BUILDING 579 WASTE ION EXCHANGE FACILITY CHARACTERIZATION REPORT

ARGONNE NATIONAL LABORATORY ARGONNE, ILLINOIS

Prepared by
C. M. Sholeen
D. C. Geraghty

Environment Safety and Health Division
Health Physics Section
Argonne National Laboratory
Argonne, Il 60439

DRAFT REPORT

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Characterization Performed and Report Prepared by
Health Physics Section
Environment, Safety and Health Division
Argonne National Laboratory

Site Preparation, Characterization and Report Team:

Charlotte Sholeen
Dolores Geraghty

Nick Contos
Joseph Cooney
Sue Santarelli
Timothy Branch
Cindy Sullivan
Keith Dunn
David Reilly
Willis Ray

Consultant:

Judd Johnson

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ABSTRACT

External direct surveys were performed for elevated γ levels with a PG2 portable detector connected to a PRM 5-3 meter and for elevated α and β levels with an NE portable detector. No γ activity above background was detected. Several locations, the floor and west wall of building 579 and the manhole, had low levels of β activity, up to 87 ± 49 dis/min. These values are below the allowable residual surface contamination limits for removable beta activity.

There is water in the Mixed Bed Exchange Vessel, the Cation Exchange Vessel, the Closed Drain Tank, the manhole and some of the pipes. The accessible internal surfaces of the pipes, tanks and columns had higher levels of β activity up to 172 ± 52 dis/min and some α activity up to 106 ± 29 dis/min. After the water is removed from the vessels, tanks, and lines, they should be surveyed to determine whether the areas accessible for smear surveys are representative of the general inside contamination levels.

There are elevated levels of radionuclides in the resin from the Cation Exchange Vessel and in the water from the manhole. Since the radionuclide concentrations in the manhole water are less than ten times the site release criteria, it does not need any processing before it is released to the onsite drains. Although there are RCRA metals on the resin in the Cation Exchange Vessel, the amount that is removed during a leaching analysis is below the toxicity Characteristic level. Therefore, the resin is a radioactive waste not a mixed waste.

BUILDING 579 WASTE ION EXCHANGE FACILITY CHARACTERIZATION REPORT

I. OBJECTIVE

The two primary goals to be achieved by a characterization are:

- Collection of enough data on the amount of contamination present to allow realistic cost estimates for radioactive and otherwise contaminated waste disposal.

- Identification of the extent of contaminated materials, areas, and equipment, to allow optimum task planning for the eventual Decontamination and Decommissioning (D&D) process.

The 579 Waste Ion Exchange Facility has been slated for a D&D Project leading to complete decontamination and full release for unrestricted use. Thus, the identification of radioactivity levels and hazardous materials levels above free release levels is critical for accurate D&D planning.

II. HISTORY OF THE WASTE ION EXCHANGE FACILITY

The Waste Ion Exchange Facility was used to process waste fluids from a collecting lagoon. It was constructed in the 1950's, and is now non-functional. The ion exchange equipment was connected to the collecting lagoon, equalization tanks, and building 575 distribution pit by underground piping (see Figure 1). There are also a pad and influent lines on the south side of the building and another pad and effluent lines on the north side of the building.

III. CHARACTERIZATION METHODOLOGY

The general approach of the characterization can be summarized by the following steps:

- took samples for airborne radioactive particulates,

- thoroughly alpha and beta scanned the floor and walls to look for localized regions or spots with elevated radiation levels,

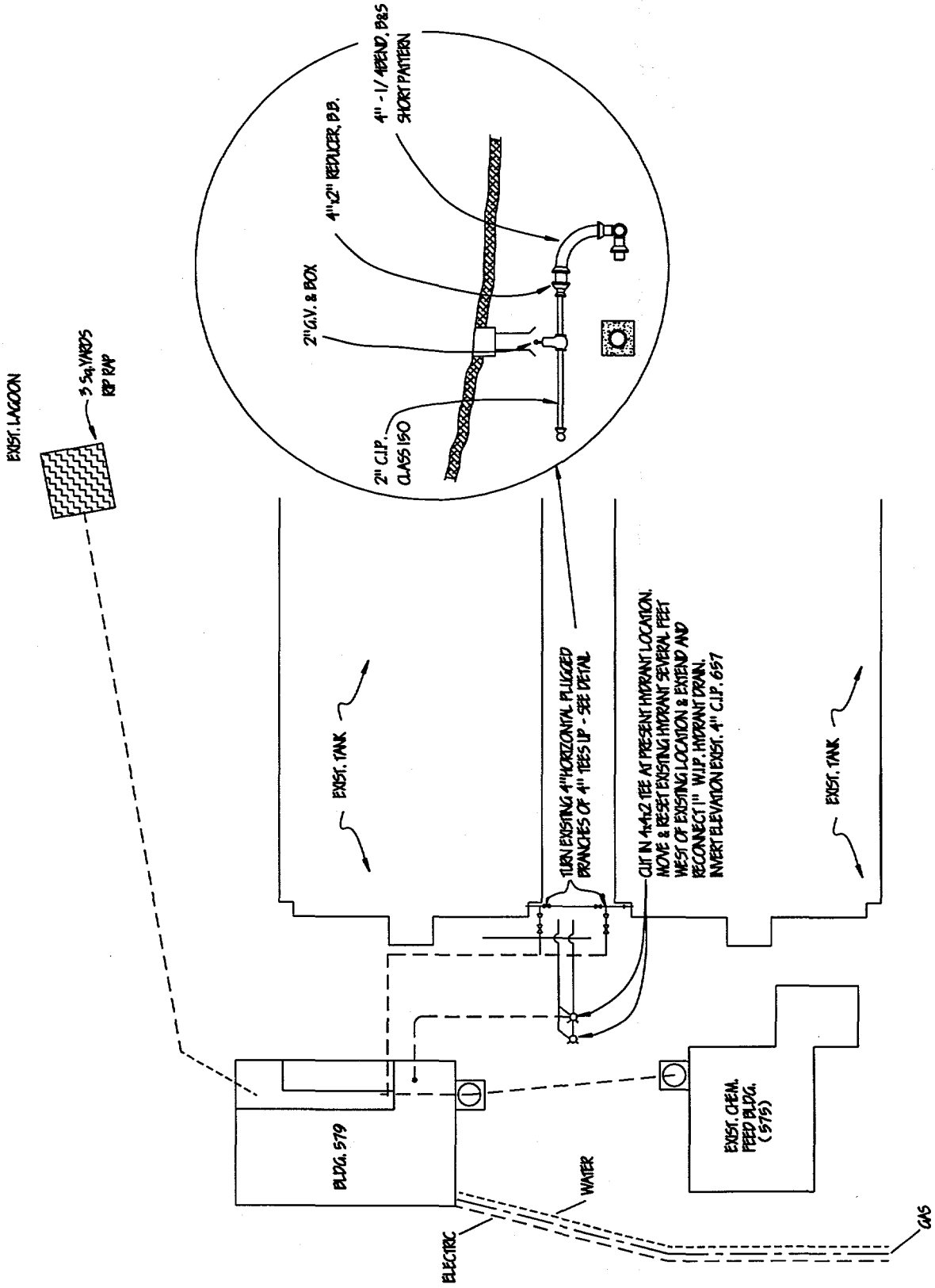

FIGURE 1. Building 579 Piping to Adjacent Facilities

- gamma scanned the tanks and pipes to measure maximum radiation exposure rates,

- took large area smear samples at randomly selected locations on walls, floors, pipes and tanks.

- took smear samples from inside the tanks to determine removable α and $\beta\gamma$ activities,

- took samples of insulation on the pipes in the trench and tested for asbestos,

- took smears or water samples at preselected locations to assess the internal contamination of the lines,

- took water and resin samples from inside the exchange vessels and closed drain tank to analyze for RCRA metals, volatile organic compounds, semivolatile organic compounds, and radioactive contaminants.

Samples were pre-numbered and labels for the sample envelopes or plastic bags were pre-printed. An example of a sheet of sample labels is given in Appendix A. The samples were checked off when completed and also when analyzed for gross α and β activity. Full lists of sample results are given in Appendix B for smear, Q-tip and scraping samples; Appendix C for air and water samples; and Appendix D for samples sent to the Control Laboratory (ESH-DA), or Argonne's Analytical Chemistry Laboratory (ACL) for analysis.

IV. SCHEDULE

The Health Physics Section of the ANL-E Environment Safety and Health Division began characterization field work on September 12, 1996 and completed field work on September 25, 1996. The water and resin in the exchange vessels were sampled on September 20, 1996. Analyses of the water samples were completed on October 29, 1996. Analysis of the resin sample was completed on December 18, 1996. On February 6, 1997 a leachate analysis was requested because of the high level of metals in the resin. The leachate analysis was completed on February 25, 1997.

V. QUALITY ASSURANCE

The Quality of the characterization process was assured by the following actions:

- All work was performed in compliance to the QA plans of the ESH Division, and the Health Physics Section.

- Calibration and Operational Checks - all instrumentation used in the characterization surveys were checked daily for proper operation. A log was maintained for operational checks. All radiation detection instrumentation were calibrated with NIST traceable radioactive sources. Instruments' operational check and calibration records are given in Appendix F.

- Data Protection - all data stored on computers were backed up daily.

- Special attention was given to contamination control during sampling of potentially contaminated materials to assure that the characterization process did not alter or bias the true condition of the facility.

VI. SAMPLES AND MEASUREMENTS IDENTIFICATION SYSTEM

Samples were identified by a five element code:

Type sample	Element 1
Component No.	Element 2
Component Name	Element 3
Sequential Number	Element 4
Location	Element 5

Following are the notations used for each element.

Type of sample

SA Smear	100 cm^2 smears
LA Smear	>100 cm^2 smears
Q-tip smear	Q-tips were used for very small or difficult to reach areas
water	sample of water from a line or component
scrapings	metal surface was scrapped with a blunt instrument
air	Retrospective air sample

Component No. and Name

The component numbers and names given below are shown in Figure 2.

# 1	Strainer with Monel Screen	#11	Mixed Bed Exchange Vessel	#21	Filter
# 2	50 gal Surge Tank	#12	Acid Regenerant Tank	#22	Trench
# 3	Forwarding Pump	#13	Lead Grid Agitator	#23	Building
# 4	Influent & Effluent Filters	#14	Acid Foot Pump	#24	Manhole
# 5	Flow Indicator	#15	Caustic Regenerant Tank	#25	Pit
# 6	Water Meter	#16	Caustic Mixer	#26	Effluent Pipe
# 7	Acid & Caustic Ejectors	#17	Conductivity Indicator	#27	Miscellaneous items in the building
# 8	Inlet & Outlet Pressure Gauges	#18	Blower	#28	Exchanger Testing Equipment
# 9	Inlet & Outlet Sampling Cocks	#19	Closed Drain Tank	#29	Influent Pipe
#10	Cation Exchange Vessel	#20	Drain Pump	#30	Air Samples

Location

This field gives information that further specifies the part of the component that was sampled.

VII. RELEASE CRITERIA AND BACKGROUND VALUES

To interpret the quantitative results of the characterization, the data were compared to currently accepted release criteria and background values typically found in the natural environment.

Following are the principal release and background values:

Surface Contamination Release Criteria - Removable and total surface contamination limits (for unrestricted release of nonporous materials) used by the USNRC and by DOE are given in USNRC Regulatory Guide 1.86 (reference 1) and are listed in the following Table 1. The Regulatory Guide 1.86 values were adopted by DOE and are also listed in DOE Order 5400.5A (reference 2) and the draft rule 10 CFR 834 (reference 3).

Lead in paint release criteria - paint is considered to be lead-containing if it has greater than 0.5% lead by weight.

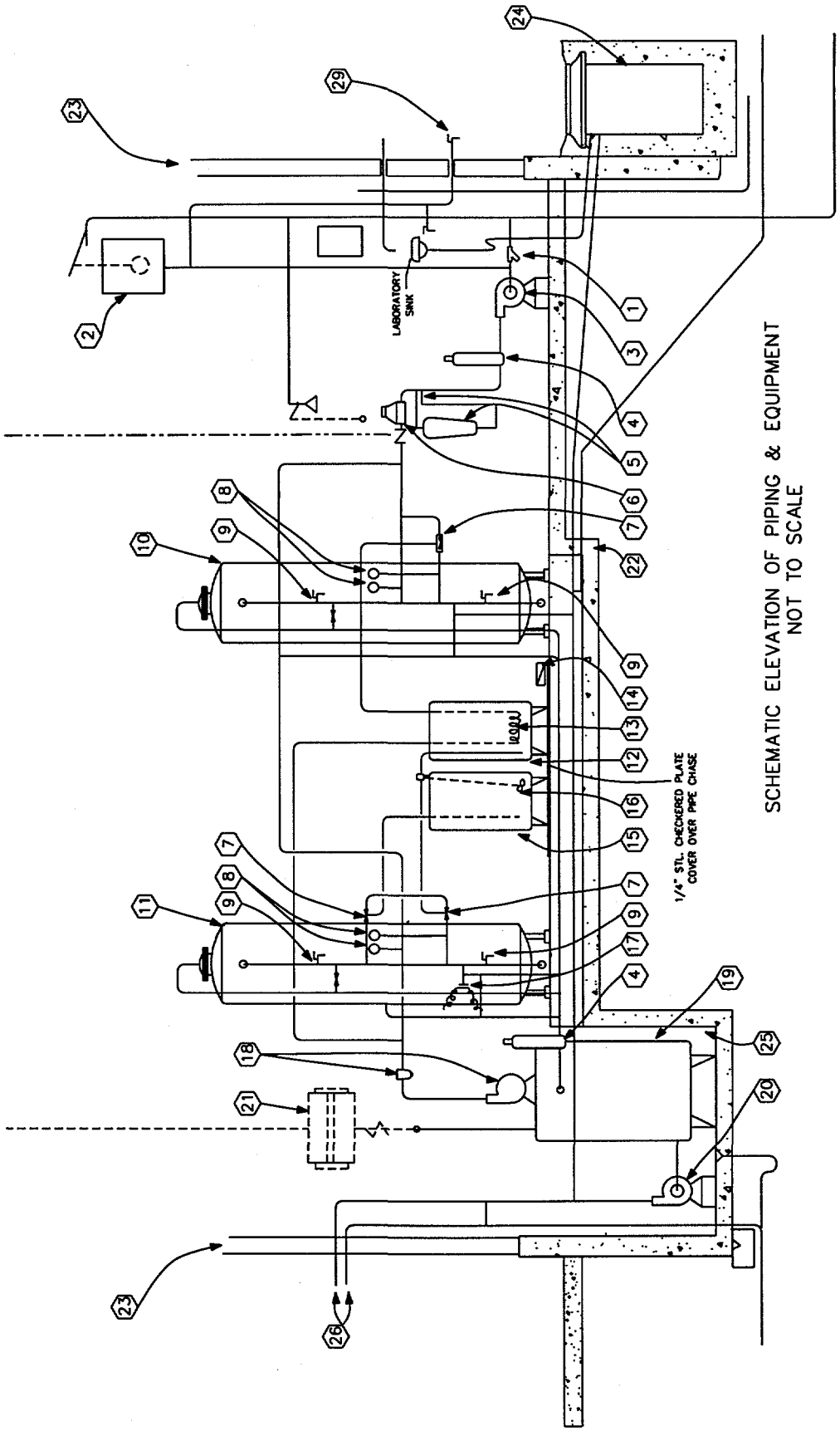

FIGURE 2. Building 579 Ion Exchange Piping & Equipment

TABLE 1. Allowable Residual Surface Contamination Limits (dpm/100 cm^2)

Total (fixed and removable) Radionuclides	Average	Maximum	Removable
Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231.	100	300	20
Th-Natural, Sr-90, I-126, I-131, I-133, Ra-233, Ra-224, U-232, Th-232.	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay product, alpha emitters	5,000	15,000	1,000
Beta-gamma emitters (except Sr-90)	5,000	15,000	1,000

Background radiation exposure rate - the radiation exposure rate inside most buildings at ANL-E is typically 10-15 μR/h. This value is consistent with the natural background exposure rate in the midwestern USA (reference 4). The environmental penetrating radiation from areas surrounding ANL were 92 ± 4 mrem/y (10.5 ± 0.5 μR/h); from the ANL boundaries the penetrating radiation ranged from 89 ± 6 mrem/y (10.2 ± 0.7 μR/h) to 129 ± 12 mrem/y (14.7 ± 1.4 μR/h) (from reference 8).

Background radioactivity in soil - the activity concentration in soil is predominantly due to naturally occurring radionuclides in the uranium and thorium series. Some non natural radionuclides found in soil are due to atmospheric fallout. Typical concentrations in soil of the major natural and fallout radionuclides are listed in Table 2 from reference 8.

Asbestos release criteria - a material (e.g., insulation, pipe joint compound, floor tile) is considered asbestos-containing if it contains greater than 1% asbestos by weight.

Hazardous material release criteria - a RCRA (Resource Conservation Recovery Act) hazardous waste is defined as waste which meets one of the following two criteria:

1. it exhibits the 40 CFR 261.20 (reference 7) specific properties of

    - ignitability
    - corrosivity
    - reactivity
    - toxicity, and

2. it is listed in 40 CFR 265 (reference 7) as a RCRA hazardous waste, and it exceeds the specified concentration limits.

TABLE 2. Typical Background Concentrations in Soil and Sediments

	Soil Average		Bottom Sediment Average	
Nuclide	ANL Perimeter	Off-Site	ANL Perimeter	Off-Site
	Activity pCi/g			
^{40}K	18.48 ± 5.42	16.55 ± 5.79	12.23 ± 10.92	14.50 ± 14.37
^{137}Cs	0.62 ± 0.37	0.53 ± 0.90	0.86 ± 2.15	0.14 ± 0.55
^{226}Ra	1.02 ± 0.41	1.04 ± 0.51	0.73 ± 0.56	0.99 ± 0.94
^{228}Th	1.08 ± 0.41	1.05 ± 0.71	0.62 ± 0.67	1.15 ± 2.37
^{232}Th	0.81 ± 0.25	0.83 ± 0.62	0.50 ± 0.48	0.94 ± 2.19
	Activity fCi/g			
^{238}Pu	0.9 ± 0.3	0.5 ± 0.3	2.2 ± 6.8	0.3 ± 1.3
^{239}Pu	15.0 ± 2.1	11.2 ± 4.9	159.4 ± 721.7	6.2 ± 25.5
^{241}Am	5.3 ± 0.9	4.4 ± 1.8	16.8 ± 58.5	2.4 ± 7.8

fCi = 10^{-15} Ci
pCi = 10^{-12} Ci

Airborne radioactivity limits - annual average concentration guidelines for the workplace are listed as derived air concentrations (DAC) in the DOE rule 10 CFR 835 (reference 5). However, the concentration of non naturally occurring radionuclides is expected to be non detectable in non radiological areas.

Retention tanks radioactivity release limits - at ANL-E, laboratory waste water is collected in retention tanks and is sampled and analyzed for alpha and beta radioactivity before being released to the laboratory waste water treatment plant. The ANL site release limits are 0.03 pCi/ml (0.067 dpm/ml, the derived concentration guide for ^{239}Pu) for alpha activity, and 1.0 pCi/ml (2.22 dpm/ml, the derived concentration guide for ^{90}Sr) for beta activity. Liquid waste in retention tanks exceeding ten times these limits is processed to remove the contamination, normally by evaporation, and the residue disposed of as radioactive waste.

VIII. INSTRUMENTATION

Instruments were chosen to assure that the MDAs for the selected instrument/technique was less than the release criteria. A listing of the principal instruments used and their typical MDAs is given in Table 3. Photographs of the principal instruments used for the characterization are shown in Figures 3 through 7.

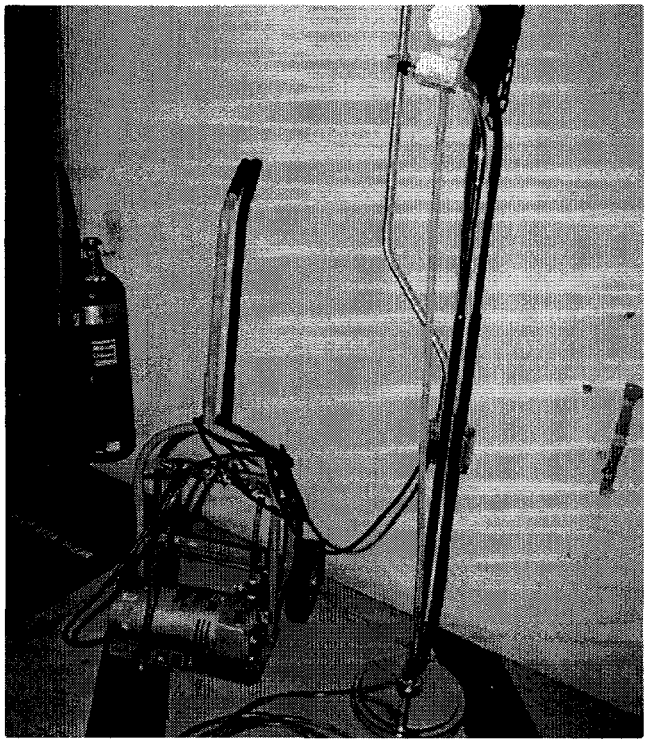

FIGURE 3. Retrospective Air Sampling System (Giraffe)

TABLE 3. Instruments Used for Characterization

Purpose	Instrument	Detector Description	Measurement Units	Typical Characteristics	Typical MDA[a]
Total Surface (α)	NE Technology, Ltd. ELECTRA	Dual Scintillator 100 cm^2 sampling area 0.5 mg/cm^2	cpm	21% ^{241}Am efficiency, 30 sec residence time, ≤7 cpm background	98 dpm
Total Surface (β-γ)	NE Technology, Ltd. ELECTRA	Dual Scintillator 100 cm^2 sampling area ~ 6 mg/cm^2	cpm	29% ^{90}Sr-Y efficiency, 30 sec residence time, ≤400 cpm background	410 dpm
Removable Surface (α)	Tennelec APC	Gas Proportional 5 cm dia. 0.1 mg/cm^2	cpm	30% ^{241}Am efficiency, 2 min count time, ≤1 cpm background	17 dpm
Removable Surface (β-γ)	Tennelec APC	Gas Proportional 5 cm dia. 0.1 mg/cm^2	cpm	42% ^{90}Sr-Y efficiency, 2 min count time, ≤40 cpm background	86 dpm
Removable Surface (α)	DABRAS	Gas Proportional 200 cm^2 0.4 mg/cm^2	cpm	27% ^{241}Am efficiency, 2 min count time, ≤2 cpm background	18 dpm
Removable Surface (β-γ)	DABRAS	Gas Proportional 200 cm^2 0.4 mg/cm^2	cpm	49% ^{90}Sr-Y efficiency, 2 min count time, ≤270 cpm background	86 dpm
Find Elevated x-γ	Eberline PRM 5-3 with PG-2 detector	5 cm diameter x 2 mm thick NaI (Tl)	cpm	2 sec residence time 500 cpm background	1500 cpm net

[a] Note: The typical MDA for the NE Technology, Ltd. ELECTRA, the Ludlum Model 3 and the Eberline PRM 5-3 with a PG-2 detector is based upon the use of audio output to enhance the discernment of recordable measurements.

