with revised 6 NYCRR § 201.
Vitrification facility heating, ventilation, and air conditioning (HVAC) system (042200-0114-15F-2)	NYSDEC/CO	Canister-welding emissions vented through vitrification facility HVAC system, i.e., canister-welding ventilation	None	CO issued 10/26/95. No expiration date. Extended indefinitely in accordance with revised 6 NYCRR § 201.
Vitrification off-gas treatment system (04220-0114-15F-1)	NYSDEC/CO	Vitrification facility off-gas treatment system emissions	None	CO issued 5/2/97. No expiration date. Extended indefinitely in accordance with revised 6 NYCRR § 201
Slurry-fed ceramic melter (modification to WVDP-687-01) Process building ventilation	EPA/NESHAP	Slurry-fed ceramic melter radionuclide emissions - main plant stack modified 2/18/97	None	Permit approved February 18, 1997. No expiration date.
Vitrification facility HVAC system	EPA/NESHAP	Vitrification facility HVAC system for radionuclide emissions	None	Permit approved February 18, 1997. No expiration date.
01-14 building ventilation system (WVDP-187-01)	EPA/NESHAP	Liquid waste treatment system ventilation of radionuclide emissions in the 01-14 building	None	Issued 10/5/87. Modified 5/25/89. No expiration date.
Contact size-reduction facility (WVDP-287-01)	EPA/NESHAP	Contact size-reduction and decontamination facility radionuclide emissions	None	Issued 10/5/87. No expiration date.

Table K-3 (concluded)
West Valley Demonstration Project Environmental Permits

Permit Name and Number	Agency/Permit Type	Description	1998 Changes	Status
Supernatant treatment system/Permanent Ventilation System (WVDP-387-01)	EPA/NESHAP	Supernatant treatment system ventilation for radionuclide emissions	Modified to accommodate waste tank ventilation	Revised 1/1/97. No expiration date.
Low-level waste supercompactor (WVDP-487-01)	EPA/NESHAP	Low-level waste super-compactor ventilation system for radionuclide emissions	Cancelled	Issued 10/5/87. Supercompactor shipped to Savannah River site.
Outdoor ventilated enclosures (WVDP-587-01)	EPA/NESHAP	Ten portable ventila-tion units for removal of radionuclides	None	Issued 12/22/87. No expiration date.
State Pollutant Discharge Elimination System (NY-0000973)	NYSDEC/ Water discharge	Covers discharges to surface waters from various sources on-site	Renewed effective 2/1/99. Expires 2/1/04. No other changes.	NYSDEC has prepared a draft permit modification for storm water discharges and for a groundwater recovery system discharge increase. Permit terms for NYSERDA and DOE responsibilities related to storm water discharges are being negotiated with NYSDEC.
Buffalo Pollutant Discharge Elimination System (98-04-TR096)	Buffalo Sewer Authority/ Sanitary sewage and sewage sludge disposal	Permit issued to hauler of waste from the wastewater treatment facility	Renewed 6/5/98	Hauler must renew permit by 6/30/99.
Chemical bulk storage (9-000158)	NYSDEC/ Chemical bulk storage tank registration	Registration of bulk storage tanks used for listed hazardous chemicals	None	Registration expires 7/5/99. Will renew before expiration.
Petroleum bulk storage (9-008885)	NYSDEC/ Petroleum bulk storage tank registration	Registration of bulk storage tanks used for petroleum	None	Regsistration expires 9/2/01. Will renew before expiration.
Bird depredation license	New York State Division of Fish and Wildlife	State license for the removal of inactive nests of migratory birds	The WVDP is no longer required to file for a U.S.Fish and Wildlife permit for these activities.	State license for CY 1998 expired 12/31/98. CY 1999 license expires 12/31/99.

Appendix L

Summary of NYSERDA Groundwater Monitoring Data



An Aerial View of the New York State-licensed Disposal Area

Table L - 1

1998 Contamination Indicator Results at SDA Monitoring Wells

Sample Location	Date	Conductivity (µmhos/cm@25°C)	pH (standard units)	Temperature (°C)	Turbidity (NTU)
WNW1101A	*June*	573	7.59	15.3	3.24
WNW1101A	*December*	319	7.37	12.0	5.94
WNW1101B	*June*	638	7.98	13.4	3.30
WNW1101B	*December*	642	7.32	10.3	5.94
WNW1101C	*June*	176	8.62	11.5	>1000
WNW1101C	*December*	365	7.60	9.7	72.90
WNW1102A	*June*	668	8.27	12.6	3.98
WNW1102A	*December*	731	7.42	12.6	3.23
WNW1102B	*June*	562	8.11	13.4	27.20
WNW1102B	*December*	554	7.57	11.2	8.52
WNW1103A	*June*	887	7.23	9.6	36.30
WNW1103A	*December*	611	7.37	8.6	178.00
WNW1103B	*June*	675	7.60	11.1	16.10
WNW1103B	*December*	452	7.60	8.7	1.16
WNW1104A	*June*	628	7.52	10.6	3.66
WNW1104A	*December*	421	7.30	8.3	0.32
WNW1104A	*December*	421	7.30	8.3	0.32
WNW1104B	*June*	578	7.42	11.1	1.21
WNW1104B	*December*	454	7.48	8.6	4.26
WNW1105A	*June*	691	7.23	10.1	>1000
WNW1105A	*December*	640	7.57	10.9	430.00
WNW1105B	*June*	728	7.60	10.1	51.60
WNW1105B	*December*	702	7.63	9.7	259.00
WNW1106A	*June*	681	7.70	10.9	2.63
WNW1106A	*December*	721	7.24	12.8	1.53
WNW1106B	*June*	728	7.56	12.1	159.00
WNW1106B	*December*	719	7.24	11.9	383.00
WNW1107A	*June*	1747	7.07	11.7	3.00
WNW1107A	*December*	1480	6.78	12.6	1.83
WNW1108A	*June*	448	7.51	11.5	40.20
WNW1108A	*December*	520	7.44	9.7	37.00

Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 1 (concluded)

1998 Contamination Indicator Results at SDA Monitoring Wells

Sample Location	Date	Conductivity (µmhos/cm@25°C)	pH (standard units)	Temperature (°C)	Turbidity (NTU)
WNW1109A	*June*	566	7.19	10.7	5.67
WNW1109A	*June*	566	7.19	10.7	5.67
WNW1109A	*December*	607	7.57	12.3	2.85
WNW1109B	*June*	428	7.65	10.3	27.70
WNW1109B	*December*	489	7.09	10.6	17.40
WNW1110A	*June*	*NA*	*NA*	*NA*	*NA*
WNW1110A	*December*	800	7.26	8.1	14.60
WNW1111A	*June*	940	7.19	10.9	11.60
WNW1111A	*December*	965	6.89	12.0	1.46

