

June 22, 1994

Mr. John Lentz
Project Manager
Low Level Waste
Division of Waste Management
Office of Nuclear Materials
USNRC
Mail Stop T7-F27
Washington, D.C., 20555-001

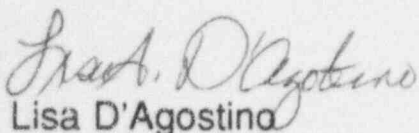
Dear John:

**RE: ALCOA CLEVELAND WORKS AUGUST 1994 GROUNDWATER
SAMPLING EVENT**

Per your request, I am enclosing the groundwater sampling and analysis procedures from our "normal" contractor bid package. I will be sending this bid package out within the next week, thereby giving ALCOA enough time to award the contract and schedule the sampling/analysis events and giving you enough time to schedule your contractor. I will notify you of the sampling dates as soon as they are confirmed. At that time, you can contact the contractor and discuss with them the split-sample process.

If there are any questions, please contact me at 216-641-5193.

Sincerely,

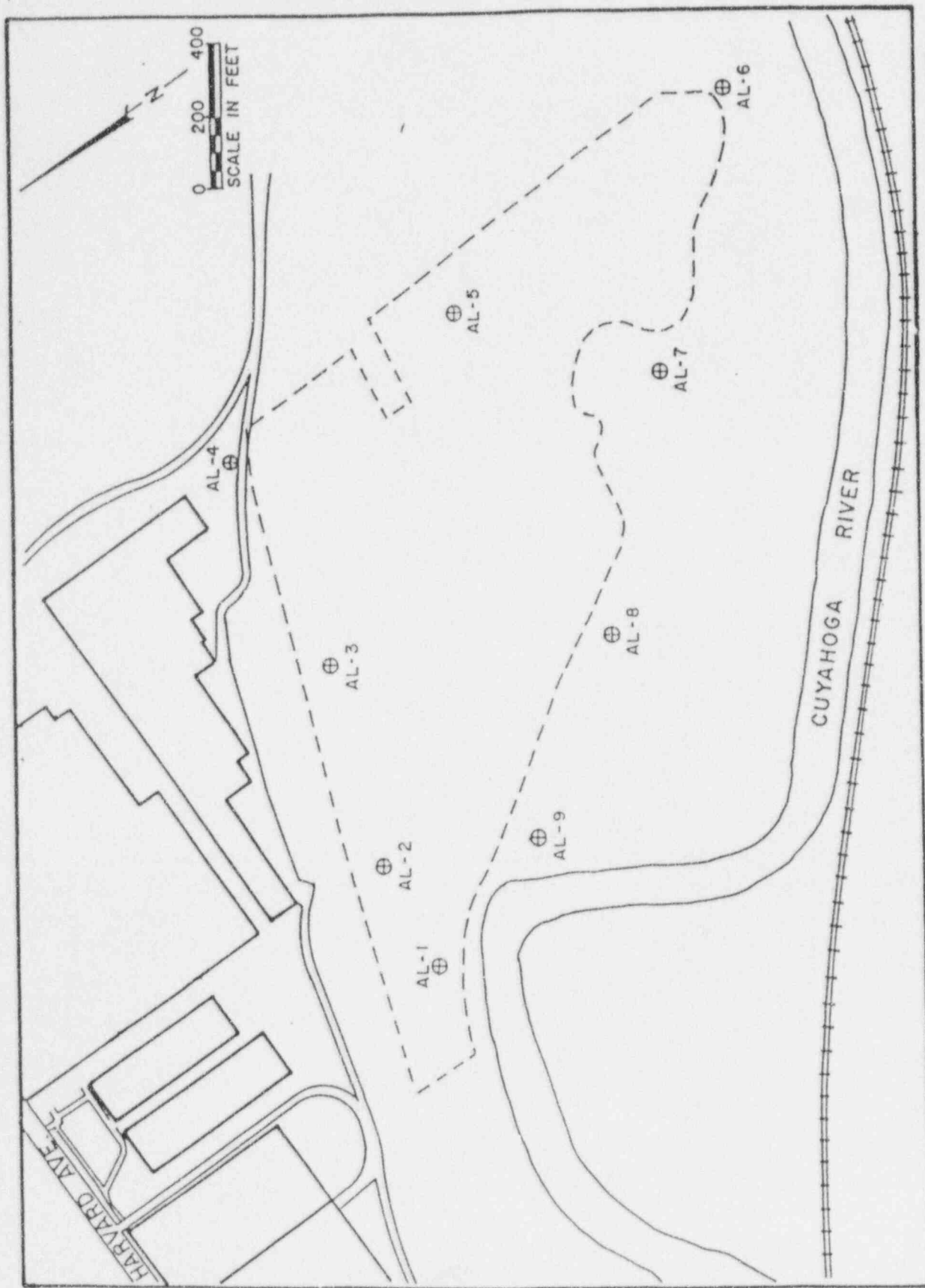


Lisa D'Agostino
Sr. Environmental Specialist

cc. Ken Lambert, USNRC Region III
R. Taylor, ALCOA Environmental
J. Rettinger, ALCOA Purchasing

9707080295 940622
PDR ADOCK 04000501
C PDR

FIGURE 3. MAP SHOWING MONITORING WELL LOCATIONS AT AN INDUSTRIAL-TYPE SANITARY LANDFILL AT ALCOA, CLEVELAND, OHIO



GERAGHTY
& MILLER, INC.
Ground-Water Consultants

EXPLANATION

⊕ MONITOR WELL LOCATIONS

presented and discussed in Appendix A. Based on the groundwater flow data, well AL-4 is upgradient of the landfill. Therefore, groundwater in this well will represent background water quality. Eight wells (AL-1, AL-2, AL-3, AL-5, AL-6, AL-7, AL-8 and AL-9), immediately downgradient of the landfill, will be used to characterize the water passing directly under the site and to detect any releases. All wells have been constructed with 10-foot screens; the screened interval corresponds to the depth of the uppermost aquifer.

The nine monitoring wells were designed, installed, and developed in order to collect a representative water-quality sample from the uppermost aquifer. The wells are therefore constructed to function for the duration of the landfill operation. The methodology for the well construction and development is presented in Appendix D. Boring and well construction logs are represented in Appendices E and G, respectively.

3) Groundwater Sampling and Analysis