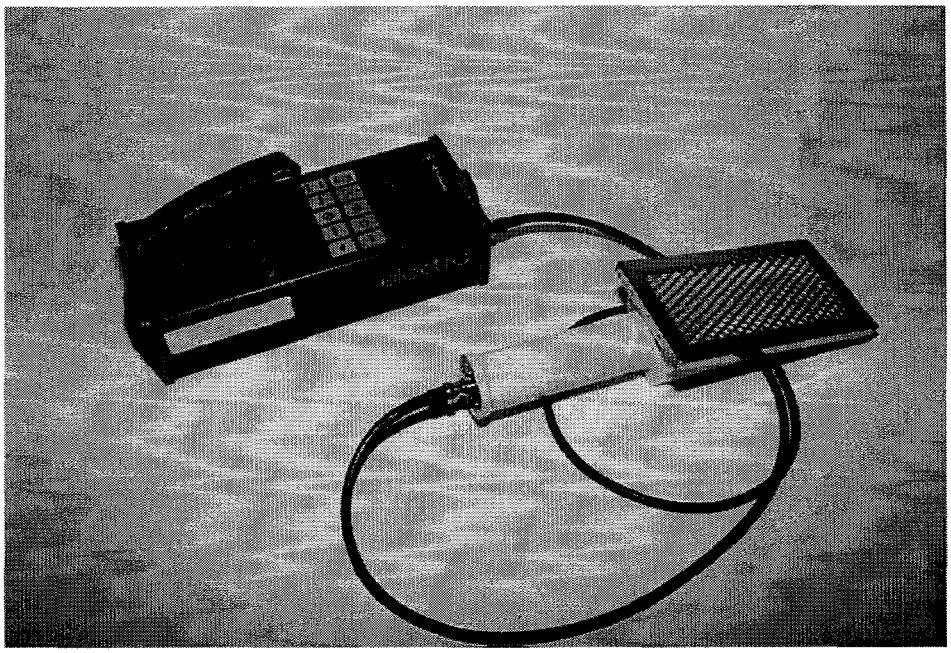

FIGURE 4. NE Technology Model Electra with 100 cm^2 Detector for Measuring $\alpha\beta\gamma$ Surface Contamination

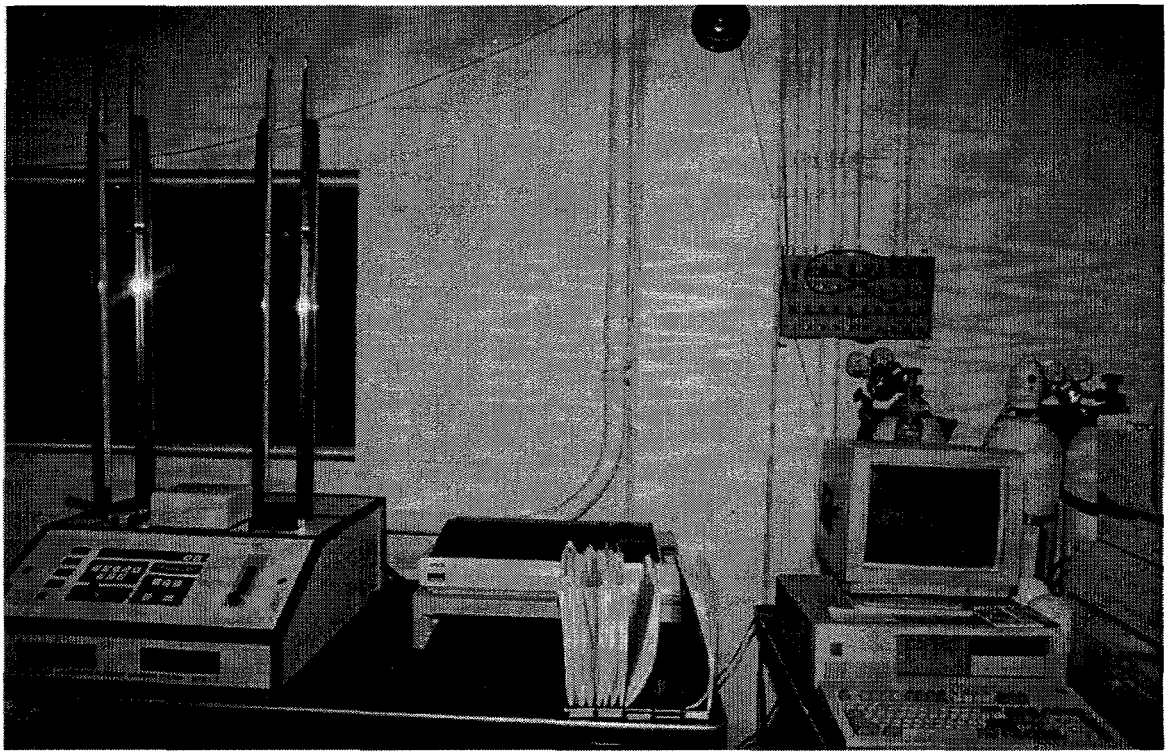

FIGURE 5. Tennelec APC MII Smear Counting System

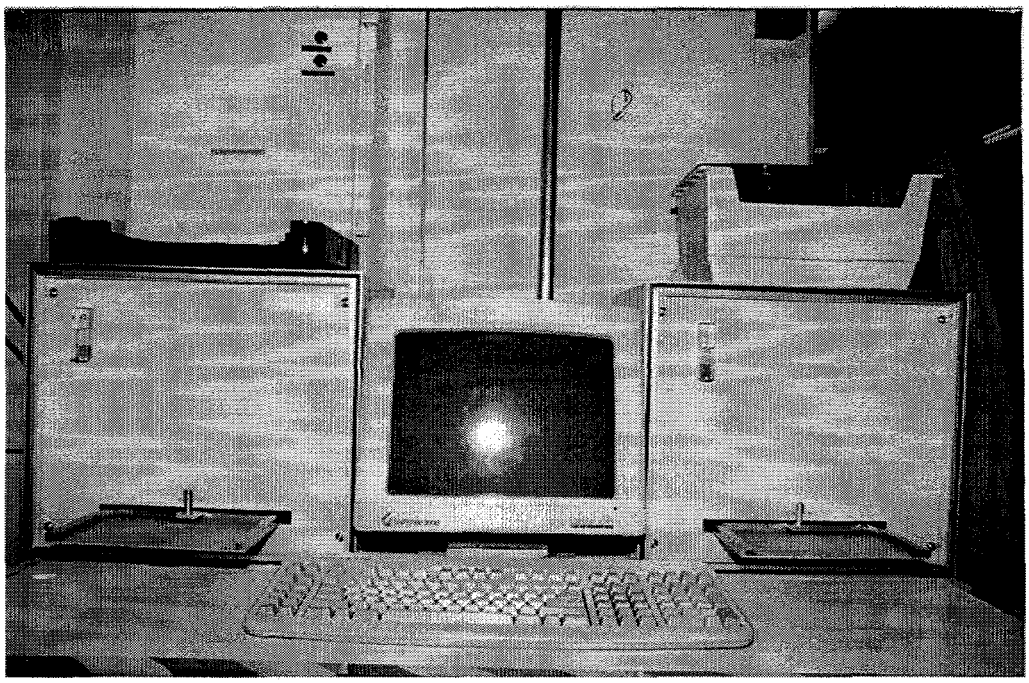

FIGURE 6. Dual Alpha Beta Radioactivity Assay System (DABRAS) for smear counting

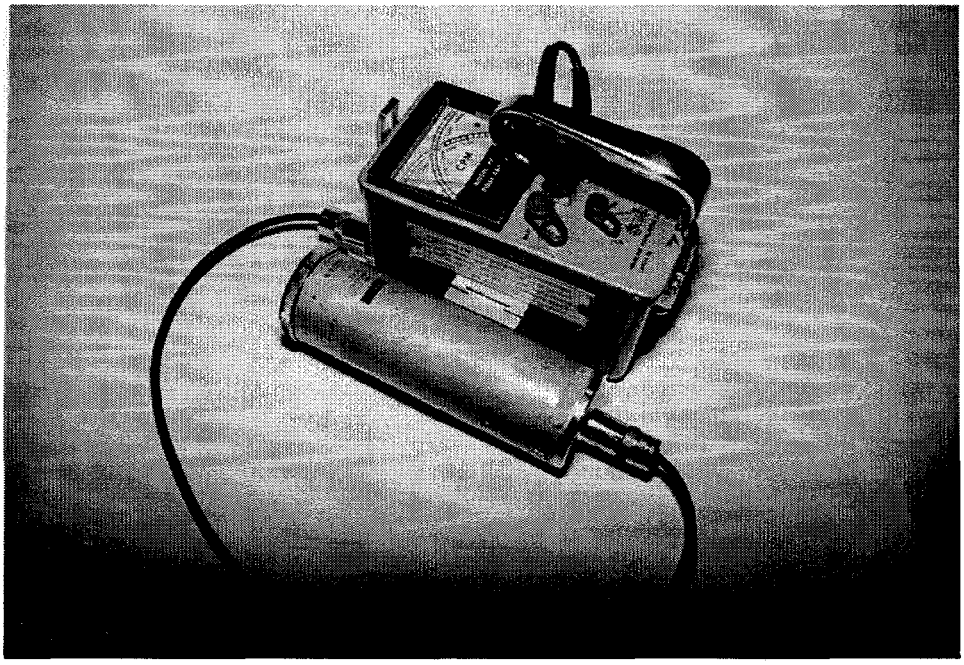

FIGURE 7. Eberline PRM-5-3 with PG-2 Scintillation Detector (2" × 2 mm thick NaI detector)

IX. NUMBER OF MEASUREMENTS AND SAMPLES

A listing of the type and number of measurements performed and samples collected during the characterization is given in Table 4.

X. RESULTS

A. Surprises

The characterization identified the following unexpected conditions:

1. There was water in the lines

TABLE 4. Measurements & Samples Required for Retention Tank Characterization

Item	Total Number
Type of measurement	
General α and β scan	23
General exposure rate	23
Type of samples collected	
Smears	50
Scrapings	1
Asbestos	1
Water and Resin	11
Air	2
Type of sample analyses	
Gross αβγ	64
γ spectroscopy	3
Asbestos	1
Hazardous materials	6
pH	3
Metals	11

2. There was water in the Cation and Mixed Bed Exchange Vessels

3. There was water in the Manhole

4. A pipe in the trench connected to the Building 575 Manhole

5. A pipe from the pit went under the floor and drained to a lagoon

6. A pipe from the trench went under the concrete under the exchange vessels.

B. Lead in Paint Results

The pipes and tanks are not painted. Therefore there were no tests for lead in paint.

C. Asbestos Results

The pipe in the trench has insulation covering it. This was tested for asbestos. None was found. The insulation is concrete.

D. Air Sample Results

Two grab air samples were collected during the sampling period. There were low levels of long lived activity on the samples; up to 4.7 ± 3.0 dis/min α and 37 ± 10 dis/min β on the filters. These are assumed to be naturally occurring radionuclides.

E. Vessels and Pipes

The main components of the waste Ion Exchange Facility are the exchange vessels and the associated piping. The original plans were to open the lines and take smears at strategic locations to assess the internal contamination. However, there is an aqueous solution in much of the piping, in the cation and mixed bed exchange vessels. Instead of smears, water samples were removed from the five locations indicated in Table 5. The samples were counted for gross α and β activities in the Control Laboratory (ESH-DA). The water from the influent filter (#4), the Cation Exchange Vessel (#10) and the Mixed Bed Exchange Vessel (#11) had no activity in the water above the retention tank release criteria. A more detailed summary of the water samples is given in Appendix C.

TABLE 5. Gross α and β Activity in Water Samples

Date	Location	Sample Number	Request Number	dpm/mL α	dpm/mL β
9/18/96	#4 Influent Filter	45	6469	0.069	0.218
9/18/96	#10 lower drain	46	6470	0.040	0.324
9/18/96	#11 lower drain	47	6471	0.044	0.871
9/18/96	#11 upper drain	48	6472	0.039	0.486
9/18/96	#24 outside	50	6474	0.03	0.10
9/24/96	#10 tank	57	6417	0.03	0.004
9/25/96	#24 inside	67	6414	0.37	0.99
	Site Release Criteria[a]			0.067	2.22

[a] The Department of Energy Derived Concentration Guide (DCG) limits

Some of the dry smears were counted in the DABRAS and some were counted on the Tennelec (see Table 3). For ease of evaluation, Table B1 in Appendix B combines the data from both counters; Table B2 has the data from the Tennelec; and Table B3 has the data from the DABRAS. Several components had elevated activities; #10 the cation exchange vessel, 28 ± 15 dis/min α and 105 ± 28 dis/min β; #12 the acid regenerant tank, 172 ± 52 dis/min β; #13 the mixer in the acid tank, 84 ± 49 dis/min β; #19 the closed drain tank, 106 ± 29 dis/min α and 48 ± 22 dis/min β; and #15 the caustic regenerant tank, 58 ± 48 dis/min β. No isotopic identification was made of the activities on the smears.

Two water samples and a resin sample from the exchange vessels and the closed drain tank were sent to ACL for hazardous constituent analysis. The water sample from the closed drain tank (#19) had no detectable contaminants. The water sample from the mixed bed exchange vessel (#11) had no metal or radioactive contaminants. However, there was a low concentration of the semivolatile organic compound bis(2-ethylhexyl) phthalate, below the toxicity characteristic level. The resin sample from the cation exchange vessel (#10) contains levels of semivolatile organic compounds less than the toxicity characteristic level; radionuclides up to 1420 times the background levels for ^{241}Am; and metal contaminants. The only organic compound that was not found in the blank was bis(2-ethylhexyl) phthalate. The metal contaminants could be up to 11 times the toxicity characteristic level chromium. This level of contaminants indicates the need for a TCLP analysis that measures the amount of metals that will actually be leached from the resin. This analysis was requested on February 6, 1997. The only metal concentrations in the resin leachate above the

detection level are mercury and barium. Because their concentrations are below the regulatory level, the resin is a radioactive waste not a mixed waste. Both the cation exchange resin sample and the water sample from the closed drain tank are acidic with a pH between 2 and 3. The results are summarized in Table 6 and presented in detail in Table D1 followed by the supporting documentation in Appendix D.

F. Manhole and Subsurface Piping

The piping from the facility is connected to other facilities (see Figure 1) such as building 575 and a lagoon. The other end of some of the piping appears to end in the laboratory tanks and equalization tanks. One water sample, #67, from the manhole (component #24) had activity above the release criteria for the site (see Table 5). Since it is less than ten times the site release criteria, it does not need any processing before it is released to the on site drains. A smear sample, #44, from the top sides had elevated activity 87 ± 49 dis/min β. The scraping sample, #55, appeared to be naturally occurring radioactivity (^{238}U and ^{232}Th daughters).

TABLE 6. Cation Exchange Resin Sample dated 9/20/96

Analysis	Highest Concentration/Activity	Limit or Background Values
pH	2.4 most acidic	≤2 or ≥12.5
Volatile Organic	none detected	> detection level[a]
Semivolatile Organic bis(2-Ethylhexyl) Phthalate	912 μg/L	1,000,000 μg/L
Mercury Metal	0.49 μg/L	200 μg/L
Barium Metal	0.20 μg/mL	100 μg/mL
^{241}Am radionuclide	24.1 pCi/g	0.017 pCi/g
^{137}Cs radionuclide	2.6 pCi/g	0.86 pCi/g
^{60}Co radionuclide	4.3 pCi/g	BDL[b]

[a] Currently list of compounds regulated under RCRA has individual limits above the detection level.

[b] BDL = Below detectable levels.

G. Building Interior, Trench and Pit

No elevated activity was found on the smears of the trench. Low levels of β activity were found on the floor 58 ± 48 dis/min and the west wall 76 ± 48 dis/min of building 579. No elevated activity was found on the smears of the pit. There are many miscellaneous items stored or abandoned in the building. Smears of these items showed a maximum of 53 ± 49 dis/min β on a mixer on the table. This mixer may not be related to the Waste Ion Exchange Facility.

Direct surveys of the Building detected no alpha or beta activity above background with the NE electra. No gamma activity above background was detected with the PG-2 detector.

XI. SUMMARY OF RESULTS ABOVE BACKGROUND

Several locations, the floor and west wall of building 579 and the manhole, had low levels of β activity, up to 87 ± 49 dis/min. These values are below the allowable residual surface contamination limits for removable beta activity.

The internal surfaces of the pipes, tanks and columns had higher levels of β activity up to 172 ± 52 dis/min and some α activity up to 106 ± 29 dis/min. The beta values are below the allowable residual removable surface contamination limits. Depending upon the isotopes involved the alpha values are above the allowable residual removable surface contamination limits for transuranics such as ^{241}Am.

The resin sample had elevated concentrations of RCRA metals, up to 11 times the toxicity characteristic level for chromium. The leachate from the resin had no metal concentrations above the toxicity characteristic level. The resin sample also had radionuclide concentrations up to 1,420 times the background level for ^{241}Am and detectable ^{60}Co levels. ^{60}Co concentrations in the background samples are below the instrument detection levels.

Two of the samples were acidic, with pH values between 2 and 3.

XII. ESTIMATE OF INVENTORY OF ACTIVITY IN COLUMNS

A. Water in Facility

Water was found in four components and resin was found in one. Volume estimates were calculated for the water and resin and are listed in Table 7 with the calculational parameters.

Table 7. Volumes in the Vessels, Tanks & Manhole

Dimensions	Mixed Bed Exchange Vessel	Cation Exchange Vessel	Closed Drain Tank	Manhole
Vessel height (ft) = h	8.5	8.5	4	3.83
circumference (ft) = $2\pi r$	7.92	7.92	9.42	6.28
radius (ft) = r	1.25	1.25	1.5	1
Vessel Volume (ft^3) $V = \pi r^2 h$	41.7	41.7	28.3	12.0
Vessel Volume (L) = 30.48^3 V/1000	1,180	1,180	801	341
Vessel Volume (gal) = 7.841 V	312	312	212	90.1
resin height (ft) = h_r		5.83		
Resin Volume (ft^3) $V_r = 0.1965\ \pi r^2 h_r$		5.63		
Resin Volume (L) = 30.48^3 V_r/1000		159		
Resin Volume (gal) = 7.841 V_r		42.1		
water level height (ft) = h_w	5.67	7.5	1.25	2.67
Water Volume (ft^3) $V_w = 0.2\pi r^2 h_r + \pi r^2(h_w - h_r)$	27.8	31.2	8.84	8.38
Water Volume (L) = 30.48^3 V_w/1000	788	833	250	237
Water Volume (gal) = 7.841 V_w	208	233	66.1	62.7

Two of the components in Table 7 have concentrations of contaminants that are of concern. An assumed resin density of 0.95 g/ml gives a total resin mass of 151 kg. The resin sample was 19.65% solids by weight. All of the contaminants in the cation exchange vessel are assumed to be associated with the resin. The water in the cation exchange vessel is assumed to have only a low level of semivolatile organic compounds similar to those found in the mixed bed exchange vessel and the closed drain tank. The total calculated amount of RCRA metal contaminants on the resin are given in Table 8. The total calculated amount of radioactive contaminants on the resin are given in Table 9.

B. Surface Contamination in the Facility

There are two small area smears (100 cm^2) that had alpha activity above the release criteria for removable surface contamination found in Table 1 for transuranic nuclides. One was from inside the Cation Exchange Vessel. If that smear was representative of the activity on the entire 9,190 cm^2 inside surface, then there are 1,160 pCi of alpha activity inside the vessel. The second smear was

TABLE 8. RCRA Metal Contamination in the Cation Exchange Vessel

Contaminant	Concentration (mg/kg)	mg
Cd	20.7	3,130
Cr	1120	169,500
Pb	248	37,500
Hg	8.3	1,250
Se	132	20,000
Ag	124	18,800

TABLE 9. Radioactive Contamination in the Cation Exchange Vessel & Manhole

	Cation Exchange Vessel		Manhole	
Contaminant	Concentration (pCi/g)	Activity (μCi)	Concentration (pCi/ml)	Activity (μCi)
^{60}Co	4.3	0.65		
^{137}Cs	2.6	0.39		
^{241}Am	24.1	3.65		
Gross α	19.2	2.91	0.8214	0.19
Gross β	4.3	0.65	2.1978	0.52

from inside the Closed Drain Tank. If that smear was representative of the activity on the entire 13,130 cm^2 inside surface, then there are 6,270 pCi of alpha activity inside the tank.

After the water is removed from the vessels, tanks and lines, they should be surveyed to determine whether the areas accessible for smear surveys are representative of the general inside contamination levels.

XIII. LESSONS LEARNED

Trace all pipes to and from the building.