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 2

1998 Radiological Indicator Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Gross Alpha	Gross Beta	H-3
WNW1101A	*June*	4.74±8.80E-10	2.82±1.00E-09	1.36±1.10E-07
WNW1101A	*December*	3.23±1.40E-09	3.11±0.71E-09	1.06±1.00E-07
WNW1101B	*June*	2.78±1.30E-09	2.30±0.86E-09	0.32±1.10E-07
WNW1101B	*December*	2.28±1.30E-09	3.46±0.74E-09	0.14±1.00E-07
WNW1101C	*June*	-2.13±3.90E-10	1.87±0.76E-09	0.15±1.10E-07
WNW1101C	*December*	6.61±6.20E-10	2.37±0.60E-09	-2.68±9.80E-08
WNW1102A	*June*	1.31±1.00E-09	4.68±1.60E-09	3.70±1.30E-07
WNW1102A	*December*	2.53±1.40E-09	3.78±0.73E-09	3.18±1.20E-07
WNW1102B	*June*	0.39±5.80E-10	2.32±0.80E-09	0.04±1.10E-07
WNW1102B	*December*	1.37±0.86E-09	1.70±0.61E-09	-1.29±9.90E-08
WNW1103A	*June*	7.00±2.20E-09	6.13±1.80E-09	5.58±1.30E-07
WNW1103A	*December*	4.00±2.00E-09	6.24±1.50E-09	5.06±1.30E-07
WNW1103B	*June*	2.79±1.10E-09	3.23±1.10E-09	0.25±1.00E-07
WNW1103B	*December*	2.57±1.40E-09	3.20±0.85E-09	0.24±1.00E-07
WNW1103C	*June*	1.59±1.80E-09	8.28±2.60E-09	0.67±1.10E-07
WNW1103C	*December*	1.55±1.20E-09	*NA*	-0.57±9.90E-08
WNW1104A	*June*	2.43±1.10E-09	3.87±1.40E-09	2.56±1.20E-07
WNW1104A	*December*	1.84±1.20E-09	4.38±1.00E-09	1.95±1.10E-07
WNW1104A	*December*	2.58±1.40E-09	3.61±0.80E-09	2.29±1.10E-07
WNW1104B	*June*	2.52±1.30E-09	2.06±1.00E-09	0.08±1.00E-07
WNW1104B	*December*	2.70±1.40E-09	3.15±0.86E-09	0.24±1.00E-07
WNW1104C	*June*	4.70±4.50E-09	1.11±0.36E-08	0.87±1.10E-07
WNW1104C	*December*	6.70±5.90E-09	5.31±3.30E-09	-1.96±9.80E-08
WNW1105A	*June*	2.49±1.40E-09	3.52±1.10E-09	1.49±1.20E-07
WNW1105A	*December*	7.72±9.20E-10	2.19±0.67E-09	1.43±1.10E-07
WNW1105B	*June*	3.19±1.60E-09	3.31±1.10E-09	0.28±1.10E-07
WNW1105B	*December*	2.71±1.50E-09	2.01±0.70E-09	-1.90±9.80E-08
WNW1106A	*June*	1.36±1.10E-09	3.64±1.30E-09	7.82±1.50E-07
WNW1106A	*December*	2.52±1.40E-09	4.20±0.93E-09	7.27±1.40E-07

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 2 (concluded)

1998 Radiological Indicator Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Gross Alpha	Gross Beta	H-3
WNW1106B	*June*	0.83±1.00E-09	2.96±1.20E-09	0.62±1.10E-07
WNW1106B	*December*	1.26±1.10E-09	3.12±0.87E-09	0.06±1.00E-07
WNW1107A	*June*	5.12±2.90E-09	3.02±0.45E-08	1.47±0.11E-05
WNW1107A	*December*	5.51±3.20E-09	1.87±0.33E-08	1.52±0.12E-05
WNW1108A	*June*	6.80±2.40E-09	4.42±1.30E-09	2.36±1.20E-07
WNW1108A	*December*	6.24±2.30E-09	3.88±0.94E-09	1.38±1.10E-07
WNW1109A	*June*	2.17±1.10E-09	3.02±1.00E-09	4.94±1.40E-07
WNW1109A	*June*	3.24±1.60E-09	2.33±0.99E-09	4.50±1.30E-07
WNW1109A	*December*	1.76±1.10E-09	3.75±0.81E-09	4.07±1.20E-07
WNW1109B	*June*	-1.12±5.60E-10	9.91±8.90E-10	6.69±1.40E-07
WNW1109B	*December*	8.60±6.80E-10	2.00±0.55E-09	4.95±1.30E-07
WNW1110A	*June*	6.58±2.20E-09	5.97±1.90E-09	2.00±1.10E-07
WNW1110A	*December*	1.17±0.41E-08	7.78±1.30E-09	1.73±1.10E-07
WNW1111A	*June*	4.01±1.60E-09	5.40±1.70E-09	2.83±1.20E-07
WNW1111A	*December*	3.77±2.10E-09	3.72±1.20E-09	3.31±1.20E-07

Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Actinium-228	Bismuth-214	Carbon-14	Cesium-134
WNW1101A	*June*	4.51±3.20E-08	-1.11±2.20E-08	1.98±3.00E-09	-0.35±9.50E-09
WNW1101A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1101B	*June*	1.45±1.60E-08	8.33±9.90E-09	1.22±3.00E-09	-0.41±4.60E-09
WNW1101B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1101C	*June*	1.90±2.00E-08	7.80±9.00E-09	0.05±3.30E-09	2.16±4.50E-09
WNW1101C	*December*	*NA*	*NA*	*NA*	*NA*
WNW1102A	*June*	1.81±1.40E-08	1.31±0.95E-08	1.28±3.00E-09	-1.21±4.70E-09
WNW1102A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1102B	*June*	2.63±1.70E-08	-3.31±8.60E-09	1.40±4.30E-09	4.11±3.90E-09
WNW1102B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103A	*June*	1.60±1.70E-08	0.43±9.20E-09	2.93±3.00E-09	2.69±4.80E-09
WNW1103A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103B	*June*	1.96±1.40E-08	0.68±1.10E-08	2.12±3.00E-09	1.87±4.10E-09
WNW1103B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103C	*June*	*NA*	*NA*	7.51±8.40E-09	*NA*
WNW1103C	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104A	*June*	-0.33±1.90E-08	1.14±0.97E-08	3.04±3.00E-09	1.46±3.80E-09
WNW1104A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104B	*June*	1.76±2.20E-08	2.23±1.00E-08	1.08±3.00E-09	1.08±3.90E-09
WNW1104B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104C	*June*	*NA*	*NA*	6.07±9.10E-09	*NA*
WNW1104C	*December*	2.30±2.20E-08	1.88±1.10E-08	*NA*	-5.25±5.50E-09
WNW1105A	*June*	-0.68±2.00E-08	0.00±1.10E-08	3.36±3.70E-09	-2.59±4.60E-09
WNW1105A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1105B	*June*	0.41±1.90E-08	-4.01±9.30E-09	0.10±3.30E-09	1.22±4.60E-09
WNW1105B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1106A	*June*	1.36±1.50E-08	-2.74±8.80E-09	2.93±3.00E-09	1.66±4.40E-09
WNW1106A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1106B	*June*	0.14±2.10E-08	5.65±9.10E-09	3.98±4.70E-09	1.12±3.60E-09
WNW1106B	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3 (continued)

