LOCATION MAPS OF HAZARDOUS SUBSTANCES

The following color-coded plant diagrams depict the primary locations of various hazardous substances in the plant. Substances may have been located in other areas or in other overhead pipes, but these would be minor quantities. The diagrams show both historic and current locations. Many of the tanks or pipelines depicted on the maps are no longer in use or have been removed. Straight colored lines represent pipes supported on an overhead piperack. These diagrams have been prepared based on information currently available to Elf Atochem North America, Inc.

a:colorcover

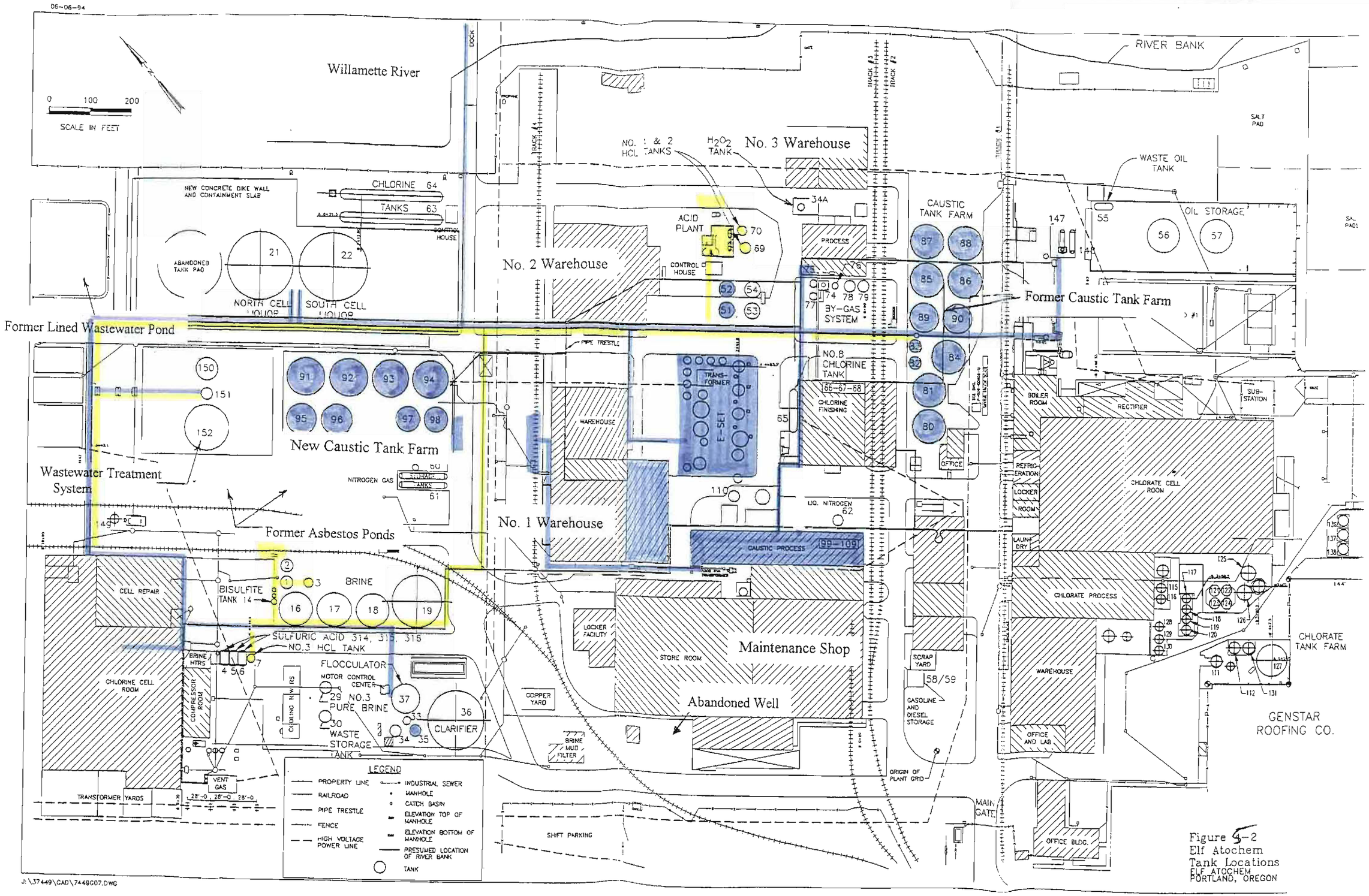
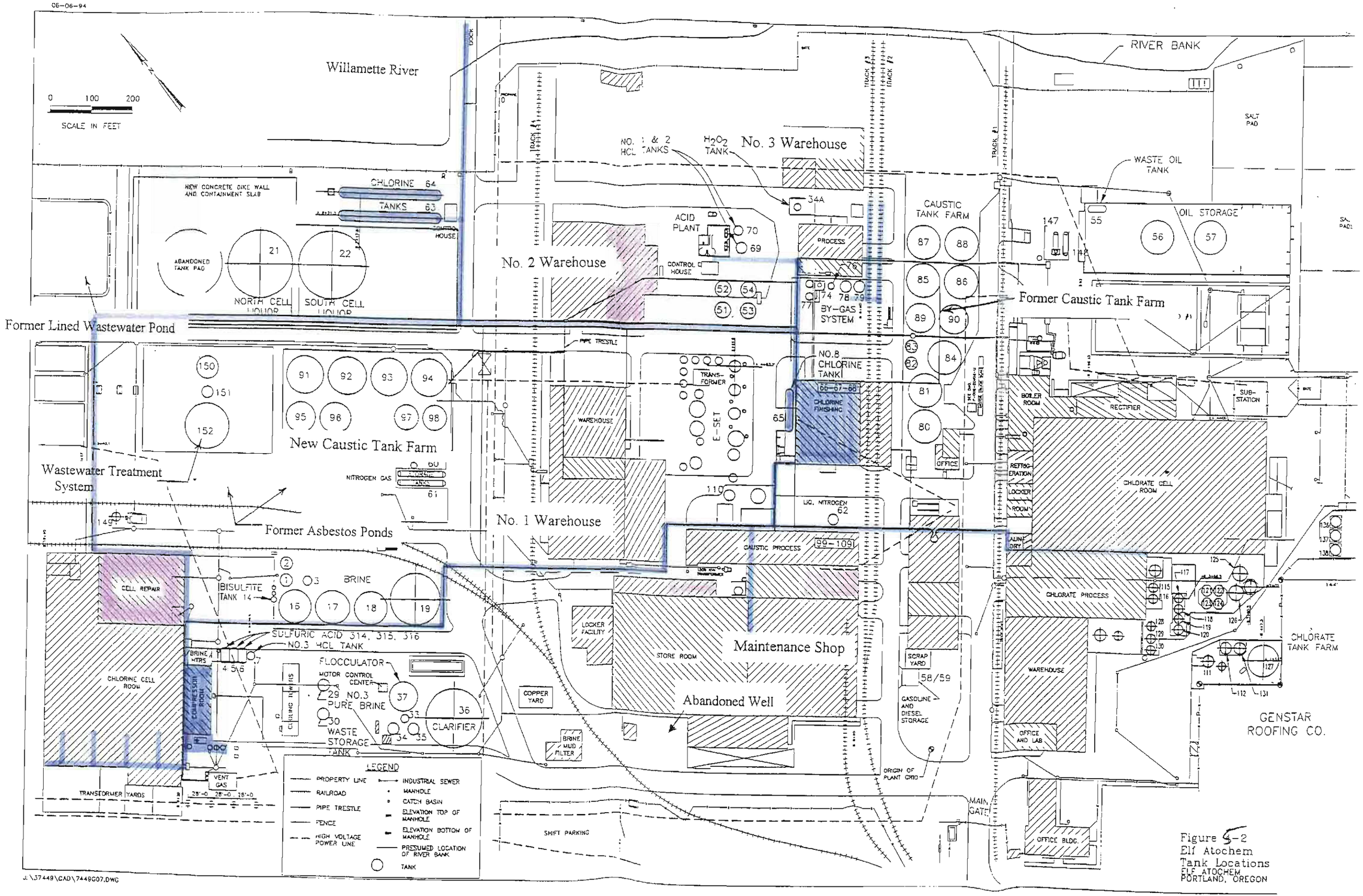


Figure 5-2
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON

ATTACHMENT NO. 1 - PLANT PLOT PLAN



ATTACHMENT NO. 1 - PLANT PLOT PLAN

Asbestos

Chlorine

06-JUN-1994

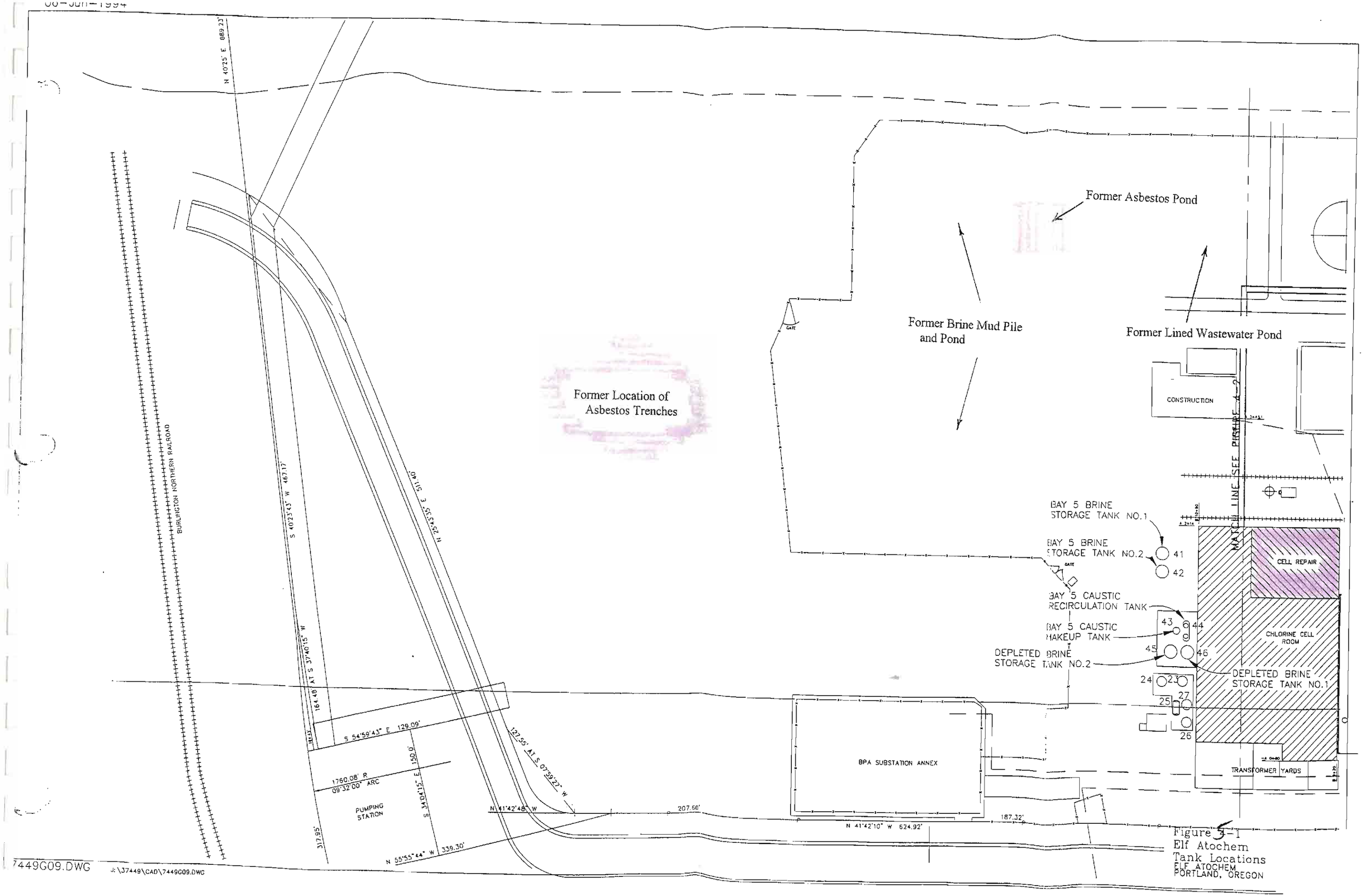
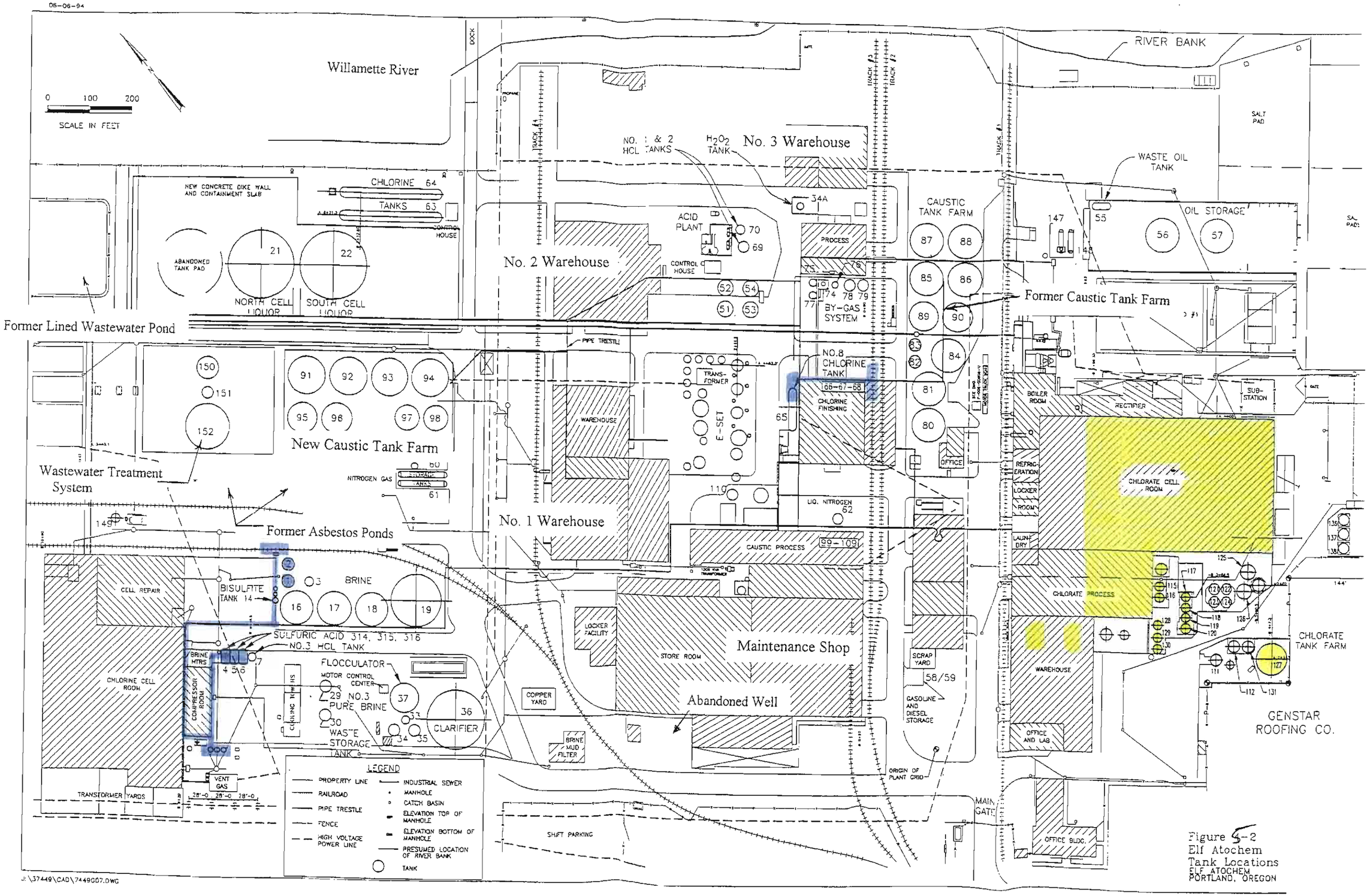


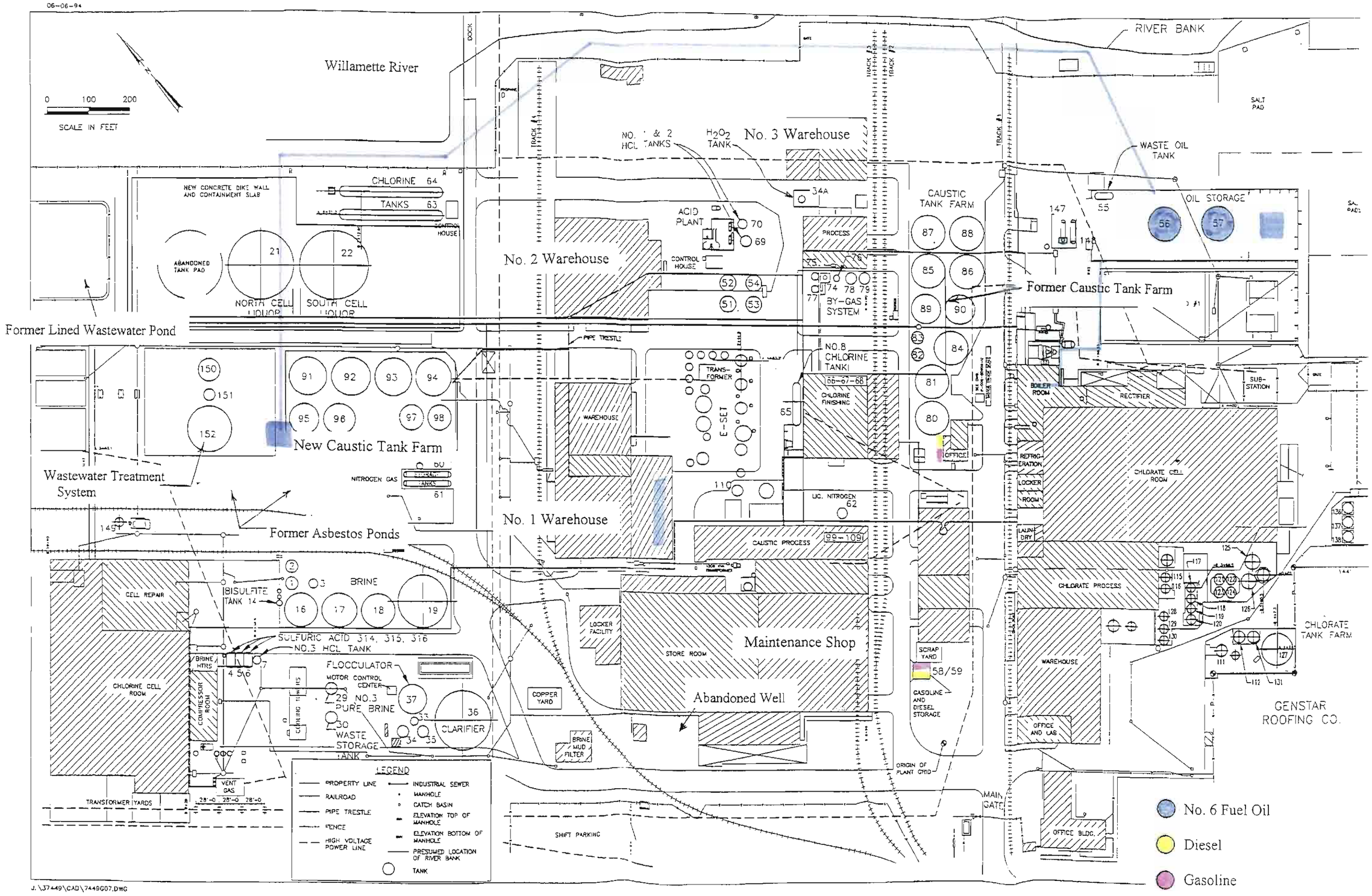
Figure 5-1
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON



ATTACHMENT NO. 1 - PLANT PLOT PLAN

Sodium Bichromate

Sulfuric Acid



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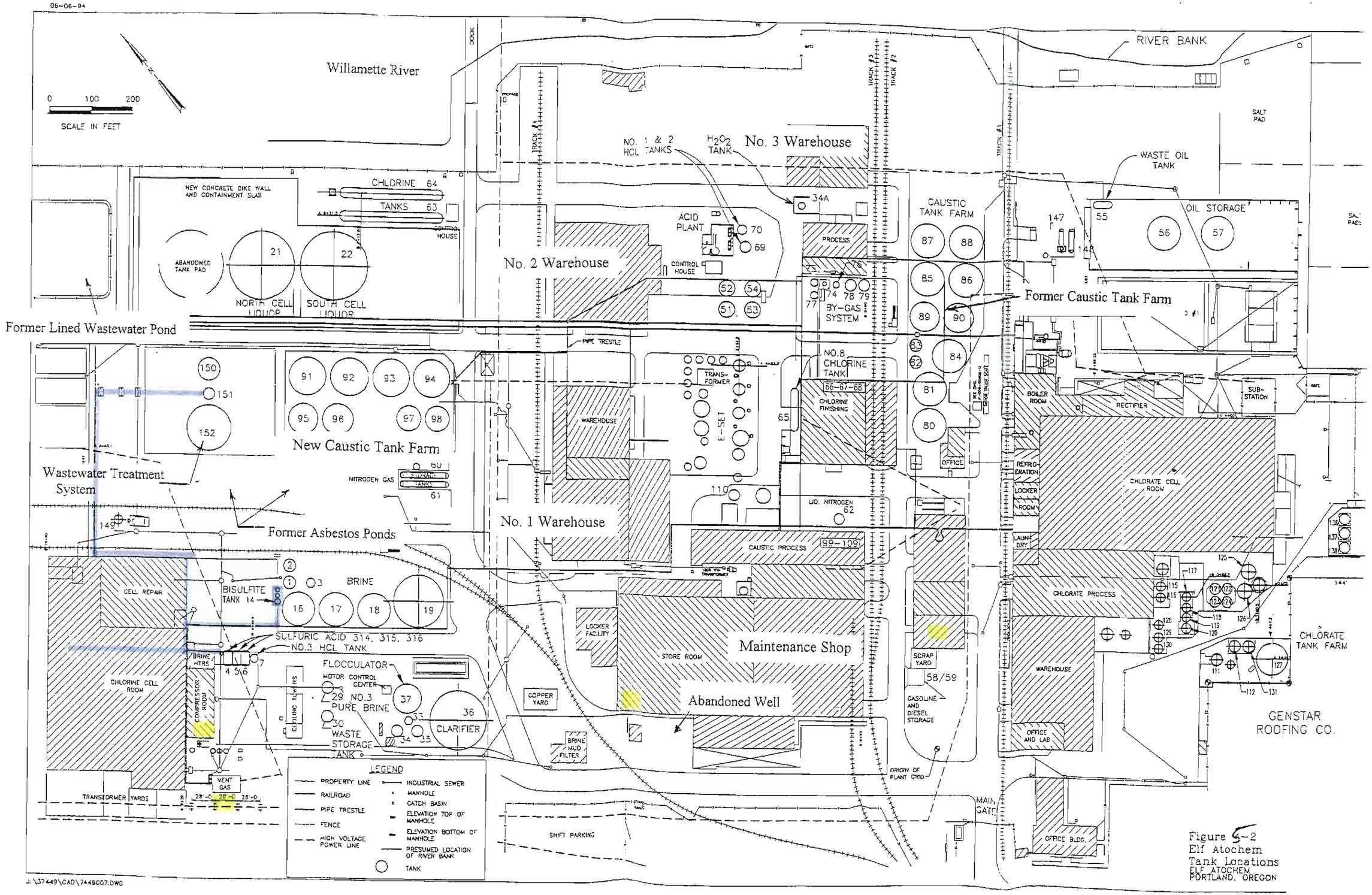

Figure 5-2
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON

ATTACHMENT NO. 1 - PLANT PLOT PLAN

Ethylene Glycol

Sodium Bisulfite

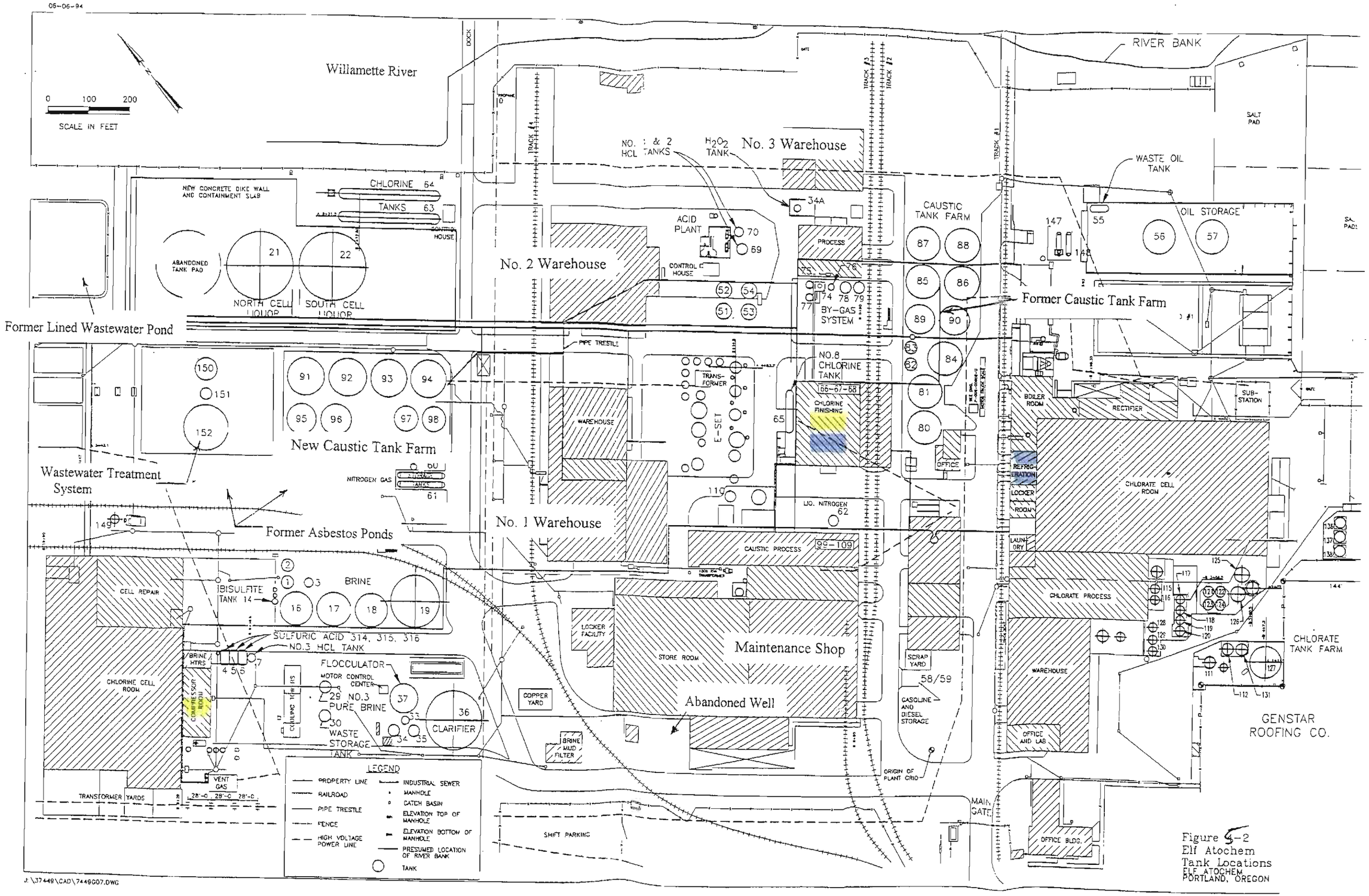

Figure 5-2
Elf Atochem
Tank Locations
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PORTLAND, OREGON

ATTACHMENT NO. 1 - PLANT PLOT PLAN

CFC-11

CFC-12

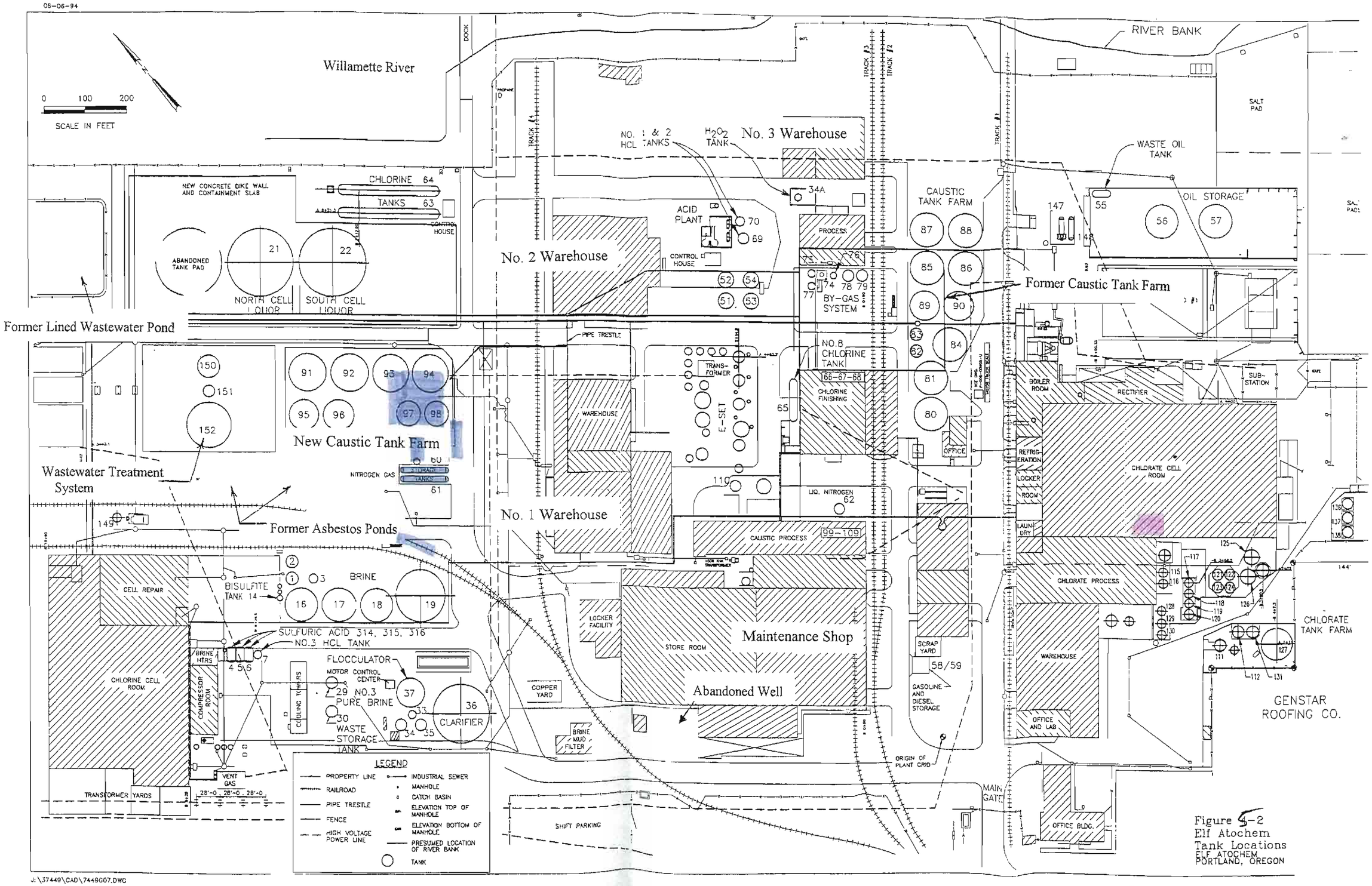
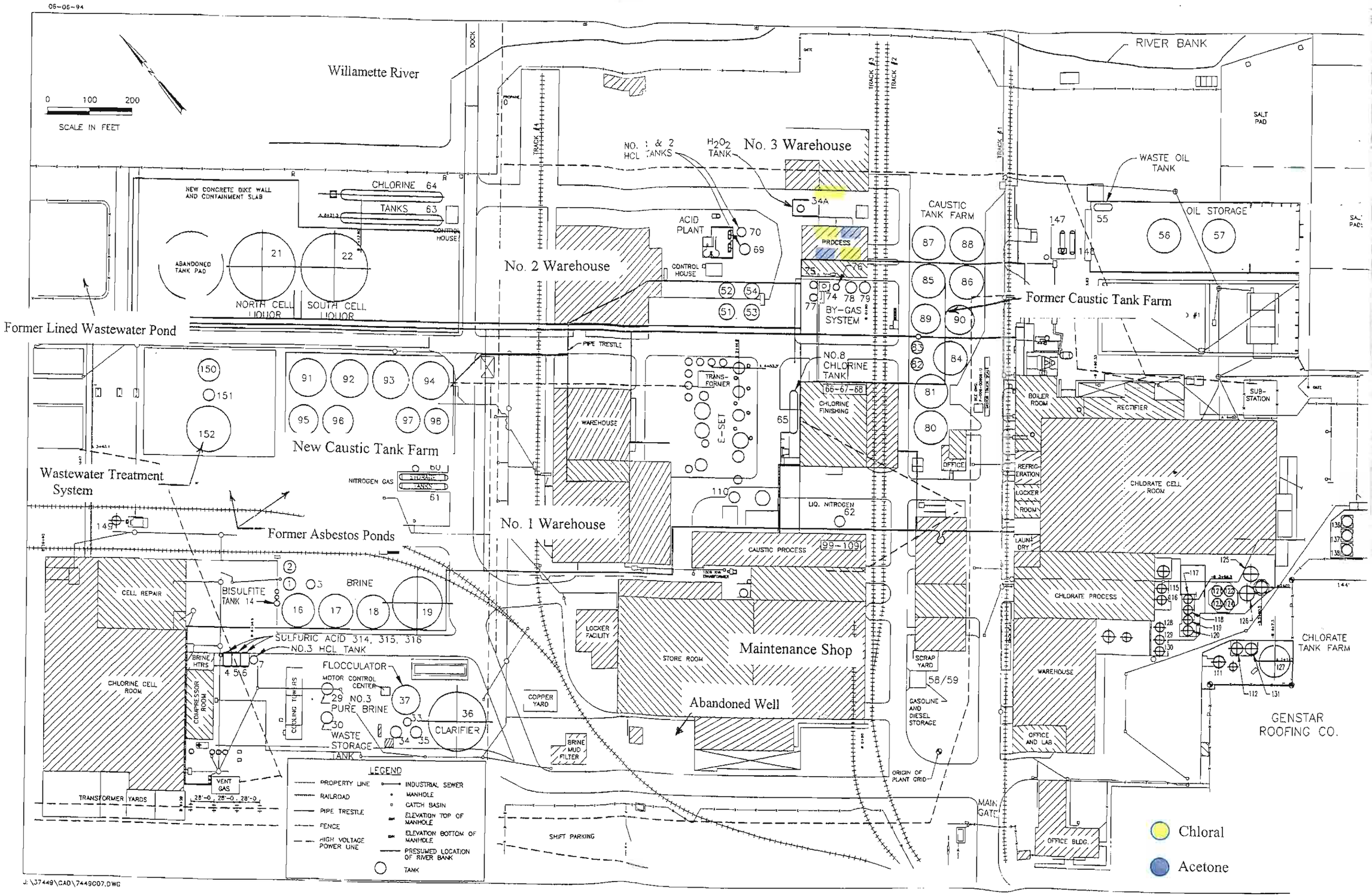


Figure 5-2
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON

Ammonia

Sodium Hypochlorite

ATTACHMENT NO. 1 - PLANT PLOT PLAN



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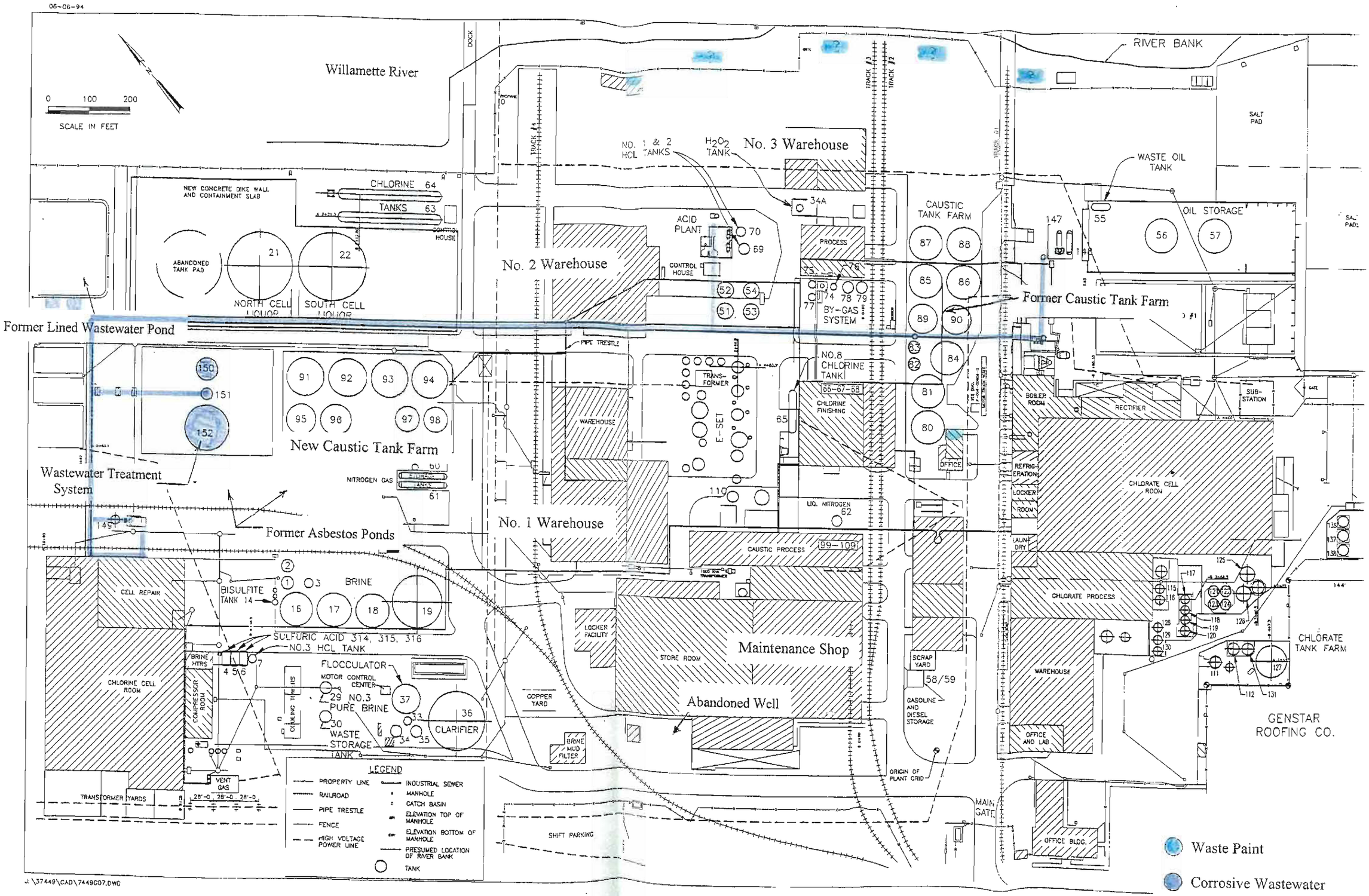

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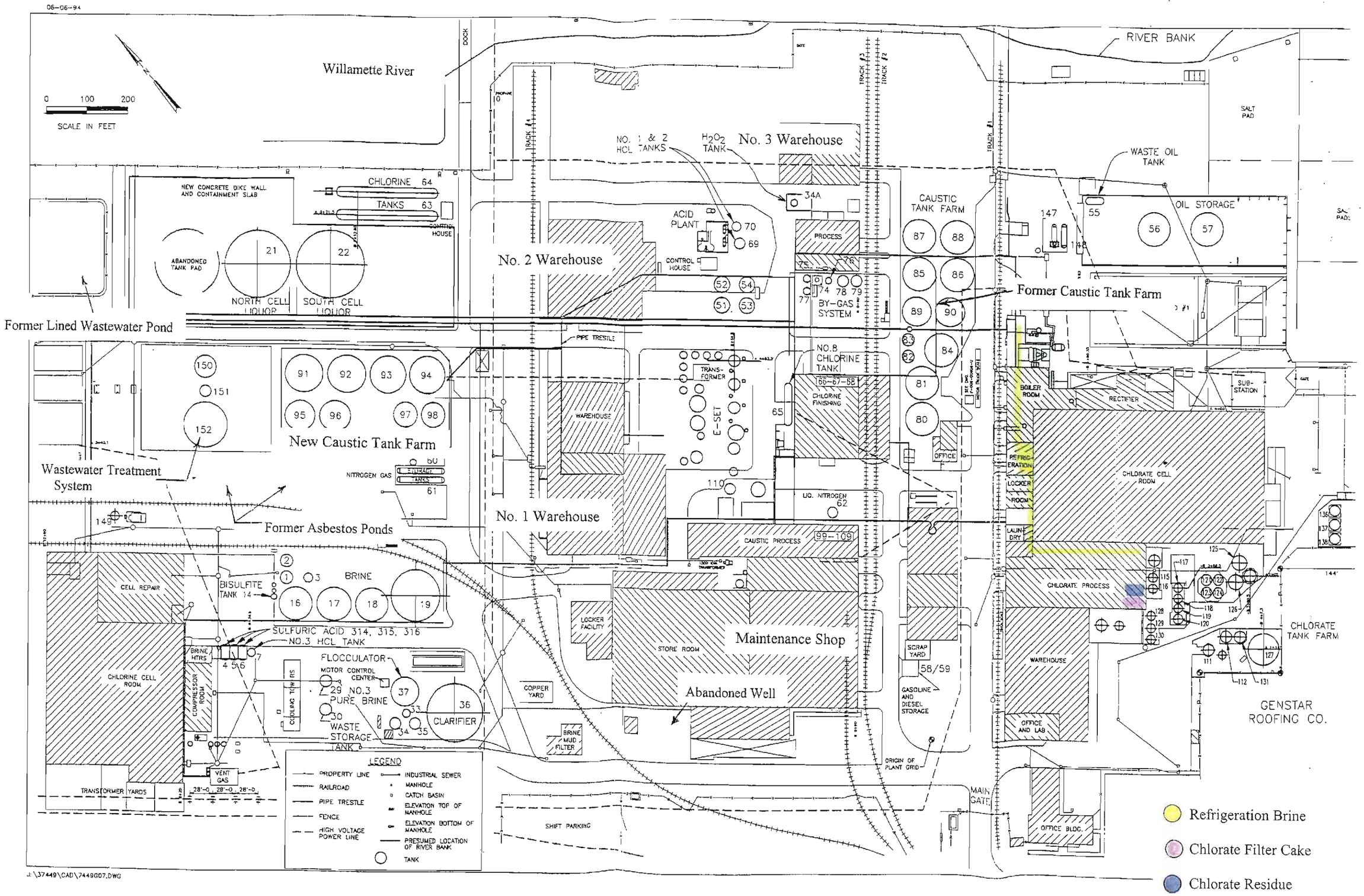


ATTACHMENT NO. 1 - PLANT PLOT PLAN

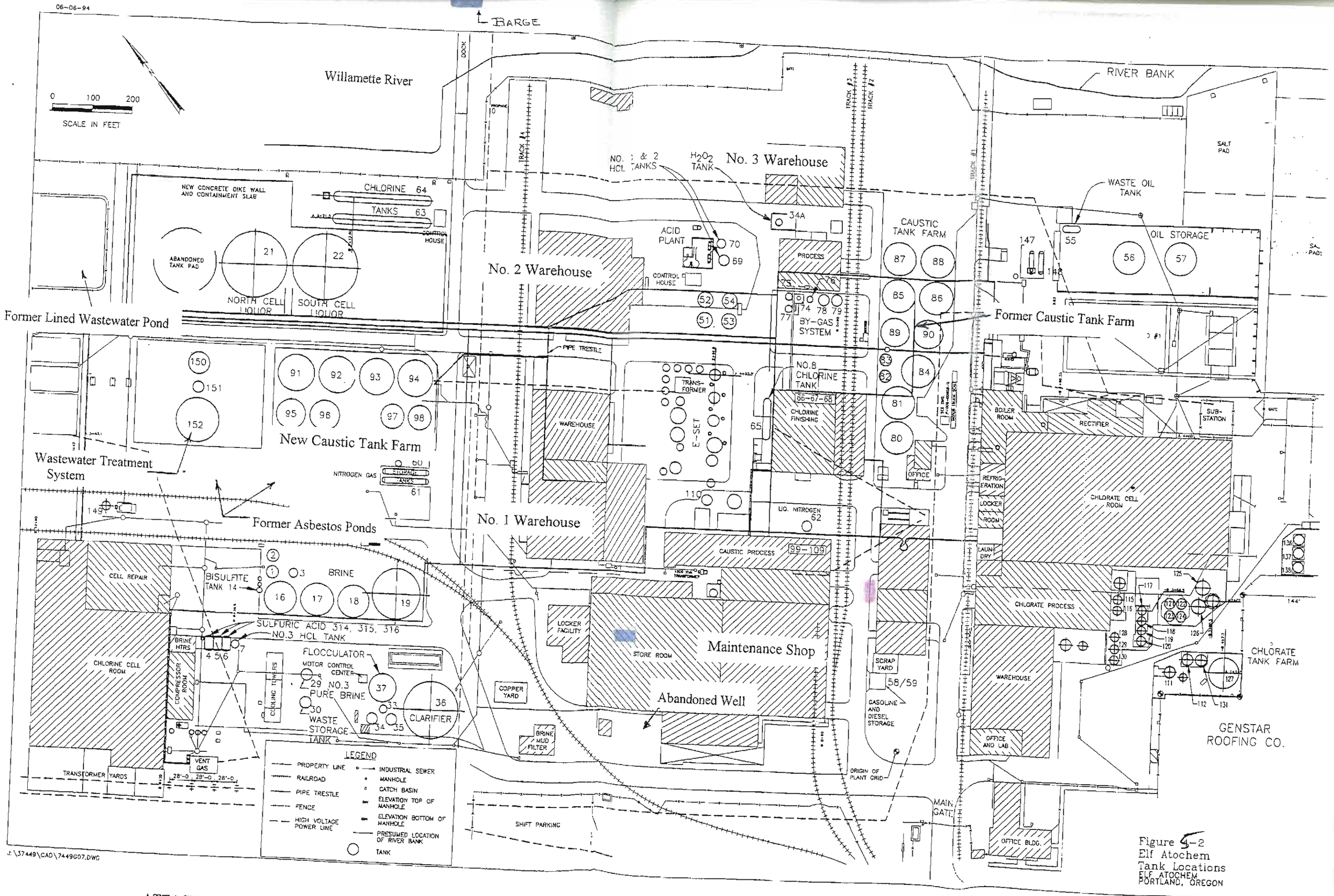


Figure 5-2
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON

ATTACHMENT NO. 1 - PLANT PLOT PLAN

Navigation Batteries

Steam Cleaning Residue

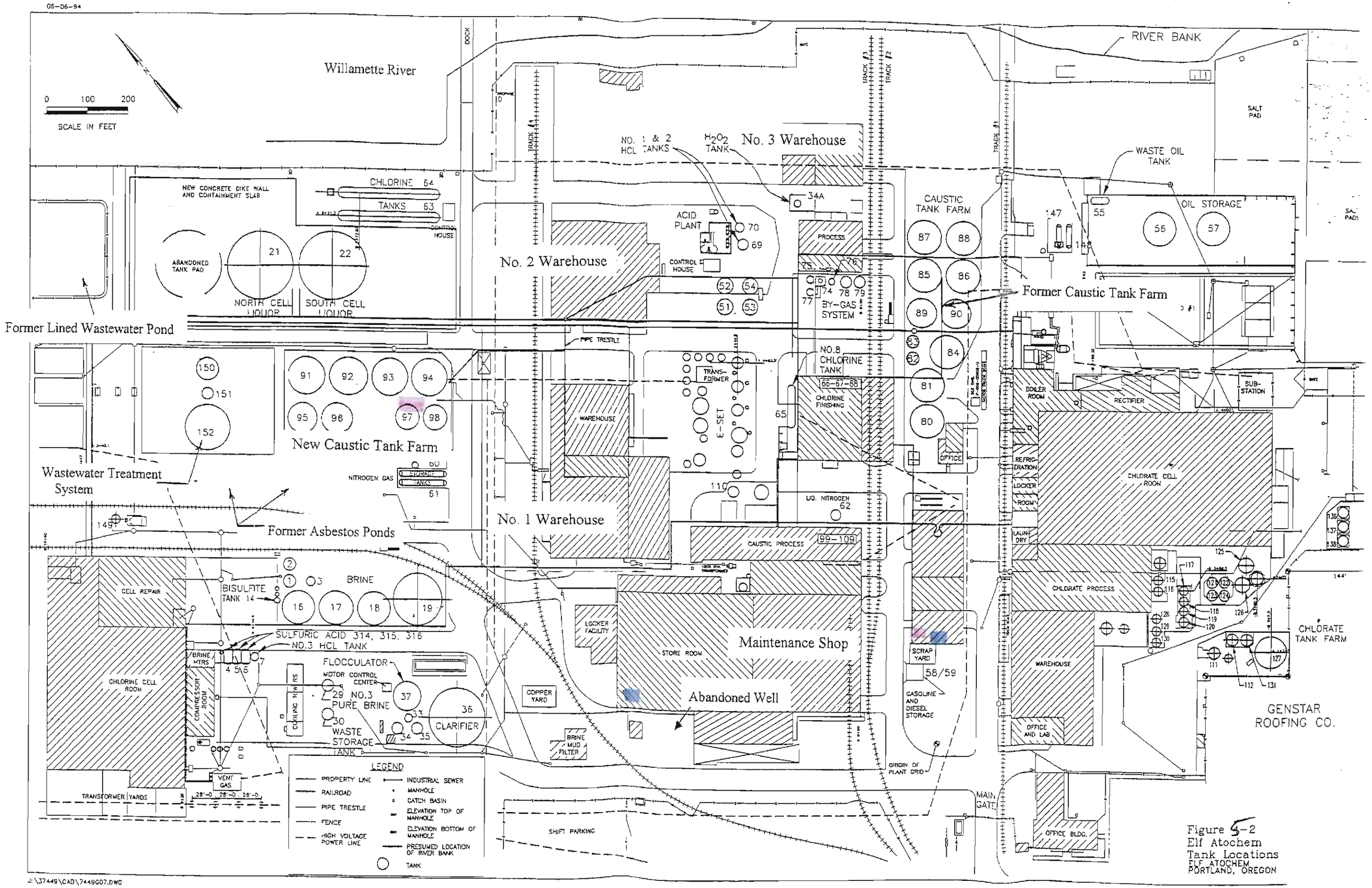


Figure 5-2
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON

Nonhalogenated Solvent

Spent Halogenated Solvent

ATTACHMENT NO. 1 - PLANT PLOT PLAN

POTENTIAL SOURCE AREAS

3.0 Waste Characteristics

3.1 Source Areas

1. Potential Source Area Name: Acid Plant (Hydrochloric Acid Plants)

   Chlorine and hydrogen are burned together in above-ground towers to form hydrogen chloride vapor. The vapor is absorbed in water to form hydrochloric acid.

2. Type of Source: The Acid Plants are a source of corrosive waste water to the plant's waste water system. The Acid Plants are not a source of hazardous substances to soil or groundwater. Above-ground HCL storage tanks are located at the Acid Plants.

3. Location of Source: See Attachment No. I in the original Preliminary Assessment (Plant Plot Plan)

4. Current Use: The Acid Plants are still in use in their original location.

5. Length of Use: Hydrochloric acid production started in 1966 and is still ongoing.

6. Permits Addressing Source: Emissions from the Acid Plants are covered by the plant's Air Contaminant Discharge Permit and the NPDES waste water permit.

7. Type and Condition of Containment: The Acid Plants are basically two aboveground towers. They were originally constructed over a concrete containment pad. The containment pad is provided with a trench which conveys water to the plant's sewer system. The concrete pad is periodically recoated with an acid resistant material.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Waste waters generated in the HCL process can be contaminated with small quantities of HCL. The waste waters flow into the concrete trench and are conveyed to the plant's sewer system. The HCL plants were constructed in the area of the old MCB recovery system. The soil in the immediate area contains DDT and MCB.

9. Release (documented) of Hazardous Substances: The HCL plants have been a contained operation. The only known releases of hazardous substances in the area are associated with the DDT plant operation.

10. Pathways of Hazardous Substances: See Acid Plant Area RI reports previously submitted to the DEQ.

11. Disposal: Maintenance activities can generate waste plastic piping and valves. These materials are washed with water and then placed into plant drop boxes. All waste waters generated from the Acid Plants are handled in the plant's NPDES permitted waste water handling systems.

12. Site Accessibility: The area is within the Portland plant's fenced property and is not accessible to the public.

II. 1. Source Name: Old Caustic Tank Farm (Sodium Hydroxide Tank Farm)

Chlorine and sodium hydroxide manufacturing processes started at the plant in 1946.Originally sodium hydroxide was stored in a few above-ground steel tanks in the tank farm. Over the years as production increased the number of caustic storage tanks in this area increased. A new sodium hydroxide tank farm was completed and put into operation in 1996. The old caustic tank farm is no longer used.

2. Type of Source: Above-ground storage tanks

3. Location of Source: See Attachment No. I in the original Preliminary Assessment (Plant Plot Plan)

4. Current Use: The above-ground storage tanks are still present, but the tank farm is no longer in use.

5. Length of Use: Caustic was first stored in the area of the Old Caustic Tank Farm in 1946 and additional tanks were added over the years. The tank farm was used until 1996.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The above-ground storage tanks were constructed on soil. Drains near each tank conveyed rainwater to a central sump. This drainage originally entered the plant's industrial sewers. In the early 1970's a pump was installed to convey drainage from the tank farm to the plant's waste water treatment system. In 1988 a concrete containment wall was constructed around the perimeter of the tanks.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Sodium hydroxide is the only hazardous substance which has been stored in these tanks, Sodium hydroxide is hazardous because of its high pH.

9. Release (documented) of Hazardous Substances: On June 8, 1993 an expansion joint ruptured inside the old caustic tank farm which allowed approximately 225 gallons of 50% sodium hydroxide to spill onto the floor of the tank farm. The floor of the old tank farm has collection sumps which conveyed the caustic to a central tank farm sump. The caustic was collected in the sump and pumped to the plant's waste water treatment system for neutralization. The entire floor area was cleaned with water and the wash water was conveyed to the treatment system.

   On February 23, 1996 a tank of sodium hydroxide overflowed inside the old caustic tank farm spilling approximately 200 gallons of caustic. The caustic was collected in floor sumps and was pumped to the plant's waste water treatment system for neutralization. The entire tank farm floor area was washed with water and the wash water was conveyed to the treatment system.

10. Pathways of Hazardous Substances: Any sodium hydroxide which may have entered the soils in the area of the old caustic tank farm could have entered the groundwater and would have flowed north/northeast towards the Acid Plant area.

11 Disposal: Waste waters generated within the old tank farm were disposed of in the plant's waste water systems.

12. Site Accessibility: The area is within the Portland plant's fenced property and is not accessible to the public.

III. 1. Source Name: Wastewater Treatment System:

   The existing wastewater treatment system was constructed in 1995. It consists of three above-ground treatment tanks for primary pH neutralization. The system is located within a concrete secondary containment system. Wastewater flows into the tanks from pipes supported on overhead piperacks. For a description of the wastewater system which existed prior to 1995, refer to the Waste Characteristics section of the original Preliminary Assessment. This system is not a source of hazardous substances to the environment.

2. Type of Source: Above-ground tanks

3. Location of Source: Immediately north of the new Caustic Tank Farm within the fenced portion of the plant's property.

4. Current Use: The system is currently permitted under the NPDES permit system for wastewater treatment.

5. Length of Use: Approximately 5 years.

6. Permits Addressing Source: An NPDES permit is maintained to operate this treatment system.

7. Type and Condition of Containment: The treatment system is located within a concrete secondary containment system. The system is in very good condition.

