10.1 EXISTING LANDFILL

40 CFR §258.50 to 258.51 specifies that a groundwater monitoring system with up-gradient and down-gradient wells is required at landfill sites unless the Director of an approved state suspends these requirements. In a 1994 permit document, Woodward-Clyde, acting on behalf of the City, proposed an alternative vadose zone monitoring system for the existing unlined landfill. The vadose zone monitoring enables early detection of leachate migration from the landfill and provides a more cost-effective alternative by avoiding the considerable costs for installation of wells in the regional aquifer to a depth of 1,600 feet.

The vadose zone monitoring system, which was installed in the fall of 1995, consists of five monitoring stations. Four of the stations are located within the existing landfill. The fifth station was installed adjacent to the landfill to assess background vadose zone conditions (Figure 10-1). Each station consists of a Soil Moisture Equipment Corporation, Model 1940 high vacuum-pressure lysimeter and a neutron probe access tube (NPAT). The lysimeters were included to allow sampling of vadose zone water for the practical design life of the lysimeter (up to 5 years). The neutron probe access tube was included to allow longer term monitoring of moisture movement in the vadose zone due to the impracticality of replacing the lysimeters as they fail. A typical schematic of a vadose zone monitoring station is shown in Figure 10-2. During installation, soil samples were collected at regular intervals from each boring for physical and chemical analyses.

The soil samples were tested for volatile organic compounds, semi-volatile organics, chloride, sulfate, pH, total organic carbon and heavy metals. Based on analytical data obtained from these tests, the subsurface soils do not appear to have been impacted by these constituents migrating from the landfill. Additionally, the soil moisture content of the soil samples collected beneath the landfill were similar to the soil moisture content of soil samples collected upgradient from the landfill indicating that leachate has not migrated from the landfill.

Results from eight neutron probe monitoring events are shown on Figures 10-3 to 10-7 (City of Flagstaff, 1997). The results of these events indicate that although moisture contents appear to be near saturation directly underlying the refuse, moisture content decreases rapidly with depth. The high moisture content directly beneath the landfill may reflect one or more of the following: the moisture content in the bentonite seal installed at the base of the conductor casing, infiltration of some construction water from installation of the conductor casings into the underlying soils, or liquid migration through the refuse and/or underlying soils (Woodward-Clyde, 1996a). Since the moisture content decreases rapidly with depth, it appears that if migration of leachate from the landfill is occurring, the migration is not extensive.

After reviewing available hydrogeologic information, HELP and MULTIMED model runs for several scenarios, and preliminary vadose monitoring results, ADEQ granted the Cinder Lake Landfill a suspension of groundwater monitoring requirements with the understanding that vadose monitoring would continue (see Appendix B).

10.1.1 Vadose Zone Constituents to be Monitored

10.1.1.1 Lysimeters

The compounds and constituents monitored in vadose zone fluid samples during the first year were selected based on the following:

• Constituents and compounds included in the Subtitle D Detection Monitoring List.

• Constituents and compounds included in the State of Arizona Detection Monitoring List for Solid Waste Facilities.

• Summary of Published Data Regarding the Chemical Character of Leachate from Municipal Landfills (Table 9-8).

Constituents and compounds that have current State of Arizona Aquifer Water Quality Standards were also considered in selecting constituents to be monitored and alert levels. A cross-reference list has been prepared illustrating the selection of constituents and compounds used during the first year of monitoring. (Table 10-1).

Table 10-2 presents a listing of the constituents that were detected in at least one lysimeter during the first year of vadose zone fluid sampling. It is proposed that future analytical testing of samples collected during semi-annual monitoring be performed only for the constituents shown in Table 10-2. The volume of sample that may be obtained during each suction lysimeter monitoring round is dependent on the antecedent moisture conditions in the soils surrounding each lysimeter. If soil moisture conditions are not favorable to collect the minimum volume required for analysis of the full analytical suite, the sampling collection priority will be as follows: common ion constituents, trace metals, volatile organic compounds, and semivolatile organic compounds. Sample collection information, including analytical methods is shown on Table 10-3.