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Actinium-228	Bismuth-214	Carbon-14	Cesium-134
WNW1107A	*June*	1.61±1.90E-08	0.35±1.00E-08	7.05±3.20E-09	4.72±4.60E-09
WNW1107A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1108A	*June*	3.28±1.80E-08	5.21±9.30E-09	2.07±3.00E-09	-0.05±3.90E-09
WNW1108A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	0.46±2.10E-08	-0.38±1.00E-08	0.70±4.00E-09	-5.03±5.10E-09
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	1.97±1.40E-08	-0.76±8.50E-09	1.69±0.50E-08	1.51±3.60E-09
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109B	*June*	1.81±1.30E-08	1.93±9.70E-09	1.46±3.00E-09	-4.10±5.60E-09
WNW1109B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1110A	*June*	*NA*	*NA*	2.79±3.30E-09	*NA*
WNW1110A	*December*	0.98±2.00E-08	5.24±9.70E-09	*NA*	-1.10±4.60E-09
WNW1111A	*June*	1.14±1.60E-08	-0.55±1.00E-08	0.99±3.70E-09	6.12±4.30E-09
WNW1111A	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3 (continued)

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Cesium-137	Cobalt-57	Cobalt-60	Iodine-129
WNW1101A	*June*	4.41±9.50E-09	-2.14±4.30E-08	0.37±1.00E-08	*NA*
WNW1101A	*December*	*NA*	*NA*	*NA*	1.07±1.20E-10
WNW1101B	*June*	6.36±4.40E-09	-1.88±2.30E-08	0.59±3.90E-09	*NA*
WNW1101B	*December*	*NA*	*NA*	*NA*	-0.45±1.20E-10
WNW1101C	*June*	2.46±4.30E-09	-2.01±1.90E-08	-3.03±4.60E-09	*NA*
WNW1101C	*December*	*NA*	*NA*	*NA*	0.25±1.30E-10
WNW1102A	*June*	-2.63±5.20E-09	-0.94±2.30E-08	4.73±3.40E-09	-2.51±2.20E-10
WNW1102A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1102B	*June*	0.52±3.20E-09	0.54±2.10E-08	2.88±5.00E-09	-0.94±2.50E-10
WNW1102B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103A	*June*	-5.40±4.60E-09	-0.55±1.80E-08	-1.97±4.30E-09	0.00±2.40E-10
WNW1103A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103B	*June*	-1.18±4.80E-09	0.08±1.70E-08	-1.60±4.30E-09	-0.25±2.20E-10
WNW1103B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104A	*June*	1.35±4.90E-09	1.00±2.30E-08	2.03±3.80E-09	0.64±2.30E-10
WNW1104A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104B	*June*	-0.34±4.20E-09	0.58±2.00E-08	0.18±4.30E-09	0.55±2.20E-10
WNW1104B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104C	*June*	*NA*	*NA*	*NA*	*NA*
WNW1104C	*December*	0.37±5.50E-09	-0.25±2.30E-08	3.47±6.20E-09	*NA*
WNW1105A	*June*	-3.42±5.20E-09	-1.26±2.20E-08	3.50±2.90E-09	0.60±2.40E-10
WNW1105A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1105B	*June*	2.20±4.20E-09	0.97±2.10E-08	-0.59±5.20E-09	-1.44±2.30E-10
WNW1105B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1106A	*June*	3.65±4.20E-09	-0.88±1.90E-08	8.15±4.40E-09	*NA*
WNW1106A	*December*	*NA*	*NA*	*NA*	0.82±1.60E-10
WNW1106B	*June*	-0.34±4.20E-09	1.68±2.00E-08	-4.03±5.30E-09	*NA*
WNW1106B	*December*	*NA*	*NA*	*NA*	0.15±1.50E-10
WNW1107A	*June*	3.24±4.60E-09	-0.06±2.10E-08	-5.71±6.30E-09	-1.50±2.40E-10
WNW1107A	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3 (continued)

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Cesium-137	Cobalt-57	Cobalt-60	Iodine-129
WNW1108A	*June*	2.85±4.40E-09	1.29±2.20E-08	4.13±4.50E-09	-1.14±2.00E-10
WNW1108A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	-5.92±5.30E-09	0.29±1.70E-08	-2.08±5.50E-09	1.31±2.10E-10
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	2.06±3.70E-09	-0.51±2.00E-08	1.90±4.00E-09	-1.01±2.50E-10
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109B	*June*	-2.12±5.60E-09	-1.42±2.10E-08	2.47±4.00E-09	-0.67±2.50E-10
WNW1109B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1110A	*June*	*NA*	*NA*	*NA*	*NA*
WNW1110A	*December*	-0.91±5.00E-09	-2.52±1.80E-08	-1.46±6.30E-09	-0.69±2.10E-10
WNW1111A	*June*	4.61±4.00E-09	0.20±2.10E-08	-3.32±4.90E-09	-0.23±2.30E-10
WNW1111A	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3 (continued)

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Lead-212	Lead-214	Potassium-40	Strontium-90
WNW1101A	*June*	-0.45±1.30E-08	-0.98±1.80E-08	3.53±1.40E-07	0.88±2.10E-10
WNW1101A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1101B	*June*	5.15±6.40E-09	-3.59±8.80E-09	9.22±5.50E-08	0.19±1.30E-10
WNW1101B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1101C	*June*	4.05±6.80E-09	4.39±8.30E-09	3.85±1.10E-07	1.65±2.20E-10
WNW1101C	*December*	*NA*	*NA*	*NA*	*NA*
WNW1102A	*June*	1.69±7.50E-09	2.59±9.90E-09	1.13±0.75E-07	1.45±2.20E-10
WNW1102A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1102B	*June*	0.53±1.20E-08	3.18±7.80E-09	0.08±9.60E-08	-0.21±1.20E-10
WNW1102B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103A	*June*	8.17±5.80E-09	2.46±7.90E-09	2.67±0.84E-07	-2.18±9.80E-11
WNW1103A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103B	*June*	4.37±6.00E-09	6.52±8.00E-09	2.10±0.74E-07	0.45±1.20E-10
WNW1103B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104A	*June*	6.72±6.30E-09	-0.02±1.00E-08	2.91±0.87E-07	0.17±1.00E-10
WNW1104A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104B	*June*	2.73±6.30E-09	5.69±7.00E-09	4.83±1.20E-07	0.65±1.30E-10
WNW1104B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104C	*June*	*NA*	*NA*	*NA*	*NA*
WNW1104C	*December*	-1.04±7.80E-09	0.52±1.00E-08	-0.57±1.10E-07	*NA*
WNW1105A	*June*	1.23±0.74E-08	3.46±8.80E-09	2.76±0.91E-07	0.99±1.40E-10
WNW1105A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1105B	*June*	2.03±6.60E-09	0.92±9.30E-09	7.34±5.80E-08	0.52±1.50E-10
WNW1105B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1106A	*June*	4.31±7.20E-09	1.33±7.60E-09	2.63±0.83E-07	2.10±2.40E-10
WNW1106A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1106B	*June*	9.25±6.00E-09	1.29±0.77E-08	0.39±1.30E-07	0.75±1.50E-10
WNW1106B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1107A	*June*	0.53±6.40E-09	1.12±0.85E-08	2.63±0.90E-07	8.36±1.60E-09
WNW1107A	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.

Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3 (continued)

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Lead-212	Lead-214	Potassium-40	Strontium-90
WNW1108A	*June*	4.90±8.50E-09	1.24±0.86E-08	0.14±1.20E-07	1.39±1.60E-10
WNW1108A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	2.88±5.00E-09	-1.48±9.20E-09	2.80±0.86E-07	0.99±1.50E-10
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	4.84±6.30E-09	5.04±7.80E-09	1.70±0.74E-07	1.01±0.31E-09
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109B	*June*	4.06±6.80E-09	1.32±0.85E-08	2.40±0.81E-07	1.43±1.50E-10
WNW1109B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1110A	*June*	*NA*	*NA*	*NA*	-3.36±9.70E-11
WNW1110A	*December*	5.45±6.20E-09	-0.53±8.30E-09	0.30±9.60E-08	*NA*
WNW1111A	*June*	3.87±6.20E-09	0.00±9.10E-09	2.12±0.88E-07	0.14±1.40E-10
WNW1111A	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3 (continued)

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Technetium-99	Thallium-208	Thorium-234	Uranium-235
WNW1101A	*June*	*NA*	1.28±0.99E-08	0.94±1.70E-06	4.88±3.90E-08
WNW1101A	*December*	0.96±1.90E-09	*NA*	*NA*	*NA*
WNW1101B	*June*	*NA*	0.56±4.20E-09	2.50±5.80E-07	0.15±2.00E-08
WNW1101B	*December*	0.11±1.80E-09	*NA*	*NA*	*NA*
WNW1101C	*June*	0.00±2.00E-09	0.41±5.60E-09	4.57±6.00E-07	1.98±1.90E-08
WNW1101C	*December*	*NA*	*NA*	*NA*	*NA*
WNW1102A	*June*	0.45±3.50E-09	2.31±4.60E-09	5.36±6.80E-07	-0.81±2.10E-08
WNW1102A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1102B	*June*	-0.29±2.00E-09	3.37±5.30E-09	-0.69±7.10E-07	2.22±2.00E-08
WNW1102B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103A	*June*	-0.10±2.00E-09	7.49±5.30E-09	1.76±7.10E-07	0.26±1.80E-08
WNW1103A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1103B	*June*	0.02±2.00E-09	8.17±4.20E-09	1.81±7.00E-07	0.76±1.90E-08
WNW1103B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104A	*June*	-0.06±2.00E-09	1.51±4.80E-09	2.08±7.70E-07	0.45±2.10E-08
WNW1104A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104B	*June*	0.39±1.90E-09	6.78±4.70E-09	-1.63±7.40E-07	-0.73±2.00E-08
WNW1104B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1104C	*June*	*NA*	*NA*	*NA*	*NA*
WNW1104C	*December*	*NA*	4.36±5.90E-09	-1.79±8.80E-07	0.46±2.30E-08
WNW1105A	*June*	-0.36±1.90E-09	-2.60±5.40E-09	-5.22±9.00E-07	1.51±2.20E-08
WNW1105A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1105B	*June*	0.11±2.00E-09	1.80±4.00E-09	0.00±6.40E-07	-0.81±2.20E-08
WNW1105B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1106A	*June*	*NA*	3.03±5.50E-09	3.82±8.80E-07	1.22±2.00E-08
WNW1106A	*December*	0.50±1.80E-12	*NA*	*NA*	*NA*
WNW1106B	*June*	*NA*	-1.54±5.20E-09	5.22±6.10E-07	0.24±1.90E-08
WNW1106B	*December*	1.40±1.90E-09	*NA*	*NA*	*NA*
WNW1107A	*June*	-0.09±1.90E-09	1.22±4.50E-09	-3.08±6.90E-07	1.56±1.80E-08
WNW1107A	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.

Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

Table L - 3 (concluded)

1998 Radioisotopic Results at SDA Monitoring Wells (µCi/mL)

Sample Location	Date	Technetium-99	Thallium-208	Thorium-234	Uranium-235
WNW1108A	*June*	0.18±1.90E-09	2.78±4.90E-09	0.34±8.20E-07	1.25±2.50E-08
WNW1108A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	-0.23±1.90E-09	3.36±5.00E-09	-2.12±9.30E-07	0.70±1.70E-08
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109A	*June*	-0.03±2.00E-09	0.87±5.10E-09	2.18±6.00E-07	1.21±1.70E-08
WNW1109A	*December*	*NA*	*NA*	*NA*	*NA*
WNW1109B	*June*	-0.32±2.00E-09	1.14±0.42E-08	-8.02±9.50E-07	0.30±2.20E-08
WNW1109B	*December*	*NA*	*NA*	*NA*	*NA*
WNW1110A	*June*	*NA*	*NA*	*NA*	*NA*
WNW1110A	*December*	0.76±3.80E-09	4.67±4.50E-09	2.57±7.60E-07	1.51±1.80E-08
WNW1111A	*June*	-0.07±2.00E-09	6.49±3.30E-09	6.46±5.50E-07	1.77±2.00E-08
WNW1111A	*December*	*NA*	*NA*	*NA*	*NA*

NA - Not available.
Note: All data in Tables L-1 through L-3 have been provided by NYSERDA.

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Glossary

ACCURACY. The degree of agreement between a measurement and its true value. The accuracy of a data set is assessed by evaluating results from standards or spikes containing known quantities of an analyte.

ACTION PLAN. An action plan addresses assessment findings and root causes that have been identified in an audit or an assessment report. It is intended to set forth specific actions that the site will undertake to remedy deficiencies. The plan includes a timetable and funding requirements for implementation of the planned activities.

ALLUVIAL FAN. A cone-shaped deposit of alluvium made by a stream where it runs out onto a level plain.

ALLUVIUM. Sedimentary material deposited by flowing water such as a river.

AQUIFER. A water-bearing unit of permeable rock or soil that will yield water in usable quantities to wells. *Confined aquifers* are bounded above and below by less permeable layers. Groundwater in a confined aquifer is under a pressure greater than the atmospheric pressure. *Unconfined aquifers* are bounded below by less permeable material but are not bounded above. The pressure on the groundwater at the surface of an unconfined aquifer is equal to that of the atmosphere.

AS LOW AS REASONABLY ACHIEVABLE (ALARA). An approach to radiation protection that advocates controlling or managing exposures (both individual and collective) to the work force and the general public and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. As used in DOE Order 5400.5, ALARA is not a dose limit but, rather, a process that has as its objective the attainment of dose levels as far below the applicable limits of the Order as practicable.

BACKGROUND RADIATION. Natural and manmade radiation such as cosmic radiation and radiation from naturally radioactive elements and from commercial sources and medical procedures.

BECQUEREL (Bq). A unit of radioactivity equal to one nuclear transformation per second.