8. Name and Quantity of Hazardous Substances and Contaminated Media: The above-ground tank based treatment system is designed to treat waste waters which could contain hydrochloric acid or sodium hydroxide.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: All waste waters entering the system are discharged in accordance with the NPDES permit.

12. Site Accessibility: The wastewater treatment system lies within the plant's fenced property and is not accessible to the public.

IV. 1. Source Name: Gasoline, Diesel, and Fuel Oil Tanks

The plant maintains one 1,000 gallon above-ground steel tank for gasoline and one 1,000 gallon above-ground steel tank for diesel fuel. These tanks are used to fill mobile plant equipment. These tanks are not a source of hazardous substances to the environment.

The fuel oil tanks are located within the Oil Tank Farm and have been previously discussed in the Waste Characteristics section of the original Preliminary Assessment.

2. Type of Source: Above-ground steel tanks.

3. Location of Source: The gasoline and diesel fuel tanks are located between the Front Office and the Maintenance Shop.

4. Current Use: These tanks are currently in use.

5. Length of Use: The diesel and gasoline tanks were installed approximately 20 years ago.

6 . Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: These tanks are provided with a concrete secondary containment system. The concrete was coated with a clear silicone sealer a few years ago.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Not applicable. There is no contaminated media associated with these tanks.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Not applicable.

12. Site Accessibility: The gasoline and diesel fuel tanks are located near the Front Guard Shed within the fenced portion of the plant's property and are not accessible to the public.

V. 1. Source Name: Used/Waste Oil Tank

Used oil from the Auto Shop and the Boiler Room is periodically transferred to a 2,400 gallon above-ground steel storage tank. This tank is not a source of hazardous substances to the environment.

2. Type of Source: Above-ground storage tank.

3. Location of Source: The Used Oil Tank is located in the northeast corner of the Oil Tank Farm.

4. Current Use: The tank is currently used to store used oil.

5. Length of Use: It is uncertain when the Used Oil Tank was originally put into service.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The Used Oil Tank lies within the Oil Tank Farm. The tank farm is surrounded with concrete containment walls and is provided with an asphalted floor. A sump pump in a concrete basin within the floor of the tank farm conveys rainwater to the oil/water skimmer at the Boiler Room.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: There are no known releases or contaminated media associated with this tank.

9. Releases (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Not applicable.

12. Site Accessibility: The Used Oil Tank is within the fenced portion of the plant's property and in not accessible to the public.

VI. 1. Source Name: Maintenance Shop

The Maintenance Shop is the location where certain types of plant maintenance occurs. These maintenance activities include welding, metal grinding and machining, pump rebuilding, and some electrical work.

In the early days of plant operation the Maintenance Shop was located in the existing Location of the Auto Shop.

2. Type of Source: Not applicable.

3. Location of Source: The existing Maintenance Shop is located just north of the plant's Front Office. The former Shop was located in the Auto Shop just east of the Front Guard Shed.

4. Current Use: See Source Name above.

5. Length of Use: The existing Maintenance Shop has been in use since 1971.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The Shop is enclosed and has a concrete floor.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Not applicable.

9. Release (documented)of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Waste metals generated in the Maintenance Shop are placed in recycle drop boxes.

12. Site Accessibility: The Maintenance Shop is within the fenced portion of the

plant's property and is not accessible to the public.

VII. 1. Source Name: Transformers and Transformer Yards

The plant maintains several electrical transformers at different locations to reduce the voltage of electricity from outside suppliers so it can be used in the plant.

2. Type of Source: Above-ground steel transformers with oil cooling systems.

3. Location of Source: The transformers are located at several different locations in the plant. A few spare transformers are kept in a containment area on the west side of the Maintenance Shop. See Attachment No. I in the original Preliminary Assessment (Plant Plot Plan).

4. Current Use: Transformers are currently used in the plant to reduce the voltage of electricity supplied by utility companies.

5. Length of Use: The length of use of each transformer varies. Transformers have been used at the plant since commencement of the original sodium chlorate operations in 1941.

6. Permits Addressing Source: Not applicable.

7. Type, and Condition of Containment: All of the electrical transformers are located on concrete foundations. Most of the transformers are surrounded with concrete flooring and curbs. A few of the transformer systems are surrounded with river rock and concrete curbing.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Each transformer contains oil for cooling purposes. There are no regulated levels of PCB in any of the transformers.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Occasionally the oil must be removed from a transformer during maintenance. This work is either done at a shop remote to our plant, or at the plant. Spent oils are handled by an oil recycler.

12. Site Accessibility: All of the transformers are located within the plant's fenced property and are not accessible to the public.

VIII. 1. Source Name: Caustic Recirculation Tank

The Caustic Recirculation Tank is an above-ground rubber lined 9,253 gallon steel tank. The tank contains approximately 32% sodium hydroxide. It is used as a cell liquor (or caustic) recirculation tank for the membrane chlorine cells. The tank is not a source of hazardous substances to the environment.

2. Type of Source: Above-ground tank.

3. Location of Source: The tank is located in a concrete containment vault which is immediately on the north side of the chlorine cell room. The vault contains several tanks and pumps.

4. Current Use: See Source Name above.

5. Length of Use: The Caustic Recirculation Tank was placed into service in approximately 1990.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The concrete containment vault was newly constructed in approximately 1989 or 1990. The vault is roughly 8 feet deep, 75 feet wide and 100 feet long. The concrete is in good condition.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: The Caustic Recirculation Tank contains approximately 32% caustic. The tank is not a source of hazardous substances to the environment and there is no contaminated media associated with the tank.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Not applicable.

12. Site Accessibility: The Caustic Recirculation Tank is within the fenced portion of the plant's property and is not accessible to the public.

IX. 1. Source Name: Caustic Makeup Tank

The Caustic Makeup Tank was intended to contain 50% caustic for use during startup of the membrane chlorine cells. The tank has a capacity of 1,850 gallons, but has not been used for a number of years. This tank is not a source of hazardous substances to the environment.

2. Type of Source: Above-ground polyethylene tank.

3. Location of Source: The tank is located near the Caustic Recirculation Tank in a concrete containment vault which is immediately north of the chlorine cell room. The vault contains several tanks and pumps.

4. Current Use: The tank is currently not in use..

5. Length of Use: The Caustic Makeup Tank was placed into service in approximately 1990.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The concrete containment vault was newly constructed in approximately 1989 or 1990. The vault is roughly 8 feet deep, 75 feet wide, and 100 feet long. The concrete is in good condition.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: The Caustic Makeup Tank is currently not in use. The tank is not a source of hazardous substances to the environment and there is no contaminated media associated with the tank.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Not applicable.

12. Site Accessibility: The Caustic Makeup Tank is within the fenced portion of the plant's property and is not accessible to the public.

X. 1. Source Name: Chlorate Tank Fann

The Chlorate Tank Farm consists of numerous above ground fiberglass tanks which are used for the storage of final sodium chlorate products and intermediate products.

2. Type of Source: Above-ground tanks.

3. Location of Source: The Chlorate Tank Farm is located on the south side of the sodium chlorate process area, along the plant's southern fence.

4. Current Use: See Source Name above.

5. Length of Use: Operations started in the sodium chlorate plant in 1941. In the early years very few tanks were located in the tank farm. Most of the tanks present today have been added over the last 10- 15 years.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The tank farm is composed of concrete floors, and concrete curbs and walls. The concrete is in good condition.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Sodium bichromate is used in the sodium chlorate process. Refer to the discussion provided for sodium bichromate in the Current and Historical Site Operations Section. Also refer to the information in a following section which pertains to the response to the November 1987 sodium chlorate spill.

9. Release (documented) of Hazardous Substances: Refer to the information in a following section which pertains to the response to the November 1987 sodium chlorate spill.

10. Pathways of Hazardous Substances: There are no known migration pathways from the sodium chlorate tank farm.

11. Disposal: The soils excavated in response to the November 1987 spill were taken to the Hillsboro Landfill.

12. Site Accessibility: The Chlorate Tank Farm is within the fenced portion of the plant's property and is not accessible to the public.

XI.

1. Source Name: Laboratory

2. Type of Source: The Laboratory provides chemical analytical work for the plant. Laboratory sinks are connected to the City of Portland sanitary sewer. Obsolete or out of date chemicals are periodically lab-packed and sent to a RCRA Subtitle C facility.

3. Location of Source: The Laboratory is immediately east of the Front Office.

4. Current Use: See Type of Source above.

5. Length of Use: It is uncertain when the laboratory was originally constructed.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: Not applicable. The laboratory is provided with concrete floors and brick exterior walls.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Not applicable. Cabinets of various analytical substances are maintained in the laboratory.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: See Type of Source above.

12. Site Accessibility: The Laboratory is within the fenced portion of the plant's property and is not accessible to the public.

XII. 1. Source Name: Sand Blasting Area

Sand blasting can occur throughout the plant in preparation for maintenance painting. The spent sand is swept up and taken to the Sand Blast Pile for temporary storage. Sand blasting of small parts and/or equipment also occurs immediately north of the Sand Blast Pile. Spent sand is recycled off-site.

2. Type of Source: Above-ground pile.

3. Location of Source: The Sand Blast Pile is north of Warehouse No. 3, adjacent to the plant's eastern fence.

4. Current Use: See Source Name above.

5. Length of Use: It is uncertain when the Sand Blast Pile originated.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The Sand Blast Pile is located on soil.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Prior to shipping the spent sand off-site for recycling, a sample of the sand is analyzed for TCLP metals. The sample results confirm that metals are either nondetectable or are present in very low quantities.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Spent sand is recycled off-site for use in asphalt materials.

12. Site Accessibility: The spent Sand Blast Pile is within the fenced portion of the plant's property and is not accessible to the public.

XIII. 1. Source Name: Painting Area

The Painting Area is located immediately north of the spent Sand Blast Pile. It is the area where the painting contractor paints small parts and equipment. A RCRA satellite accumulation container is located in the paint shed to hold paint wastes.

2. Type of Source: Portable containers of paint and paint thinner are stored in the paint shed.

3. Location of Source: See Source Name above.

4. Current Use: See Source Name above.

5. Length of Use: It is uncertain when the Painting Area was originally established.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The paint shed is located on a soil area. Containers of paint thinner and the RCRA satellite accumulation container are located on secondary containment spill pallets.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Various containers of painting materials are stored in cans in the paint shed. There have been no known releases of hazardous substances from these activities.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: Waste paint materials are stored in a RCRA satellite accumulation container and are periodically sent off-site to a RCRA Subtitle C facility.

12. Site Accessibility: The Painting Area is within the fenced portion of the plant's property and in not accessible to the public.

XIV. 1. Source Name: Copper Yard

The Copper Yard is an area where flat copper bus bars and copper cable are stored for future use in the plant. The copper is stored within a locked cyclone fence because of the value of the copper.

2. Type of Source: The Copper Yard is not a source of hazardous substances to the environment.

3. Location of Source: The Copper Yard is located north of the Maintenance Shop.

4. Current Use: See Source Name above.

5. Length of Use: It is uncertain when the Copper Yard originated.

6. Permits Addressing Source: Not applicable.

7. Type and Condition of Containment: The Copper Yard consists of a graveled area surrounded by a locked fence.

8. Name and Quantity of Hazardous Substances and Contaminated Media Found in the Source: Not applicable.

9. Release (documented) of Hazardous Substances: None.

10. Pathways of Hazardous Substances: Not applicable.

11. Disposal: The copper metal is stored for reuse. On rare occasions some of the copper may be sold to a metal recycler.

12. Site Accessibility: The Copper Yard is within a locked cage located within the fenced portion of the plant's property and is not accessible to the public.

a:activesource

DOCUMENTATION OF SAMPLING RESULTS and SOIL REMOVAL ACTIVITIES ASSOCIATED WITH OIL TANK FARM SOILS

In 1991 Elf Atochem North America started to plan for the removal of oil stained soils in the Oil Tank Farm. The only materials known to be stored within the tank farm were No. 6 fuel oil and used oil.

In September of 1991 shallow soil samples were taken around the No. 3 Oil Tank and the Used Oil Tank. There was visibly oil stained soils near the No. 3 Oil Tank. Samples were analyzed for TCLP metals, TCLP benzene, Total PCB's, and VOC's. All sample results were nondetectable, with the exception of a slight detection of barium.

In October of 1993 deep soil samples were taken around the No. 3 Oil Tank by an environmental contractor in the area of the visibly stained soils. Samples were analyzed for TCLP metals, Total PCB's, and VOC's. All sample results were nondetectable, with the exception of a slight detection of chromium. (Chromium was also found in the method blank).

In August 1995 the remediation project was started. The goal of the project was to remove all soils with any visible oil staining or petroleum odor, and to use a combination of field and laboratory TPH screening so that all remaining soils would contain less than 100 ppm using method TPH-418.1 Modified.

On the second day of the project, the contractor inquired about a musty odor in the soil. On August 22, 1995 samples of soil removed by the excavator were obtained and composited for analysis for TCLP volatile and semivolatile organic compounds. All sample results were nondetectable.

1,966 tons of soil were removed from the Oil Tank Farm. The soils were disposed of at the Columbia Ridge Landfill in Arlington, Oregon. The project was closed in September 1995.

Summary of soil composites taken on 10-7-93 by PCE Environmental from the top 5' of soil around the No. 3 oil tank. Samples were obtained from four different sites of the tank.

Parameter	Soils Around No. 3 Oil Tank
TCLP Metals	All N.D. except slight detection of chromium (at same concentration as method blank)
Total PCB's	N.D.
VOC's	N.D.

Columbia Analytical Services inc.

October 29, 1993

Service Request No.: K935998

Prad Shah
ELF ATOCHEM North America, Inc.
P. O. Box 4102
Portland, OR 97208-4102

Dear Prad:

Enclosed are the results of the sample submitted to our laboratory on October 11, 1993. For your reference, these analyses have been assigned our service request number K935998.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 216.

Respectfully submitted,

Columbia Analytical Services, Inc.

Jeff Christian
Laboratory Director

JC/akn

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ELF Atochem North America
Matrix: Soil

Date Received: 10/11/93
Date TCLP Performed: 10/19/93
Date Analyzed: 10/21,25/93
Work Order No.: K935998

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

				Sample Name:	Soil Sample	Method Blank
				Lab Code:	K599801	K5998MB
Analyte	EPA Method	MRL(a)	Regulatory Limit*			
Arsenic	3010/6010	0.2	5.0		ND	ND
Barium	3010/6010	1.0	100		ND	ND
Cadmium	3010/6010	0.02	1.0		ND	ND
Chromium	3010/6010	0.02	5.0		0.05(b)	0.05
Lead	3010/6010	0.10	5.0		ND	ND
Mercury	7470	0.001	0.2		ND	ND
Selenium	3010/6010	0.2	1.0		ND	ND
Silver	3010/6010	0.02	5.0		ND	ND

a MRLs are elevated because the sample required dilution.
b Analyte concentration is an estimate because this analyte was also found in the method blank.
* From 40 CFR Part 261,et al., and Federal Register, March 29, 1990 and June 29, 1990

TCLPM/03-13-92

Approved: [signature]

Date: 10-29-93 Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ELF ATOCHEM North America, Inc.	**Date Received:**	10/11/93
Sample Matrix:	Soil	**Date Extracted:**	10/15/93
		Work Order No.:	K935998

Halogenated and Aromatic Volatile Organic Compounds
EPA Methods 5030/8010/8020
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Soil Sample	Method Blank
Lab Code:		K5998-1	K5998-MB
Date Analyzed:		10/16/93	10/16/93
Analyte	**MRL**		
Dichlorodifluoromethane (Freon 12)	0.1	ND	ND
Chloromethane	0.1	ND	ND
Vinyl Chloride	0.05	ND	ND
Bromomethane	0.05	ND	ND
Chloroethane	0.05	ND	ND
Trichlorofluoromethane (Freon 11)	0.05	ND	ND
1,1-Dichloroethene	0.05	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.05	ND	ND
Methylene Chloride	0.5	ND	ND
trans-1,2-Dichloroethene	0.05	ND	ND
cis-1,2-Dichloroethene	0.05	ND	ND
1,1-Dichloroethane	0.05	ND	ND
Chloroform	0.05	ND	ND
1,1,1-Trichloroethane (TCA)	0.05	ND	ND
Carbon Tetrachloride	0.05	ND	ND
Benzene	0.05	ND	ND
1,2-Dichloroethane	0.05	ND	ND
Trichloroethene (TCE)	0.05	ND	ND
1,2-Dichloropropane	0.05	ND	ND
Bromodichloromethane	0.05	ND	ND
2-Chloroethyl Vinyl Ether	0.5	ND	ND
trans-1,3-Dichloropropene	0.05	ND	ND
Toluene	0.1	ND	ND
cis-1,3-Dichloropropene	0.05	ND	ND
1,1,2-Trichloroethane	0.05	ND	ND
Tetrachloroethene (PCE)	0.05	ND	ND
Dibromochloromethane	0.05	ND	ND
Chlorobenzene	0.05	ND	ND
Ethylbenzene	0.1	ND	ND
Total Xylenes	0.1	ND	ND
Bromoform	0.05	ND	ND
1,1,2,2-Tetrachloroethane	0.05	ND	ND
1,3-Dichlorobenzene	0.1	ND	ND
1,4-Dichlorobenzene	0.1	ND	ND
1,2-Dichlorobenzene	0.1	ND	ND

Approved by _____ Date 10-29-93

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ELF Atochem North America	**Date Collected:**	10/7/93
Project:	--	**Date Received:**	10/11/93
Sample Matrix:	Soil	**Date Extracted:**	10/18/93
		Service Request:	K935998

Polychlorinated Biphenyls (PCBs)
EPA Methods 3540/8080
Units: mg/Kg (ppm)
Dry Weight Basis

	Sample Name:	Soil Sample	Method Blank
	Lab Code:	K5998-01	K5998-MB
	Date Analyzed:	10/20/93	10/20/93
Analyte	**MRL**		
Aroclor 1016	1	ND	ND
Aroclor 1221	1	ND	ND
Aroclor 1232	1	ND	ND
Aroclor 1242	1	ND	ND
Aroclor 1248	1	ND	ND
Aroclor 1254	1	ND	ND
Aroclor 1260	1	ND	ND
Total Aroclor	1	ND	ND

Approved By _____ Date 10-29-93

[KP35998.XLW]S5998ARA.XLS/10/29/93

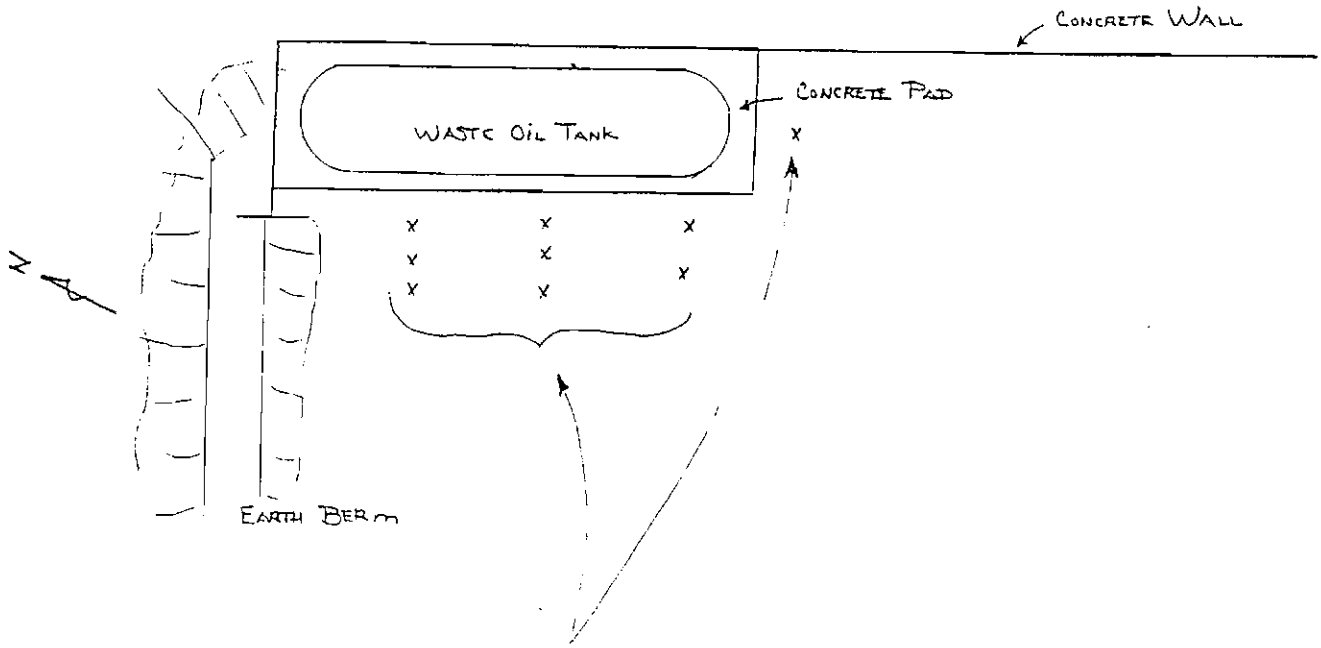
Summary of composite soil samples taken on 9-30-91 by LDP around waste oil tank and from oil stained soils around No. 3 oil tank.

Parameter	Soils Around Used Oil Tank	Soils Around No. 3 Oil Tank
TCLP	All N.D. except slight detection of barium	All N.D. except slight detection of barium
TCLP	N.D.	N.D.
TCLP	N.D.	N.D.
Total PCB's	N.D.	N.D.
VOC's	N.D.	N.D.

a:oilsoils

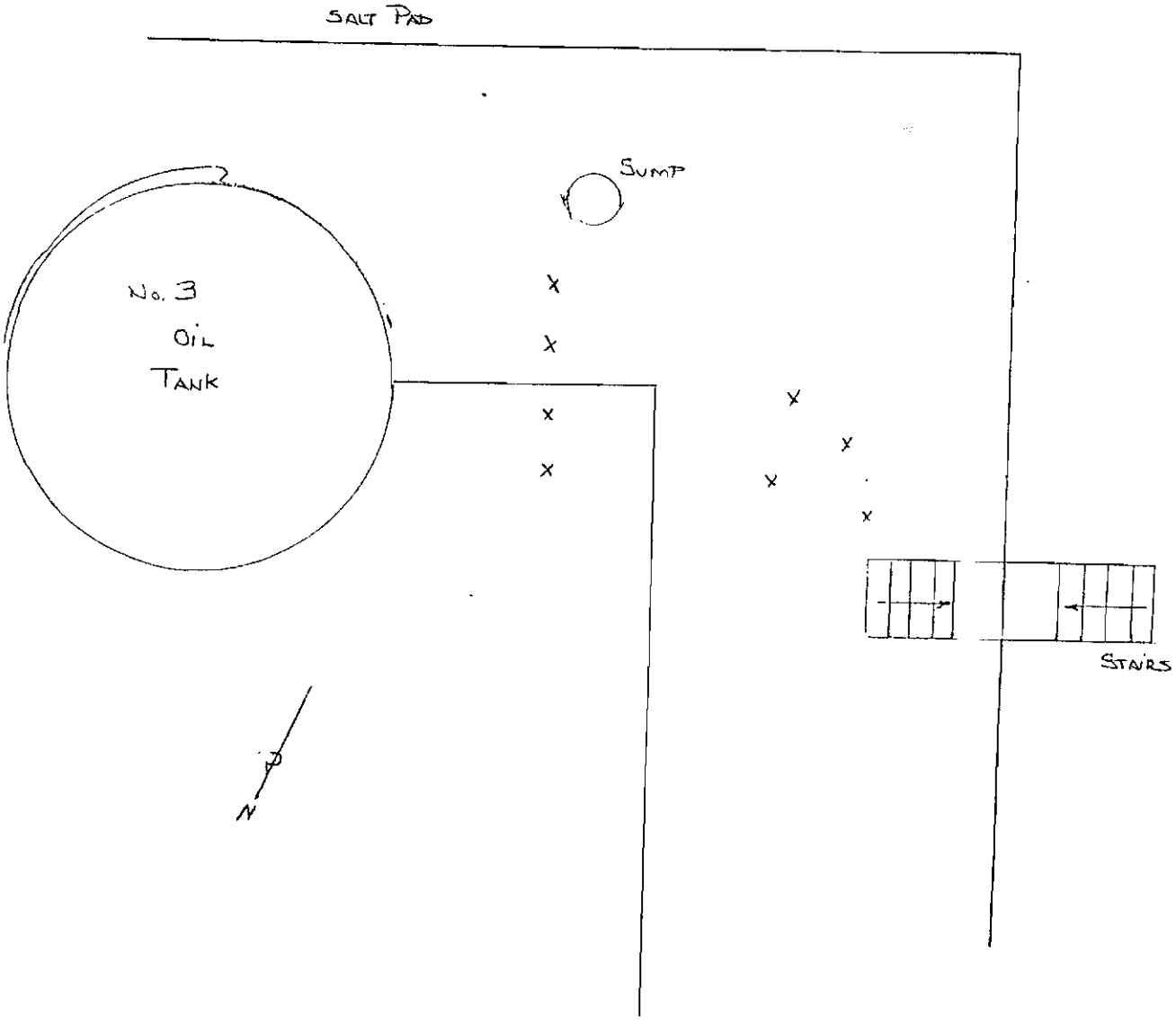
(ALL SAMPLES TAKEN BY LDP ON 9-30-91)

1. SOIL FROM AROUND WASTE OIL TANK



9 INDIVIDUAL SAMPLES of TOP 6" OF SOIL COMBINED FOR ONE COMPOSITE SAMPLE.

2. SOIL AROUND OIL STORAGE TANKS



8 INDIVIDUAL SAMPLES of TOP 4-6" OF MATERIAL (HEAVY OIL & SAND) COMBINED FOR ONE COMPOSITE SAMPLE.

Columbia Analytical Services Inc.

October 25, 1991

Prad Shah
ATOCHEM North America, Inc.
P.O. Box 4102
Portland, OR 97208-4102

Dear Prad:

Enclosed are the results of the samples submitted to our lab on October 2, 1991. For your reference, our service request number for this work is K915704.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Jeff Christian

JC/tlt

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ATOCHEM North America, Inc.	**Date Received:**	10/02/91
Sample Matrix:	Solid	**Date TCLP Performed:**	10/08/91
		Date Analyzed:	10/10/91
		Work Order #:	K915704

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

			Sample Name:	**Sample #1 Waste Oil Tank**	**Sample #2 Heavy Oil Tank**
			Lab Code:	**K5704-1**	**K5704-2**
Analyte	**Method**	**MRL**	**Regulatory Limit♦**		
Arsenic	3010/6010	0.1	5.0	ND	ND
Barium	3010/6010	0.1	100	0.4	0.5
Cadmium	3010/6010	0.01	1.0	ND	ND
Chromium	3010/6010	0.01	5.0	ND	ND
Lead	3010/6010	0.05	5.0	ND	ND
Mercury	7470	0.001	0.2	ND	ND
Selenium	3010/6010	0.1	1.0	ND	ND
Silver	3010/6010	0.01	5.0	ND	ND

MRL Method Reporting Limit
♦ From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
ND None Detected at or above the method reporting limit

Approved by _____ Date 10-28-91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ATOCHEM North America, Inc.	**Date Received:**	10/02/91
Sample Matrix:	Solid	**Date TCLP Performed:**	10/07/91
		Date Analyzed:	10/17/91
		Work Order #:	K915704

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Volatile Organic Compounds
mg/L (ppm) in TCLP Extract

		Sample Name:		**Sample #1 Waste Oil Tank**	**Sample #2 Heavy Oil Tank**
		Lab Code:		**K5704-1**	**K5704-2**
Analyte	**EPA Method**	**MRL**	**Regulatory Limit♦**		
Benzene	5030/8020	0.05	0.5	ND	ND

MRL Method Reporting Limit
♦ From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990
ND None Detected at or above the method reporting limit

Approved by [signature] Date 10-28-91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ATOCHEM North America, Inc.
Sample Matrix: Solid

Date Received: 10/02/91
Date Extracted: 10/09/91
Work Order #: K915704

Polychlorinated Biphenyls (PCBs)
EPA Methods 3550/8080
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Sample #1 Waste Oil Tank	Method Blank
Lab Code:		K5704-1*	K5704-MB
Date Analyzed:		10/10/91	10/10/91
Analyte	**MRL**		
Aroclor 1016	1	<3	ND
Aroclor 1221	1	<3	ND
Aroclor 1232	1	<3	ND
Aroclor 1242	1	<3	ND
Aroclor 1248	1	<3	ND
Aroclor 1254	1	<3	ND
Aroclor 1260	1	<3	ND
Total Aroclors	1	<3	ND

* Elevated MRLs because of matrix interferences.
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Jeff Ch[illegible] Date 10-28-91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ATOCHEM North America, Inc.
Sample Matrix: Solid

Date Received: 10/02/91
Date Extracted: 10/10/91
Work Order #: K915704

Halogenated and Aromatic Volatile Organic Compounds
EPA Methods 5030/8010/8020
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Sample #1 Waste Oil Tank	Method Blank
Lab Code:		K5704-1	K5704-MB
Date Analyzed:		10/11/91	10/11/91
Analyte	**MRL***		
Dichlorodifluoromethane (Freon 12)	1.0	ND	ND
Chloromethane	1.0	ND	ND
Vinyl Chloride	0.5	ND	ND
Bromomethane	0.5	ND	ND
Chloroethane	0.5	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND
1,1-Dichloroethene	0.5	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND
Methylene Chloride	2.0	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND
cis-1,2-Dichloroethene	0.5	ND	ND
1,1-Dichloroethane	0.5	ND	ND
Chloroform	0.5	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND
Carbon Tetrachloride	0.5	ND	ND
Benzene	0.5	ND	ND
1,2-Dichloroethane	0.5	ND	ND
Trichloroethene (TCE)	0.5	ND	ND
1,2-Dichloropropane	0.5	ND	ND
Bromodichloromethane	0.5	ND	ND
2-Chloroethyl Vinyl Ether	5.0	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND
Toluene	1.0	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND
Tetrachloroethene (PCE)	0.5	ND	ND
Dibromochloromethane	0.5	ND	ND
Chlorobenzene	0.5	ND	ND
Ethylbenzene	1.0	ND	ND
Bromoform	0.5	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND
1,3-Dichlorobenzene	1.0	ND	ND
1,4-Dichlorobenzene	1.0	ND	ND
1,2-Dichlorobenzene	1.0	ND	ND
Total Xylenes	1.0	ND	ND

MRL Method Reporting Limit
* Elevated MRLs because the sample required dilution.
ND None Detected at or above the method reporting limit

Approved by _____ Date 10-28-91

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	ATOCHEM North America, Inc.	**Date Received:**	10/02/91
Sample Matrix:	Solid	**Date TCLP Performed:**	10/08/91
		Date Analyzed:	10/10/91
		Work Order #:	K915704

QA/QC Report
Matrix Spike Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: Sample #1 Waste Oil Tank
Lab Code: K5704-1

Analyte	Method	Spike Level	MRL	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Arsenic	3010/6010	5.0	0.1	ND	5.2	104	75-125
Barium	3010/6010	5.0	0.1	0.4	5.1	102	75-125
Cadmium	3010/6010	1.0	0.01	ND	0.90	90	[illegible]
Chromium	3010/6010	5.0	[illegible]	[illegible]	[illegible]	[illegible]	
Lead	3010/[illegible]				[illegible]		
Mercury	74[illegible]	[illegible]					[illegible]
Selenium	3010/[illegible]				[illegible]	[illegible]	
Silver	3010/[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Jeff Clutter Date 10-28-91

COLUMBIA ANALYTICAL SERVICES, INC.

Client: ATOCHEM North America, Inc.
Sample Matrix: Solid

Date Received: 10/02/91
Date TCLP Performed: 10/08/91
Date Analyzed: 10/10/91
Work Order #: K915704

QA/QC Report
Duplicate Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: Sample #1 Waste Oil Tank
Lab Code: K5704-1

Analyte	Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Arsenic	3010/6010	0.1	ND	ND	ND	--
Barium	3010/6010	0.1	0.4	0.4	0.4	<1
Cadmium	3010/6010	0.01	ND	ND	ND	--
Chromium	3010/6010	0.01	ND	ND	ND	--
Lead	3010/6010	0.05	ND	ND	ND	--
Mercury	7470	0.001	ND	ND	ND	--
Selenium	3010/6010	0.1	ND	ND	ND	--
Silver	3010/6010	0.01	ND	ND	ND	--

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Jeff Clutter Date 10-28-91

COLUMBIA ANALYTICAL SERVICES, INC.

Client: ATOCHEM North America, Inc.
Sample Matrix: Solid

Date Received: 10/02/91
Date TCLP Performed: 10/07/91
Date Analyzed: 10/17/91
Work Order #: K915704

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Volatile Organic Compounds
(EPA Methods 5030/8020)
mg/L (ppm) in TCLP Extract

Sample Name: Sample #1 Waste Oil Tank
Lab Code: K5704-1

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	2.50	ND	2.52	2.70	101	108	76-127	7

ND None Detected at or above the method reporting limit

Approved by [signature] Date 10-28-91

COLUMBIA ANALYTICAL SERVICES, INC.

Client: ATOCHEM North America, Inc.
Sample Matrix: Solid

Date Received: 10/02/91
Date Extracted: 10/09/91
Date Analyzed: 10/10/91
Work Order #: K915704

QA/QC Report
Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550/8080

Sample Name	Lab Code	Percent Recovery Decachlorobiphenyl
Sample #1 Waste Oil Tank	K5704-1	71.2
Method Blank	K5704-MB	107
	CAS Acceptance Criteria	41-149

Approved by Jeff Chiu Date 10-28-91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	ATOCHEM North America, Inc.	Date Received:	10/02/91
Sample Matrix:	Solid	Date Extracted:	10/10/91
		Date Analyzed:	10/11/91
		Work Order #:	K915704

QA/QC Report
Surrogate Recovery Summary
Halogenated and Aromatic Volatile Organic Compounds
EPA Methods 5030/8020

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
Sample #1 Waste Oil Tank	K5704-1	101
Method Blank	K5704-MB	101
	CAS Acceptance Criteria	50-130

Approved by [signature] Date 10-28-91

Elf Atochem TPH Remedial Project
Summary of Activities

8/21/95 - FES mobilized to Elf Atochem with a backhoe and a large trackhoe. Walked through and reviewed the project with Larry Patterson and Norm Preacher. A site specific Health and Safety Plan was reviewed and a tailgate safety meeting was completed following the site walk through. Started excavation on the north end of the tank farm containment area, utilizing the backhoe to move the excavated soil to the south end. The trackhoe that was ordered was too large for the area, so a smaller and much safer size machine was located and scheduled for delivery on 8/22/95. Approximately 80-100 cubic yards of contaminated soils were moved and stockpiled today.

8/22/95 - Received signed Bill of Ladings from Larry for the 8/23/95 loadout. Spoke with Larry Patterson about pulling samples to determine what "clean" was, and to document that the areas are clean. Pulled 2 field screen samples, determined that they were clean and pulled lab analysis samples in the same location. Sent to lab on a rush TPH as requested by Elf Atochem. Removed 790 trackhoe from excavation area, decontaminated the tracks on the machine and moved the smaller 490 machine into the containment area. Spoke with Larry Patterson regarding concern about other contaminates within the soil and Larry Patterson agreed to run other analysis, including Vol's. Joyce Johnson with Oregon Waste Management was notified, and trucks were canceled for loading on the 23rd until it was confirmed that no other contaminates were present within the soil. Continued to stockpile soil from around the above ground waste oil tank. Notified Larry Patterson of the potential for a change order for machine rental if we are unable to loadout by Friday.

8/23/95 Standby / Awaiting analysis results
8/24/95 Standby / Awaiting analysis results
8/25/95 Standby / Awaiting analysis results
8/26/95 Weekend
8/27/95 Weekend

8/28/95 - 10 truck and pup trailers were loaded today. 5 in the morning and then 5 more in the afternoon for transport to next morning. Then back to the site the next afternoon to load. Only 5 drivers were given Elf Atochem's Safety Training, apparently only 5 drivers were available due to the demand for drivers during the summer months.

PREPARED BY:
FES ENVIRONMENTAL

8/29/95 - In the early morning soil was stockpiled to accommodate the trucks that would be soon arriving. Contacted Wilkins Trucking to find out if more trucks were available to load, we could load more than 5 a day. Soil samples for field screening and lab analysis were obtained and sent to Columbia Analytical via courier service. Contacted Angel Brothers Rock to schedule delivery of backfill material. Angel Brothers did not have the trucks available to deliver until Friday 9/1/95. Scheduled a small loader to be delivered for backfilling when rock was able to be imported. Loaded 5 trucks and pups and stockpiled more contaminated soil.

8/312/95 - Started excavation in area 3 where sumps are located. Soil around the large sump was badly contaminated with petroleum. Stockpile to accommodate trucks when they arrive. Loaded 5 trucks totaling 142.50 tons.

9/1/95 - Loaded 5 trucks in the morning, then contacted Wilkins to ask for more trucks. Wilkins said they would try to get us 8 more for the day. Confirmed with Angel Brothers rock delivery for Tuesday, and rescheduled loader delivery for then. Loaded out a total of 12 trucks for an estimated 350 tons.

9/5/95 - Started excavating on South end of tanks. Stockpiling soils in the load out area.

9/6/95 - Backfilled site in conjunction with loading out 8 trucks totaling 234.078 tons. Pulled a sample of the deepest area of where the sumps were removed.

9/7/95 - Started loading out trucks at approximately 10:30. Loaded out 5 trucks which included the debris pile down to 7 ft. Estimated total for the day: 146.54 tons.

9/8/95 - Backfilled an estimated 381 tons and loaded 5 trucks as they arrived. Estimated total backfilled for the day: 381 tons.

9/11/95 - Started hand dig around tanks 1 and 2 while backfilling from the north area moving south towards area #3 using the trackhoe to compact. The majority of the soil stockpiled outside the containment was primarily from the hand dig around the tanks and the concrete shelf in area 3.

9/13/95 - Imported 262.78 tons of backfill material today. From 08:30 to 12:00 consisted of change order work, hand digging outside of the containment area near the electrical trench and on the other side of that, a large surface area approximately 4" in depth.

9/15/95 - Removed and stockpiled another 2.5" from the bottom of area 3 deep sump field. Screen samples from that area came up clean after removal of additional contaminated soil. Also continued to backfill and prepare to set another new sump between tanks 1 and 3, change order.

9/18/95 - Placed 3/4. Fill in bottom of excavation between tanks 1 and 2, followed by placement of the new sump, then filled around it with reject, also backfilled other areas.

9/19/95 - Finish had dig, and backfill with 3/4 crushed rock around the tanks, spread backfill with trackhoe around north end of containment area. Attempted to use jack hammers to break up concrete sumps but this was unsuccessful. Mobilized a bobcat skidsteer unit with a concrete breaker attachment. Using the skidsteer, broke the concrete with no problem.

9/20/95 - Had trackhoe removed from site after decontamination of the tracks, had small dozer brought in to help grade properly and spread 3/4 fill. Worked on area 3 west wall loading shoveled contaminated soil into backhoe and stockpiling on plastic outside of containment area. No trucks were available to load.

9/21/95 - Loaded 6 truck and pup units, also spread 3/4 with dozer. Wiped down tracks with PES 51 where stains were. Also finished moving contaminated soil from around tanks 1 and 2 then backfilled those areas.

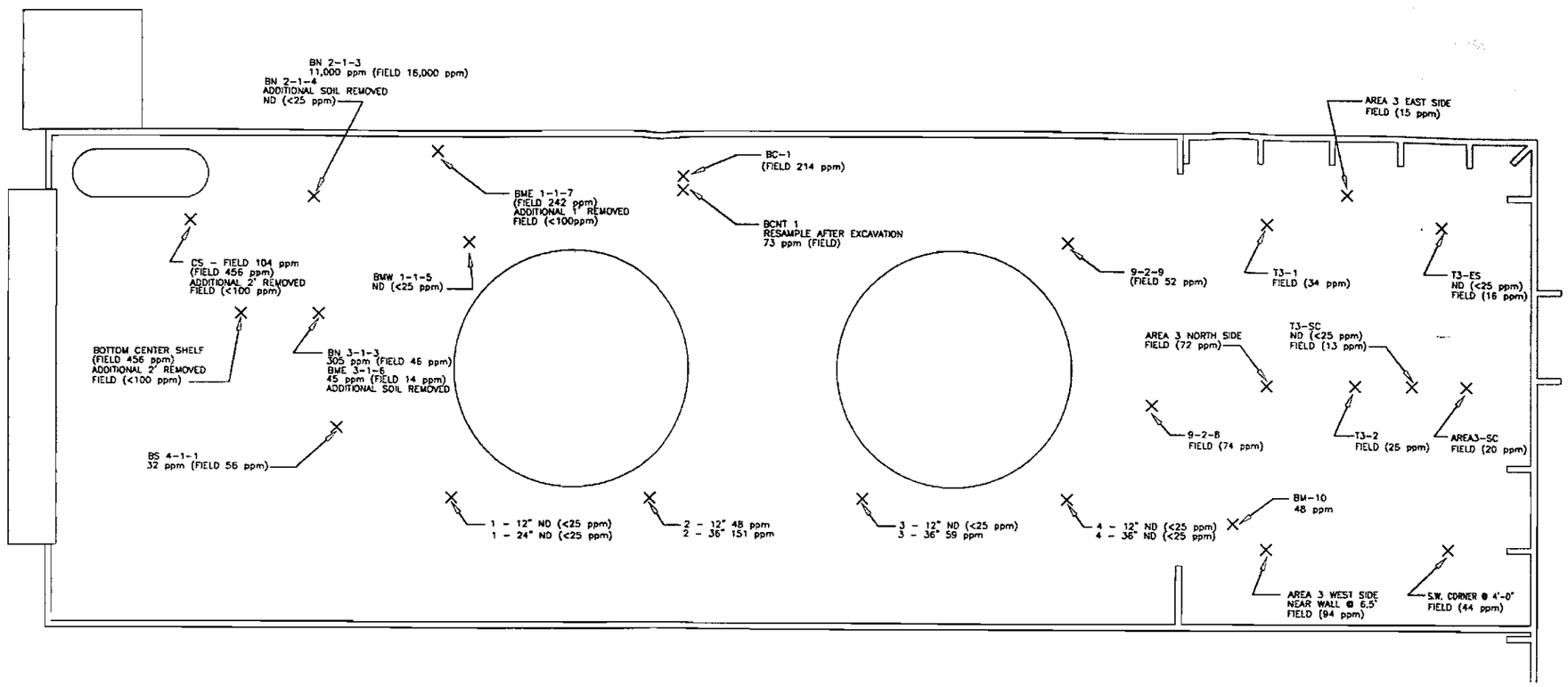
9/22/95 - Loaded the last 3 trucks needed. Also removed a small amount of contaminated soil that the electrician had hand dug while installing the electrical trench. Finished grade within containment area, called to have dozer removed from site, also called to have loader removed. Scheduled a site walk with Larry Patterson for Monday.

a:fossreport

LOG OF FIELD SCREEN AND LABORATORY SOIL SAMPLES

Sample No.	Field Screen TPH	Laboratory TPH-418.1 Modified
1 - 12"	-	<25 ppm
1 - 24"	-	<25
2 - 12"	-	48
2 - 36"	-	151
3 - 12"	-	<25
3 - 36"	-	59
4 - 12"	-	<25
4 - 36"	-	<25
CS (Additional 2' of soil removed. Field screen met criteria of 100 TPH, but exact conc. not recorded.	104 ppm <100	- -
9-2-8	74	-
9-2-9	52	-
BM-10	-	48
Area 3 west side	94	-
SW corner	44	-
Area 3 SC	20	-
T3-SC	13	<25
T3-2	26	-
Area 3 north side	72	-
T3-ES	16	<25
Area 3 east side	15	-
T3-1	34	-
BC-1	214	-
BCNT-1 (Resample BC-1 after additional soil removal)	73	-
BMW 1-1-5	-	<25
BME 1-1-7 (Additional 1' of soil removed. Field screen met criteria of 100 ppm, but exact conc. not recorded.	242 <100	- -

BN 2-1-3	16,000	11,000
BN 2-1-4 (Resample of BN 2-1-3 after soil removal	20	<25
Bottom Center Shelf	456	-
(Additional soil removed. Field screen met criteria of 100 ppm TPH, but exact conc. not recorded.	<100	-
BN 3-1-3	46	305
BME 3-1-6 (Resample of BN 3-1-3 after soil removal.	14	45
BS 4-1-1	56	32



OIL STORAGE

elf atochem

ATO

Elf Atochem North America, Inc.
8400 N.W. Front Ave., Portland, OR 97210

OIL STORAGE
SOIL TEST POINTS

DRAWN BY	-	DATE	-/-/-
SCALE	NONE	PROJ. No.	-
PLANT No.	XX	ENGRG. No.	

DEPT. NAME AND PROCESS AREA

DWG. No. D-003 REV. 3 SHEET

PROFESSIONAL SEAL

NO	DATE	BY	REVISION	BY	APPD. BY
△					
△					
△					
△					
△	-/-/-	-			

This drawing, including the principle of design, is the property of Elf Atochem and is submitted with the understanding that it will not be used for any purpose except that specified in writing by Elf Atochem North America, Incorporated.

REFERENCE DRAWING | NUMBER | NOTES

DRAWING APPROVAL | DATE
CHECKED BY:
APPROVED BY:
APPROVED BY:
APPROVED BY:
CAD FILE NO.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Elf Atochem North America, Inc.
Project: Tank Farm
Sample Matrix: Soil

Service Request: K9505235
Date Collected: 8/22/95
Date Received: 8/22/95
Date TCLP Performed: 8/22/95
Date Extracted: NA

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311 and 8260
Volatile Organic Compounds
Units: mg/L (ppm) in TCLP Extract

			Sample Name:	Tank Farm Soil	Method Blank
			Lab Code:	K9505235-001	K9505235-MB
			Date Analyzed:	8/23/95	8/23/95
Analyte	EPA Method	MRL	Regulatory Limit*		
Benzene	8240A	0.2	0.5	ND	ND
Carbon Tetrachloride	8240A	0.2	0.5	ND	ND
Chlorobenzene	8240A	0.2	100	ND	ND
Chloroform	8240A	0.2	6	ND	ND
1,4-Dichlorobenzene	8240A	0.2	7.5	ND	ND
1,2-Dichloroethane	8240A	0.2	0.5	ND	ND
1,1-Dichloroethene	8240A	0.2	0.7	ND	ND
Methyl Ethyl Ketone	8240A	5	200	ND	ND
Tetrachloroethene	8240A	0.2	0.7	ND	ND
Trichloroethene	8240A	0.2	0.5	ND	ND
Vinyl Chloride	8240A	0.1	0.2	ND	ND

* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990.

Approved By: Tracy Davis Date: 8-24-95

TCLP/1972194
05233VOAJG1 - TCLP 8/24/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Elf Atochem North America, Inc.
Project: Tank Farm
Sample Matrix: Soil

Service Request: K9505235
Date Collected: 8/22/95
Date Received: 8/22/95
Date TCLP Performed: 8/23/95
Date Extracted: 8/24/95

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Semivolatile Organic Compounds
Units: mg/L (ppm) in TCLP Extract

			Sample Name:	Tank Farm Soil	Method Blank
			Lab Code:	K9505235-001	K950824-LB3
			Date Analyzed:	8/25/95	8/25/95
Analyte	EPA Method	MRL	Regulatory Limit*		
Hexachloroethane	3510A/8270A	0.1	3	ND	ND
Nitrobenzene	3510A/8270A	0.1	2	ND	ND
Hexachlorobutadiene	3510A/8270A	0.1	0.5	ND	ND
2,4-Dinitrotoluene	3510A/8270A	0.10	0.13	ND	ND
Hexachlorobenzene	3510A/8270A	0.10	0.13	ND	ND
2,4,6-Trichlorophenol	3510A/8270A	0.1	2	ND	ND
2,4,5-Trichlorophenol	3510A/8270A	0.1	400	ND	ND
Pentachlorophenol	3510A/8270A	0.25	100	ND	ND
Pyridine	3510A/8270A	0.25	5	ND	ND
o-Cresol	3510A/8270A	0.1	200	ND	ND
m,p-Cresols	3510A/8270A	0.1	200	ND	ND
Total Cresols	3510A/8270A	0.1	200	ND	ND

* From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990.

Approved By: _____ Date: 8/25/95

TCLP/102194
052335VM JA1 - TCLP 8/25/95

Page No:

Columbia Analytical Services inc.

September 20, 1995

Service Request No.: K9505554

Larry Patterson
Foss Environmental
5420 N. Lagoon Drive
Portland, OR 97217

Re: **ELF Atochem/Project# 37387**

Dear Larry:

Enclosed are the results of the sample(s) submitted to our laboratory on September 6, 1995. For your reference, these analyses have been assigned our service request number K9505554.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 243.

Respectfully submitted,

Columbia Analytical Services, Inc

Richard Craven
Project Chemist

RAC/sl

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Foss Environmental Services
Project: ELF Atochem/ 37387
Sample Matrix: Soil

Service Request: K9505554
Date Collected: 9/6/95
Date Received: 9/6/95
Date Extracted: 9/18/95
Date Analyzed: 9/18/95

Total Petroleum Hydrocarbons as Diesel and Oil
Oregon DEQ Method TPH-418.1 Modified
Units: mg/Kg (ppm)
As Received Basis

Sample Name	Lab Code	MRL	Result
BM-10	K9505554-001	25	48
Method Blank	K950918-MB	25	ND

Approved By: _____ Date: 9/18/95

IAMRL/102594
05554PHC.AP1 - 418 9/18/95

FOSS ENVIRONMENTAL
Always Ready
P.O. Box 83357
9030 N.W. St. Helens Rd.
Portland, OR 97283
(503) 283-1151 FAX (503) 289-6568

Chain of Custody/ Laboratory Analysis Request

K9505: 4

DATE 9/6/95 PAGE 1 OF 1

PROJECT ELF Atochem #37387
CLIENT INFO. CONTACT Larry Patterson / Todd Irvin
FOSS / GENERATOR NAME
TELEPHONE #
SAMPLERS NAME Todd Irvin PHONE # 283-1150
SAMPLERS SIGNATURE Todd Irvin

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	PCB's 608/8080	TPH (circle method) 418.1 or 8015	BETX (circle method) 8240 or 8020	F-LISTED SOLVENTS 8240	TCLP F-LISTED SOLVENTS 1311/8240	TCLP METALS D004-11	METALS (TOTAL) As, Ba, Cd, Cr, Cu, Pb, Ni, Hg, Ag, Se, Ti, Sb, Zn	TCLP ORGANICS (specify methods) * VOA's 8240 * BNA's 8270 * Pesticides 8080 * Herbicides 8150	DISCHARGE TESTING	OTHER (Specify)						NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
1. BM-10	9/6/95	1100		Soil				X	[redacted]													1	
2.																							
3.																							
4.																							
5.																							
6.																							
7.																							
8.																							

Relinquished By	Relinquished By	Relinquished By
Signature Todd Irvin	Signature	Signature
Printed Name Todd Irvin	Printed Name	Printed Name
Firm Foss Environ.	Firm	Firm
Date/Time 9/8/95 1707	Date/Time	Date/Time
Received By Dan Allen	Received By	Received By
Signature Dan Allen	Signature	Signature
Printed Name CAS	Printed Name	Printed Name
Firm 9/7/95 800	Firm	Firm
Date/Time	Date/Time	Date/Time

SPECIAL INSTRUCTIONS / COMMENTS:
Standard TAT - OR. TPH 418.1

FOSS P.O. # P6275

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - returned by originator

(LAB 300 Rev. 2/95)

Columbia Analytical Services inc.

August 28, 1995

Service Request No.: K9505233

Rich Janecek
Foss Environmental Services
9030 N.W. St. Helens Rd.
Portland, OR 97283

Re: **ELF Atochem**

Dear Rich:

Enclosed are the results of the rush sample(s) submitted to our laboratory on August 22, 1995. Preliminary results were telephoned on August 25, 1995. For your reference, these analyses have been assigned our service request number K9505233.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 243.

Respectfully submitted,

Columbia Analytical Services, Inc

Richard Craven
Project Chemist

RAC/sl

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Foss Environmental Services
Project: ELF Atochem/#37387
Sample Matrix: Soil

Service Request: K9505233
Date Collected: 8/22/95
Date Received: 8/22/95
Date Extracted: 8/23/95
Date Analyzed: 8/23/95

Total Petroleum Hydrocarbons as Diesel and Oil
Oregon DEQ Method TPH-418.1 Modified
Units: mg/Kg (ppm)
As Received Basis

Sample Name	Lab Code	MRL	Result
BS-4-1-1	K9505233-001	25	32
BN-3-1-2	K9505233-002	25	305
BN-2-1-3	K9505233-003	25	11000
Method Blank	K950823-MB	25	ND

Approved By: _____ Date: 8/25/95

1AMRL/102594
05233PHC.SS1 - 418 8/25/95

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Always Ready
P.O. Box 83357
9030 N.W. St. Helens Rd.
Portland, OR 97283
(503) 283-1151 FAX (503) 289-6568

Chain of Custody/ Laboratory Analysis Request

K980520

DATE 8/22/95 PAGE 1 OF 1

PROJECT ELF Atochem # 37387
CLIENT INFO: CONTACT Todd Irish
FOSS / GENERATOR NAME
TELEPHONE # 283-1150
SAMPLERS NAME Todd Irish PHONE # 283-1150
SAMPLERS SIGNATURE

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	PCB's 608/8080	TPH (circle method) 418.1 or 8015 OR	BETX (circle method) 8240 or 8020	F-LISTED SOLVENTS 8240	TCLP F-LISTED SOLVENTS 1311/8240	TCLP METALS D004-11	METALS (TOTAL) As, Ba, Cd, Cr, Cu, Pb, Ni, Hg, Ag, Se, Ti, Sb, Zn	TCLP ORGANICS (specify methods) * VOA's 8240 * BNA's 8270 * Pesticides 8080 * Herbicides 8150	DISCHARGE TESTING	OTHER (Specify)	NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
1. BS-4-1-1	8/22/95	0800		Soil				X										
2. BN-3-1-2	8/22/95	0805		Soil				X									1	
3. BN-2-1-3	8/22/95	1145		Soil				X									1	
4.								X									1	
5.																		
6.																		
7.																		
8.																		

Relinquished By	Relinquished By	Relinquished By
Signature	Signature	Signature
Printed Name	Printed Name Todd Irish	Printed Name
Firm	Firm FOSS	Firm
Date/Time	Date/Time 8/22/95 1150	Date/Time
Received By	Received By LIN BROOK	Received By
Signature	Signature Lin Brook	Signature
Printed Name Todd Irish	Printed Name	Printed Name CAS
Firm FOSS	Firm CAS	Firm
Date/Time 8/22/95 0810	Date/Time 8/22/95 1152	Date/Time 8/22/95 130

SPECIAL INSTRUCTIONS / COMMENTS:
24 hr. Turn around Time or Sooner if Possible

FOSS P.O. # P6239

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Elf Atochem North America, Inc.
Project: Soil Study April 1996
Sample Matrix: Soil

Service Request: K9602048
Date Collected: 4/10/96
Date Received: 4/11/96
Date Extracted: 4/12/96
Date Analyzed: 4/12/96

Total Petroleum Hydrocarbons as Diesel and Oil
Oregon DEQ Method TPH-418.1 Modified
Units: mg/Kg (ppm)
As Received Basis

Sample Name	Lab Code	MRL	Result
Oil Tank Farm #1-12"	K9602048-001	25	ND
Oil Tank Farm #1-24"	K9602048-002	25	ND
Oil Tank Farm #2-12"	K9602048-003	25	48
Oil Tank Farm #2-36"	K9602048-004	25	151
Oil Tank Farm #3-12"	K9602048-005	25	ND
Oil Tank Farm #3-36"	K9602048-006	25	59
Oil Tank Farm #4-12"	K9602048-007	25	ND
Oil Tank Farm #4-36"	K9602048-008	25	ND
Method Blank	K960412-MB	25	ND

Approved By: _____ Date: 4-12-96

1AMRL/102594
02048PHC.SS1 - 418 4/12/96

Columbia Analytical Services inc.