XIV. REFERENCES

1. USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" 1974

2. DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (1990)

3. Draft DOE Rule 10 CFR 834, "Radiation Protection of the Public" (1995)

4. NCRP Report No. 94, "Exposure of the Population in the United States and Canada from Natural Background Radiation," National Council on Radiation Protection and Measurements, Bethesda, Maryland (1987)

5. DOE 10 CFR 835, "Occupational Radiation Protection" (1993)

6. EPA-5201/1-88-020, "Limiting Values of Radionuclide Intake And Air Concentration and Dose Conversion Factors For Inhalation, Submersion, And ingestion", Federal Guidance Report No. 11

7. 40 CFR Parts 260-299, Code of Federal Regulations, Protection of Environment (July 1, 1995), U.S. Government Printing Office, Washington

8. "Argonne National Laboratory-East, Site Environmental Report for Calendar Year 1995" by N. W. Golchert and R. G. Kolzow, ANL-96/3, September 1996 (UC-607)

APPENDIX A: Documentation of Samples

Type: *SA Smear* Date: _____		
579/ # 3	Inluent Pump Horizontal pipe	1.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ # 4	Effluent Filter Below cap	2.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ # 4	Influent Filter Below cap	3.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ # 4	Influent Filter Out flow plug	4.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ #10	Cation Exchange inside column	5.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ #11	Mixed Bed Exchang inside column	6.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ #11	Mixed Bed Exchang plut on inflow l	7.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ #18	Air Flow Guage below top plug	8.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *SA Smear* Date: _____		
579/ #19	Closed Drain Tank Below electrode	9.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

Type: *LA Smear* Date: _____		
579/ #19	Floor entire floor	10.00
Bldg/Room	Location	Sample #
Coordinates ↑ : _____		
→ : _____		
Sampler: _____ Counter: _____		

FIGURE A1. Sample Labels

TABLE A1. Building 579 Characterization Sample Labels

Sample Type	Component No.	Component Name	Sample No.	Location	Sample Date	Count Date	Count Time
SA Smear	# 3	Influent Pump	1	Horizontal pipe valve	09/19/96	09/23/96	16:47:14
SA Smear	# 4	Effluent Filter	2	Below cap	09/19/96	09/23/96	16:49:21
SA Smear	# 4	Influent Filter	3	Below cap	09/19/96	09/23/96	16:51:29
SA Smear	# 4	Effluent Filter	4	Out flow plug	09/19/96	09/23/96	16:53:36
SA Smear	#10	Cation Exchange	5	inside column	09/26/96	09/27/96	09:46:49
SA Smear	#11	Mixed Bed Exchange	6	inside column	09/20/96	09/23/96	16:55:44
SA Smear	#11	Mixed Bed Exchange	7	plug on inflow line		Water in Line	
SA Smear	#18	Air Flow Gauge	8	below top plug	09/20/96	09/23/96	16:57:52
SA Smear	#19	Closed Drain Tank	9	Below electrode control flange	09/20/96	09/23/96	16:59:59
LA Smear	#25	Pit	10	entire floor	09/17/96	09/18/96	11:07:24
LA Smear	#25	Pit	11	entire east wall	09/17/96	09/19/96	09:39:02
LA Smear	#25	Pit	12	entire north wall	09/17/96	09/19/96	09:42:04
LA Smear	#25	Pit	13	entire south wall	09/17/96	09/19/96	09:45:34
LA Smear	#25	Pit	14	entire west wall	09/17/96	09/19/96	09:48:47
SA Smear	#20	Drain Transfer Pump	15	below pump 6" flange		Water in Line	
SA Smear	#20	Drain Transfer Pump	16	below tank 6" flange		Water in Line	
SA Smear	#21	Air Filter	17	on vent line	09/19/96	09/23/96	17:02:07
LA Smear	#22	Trench	18	north half east side	09/17/96	09/19/96	09:51:46
LA Smear	#22	Trench	19	south half east side	09/17/96	09/19/96	10:32:29
LA Smear	#22	Trench	20	north half floor	09/17/96	09/19/96	10:39:06
SA Smear	#22	Trench	21	outlet to manhole		No Access	
LA Smear	#22	Trench	22	south half floor	09/17/96	09/19/96	10:42:41
LA Smear	#22	Trench	23	entire north side	09/17/96	09/19/96	10:47:59
LA Smear	#22	Trench	24	entire south side	09/17/96	09/19/96	13:23:09
LA Smear	#22	Trench	25	north half west side	09/17/96	09/19/96	13:29:16
LA Smear	#22	Trench	26	south half west side	09/17/96	09/19/96	13:36:44
LA Smear	#23	Building	27	entire east wall	09/17/96	09/19/96	13:39:37
LA Smear	#23	Building	28	entire floor	09/26/96	09/27/96	08:49:07
LA Smear	#23	Building	29	entire north wall	09/17/96	09/19/96	13:44:12
LA Smear	#23	Building	30	entire south wall	09/17/96	09/19/96	13:46:57
LA Smear	#23	Building	31	entire west wall	09/17/96	09/20/96	09:01:16
LA Smear	#24	Manhole	32	top edges		see sample no. 44	
Air Sample	#30	Sampling period	33	North Side	09/17/96	10/03/96	12:34:51
Air Sample	#30	Sampling period	34	South Side	09/17/96	10/03/96	12:44:59
LA Smear	#13	Mixer	35	Mixer in Acid Tank #12	09/17/96	09/23/96	18:20:38
LA Smear	#27	Miscellaneous Items	36	Mixer on Table	09/17/96	09/23/96	18:24:22
LA Smear	#27	Miscellaneous Items	37	Items on Shelves	09/17/96	09/23/96	18:25:09
LA Smear	#27	Miscellaneous Items	38	Items on Table	09/17/96	09/23/96	18:30:26
LA Smear	#27	Miscellaneous Items	39	Pressure Vessel Pump	09/17/96	09/23/96	18:30:45
LA Smear	#27	Miscellaneous Items	40	White Pipe	09/17/96	09/23/96	18:35:33
LA Smear	#27	Miscellaneous Items	41	Black Fan Cover	09/17/96	09/23/96	18:35:53
LA Smear	#27	Miscellaneous Items	42	Gray Pumps	09/17/96	09/23/96	18:39:49
LA Smear	#27	Miscellaneous Items	43	Blue Pumps	09/17/96	09/23/96	18:40:07
LA Smear	#24	Manhole	44	Top Sides of Manhole	09/17/96	09/23/96	18:17:43

TABLE A1. (Cont.)

Sample Type	Component No.	Component Name	Sample No.	Location	Sample Date	Count Date	Count Time
Water 6469	# 4	Influent Filter	45	Influent filter drain	09/18/96	09/25/96	
Water 6470	#10	Cation Exchange	46	Column lower drain	09/18/96	09/25/96	
Water 6471	#11	Mixed Bed Exchange	47	Column lower drain	09/18/96	09/25/96	
Water 6472	#11	Mixed Bed Exchange	48	Column upper drain	09/18/96	09/25/96	
Water	# 4	Effluent Filter	49	Effluent filter Drain	09/18/96	09/20/96	05:51:43
Water 6474	#24	Manhole	50	Top of Manhole	09/18/96	09/26/96	
Q-tip Smear	# 4	Influent Filter	51	Influent filter (bottom)	09/19/96	09/23/96	17:04:14
Q-tip Smear	# 4	Influent Filter	52	Effluent filter (bottom)	09/19/96	09/23/96	17:06:22
SA Smear	#26	Effluent Pipe Outlet (east)	53	Exterior North Wall	09/19/96	09/23/96	17:08:30
SA Smear	#26	Effluent Pipe Outlet (west)	54	Exterior North Wall	09/19/96	09/23/96	17:10:38
Scrapings	#24	Manhole	55	Manhole (top)	09/19/96	09/23/96	17:12:45
SA Smear	#19	Closed Drain Tank	56	Drain Tank under vent pipe	09/20/96	09/23/96	17:14:53
Water 6417	#10	Cation Exchange	57	Inside column	09/24/96	09/26/96	
Resin	#10	Cation Exchange	58	Inside column	09/20/96	09/25/96	
Water	#11	Mixed Bed Exchange	59	Inside column	09/20/96	09/25/96	
Water	#20	Drain tank	60	Drain Transfer Pump	09/20/96	09/25/96	
SA Smear	#16	Mixer	61	Mixer in Caustic Tank #15	09/26/96	09/27/96	09:48:56
SA Smear	#13	Mixer	62	Mixer in Acid Tank #12	09/26/96	09/27/96	09:51:04
LA Smear	#12	Acid Regenerant Tank	63	Outside of Tank	09/26/96	09/27/96	08:54:14
LA Smear	#12	Acid Regenerant Tank	64	Inside of Tank	09/26/96	09/27/96	08:59:58
LA Smear	#15	Caustic Regenerant Tank	65	Outside of Tank	09/26/96	09/27/96	09:30:34
LA Smear	#15	Caustic Regenerant Tank	66	Inside of Tank	09/26/96	09/27/96	09:37:54
Water 6414	#24	Manhole	67	Inside manhole	09/25/96	09/26/96	
SA Smear	#29	Influent Pipe Inlet	68	Exterior South Wall	10/02/96	10/03/96	12:49:52
LA Smear	#23	Floor	601	Water from bucket under Influent Filter	09/17/96	09/18/96	09:07:41

APPENDIX B: Smear Sample Data

TABLE B1. Composite Smear and Scraping Data for Building 579 (594)

Sample Type	Component No	Component Name	Sample No.	Location	dis/min Alpha	dis/min Beta
SA Smear	# 3	Influent Pump	1	Horizontal pipe valve	3.44 ± 5.78	-8.4 ± 15.6
SA Smear	# 4	Effluent Filter	2	Below cap	7.60 ± 8.17	21.3 ± 19.5
SA Smear	# 4	Effluent Filter	4	Out flow plug	3.44 ± 5.78	2.3 ± 17.1
Water	# 4	Effluent Filter	49	Effluent filter Drain	0.46 ± 0.26	1.1 ± 1.8
SA Smear	# 4	Influent Filter	3	Below cap	3.44 ± 5.78	5.8 ± 17.5
Q-tip Smear	# 4	Influent Filter	51	Influent filter (bottom)	-0.73 ± 4.09	8.2 ± 17.8
Q-tip Smear	# 4	Influent Filter	52	Effluent filter (bottom)	-0.73 ± 4.09	-6.1 ± 15.9
SA Smear	#10	Cation Exchange	5	inside column	28.50 ± 15.28	105.1 ± 27.7
SA Smear	#11	Mixed Bed Exchange	6	inside column	13.85 ± 10.81	5.8 ± 17.5
LA Smear	#12	Acid Regenerant Tank	63	Outside of Tank	3.1 ± 7.8	44.4 ± 47.1
LA Smear	#12	Acid Regenerant Tank	64	Inside of Tank	7.8 ± 9.5	171.8 ± 52.1
LA Smear	#13	Lead Grip Agitator	35	Mixer in Acid Tank #12	9.4 ± 10.0	83.6 ± 48.7
SA Smear	#13	Lead Grip Agitator	62	Mixer in Tank #12	-0.67 ± 4.09	11.1 ± 18.3
LA Smear	#15	Caustic Regenerant Tank	65	Outside of Tank	1.5 ± 7.1	58.1 ± 47.7
LA Smear	#15	Caustic Regenerant Tank	66	Inside of Tank	6.2 ± 9.0	26.7 ± 46.4
SA Smear	#16	Caustic Mixer	61	Mixer in Tank #15	-0.67 ± 4.09	-11.6 ± 15.2
SA Smear	#18	Air Flow Gauge	8	below top plug	11.77 ± 10.00	2.3 ± 17.1
SA Smear	#19	Closed Drain Tank	9	Below electrode control flange	-0.73 ± 4.09	11.8 ± 18.3
SA Smear	#19	Closed Drain Tank	56	Drain Tank under vent pipe	105.52 ± 29.16	47.5 ± 22.3
SA Smear	#21	Air Filter	17	on vent line	-0.73 ± 4.09	2.3 ± 17.1
LA Smear	#22	Trench	18	north half east side	3.1 ± 7.8	-9.5 ± 44.8
LA Smear	#22	Trench	19	south half east side	-0.1 ± 6.4	2.2 ± 45.3
LA Smear	#22	Trench	20	north half floor	3.1 ± 7.8	44.4 ± 47.1
LA Smear	#22	Trench	22	south half floor	1.5 ± 7.1	3.2 ± 45.4
LA Smear	#22	Trench	23	entire north side	-1.7 ± 5.5	27.7 ± 46.4
LA Smear	#22	Trench	24	entire south side	6.2 ± 9.0	24.8 ± 46.3
LA Smear	#22	Trench	25	north half west side	12.5 ± 11.0	42.4 ± 47.0
LA Smear	#22	Trench	26	south half west side	6.2 ± 9.0	-2.7 ± 45.1
LA Smear	#23	Building	27	entire east wall	6.2 ± 9.0	37.5 ± 46.8
LA Smear	#23	Building	28	entire floor	3.1 ± 7.8	58.1 ± 47.7
LA Smear	#23	Building	29	entire north wall	-0.1 ± 6.4	27.7 ± 46.4
LA Smear	#23	Building	30	entire south wall	-0.1 ± 6.4	8.1 ± 45.6
LA Smear	#23	Building	31	entire west wall	12.5 ± 11.0	75.7 ± 48.4
LA Smear	#23	Floor	601	Water from bucket under Influent Filter	-0.7 ± 6.4	-46.8 ± 44.6
LA Smear	#24	Manhole	44	Top Sides of Manhole	3.1 ± 7.8	86.5 ± 48.8
Scrapings	#24	Manhole	55	Manhole (top)	1.35 ± 4.09	1.1 ± 16.9
LA Smear	#25	Pit	10	entire floor	-3.3 ± 4.6	49.3 ± 47.3
LA Smear	#25	Pit	11	entire east wall	-1.7 ± 5.5	43.4 ± 47.1
LA Smear	#25	Pit	12	entire north wall	-0.1 ± 6.4	19.9 ± 46.1
LA Smear	#25	Pit	13	entire south wall	4.6 ± 8.4	42.4 ± 47.0
LA Smear	#25	Pit	14	entire west wall	7.8 ± 9.5	34.6 ± 46.7
SA Smear	#26	Effluent Pipe Outlet (east)	53	Exterior North Wall	3.44 ± 5.78	2.3 ± 17.1
SA Smear	#26	Effluent Pipe Outlet (west)	54	Exterior North Wall	5.52 ± 7.08	24.9 ± 19.9
LA Smear	#27	Miscellaneous Items	36	Mixer on Table	4.8 ± 9.0	52.7 ± 48.9

TABLE B1. (Cont.)

Component					dis/min	
Sample Type	No	Name	Sample No.	Location	Alpha	Beta
LA Smear	#27	Miscellaneous Items	37	Items on Shelves	3.1 ± 7.8	-9.5 ± 44.8
LA Smear	#27	Miscellaneous Items	38	Items on Table	-2.6 ± 5.3	-17.7 ± 45.9
LA Smear	#27	Miscellaneous Items	39	Pressure Vessel Pump	1.5 ± 7.1	49.3 ± 47.3
LA Smear	#27	Miscellaneous Items	40	White Pipe	4.8 ± 9.0	-19.7 ± 45.8
LA Smear	#27	Miscellaneous Items	41	Black Fan Cover	7.8 ± 9.5	22.8 ± 46.2
LA Smear	#27	Miscellaneous Items	42	Grey Pumps	-0.7 ± 6.4	36.6 ± 48.2
LA Smear	#27	Miscellaneous Items	43	Blue Pumps	7.8 ± 9.5	45.3 ± 47.2
SA Smear	#29	Influent Pipe Inlet	68	Exterior South Wall	1.33 ± 4.09	2.3 ± 17.4
				Minimum	-3.30 ± 0.26	-46.8 ± 1.8
				Maximum	105.52 ± 29.16	171.8 ± 52.1
				Average	5.81 ± 7.62	25.8 ± 36.1
				Standard Deviation	14.95 ± 3.91	35.9 ± 14.5
				Count	52	52

TABLE B2. Smear Scraping and Water Data from Tennelec for Building 579 (594)

	Component				dis/min	
Sample Type	No	Name	Sample No.	Location	Alpha	Beta
SA Smear	# 3	Influent Pump	1	Horizontal pipe valve	3.44 ± 5.78	-8.4 ± 15.6
SA Smear	# 4	Effluent Filter	2	Below cap	7.60 ± 8.17	21.3 ± 19.5
SA Smear	# 4	Influent Filter	3	Below cap	3.44 ± 5.78	5.8 ± 17.5
SA Smear	# 4	Effluent Filter	4	Out flow plug	3.44 ± 5.78	2.3 ± 17.1
Water	# 4	Effluent Filter	49	Effluent filter Drain	0.46 ± 0.26	1.1 ± 1.8
Q-tip Smear	# 4	Influent Filter	51	Influent filter (bottom)	-0.73 ± 4.09	8.2 ± 17.8
Q-tip Smear	# 4	Influent Filter	52	Effluent filter (bottom)	-0.73 ± 4.09	-6.1 ± 15.9
SA Smear	#10	Cation Exchange	5	inside column	28.50 ± 15.28	105.1 ± 27.7
SA Smear	#11	Mixed Bed Exchange	6	inside column	13.85 ± 10.81	5.8 ± 17.5
SA Smear	#13	Mixer	62	Mixer in Tank #12	-0.67 ± 4.09	11.1 ± 18.3
SA Smear	#16	Mixer	61	Mixer in Tank #15	-0.67 ± 4.09	-11.6 ± 15.2
SA Smear	#18	Air Flow Gauge	8	below top plug	11.77 ± 10.00	2.3 ± 17.1
SA Smear	#19	Closed Drain Tank	9	Below electrode control flange	-0.73 ± 4.09	11.8 ± 18.3
SA Smear	#19	Closed Drain Tank	56	Drain Tank under vent pipe	105.52 ± 29.16	47.5 ± 22.3
SA Smear	#21	Air Filter	17	on vent line	-0.73 ± 4.09	2.3 ± 17.1
Scrapings	#24	Manhole	55	Manhole (top)	1.35 ± 4.09	1.1 ± 16.9
SA Smear	#26	Effluent Pipe Outlet (east)	53	Exterior North Wall	3.44 ± 5.78	2.3 ± 17.1
SA Smear	#26	Effluent Pipe Outlet (west)	54	Exterior North Wall	5.52 ± 7.08	24.9 ± 19.9
SA Smear	#29	Influent Pipe Inlet	68	Exterior South Wall	1.33 ± 4.09	2.3 ± 17.4
				Minimum	-0.73 ± 0.26	-11.6 ± 1.8
				Maximum	105.52 ± 29.16	105.1 ± 27.7
				Average	9.76 ± 7.19	12.1 ± 17.4
				Standard Deviation	23.63 ± 6.08	25.4 ± 4.6
				Count	19	19

TABLE B3. Building 579 Smear Data logged on the DABRAS or NE

Sample Type	Component No	Component Name	Sample No.	Location	dis/min Alpha	dis/min Beta
LA Smear	#12	Acid Regenerant Tank	63	Outside of Tank	3.1 ± 7.8	44.4 ± 47.1
LA Smear	#12	Acid Regenerant Tank	64	Inside of Tank	7.8 ± 9.5	171.8 ± 52.1
LA Smear	#13	Mixer	35	Mixer in Acid Tank #12	9.4 ± 10.0	83.6 ± 48.7
LA Smear	#15	Caustic Regenerant Tank	65	Outside of Tank	1.5 ± 7.1	58.1 ± 47.7
LA Smear	#15	Caustic Regenerant Tank	66	Inside of Tank	6.2 ± 9.0	26.7 ± 46.4
LA Smear	#22	Trench	18	north half east side	3.1 ± 7.8	-9.5 ± 44.8
LA Smear	#22	Trench	19	south half east side	-0.1 ± 6.4	2.2 ± 45.3
LA Smear	#22	Trench	20	north half floor	3.1 ± 7.8	44.4 ± 47.1
LA Smear	#22	Trench	22	south half floor	1.5 ± 7.1	3.2 ± 45.4
LA Smear	#22	Trench	23	entire north side	-1.7 ± 5.5	27.7 ± 46.4
LA Smear	#22	Trench	24	entire south side	6.2 ± 9.0	24.8 ± 46.3
LA Smear	#22	Trench	25	north half west side	12.5 ± 11.0	42.4 ± 47.0
LA Smear	#22	Trench	26	south half west side	6.2 ± 9.0	-2.7 ± 45.1
LA Smear	#23	Building	27	entire east wall	6.2 ± 9.0	37.5 ± 46.8
LA Smear	#23	Building	28	entire floor	3.1 ± 7.8	58.1 ± 47.7
LA Smear	#23	Building	29	entire north wall	-0.1 ± 6.4	27.7 ± 46.4
LA Smear	#23	Building	30	entire south wall	-0.1 ± 6.4	8.1 ± 45.6
LA Smear	#23	Building	31	entire west wall	12.5 ± 11.0	75.7 ± 48.4
LA Smear	#23	Floor	601	Water from bucket under Influent Filter	-0.7 ± 6.4	-46.8 ± 44.6
LA Smear	#24	Manhole	44	Top Sides of Manhole	3.1 ± 7.8	86.5 ± 48.8
LA Smear	#25	Pit	10	entire floor	-3.3 ± 4.6	49.3 ± 47.3
LA Smear	#25	Pit	11	entire east wall	-1.7 ± 5.5	43.4 ± 47.1
LA Smear	#25	Pit	12	entire north wall	-0.1 ± 6.4	19.9 ± 46.1
LA Smear	#25	Pit	13	entire south wall	4.6 ± 8.4	42.4 ± 47.0
LA Smear	#25	Pit	14	entire west wall	7.8 ± 9.5	34.6 ± 46.7
LA Smear	#27	Miscellaneous Items	36	Mixer on Table	4.8 ± 9.0	52.7 ± 48.9
LA Smear	#27	Miscellaneous Items	37	Items on Shelves	3.1 ± 7.8	-9.5 ± 44.8
LA Smear	#27	Miscellaneous Items	38	Items on Table	-2.6 ± 5.3	-17.7 ± 45.9
LA Smear	#27	Miscellaneous Items	39	Pressure Vessel Pump	1.5 ± 7.1	49.3 ± 47.3
LA Smear	#27	Miscellaneous Items	40	White Pipe	4.8 ± 9.0	-19.7 ± 45.8
LA Smear	#27	Miscellaneous Items	41	Black Fan Cover	7.8 ± 9.5	22.8 ± 46.2
LA Smear	#27	Miscellaneous Items	42	Grey Pumps	-0.7 ± 6.4	36.6 ± 48.2
LA Smear	#27	Miscellaneous Items	43	Blue Pumps	7.8 ± 9.5	45.3 ± 47.2
				Minimum	-3.3 ± 4.6	-47 ± 45
				Maximum	12.5 ± 11.0	172 ± 52
				Average	3.5 ± 7.9	34 ± 47
				Standard Deviation	4.1 ± 1.6	38 ± 1
				Count	33	33

APPENDIX C: Air and Water Sample Data

TABLE C1. Air Sample Data from Tennelec for Building 579 (594)

Sample Type	Component No.	Component Name	Sample No.	Location	Date Started	Date Removed	initial dis/min Alpha	initial dis/min Beta	Date Count
Air	#30	Sampling period	1	North Side	09/17/96	09/27/96	4.67 ± 2.95	37.3 ± 9.7	10/03/96
Air	#30	Sampling period	2	South Side	09/17/96	09/27/96	1.75 ± 2.02	31.8 ± 9.5	10/03/96
						Minimum	1.75 ± 2.02	31.8 ± 9.5	
						Maximum	4.67 ± 2.95	37.3 ± 9.7	
						Average	3.21 ± 2.49	34.6 ± 9.6	
						Standard Deviation	1.46 ± 0.47	2.7 ± 0.1	
						Count	2	2	

Working Volume (m^3) = 40 liters/min × time (time = 60 min/hr × 8 hours x number of week days)
Alpha DAC = 6 for ^{239}Pu, ^{241}Am & ^{238}Pu
Beta DAC = 4,000 for ^{90}Sr

TABLE C2. Building 579 Characterization Water Samples

Sample Type	Analysis No.	Component No.	Component Name	Sample No.	Sample Location	dis/min/mL Alpha	dis/min/mL Beta
Water	6469	# 4	Influent Filter	45	Influent filter drain	0.069	0.218
Water	6470	#10	Cation Exchange	46	Column lower drain	0.04	0.324
Water	6471	#11	Mixed Bed Exchange	47	Column lower drain	0.044	0.871
Water	6472	#11	Mixed Bed Exchange	48	Column upper drain	0.039	0.486
Water	6474	#24	Manhole	50	Top of Manhole	0.03	0.1
Water	6417	#10	Cation Exchange	57	Inside column	0.03	0.004
Resin	96-0483-01	#10	Cation Exchange	58	Inside column	19.2	4.3
Water	96-0484-01	#11	Mixed Bed Exchange	59	Inside column	<0.09	<0.16
Water	96-0484-02	#20	Drain Transfer Pump	60	Drain tank	<0.09	<0.16
Water	6414	#24	Manhole	67	Inside manhole	0.37	0.99
					Minimum	0.030	0.004
					Maximum	19.2	4.3
					Average	2.000	0.761
					Standard Deviation	5.734	1.220
					Count	10	10

APPENDIX D: Analytical Results

TABLE D1. Documents Containing Analytical Results

TABLE D2. Water and Resin from Exchange Vessels

Contaminant	Sample Number and Item Name: #58 Cation Exchange Resin	#59 Mixed Bed Exchange Water	#60 Drain Tank Water	Toxicity Characteristic: TCLP Extract or Liquid Waste	Solid Waste, Dry
pH	2.40	8.21	2.77	≤2 or ≥12.5	
	Concentrations			Regulatory Level	
Metal	mg/kg	(µg/mL)		(µg/mL)	(mg/kg)
Arsenic	<63	<0.50	<0.50	5.0	100.0
Barium	<3	0.20	<0.03	100.0	2,000.0
Cadmium	20.7	<0.01	<0.02	1.0	20.0
Chromium	1120	<0.01	<0.02	5.0	100.0
Lead	248	<0.20	<0.30	5.0	100.0
Mercury	8.3	0.00049	<0.00004	0.2	4.0
Selenium	132	<0.50	<0.50	1.0	20.0
Silver	124	<0.02	<0.03	5.0	100.0
Semivolatile Organics	mg/kg	(µg/mL)			
Di-n-butylphthalate[a]	0.864 B	U	U		
Butylbenzylphthalate[a]	0.250 BJ	U	U		
Bis(2-Ethylhexyl)phthalate[a]	0.703	0.912	U		
	Activities			Background\Regulatory Level	
Radionuclide	pCi/g	pCi/mL		pCi/mL[b]	pCi/g[c]
^{238}U	NCD[d]	<0.2 (NCD)	<0.2	0.6	0.37 ± 0.56
^{226}Ra	NCD	<0.2	<0.2	0.1	0.37 ± 0.56
^{214}Bi	NCD	<0.2	<0.2	600	0.37 ± 0.56
^{241}Am	24.1 ± 2.4	NCD	NCD	0.03	0.017 ± 0.058
^{60}Co	3.4 ± 0.3	<0.2	<0.2 (NCD)	5	non detected
^{137}Cs	2.6 ± 0.3	NCD	NCD	3	0.86 ± 2.15
Gross α	19.2 ± 0.2	<0.04	<0.04	0.03	
Gross β	4.3 ± 0.4	<0.07	<0.07	1.0	

[a] See original data for definition of the qualifiers.