Soil moisture profiles and soil moisture samples will be collected by experienced personnel. SOPs outlining sampling protocols for all field sampling activities have been provided (Appendix K). No field decontamination protocols will be necessary for the vadose zone sampling activities as all samples will be collected directly from the sample discharge tubing into the sampler containers.

Alert Levels

Tentative alert levels for lysimeter samples were established for constituents and compounds regulated under federal MCLs and/or state AWQSs (Table 10-1). The alert levels were established based on the MULTIMED analysis performed (Section 9). The tentative alert levels were computed based on multiplying the lower of the two regulatory standards by a conservative DAF factor of 10. This DAF factor is based on the MULTIMED evaluation of potential transport of contaminants to a downgradient receptor located at the landfill boundary. These alert levels may be reevaluated and alert levels for other constituents may be determined based on data collected from additional vadose zone monitoring events.

10.1.1.2 Neutron Probe

In addition to the lysimeters, a neutron probe will be used to monitor the vadose zone at each station. The neutron probe access tubes were included in the vadose zone monitoring station to allow long-term vadose zone monitoring after the lysimeters fail. Soil moisture readings will be taken at one-foot intervals from the bottom of the landfill to the bottom of the access tube (basalt interface) at each station on a quarterly basis. The data will be collected and a statistical analysis of the neutron probe monitoring results will be conducted.

As previously discussed, vadose zone monitoring wells were installed at CLL in September 1995. Soil samples collected beneath the landfill during installation of the vadose zone wells did not contain concentration of constituents that would suggest that these soils were adversely impacted by leachate migration from the landfill. Vadose zone monitoring in 1996 and 1997 included both the collection of lysimeter samples and neutron probe readings at each vadose monitoring station. As discussed in Section 9.4, water quality data from lysimeter samples collected indicate that the soil pore water at the bedrock interface was also not adversely impacted by migration of leachate from the landfill. As a result, the neutron probe moisture content profiles for each boring can be considered as moisture profiles that represent conditions during which leachate migration from the landfill is not significant. A statistically significant change to these profiles can be used as an indication that leachate might be migrating from the landfill.

Review of the boring logs in Appendix I reveals that subsurface soil conditions in and around the landfill area show distinct small-scale stratigraphic variations. The soil types and associated soil moisture content in a site bore location may be different from that in the background bore location at the same depth because of the variations in the local soil types. For this reason, a direct statistical comparison of moisture content values between the background and site boring holes at the same vertical depth is not meaningful.

When significant spatial variability is present in the sample data, an appropriate statistical method is the intra-well prediction limit (USEPA, 1989; Gibbons, 1994). In this method, data from a specific time frame from a given boring is used as that location's background data. The time frame for defining background data is selected such that the data show no impact of site operations and no systematic time trend. Using the background data for the boring location, a background prediction limit for the boring location is established and then compared to future values from neutron probe measurements at the boring location. If a future value exceeds the background prediction limit, the increase in soil moisture content is taken as an indication of potential leachate migration. If a consistent pattern of exceeding background limit is observed, additional monitoring and/or site investigation is performed to assess whether the migration of contaminants associated with leachate is actually occurring.

In applying the intra-well prediction limit method to the CLL site, the first step was to identify a time frame when data in each site boring would be representative of conditions indicating that site operations have not adversely impacted the subsurface. As indicated previously in this subsection, data from 1996 and 1997 represent a time frame during which soil and lysimeter samples from beneath the landfill indicate no adverse impacts related to leachate migration.

Therefore, neutron probe readings during this time period would be representative of background conditions.