CATEGORICAL EXCLUSION. A proposed action that normally does not require an ENVIRONMENTAL ASSESSMENT or an ENVIRONMENTAL IMPACT STATEMENT and that the Department of Energy has determined does not individually or cumulatively have a significant effect on the human environment. See 10 CFR 1021.410.

CLASS A, B, AND C LOW-LEVEL WASTE. Waste classifications from the Nuclear Regulatory Commission's 10 CFR Part 61 rule. Maximum concentration limits are set for specific isotopes. Class A waste disposal is minimally restricted with respect to the form of the waste. Class B waste

must meet more rigorous requirements to ensure physical stability after disposal. Greater concentration limits are set for the same isotopes in Class C waste, which also must meet physical stability requirements. Moreover, special measures must be taken at the disposal facility to protect against inadvertent intrusion.

COMPLIANCE FINDINGS. Conditions that may not satisfy applicable environmental or safety and health regulations, DOE Orders and memoranda, enforcement actions, agreements with regulatory agencies, or permit conditions.

CONFIDENCE COEFFICIENT OR FACTOR. The chance or probability, usually expressed as a percentage, that a confidence interval includes some defined parameter of a population. The confidence coefficients usually associated with confidence intervals are 90%, 95%, and 99%.

CONSISTENCY. The condition of showing steady conformity to practices. In the environmental monitoring program, approved procedures are in place in order to ensure that data collection activities are carried out in a consistent manner so that variability is minimized.

COSMIC RADIATION. High-energy subatomic particles from outer space that bombard the earth's atmosphere. Cosmic radiation is part of natural background radiation.

COUNTING ERROR. The variability caused by the inherent random nature of radioactive disintegration and by the detection process.

CURIE (Ci). A unit of radioactivity equal to 37 billion (3.7×10^{10}) nuclear transformations per second.

DECAY (RADIOACTIVE). Disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles and/or photons or by spontaneous fission.

DERIVED CONCENTRATION GUIDE (DCG). The concentration of a radionuclide in air and water that, under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 100 mrem (1 mSv). See Table K-1 in Appendix K.

DETECTION LIMIT OR LEVEL. The smallest amount of a substance that can be distinguished in a sample by a given measurement procedure at a given confidence level. (See LOWER LIMIT OF DETECTION.)

DISPERSION (GROUNDWATER). The process whereby solutes are spread or mixed as they are transported by groundwater as it moves through sediments.

DOSIMETER. A portable device for measuring the total accumulated exposure to ionizing radiation.

DOWNGRADIENT. The direction of water flow from a reference point to a selected point of interest. (See GRADIENT.)

EFFECTIVE DOSE. See EFFECTIVE DOSE EQUIVALENT under RADIATION DOSE.

EFFLUENT. Any treated or untreated air emission or liquid discharge, including storm water runoff, at a DOE site or facility.

EFFLUENT MONITORING. Sampling or measuring specific liquid or gaseous effluent streams for the presence of pollutants.

ENHANCED WORK PLANNING. A process that evaluates and improves the program by which work is identified, planned, approved, controlled, and executed. The key elements are line management ownership, a graded approach to work management based on risk and complexity, worker involvement beginning at the earliest phases of work management, organizationally diverse teams, and organized, institution-wide communication.

ENVIRONMENTAL ASSESSMENT. An evaluation that provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. See 40 CFR 1508.9.

ENVIRONMENTAL IMPACT STATEMENT. A detailed statement that includes the environmental impact of the proposed action, any adverse environmental effects that cannot be avoided should the proposal be implemented, and alternatives to the proposed action. See Section 102 (2) (C) of the National Environmental Policy Act.

ENVIRONMENTAL MANAGEMENT SYSTEM. The systematic application of business management practices to environmental issues, including defining the organizational structure, planning for activities, identifying responsibilites, and defining practices, procedures, processes, and resources.

ENVIRONMENTAL MONITORING. The collection and analysis of samples or the direct measurement of environmental media. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance.

ENVIRONMENTAL SURVEILLANCE. The collection and analysis of samples or the direct measurement of air, water, soil, foodstuff, and biota in order to determine compliance with applicable standards and permit requirements.

ERG. One-billionth (1E-09) of the energy released by a 100-watt bulb in 1 second.

EVAPOTRANSPIRATION. The combined total precipitation returned to the air through direct evaporation and by transpiration of vegetation.

EXPOSURE. The subjection of a target (usually living tissue) to radiation.

FALLOUT. Radioactive materials mixed into the earth's atmosphere. Fallout constantly precipitates onto the earth.

FINDING. A Department of Energy compliance term. A finding is a statement of fact concerning a condition in the Environmental, Safety, and Health program that was investigated during an appraisal. Findings include best management practice findings, compliance findings, and noteworthy practices. A finding may be a simple statement of proficiency or a description of deficiency (i.e., a variance from procedures or criteria). See also SELF-ASSESSMENT.

FISSION. The act or process of splitting into parts. A nuclear reaction in which an atomic nucleus splits into fragments, i.e., fission products, usually fragments of comparable mass, with the evolution of approximately 100 million to several hundred million electron volts of energy.

GAMMA ISOTOPIC (also GAMMA SCAN). An analytical method by which the quantity of several gamma ray-emitting radioactive isotopes may be determined simultaneously. Typical nuclear fuel cycle isotopes determined by this method include but are not limited to Co-60, Zr-95, Ru-106, Ag-110m, Sb-125, Cs-134, Cs-137, and Eu-154. Naturally occurring isotopes for which samples also often are analyzed are Be-7, K-40, Ra-224, and Ra-226.

GRADIENT. Change in value of one variable with respect to another variable, especially vertical or horizontal distance.

GROUNDWATER. Subsurface water in the pore spaces of soil and geologic units.

HALF-LIFE. The time in which half the atoms of a radionuclide disintegrate into another nuclear form. The half-life may vary from a fraction of a second to thousands of years.

HAZARDOUS WASTE. A waste or combination of wastes that because of quantity, concentration, or physical, chemical, or infectious characteristics may: a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HIGH-LEVEL WASTE (HLW). The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic waste and fission products in concentrations sufficient to require permanent isolation. (See also TRANSURANIC WASTE.)

HYDRAULIC CONDUCTIVITY. The ratio of flow velocity to driving force for viscous flow under saturated conditions of a specified liquid in a porous medium; the ratio describing the rate at which water can move through a permeable medium.

INTEGRATED SAFETY MANAGEMENT SYSTEM (ISMS). The Integrated Safety Management System (ISMS) describes the programs, policies, and procedures used by WVNS and the DOE to ensure that WVNS establishes a safe workplace for the employees, the public, and the environment. The guiding principles of ISMS are line management responsibility for safety; clear roles and responsibilities; competence commensurate with responsibilities; balanced priorities; identification of safety standards and requirements; hazard controls; and operations authorization.

INTERIM STATUS. The status of any currently existing facility that becomes subject to the requirement to have a RCRA permit because of a new statutory or regulatory amendment to RCRA.