September 6, 1995

Service Request No.: K9505420

Larry Patterson
Foss Environmental
5420 N. Lagoon Drive
Portland, OR 97217

Re: **ELF Atochem/Project #37387**

Dear Larry:

Enclosed are the results of the rush sample(s) submitted to our laboratory on August 30, 1995. Preliminary results were transmitted via facsimile on September 1, 1995. For your reference, these analyses have been assigned our service request number K9505420.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 243.

Respectfully submitted,

Columbia Analytical Services, Inc

Richard Craven
Project Chemist

RAC/sam

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Foss Environmental Services
Project: ELF Atochem/#37387
Sample Matrix: Soil

Service Request: K9505420
Date Collected: 8/29,30/95
Date Received: 8/30/95
Date Extracted: 8/31/95
Date Analyzed: 8/31/95

Total Petroleum Hydrocarbons as Diesel and Oil
Oregon DEQ Method TPH-418.1 Modified
Units: mg/Kg (ppm)
As Received Basis

Sample Name	Lab Code	MRL	Result
BW-3-1-6	K9505420-001	25	45
BN-2-1-4	K9505420-002	25	ND
BW-1-1-5	K9505420-003	25	ND
T3-ES	K9505420-004	25	ND
T3-SC	K9505420-005	25	ND
Method Blank	K950831-MB	25	ND

Approved By: _____ Date: 9/1/95

1AMRL/102594
05420PHC.SS1 - 418 8/31/95

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Always Ready
P.O. Box 83357
9030 N.W. St. Helens Rd.
Portland, OR 97283
(503) 283-1151 FAX (503) 289-6568

Chain of Custody/ Laboratory Analysis Request

DATE 8/30/95 PAGE 1 OF 1

PROJECT ELF Anchem # 37387
CLIENT INFO. CONTACT Larry Patterson / Todd Irish
FOSS / GENERATOR NAME
TELEPHONE #
SAMPLERS NAME T. Irish PHONE # 283-1150
SAMPLERS SIGNATURE Todd Irish

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	PCB's 608/8080	TPH (circle method) 418.1 or 8015	BETX (circle method) 8240 or 8020	F-LISTED SOLVENTS 8240	TCLP F-LISTED SOLVENTS 1311/8240	TCLP METALS D004-11	METALS (TOTAL) As, Ba, Cd, Cr, Cu, Pb, Ni, Hg, Ag, Se, Tl, Sb, Zn	TCLP ORGANICS (specify methods) • VOA's 8240 • BNA's 8270 • Pesticides 8080 • Herbicides 8150	DISCHARGE TESTING	OTHER (Specify)	NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
1. BW-3-1-6	8/30/95	1230	K5420-1	Grab Soil				X									1	
2. BW-2-1-4	8/30/95	1200	2	Grab Soil				X									1	
3. BW-1-1-5	8/30/95	1215	3	Grab Soil				X									1	
4. T3-ES	8/30/95	1300	4	Grab Soil				X									1	
5. T3-SC	8/30/95	1315	5	Grab Soil				X									1	
6.																		
7.																		
8.																		

Relinquished By	Relinquished By	Relinquished By
Signature Todd Irish	Signature	Signature
Printed Name Todd Irish	Printed Name	Printed Name
Firm Foss Environ.	Firm	Firm
Date/Time 8/30/95	Date/Time	Date/Time

Received By	Received By	Received By
Signature Lin Brock	Signature Lori K. Hawn	Signature
Printed Name LIN BROCK	Printed Name CAS	Printed Name
Firm CAS	Firm 083195 0800	Firm
Date/Time 8/30/95 1723	Date/Time	Date/Time

SPECIAL INSTRUCTIONS / COMMENTS:
K95-5420
48 hr. TAT
Fax Results to (503) 289-6568

FOSS P.O. # P6258

00004

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - returned by originator

(LAB-200 Rev. 2/95)

Copy of Waste Disposal Profile for the Oil Tank Farm soils for disposal at Columbia Ridge Landfill in Arlington, Oregon.

Copy of trip log showing individual truck loads and weight of each truck for a total of 1965.87 tons.

CONFIRMATION LETTER

July 26, 1995

ACCOUNTS PAYABLE
ELF ATOCHEM NORTH AMERICA INC.
6400 NW FRONT AVENUE
PORTLAND, OREGON 97210-3633

RE: COLUMBIA RIDGE PROFILE AJ8393

Attention: Larry Patterson

We are pleased to confirm WMX's approval of your waste material as described below. The attached profile for the waste materials was prepared by WMX based on the information provided by you. It is important that no changes be made to the profile without WMX's consent. If the profile meets with your approval, please call to schedule shipment of your waste materials.

WMX PROFILE NUMBER: AJ8393

APPROVED MGMT. FACILITY: WMX COLUMBIA RIDGE LANDFILL - ARLINGTON

WASTE NAME: Oil Tank Farm Soil

DISPOSAL METHOD: Direct Landfill

DISPOSAL PRICE:
$16.00/Ton
DEQ TAX $1.24/Ton for Debris
$0.30/Ton for soil used as daily cover
Metro User Fee: $17.50/Ton
Metro Excise Tax: $1.20/Ton
Highway 19 Fee: $0.20/Ton (Gilliam County Fee)

TRANSPORTATION PRICE: $15.00/Ton No Plastic Liner Required
Minimum Weight is 30 Tons. Maximum Weight is 32 Tons per shipment.

DEMURRAGE: $55.00 per hour after the first free hour

SPECIAL CONDITIONS: Waste must not contain any free liquids.

All wastes are priced as profiled, invoiced as actually received. Invoices shall be paid no later than thirty (30) days from the date of receipt. All terms are governed by the Agreement previously executed between Elf Atochem and Chemical Waste Management, Inc. The prices quoted above are subject to change upon 30 days written notice.

SEPTEMBER

OWS TK#	CUST NAME	CUST TK#	CONTNR#	TIP DT	PROFILE#	NET WT LBS	NET WT TONS
162946	PRELF/ATOCHEM	95122		950901	AJ8393	55,160	27.580
162952	PRELF/ATOCHEM	95121		950901	AJ8393	57,700	28.850
162966	PRELF/ATOCHEM	95126		950901	AJ8393	58,300	29.150
162971	PRELF/ATOCHEM	95128		950901	AJ8393	60,500	30.250
162972	PRELF/ATOCHEM	95127		950901	AJ8393	63,180	31.590
163010	PRELF/ATOCHEM	95129		950901	AJ8393	61,880	30.940
163108	PRELF/ATOCHEM			950902	AJ8393	59,340	29.670
163109	PRELF/ATOCHEM			950902	AJ8393	58,160	29.080
163110	PRELF/ATOCHEM			950902	AJ8393	64,140	32.070
163111	PRELF/ATOCHEM			950902	AJ8393	57,520	28.760
163112	PRELF/ATOCHEM			950902	AJ8393	59,240	29.620
163113	PRELF/ATOCHEM			950902	AJ8393	58,620	29.310
163114	PRELF/ATOCHEM			950902	AJ8393	60,640	30.320
163115	PRELF/ATOCHEM			950902	AJ8393	61,220	30.610
163116	PRELF/ATOCHEM			950902	AJ8393	58,560	29.280
163484	PRELF/ATOCHEM	95139		950906	AJ8393	61,220	30.610
163493	PRELF/ATOCHEM	95140		950906	AJ8393	58,600	29.300
163499	PRELF/ATOCHEM	95141	163500	950906	AJ8393	54,560	27.280
163500	PRELF/ATOCHEM	95142		950906	AJ8393	58,380	29.190
163602	PRELF/ATOCHEM	95144		950907	AJ8393	57,600	28.800
163604	PRELF/ATOCHEM	95145		950907	AJ8393	62,760	31.380
163613	PRELF/ATOCHEM	95146		950907	AJ8393	57,140	28.570
163623	PRELF/ATOCHEM	95143		950907	AJ8393	58,960	29.480
163774	PRELF/ATOCHEM	95148		950908	AJ8393	58,340	29.170
163777	PRELF/ATOCHEM	95151		950908	AJ8393	60,540	30.270
163778	PRELF/ATOCHEM	95147		950908	AJ8393	60,960	30.480
163787	PRELF/ATOCHEM	95150		950908	AJ8393	58,240	29.120
163792	PRELF/ATOCHEM	95149		950908	AJ8393	54,400	27.200
163970	PRELF/ATOCHEM	95152		950909	AJ8393	56,160	28.080
163972	PRELF/ATOCHEM	95154		950909	AJ8393	58,720	29.360
163973	PRELF/ATOCHEM	95153		950909	AJ8393	61,680	30.840
163974	PRELF/ATOCHEM	95155		950909	AJ8393	61,280	30.640
163976	PRELF/ATOCHEM	95156		950909	AJ8393	59,140	29.570
164027	PRELF/ATOCHEM	95157		950911	AJ8393	58,880	29.440
164043	PRELF/ATOCHEM	95158		950911	AJ8393	59,180	29.590
165471	PRELF/ATOCHEM	95159		950921	061734	60,760	30.380
165473	PRELF/ATOCHEM	95160		950921	061734	58,480	29.240
165476	PRELF/ATOCHEM	95161		950921	061734	58,680	29.340
165607	PRELF/ATOCHEM	95163		950922	AJ8393	59,400	29.700
165613	PRELF/ATOCHEM	95162		950922	AJ8394	62,120	31.060
165620	PRELF/ATOCHEM	95164		950922	AJ8393	58,780	29.390
165777	PRELF/ATOCHEM	95166		950923	AJ8393	58,360	29.180
165780	PRELF/ATOCHEM	95165		950923	AJ8393	59,080	29.540
165783	PRELF/ATOCHEM	95167		950923	AJ8393	48,120	24.060
		Count:	1				
		Total:				2,594,680	1,297.340

AUGUST

OWS TK#	CUST NAME	CUST TK#	CONTNR#	TIP DT	PROFILE#	NET WT LBS	NET WT TONS
162356	PRELF/ATOCHEM	95102		950828	AJ8393	46,640	23.320
162358	PRELF/ATOCHEM	95101		950828	AJ8393	48,140	24.070
162359	PRELF/ATOCHEM	95104		950828	AJ8393	56,220	28.110
162367	PRELF/ATOCHEM	95105		950828	AJ8393	56,300	28.150
162369	PRELF/ATOCHEM	95103		950828	AJ8393	54,980	27.490
162472	PRELF/ATOCHEM	95107		950829	AJ8393	60,360	30.180
162473	PRELF/ATOCHEM	95108		950829	AJ8393	61,420	30.710
162474	PRELF/ATOCHEM	95109		950829	AJ8393	64,820	32.410
162480	PRELF/ATOCHEM	95110		950829	AJ8393	61,620	30.810
162482	PRELF/ATOCHEM	95106		950829	AJ8393	58,100	29.050
162651	PRELF/ATOCHEM			950830	AJ8393	52,800	26.400
162660	PRELF/ATOCHEM			950830	AJ8393	59,460	29.730
162662	PRELF/ATOCHEM			950830	AJ8393	63,860	31.930
162664	PRELF/ATOCHEM			950830	AJ8393	61,580	30.790
162670	PRELF/ATOCHEM			950830	AJ8393	59,600	29.800
162788	PRELF/ATOCHEM	95118		950831	AJ8393	59,180	29.590
162789	PRELF/ATOCHEM	95116		950831	AJ8393	60,440	30.220
162790	PRELF/ATOCHEM	95117		950831	AJ8393	62,900	31.450
162794	PRELF/ATOCHEM	95119		950831	AJ8393	56,760	28.380
162799	PRELF/ATOCHEM	95120		950831	AJ8393	59,860	29.930
162850	PRELF/ATOCHEM	95123		950831	AJ8393	56,100	28.050
162852	PRELF/ATOCHEM	95125		950831	AJ8393	58,620	29.310
162853	PRELF/ATOCHEM	95124		950831	AJ8393	57,300	28.650
	Count:	0					
	Total:					1,337,060	668.530

Post-it® Fax Note 7671

Date 9/25	# of pages ▶ 2
To Todd	From Cathy
Co./Dept.	Co.
Phone #	Phone #
Fax #	Fax #

July 1987 Aqua Ammonia Spill

On July 16, 1987 Pennwalt experienced a spill of 30% aqua ammonia. It was estimated that 400 gallons of solution which would have contained approximately 896 pounds of ammonia spilled onto the ground. At 12:20 p.m. on the day of the spill the temperature was 75°F. Most of the ammonia would have volatilized. The ammonia plant was located in the current location of the new caustic tank farm.

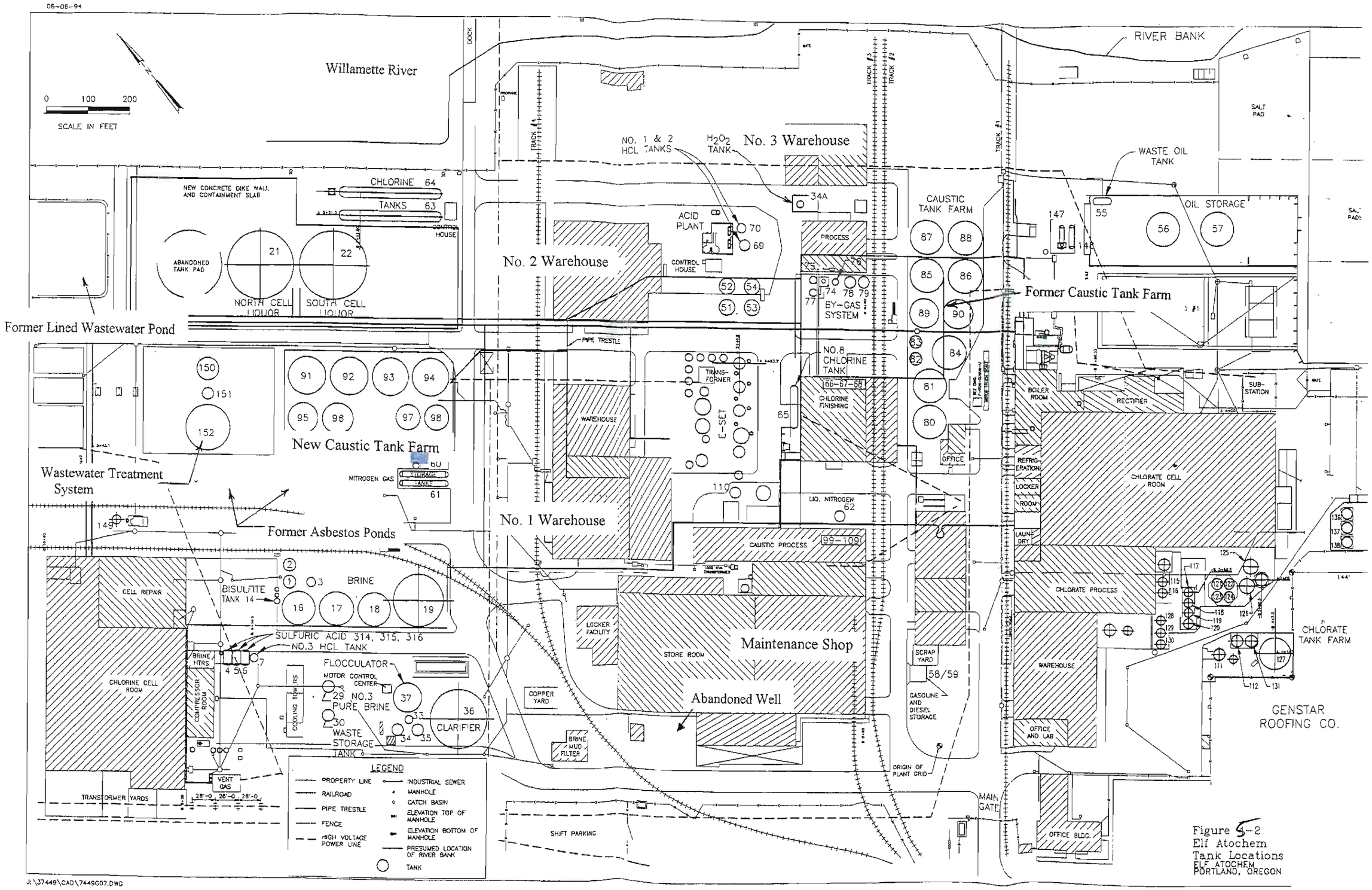


Figure 5-2
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON

ATTACHMENT NO. 1 - PLANT PLOT PLAN

Location of July 1987 Aqua Ammonia Spill

DOCUMENTATION OF SAMPLING RESULTS AND SOIL REMOVAL ACTIVITIES ASSOCIATED WITH THE NOVEMBER 1987 SODIUM CHLORATE SPILL

Attached is a memorandum dated September 13, 1991 which describes construction work which occurred in September of 1991. The construction work was associated with a requirement from the DEQ to improve the sodium chlorate spill containment system.

Attachment SC-1 shows an area highlighted in red pencil where excavation work occurred. The planned excavation involved the removal of the top 6" to 8" of soil in the highlighted area and the removal of an old underground sodium chlorate transfer pipe. The underground pipe had been abandoned in place in November of 1987 because of a leak. The pipe had been washed with water and plugged at both ends with concrete. On September 13, 1991 the underground pipe was removed along with several feet of soil around the pipe. The hole which existed after the removal of the underground pipe and the nearby storm drain measured approximately 4' deep x 6' wide x 15' long.

Attachment SC-1 shows the location of seven soil samples, designated by yellow dots, taken prior to removing the top 6" to 8" of soil. This soil was composited along with soil removed during the pipe excavation and was sent to a private laboratory for a TCLP analysis for chromium. The result was 0.07 ppm chromium.

Attachment SC-2 shows the location of ten soil samples taken from the excavated hole. The floor of the excavated hole was approximately 2' below the former location of the pipe. Three samples were taken from the floor of the excavated hole directly below the pipe area. Seven samples were taken approximately equal distance around the sidewall of the excavated hole. The samples were composited and sent to a private laboratory for a TCLP analysis for chromium. The result was 0.04 ppm chromium.

These soils were characterized as nonhazardous and were sent to the Hillsboro Landfill.

a:sodchlspill

ATOCHEM
elf aquitaine

SUBJECT **CHLORATE CONTAINMENT SOIL REMOVAL**

DATE September 13, 1991

TO File

FROM Larry Patterson

IN RE

COPIES TO

Stipulation and Final Order No. WQ-MWR-90-84 between Atochem and the Department of Environmental Quality requires Atochem to construct an improved chlorate spill containment system. This work includes the installation of replacement sewers and the construction of spill containment curbs.

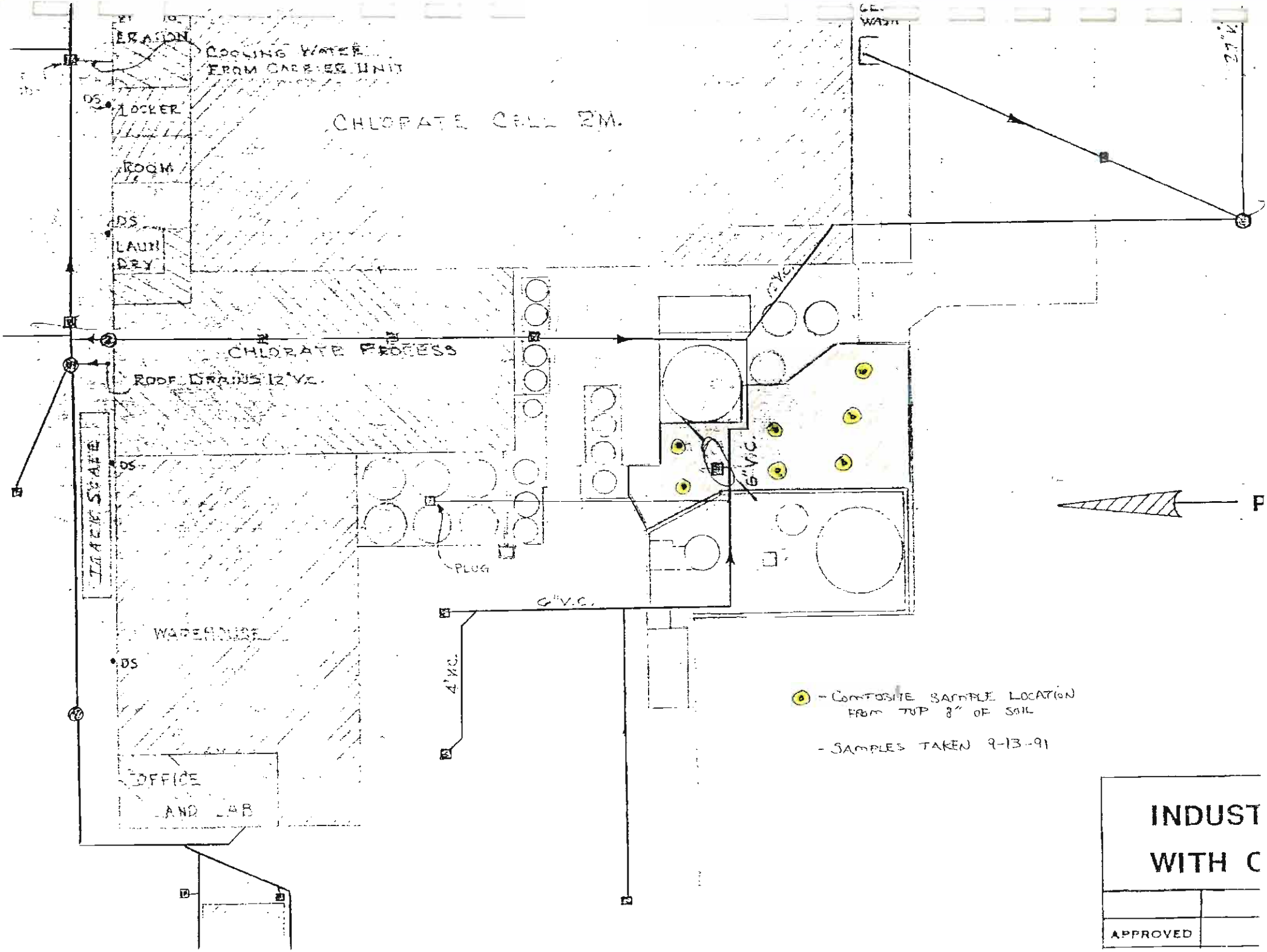
During the week of September 9, 1991 we started excavation for the replacement sewer between the truck turn-around and the new spill containment sump. The bulk of the excavation is in the graveled area between chlorate tanks 39 and 43. This is also the area where a buried chlorate line leaked in October of 1987 and caused a small amount of chlorate to surface and enter the storm drain.

A backhoe had excavated a 3 to 4 foot deep trench for the new sewer and had removed the old storm drain. During this process, the abandoned 6 inch buried chlorate line was also uncovered. The buried line was immediately south of the old storm drain and was approximately 24 inches deep. The old line had been abandoned in October of 1987 and had been rinsed before plugging both ends with concrete. A hole was drilled in the pipe to allow drainage of the remaining rinse water. The water was captured in a bucket and fed back into the chlorate process. The pipe was cut from curb to curb, plugged, and capped with concrete.

The DEQ approved plan for the chlorate containment project requires us to concrete and curb this area. To facilitate this work, it will be necessary to remove the top 6 to 8 inches of soil. The soil in this area is composed of silty sand. I had a backhoe scrape the top 8 inches of soil in 7 different locations so I could obtain soil samples representative of what will be removed. Using a clean metal spatula and a clean plastic bucket, I took 3 one cup samples from each of the 7 scraped areas. I also took 3 samples from the soil that had been removed while excavating the old pipe and the storm drain. I stirred the material in the bucket thoroughly and took several random samples to place into a clean sample container for TCLP chromium analysis.

There was a hole approximately 15 feet long, 6 feet wide, and 4 feet deep where the storm drain and the buried pipe had been removed. After thoroughly washing the spatula, I scraped the sidewalls of the hole in 7 different locations and the bottom of the hole in 3 locations under the area of the old pipe. The soil was placed directly into a clean sample container for TCLP chromium analysis.

I took the samples to our laboratory where they were sent to Columbia Analytical Services, Inc., for analysis.



ERASON
COOLING WATER FROM CARRIER UNIT
DS
LOCKER
ROOM
DS
LAUN DRY
CHLORATE CELL 2M.
CHLORATE PROCESS
ROOF DRAINS 12" V.C.
TRACK SCALE
DS
WAREHOUSE
DS
OFFICE AND LAB
PLUG
6" V.C.
4" V.C.
6" V.C.
12" V.C.
27" V.
- COMPOSITE SAMPLE LOCATION FROM TOP 8" OF SOIL
- SAMPLES TAKEN 9-13-91
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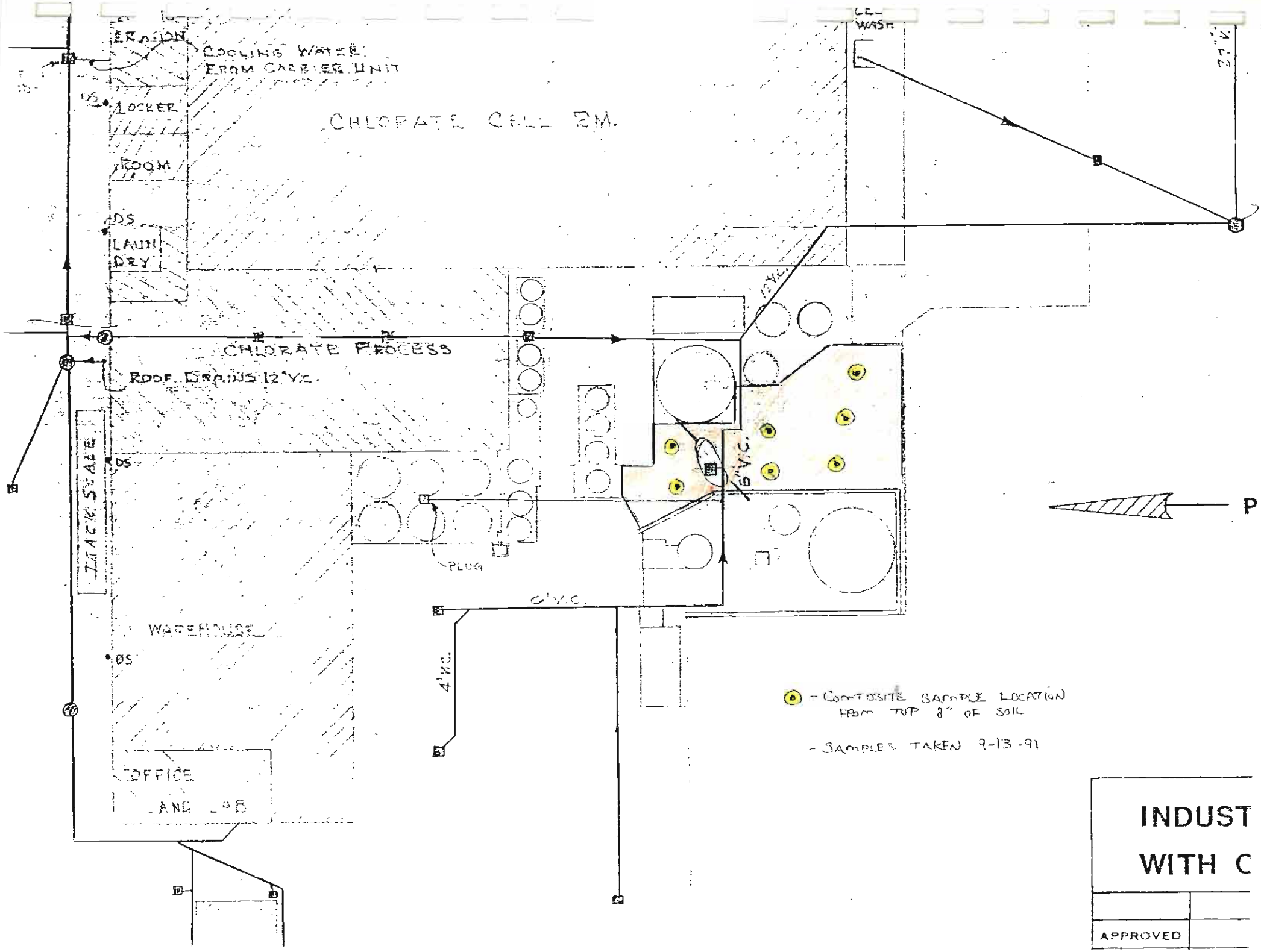
APPROVED


EROSION
COOLING WATER FROM CARRIER UNIT
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CHLORATE PROCESS
ROOF DRAINS 12" V.C.
TRACK SCALE
WAREHOUSE
OFFICE AND LAB
PLUG
6" V.C.
4" V.C.
12" V.C.
8" V.C.
CELL WASH
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- SAMPLES TAKEN 9-13-91
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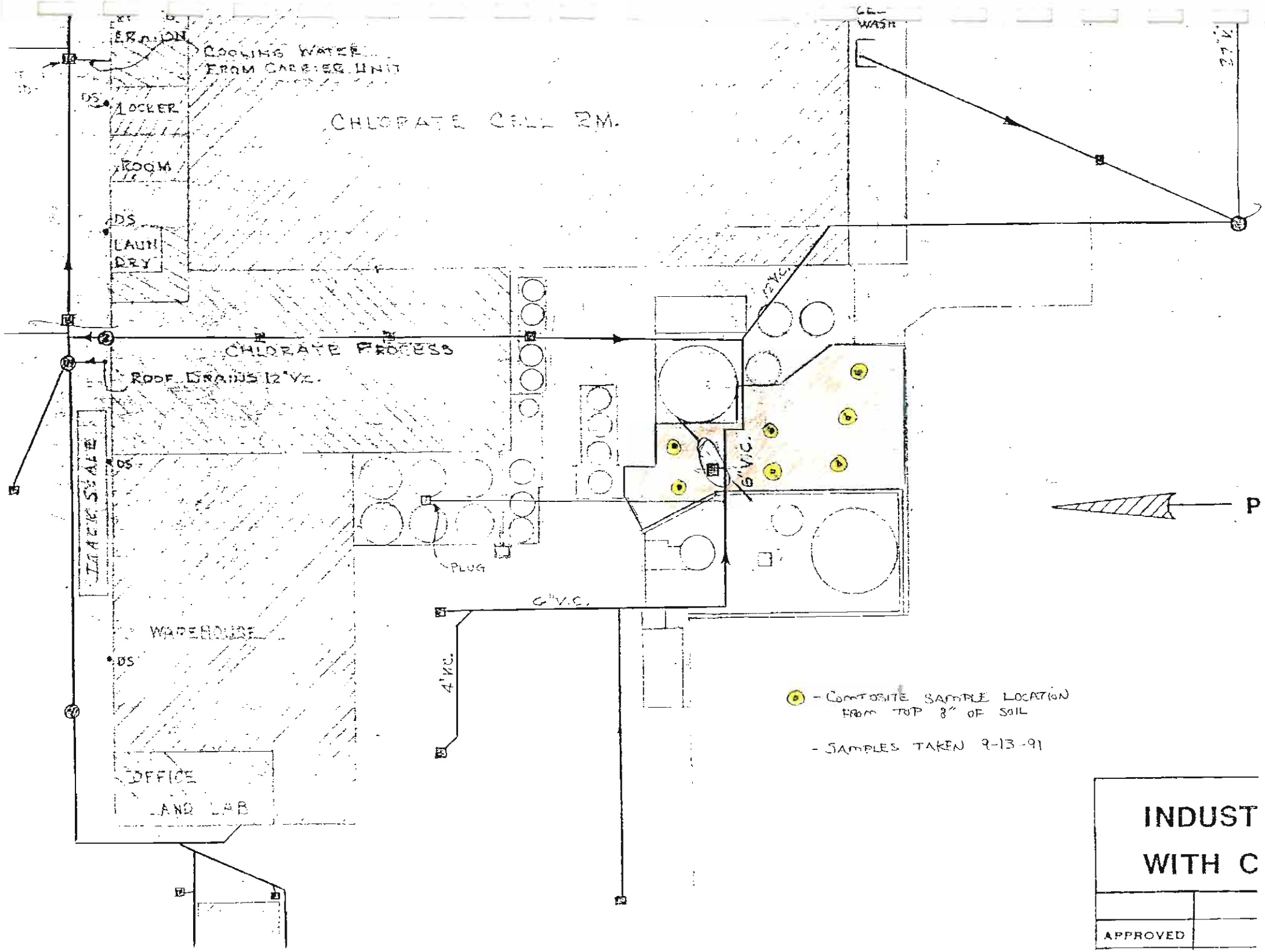
APPROVED


COOLING WATER FROM CARRIER UNIT
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ROOM
LAUN DRY
CHLORATE CELL RM.
CHLORATE PROCESS
ROOF DRAINS 12" V.C.
TRACK SCALE
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OFFICE AND LAB
PLUG
6" V.C.
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12" V.C.
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- COMPOSITE SAMPLE LOCATION FROM TOP 8" OF SOIL
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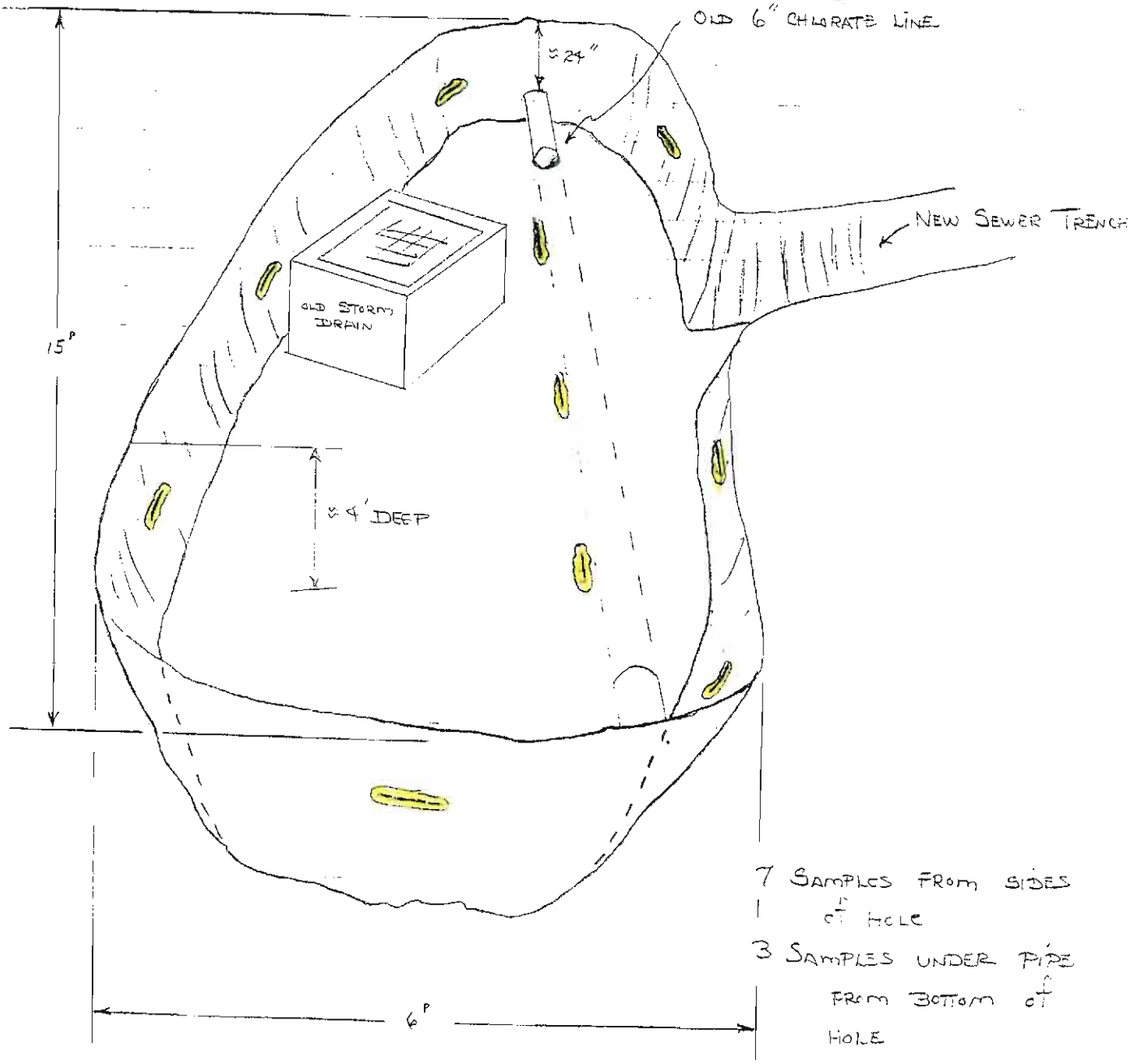

7 SAMPLES FROM SIDES of HOLE

3 SAMPLES UNDER PIPE FROM BOTTOM of HOLE

9-13-91

LDP

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Atochem North America, Inc.
Sample Matrix: Soil

Date Received: 09/17/91
Date TCLP Performed: 09/19/91
Date Analyzed: 09/20/91
Work Order #: K915322

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

			Sample Name:	#1 Composite	#2 Scrapping
			Lab Code:	K5322-1	K5322-2
Analyte	**Method**	**MRL**	**Regulatory Limit♦**		
Chromium	3010/6010	0.01	5.0	0.07	0.04

MRL Method Reporting Limit
♦ From 40 CFR Part 261, et al., and *Federal Register*, March 29, 1990 and June 29, 1990

Approved by [signature] Date 9-26-91

Received 9-30-91

00001

7 South 42th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

HILLSBORO LANDFILL, INC.
3205 S.E. Minter Bridge Road
Hillsboro, OR 97123
Phone: 503-640-9427 FAX 648-2490

Application to Dispose of Special Wastes

APPROVED

INSTRUCTIONS: Please read important sheet attached. Type, or print heavily in ink. The person responsible for accuracy of information must sign. Return copy of completed application and any supporting information to Hillsboro Landfill, Inc. along with a check for the $25 application fee.

Office use only
Permit no. 755
Expires 1/21/92

received 10/21/91 033327

Applicant's Name ATOCHEM NORTH AMERICA

Address P.O. BOX 4102 City PORTLAND Zip Code 97208

Contact Person LARRY PATTERSON Phone (503) 225-7210

Description of Special Waste (waste composition and physical, chemical, manufacturing process from which waste originated)

SOIL REMOVED NEAR SODIUM CHLORATE PLANT. SOIL ANALYZED WITH TCLP CHROMIUM EXTRACTION CONTAINED 0.07 mg/L CHROMIUM.

One time disposal? ✓ yes ____ no Disposal frequency (if more than one time) N.A.

Quantity; (gallons, drums, lbs., cubic yards) 125 yds^3 Quantity per year N.A.

Hazardous ____ yes ✓ no How did you determine whether hazardous or not? Material Safety Data Sheet ____

test results ✓ other SEE ATTACHED TCLP CHROMIUM EXTRACTION (enclose documents)

Handling and spill clean up directions SWEEP UP SOIL AND PLACE BACK INTO CONTAINER

Transporter PINCHER O'LEARY CONSTRUCTION

Previous permit for this waste, if any. Number N.A.

NO SEALED EMPTY CONTAINERS WILL BE ACCEPTED. If empty pesticide containers only: (a) Describe material originally in containers N.A.

(b) Describe method of cleansing, rinsing and preparation of containers N.A.

Certificate of Accuracy of Description: This is to certify that the above described materials are properly classified, identified, packaged, marked, labeled, cleansed, rinsed and prepared as indicated above.

X – Signature Larry D. Patterson Date 10-17-91

(also type or print name) LARRY D. PATTERSON

DEQ Review: The above described special waste is approved ____ disapproved ____ for disposal at the Hillsboro Landfill.

Signature ____ Date ____

Special Instructions ____

Hillsboro Landfill Action: Disposal of the above described special waste is approved ✓ disapproved ____ for disposal at the Hillsboro Landfill at the disposal rate of $ 53.00 per [redacted]/ton ____ per trip minimum charge.

Signature Charles H. Gray Date 10-21-91

GENERAL INSTRUCTIONS: Appointment may be required 24 HOURS prior to each disposal. Cash on disposal (NO CHECKS) or have prior account established. To Establish an account or call for an appointment, telephone 640-9427.

SPECIAL INSTRUCTIONS: ____

Scale House - LAN # 2
11/30/91 For Date Range 11/01/91 To 11/30/91 Time 18:39

Current Transactions By Date

ACCOUNT # AT0001 ACCOUNT NAME: Atochem Nort

Trans#	Stckr#	Trailr	Date	Time	Sc	MT	Material Type		Gross	Tare	Net	Vol	TipFee$	SpcFee$	TotFee$	Code
610371	0	0	11/19/91	12:43	P2	3	LF-Soils	P	79,560	31,460	48,100	00.0	1,274.65	0.00	1,274.65	
610411	0	0	11/19/91	15:55	P2	3	LF-Soils	P	77,440	31,460	45,980	00.0	1,218.47	0.00	1,218.47	
610465	0	0	11/20/91	09:49	P2	3	LF-Soils	P	78,320	31,520	46,800	00.0	1,240.20	0.00	1,240.20	
610551	0	0	11/20/91	13:55	P2	3	LF-Soils	P	76,040	31,380	44,660	00.0	1,183.49	0.00	1,183.49	

CHARGE TRANSACTIONS: 4 NET: 92.770 VOL: 0.0 $4,916.81

NON-CHARGE TRANSACTIONS: 0 NET: 0.000 VOL: 0.0 $0.00 PD

==========

TOTAL TRANSACTIONS: 4 TOTAL NET: 92.770 TOTAL VOL: 0.0 $4,916.81

CODE: PD = PAID CASH, NC = NO CHARGE, CK = CHECK, CC = CREDIT CARD, CP = COUPON

EXCAVATED SOILS FROM CONCRETING AREA BETWEEN CHLORATE TANK FARMS

2 LOADS 11/19/91
2 LOADS 11/20/91
2 LOADS 12/4/91

Scale House - LAN # 1

01/01/92 For Date Range 12/01/91 To 12/31/91 Time 09:31

Current Transactions By Date

ACCOUNT # AT0001 ACCOUNT NAME: Atochem Nort

Trans#	Stckr#	Trailr	Date	Time	Sc	MT	Material Type		Gross	Tare	Net	Vol	TipFee$	SpcFee$	TotFee$	Code
612321	0	0	12/03/91	11:42	P2	3	LF-Soils	P	83,560	31,680	51,880	00.0	1,374.82	0.00	1,374.82	
612364	0	0	12/03/91	14:31	P2	4	LF-Special Wastes	P	79,580	31,700	47,880	00.0	1,236.50	0.00	1,236.50	

CHARGE TRANSACTIONS: 2 NET: 49.880 VOL: 0.0 $2,611.32

NON-CHARGE TRANSACTIONS: 0 NET: 0.000 VOL: 0.0 $0.00 PD

TOTAL TRANSACTIONS: 2 TOTAL NET: 49.880 TOTAL VOL: 0.0 $2,611.32

CODE: PD = PAID CASH, NC = NO CHARGE, CK = CHECK, CC = CREDIT CARD, CP = COUPON

February 1989 Sodium Hydroxide Spill

On February 7, 1989 Pennwalt experienced a rupture of a sodium hydroxide fiberglass storage tank. The tank was located in the Bygas area which is immediately (plant) west of the old DDT Process Building (within the Acid Plant area). The caustic flowed into the plant's No. 1 and No. 2 sewers. Approximately 3,840 gallons of sodium hydroxide entered the Willamette River through these sewers. All appropriate agencies were notified of the release.

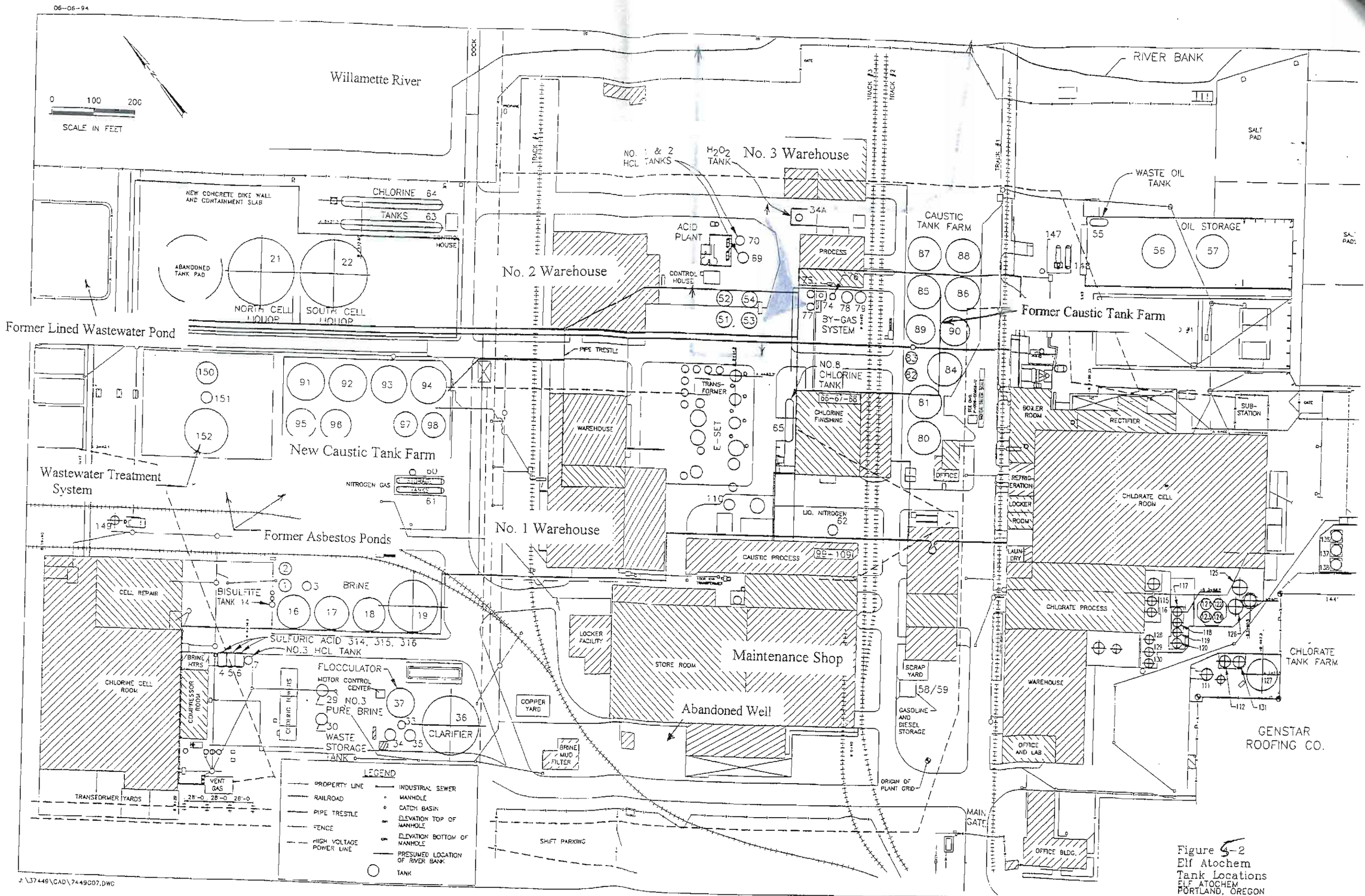

Figure 5-2
Elf Atochem
Tank Locations
ELF ATOCHEM
PORTLAND, OREGON

ATTACHMENT NO. 1 - PLANT PLOT PLAN

Location and Flow Paths of February 1989 Sodium Hydroxide Spill

Appendix E
Phase Two Environmental Site Assessment for Bonneville Power Administration

PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

for

BONNEVILLE POWER ADMINISTRATION

PENNWALT SUBSTATION
6400 NW FRONT AVENUE
PORTLAND, OREGON

Prepared by

PBS ENVIRONMENTAL
1220 SW Morrison Suite 600
Portland, OR 97205
(503) 248-1939

PBS Project Number
16291.018

January 2002

Phase Two Environmental Site Assessment

Pennwalt Substation
6400 NW Front Avenue
Portland, Oregon

prepared for

Bonneville Power Administration

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Prepared by

PBS ENVIRONMENTAL
1220 SW Morrison Suite 600
Portland, OR 97205

January 2002

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1.2 PREVIOUS INVESTIGATIONS 2

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Appendix A: Laboratory Reports and Sample Chain-of-Custody

1.0 INTRODUCTION

PBS Environmental (PBS) completed a Phase Two Environmental Site Assessment at the Pennwalt Substation in Portland, Oregon (Contract #00002491; release #003). The work was performed for Bonneville Power Administration (BPA) in general accordance with the *Environmental Site Assessment for Bonneville Power Administration Delivery Facility Sales Project: Sampling & Analysis Plan* dated May 1997. The purpose of the study is to document the environmental condition of the facility at the time of decommissioning, evaluate cleanup requirements, and to collect sufficient information regarding the nature and extent of contamination to assist BPA in making informed business decisions.

1.1 Site Location and Description

The Pennwalt Substation supplies electricity to the ATOFINA Chemical Plant (a.k.a. Elf Atochem) which is located immediately north of the substation. The plant has been the sole user of electricity from the plant, and with the upcoming closure of the plant, the substation will be decommissioned and all equipment will be removed from the site. The property on which the substation is located is owned by Elf Atochem.

The property is located at 6400 NW Front Avenue in Portland, Oregon (Figure 1). The substation, which is divided into the main substation and a substation annex to the north, has a total area of 1.28 acres, and is located in Township 1 North, Range 1 West, Section 13 (Willamette Meridian). The site is generally level, and is located between NW Front Avenue to the south and the ATOFINA Chemical Plant to the north.

The substation has seven power transformers (oil capacity: 3,400-4,900 gallons each), three station service transformers (oil capacity: 13-20 gallons each) and four grounding transformers (oil capacity: 50-737 gallons each). The station also has five oil-filled power circuit breakers (capacity: 180-228 gallons each). All of these transformers and circuit breakers contain, or are assumed to contain, PCBs.

1.2 Previous Investigations

According to a Preliminary Environmental Disclosure Report completed for the Pennwalt Substation by BPA in May 2001, a soil cleanup was initiated in the PCB capacitor yard on May 18, 1990. Two concrete pads and approximately 20 cubic yards of soil were removed. Verification sample results indicated that PCB concentrations of greater than 25 parts per million (ppm) still existed in the area. On June 4, 1990, an additional 12 cubic yards of soil was removed. Verification sample results indicated that the highest concentration of PCBs remaining on site was 5.3 ppm. The cleanups were conducted in coordination with EPA Region 10.

A second release of PCBs occurred on October 22, 2001 when a grounding transformer (voltage regulator) on the northwest side of the main substation yard failed, releasing approximately one gallon of oil (containing 93 ppm PCBs) onto the rock and footings beneath the unit. The spill was contained within the substation yard. The racks were wiped down and the affected rock removed. Confirmatory sampling showed that final cleanup was achieved.

2.0 SCOPE OF WORK

The scope of work completed by PBS consisted of the following elements:

1) **Visual Site Inspection.** A visual site inspection was performed to identify stains on soil, substation rock, concrete, and equipment. If stains were observed, the soil beneath the stained area was also to be visually inspected.

2) **Baseline Soil Sampling.** Baseline soil samples were collected from around oil-containing equipment with foundations and beneath racks with suspended oil-containing equipment. Samples were also to be collected from other areas of concern such as areas of stained soil or disturbed ground surfaces.

3) **Site Report.** A report was completed to document the site conditions.

3.0 FIELD METHODS

PBS Geologist Erik Anderson, accompanied by Fred Walasavage (BPA Environmental Protection Specialist), completed the field work on November 29, 2001. The entire ground surface within the substation boundaries was covered with crushed rock. Recent heavy rains saturated the ground making visual assessment of surface staining difficult.

Several stained areas were noted on the concrete pads around the two central transformer banks. Other BPA personnel were on site sampling the concrete equipment pads for PCBs.

Soil samples were collected from adjacent to the concrete equipment pads, 0.5 foot from the pad and zero to 0.5 foot beneath the substation rock. All samples were collected with a gloved hand and placed in laboratory-furnished 4-ounce soil jars. Only disposable sampling equipment was used and no field decontamination was performed at the site. All disposable sampling equipment was placed in sealed plastic bags and given to Mr. Walasavage for disposal at BPA's Ross HazMat Facility in Vancouver, Washington. The samples were placed in a chilled cooler and transported to Environmental Services Laboratory in Tigard, Oregon, under chain of custody. The samples were analyzed within EPA-established holding times.

3.1 Power Transformers

Four sample locations were selected from around both single power transformer foundation pads at the main substation (samples PSS-3 through PSS-6) and the substation annex (samples PSS-72 through PSS-75). Sample locations are shown on Figures 2 and 3. One sample was collected from the approximate center of each side, or in the location of the drain valve, approximately 0.5 foot from the foundation and from the zero to 0.5-foot interval beneath the substation rock for laboratory analysis for PCBs (EPA Method 8082).

Soil samples were collected from adjacent to the concrete pads at the two transformer banks in the main substation. The samples collected from the long side of the pad were placed at 6- to 8-foot intervals, for a total of eight samples per side. One sample was collected from the each end of the transformer pads.

Additional soil was collected from each sample location, disaggregated, and placed in a Ziploc®

bag. The sample headspace was then screened for volatile organics using a *Mini-RAE* portable photoionization detector (PID). No elevated PID readings were measured, therefore the samples collected from adjacent to the transformer oil drain valve was selected for analysis for 1,1,1-trichloroethane (samples PS-17, PSS-20, PSS-28, PSS-42, PSS-45, PSS-48, PSS-75).

In addition to the above analyses, twelve of the samples were randomly selected for analysis for Total Petroleum Hydrocarbons – Diesel extended (NWTPH-Dx). Of these, the samples that contained the highest TPH concentrations (3,980-8,550 mg/Kg) were also analyzed for benzene, toluene, ethylbenzene,and xylenes (BTEX) and polynuclear aromatic hydrocarbons (PAHs).

Sample PSS-25 was also selected for analysis for BTEX and PAHs based on the unusual green color of the sand within the substation rock overlying the sample area. The green staining covered an area with dimensions of approximately 3 feet by 2 feet, adjacent to the concrete pad. The staining did not appear to extend into the underlying soil. The green sandy gravel was sampled (sample PSS-25a) and, based on concerns over possible contamination from off-site sources, was analyzed for total lead and organochlorine pesticides.

3.2 Circuit Breakers

One soil sample was collected from each of the long sides of each circuit breaker pad (two samples at each pad). One sample was collected from the approximate center of each side, approximately 0.5 foot from the foundation and from the zero- to 0.5-foot interval beneath the substation rock for laboratory analysis for PCBs (EPA Method 8082).

3.3 Unidentified Concrete Pads

Four sample locations were selected from around both unknown concrete pads at the main substation (samples PSS-60 through PSS-67). Sample locations are shown on Figure 2. One sample was collected from each side of the pads, approximately 0.5 foot from the foundation and from the zero- to 0.5-foot interval beneath the substation rock for laboratory analysis for PCBs (EPA Method 8082).

3.4 Voltage Regulator Cleanup Area

Soil samples were collected from outside of the perimeter of the area that underwent soil removal in response to the previous spill. Sampling was previously completed within the cleanup area by BPA, therefore no additional samples were collected in this area. Each sample was collected from the zero- to 0.5-foot interval beneath the substation rock for laboratory analysis for PCBs (EPA Method 8082).