Additional confirmation was provided by identifying a 3-foot depth zone in the background and site borings that showed similar or comparable soil units near the bedrock interface. A 3-feet depth zone was selected because such a zone would be small enough to avoid mixing spatially disparate values, but large enough to provide benefits of reduced variability resulting from spatially averaging highly correlated sample values. A comparison of the data from the 3-foot zone in the background and site borings was conducted. Table 10-4 shows the sample data (% moisture content) at each foot within the representative depth zone in each boring hole. A minimum of 8 data points were obtained as recommended for the calculation of prediction limits (Gibbons, 1994).

Also shown in Table 10-4 are the summary data statistics (mean, standard deviation, minimum, and maximum) for the data used in calculating the prediction limits. Figure 10-8 shows results of the basic exploratory data analysis (histogram, box and whisker plot, and summary statistics) for each data set. These comparisons showed that there is no statistically significant difference between the data from the background and site borings. In addition, no systematic time trends were observed.

After confirming that the site data reflect conditions not impacted by site operations and that the data did not show a systematic time trend, a separate prediction limit was calculated for each boring using the data from April 1996 to August 1997. The Shapiro-Wilk test (USEPA, 1989) was applied to check the normality of the sample data in each boring hole. All data sets passed the normality test. We next applied the ASTM outlier test (ASTM, 1996) to check if any of the data points in each data set could be considered to be statistical outliers. None of the data points were identified to be an outlier. Finally, we calculated the prediction limit for each data set using the following equation:

$$\text{(Upper) Prediction limit} = \text{background sample mean} + ts(1+1/n)^{1/2}, \text{ in which} \qquad (1)$$

$$t = \text{one-sided } (1\text{-}\alpha) \text{ cumulative probability point of Student's}$$

$$t \text{ distribution with } (n\text{-}1) \text{ degrees of freedom},$$

$$s = \text{background sample standard deviation, and}$$

$$n = \text{number of background samples.}$$

The calculation of the t statistics in Equation 1 requires an assumption of Type error (α). We assume an overall α of 0.05. We also assume that the next 5 sample values (one taken on December 17, 1997 plus four quarterly samples taken in 1998) in each boring will be compared against the background limit calculated for that boring. Thus, the t statistics in Equation 1 will be based on using $\alpha = 0.05/5 = 0.01$. This choice is consistent with EPA recommendations (USEPA, 1989).

Table 10-4 includes the calculated prediction limit for each boring hole.

After August 1997, neutron probe monitoring was reduced to quarterly, with the first subsequent quarterly event occurring on December 17, 1997. The comparison of the most recent

(December 17, 1997) round of sample values with their respective boring-specific prediction limits show that none of the mean sample values in the representative depth zone exceed the limits (Table 10-5).

Alert Levels

All future quarterly sample values of moisture content in each boring will be compared against the prediction limit calculated for that boring. If no sample exceeds the limit, the data in each boring hole should be augmented at the end of each calendar year and new boring-specific prediction limits should be calculated and used for continued monitoring.

10.1.2 Contaminant Detection Contingency Plan

This contingency plan was prepared in the event that concentrations of monitored constituents or compounds exceed the alert levels in samples collected from the vadose zone monitoring system beneath the existing landfill. Because the point of compliance, discussed in Section 8, is located approximately 1,600 feet above the regional aquifer system, exceedance of an alert level would not result in an imminent or substantial endangerment to the public health or the environment.

If alert levels are exceeded the following actions will be taken:

- The Solid Waste Superintendent will notify ADEQ in writing that an alert level has been exceeded. Notification will be provided within seven days of receipt of monitoring results indicating the exceedance. The notification will provide detail regarding the sample type and date collected, constituent or compound involved, and concentration detected. The notification will also provide information regarding the date(s) on which verification monitoring/sampling will be performed.

- The location at which the lysimeter sample exceeding the alert level had been collected will be resampled within 14 days of receipt of the laboratory result. Duplicate verification samples will be collected, if possible, for laboratory analysis of the constituent or compound of interest.