INTERSTITIAL. The (annular) space between the inner and outer tank walls in a double-walled storage tank.

ION. An atom or group of atoms with an electric charge.

ION EXCHANGE. The reversible exchange of ions contained in solution with other ions that are part of the ion-exchange material.

ISOTOPE. Different forms of the same chemical element that are distinguished by having the same number of protons but a different number of neutrons in the nucleus. An element can have many isotopes. For example, the three isotopes of hydrogen are protium, deuterium, and tritium, with one, two, and three neutrons in the nucleus, respectively.

KAME DELTA. A conical hill or short irregular ridge of gravel or sand deposited in contact with glacier ice.

LACUSTRINE SEDIMENTS. A sedimentary deposit consisting of material pertaining to, produced by, or formed in a lake or lakes.

LAND DISPOSAL RESTRICTIONS (LDR). Regulations promulgated by the U.S. EPA (and by NYSDEC in New York State) governing the land disposal of hazardous wastes. The wastes must be treated using the best demonstrated available technology or must meet certain treatment standards before being disposed.

LOWER LIMIT OF DETECTION (LLD). The lowest limit of a given parameter an instrument is capable of detecting. A measurement of analytical sensitivity.

LOW-LEVEL WASTE (LLW). Radioactive waste not classified as high-level waste, transuranic waste, spent fuel, or uranium mill tailings. (See CLASS A, B, AND C LOW-LEVEL WASTE.)

MAXIMALLY EXPOSED INDIVIDUAL. A hypothetical person who remains in an uncontrolled area who would, when all potential routes of exposure from a facility's operations are considered, receive the greatest possible dose equivalent.

MEAN. The average value of a series of measurements.

MILLIREM (MREM). A unit of radiation dose equivalent that is equal to one one-thousandth of a rem. An individual member of the public can receive up to 500 millirems per year according to DOE standards. This limit does not include radiation received for medical treatment or the 100 to 360 mrem that people receive annually from background radiation.

MINIMUM DETECTABLE CONCENTRATION (MDC). Depending on the sample medium, the smallest amount or concentration of a radioactive or nonradioactive analyte that can be reliably detected

using a specific analytical method. Calculations of the minimum detectable concentrations are based on the lower limit of detection.

MIXED WASTE. A waste that is both radioactive and hazardous. Also referred to as RADIOACTIVE MIXED WASTE (RMW).

N-DODECANE/TRIBUTYL PHOSPHATE. An organic solution composed of 30% tributyl phosphate (TBP) dissolved in n-dodecane used to first separate the uranium and plutonium from the fission products in the dissolved fuel and then to separate the uranium from the plutonium.

NEUTRON. An electrically neutral subatomic particle in the baryon family with a mass 1,839 times that of an electron, stable when bound in an atomic nucleus, and having a mean lifetime of approximately 16.6 minutes as a free particle.

NOTICE OF VIOLATION. A letter of notice from a regional water engineer in response to an instance of significant noncompliance with a SPDES permit. Generally, an official notification from a regulatory agency of noncompliance with permit requirements.

NUCLEUS. The positively charged central region of an atom, made up of protons and neutrons and containing almost all of the mass of the atom.

OUTFALL. The end of a drain or pipe that carries wastewater or other effluents into a ditch, pond, or river.

PARAMETER. Any of a set of physical properties whose values determine the characteristics or behavior of something (e.g., temperature, pressure, density of air). In relation to environmental monitoring, a monitoring parameter is a constituent of interest. Statistically, the term "parameter" is a calculated quantity, such as a mean or variance, that describes a statistical population.

PARTICULATES. Solid particles and liquid droplets small enough to become airborne.

PERSON-REM. The sum of the individual radiation dose equivalents received by members of a certain group or population. It may be calculated by multiplying the average dose per person by the number of persons exposed. For example, a thousand people each exposed to one millirem would have a collective dose of one person-rem.

PLUME. The distribution of a pollutant in air or water after being released from a source.

PRECISION. The degree of reproducibility of a measurement under a given set of conditions. Precision in a data set is assessed by evaluating results from duplicate field or analytical samples.

PROGLACIAL LAKE. A lake occupying a basin in front of a glacier; generally in direct contact with the ice.

PROTON. A stable, positively charged subatomic particle in the baryon family with a mass of 1,836 times that of an electron.

PSEUDO-MONITORING POINT. A theoretical monitoring location rather than an actual physical location; a calculation based on analytical test results of samples obtained from other associated, tributary monitored locations. (Point 116 at the WVDP is classified as a "pseudo" monitoring point because samples are not actually physically collected at that location. Rather, using analytical results from samples collected from "real" upstream outfall locations, compliance with the total dissolved solids limit in the WVDP's SPDES permit is calculated for this theoretical point.)

QUALITY FACTOR. The extent of tissue damage caused by different types of radiation of the same energy. The greater the damage, the higher the quality factor. More specifically, the factor by which absorbed doses are multiplied to obtain a quantity that indicates the degree of biological damage produced by ionizing radiation. (See RADIATION DOSE.) The factor is dependent upon radiation type (alpha, beta, gamma, or x-ray) and exposure (internal or external).

RAD. Radiation absorbed dose. One hundred ergs of energy absorbed per gram.

RADIATION. The process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

ALPHA RADIATION. The least penetrating type of radiation. Alpha radiation can be stopped by a sheet of paper or the outer dead layer of skin.

BETA RADIATION. Electrons emitted from a nucleus during fission and nuclear decay. Beta radiation can be stopped by an inch of wood or a thin sheet of aluminum.

GAMMA RADIATION. A form of electromagnetic, high-energy radiation emitted from a nucleus. Gamma rays are essentially the same as x-rays and require heavy shielding such as lead, concrete, or steel to be stopped.

INTERNAL RADIATION. Radiation originating from a source within the body as a result of the inhalation, ingestion, or implantation of natural or manmade radionuclides in body tissues.

RADIATION DOSE:

ABSORBED DOSE. The amount of energy absorbed per unit mass in any kind of matter from any kind of ionizing radiation. Absorbed dose is measured in rads or grays.

COLLECTIVE DOSE EQUIVALENT. The sum of the dose equivalents for all the individuals comprising a defined population. The per capita dose equivalent is the quotient of the collective dose equivalent divided by the population. The unit of collective dose equivalent is person-rem or person-sievert.

COLLECTIVE EFFECTIVE DOSE EQUIVALENT. The sum of the effective dose equivalents for the individuals comprising a defined population. Units of measurement are person-rems or person-sieverts. The per capita effective dose equivalent is obtained by dividing the collective dose equivalent by the population. Units of measurement are rems or sieverts.

COMMITTED DOSE EQUIVALENT. A measure of internal radiation. The predicted total dose equivalent to a tissue or organ over a fifty-year period after a known intake of a radionuclide into the body. It does not include contributions from sources of external penetrating radiation. Committed dose equivalent is measured in rems or sieverts.

COMMITTED EFFECTIVE DOSE EQUIVALENT. The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is measured in rems or sieverts.

RADIOACTIVITY. A property possessed by some elements (such as uranium) whereby alpha, beta, or gamma rays are spontaneously emitted.