4.0 FINDINGS

A summary of laboratory results is presented in Table 1. The surrogate recovery for PCB analysis was above acceptable limits in samples PSS-3, PSS-19, PSS-22, PSS-28, PSS-30, PSS-31, PSS-63, and PSS-67, and below acceptable limits for samples PSS-25a and PSS-42. These outliers were reported by the laboratory to be the result of matrix interference. Two samples (PSS-26 and PSS-49) had no surrogate recovery due to necessary sample dilution. The remaining data are of known and acceptable quality.

Nine of the 68 samples analyzed for PCBs contained detectable concentrations of PCBs, ranging from 0.166 to 1.25 mg/Kg.

Petroleum hydrocarbons were detected in 7 of the 12 samples analyzed for diesel and heavy oil. Both diesel and heavy oil were reported in the samples, however the diesel pattern was reported to be not typical of diesel fuel. This type of spectrum is common with soils that contain mineral oil. The range of concentrations of TPH in the samples (combined total of reported diesel and heavy oil) is 141 to 8,550 milligrams per kilogram (mg/Kg).

Of the three samples with the highest TPH concentrations, none contained detectable concentrations of BTEX compounds or polynuclear aromatic hydrocarbons. Sample PSS-25, which contained no detectable TPH, contained seven detected PAH compounds. This sample was analyzed for PAHs due to the unusual green staining of the station rock in the area.

The station rock and interstitial sand in the area of green staining contained low concentrations of lead (543 mg/Kg), DDE (0.009 mg/Kg), and DDT (0.056 mg/Kg). Chlorobenzene was not detected

in the sample.

No 1,1,1-trichloroethane was detected above the laboratory reporting limits in any of the eight samples collected near the transformer drain valves.

5.0 DISCUSSION

Various state and federal soil cleanup standards may be applicable to this site. The following are discussions of these standards and their application to the subject property.

5.1 Soil Cleanup Levels (SO-CLEAN and EPA Region 9 PRGs)

The Numeric Soil Cleanup Levels (SO-CLEAN; OAR 340-122-045) were developed by the state of Oregon as the default cleanup levels for 25 different volatile organics, 24 semi-volatile organics, 15 pesticides, and 11 metals and cyanide in soil. The cleanup levels were primarily established to provide soil standards that would prevent contamination of groundwater due to leaching of contaminants from the soil. Sites must meet certain qualifying criteria before these standards can be applied.

In recent years, Oregon DEQ has determined that many of the SO-CLEAN levels are outdated, having been calculated from older, outdated toxicological data. The U.S. Environmental Protection Agency (Region 9) maintains a similar list of cleanup values for soil and groundwater, known as the Preliminary Remediation Goals, or PRGs. The PRGs include many more compounds than the SO-CLEAN list, and are periodically updated when new toxicological data becomes available for the various compounds on the list. It is for this reason that Oregon DEQ generally uses the EPA Region 9 PRGs in lieu of the SO-CLEAN values. The PRGs will therefore be used as the standard for comparison in this report.

Applicability to the Subject Site

PAH compounds were not detected in any samples above the Preliminary Remediation Goals (PRGs), and all of the reporting limits were below the corresponding cleanup levels.

The concentrations of lead, DDE, and DDT detected in the station rock and interstitial sand in the area of green staining were below the PRGs.

No 1,1,1-trichloroethane was detected above the laboratory reporting limits in any of the eight samples collected near the transformer drain valves. All of the reporting limits were below the corresponding cleanup level

5.2 Generic Remedies for Soils Contaminated with Polychlorinated Biphenyls (PCBs)

In a joint effort between the Oregon DEQ and the Electrical Utility Industry, generic remedies and risk-based cleanup levels were developed for PCBs in soil at PCB-contaminated sites. Sites being remediated within the framework of the generic remedy must comply with all applicable sections of the Oregon cleanup rules (OAR 340-122) and must also meet the following conditions:

- PCBs must be the primary contaminant of concern. Other contaminants may be present if it can be demonstrated that they are not significant contributors to the risk at the site.
- The generic remedy applies only to soils contaminated with PCBs. Oils, sediments, surface water and groundwater are not covered by this guidance, nor are ecological risks.
- Sites requiring treatment of more than 500 tons of PCB-contaminated soil may require a focused remedial study.

The remedy and cleanup standard selected is dependent upon the site use. Three categories of sites are defined in the generic remedy guidance document:

1) **Residential:** Sites suitable for residential or unrestricted use. Protective level: 1.2 mg/Kg.
2) **Industrial:** Sites used for industrial purposes into the foreseeable future. Protective level: 7.5mg/Kg.
3) **Operating Electrical Substation:** Sites that contain equipment used to transform and distribute electricity and which will continue to be used as an operating substation in the foreseeable future. Protective level: 25 mg/Kg.

Given the location of the subject property in an area of heavy industrial use, it is unlikely that the subject property will be used for residential use in the forseeable future, therefore the industrial cleanup standard is proposed for this site.

Applicability to the Subject Site

None of the soil samples collected at the Pennwalt Substation contained PCBs in excess of the Industrial cleanup standard (7.5 mg/Kg). One sample (PSS-63) contained PCBs (1.25 mg/Kg) slightly in excess of the Residential cleanup standard (1.2 mg/Kg).

6.0 CONCLUSIONS AND RECOMMENDATIONS

The sample results show no areas of the Pennwalt substation where EPA and Oregon DEQ cleanup levels have been exceeded in soil.

The DDT compounds (p,p'-DDE and p,p'-DDT) detected in sample PSS-25a are not expected to be the result of site operations by BPA since, according to BPA, DDT was never used on-site by BPA for vegetation management. The DDE and DDT in the soils are likely the result of contamination from the adjacent Atofina plant which previously manufactured DDT.

Based on these findings, no further investigation or remediation is recommended.

7.0 LIMITATIONS

PBS has prepared this report for the Bonneville Power Administration. This report is the result of interpretation of subsurface conditions based on field observations and analytical data from the indicated explorations. This report should not be used for purposes other than for which it was intended.

PBS ENVIRONMENTAL

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Senior Geologist

1-8-02

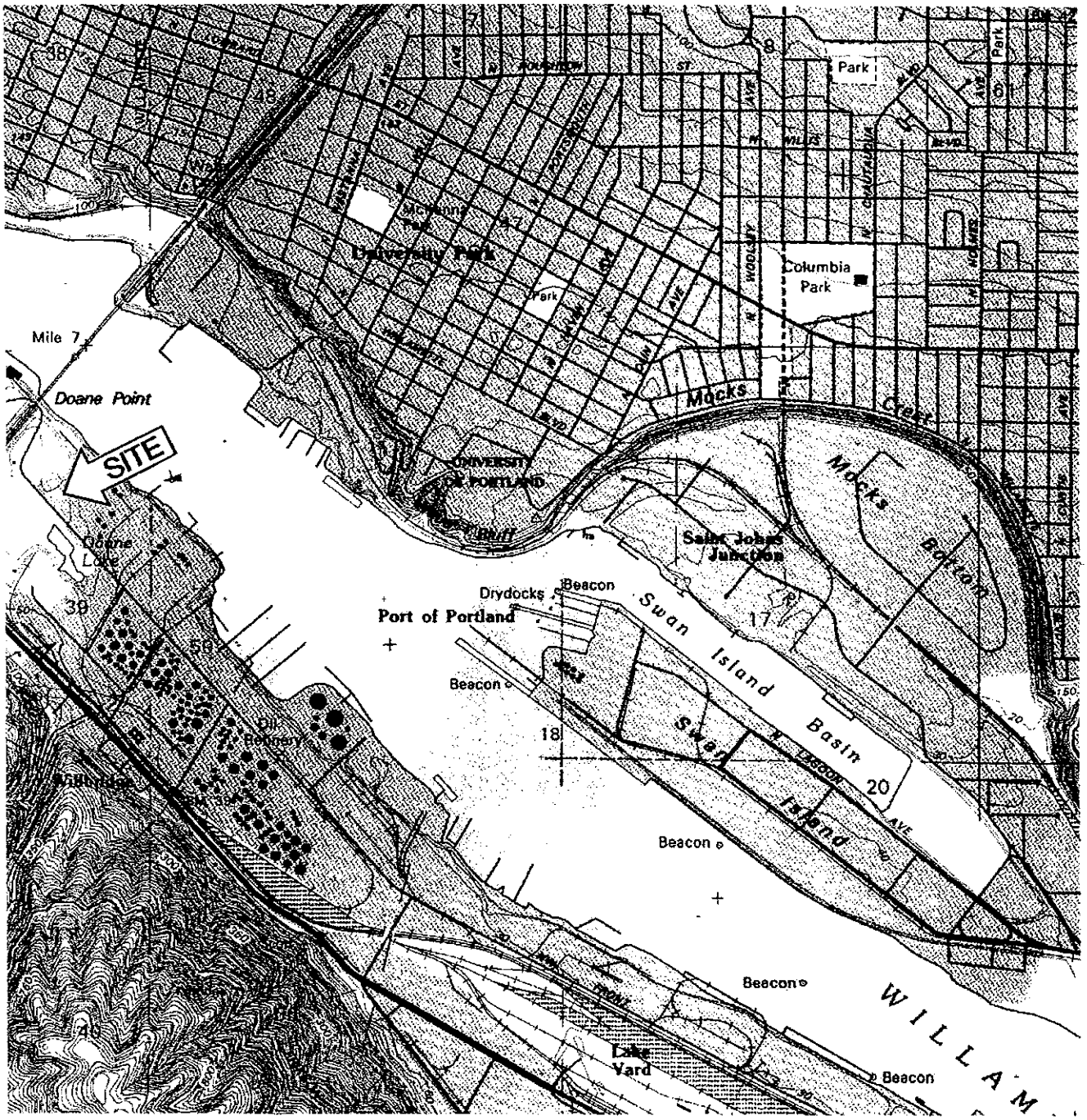
Signature Date

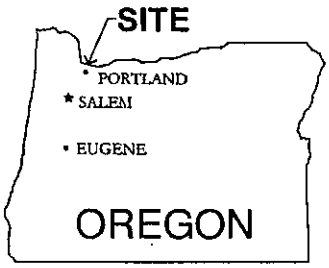
Dulcy Berri, R.G.
Senior Hydrogeologist

1/8/02

Signature Date

FIGURES





0 1/8 MILE 1/4 MILE 1/2 MILE 1 MILE

SOURCE: USGS PORTLAND QUADRANGLE, OR 1990

PBS ENVIRONMENTAL	Project #: 16291.018 Date: NOV 2001	SITE LOCATION MAP BPA - PENNWALT SUBSTATION MULTNOMAH COUNTY, OREGON	FIGURE 1

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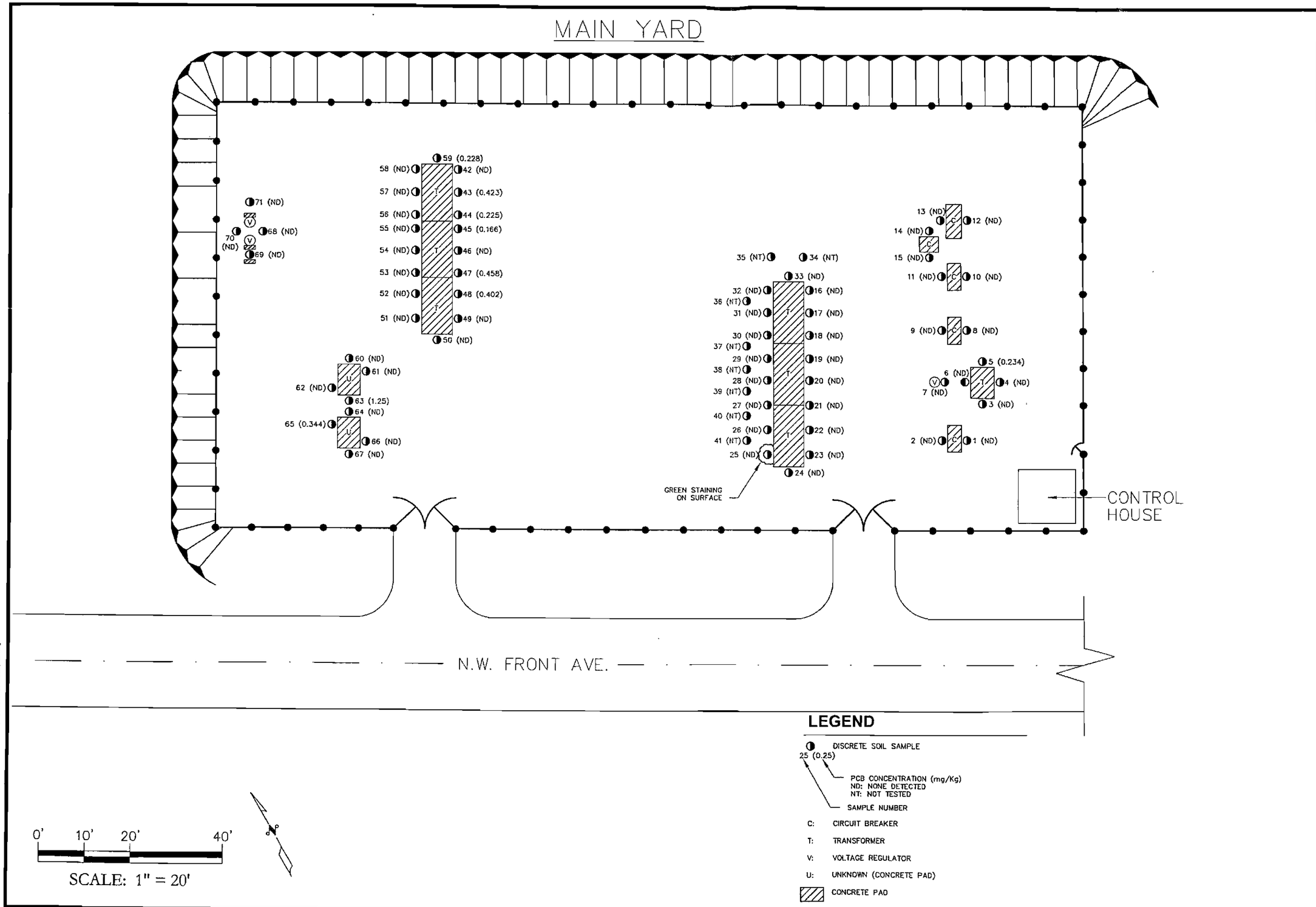

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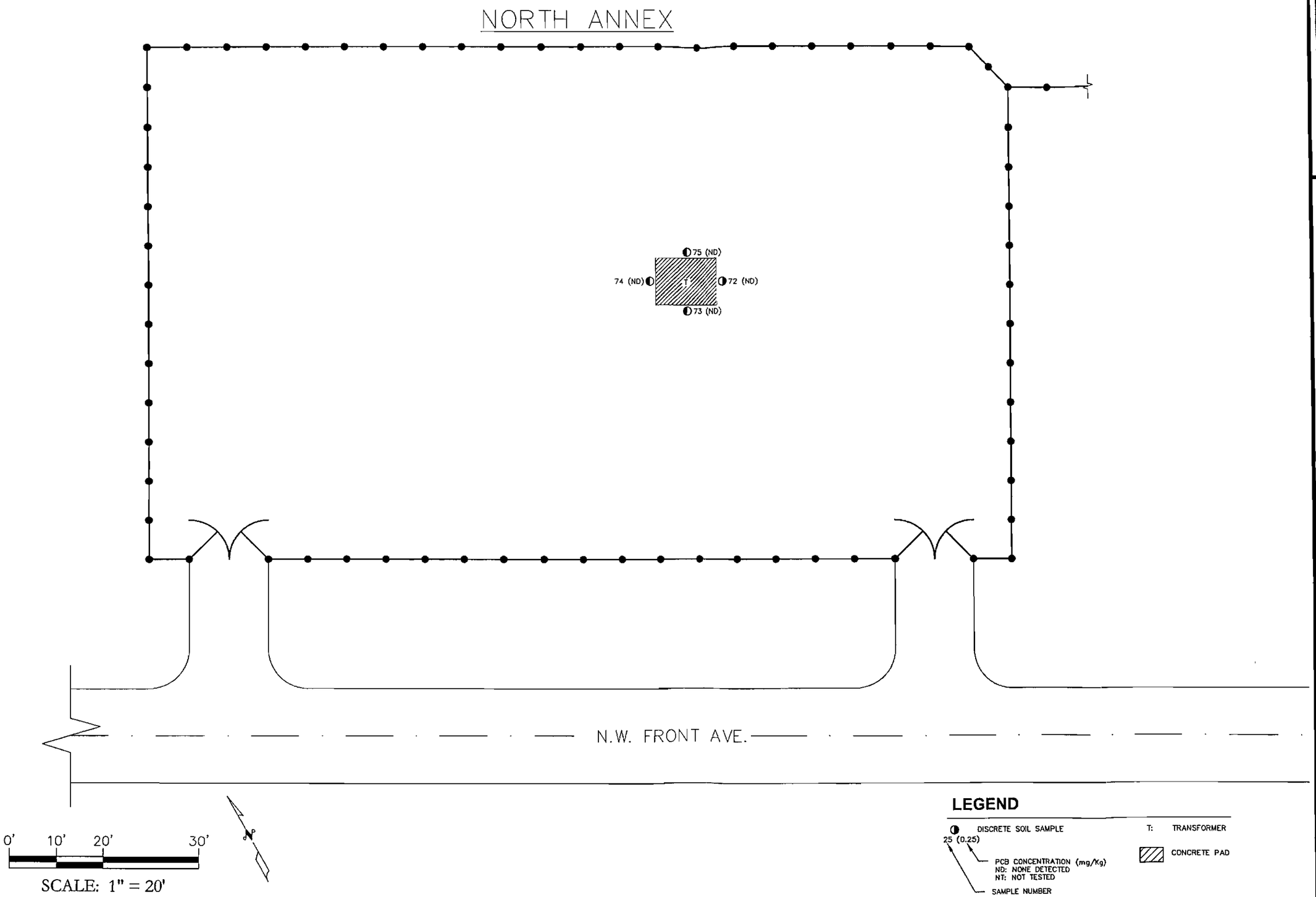
SOIL SAMPLING LOCATIONS AND SOIL PCB CONCENTRATIONS
MAIN YARD
BPA - PENWALT SUBSTATION
6400 NW FRONT AVENUE
PORTLAND, OREGON

SOIL SAMPLING

DECEMBER 2001

16291.018

FIGURE 2



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SOIL SAMPLING LOCATIONS AND SOIL PCB CONCENTRATIONS
ANNEX YARD
BPA - PENWALT SUBSTATION
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PORTLAND, OREGON

DECEMBER 2001

16291.018

FIGURE 3

11/5/01 11:21 P:\16000\16291 BPA\16291.018 Penwalt SS\16291.018_soil_samples.dwg

TABLES

Table 1
Soil Analysis Summary
Pennwalt Substation

Sample Number	Sample Location	Date Collected	Petroleum Hydrocarbons		VOCs		BTEX				PAHs							Polychlorinated Biphenyls (PCBs)								Metals	Pesticides	
			Diesel	Heavy Oil	Chlorobenzene	1,1,1-Trichloroethane	Benzene	Toluene	Ethylbenzene	Xylenes	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Fluoranthene	Pyrene	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	TOTAL AROCLORS	Lead	p,p-DDE	p,p-DDT
PSS-1	Circuit Breaker (O-2064)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-2	Circuit Breaker (O-2064)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-3	Power Transformer (V-187)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-4	Power Transformer (V-187)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-5	Power Transformer (V-187)	11/29/01	nt	nt	nt	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.234**	<0.534	nt	nt	nt
PSS-6	Power Transformer (V-187)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-7	Voltage Regulator	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-8	Circuit Breaker (O-2063)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-9	Circuit Breaker (O-2063)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-10	Circuit Breaker (O-2062)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-11	Circuit Breaker (O-2062)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-12	Circuit Breaker (O-2065)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-13	Circuit Breaker (O-2065)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-14	Circuit Breaker (O-2066)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-15	Circuit Breaker (O-2066)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-16	Power Transformer (T-1680)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-17	Power Transformer (T-1680)	11/29/01	nt	nt	nt	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-18	Power Transformer (T-1680)	11/29/01	ND	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-19	Power Transformer (T-1681)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-20	Power Transformer (T-1681)	11/29/01	nt	nt	nt	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-21	Power Transformer (T-1681)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-22	Power Transformer (T-1682)	11/29/01	846	1460	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<1.40	nt	nt	nt
PSS-23	Power Transformer (T-1682)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-24	Power Transformer (T-1682)	11/29/01	ND	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-25	Power Transformer (T-1682)	11/29/01	ND	ND	nt	nt	ND	ND	ND	ND	0.05	0.055	0.05	0.055	0.075	0.085	0.111	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-25a	Power Transformer (T-1682)	11/29/01	nt	nt	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	543	0.009	0.056
PSS-26	Power Transformer (T-1682)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<3.50	nt	nt	nt
PSS-27	Power Transformer (T-1681)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35	nt	nt	nt
PSS-28	Power Transformer (T-1681)	11/29/01	1860	2120	nt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<1.40	nt	nt	nt
EPA Region 9 Preliminary Remediation Goals																												
Industrial			na	na	540	1400	1.5	520	230	210	2.9	0.29	n/a	29	290	30000	54000	29	1.0	1.0	1.0	1.0	1.0	1.0	na	1000	12	12
Level Two Soil Matrix Cleanup Levels			500																									
Oregon Soil Cleanup Rules (OAR 340-122-045)			na	na	50	9	0.1	80	100	800	0.1	0.1	na	0.1	0.1	8,000	6,000	0.08 (total aroclors))								2,000	20	20
Oregon PCB Generic Remedy																												
Residential			na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.2 (total aroclors)								na	na	na
Industrial			na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	7.5 (total aroclors)								na	na	na
Operating Substation			na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	25 (total aroclors)								na	na	na

All values are given in milligrams per kilogram (mg/kg)
nt - Sample not tested
ND- None detected
na - Not applicable

Table 1
Soil Analysis Summary
Pennwalt Substation

Sample Number	Sample Location	Date Collected	Petroleum Hydrocarbons		VOCs	BTEX				PAHs							Polychlorinated Biphenyls (PCBs)							
			Diesel	Heavy Oil	1,1,1-Trichloroethane	Benzene	Toluene	Ethylbenzene	Xylenes	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Fluoranthene	Pyrene	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1259	TOTAL AROCLORS
PSS-29	Power Transformer (T-1681)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-30	Power Transformer (T-1680)	11/29/01	252	281	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-31	Power Transformer (T-1680)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-32	Power Transformer (T-1680)	11/29/01	ND	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-33	Power Transformer (T-1680)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-34	Power Transformer (T-1680)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-35	Power Transformer (T-1680)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-36	Power Transformer (T-1680)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-37	Power Transformer (T-1681)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-38	Power Transformer (T-1681)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-39	Power Transformer (T-1681)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-40	Power Transformer (T-1682)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-41	Power Transformer (T-1682)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
PSS-42	Power Transformer (T-1677)	11/29/01	nt	nt	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-43	Power Transformer (T-1677)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	**0.423**	<1.023
PSS-44	Power Transformer (T-1677)	11/29/01	189	139	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.225**	<0.525
PSS-45	Power Transformer (T-1678)	11/29/01	nt	nt	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.166**	<0.466
PSS-46	Power Transformer (T-1678)	11/29/01	ND	ND	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-47	Power Transformer (T-1678)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.458**	<0.758
PSS-48	Power Transformer (T-1679)	11/29/01	6470	2080	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.402**	<0.702
PSS-49	Power Transformer (T-1679)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<3.5
PSS-50	Power Transformer (T-1679)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-51	Power Transformer (T-1679)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-52	Power Transformer (T-1679)	11/29/01	160	200	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-53	Power Transformer (T-1678)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-54	Power Transformer (T-1678)	11/29/01	ND	141	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-55	Power Transformer (T-1678)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-56	Power Transformer (T-1677)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-57	Power Transformer (T-1677)	11/29/01	3330	2340	nt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
																	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
EPA Region 9 Preliminary Remediation Goals																								
Industrial			na	na	1400	1.5	520	230	210	2.9	0.29	na	29	290	30000	54000	29	1.0	1.0	1.0	1.0	1.0	1.0	na
Level Two Soil Matrix Cleanup Levels			500																					
Oregon Soil Cleanup Rules (OAR 340-122-045)			na	na	9	0.1	80	100	800	0.1	0.1	na	0.1	0.1	8,000	6,000	0.08 (total aroclors))							
Oregon PCB Generic Remedy																								
Residential			na	na	na	na	na	na	na	na	na	na	na	na	na	na	1.2 (total aroclors)							
Industrial			na	na	na	na	na	na	na	na	na	na	na	na	na	na	7.5 (total aroclors)							
Operating Substation			na	na	na	na	na	na	na	na	na	na	na	na	na	na	25 (total aroclors)							

All values are given in milligrams per kilogram (mg/kg)
nt - Sample not tested
ND- None detected
na - Not applicable

Table 1
Soil Analysis Summary
Pennwalt Substation

Sample Number	Sample Location	Date Collected	Petroleum Hydrocarbons		VOCs	BTEX				PAHs		Polychlorinated Biphenyls (PCBs)							
			Diesel	Heavy Oil	1,1,1-Trichloroethane	Benzene	Toluene	Ethylbenzene	Xylenes	Anthracene	Phenanthrene	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1259	TOTAL AROCLORS
PSS-58	Power Transformer (T-1677)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-59	Power Transformer (T-1677)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.228**	<0.588
PSS-60	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-61	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-62	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-63	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	**1.25**	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<2.45
PSS-64	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-65	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.20	<0.20	<0.20	<0.20	<0.20	**0.344**	<0.20	<1.544
PSS-66	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-67	Unidentified Concrete Pad	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-68	Voltage Regulators	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.4
PSS-69	Voltage Regulators	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-70	Voltage Regulators	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-71	Voltage Regulators	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-72	Power Transformer (annex)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-73	Power Transformer (annex)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-74	Power Transformer (annex)	11/29/01	nt	nt	nt	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
PSS-75	Power Transformer (annex)	11/29/01	nt	nt	ND	nt	nt	nt	nt	nt	nt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.35
EPA Region 9 Preliminary Remediation Goals																			
Residential			na	na	770	0.67	520	230	210	22000	na	3.9	0.22	0.22	0.22	0.22	0.22	0.22	na
Industrial			na	na	1400	1.5	520	230	210	390000	na	29	1.0	1.0	1.0	1.0	1.0	1.0	na
Level Two Soil Matrix Cleanup Levels			500																
Oregon Soil Cleanup Rules (OAR 340-122-045)			na	na	9	0.1	80	100	800	20,000	na	0.08 (total aroclors))							
Oregon PCB Generic Remedy																			
Residential			na	na	na	na	na	na	na	na	na	1.2 (total aroclors)							
Industrial			na	na	na	na	na	na	na	na	na	7.5 (total aroclors)							
Operating Substation			na	na	na	na	na	na	na	na	na	25 (total aroclors)							

All values are given in milligrams per kilogram (mg/kg)
nt - Sample not tested
ND- None detected
na - Not applicable

APPENDIX A
LABORATORY REPORTS AND SAMPLE CHAIN-OF-CUSTODY

Environmental Services Laboratory, Inc.

E S L

17400 SW Upper Boones Ferry Road, Suite 270 • Portland, OR 97224 • (503) 670-8520

December 19, 2001

Erik Anderson
PBS Environmental
1220 SW Morrison
Portland, OR 97205
TEL: (503) 248-1939
FAX (503) 248-0223

RE: 16291.018/Penwalt

Order No.: 0111250

Dear Erik Anderson,

Environmental Services Laboratory received 76 samples on 11/29/01 for the analyses presented in the following report.

The Samples were analyzed for the following tests:

GAS/BTEX, Soil (8015/8021)
ICP Metals (EPA 6010B)
Misc. Costs - see comments section (SWSUB)
NWTPH-Dx Soil (EPA 8015)
PAH BY SIM, Soil (8270-SIM)
PCBs in Soil or Solid Waste (EPA 8082A)
PERCENT MOISTURE (SM 2540)
Volatiles by GC/MS (EPA 8260B)

There were no analytical problems encountered, and all data met laboratory QC criteria, unless noted in a Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval of the Laboratory.
The following checked data sections are included in this report, and numbered to indicate total pages within each report section.

✓Base Sample Report ✓Method Blank Report ✓Sample Duplicate Report
✓Matrix Spike/Matrix Spike Duplicate Report ✓Laboratory Control Spike/Spike Duplicate Report ✓Continuing Calibration Verification Report ✓Initial Calibration Verification Report

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Environmental Services Laboratory, Inc.

E S L

17400 SW Upper Boones Ferry Road, Suite 270 • Portland, OR 97224 • (503) 670-8520

December 19, 2001

Erik Anderson
PBS Environmental
1220 SW Morrison
Portland, OR 97205
TEL: (503) 248-1939
FAX (503) 248-0223

RE: 16291.018/Penwalt

Order No.: 0111250

Dear Erik Anderson,

Leslie Rush
Leslie Rush
Project Manager

Keith Hunter
Technical Review

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-01A

Client Sample ID: PSS-1
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	100.8	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-2
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-02A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	104.2	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-3
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-03A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	200		µg/Kg	4	11/30/01
Aroclor 1221	ND	200		µg/Kg	4	11/30/01
Aroclor 1232	ND	200		µg/Kg	4	11/30/01
Aroclor 1242	ND	200		µg/Kg	4	11/30/01
Aroclor 1248	ND	200		µg/Kg	4	11/30/01
Aroclor 1254	ND	200		µg/Kg	4	11/30/01
Aroclor 1260	ND	200		µg/Kg	4	11/30/01
Surr: Decachlorobiphenyl	143.2	70-130	S, MI	%REC	4	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-4
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-04A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	101.2	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-5
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-05A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	234	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	88.4	70-130		%REC	1	11/30/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	98.0	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	98.0	80-120		%REC	1	11/30/01
Surr: Toluene-d8	98.8	81-117		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-06A

Client Sample ID: PSS-6
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	90.4	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-7
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-07A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	100.6	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-08A

Client Sample ID: PSS-8
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	100.8	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-9
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-09A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: mrs
Aroclor 1016	ND	100		µg/Kg	2	11/30/01
Aroclor 1221	ND	100		µg/Kg	2	11/30/01
Aroclor 1232	ND	100		µg/Kg	2	11/30/01
Aroclor 1242	ND	100		µg/Kg	2	11/30/01
Aroclor 1248	ND	100		µg/Kg	2	11/30/01
Aroclor 1254	ND	100		µg/Kg	2	11/30/01
Aroclor 1260	ND	100		µg/Kg	2	11/30/01
Surr: Decachlorobiphenyl	95.2	70-130		%REC	2	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-10
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-10A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	108.6	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-11
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-11A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	84.6	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-12
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-12A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	108.8	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-13
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-13A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	101.4	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-14
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-14A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	111.8	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-15
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-15A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	102.6	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *17-Jan-02*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-16A

Client Sample ID: PSS-16
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: mrs
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	116.4	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-17A

Client Sample ID: PSS-17
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	113.2	70-130		%REC	1	11/30/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	95.4	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	98.4	80-120		%REC	1	11/30/01
Surr: Toluene-d8	100.2	81-117		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-18
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-18A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	90.2	70-130		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-18
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-18B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	ND	23.5		mg/Kg-dry	1	11/30/01
Oil	ND	58.8		mg/Kg-dry	1	11/30/01
Surr: O-Terphenyl	83.0	50-150		%REC	1	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	15.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-19
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-19A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	133.2	70-130	S, MI	%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-20
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-20A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1221	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1232	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1242	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1248	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1254	ND	50.0		µg/Kg	1	11/30/01
Aroclor 1260	ND	50.0		µg/Kg	1	11/30/01
Surr: Decachlorobiphenyl	118.4	70-130		%REC	1	11/30/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	113.8	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	100.0	80-120		%REC	1	11/30/01
Surr: Toluene-d8	102.4	81-117		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-21
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-21A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/3/01
Surr: Decachlorobiphenyl	107.8	70-130		%REC	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-22A

Client Sample ID: PSS-22
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	200		µg/Kg	4	12/3/01
Aroclor 1221	ND	200		µg/Kg	4	12/3/01
Aroclor 1232	ND	200		µg/Kg	4	12/3/01
Aroclor 1242	ND	200		µg/Kg	4	12/3/01
Aroclor 1248	ND	200		µg/Kg	4	12/3/01
Aroclor 1254	ND	200		µg/Kg	4	12/3/01
Aroclor 1260	ND	200		µg/Kg	4	12/3/01
Surr: Decachlorobiphenyl	170.4	70-130	S, MI	%REC	4	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-22
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-22B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	846	120	AC	mg/Kg-dry	5	11/30/01
Oil	1,460	301	AF	mg/Kg-dry	5	11/30/01
Surr: O-Terphenyl	00.0	50-150	S, X	%REC	5	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	17.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-23
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-23A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/3/01
Surr: Decachlorobiphenyl	105.2	70-130		%REC	1	12/3/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	113.0	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	97.0	80-120		%REC	1	11/30/01
Surr: Toluene-d8	106.4	81-117		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-24
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-24A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/3/01
Surr: Decachlorobiphenyl	115.0	70-130		%REC	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-25A

Client Sample ID: PSS-25
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/3/01
Surr: Decachlorobiphenyl	91.8	70-130		%REC	1	12/3/01
GAS/BTEX, SOIL		**8015/8021**				Analyst: **jlw**
Benzene	ND	2.50		µg/Kg	1	11/30/01
Ethylbenzene	ND	2.50		µg/Kg	1	11/30/01
Toluene	ND	2.50		µg/Kg	1	11/30/01
Xylenes, Total	ND	7.50		µg/Kg	1	11/30/01
Surr: Trifluorotoluene	94.2	70-130		%REC	1	11/30/01
PAH BY SIM, SOIL		**8270-SIM**				Analyst: **mrs**
Acenaphthene	ND	50.0		µg/Kg	1	11/2/01
Acenaphthylene	ND	50.0		µg/Kg	1	11/2/01
Anthracene	ND	50.0		µg/Kg	1	11/2/01
Benz(a)anthracene	50	50.0		µg/Kg	1	11/2/01
Benzo(a)pyrene	55.0	50.0		µg/Kg	1	11/2/01
Benzo(b)fluoranthene	ND	50.0		µg/Kg	1	11/2/01
Benzo(g,h,i)perylene	50	50.0		µg/Kg	1	11/2/01
Benzo(k)fluoranthene	55.0	50.0		µg/Kg	1	11/2/01
Chrysene	75.0	50.0		µg/Kg	1	11/2/01
Dibenz(a,h)anthracene	ND	50.0		µg/Kg	1	11/2/01
Fluoranthene	85.0	50.0		µg/Kg	1	11/2/01
Fluorene	ND	50.0		µg/Kg	1	11/2/01
Indeno(1,2,3-cd)pyrene	ND	50.0		µg/Kg	1	11/2/01
Naphthalene	ND	50.0		µg/Kg	1	11/2/01
Phenanthrene	ND	50.0		µg/Kg	1	11/2/01
Pyrene	110	50.0		µg/Kg	1	11/2/01
Surr: 2-Fluorobiphenyl	109.0	30-115		%REC	1	11/2/01
Surr: 4-Terphenyl-d14	124.0	18-137		%REC	1	11/2/01
Surr: Nitrobenzene-d5	102.0	23-120		%REC	1	11/2/01

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-25
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-25B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	ND	24.7		mg/Kg-dry	1	11/30/01
Oil	ND	61.7		mg/Kg-dry	1	11/30/01
Surr: O-Terphenyl	93.0	50-150		%REC	1	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	19.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-25a
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-26A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ICP METALS		**EPA 6010B**				Analyst: **mal**
Lead	543	1.00		mg/Kg	1	12/4/01
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/3/01
Surr: Decachlorobiphenyl	59.2	70-130	S, MI	%REC	1	12/3/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
Chlorobenzene	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	105.0	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	104.4	80-120		%REC	1	11/30/01
Surr: Toluene-d8	100.2	81-117		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-26
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-27A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	500		µg/Kg	10	12/3/01
Aroclor 1221	ND	500		µg/Kg	10	12/3/01
Aroclor 1232	ND	500		µg/Kg	10	12/3/01
Aroclor 1242	ND	500		µg/Kg	10	12/3/01
Aroclor 1248	ND	500		µg/Kg	10	12/3/01
Aroclor 1254	ND	500		µg/Kg	10	12/3/01
Aroclor 1260	ND	500		µg/Kg	10	12/3/01
Surr: Decachlorobiphenyl	00.0	70-130	S, X	%REC	10	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-27
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-28A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: mrs
Aroclor 1016	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/3/01
Surr: Decachlorobiphenyl	89.6	70-130		%REC	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-28
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-29A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	200		µg/Kg	4	12/3/01
Aroclor 1221	ND	200		µg/Kg	4	12/3/01
Aroclor 1232	ND	200		µg/Kg	4	12/3/01
Aroclor 1242	ND	200		µg/Kg	4	12/3/01
Aroclor 1248	ND	200		µg/Kg	4	12/3/01
Aroclor 1254	ND	200		µg/Kg	4	12/3/01
Aroclor 1260	ND	200		µg/Kg	4	12/3/01
Surr: Decachlorobiphenyl	175.2	70-130	S, MI	%REC	4	12/3/01
GAS/BTEX, SOIL		**8015/8021**				Analyst: **jlw**
Benzene	ND	2.50		µg/Kg	1	12/12/01
Ethylbenzene	ND	2.50		µg/Kg	1	12/12/01
Toluene	ND	2.50		µg/Kg	1	12/12/01
Xylenes, Total	ND	7.50		µg/Kg	1	12/12/01
Surr: Trifluorotoluene	81.6	70-130		%REC	1	12/12/01
PAH BY SIM, SOIL		**8270-SIM**				Analyst: **mrs**
Acenaphthene	ND	50.0		µg/Kg	1	12/12/01
Acenaphthylene	ND	50.0		µg/Kg	1	12/12/01
Anthracene	ND	50.0		µg/Kg	1	12/12/01
Benz(a)anthracene	ND	50.0		µg/Kg	1	12/12/01
Benzo(a)pyrene	ND	50.0		µg/Kg	1	12/12/01
Benzo(b)fluoranthene	ND	50.0		µg/Kg	1	12/12/01
Benzo(g,h,i)perylene	ND	50.0		µg/Kg	1	12/12/01
Benzo(k)fluoranthene	ND	50.0		µg/Kg	1	12/12/01
Chrysene	ND	50.0		µg/Kg	1	12/12/01
Dibenz(a,h)anthracene	ND	50.0		µg/Kg	1	12/12/01
Fluoranthene	ND	50.0		µg/Kg	1	12/12/01
Fluorene	ND	50.0		µg/Kg	1	12/12/01
Indeno(1,2,3-cd)pyrene	ND	50.0		µg/Kg	1	12/12/01
Naphthalene	ND	50.0		µg/Kg	1	12/12/01
Phenanthrene	ND	50.0		µg/Kg	1	12/12/01
Pyrene	ND	50.0		µg/Kg	1	12/12/01
Surr: 2-Fluorobiphenyl	82.0	30-115		%REC	1	12/12/01
Surr: 4-Terphenyl-d14	80.0	18-137		%REC	1	12/12/01
Surr: Nitrobenzene-d5	79.0	23-120		%REC	1	12/12/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-28
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-29B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	1,860	127	AC	mg/Kg-dry	5	11/30/01
Oil	2,120	316	AF	mg/Kg-dry	5	11/30/01
Surr: O-Terphenyl	00.0	50-150	S, X	%REC	5	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	21.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-29
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-30A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/3/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/3/01
Surr: Decachlorobiphenyl	93.8	70-130		%REC	1	12/3/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-31A

Client Sample ID: PSS-30
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	139.8	70-130	S, MI	%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-30
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-31B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	252	25.6	AC	mg/Kg-dry	1	11/30/01
Oil	281	64.1	AF	mg/Kg-dry	1	11/30/01
Surr: O-Terphenyl	00.0	50-150	S, MI	%REC	1	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	22.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-31
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-32A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	138.0	70-130	S, MI	%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-32
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-33A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	103.0	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-33B

Client Sample ID: PSS-32
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	ND	28.2		mg/Kg-dry	1	11/30/01
Oil	ND	70.4		mg/Kg-dry	1	11/30/01
Surr: O-Terphenyl	103.0	50-150		%REC	1	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	29.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-33
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-34A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	112.2	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-43A

Client Sample ID: PSS-42
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	202	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	63.0	70-130	S, MI	%REC	1	12/4/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	50.0		µg/Kg	2	11/30/01
Surr: 4-Bromofluorobenzene	113.4	74-121		%REC	2	11/30/01
Surr: Dibromofluoromethane	98.8	80-120		%REC	2	11/30/01
Surr: Toluene-d8	103.0	81-117		%REC	2	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-43
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-44A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: mrs
Aroclor 1016	ND	100		µg/Kg	2	12/4/01
Aroclor 1221	ND	100		µg/Kg	2	12/4/01
Aroclor 1232	ND	100		µg/Kg	2	12/4/01
Aroclor 1242	ND	100		µg/Kg	2	12/4/01
Aroclor 1248	ND	100		µg/Kg	2	12/4/01
Aroclor 1254	ND	100		µg/Kg	2	12/4/01
Aroclor 1260	423	100		µg/Kg	2	12/4/01
Surr: Decachlorobiphenyl	97.6	70-130		%REC	2	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-44
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-45A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	225	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	71.4	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-44
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-45B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	189	28.6	AC	mg/Kg-dry	1	11/30/01
Oil	139	71.4	AF	mg/Kg-dry	1	11/30/01
Surr: O-Terphenyl	92.0	50-150		%REC	1	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	30.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-45
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-46A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	166	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	82.8	70-130		%REC	1	12/4/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	105.6	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	96.6	80-120		%REC	1	11/30/01
Surr: Toluene-d8	99.4	81-117		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-46
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-47A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	113.0	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-47B

Client Sample ID: PSS-46
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	ND	26.7		mg/Kg-dry	1	11/30/01
Oil	ND	66.7		mg/Kg-dry	1	11/30/01
Surr: O-Terphenyl	92.0	50-150		%REC	1	11/30/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	25.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-47
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-48A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	458	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	119.6	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-48
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-49A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	402	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	103.4	70-130		%REC	1	12/4/01
GAS/BTEX, SOIL		**8015/8021**				Analyst: **jlw**
Benzene	ND	2.50		µg/Kg	1	12/12/01
Ethylbenzene	ND	2.50		µg/Kg	1	12/12/01
Toluene	ND	2.50		µg/Kg	1	12/12/01
Xylenes, Total	ND	7.50		µg/Kg	1	12/12/01
Surr: Trifluorotoluene	84.6	70-130		%REC	1	12/12/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	109.8	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	102.0	80-120		%REC	1	11/30/01
Surr: Toluene-d8	102.4	81-117		%REC	1	11/30/01
PAH BY SIM, SOIL		**8270-SIM**				Analyst: **mrs**
Acenaphthene	ND	50.0		µg/Kg	1	12/12/01
Acenaphthylene	ND	50.0		µg/Kg	1	12/12/01
Anthracene	ND	50.0		µg/Kg	1	12/12/01
Benz(a)anthracene	ND	50.0		µg/Kg	1	12/12/01
Benzo(a)pyrene	ND	50.0		µg/Kg	1	12/12/01
Benzo(b)fluoranthene	ND	50.0		µg/Kg	1	12/12/01
Benzo(g,h,i)perylene	ND	50.0		µg/Kg	1	12/12/01
Benzo(k)fluoranthene	ND	50.0		µg/Kg	1	12/12/01
Chrysene	ND	50.0		µg/Kg	1	12/12/01
Dibenz(a,h)anthracene	ND	50.0		µg/Kg	1	12/12/01
Fluoranthene	ND	50.0		µg/Kg	1	12/12/01
Fluorene	ND	50.0		µg/Kg	1	12/12/01
Indeno(1,2,3-cd)pyrene	ND	50.0		µg/Kg	1	12/12/01
Naphthalene	ND	50.0		µg/Kg	1	12/12/01
Phenanthrene	ND	50.0		µg/Kg	1	12/12/01
Pyrene	ND	50.0		µg/Kg	1	12/12/01
Surr: 2-Fluorobiphenyl	97.0	30-115		%REC	1	12/12/01
Surr: 4-Terphenyl-d14	97.0	18-137		%REC	1	12/12/01
Surr: Nitrobenzene-d5	70.0	23-120		%REC	1	12/12/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-48
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-49B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	6,470	118	AC	mg/Kg-dry	5	12/3/01
Oil	2,080	294	AF	mg/Kg-dry	5	12/3/01
Surr: O-Terphenyl	00.0	50-150	S, X	%REC	5	12/3/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	15.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-50A

Client Sample ID: PSS-49
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	500		µg/Kg	10	12/4/01
Aroclor 1221	ND	500		µg/Kg	10	12/4/01
Aroclor 1232	ND	500		µg/Kg	10	12/4/01
Aroclor 1242	ND	500		µg/Kg	10	12/4/01
Aroclor 1248	ND	500		µg/Kg	10	12/4/01
Aroclor 1254	ND	500		µg/Kg	10	12/4/01
Aroclor 1260	ND	500		µg/Kg	10	12/4/01
Surr: Decachlorobiphenyl	00.0	70-130	S, X	%REC	10	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-50
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-51A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	115.6	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-51
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-52A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: mrs
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	97.0	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-52
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-53A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	98.2	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-52
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-53B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	160	23.5	AC	mg/Kg-dry	1	12/3/01
Oil	200	58.8	AF	mg/Kg-dry	1	12/3/01
Surr: O-Terphenyl	00.0	50-150	S, MI	%REC	1	12/3/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	15.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-53
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-54A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	117.0	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-54
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-55A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	98.8	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-54
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-55B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	ND	24.7		mg/Kg-dry	1	12/4/01
Oil	141	61.7		mg/Kg-dry	1	12/4/01
Surr: O-Terphenyl	95.0	50-150		%REC	1	12/4/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	19.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-56A

Client Sample ID: PSS-55
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	107.2	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-56
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-57A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	108.6	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-57
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-58A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	74.8	70-130		%REC	1	12/4/01
GAS/BTEX, SOIL		**8015/8021**				Analyst: **jlw**
Benzene	ND	2.50		µg/Kg	1	11/30/01
Ethylbenzene	ND	2.50		µg/Kg	1	11/30/01
Toluene	ND	2.50		µg/Kg	1	11/30/01
Xylenes, Total	ND	7.50		µg/Kg	1	11/30/01
Surr: Trifluorotoluene	84.1	70-130		%REC	1	11/30/01
PAH BY SIM, SOIL		**8270-SIM**				Analyst: **mrs**
Acenaphthene	ND	50.0		µg/Kg	1	11/2/01
Acenaphthylene	ND	50.0		µg/Kg	1	11/2/01
Anthracene	ND	50.0		µg/Kg	1	11/2/01
Benz(a)anthracene	ND	50.0		µg/Kg	1	11/2/01
Benzo(a)pyrene	ND	50.0		µg/Kg	1	11/2/01
Benzo(b)fluoranthene	ND	50.0		µg/Kg	1	11/2/01
Benzo(g,h,i)perylene	ND	50.0		µg/Kg	1	11/2/01
Benzo(k)fluoranthene	ND	50.0		µg/Kg	1	11/2/01
Chrysene	ND	50.0		µg/Kg	1	11/2/01
Dibenz(a,h)anthracene	ND	50.0		µg/Kg	1	11/2/01
Fluoranthene	ND	50.0		µg/Kg	1	11/2/01
Fluorene	ND	50.0		µg/Kg	1	11/2/01
Indeno(1,2,3-cd)pyrene	ND	50.0		µg/Kg	1	11/2/01
Naphthalene	ND	50.0		µg/Kg	1	11/2/01
Phenanthrene	ND	50.0		µg/Kg	1	11/2/01
Pyrene	ND	50.0		µg/Kg	1	11/2/01
Surr: 2-Fluorobiphenyl	93.0	30-115		%REC	1	11/2/01
Surr: 4-Terphenyl-d14	103.0	18-137		%REC	1	11/2/01
Surr: Nitrobenzene-d5	97.0	23-120		%REC	1	11/2/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-57
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-58B	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
NWTPH-DX SOIL		**EPA 8015**				Analyst: **smc**
Diesel	3,330	152	AC	mg/Kg-dry	5	12/3/01
Oil	2,340	379	AF	mg/Kg-dry	5	12/3/01
Surr: O-Terphenyl	00.0	50-150	S, X	%REC	5	12/3/01
PERCENT MOISTURE		**SM 2540**				Analyst: **smc**
% Moisture	34.0	0		wt%	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-59A

Client Sample ID: PSS-58
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	107.4	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-59
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-60A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	228	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	72.6	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-61A

Client Sample ID: PSS-60
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	104.2	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-61
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-62A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	105.2	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-62
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-63A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: mrs
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	103.4	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-63
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-64A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	1,250	200		µg/Kg	4	12/4/01
Aroclor 1221	ND	200		µg/Kg	4	12/4/01
Aroclor 1232	ND	200		µg/Kg	4	12/4/01
Aroclor 1242	ND	200		µg/Kg	4	12/4/01
Aroclor 1248	ND	200		µg/Kg	4	12/4/01
Aroclor 1254	ND	200		µg/Kg	4	12/4/01
Aroclor 1260	ND	200		µg/Kg	4	12/4/01
Surr: Decachlorobiphenyl	229.6	70-130	S, MI	%REC	4	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Lab Order: 0111250
Project: 16291.018/Penwalt
Lab ID: 0111250-65A

Client Sample ID: PSS-64
Tag Number:
Collection Date: 11/29/01
Matrix: SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	116.0	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-65
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-66A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	200		µg/Kg	4	12/4/01
Aroclor 1221	ND	200		µg/Kg	4	12/4/01
Aroclor 1232	ND	200		µg/Kg	4	12/4/01
Aroclor 1242	ND	200		µg/Kg	4	12/4/01
Aroclor 1248	ND	200		µg/Kg	4	12/4/01
Aroclor 1254	344	200		µg/Kg	4	12/4/01
Aroclor 1260	ND	200		µg/Kg	4	12/4/01
Surr: Decachlorobiphenyl	89.6	70-130		%REC	4	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-66
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-67A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	98.4	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-67
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-68A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	137.0	70-130	S, MI	%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-68
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-69A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	100		µg/Kg	2	12/4/01
Aroclor 1221	ND	100		µg/Kg	2	12/4/01
Aroclor 1232	ND	100		µg/Kg	2	12/4/01
Aroclor 1242	ND	100		µg/Kg	2	12/4/01
Aroclor 1248	ND	100		µg/Kg	2	12/4/01
Aroclor 1254	ND	100		µg/Kg	2	12/4/01
Aroclor 1260	ND	100		µg/Kg	2	12/4/01
Surr: Decachlorobiphenyl	123.2	70-130		%REC	2	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-69
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-70A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	92.0	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-70
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-71A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	107.2	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-71
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-72A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	103.6	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-72
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-73A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	113.4	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-73
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-74A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: mrs
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	109.6	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-74
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-75A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	94.8	70-130		%REC	1	12/4/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT:	PBS Environmental	**Client Sample ID:**	PSS-75
Lab Order:	0111250	**Tag Number:**	
Project:	16291.018/Penwalt	**Collection Date:**	11/29/01
Lab ID:	0111250-76A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCBS IN SOIL OR SOLID WASTE		**EPA 8082A**				Analyst: **mrs**
Aroclor 1016	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1221	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1232	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1242	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1248	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1254	ND	50.0		µg/Kg	1	12/4/01
Aroclor 1260	ND	50.0		µg/Kg	1	12/4/01
Surr: Decachlorobiphenyl	91.0	70-130		%REC	1	12/4/01
VOLATILES BY GC/MS		**EPA 8260B**				Analyst: **tmh**
1,1,1-Trichloroethane	ND	25.0		µg/Kg	1	11/30/01
Surr: 4-Bromofluorobenzene	99.8	74-121		%REC	1	11/30/01
Surr: Dibromofluoromethane	95.4	80-120		%REC	1	11/30/01
Surr: Toluene-d8	98.6	81-117		%REC	1	11/30/01

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Method Blank

Sample ID: **MBlank** Batch ID: **04 BG S-12/1** Test Code: **8015/8021** Units: **µg/L** Analysis Date: **12/12/01** Prep Date:

Client ID: **0111250** Run ID: **WATSON_011212A** SeqNo: **100432**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	0.5									
Ethylbenzene	ND	0.5									
Toluene	ND	0.5									
Xylenes, Total	ND	1.5									
Trifluorotoluene	95.5	0	100	0	95.5%	70	130	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **05 8260 S-12/** Test Code: **EPA 8260B** Units: **µg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **HORATIO_011130A** SeqNo: **98532**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	1									
1,1,1-Trichloroethane	ND	1									
1,1,2,2-Tetrachloroethane	ND	1									
1,1,2-Trichloroethane	ND	1									
1,1-Dichloroethane	ND	1.5									
1,1-Dichloroethene	ND	1									
1,1-Dichloropropene	ND	1									
1,2,3-Trichlorobenzene	ND	1.8									
1,2,3-Trichloropropane	ND	1									
1,2,4-Trichlorobenzene	ND	1									
1,2,4-Trimethylbenzene	ND	1									
1,2-Dibromo-3-chloropropane	ND	2									
1,2-Dibromoethane	ND	1									
1,2-Dichlorobenzene	ND	1									
1,2-Dichloroethane	ND	1									
1,2-Dichloropropane	ND	1									
1,3,5-Trimethylbenzene	ND	1									
1,3-Dichlorobenzene	ND	1									
1,3-Dichloropropane	ND	1									
1,4-Dichlorobenzene	ND	1									
2,2-Dichloropropane	ND	1.9									
2-Butanone	ND	20									
2-Chloroethyl vinyl ether	ND	5									
2-Chlorotoluene	ND	1									
2-Hexanone	ND	20									
4-Chlorotoluene	ND	1									
4-Isopropyltoluene	ND	1									
4-Methyl-2-pentanone	ND	1									
Acetone	ND	20									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Method Blank

Benzene	ND	1
Bromobenzene	ND	1
Bromochloromethane	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	5
Carbon disulfide	ND	1
Carbon tetrachloride	ND	1
Chlorobenzene	ND	1
Chloroethane	ND	5
Chloroform	ND	1
Chloromethane	ND	2
cis-1,2-Dichloroethene	ND	1
cis-1,3-Dichloropropene	ND	1
Dibromochloromethane	ND	1
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	2
Ethylbenzene	ND	1
Hexachlorobutadiene	ND	2
Iodomethane	ND	1
Isopropylbenzene	ND	1
m,p-Xylene	ND	2
Methyl tert-butyl ether	ND	2
Methylene chloride	ND	10
n-Butylbenzene	ND	1
n-Propylbenzene	ND	1
Naphthalene	ND	2
o-Xylene	ND	1
sec-Butylbenzene	ND	1
Styrene	ND	1
tert-Butylbenzene	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Method Blank

trans-1,2-Dichloroethene	ND	1									
trans-1,3-Dichloropropene	ND	1									
Trichloroethene	ND	1									
Trichlorofluoromethane	ND	2									
Vinyl acetate	ND	1									
Vinyl chloride	ND	1.2									
4-Bromofluorobenzene	48.9	0	50	0	97.8%	86	115	0			
Dibromofluoromethane	48.7	0	50	0	97.4%	86	118	0			
Toluene-d8	49.7	0	50	0	99.4%	88	110	0			

Sample ID: **MB-3573** Batch ID: **3573** Test Code: **EPA 6010B** Units: **mg/Kg** Analysis Date: **12/4/01** Prep Date: **11/30/01**

Client ID: **0111250** Run ID: **ICP_011204A** SeqNo: **98915**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1									
Barium	ND	1									
Cadmium	ND	1									
Chromium	ND	1									
Lead	ND	1									
Selenium	ND	1									
Silver	ND	1									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Method Blank