This section presents the methodology to be used for collecting and analyzing groundwater samples. Included are procedures for: 1) measuring groundwater elevations; 2) detecting immiscible layers; 3) collecting samples; 4) performing field analysis; 5) analyzing samples; 6) decontaminating equipment; 7) documenting chain-of-custody; 8) providing field and laboratory QA/QC; and, 9) interpreting data.

Water levels in the monitoring wells will be measured before each sampling in order to determine groundwater flow direction. The water-level measurements

will be precise to "+" or "-" 0.01 foot in elevation. The procedure for collecting water-level measurements is as follows:

- 1) The well will be identified, unlocked and the well cap removed.
- 2) The vapors in the headspace of the well will be sampled using a photoionization detector (PID) to determine organic vapor content.
- 3) Using an electronic water-level meter (M-scope), the probe will be lowered down the center of the well until contact with the water surface is indicated. First, a tape will be held at the surveyed measuring point, then the depth to water, the established measuring point description, the date, the time, and the weather will be recorded.

--or--

Using a steel tape, blue carpenters chalk will be applied to the bottom two feet of the tape. The weighted tape will be slowly lowered down the center of the well casing. After water is encountered, the tape will be held at the closest even foot marker at the top of the well casing, and the measurement recorded. The tape will then be reeled out of the well and the measurement where the tape became wet will be recorded. Depth to water from the measurement point will be determined by subtracting the "wet" measurement from the "held" measurement. The "held" measuring point description, and the date, time, and weather are then recorded.

- 4) The M-scope or tape bottom will be rinsed with distilled water between each measurement to prevent cross-contamination between wells.

Yearly after collection, the depth-to-water measurements will be converted to elevations relative to mean sea level, and plotted on a site map. A groundwater elevation map will then be constructed for each measurement period and included in the sampling reports to the OEPA.