[b] DOE 5400.5 Derived Concentration Guide (DCG).

[c] ANL Perimeter Bottom Sediment Averages from Table 2.

[d] No Contamination Detected.

REQUEST FOR ANALYSIS 6470

Date: 9/18/96 Bldg: 579 CL. Sample: #46 Lower Drain

Type of Sample: Water - Cation Exchange Column #10

Gallons: 6 oz. Requestor: Charlotte Sholeen

ANALYSES DESIRED: ☒ α, ☒ β, ☐ pH, ☐ Hg, ☐ Ammonia Nitrogen
☐ Total Solids, ☐ Volume for 20% Bottoms

Other: _____

Date Analyzed: 9-25-96 Analyst: Kris McCulloch

Results: α - 0.040 d/m/ml.

β - 0.324 d/m/ml.

Size	Determination	Reading	Result	

	Total Solids	Total Solids
Dish Number		
Wt. Dish + Wet Sample		
Wt. Dish		
Wt. Sample		
Wt. Dish + Dry Sample		
Wt. Dish		
Wt. Dry Sample		
Remarks and Calculations:		

ESH-228 (6-93)

REQUEST FOR ANALYSIS 6469

Date: 9/18/96 Bldg: 579 CL. Sample: #45

Type of Sample: Water - Influent Filter #4 drain

Gallons: 6 oz. Requestor: Charlotte Sholeen

ANALYSES DESIRED: ☒ α, ☒ β, ☐ pH, ☐ Hg, ☐ Ammonia Nitrogen
☐ Total Solids, ☐ Volume for 20% Bottoms

Other: _____

Date Analyzed: 9-25-96 Analyst: Kris McCulloch

Results: α - 0.069 d/m/ml.

β - 0.218 d/m/ml.

Size	Determination	Reading	Result	

	Total Solids	Total Solids
Dish Number		
Wt. Dish + Wet Sample		
Wt. Dish		
Wt. Sample		
Wt. Dish + Dry Sample		
Wt. Dish		
Wt. Dry Sample		
Remarks and Calculations:		

ESH-228 (6-93)

COUNTER DATA SHEET

Sample D-579 WATER Influent Filter #4 DRAIN Volume #45

Sample Date 9/18/96 ☐ PFS-11 ☐ PO-97 Counted By A Date Counted 9-25-96

ALPHA-BETA COUNTING			SPIKED SAMPLE PERCENT RECOVERY DETERMINATION				
☐ SPIKED	☐ UNSPIKED						
Counter Numbers	17	18	Counter Numbers				
Total α Counts	8	16		ALPHA	BETA	ALPHA	BETA
Counting Time	30	30	Standard Solution d/m/ml ÷ 50 = Known d/m/ml	50 =	50 =	50 =	50 =
Total α c/m	.27	.53					
Background	.05	.05					
Net α c/m	.22	.48	Spiked Sample α & β Results in d/m/ml				
ml Sample	10	10					
α c/m/ml	.022	.048					
α Yield Factor	1.96	1.96	Unspiked sample α & β Results (from PFS-11)				
α d/m/ml	.043	.094					
Total β Counts	1399	1392	Spiked d/m/ml minus Unspiked d/m/ml = Recovered d/m/ml				
Counting Time	30	30					
Total β c/m	46.63	46.40					
β Background	44.9	44.1	Recovered d/m/ml ÷ Known d/m/ml x 100 = Percent Recovery				
BKGD + Net α c/m	45.12	44.58					
Net β c/m	1.41	1.82					
ml Sample	10	10	REMARKS				
β c/m/ml	.141	.182					
β Yield Factor	1.35	1.35					
β d/m/ml	.190	.246					
REMARKS							
	Ano. α — 0.069						
	Ano. β — 0.218						

ESH-203 (6-96)

COUNTER DATA SHEET

Sample D-579 WATER-CATION EXCHANGE COLUMN #10 Volume #46

Sample Date 9/15/96 ☐ PFS-11 ☐ PO-97 Counted By [signature] Date Counted 9-25-96

ALPHA-BETA COUNTING			SPIKED SAMPLE PERCENT RECOVERY DETERMINATION				
☐ SPIKED	☐ UNSPIKED						
Counter Numbers	19	20	Counter Numbers				
Total α Counts	8	8		ALPHA	BETA	ALPHA	BETA
Counting Time	30	30	Standard Solution d/m/ml ÷ 50 = Known d/m/ml	___/50 =	___/50 =	___/50 =	___/50 =
Total α c/m	.27	.27					
Background	.07	.06					
Net α c/m	.20	.21	Spiked Sample α & β Results in d/m/ml				
ml Sample	10	10					
α c/m/ml	.020	.021					
α Yield Factor	1.96	1.96	Unspiked sample α & β Results (from PFS-11)				
α d/m/ml	.039	.041					
Total β Counts	1135	1571	Spiked d/m/ml minus Unspiked d/m/ml = Recovered d/m/ml				
Counting Time	30	30					
Total β c/m	37.83	53.37					
β Background	35.7	50.3	Recovered d/m/ml ÷ Known d/m/ml x 100 = Percent Recovery				
BKGD + Net α c/m	35.90	50.51					
Net β c/m	1.93	2.86					
ml Sample	10	10	REMARKS				
β c/m/ml	.193	.286					
β Yield Factor	1.35	1.35					
β d/m/ml	.261	.386					
REMARKS							
Ave α - 0.040							
Ave. β - 0.324							

ESH-203 (6-96)

REQUEST FOR ANALYSIS 6472

Date: 9/18/96 Bldg: 579 CL. Sample: # 48 upper Drain

Type of Sample: Water - Mixed Bed Exchange Column # 11

Gallons: 67 Requestor: Charlotte Sholeen

ANALYSES DESIRED: ☑ α, ☒ β, ☐ pH, ☐ Hg, ☐ Ammonia Nitrogen
☐ Total Solids, ☐ Volume for 20% Bottoms

Other: _____

Date Analyzed: 9-27-96 Analyst: Ann McCulley

Results: α - 0.0139 d/m/ml.
β - 0.486 d/m/ml.

Size	Determination	Reading	Result	

	Total Solids	Total Solids
Dish Number		
Wt. Dish + Wet Sample		
Wt. Dish		
Wt. Sample		
Wt. Dish + Dry Sample		
Wt. Dish		
Wt. Dry Sample		
Remarks and Calculations:		

ESH-228 (6-93)

REQUEST FOR ANALYSIS 6471

Date: 9/18/96 Bldg: 579 CL. Sample: # 47 Lower Drain

Type of Sample: Water - Mixed Bed Exchange Column # 11

Gallons: 67 Requestor: Charlotte Sholeen

ANALYSES DESIRED: ☑ α, ☒ β, ☐ pH, ☐ Hg, ☐ Ammonia Nitrogen
☐ Total Solids, ☐ Volume for 20% Bottoms

Other: _____

Date Analyzed: 9-25-96 Analyst: Ann McCulley

Results: α - 0.044 d/m/ml.
β - 0.871 d/m/ml.

Size	Determination	Reading	Result	

	Total Solids	Total Solids
Dish Number		
Wt. Dish + Wet Sample		
Wt. Dish		
Wt. Sample		
Wt. Dish + Dry Sample		
Wt. Dish		
Wt. Dry Sample		
Remarks and Calculations:		

ESH-228 (6-93)

COUNTER DATA SHEET

Sample D-579 Water - Mixed Bed Exchange Column #1 Volume # 49

Sample Date 9/18/96 ☐ PFS-11 ☐ PO-97 Counted By ✱ Date Counted 9/23/96

ALPHA-BETA COUNTING			SPIKED SAMPLE PERCENT RECOVERY DETERMINATION				
☐ SPIKED	☐ UNSPIKED						
Counter Numbers	21	22	Counter Numbers				
Total α Counts	10	7		ALPHA	BETA	ALPHA	BETA
Counting Time	30	30	Standard Solution d/m/ml ÷ 50 = Known d/m/ml	___/50 =	___/50 =	___/50 =	___/50 =
Total α c/m	.33	.23					
Background	.04	.07					
Net α c/m	.29	.16	Spiked Sample α & β Results in d/m/ml				
ml Sample	10	10					
α c/m/ml	.029	.016					
α Yield Factor	1.96	1.96	Unspiked sample α & β Results (from PFS-11)				
α d/m/ml	.057	.031					
Total β Counts	1484	1448	Spiked d/m/ml minus Unspiked d/m/ml = Recovered d/m/ml				
Counting Time	30	30					
Total β c/m	49.47	48.27					
β Background	40.9	43.5	Recovered d/m/ml ÷ Known d/m/ml x 100 = Percent Recovery				
BKGD + Net α c/m	41.19	43.66					
Net β c/m	8.28	4.61					
ml Sample	10	10	REMARKS				
β c/m/ml	.828	.461					
β Yield Factor	1.35	1.35					
β d/m/ml	1.12	.622					
REMARKS							
Ave α — 0.044							
Ave. β — 0.871							

ESH-203 (6-96)

COUNTER DATA SHEET

Sample D-579 WATER-Mixed Bed Exchange Column Volume #48

Sample Date 9/15/96 ☐ PFS-11 ☐ PO-97 Counted By [illegible] Date Counted 9/25/96

ALPHA-BETA COUNTING			SPIKED SAMPLE PERCENT RECOVERY DETERMINATION				
☐ SPIKED	☐ UNSPIKED						
Counter Numbers	23	24	Counter Numbers				
Total α Counts	2	11		ALPHA	BETA	ALPHA	BETA
Counting Time	30	30	Standard Solution d/m/ml ÷ 50 = Known d/m/ml	___/50 =	___/50 =	___/50 =	___/50 =
Total α c/m	.07	.37					
Background	.02	.02					
Net α c/m	.105	.35	Spiked Sample α & β Results in d/m/ml				
ml Sample	10	10					
α c/m/ml	.005	.035					
α Yield Factor	1.96	1.96	Unspiked sample α & β Results (from PFS-11)				
α d/m/ml	.009	.069					
Total β Counts	1211	1291	Spiked d/m/ml minus Unspiked d/m/ml = Recovered d/m/ml				
Counting Time	30	30					
Total β c/m	40.37	43.03					
β Background	36.2	39.6	Recovered d/m/ml ÷ Known d/m/ml x 100 = Percent Recovery				
BKGD + Net α c/m	36.25	39.95					
Net β c/m	4.12	3.08					
ml Sample	10	10	REMARKS				
β c/m/ml	.412	.308					
β Yield Factor	1.35	1.35					
β d/m/ml	.556	.416					
REMARKS							
Ave. α — .039							
Ave. β — 0.486							

ESH-203 (6-96)

REQUEST FOR ANALYSIS

960926-103

Date: 9/18/96 Bldg: 579 CL. Sample: #50

Type of Sample: Water - Outside Manhole

Gallons: 6 g. Requestor: Charlotte Sholeen

ANALYSES DESIRED: ☒ α, ☒ β, ☐ pH, ☐ Hg, ☐ Ammonia Nitrogen
☐ Total Solids, ☐ Volume for 20% Bottoms

Other: _____

Date Analyzed: 9/26/96 Analyst: MM

Results:

α = 0.03 D/m/mL
β = 0.10 D/m/mL

Size	Determination	Reading	Result	

	Total Solids	Total Solids
Dish Number		
Wt. Dish + Wet Sample		
Wt. Dish		
Wt. Sample		
Wt. Dish + Dry Sample		
Wt. Dish		
Wt. Dry Sample		
Remarks and Calculations:		

ESH-228 (6-93)

COUNTER DATA SHEET

Sample BLDG 579 WATER - OUTSIDE MANHOLE #50 Volume 60z

Sample Date 9/18/96 ☐ PFS-11 ☐ PO-97 Counted By DAS Date Counted 9/26/96

ALPHA-BETA COUNTING		
☐ SPIKED	☒ UNSPIKED	
Counter Numbers	27	28
Total α Counts	9	22
Counting Time	30	30
Total α c/m	.30	.73
Background	.09	.34
Net α c/m	.21	.39
ml Sample	20	20
α c/m/ml	.011	.020
α Yield Factor	1.96	1.96
α d/m/ml	.021	.038
Total β Counts	1565	1554
Counting Time	30	30
Total β c/m	52.2	51.8
β Background	50.1	50.4
BKGD + Net α c/m	50.31	50.79
Net β c/m	1.89	1.11
ml Sample	20	20
β c/m/ml	.095	.056
β Yield Factor	1.35	1.35
β d/m/ml	.128	.075
REMARKS		
α = 0.03 D/M/ML.		
β = 0.10 D/M/ML.		

SPIKED SAMPLE PERCENT RECOVERY DETERMINATION

Counter Numbers				
	ALPHA	BETA	ALPHA	BETA
Standard Solution d/m/ml ÷ 50 = Known d/m/ml	___/50 =	___/50 =	___/50 =	___/50 =
Spiked Sample α & β Results in d/m/ml				
Unspiked sample α & β Results (from PFS-11)				
Spiked d/m/ml minus Unspiked d/m/ml = Recovered d/m/ml				
Recovered d/m/ml ÷ Known d/m/ml x 100 = Percent Recovery				

REMARKS

ESH-203 (6-96)

REQUEST FOR ANALYSIS 6417 CL-960926-105

Date: 9-27-96 Bldg: 579 CL. Sample: #57

Type of Sample: WATER - CATION ION EXCHANGER.

~~Gallons:~~ 2 200 mL Requestor: CHARLOTTE SHOLEEN

ANALYSES DESIRED: ☒ α, ☒ β, ☐ pH, ☐ Hg, ☐ Ammonia Nitrogen
☐ Total Solids, ☐ Volume for 20% Bottoms

Other: _____

Date Analyzed: 9/26/96 Analyst: DM

Results:
α = 0.03 D/m/mL.
β = 0.004 D/m/mL.

Size	Determination	Reading	Result	

	Total Solids	Total Solids
Dish Number		
Wt. Dish + Wet Sample		
Wt. Dish		
Wt. Sample		
Wt. Dish + Dry Sample		
Wt. Dish		
Wt. Dry Sample		

Remarks and Calculations:

REQUEST FOR ANALYSIS 6414

Date: 9-25-96 Bldg: 579 CL. Sample: #67

Type of Sample: WATER - MANHOLE CL-960926-104

~~Gallons:~~ 60 mL. Requestor: CHARLOTTE SHOLEEN

ANALYSES DESIRED: ☒ α, ☒ β, ☐ pH, ☐ Hg, ☐ Ammonia Nitrogen
☐ Total Solids, ☐ Volume for 20% Bottoms

Other: _____

Date Analyzed: 9/26/96 Analyst: DM

Results:
α = 0.37 D/m/mL.
β = 0.99 D/m/mL.

Size	Determination	Reading	Result	

	Total Solids	Total Solids
Dish Number		
Wt. Dish + Wet Sample		
Wt. Dish		
Wt. Sample		
Wt. Dish + Dry Sample		
Wt. Dish		
Wt. Dry Sample		

Remarks and Calculations:

FSH 7208 (6-93)

COUNTER DATA SHEET

Sample BLDG 579 WATER - CATION #57 EXCHANGER Volume CL-960926-105

Sample Date 9/24/96 ☐ PFS-11 ☐ PO-97 Counted By DM Date Counted 9/26/96

ALPHA-BETA COUNTING			SPIKED SAMPLE PERCENT RECOVERY DETERMINATION				
☐ SPIKED	☒ UNSPIKED						
Counter Numbers	27	28	Counter Numbers				
Total α Counts	7	27		ALPHA	BETA	ALPHA	BETA
Counting Time	30	30	Standard Solution d/m/ml ÷ 50 = Known d/m/ml	___/50 =	___/50 =	___/50 =	___/50 =
Total α c/m	.23	.90					
Background	.09	.34					
Net α c/m	.14	.56	Spiked Sample α & β Results in d/m/ml				
ml Sample	20	20					
α c/m/ml	.007	.028					
α Yield Factor	1.96	1.96	Unspiked sample α & β Results (from PFS-11)				
α d/m/ml	.014	.054					
Total β Counts	1505	1533	Spiked d/m/ml minus Unspiked d/m/ml = Recovered d/m/ml				
Counting Time	30	30					
Total β c/m	50.2	51.1					
β Background	50.1	50.4	Recovered d/m/ml ÷ Known d/m/ml x 100 = Percent Recovery				
BKGD + Net α c/m	50.24	50.96					
Net β c/m		.14					
ml Sample	20	20	REMARKS				
β c/m/ml		.007					
β Yield Factor	1.35	1.35					
β d/m/ml	—	6009					
REMARKS							
α = 0.03 D/M/ML							
β = 0.009 D/M/ML							

ESH-203 (6-96)

COUNTER DATA SHEET

CL-960926-104

Sample BLDG 579 WATER-MANHOLE #61 Volume 60mL

Sample Date 9/25/96 ☐ PFS-11 ☐ PO-97 Counted By MB Date Counted 9/26/96

ALPHA-BETA COUNTING		
☐ SPIKED	☒ UNSPIKED	
Counter Numbers	27	28
Total α Counts	38	32
Counting Time	30	30
Total α c/m	1.27	1.07
Background	.09	.34
Net α c/m	1.18	.73
ml Sample	5	5
α c/m/ml	.236	.146
α Yield Factor	1.96	1.96
α d/m/ml	.463	.286
Total β Counts	1668	1624
Counting Time	30	30
Total β c/m	55.6	54.1
β Background	50.1	50.4
BKGD + Net α c/m	51.28	51.13
Net β c/m	4.32	2.97
ml Sample	5	5
β c/m/ml	.864	.594
β Yield Factor	1.35	1.35
β d/m/ml	1.17	.802
REMARKS		
α = 0.37 D/m/mL,		
β = 0.99 D/m/mL,		

SPIKED SAMPLE PERCENT RECOVERY DETERMINATION				
Counter Numbers				
	ALPHA	BETA	ALPHA	BETA
Standard Solution d/m/ml ÷ 50 = Known d/m/ml	___/50 =	___/50 =	___/50 =	___/50 =
Spiked Sample α & β Results in d/m/ml				
Unspiked sample α & β Results (from PFS-11)				
Spiked d/m/ml minus Unspiked d/m/ml = Recovered d/m/ml				
Recovered d/m/ml ÷ Known d/m/ml x 100 = Percent Recovery				

REMARKS

ESH-203 (6-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Water — Date Received: 9/20/96

Submitted by: Charlotte Sholeen, ESH-HP, 306 — Date Reported: 10/7/96

Submitter's Sample No.	ACL Sample No.	pH
58	96-0483-01	2.40 @ 23°C 2.41
59	96-0484-01	8.21 @ 23°C 8.20
60	-02	2.77 @ 23°C 2.75

Laboratory Control Sample - Expect 10.00 Read 10.00

Determinations followed Method 9040B (U.S. EPA SW-846).

The pH was measured on a Brinkmann Metrohm 605 pH Meter calibrating at pH 4.00 and pH 7.00.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call D. Graczyk at 2- 3489.

Reference(s): Notebook No. 001400, pg. 97.

Copies To: C. Sholeen, D. Geraghty, M. Robinet, D. Green, D. Graczyk, A. Essling, ACL 200 File

Analyst(s): A. Essling AE

/amb
10/7/96
CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Resin
Date Received: 9/20/96
Submitted by: Charlotte Sholeen, ESH-HP, 202
Date Reported: 10/16/96

Submitter's Sample No.	ACL Sample No.	mg/kg (Dry Wt.)						
		As	Ba	Cd	Cr	Pb	Se	Ag
58	96-0483-01	<63	<3	20.7	1120	248	132	124
				pH	Wt. % Solids			
				2.40	19.65			

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call D. Graczyk at 2- 3489.

Reference(s): A. Essling Notebook No. 001400, pp. 97-98.

Copies To: C. Sholeen, M. Robinet, D. Geraghty, D. Green, D. Graczyk, A. Essling, E. Huff, D. Huff, ACL 200 File
/ads/amb
10/17/96

Analyst(s): A. Essling, E. Huff/D. Huff

CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

ICP-AES Analysis Report

Spec. No.: 58548EX

Sample Material: TCLP Extract of Resin

Submitted by: Charlotte Sholeen ESH/HP306 Date Received:09-20-96

Reporting Units: ug/mL Date Reported:02-25-97

ACL Number	Your Number	As	Ba	Cd	Cr	Pb	Se	Ag		
PB-0483-	Prep. Blank	<0.50	<0.02	<0.01	<0.01	<0.20	<0.50	<0.02		
96-0483-01	58	<0.50	0.20	<0.01	<0.01	<0.20	<0.50	<0.02		

NOTE: Samples will be discarded one (1) month after date of report unless otherwise arranged. When making future inquiries regarding this work, you must reference OUR number(s) above. For further information about the results reported here, please call E. A. Huff at extension 2-3633.
Reference Number: LBT-1257, p. 70

Estimated Accuracy:+/-20%

Copies To: C. Sholeen L. TenKate
M. Robinet ACL Office
D. Geraghty
D. Graczyk
D. Green

Analyst(s): E. Huff
D. Huff
L. TenKate

Remarks:

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Water
Submitted by: Charlotte Sholeen, ESH-HP, 202
Date Received: 9/20/96
Date Reported: 10/16/96

Submitter's Sample No.	ACL Sample No.	µg/mL As	Ba	Cd	Cr	Pb	Se	Ag
59	96-0484-01	<0.50	<0.03	<0.02	<0.02	<0.30	<0.50	<0.03
60	-02	<0.50	<0.03	<0.02	<0.02	<0.30	<0.50	<0.03
					QA Data			
59 Spike	-01S	Spike:						
	Added	5.00	10.00	1.00	5.00	5.00	1.00	2.00
	Found	5.01	9.96	0.96	5.06	5.05	1.06	0.04
	% Spike Recovery	100.2	99.6	96.0	101.2	101.0	106.0	2.0
					pH			
59	-01				8.21			
60	-02				2.77			

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call D. Graczyk at 2- 3489 .