- After receipt of the analytical results for the verification lysimeter samples, further analysis may be performed, including re-run of the MULTIMED model or the use of other models as appropriate to project the fate and transport of the specific constituent or compound to the regional aquifer system. Additionally, the causes, impacts, and potential mitigation measures for the alert level exceedance will be evaluated. A written report will be submitted to ADEQ within 30 days of receipt of the analytical results for the verification sampling event. The report will include a summary of the evaluation performed.

- If the moisture content from neutron probe monitoring is found to exceed the prediction limit, the monitoring event will be repeated. If the results of the repeated event also indicate that the prediction limit has been exceeded, the monitoring frequency will be increased to monthly. If the moisture content continues to exceed the prediction limit in at least half of the monitoring events over a one-year period, a workplan for enhanced monitoring and/or a corrective action program will be developed based on the results of the monitoring results.

10.2 DEMONSTRATION FOR GROUNDWATER MONITORING EXEMPTION — LATERAL EXPANSION AREAS

As discussed above, ADEQ concurred with a determination that the existing unlined landfill will not cause migration of hazardous constituents to the groundwater during the active and post-closure periods of the facility (Rogers, 1996). The HELP modeling results in Section 8 indicate that approximately 1.84 inches per year of percolation through the existing landfill are anticipated during operational conditions. In contrast, results of HELP modeling indicate essentially no percolation (0.00085 inches annually) is expected through the liner of the proposed lateral expansion areas. Therefore, percolation through the lined landfill is expected to be approximately 2000 times less than the percolation through the unlined landfill. In addition, site-specific MULTIMED modeling has shown that the concentration of any infiltrating contaminants would be negligible at a receptor located 250 feet down-gradient of the landfill. We believe that the predicted infiltration rates and MULTIMED modeling results preclude the necessity of a groundwater monitoring or leak detection system for the lined lateral expansion areas and request that ADEQ suspend groundwater requirements for the lateral expansion areas at CLL. In accordance with 40 CFR §258.5(d), a discussion of six factors is presented below to evaluate the potential risks posed to human health and the environment by the lateral expansion areas.

1) Proximity of Human and Environmental Receptors

The nearest human receptors are residents of two housing developments, the Doney Park area south of the landfill and the Black Bill Park Area west of the landfill near the U.S. Highway 89. These residential areas are over 1 mile away from the landfill (See Figure 3-2). The CLL is in an isolated area characterized by open ponderosa pine forest, widely spaced shrubs of rabbit-brush and currant, and a sparse cover of grasses and herbs. Although two sensitive species have been identified on the expansion site, Penstemon clutei and Phacelia serrata, the USFS and Arizona Fish and Game have assessed that loss of these plants will not pose a significant impact. No floodplains or wetlands are in the vicinity of the landfill (Section 4).

2 – 4) Design, Age and Size of the MSWLF Unit

The lateral expansions will have a base liner consisting of a 60-mil HDPE flexible membrane liner and a GCL. The liner will be overlain by a leachate collection layer. The expansion areas will utilize standard cut, fill, compaction and daily cover landfilling techniques. The lateral expansion will consist of approximately 137 acres and is expected to extend the operation life of the existing facility by approximately 22 years. Development of the expansion areas is expected to begin between 2015 and 2020.

5) Types and Quantities of Waste Disposed, including Sewage Sludge

The existing landfill receives an estimated average of 340 tons of refuse per day. Daily disposal rates at the existing landfill varies from approximately 2,000 tons per day (tpd) during the summer to approximately 200 tpd during the winter. Future average disposal rates for the expansion areas are expected to be approximately 1,400 tpd. A detailed discussion of the current waste stream is presented in Section 7.1.3. The lateral expansion areas will not accept hazardous

waste; liquid, including septic tank truck loads; transformers, capacitors, and large electrical equipment (if containing PCBs); non-sewage sludges that meet the hazardous waste criteria; powders, dusts, filter cakes or industrial waste that meet the hazardous waste criteria; friable asbestos; non-dewatered sewage sludge; pesticide containers; or medical (red-bag) waste.