RADIOISOTOPE. A radioactive isotope of a specified element. Carbon-14 is a radioisotope of carbon. Tritium is a radioisotope of hydrogen. (See ISOTOPE.)

RADIONUCLIDE. A radioactive nuclide. Radionuclides are variations (isotopes) of elements. They have the same number of protons and electrons but different numbers of neutrons, resulting in different atomic masses. There are several hundred known nuclides, both manmade and naturally occurring.

REM. An acronym for Roentgen Equivalent Man. A unit of radiation exposure that indicates the potential effect of radiation on human cells.

REMOTE-HANDLED WASTE. At the WVDP, waste that has an external surface dose rate that exceeds 100 millirem per hour or a high level of alpha and/or beta surface contamination.

SELF-ASSESSMENT. Self-assessments are appraisals conducted by the WVDP to identify and correct any existing deficiencies in the environmental monitoring program. Under the WVDP environmental monitoring procedure *Self-Assessments for Environmental Programs*, information obtained from an appraisal is categorized as follows:

KEY FINDING. A direct and significant violation of a Department of Energy regulatory or other applicable guidance or procedural requirement, or a recurring pattern of observed deficiencies that could result in such a violation. A finding is a deficiency that requires corrective action.

OBSERVATION. A weakness that, if not corrected, could result in a deficiency. An observation may result if an explicit procedural nonconformance is noted but the nonconformance is an isolated incident or of minor significance. An observation requires corrective action.

COMMENT OR CONCERN. A comment is a subjective opinion of the assessment team that may be used to improve any of the specific environmental monitoring program activities, noted in *Self-Assessments for Environmental Programs,* such as sample collection, preparation, logging, storage, and shipping; instrument and equipment calibration; data receipt and data entry; training requirements and records; and compliance with discharge permit requirements. Corrective action in response to a comment or concern is at the discretion of the cognizant staff.

COMMENDABLE PRACTICE. A significant strength noted during the course of a self-assessment.

DEFICIENCY. A condition that does not meet or cannot be documented to meet applicable requirements.

SIEVERT. A unit of dose equivalent from the International System of Units (Systeme Internationale). Equal to one joule per kilogram.

SOLID WASTE MANAGEMENT UNIT (SWMU). Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

SPENT FUEL. Nuclear fuel that has been used in a nuclear reactor; this fuel contains uranium, activation products, fission products, and plutonium.

SPILL. A spill or release is defined as "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or otherwise disposing of substances from the ordinary containers employed in the normal course of storage, transfer, processing, or use."

STANDARD DEVIATION. An indication of the dispersion of a set of results around their average.

SUPER SOLID WASTE MANAGEMENT UNIT (SSWMU). Individual solid waste management units that have been grouped and ranked into larger units — super solid waste management units — because some individual units are contiguous or so close together as to make monitoring of separate units impractical.

SURFACE WATER. Water that is exposed to the atmospheric conditions of temperature, pressure, and chemical composition at the surface of the earth.

SURVEILLANCE. The act of monitoring or observing a process or activity to verify conformance with specified requirements.

THERMOLUMINESCENT DOSIMETER (TLD). A device that luminesces upon heating after being exposed to radiation. The amount of light emitted is proportional to the amount of radiation to which the luminescent material has been exposed.

TRANSURANIC WASTE. Waste containing transuranic elements, i.e., those elements with an atomic number greater than 92, including neptunium, plutonium, americium, and curium.

UPGRADIENT. Referring to the flow of water or air, "upgradient" is analogous to upstream. Upgradient is a point that is "before" an area of study that is used as a baseline for comparison with downstream data. See GRADIENT and DOWNGRADIENT.

WATERSHED. The area contained within a drainage divide above a specified point on a stream.

WATER TABLE. The upper surface in a body of groundwater; the surface in an unconfined aquifer or confining bed at which the pore water pressure is equal to atmospheric pressure.

X-RAY. Penetrating electromagnetic radiations having wave lengths shorter than those of visible light. They are usually produced by bombarding a metallic target with fast electrons in a high vacuum. In nuclear reactions it is customary to refer to photons originating in the nucleus as gamma rays and those originating in the extranuclear part of the atom as x-rays. These rays are sometimes called roentgen rays after their discoverer, W.C. Roentgen.

Acronyms

ACM	Asbestos-containing material
AEA	Atomic Energy Act
ALARA	As Low As Reasonably Achievable
BEIR	Committee on Biological Effects of Ionizing Radiation
BOD_5	Biochemical Oxygen Demand (5-day)
CAA	Clean Air Act
CDDL	Construction and Demolition Debris Landfill
CEDE	Committed Effective Dose Equivalent
CEMP	Code of Environmental Management Principles for Federal Agencies
CEQ	(President's) Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Certificate-to-Operate
CSPF	Container Sorting and Packaging Facility
CPC	Chemical Process Cell
CSRF	Contact Size-reduction Facility
CSS	Cement Solidification System
CWA	Clean Water Act
CWAP	Clean Water Action Plan
CX	Categorical Exclusion
CY	Calendar Year
DCG	Derived Concentration Guide
DMR	Discharge Monitoring Report
DOE	(United States) Department of Energy
DOE-EM	(United States) Department of Energy, Office of Environmental Restoration and Waste Management
DOE-HQ	Department of Energy, Headquarters Office
DOE-OH	Department of Energy, Ohio Field Office
DOT	(United States) Department of Transportation
EA	Environmental Assessment

EDE	Effective Dose Equivalent
EHS	Extremely Hazardous Substance
EIS	Environmental Impact Statement
EML	Environmental Measurements Laboratory
EMS	Environmental Management System
EPA	(United States) Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESR	(WVDP) Effluent Summary Report
EWP	Enhanced Work Planning
FFC Act	Federal Facility Compliance Act
FONSI	Finding of No Significant Impact
FSFCA	Federal and State Facility Compliance Agreement
FY	Fiscal Year
GEL	General Engineering Laboratory (formerly Environmental Physics, Inc. [EPI])
HEPA	High-efficiency Particulate Air (filter)
HLW	High-level (radioactive) Waste
HPIC	High-pressure Ion Chamber
HVAC	Heating, Ventilation, and Air Conditioning
ICRP	International Commission on Radiological Protection
INEEL	Idaho National Engineering and Environmental Laboratory
IRTS	Integrated Radwaste Treatment System
ISMS	Integrated Safety Management System
ISO	International Organization for Standardization
LAS	Linear Alkylate Sulfonate
LDR	Land Disposal Restriction
LIMS	Laboratory Information Management System
LLD	Lower Limit of Detection
LLW	Low-level (radioactive) Waste
LLWTF	Low-level (Liquid) Waste Treatment Facility
LPS	Liquid Pretreatment System
LWTS	Liquid Waste Treatment System
MDC	Minimum Detectable Concentration
MDL	Method Detection Limit