Sample ID: **MB-3574** Batch ID: **3574** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **PCB_011130B** SeqNo: **99359**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50									
Aroclor 1221	ND	50									
Aroclor 1232	ND	50									
Aroclor 1242	ND	50									
Aroclor 1248	ND	50									
Aroclor 1254	ND	50									
Aroclor 1260	ND	50									
Decachlorobiphenyl	193.5	0	250	0	77.4%	70	130	0			

Sample ID: **MB-3575** Batch ID: **3575** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/3/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **PCB_011203A** SeqNo: **99507**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50									
Aroclor 1221	ND	50									
Aroclor 1232	ND	50									
Aroclor 1242	ND	50									
Aroclor 1248	ND	50									
Aroclor 1254	ND	50									
Aroclor 1260	ND	50									
Decachlorobiphenyl	249.5	0	250	0	99.8%	70	130	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Method Blank

Sample ID: **MB-3576** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**

Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98650**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	ND	20									
Oil	ND	50									
O-Terphenyl	47	0	50	0	94.0%	50	150	0			

Sample ID: **MB-3577** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**

Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98515**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	ND	20									
Oil	ND	50									
O-Terphenyl	51.5	0	50	0	103.0%	50	150	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Method Blank

Sample ID: **MB-3581** Batch ID: **3581** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **11/2/01** Prep Date: **12/2/01**

Client ID: **0111250** Run ID: **HEISENBURG_011202A** SeqNo: **98504**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	50									
Acenaphthylene	ND	50									
Anthracene	ND	50									
Benz(a)anthracene	ND	50									
Benzo(a)pyrene	ND	50									
Benzo(b)fluoranthene	ND	50									
Benzo(g,h,i)perylene	ND	50									
Benzo(k)fluoranthene	ND	50									
Chrysene	ND	50									
Dibenz(a,h)anthracene	ND	50									
Fluoranthene	ND	50									
Fluorene	ND	50									
Indeno(1,2,3-cd)pyrene	ND	50									
Naphthalene	ND	50									
Phenanthrene	ND	50									
Pyrene	ND	50									
2-Fluorobiphenyl	495	0	500	0	99.0%	30	115	0			
4-Terphenyl-d14	635	0	500	0	127.0%	18	137	0			
Nitrobenzene-d5	490	0	500	0	98.0%	23	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-3582** Batch ID: **3582** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/3/01**
Client ID: **0111250** Run ID: **PCB_011204A** SeqNo: **99382**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50									
Aroclor 1221	ND	50									
Aroclor 1232	ND	50									
Aroclor 1242	ND	50									
Aroclor 1248	ND	50									
Aroclor 1254	ND	50									
Aroclor 1260	ND	50									
Decachlorobiphenyl	253	0	250	0	101.2%	70	130	0			

Sample ID: **MB-3590** Batch ID: **3590** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/4/01**
Client ID: **0111250** Run ID: **PCB_011204B** SeqNo: **99395**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50									
Aroclor 1221	ND	50									
Aroclor 1232	ND	50									
Aroclor 1242	ND	50									
Aroclor 1248	ND	50									
Aroclor 1254	ND	50									
Aroclor 1260	ND	50									
Decachlorobiphenyl	296	0	250	0	118.4%	70	130	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Method Blank

Sample ID: **MB-3632** Batch ID: **3632** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date: **12/12/01**

Client ID: **0111250** Run ID: **HEISENBURG_011212A** SeqNo: **100280**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	50									
Acenaphthylene	ND	50									
Anthracene	ND	50									
Benz(a)anthracene	ND	50									
Benzo(a)pyrene	ND	50									
Benzo(b)fluoranthene	ND	50									
Benzo(g,h,i)perylene	ND	50									
Benzo(k)fluoranthene	ND	50									
Chrysene	ND	50									
Dibenz(a,h)anthracene	ND	50									
Fluoranthene	ND	50									
Fluorene	ND	50									
Indeno(1,2,3-cd)pyrene	ND	50									
Naphthalene	ND	50									
Phenanthrene	ND	50									
Pyrene	ND	50									
2-Fluorobiphenyl	300	0	500	0	60.0%	30	115	0			
4-Terphenyl-d14	305	0	500	0	61.0%	18	137	0			
Nitrobenzene-d5	290	0	500	0	58.0%	23	120	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Duplicate

Sample ID: **0111250-29A DUP** Batch ID: **04 BG S-12/1** Test Code: **8015/8021** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date:
Client ID: **PSS-28** **0111250** Run ID: **WATSON_011212A** SeqNo: **100437**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	2.5	0	0	0.0%	0	0	0	0.0%	20	
Ethylbenzene	ND	2.5	0	0	0.0%	0	0	0	0.0%	20	
Toluene	ND	2.5	0	0	0.0%	0	0	0	0.0%	20	
Xylenes, Total	ND	7.5	0	0	0.0%	0	0	0	0.0%	20	
Trifluorotoluene	82.8	0	100	0	82.8%	70	130	0	0.0%	20	

Sample ID: **0111250-58A DUP** Batch ID: **04 BG S-12/3/** Test Code: **8015/8021** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date:
Client ID: **PSS-57** **0111250** Run ID: **CRICK_011130A** SeqNo: **98606**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	2.5	0	0	0.0%	0	0	0	0.0%	20	
Ethylbenzene	ND	2.5	0	0	0.0%	0	0	0	0.0%	20	
Toluene	ND	2.5	0	0	0.0%	0	0	0	0.0%	20	
Xylenes, Total	ND	7.5	0	0	0.0%	0	0	0	0.0%	20	
Trifluorotoluene	81.2	0	100	0	81.2%	70	130	0	0.0%	20	

Sample ID: **0111250-05A DUP** Batch ID: **05 8260 S-12/** Test Code: **EPA 8260B** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date:
Client ID: **PSS-5** **0111250** Run ID: **HORATIO_011130A** SeqNo: **98535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	ND	25	0	0	0.0%	0	0	0	0.0%	20	
4-Bromofluorobenzene	49	0	50	0	98.0%	74	121	0	0.0%	0	
Dibromofluoromethane	48.2	0	50	0	96.4%	80	120	0	0.0%	0	
Toluene-d8	50.5	0	50	0	101.0%	81	117	0	0.0%	0	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **0111244-09B DUP** Batch ID: **3573** Test Code: **EPA 6010B** Units: **mg/Kg** Analysis Date: **12/4/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ICP_011204A** SeqNo: **98921**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	4.81	1	0	0	0.0%	0	0	5.3	9.7%	20	
Barium	113	1	0	0	0.0%	0	0	124	9.3%	20	
Cadmium	ND	1	0	0	0.0%	0	0	0	0.0%	20	
Chromium	17.3	1	0	0	0.0%	0	0	19.9	14.0%	20	
Lead	5.35	1	0	0	0.0%	0	0	6.54	20.0%	20	R,Q
Selenium	ND	1	0	0	0.0%	0	0	0	0.0%	20	
Silver	ND	1	0	0	0.0%	0	0	0	0.0%	20	

Sample ID: **0111250-01A DUP** Batch ID: **3574** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **PSS-1** **0111250** Run ID: **PCB_011130B** SeqNo: **99364**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1221	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1232	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1242	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1248	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1254	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1260	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Decachlorobiphenyl	222	0	250	0	88.8%	70	130	0	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **0111250-17A DUP** Batch ID: **3574** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **PSS-17** **0111250** Run ID: **PCB_011130B** SeqNo: **99380**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1221	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1232	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1242	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1248	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1254	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1260	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Decachlorobiphenyl	236.5	0	250	0	94.6%	70	130	0	0.0%	20	

Sample ID: **0111250-23A DUP** Batch ID: **3575** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/3/01** Prep Date: **11/30/01**
Client ID: **PSS-23** **0111250** Run ID: **PCB_011203A** SeqNo: **99642**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1221	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1232	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1242	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1248	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1254	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1260	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Decachlorobiphenyl	352	0	250	0	140.8%	70	130	0	0.0%	20	S, MI

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **0111246-02A DUP** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/Kg-dry** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	1889	24.7	0	0	0.0%	0	0	2253	17.6%	20	AG
Oil	149.4	61.7	0	0	0.0%	0	0	182.1	19.7%	20	AD
O-Terphenyl	ND	0	61.7	0	0.0%	50	150	0	0.0%	20	S, MI

Sample ID: **0111246-03A DUP** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/Kg-dry** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98658**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	3968	25.3	0	0	0.0%	0	0	3127	23.7%	20	R, Q
Oil	333.5	63.3	0	0	0.0%	0	0	263.3	23.5%	20	R, Q
O-Terphenyl	ND	0	63.3	0	0.0%	50	150	0	0.0%	20	S, MI

Sample ID: **0111269-01A DUP** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/Kg-dry** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98522**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	ND	25.6	0	0	0.0%	0	0	0	0.0%	20	
Oil	ND	64.1	0	0	0.0%	0	0	0	0.0%	20	
O-Terphenyl	58.97	0	64.1	0	92.0%	50	150	0	0.0%	20	

Sample ID: **0111271-01A DUP** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/Kg-dry** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98526**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	63.92	25.3	0	0	0.0%	0	0	51.77	21.0%	20	R, Q
Oil	ND	63.3	0	0	0.0%	0	0	0	0.0%	20	
O-Terphenyl	77.85	0	63.3	0	123.0%	50	150	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **0111156-01B DUP** Batch ID: **3581** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **11/2/01** Prep Date: **12/2/01**
Client ID: **0111250** Run ID: **HEISENBURG_011202A** SeqNo: **98512**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Acenaphthylene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Anthracene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benz(a)anthracene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(a)pyrene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(b)fluoranthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(g,h,i)perylene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(k)fluoranthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Chrysene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Dibenz(a,h)anthracene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Fluoranthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Fluorene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Indeno(1,2,3-cd)pyrene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Naphthalene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Phenanthrene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Pyrene	1100	50	0	0	0.0%	0	0	750	37.8%	30	R, Q
2-Fluorobiphenyl	535	0	500	0	107.0%	30	115	0	0.0%	30	
4-Terphenyl-d14	600	0	500	0	120.0%	18	137	0	0.0%	30	
Nitrobenzene-d5	550	0	500	0	110.0%	23	120	0	0.0%	30	

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank; J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Duplicate

Sample ID: **0111250-33A DUP** Batch ID: **3582** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/3/01**
Client ID: **PSS-32** **0111250** Run ID: **PCB_011204A** SeqNo: **99387**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1221	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1232	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1242	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1248	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1254	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1260	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Decachlorobiphenyl	267.5	0	250	0	107.0%	70	130	0	0.0%	20	

Sample ID: **0111250-44A DUP** Batch ID: **3582** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/3/01**
Client ID: **PSS-43** **0111250** Run ID: **PCB_011204A** SeqNo: **99786**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	200	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1221	ND	200	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1232	ND	200	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1242	ND	200	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1248	ND	200	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1254	ND	200	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1260	480	200	0	0	0.0%	0	0	423	12.6%	20	
Decachlorobiphenyl	258	0	250	0	103.2%	70	130	0	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Duplicate

Sample ID: **0111250-67A DUP** Batch ID: **3590** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/4/01**

Client ID: **PSS-66** **0111250** Run ID: **PCB_011204B** SeqNo: **99455**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1221	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1232	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1242	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1248	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1254	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Aroclor 1260	ND	50	0	0	0.0%	0	0	0	0.0%	20	
Decachlorobiphenyl	245	0	250	0	98.0%	70	130	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Duplicate

Sample ID: **0111250-29A DUP** Batch ID: **3632** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date: **12/12/01**

Client ID: **PSS-28** **0111250** Run ID: **HEISENBURG_011212A** SeqNo: **100285**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Acenaphthylene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Anthracene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benz(a)anthracene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(a)pyrene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(b)fluoranthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(g,h,i)perylene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Benzo(k)fluoranthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Chrysene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Dibenz(a,h)anthracene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Fluoranthene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Fluorene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Indeno(1,2,3-cd)pyrene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Naphthalene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Phenanthrene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
Pyrene	ND	50	0	0	0.0%	0	0	0	0.0%	30	
2-Fluorobiphenyl	485	0	500	0	97.0%	30	115	0	0.0%	30	
4-Terphenyl-d14	485	0	500	0	97.0%	18	137	0	0.0%	30	
Nitrobenzene-d5	420	0	500	0	84.0%	23	120	0	0.0%	30	

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID: **0111250-25A MS** Batch ID: **04 BG S-12/3/** Test Code: **8015/8021** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date:

Client ID: **PSS-25** **0111250** Run ID: **CRICK_011130A** SeqNo: **98608**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	210	2.5	200	0	105.0%	85	115	0			
Ethylbenzene	217	2.5	200	0	108.5%	85	115	0			
Toluene	210	2.5	200	0	105.0%	85	115	0			
Xylenes, Total	650	7.5	600	0	108.3%	85	115	0			
Trifluorotoluene	460.5	0	500	0	92.1%	70	130	0			

Sample ID: **0111250-46A MS** Batch ID: **05 8260 S-12/** Test Code: **EPA 8260B** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date:

Client ID: **PSS-45** **0111250** Run ID: **HORATIO_011130A** SeqNo: **98541**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	213.5	25	250	0	85.4%	0	234	0			
Benzene	226.5	25	250	0	90.6%	37	151	0			
Chlorobenzene	247.5	25	250	0	99.0%	37	160	0			
Toluene	231	25	250	0	92.4%	47	150	0			
Trichloroethene	239.5	25	250	0	95.8%	71	157	0			
4-Bromofluorobenzene	259	0	250	0	103.6%	74	121	0			
Dibromofluoromethane	243	0	250	0	97.2%	80	120	0			
Toluene-d8	254	0	250	0	101.6%	81	117	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **0111244-05A MS** Batch ID: **3573** Test Code: **EPA 6010B** Units: **mg/Kg** Analysis Date: **12/4/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ICP_011204A** SeqNo: **98918**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	46.1	1	50	4.78	82.6%	75	125	0			
Barium	164	1	50	112	104.0%	75	125	0			
Cadmium	42.1	1	50	0	84.2%	75	125	0			
Chromium	56.9	1	50	12.4	89.0%	75	125	0			
Lead	47	1	50	4.55	84.9%	75	125	0			
Selenium	40.6	1	50	0	81.2%	75	125	0			
Silver	44.5	1	50	0	89.0%	75	125	0			

Sample ID: **0111244-05A MSD** Batch ID: **3573** Test Code: **EPA 6010B** Units: **mg/Kg** Analysis Date: **12/4/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ICP_011204A** SeqNo: **98919**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	45.9	1	50	4.78	82.2%	75	125	46.1	0.4%	20	
Barium	157	1	50	112	90.0%	75	125	164	4.4%	20	
Cadmium	42.1	1	50	0	84.2%	75	125	42.1	0.0%	20	
Chromium	57.3	1	50	12.4	89.8%	75	125	56.9	0.7%	20	
Lead	46.9	1	50	4.55	84.7%	75	125	47	0.2%	20	
Selenium	40	1	50	0	80.0%	75	125	40.6	1.5%	20	
Silver	44.4	1	50	0	88.8%	75	125	44.5	0.2%	20	

Sample ID: **0111250-03A MS** Batch ID: **3574** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **PSS-3** **0111250** Run ID: **PCB_011130B** SeqNo: **99774**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	586.5	500	250	0	234.6%	70	130	0			S, MI
Aroclor 1260	644	500	250	0	257.6%	70	130	0			S, MI
Decachlorobiphenyl	351	0	250	0	140.4%	70	130	0			S, MI

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID: **0111246-01A MS** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/Kg-dry** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98654**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	2738	25	62.5	2012	1160.0%	52	118	0			S, MI
O-Terphenyl	ND	0	62.5	0	0.0%	50	150	0			S, MI

Sample ID: **0111271-01A MS** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/Kg-dry** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98527**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	155.1	25.3	63.3	51.77	163.2%	52	118	0			S, MI
O-Terphenyl	65.82	0	63.3	0	104.0%	50	150	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID: **0111250-25A MS** Batch ID: **3581** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **11/2/01** Prep Date: **12/2/01**
Client ID: **PSS-25** **0111250** Run ID: **HEISENBURG_011202A** SeqNo: **98509**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	495	50	500	0	99.0%	47	145	0			
Acenaphthylene	505	50	500	0	101.0%	33	145	0			
Anthracene	515	50	500	0	103.0%	27	133	0			
Benz(a)anthracene	530	50	500	50	96.0%	33	143	0			
Benzo(a)pyrene	490	50	500	55	87.0%	17	163	0			
Benzo(b)fluoranthene	525	50	500	0	105.0%	24	159	0			
Benzo(g,h,i)perylene	425	50	500	50	75.0%	1	219	0			
Benzo(k)fluoranthene	505	50	500	55	90.0%	11	162	0			
Chrysene	540	50	500	75	93.0%	17	168	0			
Dibenz(a,h)anthracene	380	50	500	0	76.0%	1	227	0			
Fluoranthene	590	50	500	85	101.0%	26	137	0			
Fluorene	525	50	500	0	105.0%	59	121	0			
Indeno(1,2,3-cd)pyrene	430	50	500	0	86.0%	1	171	0			
Naphthalene	500	50	500	0	100.0%	21	133	0			
Phenanthrene	495	50	500	0	99.0%	54	120	0			
Pyrene	550	50	500	110	88.0%	52	115	0			
2-Fluorobiphenyl	530	0	500	0	106.0%	30	115	0			
4-Terphenyl-d14	585	0	500	0	117.0%	18	137	0			
Nitrobenzene-d5	480	0	500	0	96.0%	23	120	0			

Sample ID: **0111250-61A MS** Batch ID: **3590** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/4/01**
Client ID: **PSS-60** **0111250** Run ID: **PCB_011204B** SeqNo: **99400**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	277	50	250	0	110.8%	70	130	0			
Aroclor 1260	328	50	250	0	131.2%	70	130	0			S, MI
Decachlorobiphenyl	280	0	250	0	112.0%	70	130	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID: **0111250-49A MS** Batch ID: **3632** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date: **12/12/01**
Client ID: **PSS-48** **0111250** Run ID: **HEISENBURG_011212A** SeqNo: **100287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	370	50	500	0	74.0%	47	145	0			
Acenaphthylene	365	50	500	0	73.0%	33	145	0			
Anthracene	400	50	500	0	80.0%	27	133	0			
Benz(a)anthracene	410	50	500	0	82.0%	33	143	0			
Benzo(a)pyrene	355	50	500	0	71.0%	17	163	0			
Benzo(b)fluoranthene	425	50	500	0	85.0%	24	159	0			
Benzo(g,h,i)perylene	475	50	500	0	95.0%	1	219	0			
Benzo(k)fluoranthene	395	50	500	0	79.0%	11	162	0			
Chrysene	420	50	500	0	84.0%	17	168	0			
Dibenz(a,h)anthracene	515	50	500	0	103.0%	1	227	0			
Fluoranthene	390	50	500	0	78.0%	26	137	0			
Fluorene	395	50	500	0	79.0%	59	121	0			
Indeno(1,2,3-cd)pyrene	505	50	500	0	101.0%	1	171	0			
Naphthalene	375	50	500	0	75.0%	21	133	0			
Phenanthrene	410	50	500	0	82.0%	54	120	0			
Pyrene	355	50	500	0	71.0%	52	115	0			
2-Fluorobiphenyl	460	0	500	0	92.0%	30	115	0			
4-Terphenyl-d14	455	0	500	0	91.0%	18	137	0			
Nitrobenzene-d5	330	0	500	0	66.0%	23	120	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS** Batch ID: **04 BG S-12/1** Test Code: **8015/8021** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date:

Client ID: **0111250** Run ID: **WATSON_011212A** SeqNo: **100434**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	31.3	2.5	30	0	104.3%	85	115	0			
Ethylbenzene	31.5	2.5	30	0	105.0%	85	115	0			
Toluene	31.4	2.5	30	0	104.7%	85	115	0			
Xylenes, Total	97.3	7.5	90	0	108.1%	85	115	0			
Trifluorotoluene	95	0	100	0	95.0%	70	130	0			

Sample ID: **LCSD** Batch ID: **04 BG S-12/1** Test Code: **8015/8021** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date:

Client ID: **0111250** Run ID: **WATSON_011212A** SeqNo: **100435**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	30.9	2.5	30	0	103.0%	85	115	31.3	1.3%	20	
Ethylbenzene	31	2.5	30	0	103.3%	85	115	31.5	1.6%	20	
Toluene	31	2.5	30	0	103.3%	85	115	31.4	1.3%	20	
Xylenes, Total	95.5	7.5	90	0	106.1%	85	115	97.3	1.9%	20	
Trifluorotoluene	89	0	100	0	89.0%	70	130	0	0.0%	0	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS** Batch ID: **05 8260 S-12/** Test Code: **EPA 8260B** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **HORATIO_011130A** SeqNo: **98533**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	168	25	250	0	67.2%	0	234	0			
Benzene	185	25	250	0	74.0%	37	151	0			
Chlorobenzene	187	25	250	0	74.8%	37	160	0			
Toluene	190	25	250	0	76.0%	47	150	0			
Trichloroethene	201.5	25	250	0	80.6%	71	157	0			
4-Bromofluorobenzene	242.5	25	250	0	97.0%	74	121	0			
Dibromofluoromethane	258.5	25	250	0	103.4%	80	120	0			
Toluene-d8	249	0	250	0	99.6%	81	117	0			

Sample ID: **LCS-3573** Batch ID: **3573** Test Code: **EPA 6010B** Units: **mg/Kg** Analysis Date: **12/4/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ICP_011204A** SeqNo: **98916**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	47.1	1	50	0	94.2%	80	120	0			
Barium	48.8	1	50	0	97.6%	80	120	0			
Cadmium	47.9	1	50	0	95.8%	80	120	0			
Chromium	49.6	1	50	0	99.2%	80	120	0			
Lead	48.4	1	50	0	96.8%	80	120	0			
Selenium	46.7	1	50	0	93.4%	80	120	0			
Silver	49.3	1	50	0	98.6%	80	120	0			

Sample ID: **LCS-3574** Batch ID: **3574** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **PCB_011130B** SeqNo: **99361**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	266	50	250	0	106.4%	70	130	0			
Aroclor 1260	257	50	250	0	102.8%	70	130	0			
Decachlorobiphenyl	218	0	250	0	87.2%	70	130	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

Sample ID: **LCSD-3574** Batch ID: **3574** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **PCB_011130B** SeqNo: **99362**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	248	50	250	0	99.2%	70	130	266	7.0%	20	
Aroclor 1260	288.5	50	250	0	115.4%	70	130	257	11.5%	20	
Decachlorobiphenyl	281	0	250	0	112.4%	70	130	0	0.0%	20	

Sample ID: **LCS-3575** Batch ID: **3575** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/3/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **PCB_011203A** SeqNo: **99509**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	289	50	250	0	115.6%	70	130	0			
Aroclor 1260	300.5	50	250	0	120.2%	70	130	0			
Decachlorobiphenyl	292.5	0	250	0	117.0%	70	130	0			

Sample ID: **LCSD-3575** Batch ID: **3575** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/3/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **PCB_011203A** SeqNo: **99510**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	284	50	250	0	113.6%	70	130	289	1.7%	20	
Aroclor 1260	286	50	250	0	114.4%	70	130	300.5	4.9%	20	
Decachlorobiphenyl	253	0	250	0	101.2%	70	130	0	0.0%	20	

Sample ID: **LCS-3576** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98651**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	45.65	20	50	0	91.3%	52	118	0			
O-Terphenyl	53.5	0	50	0	107.0%	50	150	0			

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID: **LCSD-3576** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98652**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	46.8	20	50	0	93.6%	52	118	45.65	2.5%	20	
O-Terphenyl	53	0	50	0	106.0%	50	150	0	0.0%	20	

Sample ID: **LCS-3577** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98516**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	54	20	50	0	108.0%	52	118	0			
O-Terphenyl	54.5	0	50	0	109.0%	50	150	0			

Sample ID: **LCSD-3577** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/Kg** Analysis Date: **11/30/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98517**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	50.5	20	50	0	101.0%	52	118	54	6.7%	20	
O-Terphenyl	53	0	50	0	106.0%	50	150	0	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS-3581** Batch ID: **3581** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **11/2/01** Prep Date: **12/2/01**

Client ID: **0111250** Run ID: **HEISENBURG_011202A** SeqNo: **98506**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	465	50	500	0	93.0%	47	145	0			
Acenaphthylene	455	50	500	0	91.0%	33	145	0			
Anthracene	460	50	500	0	92.0%	27	133	0			
Benz(a)anthracene	465	50	500	0	93.0%	33	143	0			
Benzo(a)pyrene	385	50	500	0	77.0%	17	163	0			
Benzo(b)fluoranthene	480	50	500	0	96.0%	24	159	0			
Benzo(g,h,i)perylene	390	50	500	0	78.0%	1	219	0			
Benzo(k)fluoranthene	560	50	500	0	112.0%	11	162	0			
Chrysene	495	50	500	0	99.0%	17	168	0			
Dibenz(a,h)anthracene	340	50	500	0	68.0%	1	227	0			
Fluoranthene	535	50	500	0	107.0%	26	137	0			
Fluorene	490	50	500	0	98.0%	59	121	0			
Indeno(1,2,3-cd)pyrene	360	50	500	0	72.0%	1	171	0			
Naphthalene	470	50	500	0	94.0%	21	133	0			
Phenanthrene	460	50	500	0	92.0%	54	120	0			
Pyrene	495	50	500	0	99.0%	52	115	0			
2-Fluorobiphenyl	550	0	500	0	110.0%	30	115	0			
4-Terphenyl-d14	620	0	500	0	124.0%	18	137	0			
Nitrobenzene-d5	555	0	500	0	111.0%	23	120	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID: **LCSD-3581** Batch ID: **3581** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **11/2/01** Prep Date: **12/2/01**
Client ID: **0111250** Run ID: **HEISENBURG_011202A** SeqNo: **98507**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	475	50	500	0	95.0%	47	145	465	2.1%	30	
Acenaphthylene	465	50	500	0	93.0%	33	145	455	2.2%	30	
Anthracene	440	50	500	0	88.0%	27	133	460	4.4%	30	
Benz(a)anthracene	470	50	500	0	94.0%	33	143	465	1.1%	30	
Benzo(a)pyrene	370	50	500	0	74.0%	17	163	385	4.0%	30	
Benzo(b)fluoranthene	475	50	500	0	95.0%	24	159	480	1.0%	30	
Benzo(g,h,i)perylene	375	50	500	0	75.0%	1	219	390	3.9%	30	
Benzo(k)fluoranthene	545	50	500	0	109.0%	11	162	560	2.7%	30	
Chrysene	510	50	500	0	102.0%	17	168	495	3.0%	30	
Dibenz(a,h)anthracene	325	50	500	0	65.0%	1	227	340	4.5%	30	
Fluoranthene	545	50	500	0	109.0%	26	137	535	1.9%	30	
Fluorene	505	50	500	0	101.0%	59	121	490	3.0%	30	
Indeno(1,2,3-cd)pyrene	370	50	500	0	74.0%	1	171	360	2.7%	30	
Naphthalene	495	50	500	0	99.0%	21	133	470	5.2%	30	
Phenanthrene	475	50	500	0	95.0%	54	120	460	3.2%	30	
Pyrene	515	50	500	0	103.0%	52	115	495	4.0%	30	
2-Fluorobiphenyl	540	0	500	0	108.0%	30	115	0	0.0%	30	
4-Terphenyl-d14	590	0	500	0	118.0%	18	137	0	0.0%	30	
Nitrobenzene-d5	550	0	500	0	110.0%	23	120	0	0.0%	30	

Sample ID: **LCS-3582** Batch ID: **3582** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/3/01**
Client ID: **0111250** Run ID: **PCB_011204A** SeqNo: **99384**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	246.5	50	250	0	98.6%	70	130	0			
Aroclor 1260	250.5	50	250	0	100.2%	70	130	0			
Decachlorobiphenyl	255.5	0	250	0	102.2%	70	130	0			

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID: **LCSD-3582** Batch ID: **3582** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/3/01**
Client ID: **0111250** Run ID: **PCB_011204A** SeqNo: **99385**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	235	50	250	0	94.0%	70	130	246.5	4.8%	20	
Aroclor 1260	265.5	50	250	0	106.2%	70	130	250.5	5.8%	20	
Decachlorobiphenyl	238	0	250	0	95.2%	70	130	0	0.0%	20	

Sample ID: **LCS-3590** Batch ID: **3590** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/4/01**
Client ID: **0111250** Run ID: **PCB_011204B** SeqNo: **99397**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	273	50	250	0	109.2%	70	130	0			
Aroclor 1260	318.5	50	250	0	127.4%	70	130	0			
Decachlorobiphenyl	265.5	0	250	0	106.2%	70	130	0			

Sample ID: **LCSD-3590** Batch ID: **3590** Test Code: **EPA 8082A** Units: **µg/Kg** Analysis Date: **12/4/01** Prep Date: **12/4/01**
Client ID: **0111250** Run ID: **PCB_011204B** SeqNo: **99398**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	245.5	50	250	0	98.2%	70	130	273	10.6%	20	
Aroclor 1260	284.5	50	250	0	113.8%	70	130	318.5	11.3%	20	
Decachlorobiphenyl	259.5	0	250	0	103.8%	70	130	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS-3632** Batch ID: **3632** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date: **12/12/01**

Client ID: **0111250** Run ID: **HEISENBURG_011212A** SeqNo: **100282**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	465	50	500	0	93.0%	47	145	0			
Acenaphthylene	455	50	500	0	91.0%	33	145	0			
Anthracene	435	50	500	0	87.0%	27	133	0			
Benz(a)anthracene	480	50	500	0	96.0%	33	143	0			
Benzo(a)pyrene	315	50	500	0	63.0%	17	163	0			
Benzo(b)fluoranthene	490	50	500	0	98.0%	24	159	0			
Benzo(g,h,i)perylene	555	50	500	0	111.0%	1	219	0			
Benzo(k)fluoranthene	520	50	500	0	104.0%	11	162	0			
Chrysene	515	50	500	0	103.0%	17	168	0			
Dibenz(a,h)anthracene	590	50	500	0	118.0%	1	227	0			
Fluoranthene	505	50	500	0	101.0%	26	137	0			
Fluorene	485	50	500	0	97.0%	59	121	0			
Indeno(1,2,3-cd)pyrene	585	50	500	0	117.0%	1	171	0			
Naphthalene	435	50	500	0	87.0%	21	133	0			
Phenanthrene	455	50	500	0	91.0%	54	120	0			
Pyrene	490	50	500	0	98.0%	52	115	0			
2-Fluorobiphenyl	570	0	500	0	114.0%	30	115	0			
4-Terphenyl-d14	615	0	500	0	123.0%	18	137	0			
Nitrobenzene-d5	410	0	500	0	82.0%	23	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID: **LCSD-3632** Batch ID: **3632** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date: **12/12/01**

Client ID: **0111250** Run ID: **HEISENBURG_011212A** SeqNo: **100283**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	450	50	500	0	90.0%	47	145	465	3.3%	30	
Acenaphthylene	440	50	500	0	88.0%	33	145	455	3.4%	30	
Anthracene	410	50	500	0	82.0%	27	133	435	5.9%	30	
Benz(a)anthracene	465	50	500	0	93.0%	33	143	480	3.2%	30	
Benzo(a)pyrene	275	50	500	0	55.0%	17	163	315	13.6%	30	
Benzo(b)fluoranthene	485	50	500	0	97.0%	24	159	490	1.0%	30	
Benzo(g,h,i)perylene	530	50	500	0	106.0%	1	219	555	4.6%	30	
Benzo(k)fluoranthene	510	50	500	0	102.0%	11	162	520	1.9%	30	
Chrysene	495	50	500	0	99.0%	17	168	515	4.0%	30	
Dibenz(a,h)anthracene	590	50	500	0	118.0%	1	227	590	0.0%	30	
Fluoranthene	500	50	500	0	100.0%	26	137	505	1.0%	30	
Fluorene	475	50	500	0	95.0%	59	121	485	2.1%	30	
Indeno(1,2,3-cd)pyrene	570	50	500	0	114.0%	1	171	585	2.6%	30	
Naphthalene	435	50	500	0	87.0%	21	133	435	0.0%	30	
Phenanthrene	460	50	500	0	92.0%	54	120	455	1.1%	30	
Pyrene	455	50	500	0	91.0%	52	115	490	7.4%	30	
2-Fluorobiphenyl	545	0	500	0	109.0%	30	115	0	0.0%	30	
4-Terphenyl-d14	580	0	500	0	116.0%	18	137	0	0.0%	30	
Nitrobenzene-d5	430	0	500	0	86.0%	23	120	0	0.0%	30	

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank; J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **04 BG S-12/1** Test Code: **8015/8021** Units: **µg/L** Analysis Date: **12/12/01** Prep Date:
Client ID: **0111250** Run ID: **WATSON_011212A** SeqNo: **100433**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	40.8	0.5	40	0	102.0%	85	115	0			
Ethylbenzene	41.7	0.5	40	0	104.3%	85	115	0			
Toluene	42.3	0.5	40	0	105.8%	85	115	0			
Xylenes, Total	130	1.5	120	0	108.3%	85	115	0			
Trifluorotoluene	92.8	0	100	0	92.8%	70	130	0			

Sample ID: **CCV** Batch ID: **04 BG S-12/3/** Test Code: **8015/8021** Units: **µg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **CRICK_011130A** SeqNo: **98374**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	32	0.5	30	0	106.7%	85	115	0			
Ethylbenzene	34	0.5	30	0	113.3%	85	115	0			
Toluene	32.7	0.5	30	0	109.0%	85	115	0			
Xylenes, Total	101	1.5	90	0	112.2%	85	115	0			
Trifluorotoluene	93.8	0	100	0	93.8%	70	130	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **05 8260 S-12/** Test Code: **EPA 8260B** Units: **µg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **HORATIO_011130A** SeqNo: **98531**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	19.8	1	20	0	99.0%	80	120	0			
1,2-Dichloropropane	18.1	1	20	0	90.5%	80	120	0			
Chloroform	19.6	1	20	0	98.0%	80	120	0			
Ethylbenzene	20.7	1	20	0	103.5%	80	120	0			
Toluene	19	1	20	0	95.0%	80	120	0			
Vinyl chloride	22.5	1.2	20	0	112.5%	80	120	0			
4-Bromofluorobenzene	49.7	0	50	0	99.4%	86	115	0			
Dibromofluoromethane	47.1	0	50	0	94.2%	86	118	0			
Toluene-d8	48.7	0	50	0	97.4%	88	110	0			

Sample ID: **CCV** Batch ID: **3574** Test Code: **EPA 8082A** Units: **µg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **PCB_011130B** SeqNo: **99360**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	1.096	0.1	1	0	109.6%	80	120	0			
Aroclor 1260	.963	0.1	1	0	96.3%	80	120	0			
Decachlorobiphenyl	.808	0	1	0	80.8%	70	130	0			

Sample ID: **CCV** Batch ID: **3575** Test Code: **EPA 8082A** Units: **µg/L** Analysis Date: **12/3/01** Prep Date:
Client ID: **0111250** Run ID: **PCB_011203A** SeqNo: **99508**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	1.044	0.1	1	0	104.4%	80	120	0			
Aroclor 1260	1.048	0.1	1	0	104.8%	80	120	0			
Decachlorobiphenyl	.929	0	1	0	92.9%	70	130	0			

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98647**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	421	20	400	0	105.3%	85	115	0			
Oil	426	50	400	0	106.5%	85	115	0			

Sample ID: **CCV** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98648**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	376	20	400	0	94.0%	85	115	0			
Oil	409	50	400	0	102.3%	85	115	0			

Sample ID: **CCV** Batch ID: **3576** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011130B** SeqNo: **98649**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	385	20	400	0	96.3%	85	115	0			
Oil	423	50	400	0	105.8%	85	115	0			

Sample ID: **CCV** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98513**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	441	20	400	0	110.3%	85	115	0			
Oil	428	50	400	0	107.0%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **11/30/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011130A** SeqNo: **98514**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	442	20	400	0	110.5%	85	115	0			
Oil	453	50	400	0	113.3%	85	115	0			

Sample ID: **CCV** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **12/4/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011204B** SeqNo: **99144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	411	20	400	0	102.8%	85	115	0			
Oil	396	50	400	0	99.0%	85	115	0			

Sample ID: **CCV** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **12/4/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011204B** SeqNo: **99146**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	407	20	400	0	101.8%	85	115	0			
Oil	376	50	400	0	94.0%	85	115	0			

Sample ID: **CCV** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **12/4/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011204B** SeqNo: **99147**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	426	20	400	0	106.5%	85	115	0			
Oil	384	50	400	0	96.0%	85	115	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **12/3/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011203B** SeqNo: **99167**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	443	20	400	0	110.8%	85	115	0			
Oil	428	50	400	0	107.0%	85	115	0			

Sample ID: **CCV** Batch ID: **3577** Test Code: **EPA 8015** Units: **mg/L** Analysis Date: **12/3/01** Prep Date:
Client ID: **0111250** Run ID: **ATLAS_011203B** SeqNo: **99168**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel	436	20	400	0	109.0%	85	115	0			
Oil	445	50	400	0	111.3%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **3581** Test Code: **8270-SIM** Units: **µg/L** Analysis Date: **11/2/01** Prep Date:

Client ID: **0111250** Run ID: **HEISENBURG_011202A** SeqNo: **98505**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	1.04	0.1	1	0	104.0%	80	120	0			
Acenaphthylene	.99	0.1	1	0	99.0%	80	120	0			
Anthracene	.91	0.1	1	0	91.0%	80	120	0			
Benz(a)anthracene	.96	0.1	1	0	96.0%	80	120	0			
Benzo(a)pyrene	.9	0.1	1	0	90.0%	80	120	0			
Benzo(b)fluoranthene	.94	0.1	1	0	94.0%	80	120	0			
Benzo(g,h,i)perylene	.84	0.1	1	0	84.0%	80	120	0			
Benzo(k)fluoranthene	1.02	0.1	1	0	102.0%	80	120	0			
Chrysene	.97	0.1	1	0	97.0%	80	120	0			
Dibenz(a,h)anthracene	.8	0.1	1	0	80.0%	80	120	0			
Fluoranthene	.97	0.1	1	0	97.0%	80	120	0			
Fluorene	1.05	0.1	1	0	105.0%	80	120	0			
Indeno(1,2,3-cd)pyrene	.82	0.1	1	0	82.0%	80	120	0			
Naphthalene	.99	0.1	1	0	99.0%	80	120	0			
Phenanthrene	.87	0.1	1	0	87.0%	80	120	0			
Pyrene	1.11	0.1	1	0	111.0%	80	120	0			
2-Fluorobiphenyl	1.04	0	1	0	104.0%	30	115	0			
4-Terphenyl-d14	1.12	0	1	0	112.0%	18	137	0			
Nitrobenzene-d5	.95	0	1	0	95.0%	23	120	0			

Sample ID: **CCV** Batch ID: **3582** Test Code: **EPA 8082A** Units: **µg/L** Analysis Date: **12/4/01** Prep Date:

Client ID: **0111250** Run ID: **PCB_011204A** SeqNo: **99383**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	.835	0.1	1	0	83.5%	80	120	0			
Aroclor 1260	1	0.1	1	0	100.0%	80	120	0			
Decachlorobiphenyl	.983	0	1	0	98.3%	70	130	0			

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank; J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **3590** Test Code: **EPA 8082A** Units: **µg/L** Analysis Date: **12/4/01** Prep Date:
Client ID: **0111250** Run ID: **PCB_011204B** SeqNo: **99396**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016	.907	0.1	1	0	90.7%	80	120	0			
Aroclor 1260	1.028	0.1	1	0	102.8%	80	120	0			
Decachlorobiphenyl	.957	0	1	0	95.7%	70	130	0			

Sample ID: **CCV** Batch ID: **3632** Test Code: **8270-SIM** Units: **µg/Kg** Analysis Date: **12/12/01** Prep Date:
Client ID: **0111250** Run ID: **HEISENBURG_011212A** SeqNo: **100281**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	.91	0.1	1	0	91.0%	80	120	0			
Acenaphthylene	.9	0.1	1	0	90.0%	80	120	0			
Anthracene	.97	0.1	1	0	97.0%	80	120	0			
Benz(a)anthracene	.95	0.1	1	0	95.0%	80	120	0			
Benzo(a)pyrene	.92	0.1	1	0	92.0%	80	120	0			
Benzo(b)fluoranthene	.92	0.1	1	0	92.0%	80	120	0			
Benzo(g,h,i)perylene	1.09	0.1	1	0	109.0%	80	120	0			
Benzo(k)fluoranthene	.97	0.1	1	0	97.0%	80	120	0			
Chrysene	.98	0.1	1	0	98.0%	80	120	0			
Dibenz(a,h)anthracene	1.15	0.1	1	0	115.0%	80	120	0			
Fluoranthene	.98	0.1	1	0	98.0%	80	120	0			
Fluorene	.96	0.1	1	0	96.0%	80	120	0			
Indeno(1,2,3-cd)pyrene	1.13	0.1	1	0	113.0%	80	120	0			
Naphthalene	.87	0.1	1	0	87.0%	80	120	0			
Phenanthrene	.89	0.1	1	0	89.0%	80	120	0			
Pyrene	.9	0.1	1	0	90.0%	80	120	0			
2-Fluorobiphenyl	1.04	0	1	0	104.0%	30	115	0			
4-Terphenyl-d14	1.12	0	1	0	112.0%	18	137	0			
Nitrobenzene-d5	.87	0	1	0	87.0%	23	120	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *19-Dec-01*

CLIENT: PBS Environmental
Work Order: 0111250
Project: 16291.018/Penwalt

QC SUMMARY REPORT

Minerals ICV for ICP

Sample ID: **ICVHI** Batch ID: **3573** Test Code: **EPA 6010B** Units: **mg/L** Analysis Date: **12/4/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ICP_011204A** SeqNo: **98914**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.81	0.005	10	0	98.1%	90	110	0			

Sample ID: **ICVLOW** Batch ID: **3573** Test Code: **EPA 6010B** Units: **mg/L** Analysis Date: **12/4/01** Prep Date: **11/30/01**
Client ID: **0111250** Run ID: **ICP_011204A** SeqNo: **98913**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5	0.005	0.5	0	100.0%	90	110	0			
Barium	.499	0.005	0.5	0	99.8%	90	110	0			
Cadmium	.502	0.002	0.5	0	100.4%	90	110	0			
Chromium	.505	0.005	0.5	0	101.0%	90	110	0			
Lead	.505	0.005	0.5	0	101.0%	90	110	0			
Selenium	.51	0.005	0.5	0	102.0%	90	110	0			
Silver	.505	0.005	0.5	0	101.0%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pacific
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Laboratory

December 11, 2001
Environmental Services Laboratory, Inc.
17400 SW Upper Boones Ferry Rd., Suite 270
Portland, OR 97224

Report Number: 01496
Client Job Number: 0111250-26
Sample Matrix: soil
Numberof Samples: 1

Analytical Report

Ext. Date	Analysis Date	Sample ID	Analyte	Amount Detected	Method Reporting Limit
12/4/01	12/9/01	**PSS-25a**	p,p'-DDE	0.0090 mg/kg	0.0067 mg/kg (ppm)
Surrogate Recovery		82	p,p'-DDT	0.056 mg/kg	0.0067 mg/kg (ppm)
Surr. Recovery Range (EPA 8081)		55-120	Other OC pesticides	Not detected	see analyte list

Stephen Thun
Laboratory Director

12505 N.W. Cornell Road ◆ Portland, Oregon 97229 ◆ (503)626-7942 ◆ FAX (503) 641-3644

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Quality Assurance Report

Extr. Date	Analysis Date	Batch QC Sample #	Analyte	% Recovery	Expected % Recovery
Method Blank Data					
12/4/01	12/9/01	01496 MB	see list	Not detected	< detection limits
Matrix Spike Data					
12/4/01	12/9/01	0149601 MS	g-BHC	110	40-120
			Heptachlor	96	40-120
			Aldrin	96	40-120
			Dieldrin	71	40-120
			Endrin	79	40-120
			4,4'-DDT	133	40-120
12/4/01	12/9/01	0149601 MSD	g-BHC	120	40-120
			Heptachlor	100	40-120
			Aldrin	98	40-120
			Dieldrin	88	40-120
			Endrin	82	40-120
			4,4'-DDT	121	40-120

Additional Project Information

Methodology Employed

Organochlorine Pesticides in Soil EPA 8081A (GC-ECD)

Additional Project Notes

1. Residues were confirmed using second column gas chromatography.
2. The p,p'-DDT residues were confirmed using both second column gas chromatography and mass spectrometry. The confirmation quantitation was >40% of the reported quantitation due to matrix interferences in the sample.

12505 N.W. Cornell Road ◆ Portland, Oregon 97229 ◆ (503)626-7943 ◆ FAX (503) 641-0644

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EPA 8081A Analyte List and Detection Limits

Analyte	Reporting limit
Aldrin	0.0067 mg/kg (ppm)
α-BHC	0.0067 mg/kg (ppm)
β-BHC	0.0067 mg/kg (ppm)
δ-BHC	0.0067 mg/kg (ppm)
γ-BHC (Lindane)	0.0067 mg/kg (ppm)
Chlordane	0.033 mg/kg (ppm)
p,p'-DDD	0.0067 mg/kg (ppm)
p,p'-DDE	0.0067 mg/kg (ppm)
p,p'-DDT	0.0067 mg/kg (ppm)
Dieldrin	0.0067 mg/kg (ppm)
Endosulfan I(Thiodan)	0.0067 mg/kg (ppm)
Endosulfan II	0.0067 mg/kg (ppm)
Endosulfan sulfate	0.0067 mg/kg (ppm)
Endrin	0.0067 mg/kg (ppm)
Endrin aldehyde	0.0067 mg/kg (ppm)
Heptachlor	0.0067 mg/kg (ppm)
Heptachlor epoxide	0.0067 mg/kg (ppm)
Methoxychlor	0.0067 mg/kg (ppm)
Toxaphene	0.17 mg/kg (ppm)

12505 N.W. Cornell Road ◆ Portland, Oregon 97229 ◆ (503)626-7943 ◆ FAX (503) 641-0644

ENVIRONMENTAL SERVICES LABORATORY -- GLOSSARY OF FLAGS

Qualifier	Description
AA	This sample was analyzed after the holding time had expired.
AB	The hydrocarbon pattern in this sample is not typical of gasoline.
AC	The hydrocarbon pattern in this sample is not typical of diesel.
AD	The hydrocarbon pattern in this sample is not typical of oil.
AE	The hydrocarbon pattern in this sample extends into the gasoline range.
AF	The hydrocarbon pattern in this sample extends into the diesel range.
AG	The hydrocarbon pattern in this sample extends into the oil range.
A	This analysis was performed on a VOA sample containing headspace.
B	Analyte detected in the Method Blank above the reporting level.
C	The Relative Percent Difference (RPD) for the primary result and confirmation result was greater than 40%. The higher result was reported.
D	The sample was supplied in an inappropriate container, according to method criteria.
E	This value is above the quantitation limit. It is considered an estimate.
H	The Matrix Spike/Matrix Spike Duplicate (MS/MSD) result was outside control limits. The Laboratory Control Standard/Duplicate (LCS/LCSD) result was in control validating the batch.
J	The result is above the Method Detection Limit (MDL) and below the Reporting Level (RL). It is considered an estimate.
M	The MS/MSD recoveries are not calcuable due to a high amount of analyte in sample.
MI	This indicates a high level of matrix interference affecting the spike or surrogate recovery.
N	See case narrative.
O	Detection Limits are elevated due to sample dilution. See case narrative.
Q	Further inspection of the sample confirms a non-homogenous sample matrix affecting RPD result.
R	The RPD result is outside method control limits. See other qualifiers or case narrative.
S	The spike recovery is outside method control limits. See other qualifiers or case narrative.
T	The RPD between the sample result and duplicate result was greater than 20%. The original result was less than three times the reporting level, therefore the RPD is not applicable.
X	Unable to quantitate surrogate recovery due to sample dilution.

Rev. 04/25/00

Environmental Services Laboratory, Inc

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Company: PBS
Address:
Phone: 417-7594 Fax: 248-0223
Project Manager: Erik Anderson
LABORATORY # 0111250

SAMPLE DISPOSAL INSTRUCTIONS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NWTPH-HCID (PETROLEUM HYDROCARBONS)	NWTPH-GX	NWTPH-DX	8020M - BETX only	8270 SIMS PAHs	Halogenated VOCs/GCMS (ORGANICS)	Aromatic VOCs/GCMS	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	RCRA Metals (8) (INORGANICS)	Priority Pollutant Metals (13)	Metals:	TCLP Metals (8) (TCLP)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 827C	1,1,1-TCA	# OF CONTAINERS
PSS-75	11/29/01		SOIL	76										X								X	1

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT NUMBER: 16291.018	TOTAL NUMBER OF CONTAINERS
PROJECT NAME: Permit	COC SEALS INTACT? Y / N / NA
PURCHASE ORDER NUMBER:	RECEIVED INTACT? Y / N
ONGOING PROJECT? YES ☐ NO ☒	RECEIVED COLD? Y / N

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS

TAT (NORMAL) 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

Sampled by:

Received via:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
SIGNATURE: Time 17:20	SIGNATURE: Time	SIGNATURE: Time
Printed Name: Erik Anderson Date 11/29/01	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Time 5:20	Signature: Time	Signature: Time
Printed Name: Leslie Rush Date 11-29-01	Printed Name: Date	Printed Name: Date
Company: ESL	Company:	ESL Inc.:

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Company: PBS
Address:
Project Manager: Erik Andersen
LABORATORY # 0111250
Phone: 417-7544 Fax: 248-0223

SAMPLE DISPOSAL INSTRUCTIONS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NWTPH-HCID (PETROLEUM HYDROCARBONS)	NWTPH-GX	NWTPH-DX	8020M - BETX only	8270 SIMS PAHs	Halogenated VOCs/GCMS (ORGANICS)	Aromatic VOCs/GCMS	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	RCRA Metals (8) (INORGANICS)	Priority Pollutant Metals (13)	Metals:	TCLP Metals (8) (TCLP)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 8270	1,1,1-Trichloroethane	# OF CONTAINERS
PSS-1	11/29/01		SOIL	01											X								1
PSS-2				02											X								1
PSS-3				03											X								1
PSS-4				04											X								1
PSS-5				05											X							X	1
PSS-6				06											X								1
PSS-7				07											X								1
PSS-8				08											X								1
PSS-9				09											X								1
PSS-10				10											X								1
PSS-11				11											X								1
PSS-12				12											X								1
PSS-13				13											X								1
PSS-14				14											X								1
PSS-15				15											X								1

PROJECT INFORMATION
PROJECT NUMBER: 16291.018
PROJECT NAME: Penwalt
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☐ NO ☒

SAMPLE RECEIPT
TOTAL NUMBER OF CONTAINERS
COC SEALS INTACT? Y / N / NA
RECEIVED INTACT? Y / N
RECEIVED COLD? Y / N

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS
TAT (NORMAL) 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK
GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

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RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
SIGNATURE: Erik Andersen Time 17:20	SIGNATURE: Time	SIGNATURE: Time
Printed Name: Erik Andersen Date 11/29/01	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Leslie Rush Time 5:20	Signature: Time	Signature: Time
Printed Name: Leslie Rush Date 11-29-01	Printed Name: Date	Printed Name: Date
Company: ESL	Company:	ESL Inc.:

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Address:
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Project Manager: Erik Anderson
LABORATORY # 0111250

SAMPLE DISPOSAL INSTRUCTIONS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NWTPH-HCID	NWTPH-GX	NWTPH-DX	8020M - BETX only	8270 SIMS PAHs	Halogenated VOCs/GCMS	Aromatic VOCs/GCMS	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	RCRA Metals (8)	Priority Pollutant Metals (13)	Metals: Pb	TCLP Metals (8)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 8270		1,1,1-TCA		Chlorobenzene		~~[illegible]~~	Organochlor. Pest.								# OF CONTAINERS
PSS-16	11/29/01		soil	16											X																						1
PSS-17	↓		↓	17											X								X														1
PSS-18				18			X								X																						1
PSS-19				19											X																						1
PSS-20				20											X								X														1
PSS-21				21											X																						1
PSS-22				22			X								X																						1
PSS-23				23											X								X														1
PSS-24				24											X																						1
PSS-25				25			X	X	X						X																						1
PSS-25a				26											X			X							X		~~[illegible]~~	X									2
PSS-26				27											X																						1
PSS-27				28											X																						1
PSS-28				29			X	X	X						X																						1
PSS-29				30											X																						1

2711-01

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT NUMBER: 16291.018	TOTAL NUMBER OF CONTAINERS
PROJECT NAME: Pennwalt	COC SEALS INTACT? Y / N / NA
PURCHASE ORDER NUMBER:	RECEIVED INTACT? Y / N
ONGOING PROJECT? YES ☐ NO ☒	RECEIVED COLD? Y / N

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS

TAT (NORMAL) 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

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RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
SIGNATURE: Time 17:20	SIGNATURE: Time	SIGNATURE: Time
Printed Name: Erik Anderson Date 11/29/01	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Leslie Rush Time 5:20	Signature: Time	Signature: Time
Printed Name: Leslie Rush Date 11-29-01	Printed Name: Date	Printed Name: Date
Company: ESL	Company:	ESL Inc.:

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Company: PBS
Address:
Phone: 417-7594 Fax: 248-0223
Project Manager: Erik Anderson
LABORATORY # 0111250

SAMPLE DISPOSAL INSTRUCTIONS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NWTPH-HCID	NWTPH-GX	NWTPH-DX	8020M - BETX only	8270 SIMS PAHs	Halogenated VOCs/GCMS	Aromatic VOCs/GCMS	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	RCRA Metals (8)	Priority Pollutant Metals (13)	Metals:	TCLP Metals (8)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 8270	1,1,1-TCA	# OF CONTAINERS
PSS-30	11/28/01		SOIL	31			X								X								1
PSS-31				32											X								1
PSS-32				33			X								X								1
PSS-~~32~~ 33				34											X								1
PSS-34				35			HOLD																1
PSS-35				36			HOLD																1
PSS-36				37			HOLD																1
PSS-37				38			HOLD																1
PSS-38				39			HOLD																1
PSS-39				40			HOLD																1
PSS-40				41			HOLD																1
PSS-41				42			HOLD																1
PSS-42				43											X							X	1
PSS-43				44											X								1
PSS-44				45			X								X								1

PROJECT INFORMATION
PROJECT NUMBER: 16241.018
PROJECT NAME: Permalt
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☐ NO ☒

SAMPLE RECEIPT
TOTAL NUMBER OF CONTAINERS
COC SEALS INTACT? Y / N / NA
RECEIVED INTACT? Y / N
RECEIVED COLD? Y / N

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS
TAT (NORMAL) 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK
GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

Sampled by:
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RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
SIGNATURE: Time 17:20	SIGNATURE: Time	SIGNATURE: Time
Printed Name: Erik Anderson Date 11/28/01	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Time 5:20	Signature: Time	Signature: Time
Printed Name: Leslie Rush Date 11-29-01	Printed Name: Date	Printed Name: Date
Company: ESL	Company:	ESL Inc.:

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Phone: 417-7594 Fax: 248-0223
Project Manager: Erik Anderson
LABORATORY # 0111250

SAMPLE DISPOSAL INSTRUCTIONS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NWTPH-HCID	NWTPH-GX	NWTPH-DX	8020M - BETX only	8270 SIMS PAHs	Halogenated VOCs/GCMS	Aromatic VOCs/GCMS	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	RCRA Metals (8)	Priority Pollutant Metals (13)	Metals:	TCLP Metals (8)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 8270	111-TCA	# OF CONTAINERS
PSS-45		11/24/01	Soil	46											X							X	1
PSS-46				47			X								X								1
PSS-47				48			X								X								1
PSS-48				49			X								X							X	1
PSS-49				50											X								1
PSS-50				51											X								1
PSS-51				52											X								1
PSS-52				53			X								X								1
PSS-53				54											X								1
PSS-54				55			X								X								1
PSS-55				56											X								1
PSS-56				57											X								1
PSS-57				58			X	X	X						X								3
PSS-58				59											X								1
PSS-59				60											X								1

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT NUMBER: 16291.008	TOTAL NUMBER OF CONTAINERS
PROJECT NAME: Renault	COC SEALS INTACT? Y / N / NA
PURCHASE ORDER NUMBER:	RECEIVED INTACT? Y / N
ONGOING PROJECT? YES ☐ NO ☒	RECEIVED COLD? Y / N

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS

TAT (NORMAL) 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

Sampled by: Received via:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
SIGNATURE: Time 17:20	SIGNATURE: Time	SIGNATURE: Time
Printed Name: Erik Anderson Date 11/29/01	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Leslie Rusty Time 5:20	Signature: Time	Signature: Time
Printed Name: Leslie Rusty Date 11-29-01	Printed Name: Date	Printed Name: Date
Company: ESL	Company:	ESL Inc.:

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Address:
Phone: 417-7594 Fax: 248-6223
Project Manager: Erik Anderson
LABORATORY # 0111250

SAMPLE DISPOSAL INSTRUCTIONS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NWTPH-HCID (PETROLEUM HYDROCARBONS)	NWTPH-GX	NWTPH-DX	8020M - BETX only	8270 SIMS PAHs	Halogenated VOCs/GCMS (ORGANICS)	Aromatic VOCs/GCMS	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	RCRA Metals (8) (INORGANICS)	Priority Pollutant Metals (13)	Metals:	TCLP Metals (8) (TCLP)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 8270	# OF CONTAINERS
PSS-60	11/21/01		soil	61											X							1
PSS-61				62											X							1
PSS-62				63											X							1
PSS-63				64											X							1
PSS-64				65											X							1
PSS-65				66											X							1
PSS-66				67											X							1
PSS-67				68											X							1
PSS-68				69											X							1
PSS-69				70											X							1
PSS-70				71											X							1
PSS-71				72											X							1
PSS-72				73											X							1
PSS-73				74											X							1
PSS-74				75											X							1

PROJECT INFORMATION
PROJECT NUMBER: 16241.018
PROJECT NAME: Permit
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☐ NO ☒

SAMPLE RECEIPT
TOTAL NUMBER OF CONTAINERS
COC SEALS INTACT? Y / N / NA
RECEIVED INTACT? Y / N
RECEIVED COLD? Y / N

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS
TAT (NORMAL) 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK
GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

Sampled by:
Received via:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
SIGNATURE: Time 17:20	SIGNATURE: Time	SIGNATURE: Time
Printed Name: Erik Anderson Date 11/21/01	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: Leslie Rush Time 5:20	Signature: Time	Signature: Time
Printed Name: Leslie Rush Date 11-29-01	Printed Name: Date	Printed Name: Date
Company: ESL	Company:	ESL Inc.:

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Appendix F
Phase 2 Site Characterization Work Plan and Work Plan Addendum

Work Plan

Phase 2 Soil and Groundwater Investigation Acid Plant Project

ATO

Elf Atochem North America, Inc.
Portland, Oregon

CH2M HILL

June 1995

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Section 1.0
Introduction

This work plan describes the proposed Phase 2 investigation at the Elf Atochem North America, Inc. (Elf Atochem), inorganic chlor-alkali chemical facility located at 6400 N.W. Front Avenue, Portland, Oregon (Figure 1-1). This work plan also contains a detailed description of the Phase 1 investigation conducted at the facility during 1994. The proposed scope of this Phase 2 investigation is based primarily on the results of the Phase 1 investigation.