Reference(s): A. Essling Notebook No. 001400, pp. 97-98.

Copies To: C. Sholeen, M. Robinet, D. Geraghty, D. Green, D. Graczyk, A. Essling, E. Huff, D. Huff, ACL 200 File

Analyst(s): A. Essling, E. Huff, D. Huff

/ads/amb
10/17/96

CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Building 579 Resin
Submitted by: C. Sholeen/D. Geraghty
Date Received: 9/20/96
Date Reported: 9/25/96

Submitter's Sample No.	ACL Sample No.	Hg, µg/g*
58	96-0483-01	8.3
--	Preparation Blank	<0.04 µg/L

Laboratory Control Sample (LCS)

ICV-5 (0689): 1.23 µg/L Recovery: 98.1%

Estimated accuracy is ±10%.

Mercury was determined by Cold Vapor Atomic Absorption (CVAA) according to U.S. EPA Method 7471A, SW-846. Samples were digested according to SOP: ACL-212.

* Result reported on dry weight basis; sample contained 19.65 wt. % dry solids.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call J. Kiely at 2- 7399.

Reference(s): CMT Notebook No. 1262, p. 132 and CMT Notebook No. 1400, p. 97.

Copies To: C. Sholeen, D. Geraghty, M. Robinet, D. Green, D. Graczyk, P. Lindahl, J. Kiely, A. Essling, ACL 200 File

Analyst(s): J. Kiely, A. Essling

/ads/amb
9/26/96
CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: TCLP Extract of Resin from Bldg. 579 Date Received: 12/9/96

Submitted by: Charlotte Sholeen, ESH-HP, 202 Date Reported: 2/18/97

Submitter's Sample No.	ACL Sample No.	Hg, µg/L
58	96-0483-01	0.49
	Blank Extraction Fluid #1	<0.2
		ICV-5 (0689): 1.30 µg/L Recovery: 104% 1.31 105% 1.27 101%
		Known concentration of ICV-5 = 1.25 µg/L Hg.
		Estimated accuracy is ±10%.
		Mercury was determined by Cold Vapor Atomic Absorption (CVAA) according to U.S. EPA Method 7471A, SW-846. Extracts were digested in accordance with SOP: ACL-209.
		Samples were extracted in accordance with EPA, SW-846, Method 1311, Toxicity Characteristic Leaching Procedure.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call L. TenKate at 2- 7398 .

Reference(s): CMT Notebook No. 1262, pg. 139.
TCLP Extraction - CMT Notebook No. 1143, pp. 141-143.

Copies To: C. Sholeen, D. Geraghty, M. Robinet, /ads, 2/18/97, D. Green, D. Graczyk, P. Lindahl, L. TenKate, ACL 200 File

Analyst(s): L. TenKate

CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Building 579 Water
Date Received: 9/20/96
Submitted by: C. Sholeen/D. Geraghty
Date Reported: 9/25/96

Submitter's Sample No.	ACL Sample No.	Hg, µg/L
59	96-0484-01	<0.04
60	-02	0.37
–	Prep Blank	<0.04

Laboratory Control Sample (LCS)

ICV-5 (0689): 1.23 µg/L Recovery: 98.1%

Estimated accuracy is ±10%.

Mercury was determined by Cold Vapor Atomic Absorption (CVAA) according to U.S. EPA Method 7470A, SW-846. Samples were digested according to SOP: ACL-209.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call J. Kiely at 2- 7399.

Reference(s): CMT Notebook No. 1262, p. 132.

Copies To: C. Sholeen, D. Geraghty, M. Robinet, D. Green, D. Graczyk, P. Lindahl, J. Kiely, ACL 200 File

Analyst(s): J. Kiely JK

/ads
9/26/96

CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS Revised 12/20/96

Sample Material: Resin, Column in Bldg. 579 Date Received: 12/9/96

Submitted by: Charlotte Sholeen, ESH-HP, 202 Date Reported: 12/18/96

Submitter's Sample No.	ACL Sample No.	Gamma Spec.; (pCi/g)		
		^{241}Am	^{137}Cs	^{60}Co
58	96-0483-01	24.1 ± 2.4	2.6 ± 0.3	3.4 ± 0.3
		Gross Alpha/Beta (pCi/g)		
		Alpha		Beta
58	96-0483-01	19.2 ± .2*		4.3 ± .4*

*Reason for Revision: Uncertainty omitted from Gross Alpha/Beta results.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call T. TenKate at 2- 4291 .

Reference(s): CMT Logbook No. 1111, Pg. 141; CMT Logbook No. 938, Det. 3, Pg. 135.

Copies To: C. Sholeen, D. Geraghty, D. Green, D. Graczyk, D. Bowers, L. TenKate, L. Chromizky, K. Parish, T. TenKate, ACL 200 File

Analyst(s): T. TenKate

/hlt
12/18/96
CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATO
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESUI

Sample Material: Water, "579" Date Received: 9/30/96

Submitted by: Charlotte Sholeen, ESH-HP, 202 Date Reported: 10/29/96

Submitter's Sample No.	ACL Sample No.	Gross Alpha/Beta; (pCi/mL)	
		Alpha	Beta
59	96-0484-01	<0.04	<0.07
60	-02	<0.04	<0.07

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call T. TenKate at 2- 4291.

Reference(s): CMT Logbook No. 1111, Pg. 126.

Copies To: C. Sholeen, D. Graczyk, D. Geraghty, L. Chromizky, M. Robinet, K. Parish, D. Green, L. TenKate, D. Bowers, T. TenKate

Analyst(s): T. TenKate

T-2

Addnl. Copies: ACL Results File, ACL 200 Results

/hlt
10/29/96

CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Water, "579" Date Received: 9/30/96

Submitted by: Charlotte Sholeen, ESH-HP, 202 Date Reported: 10/2/96

Submitter's Sample No.	ACL Sample No.	Gamma Spec.; (pCi/mL)			
		^{60}Co	^{226}Ra	^{214}Bi	^{238}U
59	96-0484-01	<0.2	<0.2	<0.2	<0.2 (NCD)
60	-02	<0.2 (NCD)	<0.2	<0.2	<0.2

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call T. TenKate at 2- 4291.

Reference(s): CMT Logbook No. 1111, Pg. 126; CMT Logbook No. 1112, Det. 1, 9, and 10, Pg. 91; CMT Logbook No. 938, Det. 1, 3, and 6, Pg. 129.

Copies To: C. Sholeen, D. Graczyk, D. Geraghty, L. Chromizky, M. Robinet, K. Parish, D. Green, L. TenKate, D. Bowers, T. TenKate

Analyst(s): T. TenKate

T2

Addnl. Copies: ACL 200 File

/hlt
10/2/96
CMT-84 (9-96)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Resin
Date Received: 9/20/96
Submitted by: Charlotte Sholeen, ESH-HP, 202
Date Reported: 12/11/96

Submitter's Sample No.	ACL Sample No.	Volatile Organic Analysis (VOA)
58	96-0483-01	Analysis of this sample for volatile organics was performed using Method 8260 in the U.S. EPA Document SW-846 (Third Edition). Attached is a CLP (Contract Laboratory Program)-type reporting form listing concentrations of Method 8260 target compounds and a recovery report for surrogate compounds with which the sample was spiked. The EPA-defined qualifiers used on the data sheets are defined as follows: U - Indicates compound was analyzed for, but not detected above the given quantitation limit. J - Indicates an estimated value. This flag is used under the following circumstances: 1) when estimating a concentration for TICs where a 1:1 response is assumed, 2) when the mass spectral and retention time data indicated the presence of a compound that meets the GC/MS identification criteria, and the result is less than the estimated quantitation limit , but greater than zero.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call L. Chromizky at 2- 4367 .

Reference(s): Data recorded in Logbook No. 1418, pg. 30; and file folder in cabinet located in Room E-127A.

Copies To: [redacted]
M. Robinet
D. Geraghty
D. Green
A. Boparai
D. Graczyk
L. Chromizky
ACL Result File
ACL 200 File

Analyst(s): L. Chromizky

/ads
12/16/96
C/MT-84 (9-96)

Data File: /users/chem/msd1.i/1dec026.b/c.d
Report Date: 10-Dec-1996 15:03

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 58
Sample Location: Bldg 579
Lab Sample ID: 96-0483-01
Sample Matrix: Resin
Analysis Type: VOA
Data Type: MS DATA
Misc Info: 58

Client SDG: 1dec026.b
Sample Date:
Sample Point: resin column
Date Received: 09/20/96
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
75-71-8	DICHLORODIFLUOROMETHANE	10.00	U
74-87-3	CHLOROMETHANE	10.00	U
75-01-4	VINYL CHLORIDE	10.00	U
74-83-9	BROMOMETHANE	10.00	U
75-00-3	CHLOROETHANE	10.00	U
75-69-4	TRICHLOROFLUOROMETHANE	10.00	U
75-35-4	1 1-DICHLOROETHENE	10.00	U
75-09-2	METHYLENE CHLORIDE	10.00	U
156-60-5	TRANS-1 2-DICHLOROETHENE	10.00	U
75-34-3	1 1-DICHLOROETHANE	10.00	U
594-20-7	2 2-DICHLOROPROPANE	10.00	U
156-59-2	CIS-1,2-DICHLOROETHENE	10.00	U
74-97-5	BROMOCHLOROMETHANE	10.00	U
67-66-3	CHLOROFORM	10.00	U
71-55-6	1 1 1-TRICHLOROETHANE	10.00	U
56-23-5	CARBON TETRACHLORIDE	10.00	U
563-58-6	1 1-DICHLOROPROPENE	10.00	U
71-43-2	BENZENE	10.00	U
107-06-2	1 2-DICHLOROETHANE	10.00	U
79-01-6	TRICHLOROETHENE	10.00	U
78-87-5	1 2-DICHLOROPROPANE	10.00	U
74-95-3	DIBROMOMETHANE	10.00	U
75-27-4	BROMODICHLOROMETHANE	10.00	U
10061-02-06	CIS-1 3-DICHLOROPROPENE	10.00	U
108-88-3	TOLUENE	10.00	U
10061-01-05	TRANS-1 3-DICHLOROPROPENE	10.00	U
142-28-9	1 3-DICHLOROPROPANE	10.00	U
79-00-5	1 1 2-TRICHLOROETHANE	10.00	U
127-18-4	TETRACHLOROETHENE	1.39	J
106-93-4	1 2-DIBROMOETHANE	10.00	U
124-48-1	DIBROMOCHLOROMETHANE	10.00	U
108-90-7	CHLOROBENZENE	10.00	U
630-20-6	1 1 1 2-TETRACHLOROETHANE	10.00	U
100-41-4	ETHYL BENZENE	10.00	U
----------	m&p-XYLENE	10.00	U
95-47-6	o-XYLENE	10.00	U
100-42-5	STYRENE	10.00	U

Data File: /users/chem/msd1.i/1dec026.b/c.d
Report Date: 10-Dec-1996 15:03

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 58
Sample Location: Bldg 579
Lab Sample ID: 96-0483-01
Sample Matrix: Resin
Analysis Type: VOA
Data Type: MS DATA
Misc Info: 58

Client SDG: 1dec026.b
Sample Date:
Sample Point: resin column
Date Received: 09/20/96
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
75-25-2	BROMOFORM	10.00	U
98-82-8	ISOPROPYLBENZENE	10.00	U
108-86-1	BROMOBENZENE	10.00	U
96-18-4	1 2 3-TRICHLOROPROPANE	10.00	U
79-34-5	1 1 2 2-TETRACHLOROETHANE	10.00	U
103-65-1	n PROPYLBENZENE	10.00	U
95-49-8	4 CHLOROTOLUENE	10.00	U
108-67-8	1 3 5-TRIMETHYLBENZENE	10.00	U
95-49-8	2 CHLOROTOLUENE	10.00	U
98-06-6	TERT BUTYLBENZENE	10.00	U
95-63-6	1,2,4-TRIMETHYLBENZENE	10.00	U
135-98-8	SEC-BUTYLBENZENE	10.00	U
99-87-6	p ISOPROPYLTOLUENE	10.00	U
541-73-1	1 3 DICHLOROBENZENE	10.00	U
106-46-7	1 4 DICHLOROBENZENE	10.00	U
95-50-1	1 2-DICHLOROBENZENE	10.00	U
104-51-8	n BUTYLBENZENE	10.00	U
96-12-8	1 2-DIBROMO-3-CHLOROPROPANE	10.00	U
120-82-1	1 2 4-TRICHLOROBENZENE	10.00	U
87-68-3	HEXACHLOROBUTADIENE	10.00	U
91-20-3	NAPHTHALENE	10.00	U
87-61-6	1 2 3-TRICHLOROBENZENE	10.00	U

Data File: /users/chem/msd1.i/1dec026.b/c.d
Report Date: 10-Dec-1996 15:03

Page 3

RECOVERY REPORT

Client Name: C. Sholeen
Sample Matrix: Resin
Client ID: 58
Data Type: MS DATA
SpikeList File:
Method File: /users/chem/msd1.i/1dec026.b/rcrav2.m
Misc Info: 58

Client SDG: 1dec026.b
Fraction: VOA
Level: LOW
SampleType: SAMPLE
Quant Type: ISTD

SURROGATE COMPOUND	AMOUNT ADDED ug/Kg	AMOUNT RECOVERED ug/Kg	% RECOVERED	LIMITS
$ 16 DIBROMOFLUOROMETHA	50.00	54.35	108.70	86-118
$ 28 TOLUENE d-8	50.00	54.62	109.25	88-110
$ 45 4 BROMOFLUOROBENZE	50.00	55.95	111.91	86-115

* - Values outside of QC limits
Spike Recovery: 0 out of 3 outside limits
0 out of 3 not found

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Water — Date Received: 9/24/96

Submitted by: Charlotte Sholeen, ESH-HP, 202 — Date Reported: 10/9/96

Submitter's Sample No.	ACL Sample No.	Volatile Organic Analysis (VOA)
59 60	96-0484-01 -02	Analyses of these samples for volatile organics were performed using Method 8260 in the U.S. EPA Document SW-846 (Third Edition). Attached are CLP (Contract Laboratory Program)-type reporting forms listing concentrations of Method 8260 target compounds and recovery reports for surrogate compounds with which the samples were spiked. The EPA-defined qualifier used on the data sheets are defined as follows: U - Indicates compound was analyzed for, but not detected above the given quantitation limit of 10 ppb.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call L. Chromizky at 2- 4367.

Reference(s): Data recorded in VOA Sample Preparation Book VI, Pg. 10; also in file folder located in Room E-127A.

Copies To: C. Sholeen, D. Geraghty, M. Robinet, D. Green, A. Boparai, D. Graczyk, L. Chromizky, ACL 200 File

Analyst(s): L. Chromizky

/hlt
10/9/96
CMT-84 (9-96)

Data File: /users/chem/msd1.i/1oct086.b/a.d
Report Date: 08-Oct-1996 17:09

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 59
Sample Location: Bldg 579
Lab Sample ID: 96-0484-01
Sample Matrix: WATER
Analysis Type: VOA
Data Type: MS DATA
Misc Info: #59-Mixed bed exchange column in 579

Client SDG: 59
Sample Date:
Sample Point:
Date Received: 09/24/96
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
75-71-8	DICHLORODIFLUOROMETHANE	10.00	U
74-87-3	CHLOROMETHANE	10.00	U
75-01-4	VINYL CHLORIDE	10.00	U
74-83-9	BROMOMETHANE	10.00	U
75-00-3	CHLOROETHANE	10.00	U
75-69-4	TRICHLOROFLUOROMETHANE	10.00	U
75-35-4	1 1-DICHLOROETHENE	10.00	U
75-09-2	METHYLENE CHLORIDE	10.00	U
156-60-5	TRANS-1 2-DICHLOROETHENE	10.00	U
75-34-3	1 1-DICHLOROETHANE	10.00	U
594-20-7	2 2-DICHLOROPROPANE	10.00	U
156-59-2	CIS-1,2-DICHLOROETHENE	10.00	U
74-97-5	BROMOCHLOROMETHANE	10.00	U
67-66-3	CHLOROFORM	10.00	U
71-55-6	1 1 1-TRICHLOROETHANE	10.00	U
56-23-5	CARBON TETRACHLORIDE	10.00	U
563-58-6	1 1-DICHLOROPROPENE	10.00	U
71-43-2	BENZENE	10.00	U
107-06-2	1 2-DICHLOROETHANE	10.00	U
79-01-6	TRICHLOROETHENE	10.00	U
78-87-5	1 2-DICHLOROPROPANE	10.00	U
74-95-3	DIBROMOMETHANE	10.00	U
75-27-4	BROMODICHLOROMETHANE	10.00	U
10061-02-06	CIS-1 3-DICHLOROPROPENE	10.00	U
108-88-3	TOLUENE	10.00	U
10061-01-05	TRANS-1 3-DICHLOROPROPENE	10.00	U
142-28-9	1 3-DICHLOROPROPANE	10.00	U
79-00-5	1 1 2-TRICHLOROETHANE	10.00	U
127-18-4	TETRACHLOROETHENE	10.00	U
106-93-4	1 2-DIBROMOETHANE	10.00	U
124-48-1	DIBROMOCHLOROMETHANE	10.00	U
108-90-7	CHLOROBENZENE	10.00	U
630-20-6	1 1 1 2-TETRACHLOROETHANE	10.00	U
100-41-4	ETHYL BENZENE	10.00	U
----------	m&p-XYLENE	10.00	U
95-47-6	o-XYLENE	10.00	U
100-42-5	STYRENE	10.00	U

Data File: /users/chem/msd1.i/1oct086.b/a.d Page 3
Report Date: 08-Oct-1996 17:09

TARGET COMPOUNDS

Client Name: C. Sholeen
Client SDG: 59
Client Sample ID: 59
Sample Date:
Sample Location: Bldg 579
Sample Point:
Lab Sample ID: 96-0484-01
Date Received: 09/24/96
Sample Matrix: WATER
Quant Type: ISTD
Analysis Type: VOA
Level: LOW
Data Type: MS DATA
Misc Info: #59-Mixed bed exchange column in 579

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
75-25-2	BROMOFORM	10.00	U
98-82-8	ISOPROPYLBENZENE	10.00	U
108-86-1	BROMOBENZENE	10.00	U
96-18-4	1 2 3-TRICHLOROPROPANE	10.00	U
79-34-5	1 1 2 2-TETRACHLOROETHANE	10.00	U
103-65-1	n PROPYLBENZENE	10.00	U
95-49-8	4 CHLOROTOLUENE	10.00	U
108-67-8	1 3 5-TRIMETHYLBENZENE	10.00	U
95-49-8	2 CHLOROTOLUENE	10.00	U
98-06-6	TERT BUTYLBENZENE	10.00	U
95-63-6	1,2,4-TRIMETHYLBENZENE	10.00	U
135-98-8	SEC-BUTYLBENZENE	10.00	U
99-87-6	p ISOPROPYLTOLUENE	10.00	U
541-73-1	1 3 DICHLOROBENZENE	10.00	U
106-46-7	1 4 DICHLOROBENZENE	10.00	U
95-50-1	1 2-DICHLOROBENZENE	10.00	U
104-51-8	n BUTYLBENZENE	10.00	U
96-12-8	1 2-DIBROMO-3-CHLOROPROPANE	10.00	U
120-82-1	1 2 4-TRICHLOROBENZENE	10.00	U
87-68-3	HEXACHLOROBUTADIENE	10.00	U
91-20-3	NAPHTHALENE	10.00	U
87-61-6	1 2 3-TRICHLOROBENZENE	10.00	U
	DIBROMOFLUOROMETHANE	54.35	
	TOLUENE d-8	51.01	
	4 BROMOFLUOROBENZENE	43.79	

Data File: /users/chem/msd1.i/1oct086.b/a.d Page 1
Report Date: 08-Oct-1996 17:09

RECOVERY REPORT

Client Name: C. Sholeen Client SDG: 59
Sample Matrix: LIQUID Fraction: VOA
Client ID: 59 Level: LOW
Data Type: MS DATA SampleType: SAMPLE
SpikeList File: Quant Type: ISTD
Method File: /users/chem/msd1.i/1oct086.b/rcrav2.m
Misc Info: #59-Mixed bed exchange column in 579

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
$ 16 DIBROMOFLUOROMETHA	50.00	54.35	108.70	86-118
$ 28 TOLUENE d-8	50.00	51.01	102.03	88-110
$ 45 4 BROMOFLUOROBENZE	50.00	43.79	87.58	86-115

* - Values outside of QC limits
Spike Recovery: 0 out of 3 outside limits
0 out of 3 not found

Data File: /users/chem/msd1.i/1oct086.b/b.d
Report Date: 08-Oct-1996 17:09

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 60
Sample Location: Bldg 579
Lab Sample ID: 96-0484-02
Sample Matrix: WATER
Analysis Type: VOA
Data Type: MS DATA
Misc Info: #60-Drain tank in bldg 579

Client SDG: 59
Sample Date:
Sample Point:
Date Received: 09/24/96
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
75-71-8	DICHLORODIFLUOROMETHANE	10.00	U
74-87-3	CHLOROMETHANE	10.00	U
75-01-4	VINYL CHLORIDE	10.00	U
74-83-9	BROMOMETHANE	10.00	U
75-00-3	CHLOROETHANE	10.00	U
75-69-4	TRICHLOROFLUOROMETHANE	10.00	U
75-35-4	1 1-DICHLOROETHENE	10.00	U
75-09-2	METHYLENE CHLORIDE	10.00	U
156-60-5	TRANS-1 2-DICHLOROETHENE	10.00	U
75-34-3	1 1-DICHLOROETHANE	10.00	U
594-20-7	2 2-DICHLOROPROPANE	10.00	U
156-59-2	CIS-1,2-DICHLOROETHENE	10.00	U
74-97-5	BROMOCHLOROMETHANE	10.00	U
67-66-3	CHLOROFORM	10.00	U
71-55-6	1 1 1-TRICHLOROETHANE	10.00	U
56-23-5	CARBON TETRACHLORIDE	10.00	U
563-58-6	1 1-DICHLOROPROPENE	10.00	U
71-43-2	BENZENE	10.00	U
107-06-2	1 2-DICHLOROETHANE	10.00	U
79-01-6	TRICHLOROETHENE	10.00	U
78-87-5	1 2-DICHLOROPROPANE	10.00	U
74-95-3	DIBROMOMETHANE	10.00	U
75-27-4	BROMODICHLOROMETHANE	10.00	U
10061-02-06	CIS-1 3-DICHLOROPROPENE	10.00	U
108-88-3	TOLUENE	10.00	U
10061-01-05	TRANS-1 3-DICHLOROPROPENE	10.00	U
142-28-9	1 3-DICHLOROPROPANE	10.00	U
79-00-5	1 1 2-TRICHLOROETHANE	10.00	U
127-18-4	TETRACHLOROETHENE	10.00	U
106-93-4	1 2-DIBROMOETHANE	10.00	U
124-48-1	DIBROMOCHLOROMETHANE	10.00	U
108-90-7	CHLOROBENZENE	10.00	U
630-20-6	1 1 1 2-TETRACHLOROETHANE	10.00	U
100-41-4	ETHYL BENZENE	10.00	U
----------	m&p-XYLENE	10.00	U
95-47-6	o-XYLENE	10.00	U
100-42-5	STYRENE	10.00	U