If significant concentrations of total organic vapors are measured at the wellhead, or if an organic substance is evident on the water-level tape, the

potential exists for immiscible organic fluids in the well. The thickness of the immiscible layers will be determined using an interface probe or by applying a water-sensitive paste to the measuring tape. The presence of any immiscible fluids will be noted on the field sampling sheet.

Protocols will be followed during each sampling event to ensure that the groundwater samples collected provide representative chemical quality information. Standing water will be removed from the well casing prior to collection of groundwater samples. Well excavation procedures are as follows:

- 1) The well is identified and its designation recorded on the water sampling log. Also recorded are preliminary information, such as project, location, time, date, weather, and sampling personnel.
- 2) The well is unlocked and the vented well cap removed. The inside of the casing is wiped with a clean rag; the cap is placed down to prevent soiling.
- 3) The standing volume (in gallons) of water in the well is computed by subtracting the depth-to-water measurement from the total depth of the well. This figure is then multiplied by a coefficient that relates the diameter of the well to gallons per linear foot. Coefficients for commonly encountered well diameters are listed on the bottom of the water sampling log (0.162 gallons/foot for a 2-inch diameter well).

The following standard procedure is used during groundwater sample collection and field analysis:

- 1) The sample containers are inspected and the correct type and number are selected based on the sample constituents. Pre-prepared sample labels, which include the well identification number, parameters to be analyzed, preservatives added, and sampling personnel are affixed to the sample containers. The date and time are added to the labels at the time of sampling.

- 2) The well is allowed to recharge sufficiently to obtain samples. In the event that a well does not have sufficient recharge for immediate sampling, only one well volume is purged from the well. The well is sampled only after the static water level has recovered to 80 percent of the initial level.
- 3) Measurements of pH, temperature, and specific conductance are made in the field at the time of sampling because these parameters change rapidly and laboratory analysis might not be representative of true groundwater quality. The pH and specific conductance meters are calibrated at the start of each day with standard buffer solutions. The calibrations are periodically checked throughout the day and adjusted as necessary. Four replicate measurements of pH and specific conductance are recorded on the Water Sampling Log immediately after well excavation; one measurement of each field parameter is recorded after sample collection.
- 4) Water samples are collected using a bottom-filling Teflon bailer. The bailer is lowered into the well in a manner that minimizes disturbances to the water table. The bailer is carefully removed from the well and the water sample gently poured into the sample containers provided by the laboratory; container lids are then replaced and sealed. Samples are collected and containerized in the order of the volatilization sensitivity of the parameters. Samples containers for VOCs and TOC are filled first, followed by containers for analysis of the major ions and trace metals.
- 5) Once the samples are collected, each is prepared and preserved in accordance with recommended USEPA procedures (Table 1). Water samples intended for volatile organics analysis are placed in 40 milliliter (ml) vials with a teflon septum. The vials are filled and sealed such that no headspace exists. Water samples designated for metals analysis are filtered in the field immediately after sample collection. Samples are filtered through a 0.45 micron membrane filter prior to preservation.
- 6) After the samples are properly prepared, each is placed into coolers with ice packs to provide thermal preservation. The sample coolers are sealed with tape, secured with chain of custody seals, and shipped via courier to the laboratory. Pertinent data regarding sample collection procedures for each well are recorded on a water sampling log.

The sampling team will be responsible for the custody and care of collected samples until the containers are transferred to the custody of the laboratory. Stringent chain-of-custody procedures will be followed to maintain and document possession. Documentation of sample collection, as well as other pertinent information, will be recorded in a daily log book. A chain-of-custody form will be completed daily prior to sample shipment in order to document possession from the time of collection to analysis. The chain-of-custody forms will include the following information:

- * Project identification and location;
- * Sampling personnel;
- * Identity of sample(s);
- * Date of sampling; and,
- * Signatures of persons involved in the chain-of-custody and the dates and times of possession.

The chemical analyses performed in the laboratory on groundwater samples include major ions and trace metals, and volatile organic compounds. The constituents are listed in Tables 1 and 2, respectively. Laboratory analyses will be performed utilizing USEPA-approved test procedures for water and wastewater analysis. Table 1 lists the analytical methods, container type and field preservation techniques for groundwater samples to be collected at the ALCOA, Cleveland Works site. The sample preservation techniques and analytical methods have been selected to minimize potential interferences.