The area included in both the Phase 1 and proposed Phase 2 investigations is referred to as the Acid Plant Area (Figure 1-2). Two areas within the Acid Plant Area are included in this investigation: the General Acid Plant Area and the Former Manufacturing Process Residue Pond (Former Residue Pond), which is located within the General Acid Plant Area. The Former Residue Pond includes the area of the pond as well as a possible overflow trench. The approximate locations of these areas are presented in Figure 1-3.

The purpose of the Phase 1 investigation was to establish the presence or absence of dichlorodiphenyltrichloroethane (DDT) residue and related compounds in the soil and groundwater within the General Acid Plant Area and the Former Residue Pond, and assess the presence of DDT residue and related compounds in the groundwater in the vicinity of the Former Residue Pond. The results of the investigation indicated the presence of DDT residue in the soil in the General Acid Plant Area and DDT residue and related compounds in the soil and groundwater in the Former Residue Pond Area. A detailed description of the Phase 1 investigation scope and findings is presented in Section 3.0 of this work plan.

The goal of the Phase 2 investigation is to gather information to assess the level of risk associated with the DDT residue and related compounds. The objectives of the investigation include evaluating the lateral and vertical extent of DDT residue and related compounds in soil in the General Acid Plant Area, if any; further delineating the lateral and vertical extent of affected soil around the Former Residue Pond, if any; evaluating the presence and extent of DDT residue and related compounds in the uppermost groundwater in the vicinity of the Former Residue Pond area, if any; and characterizing the local hydrogeology and groundwater flow patterns.

The results of the Phase 1 and Phase 2 investigations will be used to evaluate possible remedial alternatives, if appropriate.

This work plan is organized into the following sections:

Section 2.0: Site Background. This section summarizes the applicable site history and the physical setting of the facility.

Section 3.0: Phase 1 Investigation. This section summarizes the Phase 1 investigation previously conducted in the Acid Plant Area of the facility.

Section 4.0: Work Plan Rationale. This section summarizes the Phase 2 investigation objectives, data needs, and data quality objectives as well as the phased approach that will be used to meet the identified data needs.

Section 5.0: Phase 2 Investigation Tasks. This section outlines the individual tasks to be completed during the Phase 2 investigation, including soil and groundwater characterization.

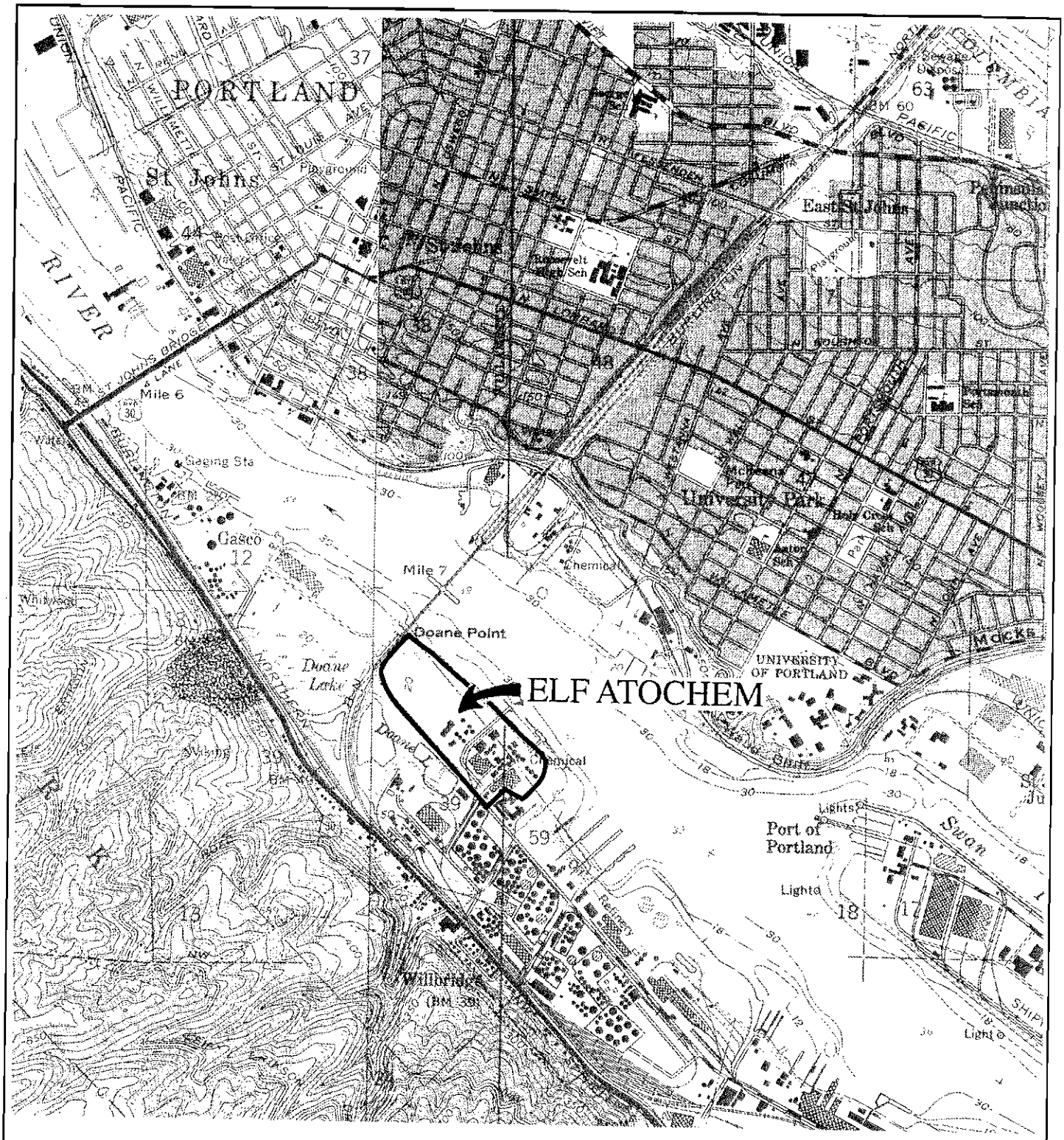
Section 6.0: Data Management and Validation. This section describes the data management and data validation approach for data collected under the Phase 2 investigation.

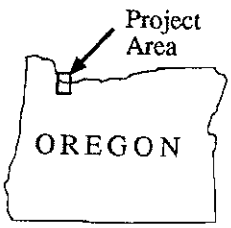
Section 7.0: Project Management, Reporting, and Schedule. This section describes the project management organization and schedule for developing and performing the investigation.

Section 8.0: Works Cited. This section is a list of the documents cited in the text.

The following documents are included as appendixes to the work plan:

- Appendix A: Phase 1 Soil Boring and Test Pit Logs
- Appendix B: Phase 1 Laboratory Data Sheets
- Appendix C: Phase 1 Data Validation
- Appendix D: Phase 2 Sampling and Analysis Plan
- Appendix E: Phase 2 Quality Assurance Project Plan
- Appendix F: Phase 2 Site Health and Safety Plan
- Appendix G: CH2M HILL Staff Resumes





NORTH

0 1000 2000 FEET

Base map from USGS 7.5-minute Portland Quadrangle, 1977, and Linnton Quadrangle, 1984

FIGURE 1-1
Location Map
Elf Atochem
Portland, Oregon

CH2M HILL

06-01-95

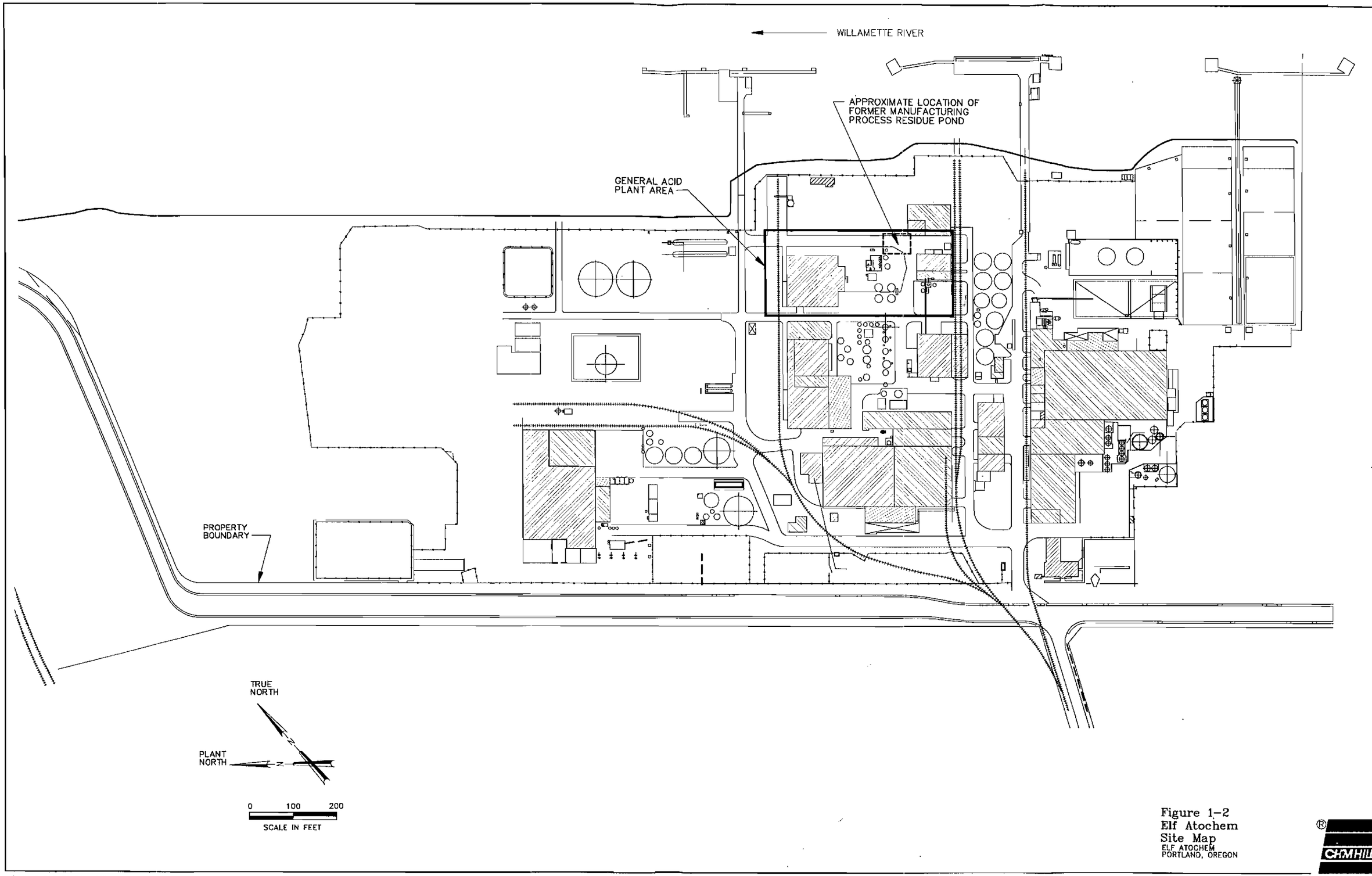


Figure 1-2
Elf Atochem
Site Map
ELF ATOCHEM
PORTLAND, OREGON

CH2M HILL

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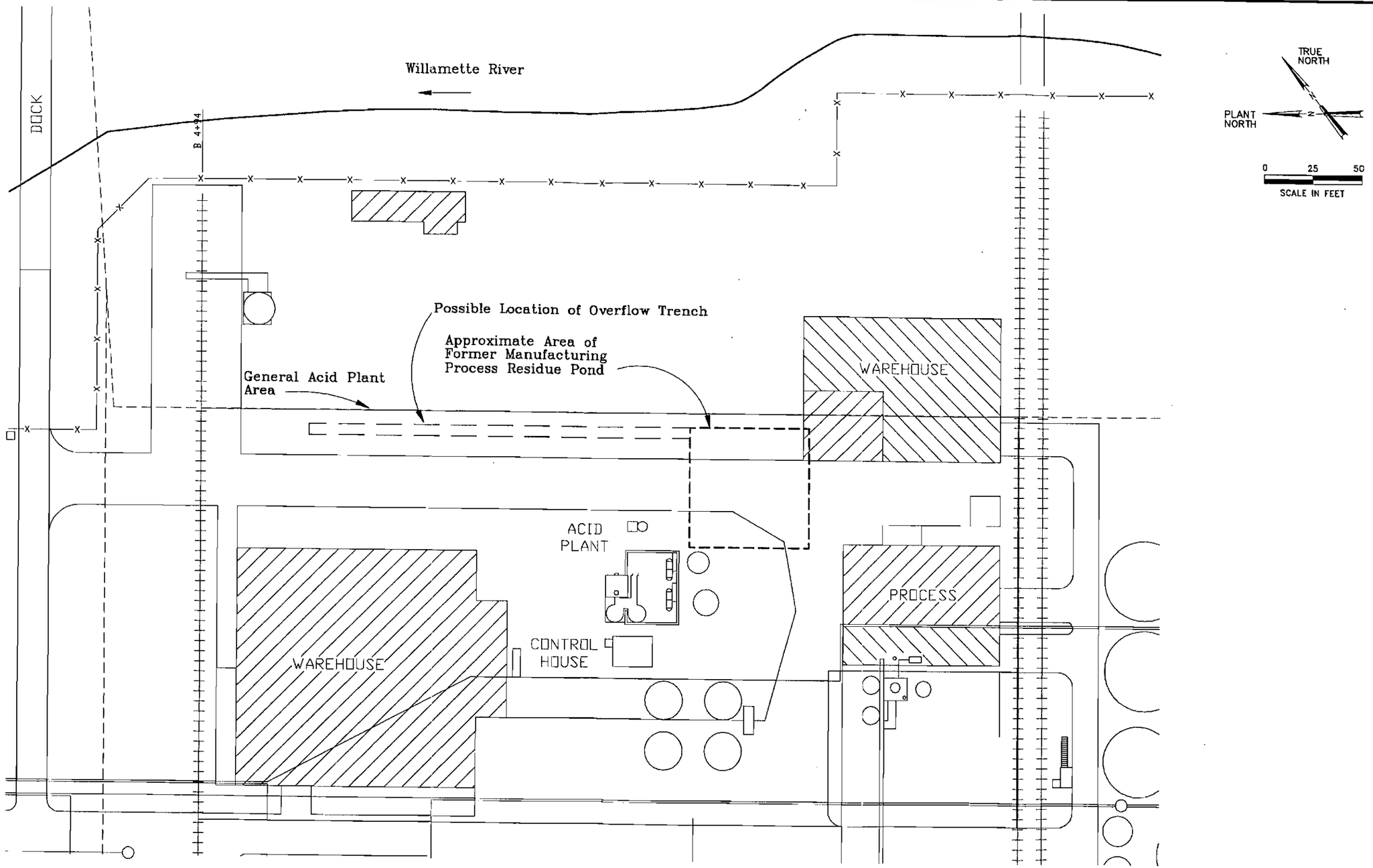


Figure 1-3

Approximate Locations of Investigation Areas

ELF ATOCHEM
PORTLAND, OREGON

CH2M HILL

Q:\37449\CAD\7449G22.DWG

Section 2.0

Site Background

2.1 Site Description

The Elf Atochem facility is located at 6400 N.W. Front Avenue in Portland, Oregon. The facility occupies approximately 50 acres. The northern portion of the property, encompassing approximately 15 to 20 acres, is currently undeveloped. The facility is located within an industrially zoned area and operates as an inorganic chlor-alkali chemical plant.

According to Elf Atochem, DDT was manufactured in the present Acid Plant Area of the facility from approximately the late 1940s until approximately 1954. Based on information provided by Elf Atochem, the following raw materials were used to manufacture DDT:

- Chloral (trichloroacetaldehyde)
- Monochlorobenzene (also referred to as chlorobenzene or MCB)
- Oleum-104 percent (fuming sulfuric acid)

According to available information, manufacturing process waste was discharged from the former process building to a chlorobenzene recovery system and then into a shallow manufacturing process residue pond. Reportedly, for a short period of time (approximately 1 to 2 years), an overflow trench may have extended from the northeastern (plant north) corner of the Former Residue Pond.

2.2 Physical Setting

Elf Atochem's Portland plant is located along the west bank of the Willamette River at River Mile 7.5. The plant is bordered on the east by the Willamette River, on the south by Genstar Roofing Products Company, and on the north and west by Front Avenue. The plant site is fairly flat. The facility is surrounded by steel security fencing, and the main gate is attended by security personnel 24 hours a day.

2.2.1 Regional Geology

The facility lies on a river terrace of the Willamette River. The terrace is bounded by the Tualatin Mountains to the west and the Willamette River to the east. The area bordering the Willamette River has been filled with river dredge spoils by the U.S. Army Corps of Engineers and other fill material. Based on aerial photos, it appears that the bank adjacent to the Acid Plant Area has been filled out toward the Willamette River approximately 200 feet since the 1950s.

The area is underlain by unconsolidated sediments comprising recent fill and Quaternary Age alluvial deposits. Below the unconsolidated sediments, the Tertiary Age Troutdale Formation, composed of sandstone and conglomerate, occurs only to a limited extent and is laterally discontinuous throughout the area (Geraghty & Miller, 1991).

The entire area is underlain by Tertiary Age Columbia River Basalt. The basalt has been encountered at variable depths in the area, ranging from 45 to 100 feet below ground surface. Available data indicates a trough or basin feature in the upper basalt surface near, and possibly passing beneath, the Elf Atochem facility. The limited occurrence of the Troutdale Formation and the trough-shaped feature of the basalt surface are probably attributable to erosional scoring caused by the ancestral river. The location of the trough feature with respect to the Elf Atochem facility is not known.

2.2.2 Regional Hydrogeology

Four general hydrostratigraphic units may be present beneath the area: sand, silt, the Troutdale Formation, and Columbia River Basalt. The sand unit includes the fill as well as alluvial deposits and consists of both sand and silty sand. The silt unit consists of silt and clayey silt within the alluvial deposits. Due to its discontinuous nature in the area, the Troutdale Formation is probably not a significant hydrogeologic unit in the area.

Groundwater in the area typically flows toward the Willamette River to the north-northeast. Recharge to the area occurs from the Tualatin Mountains and probably discharges to the Willamette River. Depth to groundwater in the area appears to range from approximately 10 to 30 feet (Geraghty & Miller, 1991).

Section 3.0
Phase 1 Investigation

Elf Atochem conducted a preliminary soil and groundwater investigation (Phase 1) in the Acid Plant Area during 1994. The purpose of the Phase 1 investigation was to establish the presence or absence of DDT residue and related compounds in the soil in the General Acid Plant Area and the Former Residue Pond, and the quality of the groundwater in the vicinity of the Former Residue Pond.

The Phase 1 investigation involved the following specific objectives:

- Determine whether remnants of the Former Residue Pond are present beneath the Acid Plant Area and, if so, to evaluate the nature and characteristics of the Former Residue Pond remnants.
- Identify potentially present constituents, if any, in the affected soil, including DDT, chlorobenzene, and potential DDT degradation products, by performing a limited field investigation.
- Estimate the volume of soil that may contain DDT residue originating from the Former Residue Pond operation, if any.
- Assess the presence of DDT residue and related compounds, if any, in the uppermost groundwater in the vicinity of the Former Residue Pond Area.

3.1 Scope of the Phase 1 Investigation

The scope of the Phase 1 investigation was developed based on available information regarding DDT production and the physical setting of the Portland plant.

An available historical aerial photograph of the Acid Plant Area taken in the early 1950s was used to visually estimate the areal extent of the Former Residue Pond. The information was transferred to the AutoCAD site base map used for graphics presented in this work plan. Specific sampling locations in the Former Residue Pond Area were identified based on the information obtained during the aerial photo review.

The identified areas are briefly described below. A description of the sampling and analysis conducted at each area follows the area description. Table 3-1 presents a summary of the sampling methods used in each area of investigation.

3.1.1 Former Manufacturing Process Residue Pond

According to available information, manufacturing process waste was discharged from the former process building to an MCB recovery system and then into a shallow manufacturing process residue pond. Based on an aerial photograph from the 1950s, the Former Residue Pond was estimated to have been approximately 35 feet by 25 feet in size.

Table 3-1
Summary of Investigation Areas

Investigation Area	Potential Source of Constituents	Potential Constituents	Sampling Method			Analytical Methods
			Soil Borings	Test Pits	Groundwater Samples	
Former Residue Pond	Possible disposal of manufacturing process waste associated with DDT production	1) DDT residue 2) Breakdown products of DDT residue: DDD and DDE 3) Residual monochlorobenzene and chloral 4) Breakdown product of chloral: chloroform	15	--	4	1) Organochlorinated Pesticides by EPA Method 8080 2) Aromatic Volatile Organic Compounds by EPA Method 8020 3) Total Petroleum Hydrocarbons by EPA Method 418.1 (two soil samples only) 4) Halogenated Volatile Organic Compounds by EPA Method 8010 (groundwater samples only)
General Acid Plant Area	Possible incidental areal distribution of DDT residue	1) DDT residue 2) Breakdown products of DDT residue: DDD and DDE	--	6	--	1) Organochlorinated Pesticides by EPA Method 8080

3.1.1.1 Soil. In April 1994, 15 soil borings were advanced in the Former Residue Pond Area. Sampling locations are shown in Figure 3-1. The first boring, 1A-SB1, was advanced into the inferred center of the Former Residue Pond to a depth of approximately 15 feet below ground surface (bgs) in an effort to assess the vertical extent of the Former Residue Pond. The DDT residue was visually identifiable by its pink color.

The remainder of the borings were advanced along the four inferred edges of the Former Residue Pond to evaluate the pond's approximate lateral extent. The borings were advanced to approximately 5 to 7 feet bgs, approximately 3½ to 5½ feet below the depth of the first pink material encountered in boring 1A-SB1. If DDT residue was encountered in a boring, another boring was advanced 5 to 10 feet farther away from the inferred Former Residue Pond center. If DDT residue was not encountered, the next boring was advanced 5 to 10 feet closer to the inferred Former Residue Pond center. This process was repeated until the approximate lateral extent of pond residue was visually identified.

Selected soil samples were analyzed to confirm the lateral extent of DDT residue and related compounds and to characterize the DDT residue material. Soil samples were analyzed for organochlorinated pesticides using U.S. Environmental Protection Agency (EPA) Method 8080 to evaluate the presence of DDT residue and its degradation products, DDD and DDE. Samples were also analyzed for aromatic volatile organic compounds (EPA Method 8020) to evaluate the presence of MCB. In addition, two samples that appeared to have a hydrocarbon-like odor and sheen were analyzed for total petroleum hydrocarbons (EPA Method 418.1).

3.1.1.2 Groundwater. In November 1994, screening level groundwater sampling was conducted to assess the presence or absence of DDT residue and related compounds in the uppermost groundwater in the vicinity of the Former Residue Pond Area.

Groundwater samples were collected from four locations using a Geoprobe®, which is a subsurface sampling tool capable of collecting groundwater samples without installing a well. The Geoprobe® sampling locations were approximately 20 to 25 feet laterally beyond each side of the inferred pond perimeter (see Figure 3-1). Two sets of samples were collected from each location. One set was filtered in the laboratory before analysis to assess the possible bias introduced into the analytical results by the presence of turbidity in the samples.

The samples were analyzed for organochlorinated pesticides (EPA Method 8080/608), aromatic volatile organic compounds (EPA Method 8020/602), and halogenated volatile organics (EPA Method 8010/601).

3.1.2 General Acid Plant Area

DDT allegedly was manufactured within the General Acid Plant Area, which encompasses the Former Residue Pond Area. The conceptual model of the presence of DDT residue and related constituents in the General Acid Plant Area is that small quantities of DDT residue may have been released to the ground surface during the manufacturing process. Because the quantity of DDT residue that may have been released by this mechanism is assumed to be

small and surficial, the likelihood of significant vertical migration was considered to be limited. Therefore, sampling conducted in this area focused on shallow soil.

Soil samples were collected from test pits at six locations (TP-1, TP-2, TP-3, TP-4, TP-5, and TP-6) in the General Acid Plant Area to investigate the presence of DDT residue and related constituents (see Figure 3-1). Soil samples were collected at depths of approximately ½ foot, 2 feet, and 4 feet bgs (in test pit TP-6) and were analyzed for organochlorinated pesticides (EPA Method 8080).

3.2 Field Investigation Methodology

Field activities during the Phase 1 investigation included locating utilities, drilling, excavating test pits, sampling soil, and sampling groundwater with a Geoprobe®. Drilling, test pit excavation, and soil sampling were conducted at the site from April 20, 1994, to April 22, 1994. Groundwater sampling was performed on November 3, 1994.

The Utility Coordinating Council was contacted before both of the sampling events to notify utility companies with service on or adjacent to the Elf Atochem facility. In addition, an Elf Atochem employee cleared the drilling, test pit, and Geoprobe® locations before the work was initiated.

The field investigation was performed in accordance with CH2M HILL's Health and Safety Plan. In addition, Elf Atochem conducted a site health and safety meeting that addressed hazards associated with plant operation. During the field investigation, CH2M HILL personnel maintained a field logbook for recording oversight activities and borehole logs.

3.2.1 Soil Sampling

Two types of soil samples were collected: soil boring samples (SB) and test pit soil samples (TP). The soil boring samples were collected from the Former Residue Pond Area to evaluate its remnants and vertical extent (one boring, 15 feet deep) and to evaluate the lateral extent of the Former Residue Pond remnants (14 borings, 5 to 7 feet deep). The test pit soil samples were collected throughout the General Acid Plant Area. Six test pits were dug with a backhoe, five to a depth of 2 feet and one to a depth of 4 feet.

Sampling locations, depths, and methods are summarized in Table 3-2. The sampling locations are shown in Figure 3-1. Sampling locations were measured in the field with tape and transit to the nearest foot, and sampling depths were measured to the nearest ½ foot. The following subsections describe the soil sampling methods in more detail.

3.2.1.1 Soil Boring Samples. The soil boring work to evaluate the Former Residue Pond remnants was performed with a drilling rig equipped with a 4¼-inch-inside-diameter hollow-stem auger. A 5-foot-long continuous-core barrel was used to collect the soil samples. The continuous-core barrel has an inside diameter of approximately 3 inches and can be separated into two pieces, similar to a split spoon. The soil borings were abandoned in accordance with State of Oregon abandonment requirements for "other holes" following completion of the drilling (OAR 690-240). The boreholes were backfilled with bentonite chips from total depth

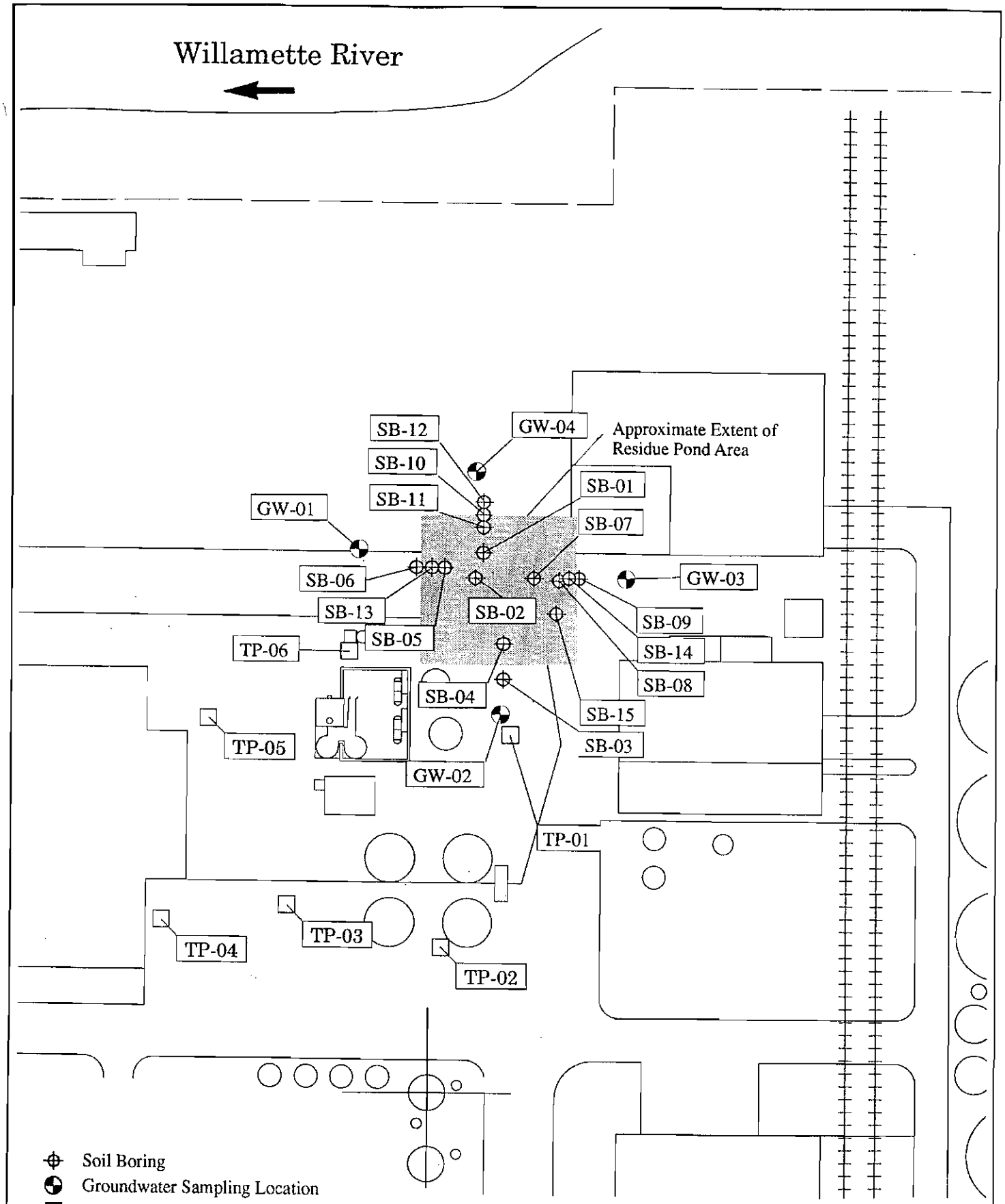


FIGURE 3-1
Test Pit, Soil Boring, and Groundwater Sampling Locations
Elf Atochem
Portland, Oregon

CH2M HILL

Table 3-2
Summary of Sampling and Analysis Program

Area of Investigation	Sample Designation	Media	Sampling Method	Sample Depth (ft bgs)[a]	Date Sampled	Laboratory Analysis			
						Organo-chlorinated Pesticides (EPA 8080)	Aromatic Volatile Organic Compounds (EPA 8020)	Halogenated Volatile Organic Compounds (EPA 8010)	Total Petroleum Hydro-carbons (EPA 418.1)
Former Residue Pond	1A-SB1-2.7	Soil	Soil boring	2.7	4/20/94	×	×		
	1A-SB1-4.0	Soil	Soil boring	4.0	4/20/94	×	×		×
	1A-SB1-8.5	Soil	Soil boring	8.5	4/20/94	×	×		
	1A-SB1-15.0	Soil	Soil boring	15.0	4/20/94	×	×		
	1A-SB3-3.5	Soil	Soil boring	3.5	4/20/94	×	×		
	1A-SB4-3.5	Soil	Soil boring	3.5	4/20/94	×	×		×
	1A-SB6-5.1	Soil	Soil boring	5.1	4/20/94	×	×		
	1A-SB9-4.3	Soil	Soil boring	4.3	4/20/94	×	×		
	1A-SB11-3.0	Soil	Soil boring	3.0	4/21/94	×	×		
	1A-SB13-4.7	Soil	Soil boring	4.7	4/21/94	×	×		
	1A-SB14-5.6	Soil	Soil boring	5.6	4/21/94	×	×		
	1A-SB15-10.6	Soil	Soil boring	10.6	4/21/94	×	×		
	1A-SB15-11.6	Soil	Soil boring	11.6	4/21/94	×	×		
	1B-GW1-A[b]	Groundwater	Geoprobe	34–36	11/3/94	×	×	×	
	1B-GW2-A[b]	Groundwater	Geoprobe	34–36	11/3/94	×	×	×	
	1B-GW2-B[c]	Groundwater	Geoprobe	34–36	11/3/94	×	×	×	
	1B-GW3-A[b]	Groundwater	Geoprobe	34–36	11/3/94	×	×	×	
	1B-GW3-B[c]	Groundwater	Geoprobe	34–36	11/3/94	×	×	×	
	1B-GW4-A[b]	Groundwater	Geoprobe	34–36	11/3/94	×	×	×	
	1B-GW4-B[c]	Groundwater	Geoprobe	34–36	11/3/94	×	×	×	

Table 3-2
Summary of Sampling and Analysis Program

Area of Investigation	Sample Designation	Media	Sampling Method	Sample Depth (ft bgs)[a]	Date Sampled	Laboratory Analysis			
						Organo-chlorinated Pesticides (EPA 8080)	Aromatic Volatile Organic Compounds (EPA 8020)	Halogenated Volatile Organic Compounds (EPA 8010)	Total Petroleum Hydro-carbons (EPA 418.1)
General Acid Plant Area	1A-TP1-0.5	Soil	Test pit	0.5	4/22/94	×			
	1A-TP1-2.0	Soil	Test pit	2.0	4/22/94	×			
	1A-TP2-0.5	Soil	Test pit	0.5	4/22/94	×			
	1A-TP2-2.0	Soil	Test pit	2.0	4/22/94	×			
	1A-TP3-0.5	Soil	Test pit	0.5	4/22/94	×			
	1A-TP3-2.0	Soil	Test pit	2.0	4/22/94	×			
	1A-TP4-0.5	Soil	Test pit	0.5	4/22/94	×			
	1A-TP4-2.0	Soil	Test pit	2.0	4/22/94	×			
	1A-TP5-0.5	Soil	Test pit	0.5	4/22/94	×			
	1A-TP5-2.0	Soil	Test pit	2.0	4/22/94	×			
	1A-TP6-0.5	Soil	Test pit	0.5	4/22/94	×			
	1A-TP6-2.0	Soil	Test pit	2.0	4/22/94	×			
	1A-TP6-4.0	Soil	Test pit	4.0	4/22/94	×			

[a]Feet below ground surface.
[b]Unfiltered groundwater sample.
[c]Filtered groundwater sample.

to 1 foot bgs as the auger sections were removed; the final 1 foot was filled with concrete flush to the ground surface.

Soil boring samples were classified visually in accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure, ASTM D 2487 85) and logged on soil boring log forms (see Appendix A). Soil samples selected for laboratory analysis were put into clean, laboratory-supplied jars using decontaminated stainless-steel spoons. Some soil was also placed into a Ziploc plastic bag and set aside for approximately 15 minutes prior to headspace testing. An organic vapor meter (OVM) with a 10.0 ionization energy probe was used to estimate the quantity of volatile organic compounds in the headspace of each bagged soil sample. The OVM probe tip was inserted into the bag without the bag being completely opened, and the reading was recorded in the field logbook.

3.2.1.2 Test Pit Samples. Test pits were excavated with a backhoe to a depth of approximately 2 to 4 feet. Soil excavated from the test pit was visually classified and recorded in the field logbook as described in the section above. Test pit log forms are included in Appendix A. Soil samples were collected from each test pit at depths of approximately 6 inches, 2 feet, and (for test pit TP-6) 4 feet bgs by first scraping away some of the exposed soil in the pit with a clean stainless-steel trowel or spoon and then scooping fresh soil into the laboratory-supplied containers. Headspace analysis was not performed on soil samples collected from test pits because DDT and its breakdown compounds are not detectable with the OVM.

3.2.2 Groundwater Sampling

A Geoprobe® was used to collect screening level groundwater samples in the vicinity of the Former Residue Pond. The groundwater samples were obtained by hydraulically pushing a 1-inch-inside-diameter steel pipe to a depth of 36 feet. The steel pipe was then withdrawn to 34 feet bgs, exposing 2 feet of stainless-steel screen. Prior to sample collection, water level measurements were collected. These measurements are approximate because actual monitoring wells were not constructed and developed.

The samples were collected using a vacuum pump system. Temperature and pH measurements were collected on samples GW-2, GW-3, and GW-4 and are summarized in Table 3-3. An insufficient sample volume was obtained from GW-1 to allow for temperature and pH measurements. As described previously in Section 3.2.1, two sets of samples were collected from each location (except GW-1). One set was filtered in the laboratory before being analyzed to assess the possible bias introduced into the analytical results by the presence of turbidity in the samples.

Table 3-3 Groundwater Sampling Field Measurements				
	Geoprobe® Sampling Location			
Parameter	GW-1	GW-2	GW-3	GW-4
Approximate depth to water (feet)	NM	23.7	26.0	26.5
Screened interval depth (feet)	34-36	34-36	34-36	34-36
pH	NM	11.1	6.1	3.4
Temperature (°C)	NM	10.6	14.9	14.2
NM = Not measured.				

The boreholes were backfilled with bentonite in accordance with State of Oregon abandonment requirements for "other holes" (OAR 690-240).

3.2.3 Decontamination Procedures

Downhole and sampling equipment was decontaminated before use on the site, between each sampling location, and before demobilization from the site. Nondedicated, nondisposable sampling equipment was decontaminated before each sample was collected and after sampling was completed. Decontamination of downhole equipment was performed with a high-pressure steam cleaner in an enclosed trailer. Other sampling equipment such as spoons and trowels were decontaminated at portable temporary decontamination stations using Alconox or Liquinox solution, tap water rinse, and a deionized water rinse.

3.2.4 Sample Packaging and Shipping

Samples were stored in coolers with ice at a maintained temperature of approximately 4°C until sample analysis. All sample containers were packed in iced coolers before shipment. One copy of the chain-of-custody record form was placed in a sealed plastic bag inside the cooler. Soil samples were sent by courier to Pacific Environmental Laboratory in Beaverton, Oregon. Groundwater samples were shipped overnight to Quality Analytical Laboratory in Redding, California.

3.2.5 Management of Investigation-Derived Waste

Investigation-derived waste (IDW) generated during the investigation included soil from drilling and decontamination water. Waste soil and decontamination water were stored separately in 55-gallon drums approved by the U.S. Department of Transportation (DOT). Drums were temporarily stored in an onsite staging area until completion of waste characterization. The drums were sealed and labeled with identification number, contents, owner, source, and date of generation.

The material generated was designated a state waste X001 and was disposed of at the Chemical Waste Management facility in Arlington, Oregon.

3.3 Analytical Data Management and Validation

The analytical data were input into Access data management software. The data were then imported into SitePlanner™, a three-dimensional data visualization software package. SitePlanner™ was used to generate plan view mapping of sample locations, chemical concentrations, and diagrams showing cross-sectional stratigraphy and chemical concentrations. SitePlanner™ was also used to estimate the volume of soil containing DDT residue in the Former Residue Pond Area. Laboratory data sheets are provided in Appendix B.

Overall, the quality of the Elf Atochem analytical data is acceptable. Holding times, method blanks, surrogate spike recoveries, precision and accuracy, and laboratory control sample recoveries were evaluated. Nonconformances with project data quality objectives or quality assurance/quality control (QA/QC) criteria are discussed and identified in Appendix C. Except for several volatile organic compound (VOC) results, sample results met QA/QC criteria for the selected QC parameters. The following is a brief summary of the overall quality of the sample results.

- VOC results for one soil sample were qualified as estimates and flagged with a "J" for positive results or a "UJ" for the detection limit because the holding time QC acceptance criterion was not met.

- VOC results for one water sample and four soil samples were qualified as estimates and flagged with a "J" for positive results or a "UJ" for the detection limit because surrogate spike recoveries did not meet QC acceptance criteria.

- The majority of the water and soil samples analyzed for VOCs and pesticides required dilutions to bring high concentrations of target or nontarget or both compounds into the linear range of the instrument. Method reporting limits (MRLs) were properly adjusted by the dilution factor.

3.4 Phase 1 Investigation Findings

The findings of the Phase 1 soil and groundwater investigation are described in the following subsections.

3.4.1 Physical Characteristics

Physical characteristics of the soil and groundwater encountered during the Phase 1 investigation are described below.

3.4.1.1 Soil. Subsurface material encountered during the soil investigation primarily included sand, silty sand, sand with gravel, and silt. In the Former Residue Pond Area, generally fill material consisting of a dark-brown sand with gravel and occasional wood

debris was encountered from ground surface to approximately 3 feet bgs. The exception to this sequence is northeast of the inferred Former Residue Pond boundary, in borings SB-10 and SB-12, where the dark-brown sand with gravel was observed to the bottom of the borings at approximately 7 feet bgs.

Underlying the sand with gravel was dark-brown and light-gray silty sand with localized lenses of silt. Pink residue was evident in some borings in the light-gray sand. Underlying the silty sand at a minimum depth of approximately 4½ feet was a gray, poorly sorted sand. As in the overlying silty sand, pink residue was evident in the gray sand. Stratigraphic cross sections (as shown in Figure 3-2) of the borings in the Former Residue Pond Area are presented in Figures 3-3 and 3-4.

The lateral extent of the former pond was delineated based on visible observations of the pink residue and correlated with analytical results (see Section 3.4.2). The lateral extent of soil affected by the Former Residue Pond is estimated to be approximately 60 feet by 56 feet (approximately 3,360 square feet), as shown in Figure 3-1. Pink residue was observed to the bottom of boring SB-1 (15 feet). Consequently, the vertical extent of soil affected by the Former Residue Pond is unknown.

Dark-brown, well-graded sand with gravel was generally encountered in the 2-foot-deep test pits. In test pit TP-6, which extended to a depth of 4 feet, a gray silt was observed at the bottom of the pit.

3.4.1.2 Groundwater. The Geoprobe® sampling tool was advanced in four locations surrounding the inferred boundary of the Former Residue Pond. At the first Geoprobe® sampling location, GW-1, water level measurement and field parameter collection were not conducted because gas was venting from the borehole. The composition and origin of the gas is unknown.

Temperature and pH measurements were collected at the other three groundwater sampling locations. Results are summarized in Table 3-3. The pH ranged from 3.4 at GW-4 to 11.1 at GW-2. The temperature of the groundwater samples ranged from 10.6 to 14.9 degrees Celsius (°C).

During the Geoprobe® groundwater sampling, groundwater levels were measured at depths of approximately 23.7 feet bgs (GW-2), 26.0 feet bgs (GW-3), and 26.5 feet bgs (GW-1). Groundwater level measurements were taken from the Geoprobe® tubing before sampling began. These measurements are approximate because the degree of hydraulic connection to the aquifer is unknown. The groundwater flow direction in the area is typically toward the Willamette River.

3.4.2 Analytical Results

3.4.2.1 Former Residue Pond. Analytical results of the samples collected and analyzed from the Former Residue Pond and the General Acid Plant Area are described below.

3.4.2.1.1 Soil. Thirteen soil samples were collected from soil borings in the Former Residue Pond Area and analyzed for organochlorinated pesticides and VOCs. Two samples were also analyzed for TPH. A summary of detected analytical results for pesticides and VOCs in soil samples from the Former Residue Pond Area is provided in Table 3-4.

Analytical results supported visual observations made during soil sampling in assessing the extent of affected soil. Generally, soil samples that appeared pinkish had higher concentrations of DDT than soil samples that did not appear pink. Soil samples collected from within the inferred boundaries of the Former Residue Pond and with visually apparent pink residue had detected DDT concentrations ranging from 5,000 milligrams per kilogram (mg/kg) to 150,000 mg/kg. Samples collected 5 to 10 feet laterally beyond the visibly pink material had DDT concentrations well below samples collected from similar zones within the visibly affected soil, ranging from not detected to 29 mg/kg. Stratigraphic cross sections A-A′ (see Figure 3-3) and B-B′ (see Figure 3-4) illustrate the correlation between the visibly affected soil and DDT concentrations.

VOCs detected in the soil samples included MCB, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and total xylenes (see Table 3-4). As shown in Figure 3-5, MCB was detected in 12 of the 13 samples analyzed, at concentrations ranging from 0.006 mg/kg to 200 mg/kg. 1,2-dichlorobenzene was detected in 7 of the 13 samples analyzed, at concentrations ranging from 0.00078 mg/kg to 1.3 mg/kg. 1,3-dichlorobenzene was detected in one sample (at 0.051 mg/kg), and 1,4-dichlorobenzene was detected in 5 of the 12 samples analyzed, at concentrations ranging from 0.0017 mg/kg to 0.046 mg/kg. Three samples had detectable concentrations of total xylenes ranging from 0.0006 mg/kg to 0.011 mg/kg.

Two samples that appeared to have a hydrocarbon-like odor and an iridescent sheen were analyzed for TPH. TPH was detected in both samples at levels of 34 mg/kg in SB1-4.0 and 860 mg/kg in SB4-3.5.

3.4.2.1.2 Groundwater. Groundwater samples were collected from four locations in the vicinity of the Former Residue Pond using a Geoprobe®. Unfiltered and laboratory-filtered samples were analyzed for organochlorinated pesticides and VOCs. Summaries of detected analytical results for pesticides and VOCs are provided in Tables 3-5 and 3-6, respectively. Insufficient sample was collected from GW-1 for pesticide analysis and VOC analysis of a filtered sample. Consequently, an unfiltered sample from GW1-A was analyzed for VOCs only.

As shown in Table 3-5 and in Figure 3-6, DDT was detected in the three unfiltered samples analyzed at concentrations ranging from 0.00036 to 0.5 mg/L. DDT was also detected in one of the three filtered samples analyzed (GW2-B) at 0.011 mg/L. DDD was detected in two of the unfiltered samples (GW2-A and GW4-A) and one of the filtered samples (GW2-B). DDE was detected in one unfiltered sample (GW2-A).

The solubility limit for DDT in water is reported to be 0.0031 to 0.0034 mg/L at 25°C (Verschueren, 1983). Three of the four samples with detectable concentrations of DDT had levels exceeding the solubility limit of DDT. In addition, samples that were filtered in the

laboratory before analysis contained lower concentrations of DDT than samples that were not filtered.

These data suggest that DDT detected at levels exceeding its solubility may be associated with DDT attached to suspended sediment. It is also possible that the presence of MCB in the groundwater may have increased the solubility of DDT, an effect known as cosolvency. The solubility of DDT is many orders of magnitude greater in an organic solvent, such as MCB, than it is in water (Windholz, 1983).

VOCs were detected in each of the analyzed samples (Table 3-6). MCB was the most prevalent VOC detected. MCB was detected in each sample analyzed at concentrations ranging from 0.87 mg/L to 370 mg/L, which is below its solubility limit of approximately 488 mg/L at 30°C (Verchueren, 1983). The highest MCB concentrations were detected in the unfiltered and filtered samples collected from GW-4. The assumed groundwater flow direction in the area suggests that GW-4 is located in a likely downgradient direction from the former pond area.

1,4-dichlorobenzene, the second most prevalent VOC detected in the groundwater samples, was detected in samples collected from GW-2, GW-3, and GW-4 at concentrations ranging from 0.0011 mg/L to 0.120 mg/L. Chloroform was detected in two of the unfiltered samples and three of the filtered samples at concentrations ranging from 0.0022 mg/L to 0.260 mg/L. Other VOCs detected included chloroethane, chloromethane, methylene chloride, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,3-dichlorobenzene, benzene, and carbon tetrachloride. VOC concentrations generally were slightly lower in the filtered samples than in the unfiltered samples. This could be attributable to volatilization during the filtering process or VOC sorption to suspended sediment, or both.

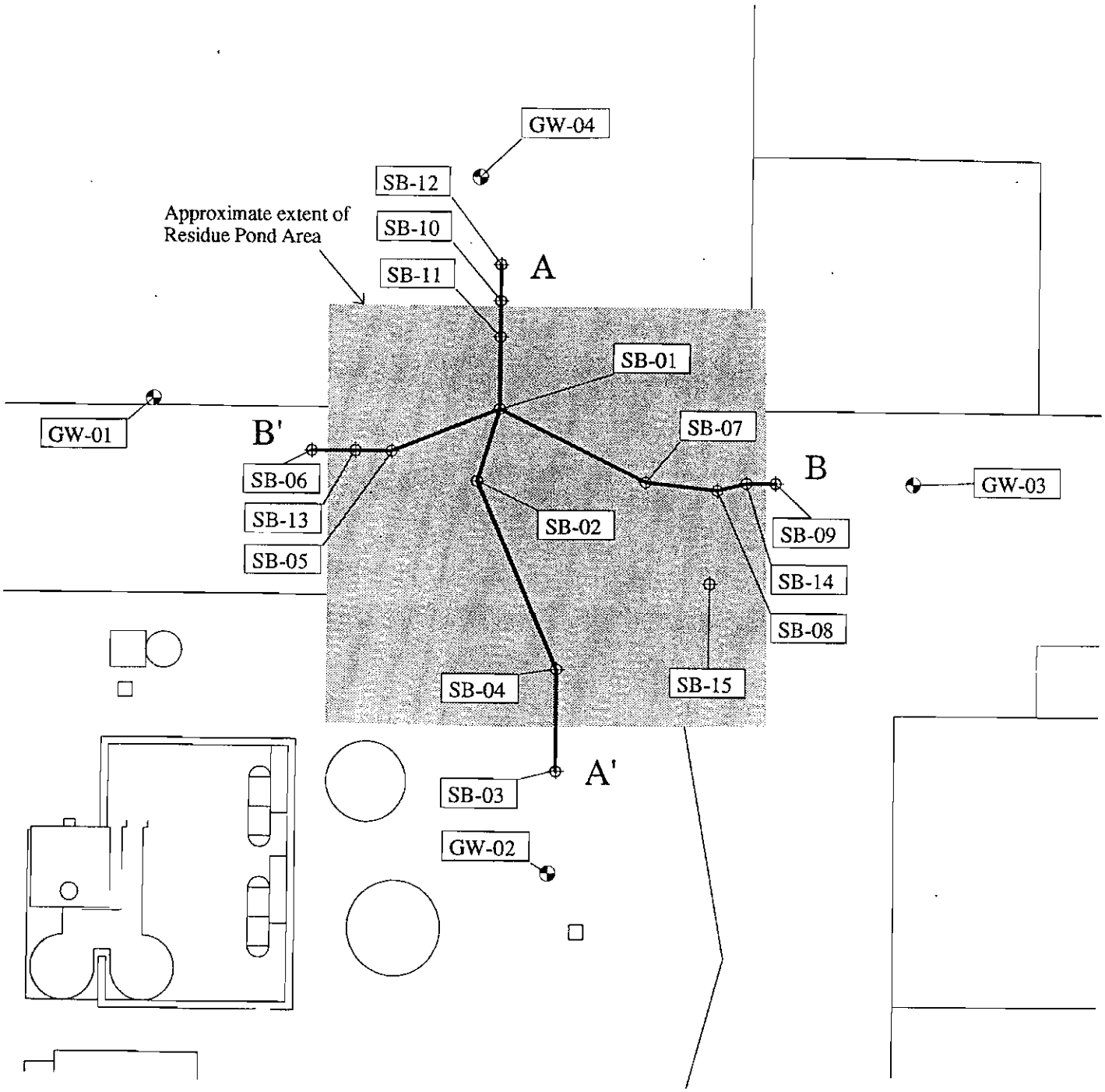
3.4.2.2 General Acid Plant Area. Thirteen soil samples were collected from six test pits and analyzed for organochlorinated pesticides (EPA Method 8080) in the General Acid Plant Area. Analytical results are summarized in Table 3-7 and Figure 3-7. DDT was detected in 12 of the 13 samples analyzed. Samples collected at a depth of approximately 6 inches had DDT concentrations ranging from 1.9 mg/kg to 210 mg/kg. The 2-foot samples had DDT concentrations ranging from not detected to 2,700 mg/kg. DDT was detected in the one sample collected at a depth of 4 feet (TP6-4.0) at a concentration of 0.25 mg/kg.

DDD and DDE were detected in one sample each at levels of 15 mg/kg (TP5-0.5) and 0.9 mg/kg (TP1-0.5), respectively.