Data File: /users/chem/msd1.i/1oct086.b/b.d
Report Date: 08-Oct-1996 17:09

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 60
Sample Location: Bldg 579
Lab Sample ID: 96-0484-02
Sample Matrix: WATER
Analysis Type: VOA
Data Type: MS DATA
Misc Info: #60-Drain tank in bldg 579

Client SDG: 59
Sample Date:
Sample Point:
Date Received: 09/24/96
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
75-25-2	BROMOFORM	10.00	U
98-82-8	ISOPROPYLBENZENE	10.00	U
108-86-1	BROMOBENZENE	10.00	U
96-18-4	1 2 3-TRICHLOROPROPANE	10.00	U
79-34-5	1 1 2 2-TETRACHLOROETHANE	10.00	U
103-65-1	n PROPYLBENZENE	10.00	U
95-49-8	4 CHLOROTOLUENE	10.00	U
108-67-8	1 3 5-TRIMETHYLBENZENE	10.00	U
95-49-8	2 CHLOROTOLUENE	10.00	U
98-06-6	TERT BUTYLBENZENE	10.00	U
95-63-6	1,2,4-TRIMETHYLBENZENE	10.00	U
135-98-8	SEC-BUTYLBENZENE	10.00	U
99-87-6	p ISOPROPYLTOLUENE	10.00	U
541-73-1	1 3 DICHLOROBENZENE	10.00	U
106-46-7	1 4 DICHLOROBENZENE	10.00	U
95-50-1	1 2-DICHLOROBENZENE	10.00	U
104-51-8	n BUTYLBENZENE	10.00	U
96-12-8	1 2-DIBROMO-3-CHLOROPROPANE	10.00	U
120-82-1	1 2 4-TRICHLOROBENZENE	10.00	U
87-68-3	HEXACHLOROBUTADIENE	10.00	U
91-20-3	NAPHTHALENE	10.00	U
87-61-6	1 2 3-TRICHLOROBENZENE	10.00	U
	DIBROMOFLUOROMETHANE	52.81	
	TOLUENE d-8	49.72	
	4 BROMOFLUOROBENZENE	43.17	

Data File: /users/chem/msd1.i/1oct086.b/b.d Page 1
Report Date: 08-Oct-1996 17:09

RECOVERY REPORT

Client Name: C. Sholeen
Sample Matrix: LIQUID
Client ID: 60
Data Type: MS DATA
SpikeList File:
Client SDG: 59
Fraction: VOA
Level: LOW
SampleType: SAMPLE
Quant Type: ISTD
Method File: /users/chem/msd1.i/1oct086.b/rcrav2.m
Misc Info: #60-Drain tank in bldg 579

SURROGATE COMPOUND	AMOUNT ADDED ug/L	AMOUNT RECOVERED ug/L	% RECOVERED	LIMITS
$ 16 DIBROMOFLUOROMETHA	50.00	52.81	105.61	86-118
$ 28 TOLUENE d-8	50.00	49.72	99.45	88-110
$ 45 4 BROMOFLUOROBENZE	50.00	43.17	86.35	86-115

* - Values outside of QC limits
Spike Recovery: 0 out of 3 outside limits
0 out of 3 not found

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Resin
Date Received: 9/20/96

Submitted by: Charlotte Sholeen, ESH-HP, 202
Date Reported: 12/6/96

Submitter's Sample No.	ACL Sample No.	Semivolatile Organic Results Semivolatile Target Compound	Concentration (µg/kg)	Q
	Lab Blank (96-1127)	Di-n-butyphthalate	599	
		Butylbenzylphthalate	254	J
58	96-0483-01	Di-n-butylphthalate	864	B
		Butylbenzylphthalate	250	BJ
		bis(2-Ethylhexyl)phthalate	703	

NOTE: Sample preparation was based on EPA-Method 3550 (SW-846, Revision 1, July 1992). The analytical method used was based on EPA-Method 8270A (SW-846, Revision 1, July 1992) for determination of semivolatile organic compounds. The attached data sheets contain data for one sample and one laboratory blank. The surrogate recoveries are within QC limits for 12 out of 12 values reported. For some of the compounds found in the sample that are not on the semivolatile target compound list, the table of tentatively identified compounds is included. Quantitation is carried out using total ion chromatogram peak areas compared to the peak areas of the nearest internal standard.

The EPA-defined qualifiers to be used on the data sheets are as follows:

U - Indicates compound was analyzed for, but not detected above the given quantitation limit.

J - Indicates an estimated value. This flag is used under the following circumstances: (1) when estimating a concentration for tentatively identified compounds (TICs) where a 1:1 response is assumed, (2) when the mass spectral and retention time data indicate the presence of a compound that meets the SV GC/MS identification criteria, and the result is less than the estimated quantitation limit, but greater than zero.

N - Indicates presumptive evidence of a compound. This flag is only used for TICs where the identification is based on a mass spectral library search.

B - This flag is used when the analyte is found in the associated blank as well as the sample. It indicates possible/probable blank contamination.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call Y. Tsai at 2- 7732.

Reference(s): GC/MSD-2 Run Logbook No. 2, pg. 45.

Copies To: C. Sholeen, M. Robinet, D. Geraghty, D. Green, A. Boparai, D. Graczyk, Y. Tsai, ACL Results File, ACL 200 File

Analyst(s): Y. Tsai

ATTACHMENT (10 pages)

/hlt
12/9/96
CMT-84 (9-96)

Data File: /data/msd2.i/2dec046.b/0101001.d
Report Date: 05-Dec-1996 13:30

ANL

TARGET COMPOUNDS

Client Name:
Lab Smp Id: 96-1127, Lab Blank
Sample Location:
Sample Date:
Sample Matrix: SOIL
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2dec046.b
Client Smp ID: Lab Blank
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW
Operator: Y. Tsai

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
62-75-9	N-Nitrosodimethylamine	330	U
109-06-8	2-Picoline	330	U
66-27-3	Methyl methansulfonate	660	U
62-50-0	Ethyl methansulfonate	330	U
62-53-3	Aniline	330	U
108-95-2	Phenol	330	U
95-57-8	2-Chlorophenol	330	U
111-44-4	bis(2-Chloroethyl)ether	330	U
541-73-1	1,3-Dichlorobenzene	330	U
106-46-7	1,4-Dichlorobenzene	330	U
95-50-1	1,2-Dichlorobenzene	330	U
100-51-6	Benzyl alcohol	330	U
95-48-7	2-Methylphenol	330	U
108-60-1	bis(2-Chloroisopropyl)ether	330	U
98-86-2	Acetophenone	330	U
621-64-7	N-nitroso-di-n-propylamine	330	U
106-44-5	4-Methylphenol	330	U
67-72-1	Hexachloroethane	330	U
98-95-3	Nitrobenzene	330	U
100-75-4	N-Nitrosopiperidine	330	U
78-59-1	Isophorone	330	U
88-75-5	2-Nitrophenol	330	U
105-67-9	2,4-Dimethyphenol	330	U
111-91-1	bis(2-Chloroethoxy)methane	330	U
120-83-2	2,4-Dichlorophenol	330	U
65-85-0	Benzoic acid	330	U
120-82-1	1,2,4-Trichlorobenzene	330	U
91-20-3	Naphthalene	330	U
122-09-8	a,a-Dimethylphenethylamine	660	U
87-65-0	2,6-Dichlorophenol	330	U
106-47-8	4-Chloroaniline	330	U
87-68-3	Hexachlorobutadiene	330	U
924-16-3	N-Nitrosodibutylamine	330	U
59-50-7	4-Chloro-3-methylphenol	330	U
91-57-6	2-Methylnaphthalene	330	U
95-94-3	1,2,4,5-Tetrachlorobenzene	330	U
77-47-4	Hexachlorocyclopentadiene	660	U

Data File: /data/msd2.i/2dec046.b/0101001.d
Report Date: 05-Dec-1996 13:30

2

ANL

TARGET COMPOUNDS

Client Name:
Lab Smp Id: 96-1127, Lab Blank
Sample Location:
Sample Date:
Sample Matrix: SOIL
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2dec046.b
Client Smp ID: Lab Blank
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW
Operator: Y. Tsai

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
88-06-2	2,4,6-Trichlorophenol	330	U
95-95-4	2,4,5-Trichlorophenol	330	U
91-58-7	2-Chloronaphthalene	330	U
90-13-1	1-Chloronaphthalene	330	U
88-74-4	2-Nitroaniline	330	U
131-11-3	Dimethyl phthalate	330	U
208-96-8	Acenaphthylene	330	U
606-20-2	2,6-Dinitrotoluene	330	U
----------	3-Nitroaniline	330	U
83-32-9	Acenaphthene	330	U
51-28-5	2,4-Dinitrophenol	660	U
608-93-5	Pentachlorobenzene	330	U
132-64-9	Dibenzofuran	330	U
100-02-7	4-Nitrophenol	660	U
121-14-2	2,4-Dinitrotoluene	330	U
91-59-8	2-Napthylamine	330	U
58-90-2	2,3,4,6-Tetrachlorophenol	330	U
134-32-7	1-Naphthylamine	330	U
86-73-7	Fluorene	330	U
84-66-2	Diethylphthalate	330	U
7005-72-3	4-Chlorophenyl phenyl ether	330	U
100-01-6	4-Nitroaniline	330	U
534-52-1	4,6-Dinitro-2-methylphenol	330	U
----------	N-NitrosoDPA & Diphenylamine	160	U
122-66-7	1,2-Diphenylhydrazine	330	U
101-55-3	4-Bromophenyl phenyl ether	330	U
118-74-1	Hexachlorobenzene	330	U
62-44-2	Phenacetin	330	U
87-86-5	Pentachlorophenol	330	U
82-68-8	Pentachloronitrobenzene	330	U
92-67-1	4-Aminobiphenyl	330	U
23950-58-5	Pronamide	330	U
85-01-8	Phenanthrene	330	U
120-12-7	Anthracene	330	U
84-74-2	Di-n-butylphthalate	599	
206-44-0	Fluoranthene	330	U
92-87-5	Benzidine	660	U

Data File: /data/msd2.i/2dec046.b/0101001.d
Report Date: 05-Dec-1996 13:30

3

ANL

TARGET COMPOUNDS

Client Name:
Lab Smp Id: 96-1127, Lab Blank
Sample Location:
Sample Date:
Sample Matrix: SOIL
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2dec046.b
Client Smp ID: Lab Blank
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW
Operator: Y. Tsai

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
129-00-0	Pyrene	330	U
60-11-7	p-Dimethylaminoazobenzene	330	U
85-68-7	Butylbenzylphthalate	254	J
56-55-3	Benzo(a)anthracene	330	U
91-94-1	3,3'-Dichlorobenzidine	330	U
218-01-9	Chrysene	330	U
117-81-7	bis(2-Ethylhexyl)phthalate	330	U
117-84-0	Di-n-octylphthalate	330	U
205-99-2	Benzo(b)fluoranthene	330	U
57-97-6	7,12Dimethylbenz(a)anthracen	330	U
207-08-9	Benzo(k)fluoranthene	330	U
50-32-8	Benzo(a)pyrene	330	U
56-49-5	3-Methylcholanthrene	330	U
224-42-0	Dibenz(a,j)acridine	330	U
193-39-5	Indeno(1,2,3-cd)pyrene	330	U
53-70-3	Dibenzo(a,h)anthracene	330	U
191-24-2	Benzo(g,h,i)perylene	330	U
367-12-4	2-Fluorophenol	5320	
4165-62-2	Phenol-d5	6130	
4165-60-0	Nitrobenzene-d5	2770	
321-60-8	2-Fluorobiphenyl	3140	
118-79-6	2,4,6-Tribromophenol	6680	
98904-43-9	Terphenyl-d14	2390	

Data File: /data/msd2.i/2dec046.b/0101001.d
Report Date: 05-Dec-1996 13:30

4

ANL

RECOVERY REPORT

Client Name:
Sample Matrix: SOLID
Lab Smp Id: 96-1127, Lab Blank
Level: LOW
Data Type: MS DATA
SpikeList File: HPMSS.spk
Method File: /data/msd2.i/2dec046.b/yt8270.m
Misc Info:

Client SDG: 2dec046.b
Fraction: SV
Client Smp ID: Lab Blank
Operator: Y. Tsai
SampleType: BLANK
Quant Type: ISTD

SURROGATE COMPOUND	AMOUNT ADDED ng	AMOUNT RECOVERED ng	% RECOVERED	LIMITS
$ 4 2-Fluorophenol	200.00	159.71	79.85	25-121
$ 7 Phenol-d5	200.00	184.01	92.01	24-113
$ 22 Nitrobenzene-d5	100.00	83.16	83.16	23-120
$ 45 2-Fluorobiphenyl	100.00	94.17	94.17	30-115
$ 70 2,4,6-Tribromophen	200.00	200.52	100.26	19-122
$ 85 Terphenyl-d14	100.00	71.84	71.84	18-137

* - Values outside of QC limits
Spike Recovery: 0 out of 6 outside limits
0 out of 6 not found

Data File: /data/msd2.i/2dec046.b/1601016.d
Report Date: 06-Dec-1996 14:06

5

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 58 (Resin)
Sample Location:
Lab Sample ID: 96-0483-01
Sample Matrix: SOIL
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2dec046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
62-75-9	N-Nitrosodimethylamine	330	U
109-06-8	2-Picoline	330	U
66-27-3	Methyl methansulfonate	660	U
62-50-0	Ethyl methansulfonate	330	U
62-53-3	Aniline	330	U
108-95-2	Phenol	330	U
95-57-8	2-Chlorophenol	330	U
111-44-4	bis(2-Chloroethyl)ether	330	U
541-73-1	1,3-Dichlorobenzene	330	U
106-46-7	1,4-Dichlorobenzene	330	U
95-50-1	1,2-Dichlorobenzene	330	U
100-51-6	Benzyl alcohol	330	U
95-48-7	2-Methylphenol	330	U
108-60-1	bis(2-Chloroisopropyl)ether	330	U
98-86-2	Acetophenone	330	U
621-64-7	N-nitroso-di-n-propylamine	330	U
106-44-5	4-Methylphenol	330	U
67-72-1	Hexachloroethane	330	U
98-95-3	Nitrobenzene	330	U
100-75-4	N-Nitrosopiperidine	330	U
78-59-1	Isophorone	330	U
88-75-5	2-Nitrophenol	330	U
105-67-9	2,4-Dimethyphenol	330	U
111-91-1	bis(2-Chloroethoxy)methane	330	U
120-83-2	2,4-Dichlorophenol	330	U
65-85-0	Benzoic acid	330	U
120-82-1	1,2,4-Trichlorobenzene	330	U
91-20-3	Naphthalene	330	U
122-09-8	a,a-Dimethylphenethylamine	660	U
87-65-0	2,6-Dichlorophenol	330	U
106-47-8	4-Chloroaniline	330	U
87-68-3	Hexachlorobutadiene	330	U
924-16-3	N-Nitrosodibutylamine	330	U
59-50-7	4-Chloro-3-methylphenol	330	U
91-57-6	2-Methylnaphthalene	330	U
95-94-3	1,2,4,5-Tetrachlorobenzene	330	U
77-47-4	Hexachlorocyclopentadiene	660	U

Data File: /data/msd2.i/2dec046.b/1601016.d
Report Date: 06-Dec-1996 14:06

6

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 58 (Resin)
Sample Location:
Lab Sample ID: 96-0483-01
Sample Matrix: SOIL
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2dec046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
88-06-2	2,4,6-Trichlorophenol	330	U
95-95-4	2,4,5-Trichlorophenol	330	U
91-58-7	2-Chloronaphthalene	330	U
90-13-1	1-Chloronaphthalene	330	U
88-74-4	2-Nitroaniline	330	U
131-11-3	Dimethyl phthalate	330	U
208-96-8	Acenaphthylene	330	U
606-20-2	2,6-Dinitrotoluene	330	U
----------	3-Nitroaniline	330	U
83-32-9	Acenaphthene	330	U
51-28-5	2,4-Dinitrophenol	660	U
608-93-5	Pentachlorobenzene	330	U
132-64-9	Dibenzofuran	330	U
100-02-7	4-Nitrophenol	660	U
121-14-2	2,4-Dinitrotoluene	330	U
91-59-8	2-Napthylamine	330	U
58-90-2	2,3,4,6-Tetrachlorophenol	330	U
134-32-7	1-Naphthylamine	330	U
86-73-7	Fluorene	330	U
84-66-2	Diethylphthalate	330	U
7005-72-3	4-Chlorophenyl phenyl ether	330	U
100-01-6	4-Nitroaniline	330	U
534-52-1	4,6-Dinitro-2-methylphenol	330	U
----------	N-NitrosoDPA & Diphenylamine	160	U
122-66-7	1,2-Diphenylhydrazine	330	U
101-55-3	4-Bromophenyl phenyl ether	330	U
118-74-1	Hexachlorobenzene	330	U
62-44-2	Phenacetin	330	U
87-86-5	Pentachlorophenol	330	U
82-68-8	Pentachloronitrobenzene	330	U
92-67-1	4-Aminobiphenyl	330	U
23950-58-5	Pronamide	330	U
85-01-8	Phenanthrene	330	U
120-12-7	Anthracene	330	U
84-74-2	Di-n-butylphthalate	864	B
206-44-0	Fluoranthene	330	U
92-87-5	Benzidine	660	U

Data File: /data/msd2.i/2dec046.b/1601016.d
Report Date: 06-Dec-1996 14:06

7

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 58 (Resin)
Sample Location:
Lab Sample ID: 96-0483-01
Sample Matrix: SOIL
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2dec046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/Kg	Q
129-00-0	Pyrene	330	U
60-11-7	p-Dimethylaminoazobenzene	330	U
85-68-7	Butylbenzylphthalate	250	JB
56-55-3	Benzo(a)anthracene	330	U
91-94-1	3,3'-Dichlorobenzidine	330	U
218-01-9	Chrysene	330	U
117-81-7	bis(2-Ethylhexyl)phthalate	703	
117-84-0	Di-n-octylphthalate	330	U
205-99-2	Benzo(b)fluoranthene	330	U
57-97-6	7,12Dimethylbenz(a)anthracen	330	U
207-08-9	Benzo(k)fluoranthene	330	U
50-32-8	Benzo(a)pyrene	330	U
56-49-5	3-Methylcholanthrene	330	U
224-42-0	Dibenz(a,j)acridine	330	U
193-39-5	Indeno(1,2,3-cd)pyrene	330	U
53-70-3	Dibenzo(a,h)anthracene	330	U
191-24-2	Benzo(g,h,i)perylene	330	U
367-12-4	2-Fluorophenol	3670	
4165-62-2	Phenol-d5	4170	
4165-60-0	Nitrobenzene-d5	1740	
321-60-8	2-Fluorobiphenyl	1890	
118-79-6	2,4,6-Tribromophenol	4680	
98904-43-9	Terphenyl-d14	2870	

Data File: /data/msd2.i/2dec046.b/1601016.d
Report Date: 06-Dec-1996 14:06

8

RECOVERY REPORT

Client Name: C. Sholeen
Client SDG: 2dec046.b
Sample Matrix: SOLID
Fraction: SV
Client ID: 58 (Resin)
Level: LOW
Data Type: MS DATA
SampleType: SAMPLE
SpikeList File: HPMSS.spk
Quant Type: ISTD
Method File: /data/msd2.i/2dec046.b/yt8270.m
Misc Info:

SURROGATE COMPOUND	AMOUNT ADDED ng	AMOUNT RECOVERED ng	% RECOVERED	LIMITS
$ 4 2-Fluorophenol	200	110	55.12	25-121
$ 7 Phenol-d5	200	125	62.59	24-113
$ 22 Nitrobenzene-d5	100	52.2	52.21	23-120
$ 45 2-Fluorobiphenyl	100	56.6	56.60	30-115
$ 70 2,4,6-Tribromophen	200	140	70.19	19-122
$ 85 Terphenyl-d14	100	86.1	86.11	18-137

* - Values outside of QC limits
Spike Recovery: 0 out of 6 outside limits
0 out of 6 not found

Data File: /data/msd2.i/2dec046.b/1601016.d
Report Date: 12/06/96 14:06

9

TENTATIVELY IDENTIFIED COMPOUNDS

Client Name: C. Sholeen
Lab Smp ID: 96-0483-01
Operator: Y. Tsai
Sample Location:
Sample Matrix: SOIL
Analysis Type: SV

Client SDG: 2dec046.b
Client Smp ID: 58 (Resin)
Sample Date:
Sample Point:
Date Received:
Level: Low

Number TICs found: 22

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	CONC.	Q
1.	1193-11-9	1,3-Dioxolane, 2,2,4-trimethyl-	4.150	6098	NJ
2.		UNKNOWN	4.435	2577	NJ
3.		UNKNOWN	4.719	7433	J
4.		UNKNOWN	5.878	27106	NJ
5.		UNKNOWN	6.094	414	J
6.		UNKNOWN	6.212	490	J
7.		UNKNOWN	6.782	1460	NJ
8.		UNKNOWN	8.943	2523	J
9.	544-76-3	Hexadecane	25.010	468	NJ
10.	126-73-8	Phosphoric acid, tributyl ester	25.834	554	NJ
11.		Unknown alkane	26.927	1492	J
12.		Unknown alkane	27.693	297	J
13.		Unknown alkane	28.062	256	J
14.		Unknown alkane	28.739	1505	J
15.	638-36-8	Hexadecane, 2,6,10,14-tetramethyl-	28.839	1529	NJ
16.		Unknown	29.337	433	J
17.	0-00-0	NEOPHYTADIENE	30.045	764	NJ
18.		Unknown alkane	30.364	1061	J
19.		Unknown alkane	31.582	250	J
20.		UNKNOWN	35.552	511	J

10

ARGONNE NATIONAL LABORATORY
ANALYTICAL CHEMISTRY LABORATORY

SEMIVOLATILE ORGANICS ANALYSIS BENCH SHEET
MATRIX: SOIL

Bench Sheet Number _____

Sheet 1 of 1

ACL Sample Number	Customer Sample Number	Date Rec'd	Sample Size, g	pH	Percent Moisture	Level Low / Med	Extraction Date / Initial	Conc. Date / Initial	GPC [Y/N]	Extraction Vol. A/BN	MS Anal.	Comments
96-1112K MB	12/4/96 Lab Blank	—	30g	—	—	Med	11/27/96 MJS	11/27/96 MJS	N	1mL	12/4/96 YT	
97-8011-01	Bldg. 24-SL	10/23/96	30g	—	—	Med	11/27/96 MJS	11/27/96 MJS	N	1mL		(J. Wescott)
97-8025-01	Bldg. 24 Drain-East	11/18/96	30g	—	—	Med	11/27/96 MJS	11/27/96 MJS	N	1.8mL		adjusted 1mL (R. Rock)
97-8025-02	Bldg 24 Drain-West	11/18/96	30g	—	—	Med	11/27/96 MJS	12/04/96 MJS	N	1mL		
96-0483-01	58 (Resin)	9/20/96	30g	—	—	Med	11/27/96 MJS	12/04/96 MJS	N	1mL	↓	(C. Sheleen)

Reagent Tracking:
$MeCl_2$ _____
Na_2SO_4 8024 KTEH
NaOH _____
H_2SO_4 _____
$MeCl_2$/Acetone 1:1 BN549
BH075+BG194

1000AL

Standard Tracking:
_____ µL of Acid Surrogate Std # _____
_____ µL of Base Surrogate Std # _____
_____ µL of Matrix Spike # _____
_____ µL of Internal Std # _____

A = Acid = 200 mg/mL
B = Base/Neutral = 100mg/mL

Extracts Transferred to Y. Tsai Date 12/4/96

CMT-94A (1/94)

ANALYTICAL CHEMISTRY LABORATORY
Argonne National Laboratory
Argonne, IL 60439

REPORT OF ANALYTICAL RESULTS

Sample Material: Liquid — Date Received: 9/20/96

Submitted by: Charlotte Sholeen, ESH-HP, 202 — Date Reported: 10/15/96

Submitter's Sample No.	ACL Sample No.	Semivolatile Organic Analysis Semivolatile Target Compound	Concentration (µg/L)	Q
	Lab Blank (96-0925)	ND*	--	
59	96-0484-01	bis(2-Ethylhexyl)Phthalate	912	
60	-02	ND	--	

Note: Sample preparation was based on EPA-Method 3510 (SW-846, Revision 1, July 1992). The analytical method used was based on EPA-Method 8270A (SW-846, Revision 1, July 1992) for determination of semivolatile organic compounds. The attached data sheets contain data for two samples and one laboratory blank. The surrogate recoveries are within QC limits for 18 out of 18 values reported. For some of the compounds found in the samples (excluding system contaminants found in the lab blank and samples) that are not on the semivolatile target compound list, tables of tentatively identified compounds are included. Quantitation is carried out using total ion chromatogram peak areas compared to the peak area of the nearest internal standard.