Table 1
GROUNDWATER SAMPLING PARAMETERS

Parameter	Container (1)	Method	Reference (2)	Preservation
Alkalinity	P	305.1	A	Cool, 4 deg C
Ammonia	P/G	350.1	A	H2SO4 to pH<2; Cool, 4 deg C
Arsenic (dissolved)	P	206.2	A	HNO3 to pH<2; Cool, 4 deg C
Barium (dissolved)	P	208.1	A	HNO3 to pH<2; Cool, 4 deg C
Cadmium (dissolved)	P	213.1	A	HNO3 to pH<2; Cool, 4 deg C
Chromium (dissolved)	P	218.1	A	HNO3 to pH<2; Cool, 4 deg C
COD	P/G	410.2	A	H2SO4 to pH<2; Cool, 4 deg C
Copper (dissolved)	P	220.1	A	HNO3 to pH<2; Cool, 4 deg C
Fluoride	P	413B	B	Cool, 4 deg C
Lead (dissolved)	P	239.1	A	HNO3 to pH<2; Cool, 4 deg C
Magnesium	P	242.1	A	HNO3 to pH<2; Cool, 4 deg C
Mercury (dissolved)	P	245.1	A	HNO3 to pH<2; Cool, 4 deg C
Nickel (dissolved)	P	249.1	A	HNO3 to pH<2; Cool, 4 deg C
Nitrate (as N)	P	352.1	A	Cool, 4 deg C
Potassium	P	258.1	A	HNO3 to pH<2; Cool, 4 deg C
Phosphorus	P/G	365.1	A	H2SO4 to pH<2; Cool, 4 deg C
Selenium (dissolved)	P	270.2	A	HNO3 to pH<2; Cool, 4 deg C
Silver (dissolved)	P	272.1	A	HNO3 to pH<2; Cool, 4 deg C
TDS	P	160.3	A	Cool, 4 deg C
Turbidity	G	180.1	A	Cool, 4 deg C
Zinc (dissolved)	P	289.1	A	HNO3 to pH<2; Cool, 4 deg C
Cyanide	P	D2306	C	Cool, 4 deg C
Chloride	P	407B	B	Cool, 4 deg C
Iron (dissolved)	P	236.1	A	HNO3 to pH<2; Cool, 4 deg C
Manganese (dissolved)	P	243.1	A	HNO3 to pH<2; Cool, 4 deg C
Phenols	G	420.1	A	H2SO4 to pH 2; Cool, 4 deg C
Sodium	P	273.1	A	HNO3 to pH<2; Cool, 4 deg C
Sulfate	P	426C	B	Cool, 4 deg C
pH	P	150.1	A	Cool, 4 deg C
Specific Conductance	P	120.1	A	Cool, 4 deg C
TOC	G	415.1	A	H2SO4 to pH<2; Cool, 4 deg C
VOCs	G	624.0	D	Cool, 4 deg C
Temperature	P/G	170.1	A	n/a

Notes:

1. Containers:

P = Polyethylene
G = Glass

2. References:

A = EPA-600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1979, U.S. EPA, Cincinnati, Ohio, revised March 1983.
B = Standard Methods for the Examination of Water and Wastewater, 16th edition, ALPHA-AWWA-WPCF.
C = ASTM Annual Book of Standards
D = Federal Register, October 26, 1984.