3.5 Summary of Phase 1 Findings

The following findings summarize the results of the Phase 1 soil and groundwater investigation in the Acid Plant Area of Elf Atochem's Portland facility:

- The lateral extent of soil affected by the Former Residue Pond, delineated based on visible observations of the pink residue and supported with analytical results, is estimated to be approximately 60 feet by 56 feet



Soil Boring
Groundwater Sampling Location
Test Pit

TRUE NORTH
PLANT NORTH
0 20 FEET

FIGURE 3-2
Section Line Locations
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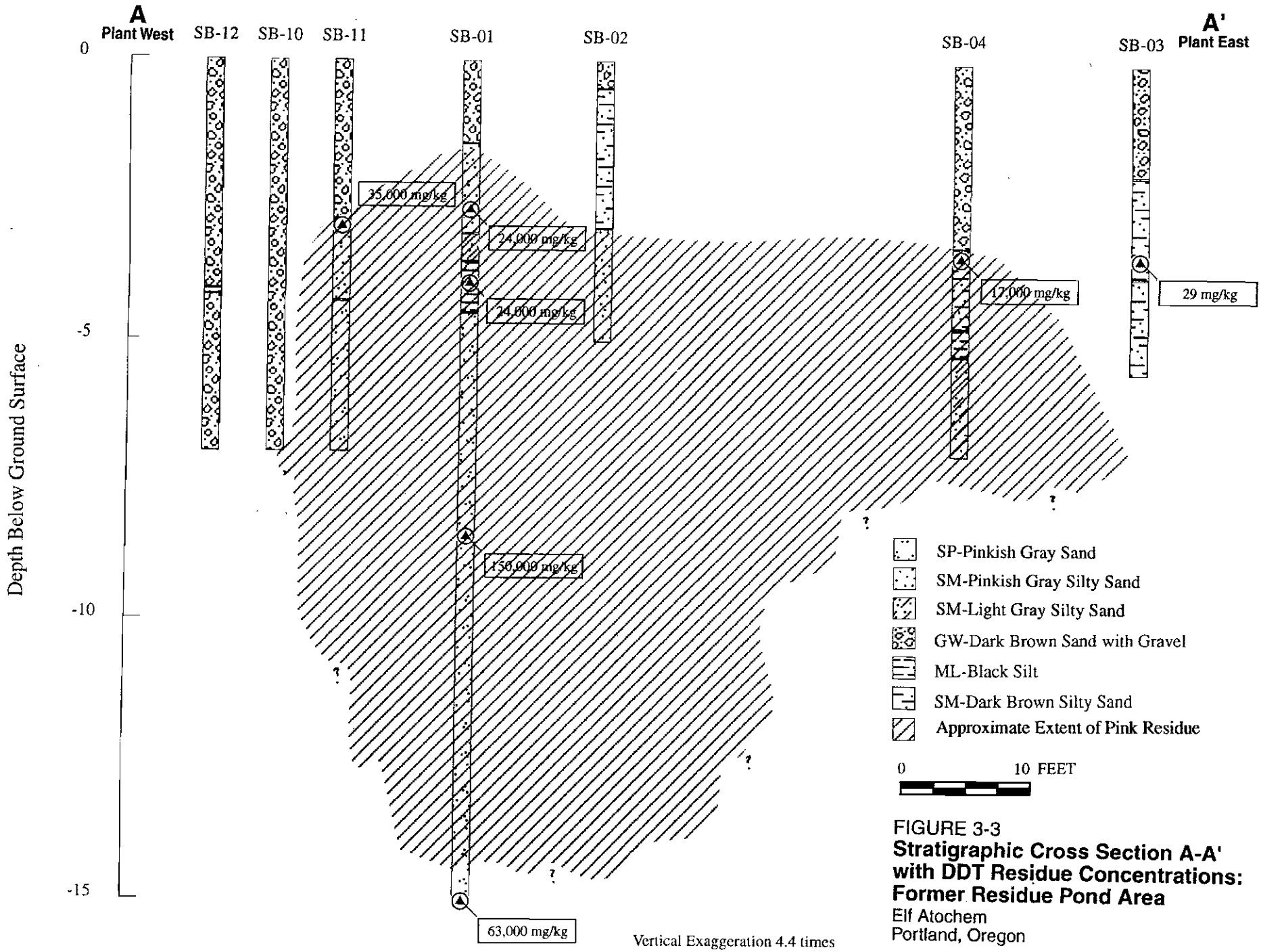

FIGURE 3-3
Stratigraphic Cross Section A-A' with DDT Residue Concentrations: Former Residue Pond Area
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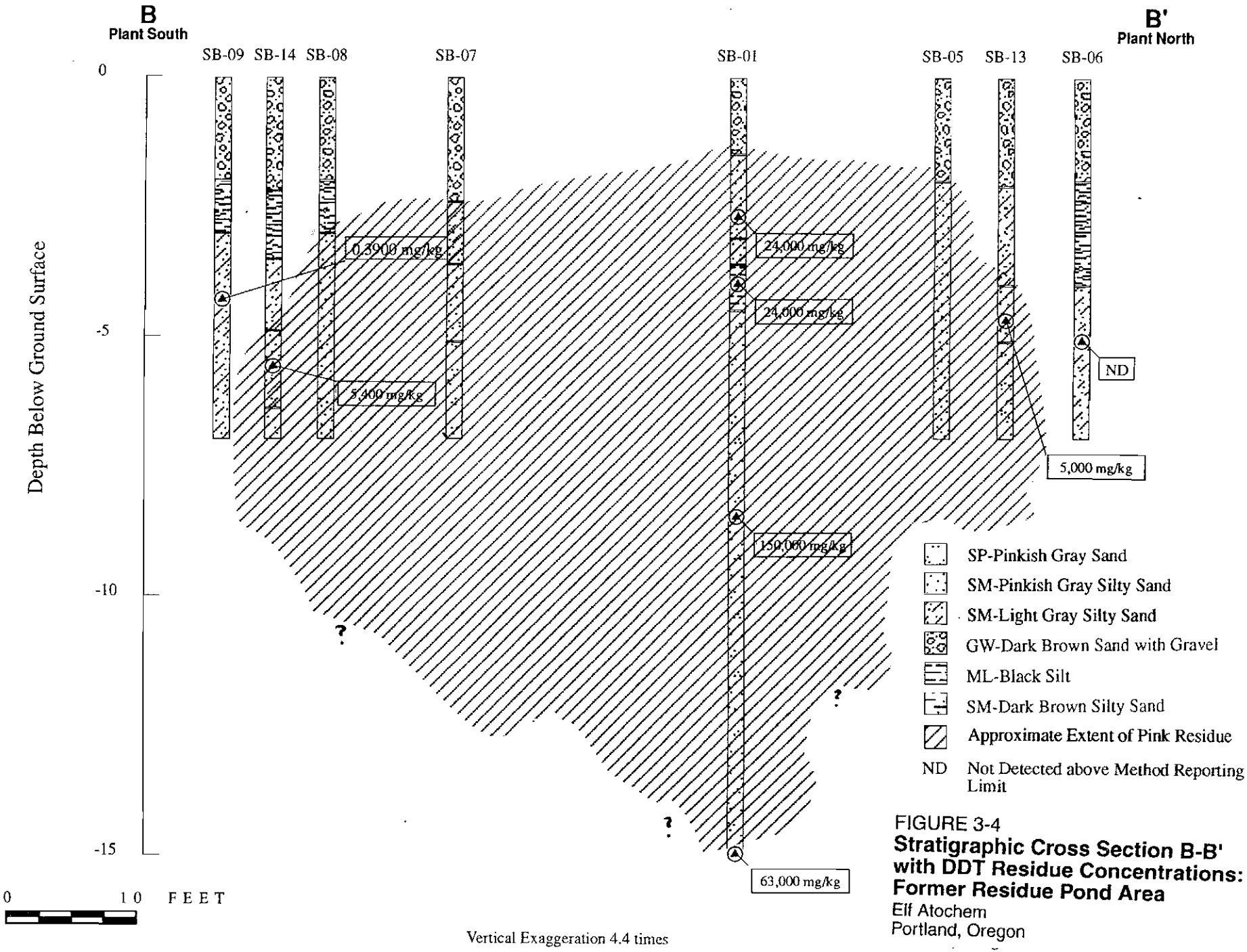

FIGURE 3-4
Stratigraphic Cross Section B-B' with DDT Residue Concentrations: Former Residue Pond Area
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Table 3-4
Summary of Detected VOCs and Pesticides in Soil Boring Samples: Former Residue Pond Area

Sample ID	Sample Collection Date	Sample Depth (ft bgs)[a]	Volatile Organic Compounds EPA Method 8020										Organochlorinated Pesticides EPA Method 8080					
			1,2-Dichloro-benzene (mg/kg)[b]	Q	1,3-Dichloro-benzene (mg/kg)	Q	1,4-Dichloro-benzene (mg/kg)	Q	Monochloro-benzene (mg/kg)	Q	Xylenes (Total) (mg/kg)	Q	4,4'-DDD (mg/kg)	Q	4,4'-DDE (mg/kg)	Q	4,4'-DDT (mg/kg)	Q
1A-SB1-2.7	4/20/94	2.7	ND	J	ND	J	0.002	J	0.27	J	0.0057	J	ND		ND		24,000	
1A-SB1-4.0	4/20/94	4.0	1.3		0.051		0.1		0.48		ND		ND		ND		24,000	
1A-SB1-8.5	4/20/94	8.5	0.018		ND		ND		2.3		ND		ND		ND		150,000	
1A-SB1-15.0	4/20/94	15.0	0.02		ND		0.032		2.1		ND		ND		ND		63,000	
1A-SB3-3.5	4/20/94	3.5	0.00078	J	ND	J	ND	J	0.006	J	0.0006	J	ND		ND		29	
1A-SB4-3.5	4/20/94	3.5	ND	J	ND	J	0.0017	J	0.02	J	ND	J	ND		ND		17,000	
1A-SB6-5.1	4/20/94	5.1	0.041		ND		0.046		2.6		ND		ND		ND		ND	
1A-SB9-4.3	4/20/94	4.3	ND		ND		ND		0.0061		ND		ND		ND		0.39	
1A-SB11-3.0	4/21/94	3.0	ND	J	ND	J	ND	J	0.018	J	ND	J	ND		ND		35,000	
1A-SB13-4.7	4/21/94	4.7	0.0059		ND		ND		0.039		0.011		ND		ND		5,000	
1A-SB14-5.6	4/21/94	5.6	0.028		ND		ND		0.63		ND		ND		ND		5,400	
1A-SB15-10.6	4/21/94	10.6	ND		ND		ND		200		ND		ND		ND		400	
1A-SB15-11.6	4/21/94	11.6	ND		ND		ND		ND		ND		ND		ND		0.87	

[a]Feet below ground surface.
[b]Milligrams per kilogram.
ND = Not detected above method reporting limit.
J = Estimated value.
Q = Data qualifier.

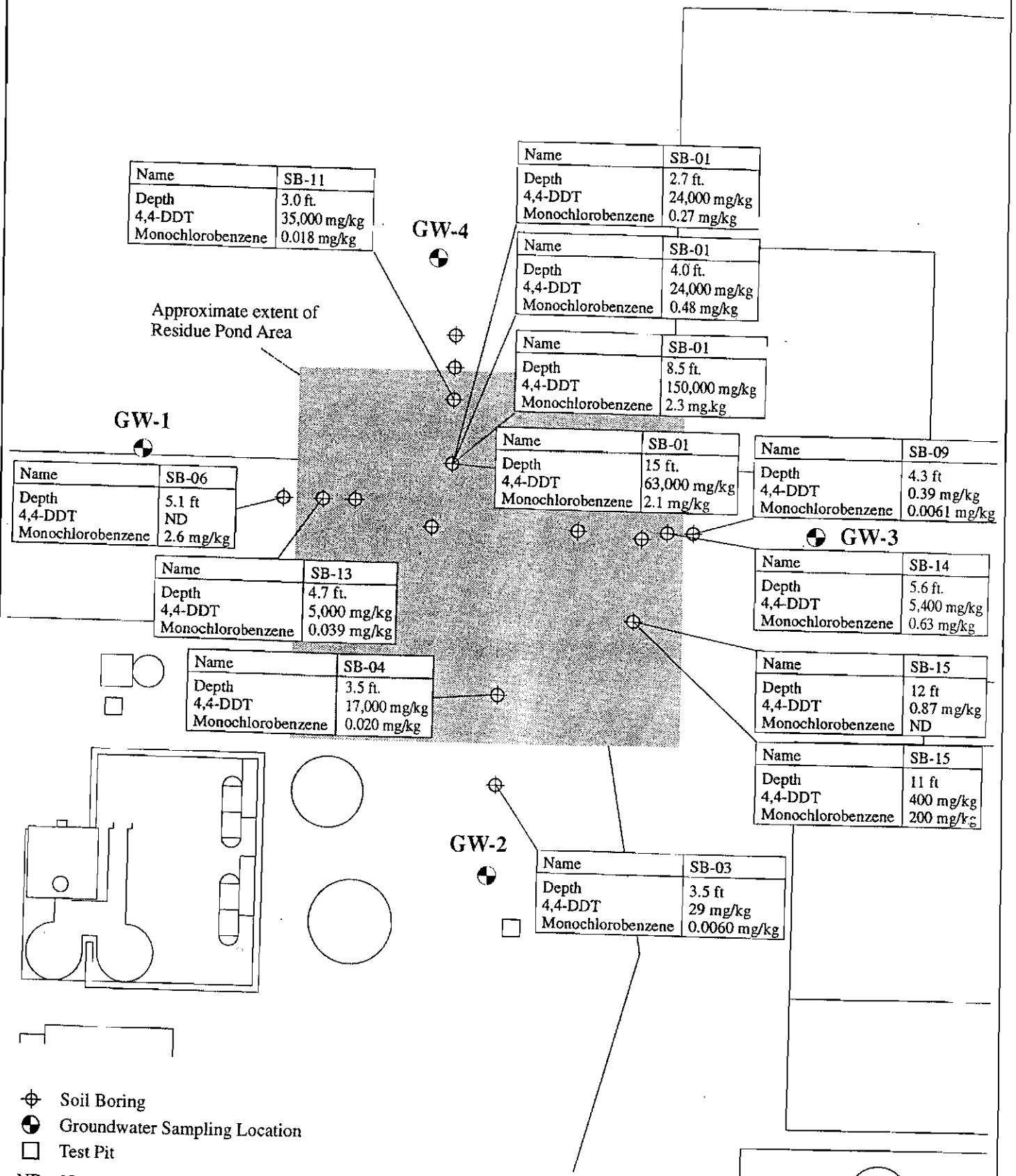

FIGURE 3-5
DDT Residue and Monochlorobenzene Levels in Soil Boring Samples: Former Residue Pond Area
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Table 3-5
Summary of Detected Pesticides in Groundwater Samples: Former Residue Pond Area

Sample Location	Sample Date	4,4'-DDD (mg/L)[a]	Q	4,4'-DDE (mg/L)	Q	4,4'-DDT (mg/L)	Q
1B-GW2-A[b]	11/3/94	0.012		0.00045	J	0.030	
1B-GW2-B[c]	11/3/94	0.005		ND		0.011	
1B-GW3-A[b]	11/3/94	ND		ND		0.00036	
1B-GW3-B[c]	11/3/94	ND		ND		ND	
1B-GW4-A[b]	11/3/94	0.011		ND		0.500	D
1B-GW4-B[c]	11/3/94	ND		ND		ND	

[a]Milligrams per liter.
[b]Unfiltered groundwater sample.
[c]Filtered groundwater sample.
ND = Not detected above method reporting limit.
J = Estimated value.
D = Sample required dilution.
Q = Data qualifier.

Table 3-6
Summary of Detected VOCs in Groundwater Samples: Former Residue Pond Area

Sample Location	Sample Date	1,1,1-Trichloro-ethane (mg/L)[a]	Q	1,1-Dichloro-ethane (mg/L)	Q	1,2-Dichloro-benzene (mg/L)	Q	1,2-Dichloro-ethane (mg/L)	Q	1,3-Dichloro-benzene (mg/L)	Q	1,4-Dichloro-benzene (mg/L)	Q	Benzene (mg/L)	Q	Carbon Tetrachloride (mg/L)	Q
1B-GW1-A[b]	11/3/94	ND		ND		ND		ND		ND		ND		ND		ND	
1B-GW2-A[b]	11/3/94	ND		0.0012	J	ND		ND		ND		0.0023		ND		ND	
1B-GW2-B[c]	11/3/94	ND		ND		ND		ND		ND		0.0011		ND		ND	
1B-GW3-A[b]	11/3/94	0.020	J	0.0017	J	0.0058		0.0021	J	ND		0.0085		0.0031		ND	
1B-GW3-B[c]	11/3/94	0.012	J	0.001	J	0.0031		0.0017	J	ND		0.0049		0.0019		ND	
1B-GW4-A[b]	11/3/94	ND		ND		0.039		0.011	J	0.0027		0.120	EJ	0.0047	J	0.0091	J
1B-GW4-B[c]	11/3/94	ND		ND		0.037		0.011	J	0.0021		0.100		0.0024		0.0051	J

[a]Milligrams per liter.
[b]Unfiltered groundwater sample.
[c]Filtered groundwater sample.
ND = Not detected above method reporting limit.
J = Estimated value.
D = Sample required dilution.
E = Estimated value outside linear calibration range for that compound.
Q = Data qualifer.

Table 3-6
Summary of Detected VOCs in Groundwater Samples: Residue Pond Area

Sample Location	Sample Date	Monochloro-benzene (mg/L)[a]	Q	Chloro-ethane (mg/L)	Q	Chloro-form (mg/L)	Q	Chloro-methane (mg/L)	Q	Methylene Chloride (mg/L)	Q	Tetrachloro-ethene (mg/L)	Q	Toluene (mg/L)	Q
1B-GW1-A[b]	11/3/94	0.870	DJ	ND		ND		ND		ND		ND		ND	
1B-GW2-A[b]	11/3/94	10	D	ND		ND		ND		ND		ND		ND	
1B-GW2-B[c]	11/3/94	9	D	ND		2.2	J	ND		ND		ND		ND	
1B-GW3-A[b]	11/3/94	93	D	0.0045	J	0.26	EJ	ND		ND		0.0012	J	0.0013	
1B-GW3-B[c]	11/3/94	24	DJ	0.0033	J	0.2	EJ	ND		0.0036	J	ND		ND	
1B-GW4-A[b]	11/3/94	370	DJ	0.067	J	0.18	EJ	0.0014	J	0.0019	J	0.017	J	0.0022	J
1B-GW4-B[c]	11/3/94	170	DJ	0.034	J	0.25	EJ	ND		0.0017	J	0.014	J	0.0022	

[a]Micrograms per liter.
[b]Unfiltered groundwater sample.
[c]Filtered groundwater sample.
ND = Not detected above method reporting limit.
J = Estimated value.
D = Sample required dilution.
E = Estimated value outside linear calibration range for that compound.
Q = Data qualifer.

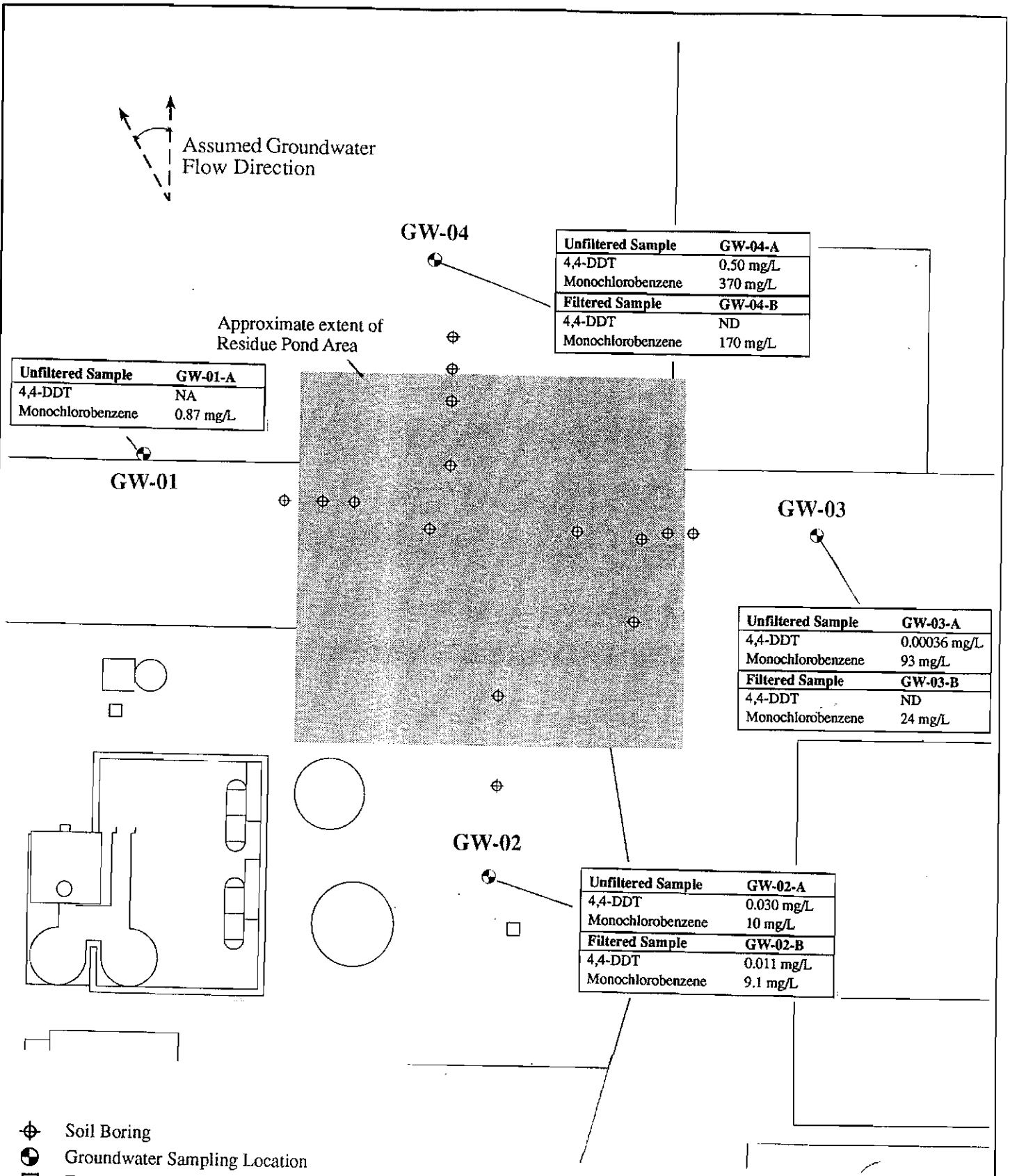

FIGURE 3-6
DDT Residue and Monochlorobenzene Concentrations in Groundwater Samples: Former Residue Pond Area
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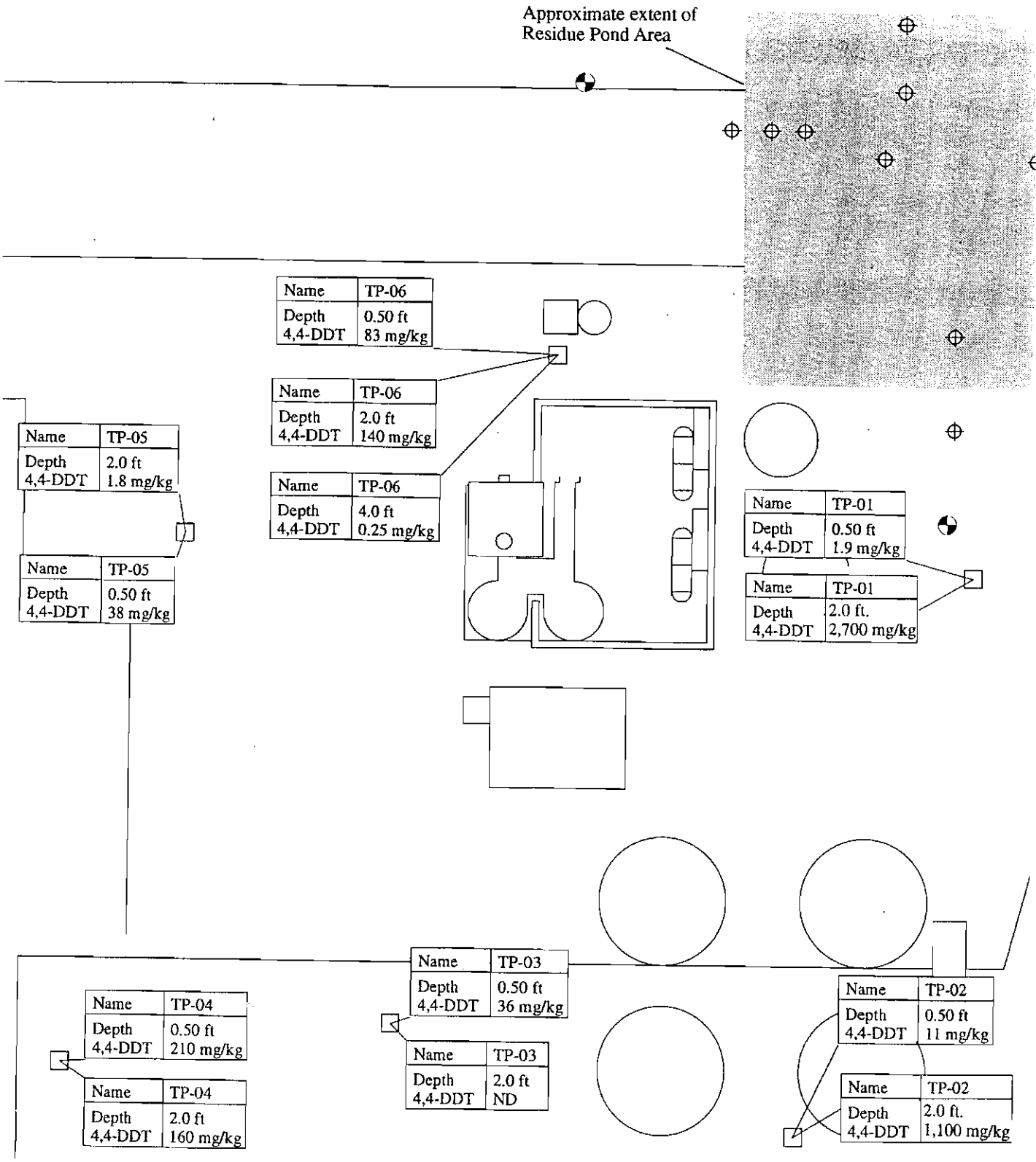

FIGURE 3-7
DDT Residue Concentrations in Test Pit Samples: General Acid Plant Area
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Table 3-7
Summary of Detected Pesticides in Test Pit Soil Samples:
Former General Acid Plant Area

Sample ID	Sample Collection Date	Sample Depth (ft bgs)[a]	4,4'-DDD (mg/kg)[b]	Q	4,4'-DDE (mg/kg)	Q	4,4'-DDT (mg/kg)	Q
1A-TP1-0.5	4/22/94	0.5	ND		0.9		1.9	
1A-TP1-2.0	4/22/94	2	ND		ND		2,700	
1A-TP2-0.5	4/22/94	0.5	ND		ND		11	
1A-TP2-2.0	4/22/94	2	ND		ND		1,100	
1A-TP3-0.5	4/22/94	0.5	ND		ND		36	
1A-TP3-2.0	4/22/94	2	ND		ND		ND	
1A-TP4-0.5	4/22/94	0.5	ND		ND		210	
1A-TP4-2.0	4/22/94	2	ND		ND		160	
1A-TP5-0.5	4/22/94	0.5	15		ND		38	
1A-TP5-2.0	4/22/94	2	ND		ND		1.8	
1A-TP6-0.5	4/22/94	0.5	ND		ND		83	
1A-TP6-2.0	4/22/94	2	ND		ND		140	
1A-TP6-4.0	4/22/94	4	ND		ND		0.25	

[a]Feet below ground surface.
[b]Milligrams per kilogram.
ND = Not detected above method reporting limit.
Q = Data qualifier.

(approximately 3,360 square feet). Pink residue was observed to the bottom of boring SB-1 (15 feet). Consequently, the vertical extent is confirmed to a depth of at least 15 feet within certain areas of the Former Residue Pond.

- Soil samples collected from within the inferred boundaries of the Former Residue Pond and in areas with visually apparent pink residue had detected DDT concentrations ranging from 5,000 mg/kg to 150,000 mg/kg. Samples collected 5 to 10 feet laterally beyond the visibly pink material had DDT concentrations well below samples collected from similar zones within the visibly affected soil, ranging from not detected to 29 mg/kg.

- VOCs detected in the soil samples from the Former Residue Pond Area included MCB, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and total xylenes. MCB, the most prevalent VOC, was detected in 12 of the 13 samples analyzed at concentrations ranging from 0.006 mg/kg to 200 mg/kg.

- In the General Acid Plant Area, DDT was detected in 12 of the 13 soil samples analyzed, at concentrations ranging from 0.25 mg/kg to 2,700 mg/kg.

- DDT was detected in four of the groundwater samples (three unfiltered and one filtered) collected in the Former Residue Pond Area, at concentrations ranging from 0.00036 to 0.500 mg/L. Three of these four samples had DDT levels that exceed the solubility limit of DDT in water (approximately 0.0031 to 0.0034 mg/L), indicating that these levels of DDT may be associated with DDT that is adsorbed to suspended sediment. It is also possible that the presence of MCB in the groundwater may have increased the solubility of DDT. The solubility of DDT is many orders of magnitude greater in an organic solvent, such as MCB, than it is in water.

- MCB was the most prevalent VOC detected in the groundwater samples collected from the Former Residue Pond Area, at concentrations ranging from 0.870 mg/L to 370 mg/L. The highest MCB concentrations were detected in the samples collected from GW-4. The assumed groundwater flow direction in the area suggests that GW-4 is located downgradient of the Former Residue Pond Area.

Section 4.0

Work Plan Rationale

The overall goal of Phase 2 investigation is to gather additional information to assess the need for, and extent of, remedial action with regard to soil and groundwater in the Acid Plant Area. The objectives of Phase 2 are presented in the following section.

4.1 Objectives

The Phase 2 investigation has the following objectives:

- Evaluate the vertical and lateral extent of DDT residue in soil in the General Acid Plant Area.
- Further delineate the lateral and vertical extent of the affected soil around the Former Residue Pond.
- Assess the presence and, if appropriate, the extent of the affected soil around the overflow trench of the Former Residue Pond.
- Evaluate the presence and extent of DDT residue and related compounds, if any, in the uppermost groundwater in the vicinity of the Former Residue Pond Area.
- Characterize the local stratigraphy, including determining the presence or absence of a silt layer underlying the uppermost groundwater.
- Assess groundwater flow direction and gradient in the uppermost groundwater.
- Collect data necessary to develop remedial action objectives.

4.2 Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of data required to support decisions during characterization and remedial activities. DQOs are based on the end use of the data to be collected. For this investigation, the primary focus of the DQOs, as summarized in Table 4-1, will be to support characterization of the nature and extent of constituents of concern.

Table 4-1
Data Quality Objectives Summary for Phase 2

Environmental Media	Data Uses	Data Types	Data Acquisition	Data Quality/ Analytical Level
Soil	Refine conceptual model	Evaluate the extent of DDT residue and related compounds in soil	Soil sampling	Validated Laboratory Analysis (Level III)
Groundwater	Refine conceptual model	Groundwater flow patterns	Groundwater elevation measurements	Elevation measurements to ±0.01 foot
		Evaluate presence of DDT residue and related compounds in groundwater and assess subsurface stratigraphy	Installation of shallow monitoring wells	Validated Laboratory Analysis (Level III)

As defined in the EPA's *Data Quality Objectives for Remedial Activities, Volume I-Development Process* (March 1987), data quality will be Level III, validated laboratory analyses, to support these data uses. The DQOs are described in greater detail in the Quality Assurance Project Plan (QAPP) (Appendix E).

Section 5.0
Phase 2 Investigation Tasks

This section describes the proposed tasks to be performed during Phase 2 and is supplemented by the Sampling and Analysis Plan (Appendix D), the Quality Assurance Project Plan (Appendix E), and the Site Health and Safety Plan (Appendix F). Phase 2 includes four primary tasks:

- Conduct a well survey within a 1-mile radius of the facility.
- Advance five soil borings in the General Acid Plant Area to evaluate the lateral and vertical extent of DDT residue and related compounds.
- Advance up to ten soil borings around the inferred edges of the Former Residue Pond to delineate the subsurface extent of the affected soil.
- Advance up to ten soil borings to assess the presence and, if appropriate, the extent of the overflow trench of the Former Residue Pond.
- Install four shallow monitoring wells in the vicinity of the Former Residue Pond to characterize groundwater flow and groundwater quality, and to evaluate local hydrogeology.

A summary of the Phase 2 sampling and analysis is presented in Table 5-1. Each of these tasks is described below.

5.1 Well Survey

Available well record logs for the area within a 1-mile radius of the facility will be obtained from the Oregon Department of Water Resources. The well logs will be used to identify potential groundwater users for risk evaluation purposes and to augment regional hydrogeologic information.

5.2 Soil Characterization

5.2.1 General Acid Plant Area

Five soil borings will be advanced within the General Acid Plant Area to an approximate depth of 10 feet. The locations of the five borings are shown in Figure 5-1. The purpose of these borings is to evaluate the lateral and vertical extent of DDT residue in the General Acid Plant Area. Results from the Phase 1 investigation indicated that DDT residue was detected in 11 of the 12 samples collected from depths of ½ and 2 feet at concentrations ranging from 1.8 mg/kg to 2,700 mg/kg. In the one sample collected at a depth of 4 feet, DDT was detected at 0.25 mg/kg.

Table 5-1
Sampling and Analysis Summary
Phase 2

		Sampling Methodology			Number of Analyses				
Medium	**Investigation Area**	**Type**	**Number**	**Approximate Boring/ Well Depth (feet)**	**Organo-chlorinated Pesticides (EPA 8080)**	**VOCs (EPA 8240)**	**Total Organic Carbon (EPA 9060)**	**Vertical Permeability (ASTM D-5084)**	**Particle Size Distribution (ASTM D-422)**
Soil	General Acid Plant	Soil borings	5	10	20	0	10	0	2
	Former Residue Pond	Soil borings (pond)	Up to 10	30	Up to 12	Up to 12	4	0	2
		Soil borings (trench)	Up to 10	10-30	Up to 10	Up to 10	2	0	0
		Shallow monitoring well installation	4	40	16	16	8	4	2
	QA/QC samples								
	Equipment blanks				3	2	0	0	0
	Trip blanks				0	2	0	0	0
	Total Phase 2 soil samples				Up to 61	Up to 42	24	4	6
Groundwater	Former Residue Pond	Shallow monitoring well installation	4	40	4	4	0	0	0
	QA/QC samples								
	Duplicates				1	1	0	0	0
	Equipment blanks				1	1	0	0	0
	Trip blanks				0	1	0	0	0
	Total Phase 2 groundwater samples				6	7	0	0	0

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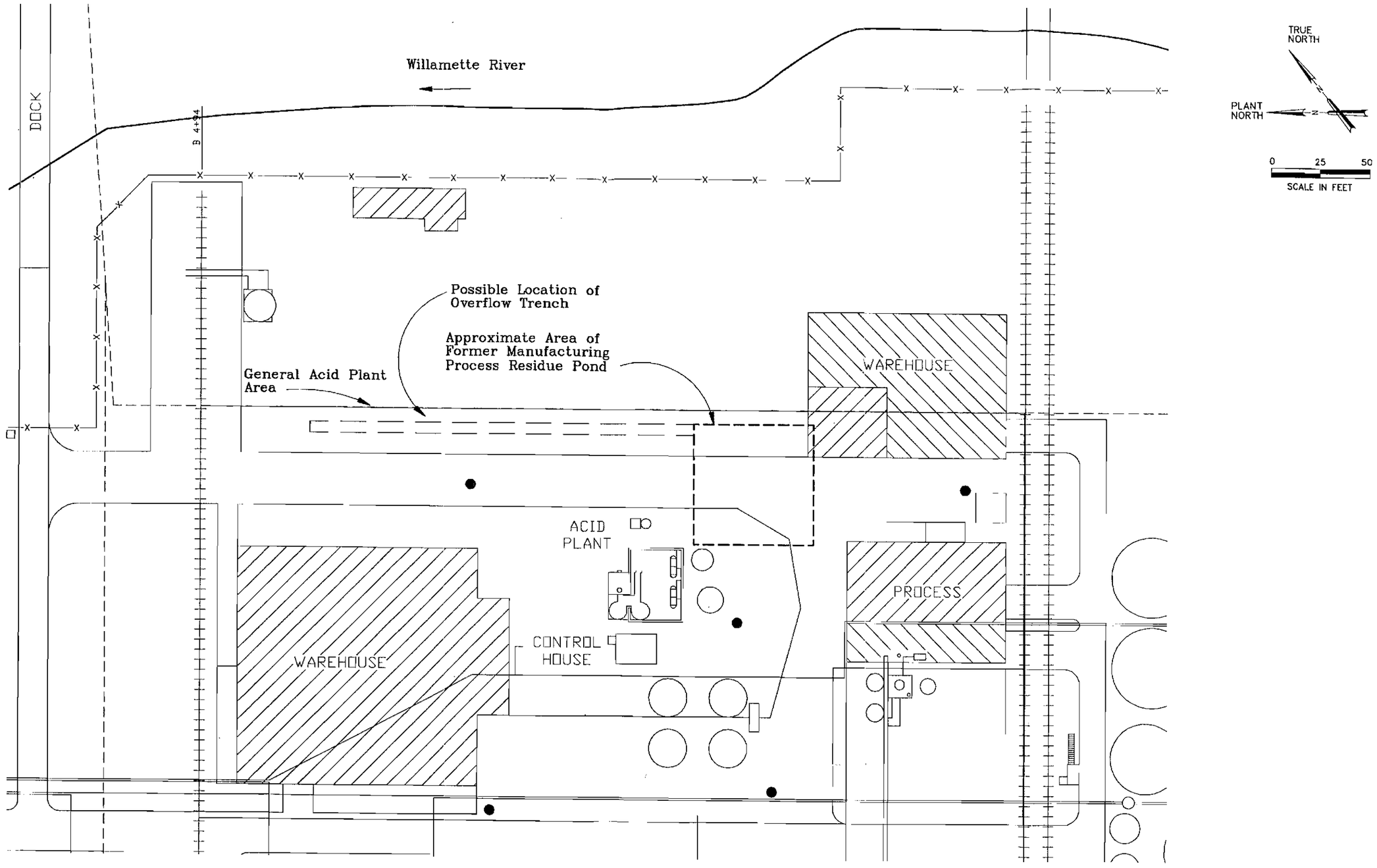

Legend

● Proposed Location of Phase 2 Soil Boring

Figure 5-1
Phase 2 Soil Sampling Locations
General Acid Plant Area
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Soil samples will be collected from each of the five soil borings at depths of approximately ½, 2, 4, 6, 8, and 10 feet. Samples from depths of ½, 2, 4, and 6 feet will be analyzed for organochlorinated pesticides using EPA Method 8080. Samples collected at depths of 8 and 10 feet will be archived for possible future analysis if results of shallower samples indicate the presence of DDT residue deeper than 6 feet bgs. Ten soil samples will also be analyzed for total organic carbon (TOC) (EPA Method 9060) and two samples will be analyzed for particle size distribution (ASTM D-422). The purpose of the TOC analysis is to establish representative TOC concentrations for site soil to be used in DDT residue soil and groundwater partitioning calculations. A summary of the sampling and analysis to be performed is provided in Table 5-1. Drilling and soil sampling methods are described in detail in the Sampling and Analysis Plan (Appendix D).

5.2.2 Former Residue Pond Area

This Phase 2 soil investigation in the vicinity of the Former Residue Pond includes the area of the pond as well as the overflow trench. The objective of the Phase 2 soil sampling program in the Former Residue Pond Area is to further delineate the subsurface extent of the affected soil in the vadose zone near the Former Residue Pond.

A total of up to 20 soil borings will be installed in the vicinity of the Former Residue Pond (Figure 5-2). Up to 10 of these borings will be installed around the inferred edges of the Former Residue Pond and the remaining 10 borings will be installed in the potential area of the overflow trench

5.2.2.1 Former Residue Pond

During the Phase 1 investigation, the near-surface (within 5 to 7 feet of the ground surface) horizontal dimensions of the affected soil around the inferred edges of the Former Residue Pond were estimated to be approximately 60 feet by 56 feet. The vertical extent of the affected soil was estimated to exceed 15 feet bgs.

The borings around the inferred edges of the Former Residue Pond will be installed to a depth of approximately 25 to 30 feet or to first encountered groundwater, whichever is shallower. Four of these borings will be advanced approximately 10 feet beyond the inferred edges of the Former Residue Pond (Figure 5-2). Continuous soil samples will be collected and the samples will be visually inspected by a CH2M HILL representative for pink-colored soil. A direct correlation between affected soil and pink-colored soil was supported by analytical results during the Phase 1 investigation. If pink-colored soil is identified in a soil boring, the soil boring will be terminated and a new boring will be advanced approximately 5 to 10 feet further from the inferred area of the Former Residue Pond. If pink-colored soil is not identified in the soil boring, the next boring will be located approximately 5 to 10 feet closer to the inferred area of the Former Residue Pond. Drilling and soil sampling methods are described in detail in the Sampling and Analysis Plan (Appendix D).

5.2.2.2 Overflow Trench

The overflow trench is reported to have been approximately 5 to 6 feet wide, 5 to 6 feet deep, and approximately 200 feet long, extending from the northeastern corner (plant north) of the Former Residue Pond. The trench is thought to have been used for only 1 to 2 years, receiving overflow occasionally. As shown in Figure 5-2, up to five soil borings will be advanced to a depth of approximately 10 feet, located about 25 feet north (plant north) of the Former Residue Pond, to evaluate the presence of the overflow trench. The borings will be spaced approximately 5 feet apart. If the trench is located, using the presence of pink colored soil as an indicator, five additional borings will be advanced to a depth of up to approximately 25 to 30 feet bgs, or first encountered groundwater, whichever is shallower, to delineate the length and vertical extent of the trench.

5.2.2.3 Laboratory Analysis

Up to 22 selected soil samples will be submitted to the laboratory for analysis. Samples of both the visibly affected soil and the visibly unaffected soil will be analyzed to confirm field observations of the extent of the affected soil. Samples that are not selected for analysis will be labeled and submitted to the laboratory to be archived for possible future analysis. Selected samples will be analyzed for organochlorinated pesticides (EPA Method 8080) and volatile organic compounds (EPA Method 8240). In addition, four samples will be analyzed for total organic carbon (TOC) (EPA Method 9060) and two samples will be analyzed for particle size distribution (ASTM D-422) (Table 5-1). Quality control samples, including equipment blanks and trip blanks, will be collected as described in the Sampling and Analysis Plan (Appendix D).

5.3 Groundwater Characterization

Four shallow groundwater monitoring wells (MWA-1, MWA-2, MWA-3, and MWA-4) will be installed in the uppermost water-bearing zone in the vicinity of the Former Residue Pond. Proposed well locations are shown in Figure 5-2. The objectives of the Phase 2 groundwater characterization include characterizing the shallow hydrostratigraphy, determining the presence or absence of a silt layer below the overlying sand, assessing the shallow groundwater flow direction and gradient, and confirming the groundwater quality results collected during Phase 1.

Initially, the wells will be drilled using a truck-mounted, hollow-stem auger drilling rig with continuous soil sampling. However, given the likely presence of debris-laden fill in the area east of the Former Residue Pond, it is possible that an air rotary drilling rig will be required for one or more of the wells. Boreholes will be advanced through fill and unconsolidated alluvial deposits to an estimated depth of approximately 40 feet bgs. The actual depths will be selected in the field by the project hydrogeologist and may vary depending on field conditions and lithology encountered. It is anticipated that the boreholes will extend to the top of a silt layer estimated to be present at approximately 40 to 45 feet bgs.

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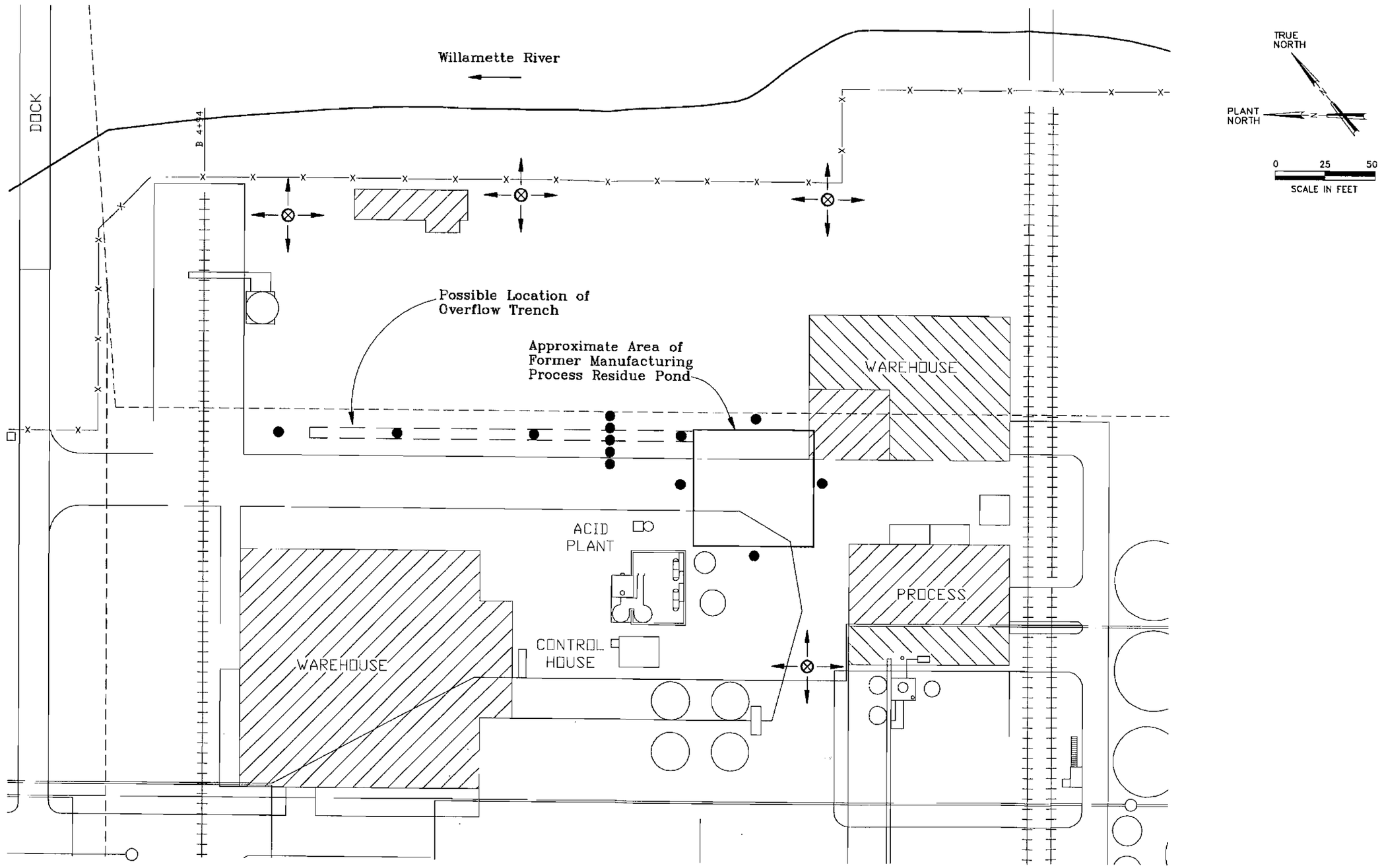

Legend

- ● Proposed Location of Residue Pond Soil Boring
- ⊗ Proposed Location of Shallow Monitoring Well

Figure 5-2
Phase 2 Soil Borings and Monitoring Well Locations
Former Residue Pond Area
ELF ATOCHEM
PORTLAND, OREGON

CH2M HILL

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The selected soil samples will be analyzed for organochlorinated pesticides (EPA Method 8080) and VOCs (EPA Method 8240). Eight samples will also be analyzed for total organic carbon (EPA Method 9060) and two samples will be analyzed for particle size distribution (ASTM D-422). In addition, the four soil samples collected from the silt layer, if encountered, will be analyzed for vertical permeability (ASTM D-5084). Quality control samples, including equipment blanks and trip blanks, will be collected as described in the Sampling and Analysis Plan (Appendix D).

The wells will be constructed with 2-inch-diameter, Schedule 10, flush-threaded stainless-steel screen casing. Stainless-steel casing was selected instead of polyvinyl chloride (PVC) because PVC is considered potentially incompatible with chlorobenzene at the levels of chlorobenzene detected in the groundwater during Phase 1. Well screens are anticipated to be 10 feet long. Well construction will be performed by a licensed Oregon well constructor in accordance with the design requirements outlined in OAR 690-240 and in accordance with the Oregon Department of Environmental Quality's (DEQ's) *Final Groundwater Monitoring Well Drilling and Construction, and Decommissioning* guidance dated August 1992. The wells will be developed after construction. They will be surveyed for horizontal and vertical elevation at ground surface and at the top of the stainless steel casing. Elevations will be based on the National Geodetic Vertical Datum (NGVD) of 1929. Elf Atochem's site grid or state plane coordinates will be used for horizontal location. Well construction details are provided in the Sampling and Analysis Plan (Appendix D).

Groundwater samples will be collected from each of the four wells no sooner than 7 days following well development activities. Before sampling, the wells will be purged of a minimum of three well-bore volumes until water quality measurements (pH, temperature, and specific conductance) have stabilized. Groundwater samples will be analyzed for organo-chlorinated pesticides (EPA Method 8080) and VOCs (EPA Method 8240) (see Table 5-1). Quality control samples, including equipment blanks, duplicates, and trip blanks, will be collected as described in the Sampling and Analysis Plan (Appendix D).

Aquifer tests will be conducted on the four wells to assess the hydraulic conductivity of the material in which the monitoring wells are screened. The aquifer tests will consist of slug withdrawal tests where the rate of water level recovery in a well is monitored before and after a known volume (slug) is quickly withdrawn from below the water table under static conditions. The slug test data will be analyzed by using appropriate analytical models (for example, Cooper et al. [1967] and Bouwer and Rice [1976]).

Section 6.0
Data Management and Validation

This section describes the data management approach for data collected under the Phase 2 investigation. Data management involves the ability to store, access, and deliver chemical, physical, and spatial information obtained from data collection efforts at the site. This plan is accompanied by the Quality Assurance Project Plan (Appendix E).

6.1 Data Types

This section describes data types and data flow within the Elf Atochem data management system. Data collected for the Phase 2 investigation includes chemical, physical, field, and spatial information, as described below:

- **Chemical:** Data generated by a field or analytical laboratory for environmental samples.

- **Physical:** Geologic data collected during well installation and subsurface soil sampling, including but not limited to soil classification, density, moisture content, color, and description of the soil.

- **Field:** Groundwater elevation data generated during groundwater sampling and elevation surveys. If required, pH, specific conductance, and turbidity data collected during sampling can be included in this data type.

- **Spatial:** Station location data, including x, y, and z coordinates for sampling locations.

Data will be loaded as described in Section 6.2.2 and will reside in the Elf Atochem Site Database. Phase 2 investigation data will be merged with the existing Phase 1 investigation site database.

6.2 Data Management System

This section describes the system used to store all data associated with the Phase 2 investigation. The Environmental Data Management System to be used involves the following steps:

- Building a data inventory or Sample Tracking Database
- Building the Analytical Results Database
- Reducing the data
- Reporting the data

The following sections briefly describe the processes required to complete these steps.

Data packages received from the laboratory will include sample results accompanied by the following associated laboratory QA/QC documentation:

- Calibration logs and results
- Method blanks
- Leachate blank results (when applicable)
- Surrogate spike results
- Matrix spike results
- Dilution or reanalysis results, or both

The above information combined with field QA/QC results will be used by project staff to evaluate the quality of the analytical procedures and results according to the current versions of the USEPA Contract Laboratory Program (CLP) *National Functional Guidelines for Organic and Inorganic Data Review*. Data validation will result in individual data points being modified or flagged, or both, with appropriate qualifiers. Modifications to the original laboratory data will be recorded on the original data sheets and signed by the validator. The modifications will then be applied to the electronic data and documented in the Analytical Results Database.

Upon completion of the Elf Atochem Phase 2 Investigation, a Data Quality Assurance Report will be prepared by data validation staff. It will summarize the number and frequency of modifications, corrective actions, results of system audits, and an overall assessment of precision and accuracy. In addition, each data package will have a package-specific report attached to it that identifies and justifies validation modifications.

6.2.4 Reporting

The data will be presented in a clear and logical format to aid data evaluation and decision-making. Tabular, graphic, and statistical presentations are often needed for these tasks. Data can be queried and exported directly to word processing, spreadsheet, graphing programs, or data visualization software for presentation.

The following reports are available:

- Appendix style reports, including tabular listings sorted by station and sample identifier. These tables can be produced with samples as row headers and compounds as column headers, or vice versa.

- Summary statistics, including frequency of detection; mean, minimum, and maximum values; standard deviation; and variance.