* Not detected

The EPA-defined qualifiers to be used on the data sheets are as follows:

U - Indicates compound was analyzed for, but not detected above the given quantitation limit.

J - Indicates an estimated value. This flag is used under the following circumstances: (1) when estimating a concentration for TICs where a 1:1 response is assumed, (2) when the mass spectral and retention time data indicate the presence of a compound that meet the SV GC/MS identification criteria, and the results are less than the estimated quantitation limit, but greater than zero.

N - Indicates presumptive evidence of a compound. This flag is only used for TICs where the identification is based on a mass spectral library search.

NOTE: Unused sample material will be returned to the Client. Prepared samples will be discarded one (1) month after the date of this report unless other arrangements are made. When making future inquiries regarding this report, please reference the ACL sample number(s) above. For further information about the results reported here, please call Y. Tsai at 2- 7732 .

Reference(s): GC/MSD-2 Run Logbook 2, pg. 41.

Copies To: ~~C. Sholeen~~
M. Robinet
D. Geraghty
/ads
10/16/96
D. Green
A. Boparai
D. Graczyk
Y. Tsai
ACL 200 File

Analyst(s): Y. Tsai

ATTACHMENT
(14 Pages)

CMT-84 (9-96)

Data File: /data/msd2.i/2oct046.b/0701007.d
Report Date: 09-Oct-1996 11:18

TARGET COMPOUNDS

Client Name: C. Sholeen
Client SDG: 2oct046.b
Client Sample ID: lab blank, 96-0925
Sample Date:
Sample Location:
Sample Point:
Lab Sample ID: lab blank, 96-0925
Date Received:
Sample Matrix: WATER
Quant Type: ISTD
Analysis Type: SV
Level: LOW
Data Type: MS DATA
Misc Info:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
62-75-9	N-Nitrosodimethylamine	100	U
109-06-8	2-Picoline	100	U
66-27-3	Methyl methansulfonate	200	U
62-50-0	Ethyl methansulfonate	100	U
62-53-3	Aniline	100	U
108-95-2	Phenol	100	U
95-57-8	2-Chlorophenol	100	U
111-44-4	bis(2-Chloroethyl)ether	100	U
541-73-1	1,3-Dichlorobenzene	100	U
106-46-7	1,4-Dichlorobenzene	100	U
95-50-1	1,2-Dichlorobenzene	100	U
100-51-6	Benzyl alcohol	100	U
95-48-7	2-Methylphenol	100	U
108-60-1	bis(2-Chloroisopropyl)ether	100	U
98-86-2	Acetophenone	100	U
621-64-7	N-nitroso-di-n-propylamine	100	U
106-44-5	4-Methylphenol	100	U
67-72-1	Hexachloroethane	100	U
98-95-3	Nitrobenzene	100	U
100-75-4	N-Nitrosopiperidine	100	U
78-59-1	Isophorone	100	U
88-75-5	2-Nitrophenol	100	U
105-67-9	2,4-Dimethyphenol	100	U
111-91-1	bis(2-Chloroethoxy)methane	100	U
120-83-2	2,4-Dichlorophenol	100	U
65-85-0	Benzoic acid	100	U
120-82-1	1,2,4-Trichlorobenzene	100	U
91-20-3	Naphthalene	100	U
122-09-8	a,a-Dimethylphenethylamine	200	U
87-65-0	2,6-Dichlorophenol	100	U
106-47-8	4-Chloroaniline	100	U
87-68-3	Hexachlorobutadiene	100	U
924-16-3	N-Nitrosodibutylamine	100	U
59-50-7	4-Chloro-3-methylphenol	100	U
91-57-6	2-Methylnaphthalene	100	U
95-94-3	1,2,4,5-Tetrachlorobenzene	100	U
77-47-4	Hexachlorocyclopentadiene	200	U

Data File: /data/msd2.i/2oct046.b/0701007.d
Report Date: 09-Oct-1996 11:18

2

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: lab blank, 96-0925
Sample Location:
Lab Sample ID: lab blank, 96-0925
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
88-06-2	2,4,6-Trichlorophenol	100	U
95-95-4	2,4,5-Trichlorophenol	100	U
91-58-7	2-Chloronaphthalene	100	U
90-13-1	1-Chloronaphthalene	100	U
88-74-4	2-Nitroaniline	100	U
131-11-3	Dimethyl phthalate	100	U
208-96-8	Acenaphthylene	100	U
606-20-2	2,6-Dinitrotoluene	100	U
----------	3-Nitroaniline	100	U
83-32-9	Acenaphthene	100	U
51-28-5	2,4-Dinitrophenol	200	U
608-93-5	Pentachlorobenzene	100	U
132-64-9	Dibenzofuran	100	U
100-02-7	4-Nitrophenol	200	U
121-14-2	2,4-Dinitrotoluene	100	U
91-59-8	2-Napthylamine	100	U
58-90-2	2,3,4,6-Tetrachlorophenol	100	U
134-32-7	1-Naphthylamine	100	U
86-73-7	Fluorene	100	U
84-66-2	Diethylphthalate	100	U
7005-72-3	4-Chlorophenyl phenyl ether	100	U
100-01-6	4-Nitroaniline	100	U
534-52-1	4,6-Dinitro-2-methylphenol	100	U
----------	N-NitrosoDPA & Diphenylamine	50.0	U
122-66-7	1,2-Diphenylhydrazine	100	U
101-55-3	4-Bromophenyl phenyl ether	100	U
118-74-1	Hexachlorobenzene	100	U
62-44-2	Phenacetin	100	U
87-86-5	Pentachlorophenol	100	U
82-68-8	Pentachloronitrobenzene	100	U
92-67-1	4-Aminobiphenyl	100	U
23950-58-5	Pronamide	100	U
85-01-8	Phenanthrene	100	U
120-12-7	Anthracene	100	U
84-74-2	Di-n-butylphthalate	100	U
206-44-0	Fluoranthene	100	U
92-87-5	Benzidine	200	U

Data File: /data/msd2.i/2oct046.b/0701007.d
Report Date: 09-Oct-1996 11:18

3

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: lab blank, 96-0925
Sample Location:
Lab Sample ID: lab blank, 96-0925
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
129-00-0	Pyrene	100	U
60-11-7	p-Dimethylaminoazobenzene	100	U
85-68-7	Butylbenzylphthalate	100	U
56-55-3	Benzo(a)anthracene	100	U
91-94-1	3,3'-Dichlorobenzidine	100	U
218-01-9	Chrysene	100	U
117-81-7	bis(2-Ethylhexyl)phthalate	100	U
117-84-0	Di-n-octylphthalate	100	U
205-99-2	Benzo(b)fluoranthene	100	U
57-97-6	7,12Dimethylbenz(a)anthracen	100	U
207-08-9	Benzo(k)fluoranthene	100	U
50-32-8	Benzo(a)pyrene	100	U
56-49-5	3-Methylcholanthrene	100	U
224-42-0	Dibenz(a,j)acridine	100	U
193-39-5	Indeno(1,2,3-cd)pyrene	100	U
53-70-3	Dibenzo(a,h)anthracene	100	U
191-24-2	Benzo(g,h,i)perylene	100	U
367-12-4	2-Fluorophenol	1050	
----------	Phenol-d5	677	
----------	Nitrobenzene-d5	718	
321-60-8	2-Fluorobiphenyl	646	
----------	2,4,6-Tribromophenol	1440	
----------	Terphenyl-d14	678	

Data File: /data/msd2.i/2oct046.b/0701007.d
Report Date: 08-Oct-1996 13:18

4

RECOVERY REPORT

Client Name: C. Sholeen
Client SDG: 2oct046.b
Sample Matrix: LIQUID
Fraction: SV
Client ID: lab blank, 96-0925
Level: LOW
Data Type: MS DATA
SampleType: SAMPLE
SpikeList File: HPMSS.spk
Quant Type: ISTD
Method File: /data/msd2.i/2oct046.b/yt8270.m
Misc Info:

SURROGATE COMPOUND	AMOUNT ADDED ng	AMOUNT RECOVERED ng	% RECOVERED	LIMITS
$ 4 2-Fluorophenol	200	105	52.62	21-100
$ 7 Phenol-d5	200	67.7	33.84	10-94
$ 22 Nitrobenzene-d5	100	71.8	71.84	35-114
$ 45 2-Fluorobiphenyl	100	64.6	64.58	43-116
$ 70 2,4,6-Tribromophen	200	144	71.86	10-123
$ 85 Terphenyl-d14	100	67.8	67.83	33-141

* - Values outside of QC limits
Spike Recovery: 0 out of 6 outside limits
0 out of 6 not found

Data File: /data/msd2.i/2oct046.b/0801008.d
Report Date: 09-Oct-1996 11:39

5

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 59
Sample Location:
Lab Sample ID: 96-0484-01
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
62-75-9	N-Nitrosodimethylamine	100	U
109-06-8	2-Picoline	100	U
66-27-3	Methyl methansulfonate	200	U
62-50-0	Ethyl methansulfonate	100	U
62-53-3	Aniline	100	U
108-95-2	Phenol	100	U
95-57-8	2-Chlorophenol	100	U
111-44-4	bis(2-Chloroethyl)ether	100	U
541-73-1	1,3-Dichlorobenzene	100	U
106-46-7	1,4-Dichlorobenzene	100	U
95-50-1	1,2-Dichlorobenzene	100	U
100-51-6	Benzyl alcohol	100	U
95-48-7	2-Methylphenol	100	U
108-60-1	bis(2-Chloroisopropyl)ether	100	U
98-86-2	Acetophenone	100	U
621-64-7	N-nitroso-di-n-propylamine	100	U
106-44-5	4-Methylphenol	100	U
67-72-1	Hexachloroethane	100	U
98-95-3	Nitrobenzene	100	U
100-75-4	N-Nitrosopiperidine	100	U
78-59-1	Isophorone	100	U
88-75-5	2-Nitrophenol	100	U
105-67-9	2,4-Dimethyphenol	100	U
111-91-1	bis(2-Chloroethoxy)methane	100	U
120-83-2	2,4-Dichlorophenol	100	U
65-85-0	Benzoic acid	100	U
120-82-1	1,2,4-Trichlorobenzene	100	U
91-20-3	Naphthalene	100	U
122-09-8	a,a-Dimethylphenethylamine	200	U
87-65-0	2,6-Dichlorophenol	100	U
106-47-8	4-Chloroaniline	100	U
87-68-3	Hexachlorobutadiene	100	U
924-16-3	N-Nitrosodibutylamine	100	U
59-50-7	4-Chloro-3-methylphenol	100	U
91-57-6	2-Methylnaphthalene	100	U
95-94-3	1,2,4,5-Tetrachlorobenzene	100	U
77-47-4	Hexachlorocyclopentadiene	200	U

Data File: /data/msd2.i/2oct046.b/0801008.d
Report Date: 09-Oct-1996 11:39

6

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 59
Sample Location:
Lab Sample ID: 96-0484-01
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
88-06-2	2,4,6-Trichlorophenol	100	U
95-95-4	2,4,5-Trichlorophenol	100	U
91-58-7	2-Chloronaphthalene	100	U
90-13-1	1-Chloronaphthalene	100	U
88-74-4	2-Nitroaniline	100	U
131-11-3	Dimethyl phthalate	100	U
208-96-8	Acenaphthylene	100	U
606-20-2	2,6-Dinitrotoluene	100	U
----------	3-Nitroaniline	100	U
83-32-9	Acenaphthene	100	U
51-28-5	2,4-Dinitrophenol	200	U
608-93-5	Pentachlorobenzene	100	U
132-64-9	Dibenzofuran	100	U
100-02-7	4-Nitrophenol	200	U
121-14-2	2,4-Dinitrotoluene	100	U
91-59-8	2-Napthylamine	100	U
58-90-2	2,3,4,6-Tetrachlorophenol	100	U
134-32-7	1-Naphthylamine	100	U
86-73-7	Fluorene	100	U
84-66-2	Diethylphthalate	100	U
7005-72-3	4-Chlorophenyl phenyl ether	100	U
100-01-6	4-Nitroaniline	100	U
534-52-1	4,6-Dinitro-2-methylphenol	100	U
----------	N-NitrosoDPA & Diphenylamine	50.0	U
122-66-7	1,2-Diphenylhydrazine	100	U
101-55-3	4-Bromophenyl phenyl ether	100	U
118-74-1	Hexachlorobenzene	100	U
62-44-2	Phenacetin	100	U
87-86-5	Pentachlorophenol	100	U
82-68-8	Pentachloronitrobenzene	100	U
92-67-1	4-Aminobiphenyl	100	U
23950-58-5	Pronamide	100	U
85-01-8	Phenanthrene	100	U
120-12-7	Anthracene	100	U
84-74-2	Di-n-butylphthalate	100	U
206-44-0	Fluoranthene	100	U
92-87-5	Benzidine	200	U

Data File: /data/msd2.i/2oct046.b/0801008.d
Report Date: 09-Oct-1996 11:39

7

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 59
Sample Location:
Lab Sample ID: 96-0484-01
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
129-00-0	Pyrene	100	U
60-11-7	p-Dimethylaminoazobenzene	100	U
85-68-7	Butylbenzylphthalate	100	U
56-55-3	Benzo(a)anthracene	100	U
91-94-1	3,3'-Dichlorobenzidine	100	U
218-01-9	Chrysene	100	U
117-81-7	bis(2-Ethylhexyl)phthalate	912	
117-84-0	Di-n-octylphthalate	100	U
205-99-2	Benzo(b)fluoranthene	100	U
57-97-6	7,12Dimethylbenz(a)anthracen	100	U
207-08-9	Benzo(k)fluoranthene	100	U
50-32-8	Benzo(a)pyrene	100	U
56-49-5	3-Methylcholanthrene	100	U
224-42-0	Dibenz(a,j)acridine	100	U
193-39-5	Indeno(1,2,3-cd)pyrene	100	U
53-70-3	Dibenzo(a,h)anthracene	100	U
191-24-2	Benzo(g,h,i)perylene	100	U
367-12-4	2-Fluorophenol	1080	
----------	Phenol-d5	665	
----------	Nitrobenzene-d5	704	
321-60-8	2-Fluorobiphenyl	642	
----------	2,4,6-Tribromophenol	1670	
----------	Terphenyl-d14	799	

Data File: /data/msd2.i/2oct046.b/0801008.d
Report Date: 09-Oct-1996 11:39

8

TENTATIVELY IDENTIFIED COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 59
Sample Location:
Lab Sample ID: 96-0484-01
Sample Matrix: WATER
Analysis Type: SV

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:

Level: LOW

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/KG) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 617-84-5	Formamide, N,N-diethyl-	9.218	101	NJ
2. 99-85-4	.gamma.-Terpinene	12.655	56.3	NJ

Data File: /data/msd2.i/2oct046.b/0801008.d
Report Date: 09-Oct-1996 11:02

9

RECOVERY REPORT

Client Name: C. Sholeen
Sample Matrix: LIQUID
Client ID: 59
Data Type: MS DATA
SpikeList File: HPMSS.spk
Client SDG: 2oct046.b
Fraction: SV
Level: LOW
SampleType: SAMPLE
Quant Type: ISTD
Method File: /data/msd2.i/2oct046.b/yt8270.m
Misc Info:

SURROGATE COMPOUND	AMOUNT ADDED ng	AMOUNT RECOVERED ng	% RECOVERED	LIMITS
$ 4 2-Fluorophenol	200	108	54.14	21-100
$ 7 Phenol-d5	200	66.5	33.25	10-94
$ 22 Nitrobenzene-d5	100	70.4	70.46	35-114
$ 45 2-Fluorobiphenyl	100	64.2	64.23	43-116
$ 70 2,4,6-Tribromophen	200	167	83.65	10-123
$ 85 Terphenyl-d14	100	79.9	79.88	33-141

* - Values outside of QC limits
Spike Recovery: 0 out of 6 outside limits
0 out of 6 not found

Data File: /data/msd2.i/2oct046.b/0901009.d
Report Date: 09-Oct-1996 11:47

10

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 60
Sample Location:
Lab Sample ID: 96-0484-02
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
62-75-9	N-Nitrosodimethylamine	100	U
109-06-8	2-Picoline	100	U
66-27-3	Methyl methansulfonate	200	U
62-50-0	Ethyl methansulfonate	100	U
62-53-3	Aniline	100	U
108-95-2	Phenol	100	U
95-57-8	2-Chlorophenol	100	U
111-44-4	bis(2-Chloroethyl)ether	100	U
541-73-1	1,3-Dichlorobenzene	100	U
106-46-7	1,4-Dichlorobenzene	100	U
95-50-1	1,2-Dichlorobenzene	100	U
100-51-6	Benzyl alcohol	100	U
95-48-7	2-Methylphenol	100	U
108-60-1	bis(2-Chloroisopropyl)ether	100	U
98-86-2	Acetophenone	100	U
621-64-7	N-nitroso-di-n-propylamine	100	U
106-44-5	4-Methylphenol	100	U
67-72-1	Hexachloroethane	100	U
98-95-3	Nitrobenzene	100	U
100-75-4	N-Nitrosopiperidine	100	U
78-59-1	Isophorone	100	U
88-75-5	2-Nitrophenol	100	U
105-67-9	2,4-Dimethyphenol	100	U
111-91-1	bis(2-Chloroethoxy)methane	100	U
120-83-2	2,4-Dichlorophenol	100	U
65-85-0	Benzoic acid	100	U
120-82-1	1,2,4-Trichlorobenzene	100	U
91-20-3	Naphthalene	100	U
122-09-8	a,a-Dimethylphenethylamine	200	U
87-65-0	2,6-Dichlorophenol	100	U
106-47-8	4-Chloroaniline	100	U
87-68-3	Hexachlorobutadiene	100	U
924-16-3	N-Nitrosodibutylamine	100	U
59-50-7	4-Chloro-3-methylphenol	100	U
91-57-6	2-Methylnaphthalene	100	U
95-94-3	1,2,4,5-Tetrachlorobenzene	100	U
77-47-4	Hexachlorocyclopentadiene	200	U

Data File: /data/msd2.i/2oct046.b/0901009.d
Report Date: 09-Oct-1996 11:47

//

TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 60
Sample Location:
Lab Sample ID: 96-0484-02
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
88-06-2	2,4,6-Trichlorophenol	100	U
95-95-4	2,4,5-Trichlorophenol	100	U
91-58-7	2-Chloronaphthalene	100	U
90-13-1	1-Chloronaphthalene	100	U
88-74-4	2-Nitroaniline	100	U
131-11-3	Dimethyl phthalate	100	U
208-96-8	Acenaphthylene	100	U
606-20-2	2,6-Dinitrotoluene	100	U
----------	3-Nitroaniline	100	U
83-32-9	Acenaphthene	100	U
51-28-5	2,4-Dinitrophenol	200	U
608-93-5	Pentachlorobenzene	100	U
132-64-9	Dibenzofuran	100	U
100-02-7	4-Nitrophenol	200	U
121-14-2	2,4-Dinitrotoluene	100	U
91-59-8	2-Napthylamine	100	U
58-90-2	2,3,4,6-Tetrachlorophenol	100	U
134-32-7	1-Naphthylamine	100	U
86-73-7	Fluorene	100	U
84-66-2	Diethylphthalate	100	U
7005-72-3	4-Chlorophenyl phenyl ether	100	U
100-01-6	4-Nitroaniline	100	U
534-52-1	4,6-Dinitro-2-methylphenol	100	U
----------	N-NitrosoDPA & Diphenylamine	50.0	U
122-66-7	1,2-Diphenylhydrazine	100	U
101-55-3	4-Bromophenyl phenyl ether	100	U
118-74-1	Hexachlorobenzene	100	U
62-44-2	Phenacetin	100	U
87-86-5	Pentachlorophenol	100	U
82-68-8	Pentachloronitrobenzene	100	U
92-67-1	4-Aminobiphenyl	100	U
23950-58-5	Pronamide	100	U
85-01-8	Phenanthrene	100	U
120-12-7	Anthracene	100	U
84-74-2	Di-n-butylphthalate	100	U
206-44-0	Fluoranthene	100	U
92-87-5	Benzidine	200	U

Data File: /data/msd2.i/2oct046.b/0901009.d
Report Date: 09-Oct-1996 11:47

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TARGET COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 60
Sample Location:
Lab Sample ID: 96-0484-02
Sample Matrix: WATER
Analysis Type: SV
Data Type: MS DATA
Misc Info:

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:
Quant Type: ISTD
Level: LOW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/KG) ug/L	Q
129-00-0	Pyrene	100	U
60-11-7	p-Dimethylaminoazobenzene	100	U
85-68-7	Butylbenzylphthalate	100	U
56-55-3	Benzo(a)anthracene	100	U
91-94-1	3,3'-Dichlorobenzidine	100	U
218-01-9	Chrysene	100	U
117-81-7	bis(2-Ethylhexyl)phthalate	100	U
117-84-0	Di-n-octylphthalate	100	U
205-99-2	Benzo(b)fluoranthene	100	U
57-97-6	7,12Dimethylbenz(a)anthracen	100	U
207-08-9	Benzo(k)fluoranthene	100	U
50-32-8	Benzo(a)pyrene	100	U
56-49-5	3-Methylcholanthrene	100	U
224-42-0	Dibenz(a,j)acridine	100	U
193-39-5	Indeno(1,2,3-cd)pyrene	100	U
53-70-3	Dibenzo(a,h)anthracene	100	U
191-24-2	Benzo(g,h,i)perylene	100	U
367-12-4	2-Fluorophenol	1170	
----------	Phenol-d5	748	
----------	Nitrobenzene-d5	847	
321-60-8	2-Fluorobiphenyl	722	
----------	2,4,6-Tribromophenol	1730	
----------	Terphenyl-d14	762	

Data File: /data/msd2.i/2oct046.b/0901009.d
Report Date: 09-Oct-1996 11:51

13

TENTATIVELY IDENTIFIED COMPOUNDS

Client Name: C. Sholeen
Client Sample ID: 60
Sample Location:
Lab Sample ID: 96-0484-02
Sample Matrix: WATER
Analysis Type: SV

Client SDG: 2oct046.b
Sample Date:
Sample Point:
Date Received:

Level: LOW

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/KG) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 126-73-8	Phosphoric acid, tributyl ester	25.839	693	NJ
2. 57-10-3	Hexadecanoic acid	31.092	51.8	NJ

Data File: /data/msd2.i/2oct046.b/0901009.d
Report Date: 09-Oct-1996 11:03

14

RECOVERY REPORT

Client Name: C. Sholeen
Sample Matrix: LIQUID
Client ID: 60
Data Type: MS DATA
SpikeList File: HPMSS.spk
Method File: /data/msd2.i/2oct046.b/yt8270.m
Misc Info:

Client SDG: 2oct046.b
Fraction: SV
Level: LOW
SampleType: SAMPLE
Quant Type: ISTD

SURROGATE COMPOUND	AMOUNT ADDED ng	AMOUNT RECOVERED ng	% RECOVERED	LIMITS
$ 4 2-Fluorophenol	200	117	58.32	21-100
$ 7 Phenol-d5	200	74.8	37.39	10-94
$ 22 Nitrobenzene-d5	100	84.7	84.72	35-114
$ 45 2-Fluorobiphenyl	100	72.2	72.26	43-116
$ 70 2,4,6-Tribromophen	200	173	86.70	10-123
$ 85 Terphenyl-d14	100	76.2	76.19	33-141

* - Values outside of QC limits
Spike Recovery: 0 out of 6 outside limits
0 out of 6 not found

15 Client: C. Shaleen

ARGONNE NATIONAL LABORATORY
ANALYTICAL CHEMISTRY LABORATORY

SEMIVOLATILE ORGANICS ANALYSIS BENCH SHEET
MATRIX: WATER

Bench Sheet Number _____

Sheet 1 of 1

ACL Sample Number	Customer Sample Number	Date Received	Sample Size, mL	pH	Extraction Date / Initial	Concentration Date / Initial	GPC [Y/N]	Extract Vol. A / BN	MS Analysis	Comments
96-0925	Lab Blank	—	100 mL	—	9/25/96 MJS	9/26/96 DVA	N	1 mL	10/4/96 YT	
96-0484-01	59	9/20/96	↓	—	↓	↓	↓	↓	10/4/96 YT	
-02	60	9/20/96	↓	—	↓	↓	↓	↓	10/4/96 YT	

Reagent Tracking:
$MeCl_2$ BM024
Na_2SO_4 8024KTEH
NaOH _____
H_2SO_4 _____

Standard Tracking:
1000 µL of Acid Surrogate Std # _____
_____ µL of Base Surrogate Std # _____
_____ µL of Matrix Spike # _____
_____ µL of Internal Std # _____

A = Acid 200 ug/mL
B = Base/Neutral 100 ug/mL

Extracts Transferred to: Yifen Tsai Date 10/2/96

CMT-94B (1/94)

APPENDIX E: Instrument Calibration and Operational Check Records

TABLE E1. Source Data from Tennelec for Building 579 (594)

Real Time			counts/min		efficiency		% cross talk	
	Day	Time	α	β	α	β	α to β	β to α
THU	09/19/96	12:59:29	13,329 ± 82	6,645 ± 58	0.240		33.3	
THU	09/19/96	13:01:38	5 ± 2	39,564 ± 141		0.413		0.0114
MON	09/23/96	15:58:08	13,390 ± 82	6,598 ± 57	0.241		33.0	
MON	09/23/96	16:00:18	2 ± 1	39,380 ± 140		0.411		0.0051
FRI	09/27/96	09:42:28	13,449 ± 82	6,696 ± 58	0.242		33.2	
FRI	09/27/96	09:44:37	3 ± 1	39,683 ± 141		0.414		0.0063
THU	10/03/96	12:22:32	13,723 ± 83	6,550 ± 57	0.247		32.3	
THU	10/03/96	12:24:41	2 ± 1	39,457 ± 140		0.412		0.0038
		Minimum	2 ± 1	6,550 ± 57	0.240	0.411	32.3	0.0038
		Maximum	13,723 ± 83	39,683 ± 141	0.247	0.414	33.3	0.0114
		Average	6,738 ± 42	23,071 ± 99	0.242	0.413	33.0	0.0066
		Standard Deviation	6,736 ± 40	16,450 ± 42	0.003	0.001	0.4	0.0029
		Count	8	8	4	4	4	4

The alpha source is ^{241}Am

The beta source is $^{90}Sr/^{90}Y$

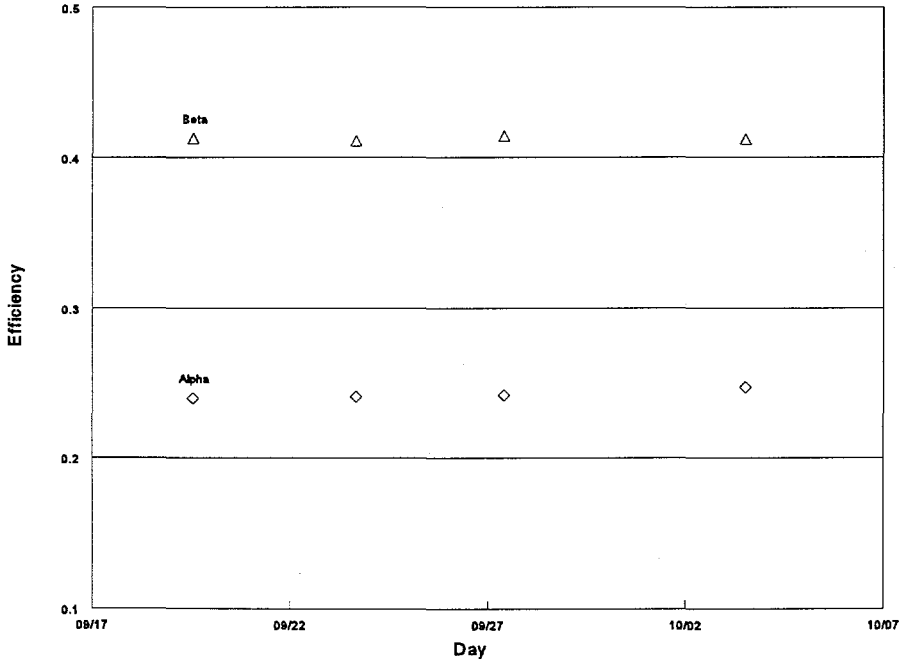

FIGURE E1. Calibration Check Data for the Tennelec System

TABLE E2. Blank Data from Tennelec for Building 579 (594)

Clock Real Time				counts/min	
	Day	Time	Count Time (min)	alpha	beta
THU	09/19/96	11:47:02	200	0.155 ± 0.028	25.44 ± 0.36
FRI	09/20/96	11:50:26	200	0.155 ± 0.028	25.49 ± 0.36
MON	09/23/96	12:17:21	200	0.175 ± 0.030	25.55 ± 0.36
FRI	09/27/96	08:20:14	200	0.160 ± 0.028	25.86 ± 0.36
THU	10/03/96	12:20:21	200	0.180 ± 0.030	26.54 ± 0.36
			Minimum	0.155 ± 0.028	25.44 ± 0.36
			Maximum	0.180 ± 0.030	26.54 ± 0.36
			Average	0.165 ± 0.029	25.77 ± 0.36
			Standard Deviation	0.010 ± 0.001	0.41 ± 0.00
			Count	5	5

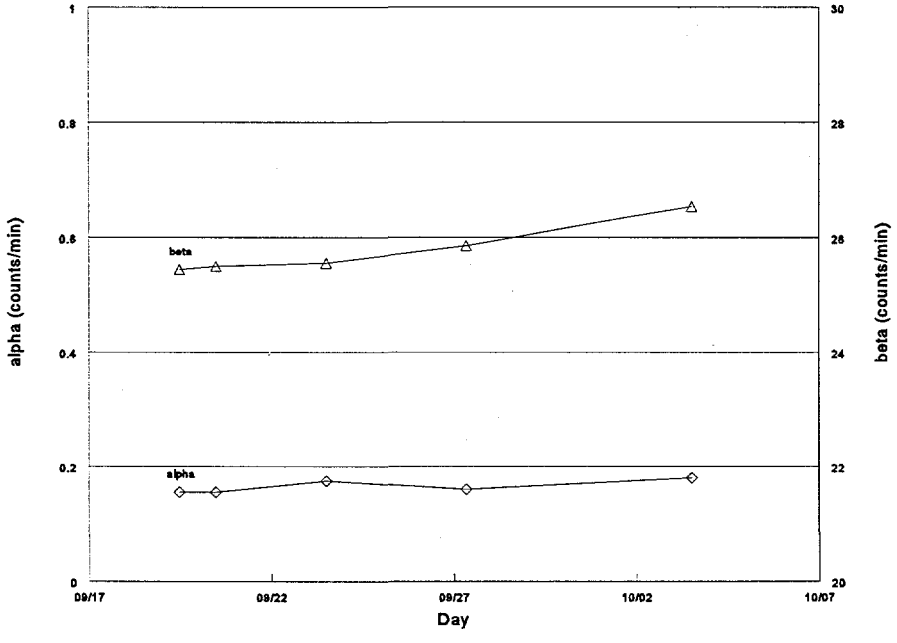

FIGURE E2. Background Check Data for the Tennelec System

3-3

DABRAS UTILITIES : Determine Instrument Parameters - COUNTER 1

05/21/96 09:59:57	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Determination ALPHA	Today's Determination BETA
Bkgd Time (min)	100.00	100.00	100.00	100.00
Bkgd Cnts	139	25514	170	26429
Bkgd Rate (cpm)	0.00	0.00	1.70	264.29
Bkgd 2*Sig (± cpm)	0.00	0.00	0.26	3.25
Std Cnt Time (min)	10.00	10.00	10.00	10.00
Std Cts	144109	482099	152339	494075
Std Rate (cpm)	14410.90	48209.90	15233.90	49407.50
Std Net Rate (cpm)	0.00	0.00	15232.20	49143.21
Std Eff (cts/dis)	0.00	0.00	0.27	0.50

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : Determine Instrument Parameters - COUNTER 2

05/21/96 12:59:38	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Determination ALPHA	Today's Determination BETA
Bkgd Time (min)	100.00	100.00	100.00	100.00
Bkgd Cnts	134	25514	203	26087
Bkgd Rate (cpm)	0.00	0.00	2.03	260.87
Bkgd 2*Sig (± cpm)	0.00	0.00	0.28	3.23
Std Cnt Time (min)	10.00	10.00	10.00	10.00
Std Cts	173567	500576	176478	506531
Std Rate (cpm)	17356.70	50057.60	17647.80	50653.10
Std Net Rate (cpm)	0.00	0.00	17645.77	50392.23
Std Eff (cts/dis)	0.00	0.00	0.32	0.51

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 1

09/18/96 07:54:47	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	170	26429	17	2608
Bkgd Rate (cpm)	1.70	264.29	1.70	260.80
Bkgd 2*Sig (± cpm)	0.26	3.25	0.82	10.21
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	152339	494075	14254	47394
Std Rate (cpm)	15233.90	49407.50	14254.00	47394.00
Std Net Rate (cpm)	15232.20	49143.21	14252.30	47133.20
Std Eff (cts/dis)	0.27	0.50	0.26	0.48

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 2

09/18/96 08:08:07	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	203	26087	16	2550
Bkgd Rate (cpm)	2.03	260.87	1.60	255.00
Bkgd 2*Sig (± cpm)	0.28	3.23	0.80	10.10
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	176478	506531	15080	48186
Std Rate (cpm)	17647.80	50653.10	15080.00	48186.00
Std Net Rate (cpm)	17645.77	50392.23	15078.40	47931.00
Std Eff (cts/dis)	0.32	0.51	0.27	0.49

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 1

09/19/96 07:53:24

	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	170	26429	57	2683
Bkgd Rate (cpm)	1.70	264.29	5.70	268.30
Bkgd 2*Sig (± cpm)	0.26	3.25	1.51	10.36
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	152339	494075	14542	47858
Std Rate (cpm)	15233.90	49407.50	14542.00	47858.00
Std Net Rate (cpm)	15232.20	49143.21	14536.30	47589.70
Std Eff (cts/dis)	0.27	0.50	0.26	0.48

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 2

09/19/96 08:15:03

	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	203	26087	39	2666
Bkgd Rate (cpm)	2.03	260.87	3.90	266.60
Bkgd 2*Sig (± cpm)	0.28	3.23	1.25	10.33
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	176478	506531	14928	48115
Std Rate (cpm)	17647.80	50653.10	14928.00	48115.00
Std Net Rate (cpm)	17645.77	50392.23	14924.10	47848.40
Std Eff (cts/dis)	0.32	0.51	0.27	0.48

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 1

09/20/96 07:56:49	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	170	26429	27	2741
Bkgd Rate (cpm)	1.70	264.29	2.70	274.10
Bkgd 2*Sig (± cpm)	0.26	3.25	1.04	10.47
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	152339	494075	14950	48276
Std Rate (cpm)	15233.90	49407.50	14950.00	48276.00
Std Net Rate (cpm)	15232.20	49143.21	14947.30	48001.90
Std Eff (cts/dis)	0.27	0.50	0.27	0.49

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 2

09/20/96 08:09:52	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	203	26087	100	2750
Bkgd Rate (cpm)	2.03	260.87	10.00	275.00
Bkgd 2*Sig (± cpm)	0.28	3.23	2.00	10.49
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	176478	506531	14948	48560
Std Rate (cpm)	17647.80	50653.10	14948.00	48560.00
Std Net Rate (cpm)	17645.77	50392.23	14938.00	48285.00
Std Eff (cts/dis)	0.32	0.51	0.27	0.49

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 1

09/23/96 07:52:24

	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	170	26429	29	2561
Bkgd Rate (cpm)	1.70	264.29	2.90	256.10
Bkgd 2*Sig (± cpm)	0.26	3.25	1.08	10.12
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	152339	494075	14759	48776
Std Rate (cpm)	15233.90	49407.50	14759.00	48776.00
Std Net Rate (cpm)	15232.20	49143.21	14756.10	48519.90
Std Eff (cts/dis)	0.27	0.50	0.26	0.49

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 2

09/23/96 08:06:12

	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	203	26087	81	2750
Bkgd Rate (cpm)	2.03	260.87	8.10	275.00
Bkgd 2*Sig (± cpm)	0.28	3.23	1.80	10.49
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	176478	506531	15170	48751
Std Rate (cpm)	17647.80	50653.10	15170.00	48751.00
Std Net Rate (cpm)	17645.77	50392.23	15161.90	48476.00
Std Eff (cts/dis)	0.32	0.51	0.27	0.49

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 1

09/27/96 07:57:56	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	170	26429	15	2452
Bkgd Rate (cpm)	1.70	264.29	1.50	245.20
Bkgd 2*Sig (± cpm)	0.26	3.25	0.77	9.90
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	152339	494075	13768	48122
Std Rate (cpm)	15233.90	49407.50	13768.00	48122.00
Std Net Rate (cpm)	15232.20	49143.21	13766.50	47876.80
Std Eff (cts/dis)	0.27	0.50	0.25	0.48

Hit "Q" Anytime to Abort

3-3

DABRAS UTILITIES : DAILY Op CHECK - COUNTER 2

09/27/96 08:10:36	CURRENT PARAMETERS ALPHA	CURRENT PARAMETERS BETA	Today's Check ALPHA	Today's Check BETA
Bkgd Time (min)	100.00	100.00	10.00	10.00
Bkgd Cnts	203	26087	20	2605
Bkgd Rate (cpm)	2.03	260.87	2.00	260.50
Bkgd 2*Sig (± cpm)	0.28	3.23	0.89	10.21
Std Cnt Time (min)	10.00	10.00	1.00	1.00
Std Cts	176478	506531	14966	48598
Std Rate (cpm)	17647.80	50653.10	14966.00	48598.00
Std Net Rate (cpm)	17645.77	50392.23	14964.00	48337.50
Std Eff (cts/dis)	0.32	0.51	0.27	0.49

Hit "Q" Anytime to Abort

Certificate #015-D2
rev. 1.0, January 1996

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 1259 Procedure#: **015** Configuration: **Surface Contam**
Type: **X** Dual Scintillator (**dpm units**)
Unit#: 5497 Mfr/Model: **NE Technology Electra** S/N: 516
Unit#: 6907 Mfr/Model: **NE Technology DP6A** S/N: 534

Pulse Generator, Eberline MP- 1, S/N 535
Electrostatic KiloVoltmeter: ESO 2K, S/N 900147
Alpha Source: Am241, S/N DN965, Activity 60800 dpm
Beta Source: Sr90, S/N DN636, Activity 97800 dpm

I) MAINTENANCE/PRECALIBRATION:
Window: ✓ Cabling: ✓ Mechanical/Cleanliness: ✓
Battery Voltage (Parameter # 0): 4.5 (ref: > 4)
Threshold: 27 (verify 25 mV with the MiniPulser)
As the Electra "supervisor" set the Upper Level Discriminator (Parameter #6): 2 V (ref: 2.00 V), then INHIBIT: ✓
Count Rate Check @ 10 k cpm: ✓
HV Calib.: ✓ (compare Parameter #3 w/ the Electrostatic)

High Voltage Adjustment:
Using Sr-90 beta source, observe count rates in both alpha and beta channels. Adjust HV so that count rate in alpha channel is less than 0.1% of count rate in beta channel.
Beta cpm: 27.3K Alpha cpm: 11 (e.g., 0.1% of beta)
HV = 990, and INHIBIT: Y

Parameter Settings:
As the Electra "supervisor" (i.e., the internal switch S1-2 to ON), set the remaining parameters as follows:
Parameter #4 (Overload Current): 10 µA, then INHIBIT: ✓
Parameter #5 (Deadtime): 3 µsec, then INHIBIT: ✓
Parameter #8 (Units): cpm
Parameter #A (inhibit bkgd subt): set to OFF
Parameter #b (inhibit integrate): set to OFF
Parameter #C (rate mode): set to preset
Parameter #d (preset response time): set to 3 sec
Parameter #E (pulse mode): set to dUAL
Parameter #F (ohms): set to S66

II) PRIMARY CALIBRATION:
Response to Alpha Std: 12.2K cpm; .200 % efficiency (alpha)
Alpha Mode Bkgd: 5 cpm (ref.: < 7 cpm)
Response to Beta Std: 27.3K cpm; .279 % efficiency (beta)
Beta Mode Bkgd: 360 cpm (ref.: < 400 cpm)
Integrate Check: ✓ Audible Functional Check: ✓

Parameter #8 (Units): change from cpm to **dpm**
Parameter #9 (Efficiencies): enter efficiencies from above
Now set switch S1-2 back to OFF (user), and leave switch S1-3 set to ON (hide). ✓

REMARKS: _____

Calibrated by: [signature] Date: 5-1-96

Rev. 1.0, ---- --

INSTRUMENT MAINTENANCE/CALIBRATION CERTIFICATE

Set#: 141 Procedure#: 018 Configuration: Scintillator
Type: _X_ 2 mm NaI

Unit#: 4591 Mfr/Model: Eberline PRM-5-3 S/N: 2983
Unit#: 7805 Mfr/Model: Eberline PG-2 S/N: ——

Pulse Generator, Eberline MP- 1, S/N 300
Electrostatic KiloVoltmeter: 5R, S/N 960556
Source(s): Pu-239 ,S/N 7552 ,Activity 4150000 dpm
Am-241 ,S/N 7551 ,Activity 6028000 dpm
U-235 ,S/N 22B6102 ,Activity 1.06 g foil

I) MAINTENANCE/PRECALIBRATION:

Batteries: ok Cabling: ok Mechanical/Cleanliness: ok

I { Threshold: 10 mV (fixed at 5 to 10 mV).
Window: 12.5 mV = 25 % (ref.: 25% of Threshold mV)
Audible Function Check: ok

[illegible] 5/96
Pre-Calibrator Date

II) PRIMARY CALIBRATION:

Range (cpm)	Pulser Rate (cpm)	As Found (cpm)	As Left (cpm)	% Diff. Pulser vs As Left
R-2	400	375	~~400~~	400 [illegible]
R-3	4K	3.6K	~~4K~~	4K
R-4	40K	39K	~~40K~~	40K
R-5	400K	380K	~~400K~~	400K

With PHA in, adjust HV to maximize detector response to isotope of interest:

Mode	Isotope	Response As Found (cpm)	Response As Left (cpm)	Efficiency (If Applicable) (%)
HV- 1	Pu-239	13K	14K	N/A
HV- 2	Am-241	300K	300K	N/A
I — HV- 3	U-235	175K	80K	N/A

Mode of Operation: **HV- 1 , Gross**
Ambient Bkgd in chosen Oper. Mode: 200 cpm (ref.: > 300 cpm)

REMARKS: I - re-cal for 25% window.
II - re-cal for Tot Reads

[illegible] 5/8/96
Primary-Calibrator Date

NE Instrument Operational Check Log

Building 579		Location			
SOURCE #	EA 719	MINIMUM	α 99333	BY 80516	
	DN 639	MAXIMUM	α 68000	BY 120750	
INSTRUMENT SET #	**DATE**	**A PASS**	**BG PASS**	**INITIALS**	**COMMENTS**
1259	9/16/96	✓	✓	DCG	
1259	9/17/96	✓	✓	DCG	
1259	9/18/96	✓	✓	DCG	
1259	9/19/96	✓	✓	DCG	
1259	9/20/96	✓	✓	DCG	
1259	9/23/96	✓	✓	DCG	
1259	9/25/96	✓	✓	DCG	

PRM 5-3 Operational Check Log

Building 579	Location			
SOURCE # Mantle	MINIMUM	9000	cts/min	
	MAXIMUM	12000	cts/min	
INSTRUMENT SET #	**DATE**	**PASS/READING**	**INITIALS**	**COMMENTS**
141	9/17/96	✓ 8000	DCC	
141	9/18/96	✓ 9000	DCC	
141	9/20/96	✓ 8000	DCC	

Distribution for ANL/ESH-HP-97/01

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