MSDS	Material Safety Data Sheet
MTAR	Monthly Trend Analysis Report
NCRP	National Council on Radiation Protection and Measurements
NDA	Nuclear Regulatory Commission-licensed Disposal Area
NEPA	National Environmental Policy Act
NERL ESD	National Exposure Research Laboratory, Environmental Sciences Division
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFS	Nuclear Fuel Services, Inc.
NIST	National Institute of Standards and Technology
NOI	Notice of Intent
NPOC	Nonpurgeable Organic Carbon
NPGRS	North Plateau Groundwater Recovery System
NPDES	National Pollutant Discharge Elimination System
NRC	(United States) Nuclear Regulatory Commission
NYCRR	New York Official Compilation of Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOL	New York State Department of Labor
NYSERDA	New York State Energy Research and Development Authority
NYSGS	New York State Geological Survey
ODIS	(Effluent Information System) On-site Discharge Information System Report (also EIS/ ODIS)
OH/WVDP	Department of Energy, West Valley Demonstration Project
OSHA	Occupational Safety and Health Act
OSR	Operational Safety Requirement
OVE	Outdoor Ventilated Enclosure
PC	Permit-to-Construct
PCB	Polychlorinated Biphenyl
PQL	Practical Quantitation Limit
PTW	Permeable Treatment Wall
PVU	Portable Ventilation Unit
QA	Quality Assurance
QAP	Quality Assessment Program (also Quality Assurance Program)

QC	Quality Control
QEMDR	Quarterly Environmental Monitoring Data Report
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RMW	Radioactive Mixed Waste
SA	Supplement Analysis
SAR	Safety Analysis Report
SARA	Superfund Amendments and Reauthorization Act
SD	Standard Deviation
SDA	(New York) State-licensed Disposal Area
SDWA	Safe Drinking Water Act
SER	Site Environmental Report
SI	Systeme Internationale (International System of Units)
SPDES	State Pollutant Discharge Elimination System
STS	Supernatant Treatment System
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
SSWMU	Super Solid Waste Management Unit
TLD	Thermoluminescent Dosimetry
TOC	Total Organic Carbon
TOX	Total Organic Halogens
TRI	Toxic Release Inventory
TRU	Transuranic
TSCA	Toxic Substances and Control Act
TSDF	Treatment, Storage, and Disposal Facility
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WNYNSC	Western New York Nuclear Service Center
WRG	Work Review Group
WVDP	West Valley Demonstration Project
WVNS	West Valley Nuclear Services Company
WWTF	Wastewater Treatment Facility

Units of Measure

Radioactivity

Symbol	Name
Ci	curie
mCi	millicurie (1E-03 Ci)
μCi	microcurie (1E-06 Ci)
nCi	nanocurie (1E-09 Ci)
pCi	picocurie (1E-12 Ci)
Bq	becquerel (27 pCi)

Volume

Symbol	Name
cm^3	cubic centimeter
L	liter
mL	milliliter
m^3	cubic meter
gal	gallon
ft^3	cubic feet
ppm	parts per million
ppb	parts per billion

Dose

Symbol	Name
Sv	sievert (100 rems)
mSv	millisievert (1E-03 Sv)
Gy	gray (100 rads)

Area

Symbol	Name
ha	hectare (10,000 m^2)

Concentration

Symbol	Name
μCi/mL	microcuries per milliliter
mL/L	milliliter per liter
μCi/g	microcuries per gram
mg/L	milligrams per liter
μg/mL	micrograms per milliliter
pCi/L	picocuries per liter

Length

Symbol	Name
m	meter
km	kilometer (1E+03 m)
cm	centimeter (1E-02 m)
mm	millimeter (1E-03 m)
μm	micrometer (1E-06 m)

Mass

Symbol	Name
g	gram
kg	kilogram (1E+03 g)
mg	milligram (1E-03 g)
μg	microgram (1E-06 g)
ng	nanogram (1E-09 g)
t	metric ton (1E+06 g)

Flow Rate

Symbol	Name
mgd	million gallons per day
cfm	cubic feet per minute
Lpm	liters per minute

Unit Prefixes

centi	$1/100 = 1 \times 10^{-2} = 0.01 =$ E-02
milli	$1/1{,}000 = 1 \times 10^{-3} = 0.001 =$ E-03
micro	$1/1{,}000{,}000 = 1 \times 10^{-6} = 0.000001 =$ E-06
nano	$1/1{,}000{,}000{,}000 = 1 \times 10^{-9} = 0.000000001 =$ E-09
pico	$1/1{,}000{,}000{,}000{,}000 = 1 \times 10^{-12} = 0.000000000001 =$ E-12

Scientific Notation

Scientific notation may be used to express very large or very small numbers. A number smaller than 1 is expressed with a negative exponent, e.g., 1.3×10^{-6}. To convert this number to decimal form, the decimal point is moved left by the number of places equal to the exponent. Thus, 1.3×10^{-6} becomes 0.0000013.

A number larger than 10 is expressed with a positive exponent, e.g., 1.3×10^{6}. To convert this number to decimal form, the decimal point is moved right by the number of places equal to the exponent. Thus, 1.3×10^{6} becomes 1,300,000.

The power of 10 also is expressed as E. For example, 1.3×10^{-6} also can be written as 1.3E-06. The chart below shows equivalent exponential and decimal values.

1.0×10^{2}	=	1E+02	=	100
1.0×10^{1}	=	1E+01	=	10
1.0×10^{0}	=	1E+00	=	1
1.0×10^{-1}	=	1E-01	=	0.1
1.0×10^{-2}	=	1E-02	=	0.01
1.0×10^{-3}	=	1E-03	=	0.001
1.0×10^{-4}	=	1E-04	=	0.0001
1.0×10^{-5}	=	1E-05	=	0.00001
1.0×10^{-6}	=	1E-06	=	0.000001 One Millionth
1.0×10^{-7}	=	1E-07	=	0.0000001
1.0×10^{-8}	=	1E-08	=	0.00000001

Conversion Chart

Both traditional radiological units (curie, roentgen, rad, rem) and the Systeme Internationale (S.I.) units (becquerel, gray, sievert) are used in this report. Nonradiological measurements are presented in metric units with the English equivalent noted in parentheses.

1 centimeter (cm)	=	0.3937 inches (in)
1 meter (m)	=	39.37 inches (in) = 3.28 feet (ft)
1 kilometer (km)	=	0.62 miles (mi)
1 milliliter (mL)	=	0.0338 ounces (oz)
	=	0.061 cubic inches (in^3)
	=	1 cubic centimeter (cm^3)
1 liter (L)	=	1.057 quarts (qt)
	=	61.02 cubic inches (in^3)
1 gram (g)	=	0.0353 ounces (oz)
	=	0.0022 pounds (lbs)
1 kilogram (kg)	=	2.2 pounds (lbs)
1 curie (Ci)	=	3.7×10^{10} disintegrations per second (d/s)
1 becquerel (Bq)	=	1 disintegration per second (d/s)
	=	27 picocuries (pCi)
1 roentgen (R)	=	2.58×10^{-4} coulombs per kilogram of air (C/kg)
1 rad	=	0.01 gray (Gy)
1 rem	=	0.01 sievert (Sv)
1 millirem (mrem)	=	0.001 rem

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