6)   Resource Value of the Underlying Aquifer including Current and Future Uses; Proximity and Withdrawal Rate of Users; and Groundwater Quality

The only significant groundwater unit known to underlie the landfill is the regional Supai/Coconino aquifer. Depth to water in the regional aquifer is estimated to be approximately 1,600 feet below the landfill property.

Groundwater users in the vicinity of the landfill include private users and the Doney Park Water Company (DPW). DPW provides water service to residential developments in the Doney Park and Black Bill Park areas. As of 1991, DPW served approximately 1,630 residential and 85 commercial customers. DPW supplies its customers with groundwater pumped from seven wells. A total of 25 private wells have been identified in the area. The location of wells is shown in Figures 9-4 and 9-5.

None of the wells identified in the well inventory are located in areas downgradient of the landfill, based on groundwater flow direction in the regional aquifer system. Groundwater flow in the regional aquifer system beneath the property is toward the northeast.

Future groundwater uses are not known at this time. However, as shown in Figure 3-2, most of the land surrounding the landfill is owned by the US Forest Service which will tend to limit both development and future groundwater users.

Inorganic and organic water quality data are available for selected wells in the general vicinity of CLL. Review of available data for inorganic constituents indicates barium concentrations in wells tapping the regional aquifer may exceed the ADEQ Arizona Water Quality Standards (AWQS) for aquifers classified as drinking water protected use. Additionally, it appears that barium concentrates in some areas in the regional aquifer may also exceed both the EPA Maximum Contaminant Level (MCL) for drinking water and the ADEQ Heath Based Guidance Levels (HBGL) for drinking water. An unpublished study prepared for DPW suggests that elevated barium concentrations in the regional aquifer within the study area are naturally occurring and may be associated with recent volcanic activity. No other inorganic constituents were reported at concentrations exceeding current AWQLs, MCLs, or HBGLs. No organic compounds were detected.

In conclusion, we believe that the information presented in this subsection demonstrates that there is no potential for migration of hazardous constituents from the expansion area to the uppermost aquifer and that suspension of groundwater monitoring for the lined expansion areas is appropriate.

Table 10-1
ANALYTICAL LIST AND INITIAL ALERT LEVEL CONCENTRATIONS

COMPOUND OR CONSTITUENT AND EPA ANALYTICAL METHOD NUMBER	RCRA SUBTITLE D DETECTION MONITORING	ARIZONA SOLID WASTE DRAFT RULES	ARIZONA AQUIFER WATER QUALITY STANDARDS	ARIZONA NUMERIC AQUIFER WATER QUALITY STANDARDS (mg/l)	U.S EPA MAXIMUM CONTAMINANT LEVEL (mg/l)	INITIAL ALERT LEVEL (mg/l)
INORGANIC CONSTITUENTS						
EPA METHOD NUMBER 6010						
Antimony	X (b)	X (b)			0.006	0.06
Arsenic	X (b)	X (b)	X	0.05	0.05	0.5
Barium	X (b)	X (b)	X	1.0	2	10
Beryllium	X (b)	X (b)			0.004	0.04
Cadmium	X (b)	X (b)	X	0.005	0.005	0.05
Calcium		X (b)				
Chromium	X (b)	X (b)	X	0.1	0.1	1
Cobalt	X (b)	X (b)				
Copper	X (b)	X (b)			1.3(a)	13
Iron		X (b)				
Lead	X (b)	X (b)	X	0.05	0.015(a)	0.15
Magnesium		X (b)				
Manganese		X (b)				
Nickel	X (b)	X (b)			0.1	1
Potassium		X (b)				
Selenium	X (b)	X (b)	X	0.05	0.05	0.5
Silver	X (b)	X (b)				
Thallium	X (b)	X (b)			0.002	0.02
Vanadium	X (b)	X (b)				
Zinc	X (b)	X (b)				
EPA METHOD 340.2						
Fluoride		X (b)	X	4.0	4	40