Table 2
VOLATILE ORGANIC CONSTITUENTS FOR
GROUNDWATER MONITORING

Constituent	Detection Concentration Levels (ug/l)
Acetone	100.0
Acrolein	5.0
Acrylonitrile	5.0
Benzene	2.0
Bromodichloromethane	1.0
cis-1,3-Dichloropropene	1.0
trans-1,3-Dichloropropene	5.0
Ethylbenzene	2.0
Ethyl Methacrylate	5.0
Bromoform	2.0
Bromomethane	10.0
2-Butanone (Methyl Ethyl Ketone)	10.0
Carbon Disulfide	5.0
Carbon Tetrachloride	1.0
Chlorobenzene	2.0
Chloroethane	5.0
2-Chloroethyl Vinyl Ether	10.0
Chloroform	0.5
Chloromethane	5.0
Dichlorodifluoromethane	5.0
1,1-Dichloroethane	1.0
1,2-Dichloroethane	0.5
2-Hexanone	50.0
Methylene Chloride	5.0
4-Methyl-2-Pentanone	50.0
1,1-Dichloroethene	1.0
trans-1,2-Dichloroethene	1.0
Styrene	1.0
1,1,2,2-Tetrachloroethane	0.5
Toluene	2.0
1,1,1-Trichloroethane	5.0
1,1,2-Trichloroethane	0.2
Trichloroethene	1.0
Trichlorofluoromethane	5.0
1,2,3-Trichloropropane	5.0
Vinyl Acetate	5.0
Vinyl Chloride	2.0
Xylene	5.0

To minimize the potential for cross-contamination during the collection of groundwater samples, the bailers and/or pumps will be thoroughly cleaned with laboratory-grade detergent wash, and rinsed three times with deionized water immediately before placement in each well. New bailer rope will be used and new surgical gloves will be worn by the sampling team for each well.

For quality control purposes, a trip blank, field/equipment blank, and duplicate sample will be collected during each sampling episode and submitted to the analytical laboratory. Duplicate samples will be collected from selected wells and labeled with a fictitious well number. Results of the duplicate analysis will then be used to check the analytical reproducibility of the laboratory and to verify the type and concentration of the constituents present. Field/equipment blanks will be collected to check procedural or ambient contamination from field activities. Trip blanks are samples prepared in the laboratory by filling sample containers with deionized laboratory water. The trip blanks accompany the groundwater samples at all times; thus, any inadvertent contamination of the samples will be detected in the trip blank analysis.

The specific conductance and pH meters will be calibrated daily with standard buffer solutions according to factory instructions. The calibration will be periodically checked each day and adjusted as necessary.

4) Detection Monitoring Program

The purpose of the Detection Monitoring Program is to characterize the water quality in the uppermost aquifer underlying the landfill closure area. Water-

quality samples will be collected to establish background water at the site and to determine if leachate from the landfill is entering the groundwater system and migrating downgradient. Statistical methods will be utilized to interpret the water-quality data. This section describes the constituents and parameters that will be analyzed, the sampling frequency, data validation procedures, and statistical methods for data interpretation.

The groundwater constituents and parameters to be monitored at the site are listed in Tables 1 and 2. Table 1 includes field parameters (temperature, pH, and specific conductance), major ions, trace metals, and other selected contaminant indicator parameters such as TOC, COD, TDS, total alkalinity, and phenols. Table 2 lists the VOCs that will be monitored. The samples will be analyzed by the methods presented in Section 3, "Groundwater Sampling and Analysis" and listed in Table 1.

Groundwater samples were collected during the initial one and one half years of monitoring on a quarterly basis and analyzed for the constituents listed in Table 1. After the initial one and one half years of monitoring, the frequency of sampling has been semi-annually.

The water-quality data will be validated when it is received from the laboratory. Data validation will include assessing "0" concentration values, missing data values, and outliers. Additionally, data from the field/equipment and trip blanks will be examined to determine inadvertent contamination during sampling and analysis.

All "0" concentration values will be examined to confirm the numerical values accompany the "less than" designation, so that the data is available for subsequent statistical analysis. If any data values are missing, the laboratory will be immediately contacted to determine the status. Analysis of the sample will be repeated if holding times have not been exceeded. Otherwise, the missing data will be reported as such. Outliers (anomalously high or low values) will be examined to determine if a transcription error has occurred or the data point is valid. If the cause of the outlier is a transcription error, it will be documented and the value will be altered.

The data will be evaluated and interpreted after data validation. The volatile organic compound analyses will be checked for any values above the detection limits which are considered background water-quality constituents. Background concentrations for inorganic constituents will be determined by assessing the data from well number AL-4. Following each semi-annual sampling, statistical analysis will be performed for the groundwater sampling parameters. The type of statistical test will depend on the distribution of various constituent concentrations and the number of "less than" values. One of the following tests will be employed for each constituent:

- 1) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination;
- 2) An ANOVA based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination;