Table 10-1 (Continued)
ANALYTICAL LIST AND INITIAL ALERT LEVEL CONCENTRATIONS

COMPOUND OR CONSTITUENT AND EPA ANALYTICAL METHOD NUMBER	RCRA SUBTITLE D DETECTION MONITORING	ARIZONA SOLID WASTE DRAFT RULES	ARIZONA AQUIFER WATER QUALITY STANDARDS	ARIZONA NUMERIC AQUIFER WATER QUALITY STANDARDS (mg/l)	U.S EPA MAXIMUM CONTAMINANT LEVEL (mg/l)	INITIAL ALERT LEVEL (mg/l)
EPA METHOD 353						
Nitrate-N (Method 353.2)		X (Total nitrate)	X	10.0	10	100
Nitrite-N (Method 353.2)			X	1.0	1	10
Total Nitrate+Nitrite-N			X	10.0	10	100
EPA METHOD 300.0						
Chloride		X (b)				
Sulfate		X (b)				
ORGANIC COMPOUNDS						
EPA METHOD 8240						
Bromodichloromethane	X	X	X (THM)	0.1(c)	0.1	1.0 (c)
Bromoform	X	X	X (THM)	0.1(c)	0.1	1.0 (c)
Carbon tetrachloride	X	X	X	0.005	0.005	0.05
Chlorobenzene	X	X	X	0.1	0.1	1
Chloroethane	X	X				
Chloroform	X	X	X (THM)	0.1(c)	0.1(c)	1.0 (c)
2-Chloroethylvinylether		X				
Dibromochloromethane	X	X	X (THM)	0.1(c)	0.1(c)	1.0 (c)
1,1-Dichloroethane	X	X				
1,2-Dichloroethane	X	X	X	0.005	0.005	0.05
1,1-Dichloroethylene	X	X	X	0.007	0.007	0.07
1,2-Dichlorobenzene	X	X	X	0.6	0.6	6
1,4-Dichlorobenzene	X	X	X	0.075	0.075	0.75
cis-1,2-Dichloroethylene	X	X	X	0.07	0.07	0.7
trans-1,2-Dichloroethylene	X	X	X	0.1	0.1	1
1,2-Dichloropropane	X	X	X	0.005	0.005	0.05

Table 10-1 (Continued)
ANALYTICAL LIST AND INITIAL ALERT LEVEL CONCENTRATIONS

COMPOUND OR CONSTITUENT AND EPA ANALYTICAL METHOD NUMBER	RCRA SUBTITLE D DETECTION MONITORING	ARIZONA SOLID WASTE DRAFT RULES	ARIZONA AQUIFER WATER QUALITY STANDARDS	ARIZONA NUMERIC AQUIFER WATER QUALITY STANDARDS (mg/l)	U.S EPA MAXIMUM CONTAMINANT LEVEL (mg/l)	INITIAL ALERT LEVEL (mg/l)
EPA METHOD 8240 (continued)						
cis-1,3-Dichloropropene	X	X				
trans-1,3-Dichloropropene	X	X				
Methyl bromide	X	X				
Methyl chloride	X	X				
Methylene bromide	X	X				
Methylene chloride	X	X			0.005	0.05
1,1,2,2-Tetrachloroethane	X	X				
Tetrachloroethylene	X	X	X	0.005	0.005	0.05
1,1,1-Trichloroethane	X	X	X	0.20	0.2	2
1,1,2-Trichloroethane	X	X			0.005	0.05
Trichloroethylene	X	X	X	0.005	0.005	0.05
Vinyl chloride	X	X	X	0.002	0.002	0.02
Carbon disulfide	X	X				
Methyl ethyl ketone	X	X				
4-Methyl-2-pentanone	X	X				
Benzene	X	X	X	0.005	0.005	0.05
Ethylbenzene	X	X	X	0.7	0.7	7
Toluene	X	X	X	1.0	1	10
Xylenes	X	X	X (b)	10.0	10	100
Acrylonitrile	X	X				
Acetone	X	X				
Styrene	X	X	X	0.1	0.1	1
Bromochloromethane	X	X				
Dichlorodifluoromethane		X				

Table 10-1 (Continued)
ANALYTICAL LIST AND INITIAL ALERT LEVEL CONCENTRATIONS

COMPOUND OR CONSTITUENT AND EPA ANALYTICAL METHOD NUMBER	RCRA SUBTITLE D DETECTION MONITORING	ARIZONA SOLID WASTE DRAFT RULES	ARIZONA AQUIFER WATER QUALITY STANDARDS	ARIZONA NUMERIC AQUIFER WATER QUALITY STANDARDS (mg/l)	U.S EPA MAXIMUM CONTAMINANT LEVEL (mg/l)	INITIAL ALERT LEVEL (mg/l)
EPA METHOD 8240 (continued)						
2-Hexanone	X	X				
Methyl iodide	X	X				
Trichlorofluoromethane	X	X				
1,2,3-Trichloropropane	X	X				
Vinyl acetate	X	X				
trans-1,4-dichloro-2-butene	X	X				
1,1,1,2-Tetrachloroethane	X	X				
EPA METHOD 8011						
1,2-Dibromo-3-chloropropane (DBCP)	X	X	X	0.0002	0.0002	0.002
1,2-Dibromomethane (EDB)	X	X	X	0.00005	0.00005	0.0005
EPA METHOD 9065						
Phenolics		X (b)		6		
EPA METHOD 9060						
Total Organic Carbon (9060)		X				

Footnotes:

(a) Action level concentration
(b) Total concentration; unfiltered sample submitted for laboratory analysis
(c) Total Trihalomethanes not to exceed 0.1 milligrams per liter

mg/l   =   Milligrams per liter
THM   =   Trihalomethane
pCi/l   =   Picocuries per liter
mrem/yr =   Millirems per year

Table 10-3
LYSIMETER SAMPLE COLLECTION INFORMATION

Priority	Analytical Method Number	Analytical Parameters	Typical Container	Preservative (1)	Minimum Sample Size (2)
1	EPA 300.0 A	Cl, Fl, SO4	1 liter, poly	None	100 ml
2	EPA 8240	VOCs	3-40ml glass	Hydrochloric acid to pH <2	3-40 ml
3	EPA 353.2	NO3, NO2	4 oz. (125 ml) poly	Sulfuric acid to pH <2	100 ml
4	EPA 6010	Metals	500 ml poly	Nitric acid to pH <2	150 ml

EPA = U.S. Environmental Protection Agency
Cl = chloride, Fl = Fluoride, SO4 = sulfate
VOCs = volatile organic compounds
NO3, NO2 = nitrate, nitrite
ml = milliliter, oz. = ounce, poly = polyethylene
Note (1): All samples are cooled to 4 degrees Centigrade.
Note (2) Confirm minimum sample size with lab prior to each sampling event.
Minimum sample size is the absolute smallest volume required for the analysis.

NA=Not analyzed, ND=Not detected, NL=No maximum contaminant level set, ug/l=micrograms per liter, mg/l=milligrams per liter.

Table 10-4
NEUTRON PROBE DATA

Table 10-5
ANALYSES OF DECEMBER 1997 EVENT

Well	Sampling Episode	Moisture Content (% weight)			Descriptive Studies				Prediction Limit
		Layer 1	Layer 2	Layer 3	Mean	Std Dev	Min	Max	(α=1%)
V-1	16-Dec-97*	19.13	19.09	19.19	19.14	0.046	19.09	19.19	20.43
V-2	17-Dec-97*	19.52	19.34	20.20	19.69	0.455	19.34	20.20	20.90
V-3	17-Dec-97*	20.19	20.12	20.12	20.14	0.039	20.12	20.19	20.88
V-4	17-Dec-97*	18.32	18.36	17.85	18.17	0.284	17.85	18.36	18.69
V-5	17-Dec-97	18.42	18.74	18.81	18.66	0.210	18.42	18.81	18.86