The following graphical and statistical plots are available:

- Time versus concentration line graphs
- Compound concentration contour plots
- Water table elevation contour plots
- Probability or box plots

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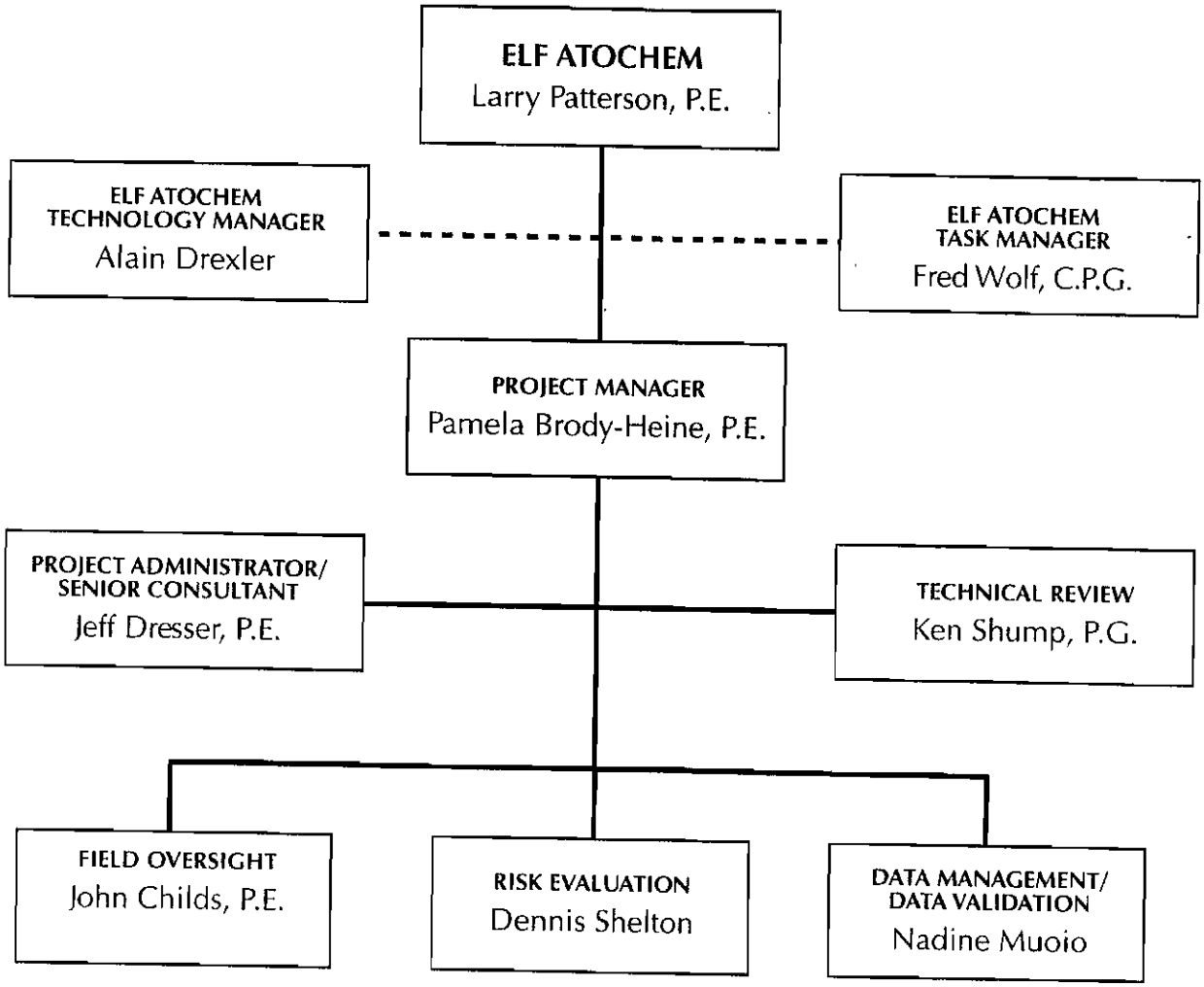


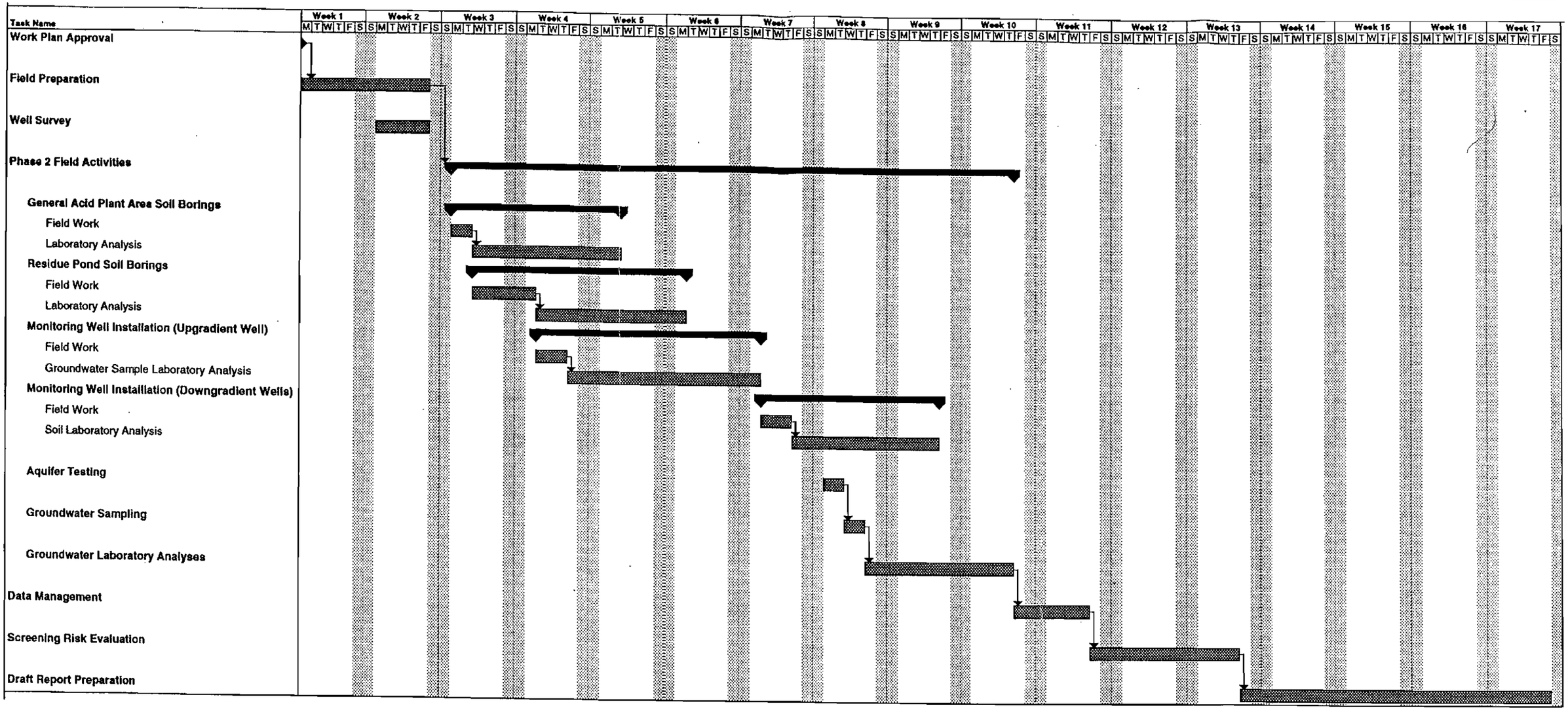
FIGURE 7-1
Project Organization

Section 7.0
Project Management, Reporting and Schedule

The project team organization is shown in Figure 7-1. Resumes for the primary CH2M HILL project staff are contained in Appendix G. Additional staff may be utilized if needed. Elf Atochem's project manager is Larry Patterson, located at the Portland facility.

Figure 7-2 provides the anticipated schedule for the Phase 2 investigation. The Phase 2 investigation will begin within 2 weeks of Oregon Department of Environmental Quality's approval of the work plan, including the Sampling and Analysis Plan, the Quality Assurance Project Plan, and the Health and Safety Plan.

A draft Phase 2 report will be submitted to Elf Atochem within 6 weeks of receipt of the investigation-validated data from the Phase 2 investigation. The report will include a description of methodologies used during the field program, the investigation findings, and if appropriate, remedial action objectives. Laboratory data will be tabulated and, if appropriate, presented in figures. The report will also include laboratory data sheets, boring logs, and a summary of data validation. Monthly progress reports will be submitted to Elf Atochem throughout the project.



Summary

Task

Milestone

FIGURE 7-2
Phase 2 Project Schedule
Elf Atochem
Portland, Oregon

CH2M HILL

Section 8.0
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Appendix A

Phase 1 Soil Boring and Test Pit Logs

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB1 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollw-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	1.5				Surface: Gravel, small on top, large gravel from 0.5' to 1.5'.	
		1-S	2.7		2.0'-3.1' SILTY SAND, SM, pinkish gray, (5YR 6/2), moist, loose. Apparently contaminated. 3.1'-3.6' SILTY SAND, SM, light gray, (5Y 7/1), moist, loose. 3.6'-4.5' SILT, ML, black, moist, stratified, medium dense. Carbon rich sheen visible upon wetting. 4.5'-15.0': WELL-GRADED SAND, SW, pinkish gray, (5YR 6/2), moist, loose. Sand is very fine to medium. Grains are angular, white.	OVM = 0 ppm OVM = 0.7 ppm OVM = 7.3 ppm
5.0	5.0					
		2-S	5.0			OVM = 2.1 ppm OVM = 10.2 ppm
10.0	10.0					
		3-S	5.0			OVM = 3.2 ppm
15.0	15.0					OVM = 4.2 ppm

TOTAL DEPTH = 15.0 FEET

Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB2

SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C, 0.3' thick.	
					0.5'-3.0': SILTY SAND, SM, dark grayish brown, (2.5Y 4/2), moist, medium dense.	
	2.0					
					3.0'-5.0': SILT AND SAND, black to dark pinkish gray, odor, some layering, moist. Strong odor. The dark-colored section from 3.0' to 5.0' is very dark red when smeared in gloves - probably stained underlying sands.	OVM = 510 ppm
		1-S	4.0			
5.0					5.0'-7.0': POORLY-GRADED SAND, SP, pinkish gray, moist, medium dense.	
						OVM = 350 ppm
	7.0					
					TOTAL DEPTH = 7.0 FEET	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB3 SHEET 1 OF 0

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-14" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: Gravel.	
	2.0					
		1-S	2.5		Fill material. SAND, SILT, WOOD DEBRIS, GRAVEL. One 0.3' thick layer of black sand is collected for sample (at 3.5'-3.8' bgs).	OVM = 3.8 ppm
5.0	5.5					
					TOTAL DEPTH = 7.0 FEET Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB4

SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: Gravel.	
	2.0					
					Fill from 2.0'-3.3': SAND AND GRAVEL, olive gray. Black layer 0.2' thick 3.3'-3.5'. Black silt layer, odor and sheen, at 4.7'-5.2', finely stratified. 5.2'-7.0': SILT, ML, light gray, (5YR 7/1), moist, odor. Lower silt is probably native soil.	
		1-S	5.0			OVM = 1.1 ppm
5.0						OVM = 12.3 ppm
	7.0					
					TOTAL DEPTH = 7.0 FEET	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB5
	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C	
	2.0				0-2.0':SAND AND GRAVEL FILL, dark olive brown, most, medium dense.	
					2.0'-4.7':POORLY-GRADED SAND, SP, fine sand, pinkish gray, (5YR 6/2), moist, medium dense. Material gets finer, more gooey towards 4.7'. Below 4.7' (to 7.0'):POORLY-GRADED SAND, SP, pinkish gray, medium sand, medium dense.. 4.7' appears to be the bottom of the pond. Fine stratification starts there and continues higher in section. Poorly-graded sand below may be stained native material.	OVM = 1.0 ppm
5.0		1-S	5.0			OVM = 9.5 ppm
	7.0					
					TOTAL DEPTH = 7.0 FEET	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB6 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C	
	2.0					
		1-S	5.0		2.0'-5.8': SILTY SAND, ranging from bright olive green at top to light gray at bottom, moist, firm. Sand is fine to medium. 5.8'-7.0': POORLY-GRADED MEDIUM SAND, light gray, (5YR 6/1), moist, medium dense. Slight odor throughout, but no pink or black material. Material at 5.1' is finely stratified. Stratified material is probably native, stained by leaching from former pond residue above.	
5.0						OVM = 4.9 ppm
	7.0					
					TOTAL DEPTH = 7.0'	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB7
	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C	
	2.0					
					2.0'-2.4': SAND AND GRAVEL FILL, gray-green. 2.4'-3.6': FINE SAND WITH SILT, light gray, moist, dense. 3.6'-5.1': SILT AND FINE SAND, stratified, pinkish gray, odor. 5.1'-7.0': POORLY-GRADED SAND, pinkish gray, (5YR 6/1), medium- grained, moist, loose.	
		1-S	5.0			
5.0						OVM = 41.5 ppm
	7.0					
					TOTAL DEPTH = 7.0 FEET Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2.0					
	7.0	1-S	5.0		2.0'-4.0': SAND AND GRAVEL FILL, bright olive green, grading to grayish color, then pinkish gray. 4.0'-6.1': SILT AND FINE SAND, pinkish gray, stratified. 6.1'-7.0': FINE SAND, pinkish gray to light gray, (5YR 6/1), moist, dense. Slight odor.	OVM = 0 ppm
5.0						
					TOTAL DEPTH = 7.0 FEET Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C	
	2.0					
					2.0'-4.0':SAND SILT FILL, olive green, then grades into gray, (5YR 5/4), stratified. 4.0'-6.0':Darker, light gray green sand/silt, very slight odor. No pinkish gray material. Does not appear to be part of the pond.	
		1-S				OVM = 0 ppm
5.0						
	7.0					
					TOTAL DEPTH = 7.0 FEET Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB10 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/20/94 FINISH 4/20/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: Gravel	
	2.0					
		1-S	2.5		WELL-GRADED SAND WITH GRAVEL, SW, dark olive brown, (2.5Y 3/3), moist, loose. Wood debris. Fill material.	
5.0						
	7.0					
		2-S	1.0		Similar to 1-S	
	8.5				TOTAL DEPTH = 8.0 FEET	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB11 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/21/94 FINISH 4/21/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: Gravel	
	2.0					
		1-S	4.5		0-2.9':WELL-GRADED SAND AND GRAVEL, dark olive gray. 2.9'-3.0':BLACK SILT, appears to be carbon-rich. No sheen. 3.0'-4.3':SILTY SAND WITH GRAVEL, pinkish gray, (2.5YR 6/2), moist, soft. 4.3'-7.0':POORLY-GRADED SAND, SP, pale red to pinkish gray, (2.5YR 6/2), moist, loose.	OVM = 1.1 ppm
5.0						
	7.0					
					TOTAL DEPTH = 7.0 FEET Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB12 SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/21/94 FINISH 4/21/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: Gravel	
					0-4.1':WELL-GRADED SAND WITH GRAVEL, dark olive gray, moist. 4.1'-4.2'SILTY SAND, pale red, (2.5YR 6/2), moist, loose. Thin (.05') black layer. 4.2'-7.0':WELL-GRADED SAND WITH GRAVEL, dark olive gray. Fill material.	
5.0						No sample.
					TOTAL DEPTH = 7.0 FEET	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB13
	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/21/94 FINISH 4/21/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C	
	2.0				0-2.1': WELL-GRADED SAND WITH GRAVEL, SW, dark olive gray.	
					2.1'-5.1' SILTY SAND, stratified, light gray at top, grading into pinkish gray at bottom. Odor. Finely stratified in dark brown layer at base.	
					5.1'-7.0': POORLY-GRADED SAND, SP, pinkish gray, moist, loose.	
		1-S	5.0			
5.0					The dark brown layer at 4.8'-5.1' is brown, (7.5YR 4/2), moist and thixotrtropic. Upon kneading, it becomes oozy and develops a sheen. It becomes much more fluid-like. It appears that this is the base of the original pond layer.	OVM = 4.5 ppm
	7.0					
					TOTAL DEPTH = 7.0 FEET	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER	
OPE37640.A0	1A-SB14	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/21/94 FINISH 4/21/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C	
	2.0				0-2.2':WELL-GRADED SAND WITH GRAVEL, SW, olive gray.	
					2.2'-4.9'SILTY SAND, SM, bright olive near top, grading to light gray at bottom, moist, medium dense. Stratified.	
					4.9'-5.6':SILTY SAND, SM, pinkish gray, stratified, grading to brown silt at bottom. The brown part is thixotropic.	
					5.6'-6.4':SILT AND VERY FINE SAND, ML, light gray, (5YR 6/1), moist. Thixotropic.	
		1-S	5.0		6.4'-7.0':POORLY-GRADED SAND, SP, pinkish gray.	
5.0						OVM = 4.5 ppm
	7.0					
					TOTAL DEPTH = 7.0 FEET	
					Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	
10.0						
15.0						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
OPE37640.A0	1A-SB15
	SHEET 1 OF 1

SOIL BORING LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue

ELEVATION _____ DRILLING CONTRACTOR Geo-Tech Explorations, Inc., Tualatin, Oregon

DRILLING METHOD AND EQUIPMENT CME 55 Hollow-Stem Auger, 4-1/4" I.D. x 8" O.D.

WATER LEVELS _____ START 4/21/94 FINISH 4/21/94 LOGGER S. Waichler

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY FEET	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Surface: A/C	
	2.0				0-2.2':FILL, WELL-GRADED SAND, SW, 20% gravel and brick fragments. 2.2'-5.5'SILTY SAND, SM, pinkish gray to brown, stratified, moist, loose. Odor. 5.5'-6.0':SILT, ML, brown, thixotropic, odor. 6.0'-7.0':SILT, ML, light gray, thixotropic, odor. 7.0'-11.0':SILT, ML, light gray to pinkish gray to brown, stratified, thixotropic, odor. 11.0'-12.0':POORLY-GRADED SAND, SP, gray, (7.5YR N6/), fine to medium, moist, loose.	
5.0	7.0	1-S				OVM = 0 ppm
10.0	12.0	2-S				OVM = 42.1 ppm OVM =1.6 ppm
15.0					TOTAL DEPTH = 12.0 FEET Borehole abandoned with bentonite chips from total depth up to 1' bgs, and concrete from 1' to ground surface.	

CH2M HILL

PROJECT NUMBER	TEST PIT NUMBER
OPE37640.A0	1A-TP1 SHEET 1 OF 1

TEST PIT LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue, Portland, Oregon LOGGER S. Waichler

ELEVATION _____ CONTRACTOR Stratus Corporation

EXCAVATION EQUIPMENT Bobcat backhoe, 10" bucket DATE EXCAVATED 4/22/94

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length 2 feet Width 1 foot Max Depth 2 feet

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	COMMENTS (DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION)
			0'-0.6': WELL-GRADED SAND, SW, dark brown, (10YR 3/3), moist, loose. Fine to medium. 2.0': SILTY SAND, SM, gray, (10YR 6/1), moist, medium dense. Silt 30%.	
5.0				
10.0				
15.0				
20.0				
25.0				

CH2M HILL

PROJECT NUMBER	TEST PIT NUMBER
OPE37640.A0	1A-TP2 SHEET 1 OF 1

TEST PIT LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue, Portland, Oregon LOGGER S. Waichler

ELEVATION _____ CONTRACTOR Stratus Corporation

EXCAVATION EQUIPMENT Bobcat backhoe, 10" bucket DATE EXCAVATED 4/22/94

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length 2 feet Width 1 foot Max Depth 2 feet

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
			0'-0.5':WELL-GRADED SAND WITH GRAVEL, SW, very dark grayish brown, (2.5Y 3/2), moist, loose. Gravel 15%. 0.5'-2.0':SW, similar to above.	
5.0				
10.0				
15.0				
20.0				
25.0				

CH2M HILL

PROJECT NUMBER	TEST PIT NUMBER
OPE37640.A0	1A-TP3 SHEET 1 OF 1

TEST PIT LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue, Portland, Oregon LOGGER S. Waichler

ELEVATION _____ CONTRACTOR Stratus Corporation

EXCAVATION EQUIPMENT Bobcat backhoe, 10" bucket DATE EXCAVATED 4/22/94

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length 2 feet Width 1 foot Max Depth 2 feet

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	COMMENTS (DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION)
			0'-0.5': WELL-GRADED SAND WITH GRAVEL, SW, similar to 1A-TP2. 2.0': WELL-GRADED SAND, SW, dark grayish brown, (2.5Y 4/2), moist, medium dense. Gravel 5%.	
5.0				
10.0				
15.0				
20.0				
25.0				

CH2M HILL

PROJECT NUMBER	TEST PIT NUMBER
OPE37640.A0	1A-TP4 SHEET 1 OF 1

TEST PIT LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue, Portland, Oregon LOGGER S. Waichler

ELEVATION _____ CONTRACTOR Stratus Corporation

EXCAVATION EQUIPMENT Bobcat backhoe, 10" bucket DATE EXCAVATED 4/22/94

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length 2 feet Width 1 foot Max Depth 2 feet

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: NUMBER AND TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
			0'-0.5': WELL-GRADED SAND WITH GRAVEL, SW, similar to 1A-TP2.	
			2.0': SW, similar to above, with 1 mm white, hard beads of dessicant product.	
5.0				
10.0				
15.0				
20.0				
25.0				

CH2M HILL

PROJECT NUMBER	TEST PIT NUMBER
OPE37640.A0	1A-TP5 SHEET 1 OF 1

TEST PIT LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue, Portland, Oregon LOGGER S. Waichler

ELEVATION _____ CONTRACTOR Stratus Corporation

EXCAVATION EQUIPMENT Bobcat backhoe, 10" bucket DATE EXCAVATED 4/22/94

WATER LEVEL AND DATE _____ APPROX. DIMENSIONS: Length 2 feet Width 1 foot Max Depth 2 feet

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	COMMENTS (DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION)
			0.5': WELL-GRADED SAND WITH GRAVEL, SW, similar to 1A-TP2.	
			2.0': SW, similar to above, with brick fragments.	
5.0				
10.0				
15.0				
20.0				
25.0				

CH2M HILL

PROJECT NUMBER	TEST PIT NUMBER
OPE37640.A0	1A-TP6 SHEET 1 OF 1

TEST PIT LOG

PROJECT Atochem LOCATION 6400 NW Front Avenue, Portland, Oregon LOGGER S. Waichler

ELEVATION CONTRACTOR Stratus Corporation

EXCAVATION EQUIPMENT Bobcat backhoe, 10" bucket DATE EXCAVATED 4/22/94

WATER LEVEL AND DATE APPROX. DIMENSIONS: Length 2 feet Width 1 foot Max Depth 2 feet

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	COMMENTS (DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE DEBRIS ENCOUNTERED, WATER SEEPAGE GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION)
			0.5': WELL-GRADED SAND WITH GRAVEL, SW, similar to 1A-TP2.	
			2.0': WELL-GRADED SAND WITH GRAVEL, SW, gray, (5Y 6/1), moist, med. dense. Gravel 25%.	
			4.0': SILT, ML, gray, (5Y 6/1), moist, firm.	
5.0				
10.0				
15.0				
20.0				
25.0				

Appendix B

Phase 1 Laboratory Data Sheets

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

May 9, 1994

CH2M Hill
825 N.E. Multnomah
Suite 1300
Portland, OR 97232

Attention: Pamela Brody

RE: JOB # OPE37640.A0
P.O.#
PROJECT - ATOCHEM PHASE 1A

Enclosed are test results for your samples received in this lab on Apr. 22, 1994. For your reference, these analyses have been assigned our PEL # 94-1001.

Solid samples are reported on a dry weight basis except for Oregon DEQ Fuels Methods and where otherwise noted.

Please call if you have any questions.

Respectfully,

Howard Holmes
Project Manager

Howard Boorse
QA Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP1-0.5' *[1]	Aldrin	ND	0.20	04/29/94	05/04/94
	Alpha-BHC	ND	0.20		
	Beta-BHC	ND	0.20		
	Chlordane	ND	6.0		
	4,4'-DDD	ND	0.20		
	4,4'-DDE	0.90	0.20		
	4,4'-DDT	1.9	0.20		
	Delta-BHC	ND	0.20		
	Dieldrin	ND	0.20		
	Endosulfan I	ND	0.20		
	Endosulfan II	ND	0.20		
	Endosulfan Sulfate	ND	0.20		
	Endrin	ND	0.20		
	Endrin Aldehyde	ND	0.20		
	Gamma-BHC	ND	0.20		
	Heptachlor	ND	0.20		
	Heptachlor Epoxide	ND	0.20		
	Methoxychlor	ND	0.20		
	Toxaphene	ND	6.0		
1A-TP1-2.0' *[1]	Aldrin	ND	200	04/29/94	05/02/94
	Alpha-BHC	ND	200		
	Beta-BHC	ND	200		
	Chlordane	ND	6000		
	4,4'-DDD	ND	200		
	4,4'-DDE	ND	200		
	4,4'-DDT	2700	200		
	Delta-BHC	ND	200		
	Dieldrin	ND	200		
	Endosulfan I	ND	200		
	Endosulfan II	ND	200		
	Endosulfan Sulfate	ND	200		
	Endrin	ND	200		
	Endrin Aldehyde	ND	200		
	Gamma-BHC	ND	200		
	Heptachlor	ND	200		
	Heptachlor Epoxide	ND	200		
	Methoxychlor	ND	200		
	Toxaphene	ND	6000		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP2-0.5' *[1]	Aldrin	ND	1.0	04/29/94	05/03/94
	Alpha-BHC	ND	1.0		
	Beta-BHC	ND	1.0		
	Chlordane	ND	30		
	4,4'-DDD	ND	1.0		
	4,4'-DDE	ND	1.0		
	4,4'-DDT	11	1.0		
	Delta-BHC	ND	1.0		
	Dieldrin	ND	1.0		
	Endosulfan I	ND	1.0		
	Endosulfan II	ND	1.0		
	Endosulfan Sulfate	ND	1.0		
	Endrin	ND	1.0		
	Endrin Aldehyde	ND	1.0		
	Gamma-BHC	ND	1.0		
	Heptachlor	ND	1.0		
	Heptachlor Epoxide	ND	1.0		
	Methoxychlor	ND	1.0		
	Toxaphene	ND	30		
1A-TP2-2.0' *[1]	Aldrin	ND	100	04/29/94	05/03/94
	Alpha-BHC	ND	100		
	Beta-BHC	ND	100		
	Chlordane	ND	3000		
	4,4'-DDD	ND	100		
	4,4'-DDE	ND	100		
	4,4'-DDT	1100	100		
	Delta-BHC	ND	100		
	Dieldrin	ND	100		
	Endosulfan I	ND	100		
	Endosulfan II	ND	100		
	Endosulfan Sulfate	ND	100		
	Endrin	ND	100		
	Endrin Aldehyde	ND	100		
	Gamma-BHC	ND	100		
	Heptachlor	ND	100		
	Heptachlor Epoxide	ND	100		
	Methoxychlor	ND	100		
	Toxaphene	ND	3000		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP3-0.5' *[1]	Aldrin	ND	5.0	04/29/94	05/05/94
	Alpha-BHC	ND	5.0		
	Beta-BHC	ND	5.0		
	Chlordane	ND	150		
	4,4'-DDD	ND	5.0		
	4,4'-DDE	ND	5.0		
	4,4'-DDT	36	5.0		
	Delta-BHC	ND	5.0		
	Dieldrin	ND	5.0		
	Endosulfan I	ND	5.0		
	Endosulfan II	ND	5.0		
	Endosulfan Sulfate	ND	5.0		
	Endrin	ND	5.0		
	Endrin Aldehyde	ND	5.0		
	Gamma-BHC	ND	5.0		
	Heptachlor	ND	5.0		
	Heptachlor Epoxide	ND	5.0		
	Methoxychlor	ND	5.0		
	Toxaphene	ND	150		
1A-TP3-2.0'	Aldrin	ND	0.10	04/29/94	05/04/94
	Alpha-BHC	ND	0.10		
	Beta-BHC	ND	0.10		
	Chlordane	ND	3.0		
	4,4'-DDD	ND	0.10		
	4,4'-DDE	ND	0.10		
	4,4'-DDT	ND	0.10		
	Delta-BHC	ND	0.10		
	Dieldrin	ND	0.10		
	Endosulfan I	ND	0.10		
	Endosulfan II	ND	0.10		
	Endosulfan Sulfate	ND	0.10		
	Endrin	ND	0.10		
	Endrin Aldehyde	ND	0.10		
	Gamma-BHC	ND	0.10		
	Heptachlor	ND	0.10		
	Heptachlor Epoxide	ND	0.10		
	Methoxychlor	ND	0.10		
	Toxaphene	ND	3.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC ENVIRONMENTAL LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP4-0.5' *[1]	Aldrin	ND	20	04/29/94	05/03/94
	Alpha-BHC	ND	20		
	Beta-BHC	ND	20		
	Chlordane	ND	600		
	4,4'-DDD	ND	20		
	4,4'-DDE	ND	20		
	4,4'-DDT	210	20		
	Delta-BHC	ND	20		
	Dieldrin	ND	20		
	Endosulfan I	ND	20		
	Endosulfan II	ND	20		
	Endosulfan Sulfate	ND	20		
	Endrin	ND	20		
	Endrin Aldehyde	ND	20		
	Gamma-BHC	ND	20		
	Heptachlor	ND	20		
	Heptachlor Epoxide	ND	20		
	Methoxychlor	ND	20		
	Toxaphene	ND	600		
1A-TP4-2.0' *[1]	Aldrin	ND	20	04/29/94	05/03/94
	Alpha-BHC	ND	20		
	Beta-BHC	ND	20		
	Chlordane	ND	600		
	4,4'-DDD	ND	20		
	4,4'-DDE	ND	20		
	4,4'-DDT	160	20		
	Delta-BHC	ND	20		
	Dieldrin	ND	20		
	Endosulfan I	ND	20		
	Endosulfan II	ND	20		
	Endosulfan Sulfate	ND	20		
	Endrin	ND	20		
	Endrin Aldehyde	ND	20		
	Gamma-BHC	ND	20		
	Heptachlor	ND	20		
	Heptachlor Epoxide	ND	20		
	Methoxychlor	ND	20		
	Toxaphene	ND	600		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP5-0.5' *[1]	Aldrin	ND	10	04/29/94	05/03/94
	Alpha-BHC	ND	10		
	Beta-BHC	ND	10		
	Chlordane	ND	300		
	4,4'-DDD	15	10		
	4,4'-DDE	ND	10		
	4,4'-DDT	38	10		
	Delta-BHC	ND	10		
	Dieldrin	ND	10		
	Endosulfan I	ND	10		
	Endosulfan II	ND	10		
	Endosulfan Sulfate	ND	10		
	Endrin	ND	10		
	Endrin Aldehyde	ND	10		
	Gamma-BHC	ND	10		
	Heptachlor	ND	10		
	Heptachlor Epoxide	ND	10		
	Methoxychlor	ND	10		
	Toxaphene	ND	300		
1A-TP5-2.0' *[1]	Aldrin	ND	0.20	04/29/94	05/06/94
	Alpha-BHC	ND	0.20		
	Beta-BHC	ND	0.20		
	Chlordane	ND	6.0		
	4,4'-DDD	ND	0.20		
	4,4'-DDE	ND	0.20		
	4,4'-DDT	1.8	0.20		
	Delta-BHC	ND	0.20		
	Dieldrin	ND	0.20		
	Endosulfan I	ND	0.20		
	Endosulfan II	ND	0.20		
	Endosulfan Sulfate	ND	0.20		
	Endrin	ND	0.20		
	Endrin Aldehyde	ND	0.20		
	Gamma-BHC	ND	0.20		
	Heptachlor	ND	0.20		
	Heptachlor Epoxide	ND	0.20		
	Methoxychlor	ND	0.20		
	Toxaphene	ND	6.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP6-0.5' *[1]	Aldrin	ND	10	04/29/94	05/03/94
	Alpha-BHC	ND	10		
	Beta-BHC	ND	10		
	Chlordane	ND	300		
	4,4'-DDD	ND	10		
	4,4'-DDE	ND	10		
	4,4'-DDT	83	10		
	Delta-BHC	ND	10		
	Dieldrin	ND	10		
	Endosulfan I	ND	10		
	Endosulfan II	ND	10		
	Endosulfan Sulfate	ND	10		
	Endrin	ND	10		
	Endrin Aldehyde	ND	10		
	Gamma-BHC	ND	10		
	Heptachlor	ND	10		
	Heptachlor Epoxide	ND	10		
	Methoxychlor	ND	10		
	Toxaphene	ND	300		
1A-TP6-2.0' *[1]	Aldrin	ND	20	04/29/94	05/03/94
	Alpha-BHC	ND	20		
	Beta-BHC	ND	20		
	Chlordane	ND	600		
	4,4'-DDD	ND	20		
	4,4'-DDE	ND	20		
	4,4'-DDT	140	20		
	Delta-BHC	ND	20		
	Dieldrin	ND	20		
	Endosulfan I	ND	20		
	Endosulfan II	ND	20		
	Endosulfan Sulfate	ND	20		
	Endrin	ND	20		
	Endrin Aldehyde	ND	20		
	Gamma-BHC	ND	20		
	Heptachlor	ND	20		
	Heptachlor Epoxide	ND	20		
	Methoxychlor	ND	20		
	Toxaphene	ND	600		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP6-4.0'	Aldrin	ND	0.10	04/29/94	05/04/94
	Alpha-BHC	ND	0.10		
	Beta-BHC	ND	0.10		
	Chlordane	ND	3.0		
	4,4'-DDD	ND	0.10		
	4,4'-DDE	ND	0.10		
	4,4'-DDT	0.25	0.10		
	Delta-BHC	ND	0.10		
	Dieldrin	ND	0.10		
	Endosulfan I	ND	0.10		
	Endosulfan II	ND	0.10		
	Endosulfan Sulfate	ND	0.10		
	Endrin	ND	0.10		
	Endrin Aldehyde	ND	0.10		
	Gamma-BHC	ND	0.10		
	Heptachlor	ND	0.10		
	Heptachlor Epoxide	ND	0.10		
	Methoxychlor	ND	0.10		
	Toxaphene	ND	3.0		
Method Blank	Aldrin	ND	0.10		
	Alpha-BHC	ND	0.10		
	Beta-BHC	ND	0.10		
	Chlordane	ND	3.0		
	4,4'-DDD	ND	0.10		
	4,4'-DDE	ND	0.10		
	4,4'-DDT	ND	0.10		
	Delta-BHC	ND	0.10		
	Dieldrin	ND	0.10		
	Endosulfan I	ND	0.10		
	Endosulfan II	ND	0.10		
	Endosulfan Sulfate	ND	0.10		
	Endrin	ND	0.10		
	Endrin Aldehyde	ND	0.10		
	Gamma-BHC	ND	0.10		
	Heptachlor	ND	0.10		
	Heptachlor Epoxide	ND	0.10		
	Methoxychlor	ND	0.10		
	Toxaphene	ND	3.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC ENVIRONMENTAL LABORATORY INC.

PCB's per EPA 8080
Results in mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP1-0.5' *[1]	PCB 1016	ND	2.0	04/29/94	05/04/94
	PCB 1221	ND	2.0		
	PCB 1232	ND	2.0		
	PCB 1242	ND	2.0		
	PCB 1248	ND	2.0		
	PCB 1254	ND	2.0		
	PCB 1260	ND	2.0		
1A-TP1-2.0' *[1]	PCB 1016	ND	2000	04/29/94	05/02/94
	PCB 1221	ND	2000		
	PCB 1232	ND	2000		
	PCB 1242	ND	2000		
	PCB 1248	ND	2000		
	PCB 1254	ND	2000		
	PCB 1260	ND	2000		
1A-TP2-0.5' *[1]	PCB 1016	ND	10	04/29/94	05/03/94
	PCB 1221	ND	10		
	PCB 1232	ND	10		
	PCB 1242	ND	10		
	PCB 1248	ND	10		
	PCB 1254	ND	10		
	PCB 1260	ND	10		
1A-TP2-2.0' *[1]	PCB 1016	ND	1000	04/29/94	05/03/94
	PCB 1221	ND	1000		
	PCB 1232	ND	1000		
	PCB 1242	ND	1000		
	PCB 1248	ND	1000		
	PCB 1254	ND	1000		
	PCB 1260	ND	1000		
1A-TP3-0.5' *[1]	PCB 1016	ND	50	04/29/94	05/05/94
	PCB 1221	ND	50		
	PCB 1232	ND	50		
	PCB 1242	ND	50		
	PCB 1248	ND	50		
	PCB 1254	ND	50		
	PCB 1260	ND	50		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

PCB's per EPA 8080
Results in mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP3-2.0'	PCB 1016	ND	1.0	04/29/94	05/04/94
	PCB 1221	ND	1.0		
	PCB 1232	ND	1.0		
	PCB 1242	ND	1.0		
	PCB 1248	ND	1.0		
	PCB 1254	ND	1.0		
	PCB 1260	ND	1.0		
1A-TP4-0.5' *[1]	PCB 1016	ND	200	04/29/94	05/03/94
	PCB 1221	ND	200		
	PCB 1232	ND	200		
	PCB 1242	ND	200		
	PCB 1248	ND	200		
	PCB 1254	ND	200		
	PCB 1260	ND	200		
1A-TP4-2.0' *[1]	PCB 1016	ND	200	04/29/94	05/03/94
	PCB 1221	ND	200		
	PCB 1232	ND	200		
	PCB 1242	ND	200		
	PCB 1248	ND	200		
	PCB 1254	ND	200		
	PCB 1260	ND	200		
1A-TP5-0.5' *[1]	PCB 1016	ND	100	04/29/94	05/03/94
	PCB 1221	ND	100		
	PCB 1232	ND	100		
	PCB 1242	ND	100		
	PCB 1248	ND	100		
	PCB 1254	ND	100		
	PCB 1260	ND	100		
1A-TP5-2.0' *[1]	PCB 1016	ND	2.0	04/29/94	05/06/94
	PCB 1221	ND	2.0		
	PCB 1232	ND	2.0		
	PCB 1242	ND	2.0		
	PCB 1248	ND	2.0		
	PCB 1254	ND *[2]	10		
	PCB 1260	ND *[2]	10		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

PCB's per EPA 8080
Results in mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/22/1994

PEL Number: 94-1001
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-TP6-0.5' *[1]	PCB 1016	ND	100	04/29/94	05/03/94
	PCB 1221	ND	100		
	PCB 1232	ND	100		
	PCB 1242	ND	100		
	PCB 1248	ND	100		
	PCB 1254	ND	100		
	PCB 1260	ND	100		
1A-TP6-2.0' *[1]	PCB 1016	ND	200	04/29/94	05/03/94
	PCB 1221	ND	200		
	PCB 1232	ND	200		
	PCB 1242	ND	200		
	PCB 1248	ND	200		
	PCB 1254	ND	200		
	PCB 1260	ND	200		
1A-TP6-4.0'	PCB 1016	ND	1.0	04/29/94	05/04/94
	PCB 1221	ND	1.0		
	PCB 1232	ND	1.0		
	PCB 1242	ND	1.0		
	PCB 1248	ND	1.0		
	PCB 1254	ND	1.0		
	PCB 1260	ND	1.0		
Method Blank	PCB 1016	ND	1.0		
	PCB 1221	ND	1.0		
	PCB 1232	ND	1.0		
	PCB 1242	ND	1.0		
	PCB 1248	ND	1.0		
	PCB 1254	ND	1.0		
	PCB 1260	ND	1.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SURROGATE RECOVERIES (%)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A

PEL Number: 94-1001
Received: 04/22/1994

Sample Name	Analyte	Result	Control Limits
Organochlorinated Pesticides per EPA 8080			
1A-TP1-0.5'	Decachlorobiphenyl	113	74-127
	2,4,5,6-Tetrachloro-m-xylene	104	73-125
1A-TP1-2.0'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP2-0.5'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP2-2.0'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP3-0.5'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP3-2.0'	Decachlorobiphenyl	110	74-127
	2,4,5,6-Tetrachloro-m-xylene	103	73-125
1A-TP4-0.5'	Decachlorobiphenyl	— *3	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *3	64-126
1A-TP4-2.0'	Decachlorobiphenyl	— *3	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *3	64-126
1A-TP5-0.5'	Decachlorobiphenyl	— *3	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *3	64-126
1A-TP5-2.0'	Decachlorobiphenyl	114	48-151
	2,4,5,6-Tetrachloro-m-xylene	102	64-126
1A-TP6-0.5'	Decachlorobiphenyl	— *3	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *3	64-126
1A-TP6-2.0'	Decachlorobiphenyl	— *3	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *3	64-126
1A-TP6-4.0'	Decachlorobiphenyl	112	48-151
	2,4,5,6-Tetrachloro-m-xylene	106	64-126

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SURROGATE RECOVERIES (%)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A

PEL Number: 94-1001
Received: 04/22/1994

Sample Name	Analyte	Result	Control Limits
PCB's per EPA 8080			
1A-TP1-0.5'	Decachlorobiphenyl	113	74-127
	2,4,5,6-Tetrachloro-m-xylene	104	73-125
1A-TP1-2.0'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP2-0.5'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP2-2.0'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP3-0.5'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP3-2.0'	Decachlorobiphenyl	110	74-127
	2,4,5,6-Tetrachloro-m-xylene	103	73-125
1A-TP4-0.5'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP4-2.0'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP5-0.5'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP5-2.0'	Decachlorobiphenyl	114	74-127
	2,4,5,6-Tetrachloro-m-xylene	102	73-125
1A-TP6-0.5'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP6-2.0'	Decachlorobiphenyl	— *3	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *3	73-125
1A-TP6-4.0'	Decachlorobiphenyl	112	74-127
	2,4,5,6-Tetrachloro-m-xylene	106	73-125

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

COMMENTS

Client: CH2M Hill
Project: ATOCHEM PHASE 1A

PEL Number: 94-1001
Received: 04/22/1994

1. Detection limit is raised due to dilution necessary for analysis.

2. Detection limit is raised due to matrix interference.

3. Unable to calculate surrogate recovery due to dilution necessary for analysis.

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

May 9, 1994

CH2M Hill
825 N.E. Multnomah
Suite 1300
Portland, OR 97232

Attn: Pamela Brody

Re: Requested Quality Control Data

Enclosed is the in-house quality control data you requested on PEL project number 94-1001.

Note: Method blank results and Surrogate Recoveries are included in the final report.

QUALITY CONTROL DEFINITIONS

METHOD BLANK RESULTS

A Method Blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your sample.

No target parameters were detected in the method blank associated with your sample at the reporting limit levels noted on the data sheets in the final report.

SURROGATE STANDARD

A surrogate standard (i.e., a chemical compound not expected to occur in an environmental sample) is added to each sample, blank, and matrix spike sample just prior to extraction or processing. The recovery of the surrogate standard is used to monitor for unusual matrix effects, gross sample processing errors, etc. Surrogate recovery is evaluated for acceptance by determining whether the measured concentration falls within accepted limits.

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

Accuracy is measured by percent recovery as in:

$$\text{\% Recovery} = \frac{\text{(Measured Concentration)}}{\text{(Actual Concentration)}} \times 100$$

Precision is measured using duplicate tests by relative percent difference.

$$\text{RPD} = \frac{\text{(Result of Test 1 - Result of Test 2)}}{\text{(Result of Test 1 + Result of Test 2)/2}} \times 100$$

If you should have any questions concerning this report, please contact me.

Sincerely,

Howard Boorse
QA/QC Manager

METHOD BLANK RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Method Blank PD94006a	Detection Limit
Aldrin	ND	0.10
Alpha-BHC	ND	0.10
Beta-BHC	ND	0.10
Chlordane	ND	3.0
4-4'-DDD	ND	0.10
4-4'-DDE	ND	0.10
4-4'-DDT	ND	0.10
Delta-BHC	ND	0.10
Dieldrin	ND	0.10
Endosulfan	ND	0.10
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Endrin Aldehyde	ND	0.10
Gamma-BHC	ND	0.10
Heptachlor	ND	0.10
Heptachlor Epoxide	ND	0.10
Methoxychlor	ND	0.10
Toxaphene	ND	3.0
Date Prepped:	4/29/94	
Date Analyzed:	5/02/94	

Surrogate Recovery (%)		Control Limit
Decachlorobiphenyl	99	48-151
2,4,5,6-Tetrachloro-m-xylene	100	64-126

BATCH DUPLICATE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Sample Conc	Dup Conc	RPD	QC Limit RPD
Aldrin	ND	ND	0	50
4,4'-DDT	180	290	47	50
Dieldrin	ND	ND	0	50
Endrin	ND	ND	0	50
Gamma-BHC	ND	ND	0	50
Heptachlor	ND	ND	0	50

BATCH MATRIX SPIKE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Spike Added	Sample Conc	MS Conc	MS %Rec	QC Limit %Rec
Aldrin	0.25	ND	0.25	100	58-121
4,4'-DDT	1.0	0.31	1.2	89	49-129
Dieldrin	1.0	ND	0.91	91	44-170
Endrin	1.0	ND	1.0	100	75-128
Gamma-BHC	0.25	ND	0.24	96	58-121
Heptachlor	0.25	ND	0.25	100	49-133

BATCH LABORATORY CONTROL SAMPLE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	True	Found	%Rec	QC Limit %Rec
Aldrin	0.25	0.25	100	69-135
4,4'-DDT	1.0	1.2	120	73-137
Dieldrin	1.0	0.84	84	69-135
Endrin	1.0	0.96	96	57-152
Gamma-BHC	0.25	0.24	96	69-131
Heptachlor	0.25	0.26	104	68-144

METHOD BLANK RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080 RESULTS IN MG/KG (PPM)

Analyte	Method Blank PD94007a	Detection Limit
Aldrin	ND	0.10
Alpha-BHC	ND	0.10
Beta-BHC	ND	0.10
Chlordane	ND	3.0
4-4'-DDD	ND	0.10
4-4'-DDE	ND	0.10
4-4'-DDT	ND	0.10
Delta-BHC	ND	0.10
Dieldrin	ND	0.10
Endosulfan	ND	0.10
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Endrin Aldehyde	ND	0.10
Gamma-BHC	ND	0.10
Heptachlor	ND	0.10
Heptachlor Epoxide	ND	0.10
Methoxychlor	ND	0.10
Toxaphene	ND	3.0
Date Prepped:	4/29/94	
Date Analyzed:	5/02/94	

Surrogate Recovery (%)		Control Limit
Decachlorobiphenyl	97	48-151
2,4,5,6-Tetrachloro-m-xylene	99	64-126

BATCH DUPLICATE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080 RESULTS IN MG/KG (PPM)

Analyte	Sample Conc	Dup Conc	RPD	QC Limit RPD
Aldrin	ND	ND	0	50
4,4'-DDT	70	89	24	50
Dieldrin	ND	ND	0	50
Endrin	ND	ND	0	50
Gamma-BHC	ND	ND	0	50
Heptachlor	ND	ND	0	50

BATCH MATRIX SPIKE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Spike Added	Sample Conc	MS Conc	MS %Rec	QC Limit %Rec
Aldrin	0.25	ND	0.28	112	58-121
4,4'-DDT (q)	1.0	1.6	8.3	670	49-129
Dieldrin	1.0	ND	0.90	90	44-170
Endrin	1.0	ND	0.93	93	75-128
Gamma-BHC	0.25	ND	0.26	104	58-121
Heptachlor	0.25	ND	0.27	108	49-133

(q) Spike recovery is out of control limits.

BATCH LABORATORY CONTROL SAMPLE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	True	Found	%Rec	QC Limit %Rec
Aldrin	0.25	0.25	100	69-135
4,4'-DDT	1.0	1.2	120	73-137
Dieldrin	1.0	0.84	84	69-135
Endrin	1.0	0.96	96	57-152
Gamma-BHC	0.25	0.24	96	69-131
Heptachlor	0.25	0.26	104	68-144

CH2M HILL QUALITY ANALYTICS

CHAIN OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
OPE37640.A0	Atochem Phase 1A

CLIENT NAME: CH2M HILL

PROJECT MANAGER: Pamela Brady

COPY TO:

REQUESTED COMP. DATE: Normal

SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER ____

CLIENT ADDRESS AND PHONE NUMBER: 235-5000

ANALYSES REQUESTED: 8080

	STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS (12 CHARACTERS)	# OF CONTAINERS	8080	LAB ID	REMARKS
1		4/22/94	0845		X	X	1A-TP1-0.5'	1	X		8 oz. jar
2			0845				1A-TP1-2.0'				
3			0915				1A-TP2-0.5'				
4			0915				1A-TP2-2.0'				
5			1000				1A-TP3-0.5'				
6			1000				1A-TP3-2.0'				
7			1030				1A-TP4-0.5'				
8			1030				1A-TP4-2.0'				
9			1045				1A-TP5-0.5'				
10			1045				1A-TP5-2.0'				
11			1115				1A-TP6-0.5'				
12			1115				1A-TP6-2.0'				
13			1115				1A-TP6-4.0'				

FOR LAB USE ONLY

LAB# PEL-94-1001

LAB#

PROJECT NO.

ACK | VERIFIED

QUOTE# | BS

NO. OF SAMP | PG | OF

SAMPLED BY AND TITLE: Scott Waechler	DATE/TIME: 4/22/94 12:00	RELINQUISHED BY: Scott Waechler	DATE/TIME: 4/22/94 13:00
RECEIVED BY: Julio Reynaldo	DATE/TIME: 4-22-94 / 1510	RELINQUISHED BY:	DATE/TIME
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY LAB:	DATE/TIME	SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER ____	AIR BILL#

HAZWRAP/NEESA Y N

QC LEVEL 1 2 3

COC | ICE

ANA REQ | TEMP

CUST SEAL | Ph

SAMPLE COND.

REMARKS

ENTERED INTO LIMS ____ COC REVIEWED ____

PACIFIC
ENVIRONMENTAL
LABORATORY INC

May 11, 1994

CH2M Hill
825 N.E. Multnomah
Suite 1300
Portland, OR 97232

Attention: Pamela Brody

RE: JOB # OPE37640.A0
P.O.#
PROJECT - ATOCHEM PHASE 1A

Enclosed are test results for your samples received in this lab on Apr. 21, 1994. For your reference, these analyses have been assigned our PEL # 94-0992.

Solid samples are reported on a dry weight basis except for Oregon DEQ Fuels Methods and where otherwise noted.

Please call if you have any questions.

Respectfully,

Howard Holmes
Project Manager

Howard Boorse
QA Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Aromatic Volatile Organic Compounds per EPA Method 8020
Results In ug/kg (ppb)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL
1A-SB1-2.7	Benzene	ND	1.0
	Chlorobenzene	270	1.0
	1,2-Dichlorobenzene	ND	1.0
	1,3-Dichlorobenzene	ND	1.0
	1,4-Dichlorobenzene	2.0	1.0
	Ethylbenzene	ND	1.0
	Toluene	ND	1.0
	Xylenes (total)	5.7	1.0
	Date Prepped	04/27/94	
	Date Analyzed	04/27/94	
1A-SB1-4.0	Benzene	ND	13
	Chlorobenzene	480	13
	1,2-Dichlorobenzene	1300	13
	1,3-Dichlorobenzene	51	13
	1,4-Dichlorobenzene	100	13
	Ethylbenzene	ND	13
	Toluene	ND	13
	Xylenes (total)	ND	13
	Date Prepped	04/28/94	
	Date Analyzed	04/28/94	
1A-SB1-8.5	Benzene	ND	13
	Chlorobenzene	2300	13
	1,2-Dichlorobenzene	18	13
	1,3-Dichlorobenzene	ND	13
	1,4-Dichlorobenzene	ND	13
	Ethylbenzene	ND	13
	Toluene	ND	13
	Xylenes (total)	ND	13
	Date Prepped	04/29/94	
	Date Analyzed	04/29/94	

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC ENVIRONMENTAL LABORATORY INC.

Aromatic Volatile Organic Compounds per EPA Method 8020
Results In ug/kg (ppb)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL
1A-SB1-15.0	Benzene	ND	13
	Chlorobenzene	2100	13
	1,2-Dichlorobenzene	20	13
	1,3-Dichlorobenzene	ND	13
	1,4-Dichlorobenzene	32	13
	Ethylbenzene	ND	13
	Toluene	ND	13
	Xylenes (total)	ND	13
	Date Prepped	04/28/94	
	Date Analyzed	04/28/94	
1A-SB3-3.5	Benzene	ND	0.50
	Chlorobenzene	6.0	0.50
	1,2-Dichlorobenzene	0.78	0.50
	1,3-Dichlorobenzene	ND	0.50
	1,4-Dichlorobenzene	ND	0.50
	Ethylbenzene	ND	0.50
	Toluene	ND	0.50
	Xylenes (total)	0.60	0.50
	Date Prepped	05/09/94	
	Date Analyzed	05/09/94	
1A-SB4-3.5	Benzene	ND	0.50
	Chlorobenzene	20	0.50
	1,2-Dichlorobenzene	ND	0.50
	1,3-Dichlorobenzene	ND	0.50
	1,4-Dichlorobenzene	1.7	0.50
	Ethylbenzene	ND	0.50
	Toluene	ND	0.50
	Xylenes (total)	ND	0.50
	Date Prepped	04/25/94	
	Date Analyzed	04/25/94	

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC ENVIRONMENTAL LABORATORY INC.

Aromatic Volatile Organic Compounds per EPA Method 8020
Results In ug/kg (ppb)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL
1A-SB6-5.1'	Benzene	ND	13
	Chlorobenzene	2600	13
	1,2-Dichlorobenzene	41	13
	1,3-Dichlorobenzene	ND	13
	1,4-Dichlorobenzene	46	13
	Ethylbenzene	ND	13
	Toluene	ND	13
	Xylenes (total)	ND	13
	Date Prepped	04/25/94	
	Date Analyzed	04/27/94	
1A-SB9-4.3 *[1]	Benzene	ND	2.5
	Chlorobenzene	6.1	2.5
	1,2-Dichlorobenzene	ND	2.5
	1,3-Dichlorobenzene	ND	2.5
	1,4-Dichlorobenzene	ND	2.5
	Ethylbenzene	ND	2.5
	Toluene	ND	2.5
	Xylenes (total)	ND	2.5
	Date Prepped	05/02/94	
	Date Analyzed	05/02/94	
1A-SB11-3.0' *[1]	Benzene	ND	2.5
	Chlorobenzene	18	2.5
	1,2-Dichlorobenzene	ND	2.5
	1,3-Dichlorobenzene	ND	2.5
	1,4-Dichlorobenzene	ND	2.5
	Ethylbenzene	ND	2.5
	Toluene	ND	2.5
	Xylenes (total)	ND	2.5
	Date Prepped	05/02/94	
	Date Analyzed	05/02/94	

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Aromatic Volatile Organic Compounds per EPA Method 8020
Results In ug/kg (ppb)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL
1A-SB13-4.7' *1	Benzene	ND	2.5
	Chlorobenzene	39	2.5
	1,2-Dichlorobenzene	5.9	2.5
	1,3-Dichlorobenzene	ND	2.5
	1,4-Dichlorobenzene	ND	2.5
	Ethylbenzene	ND	2.5
	Toluene	ND	2.5
	Xylenes (total)	11	2.5
	Date Prepped	05/02/94	
	Date Analyzed	05/02/94	
1A-SB14-5.6'	Benzene	ND	13
	Chlorobenzene	630	13
	1,2-Dichlorobenzene	28	13
	1,3-Dichlorobenzene	ND	13
	1,4-Dichlorobenzene	ND	13
	Ethylbenzene	ND	13
	Toluene	ND	13
	Xylenes (total)	ND	13
	Date Prepped	04/28/94	
	Date Analyzed	04/29/94	
1A-SB15-10.6'	Benzene	ND	630
	Chlorobenzene	200000	630
	1,2-Dichlorobenzene	ND	630
	1,3-Dichlorobenzene	ND	630
	1,4-Dichlorobenzene	ND	630
	Ethylbenzene	ND	630
	Toluene	ND	630
	Xylenes (total)	ND	630
	Date Prepped	04/25/94	
	Date Analyzed	05/02/94	

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

Aromatic Volatile Organic Compounds per EPA Method 8020
Results In ug/kg (ppb)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL
1A-SB15 11.6' *[1]	Benzene	ND	2.5
	Chlorobenzene	ND	2.5
	1,2-Dichlorobenzene	ND	2.5
	1,3-Dichlorobenzene	ND	2.5
	1,4-Dichlorobenzene	ND	2.5
	Ethylbenzene	ND	2.5
	Toluene	ND	2.5
	Xylenes (total)	ND	2.5
	Date Prepped	05/02/94	
	Date Analyzed	05/02/94	
Method Blank	Benzene	ND	0.50
	Chlorobenzene	ND	0.50
	1,2-Dichlorobenzene	ND	0.50
	1,3-Dichlorobenzene	ND	0.50
	1,4-Dichlorobenzene	ND	0.50
	Ethylbenzene	ND	0.50
	Toluene	ND	0.50
	Xylenes (total)	ND	0.50

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC

Total Petroleum Hydrocarbons per EPA 418.1
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB1-4.0	TPH	34	20	04/22/94	04/22/94
1A-SB4-3.5	TPH	860	20	04/22/94	04/22/94
Method Blank	TPH	ND	20		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC

Organochlorinated Pesticides per EPA 8080
Results in mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB1-2.7 *[2]	Aldrin	ND	2000	04/29/94	05/02/94
	Alpha-BHC	ND	2000		
	Beta-BHC	ND	2000		
	Chlordane	ND	60000		
	4,4'-DDD	ND	2000		
	4,4'-DDE	ND	2000		
	4,4'-DDT	24000	2000		
	Delta-BHC	ND	2000		
	Dieldrin	ND	2000		
	Endosulfan I	ND	2000		
	Endosulfan II	ND	2000		
	Endosulfan Sulfate	ND	2000		
	Endrin	ND	2000		
	Endrin Aldehyde	ND	2000		
	Gamma-BHC	ND	2000		
	Heptachlor	ND	2000		
	Heptachlor Epoxide	ND	2000		
	Methoxychlor	ND	2000		
	Toxaphene	ND	60000		
1A-SB1-4.0 *[2]	Aldrin	ND	2000	04/29/94	05/03/94
	Alpha-BHC	ND	2000		
	Beta-BHC	ND	2000		
	Chlordane	ND	60000		
	4,4'-DDD	ND	2000		
	4,4'-DDE	ND	2000		
	4,4'-DDT	24000	2000		
	Delta-BHC	ND	2000		
	Dieldrin	ND	2000		
	Endosulfan I	ND	2000		
	Endosulfan II	ND	2000		
	Endosulfan Sulfate	ND	2000		
	Endrin	ND	2000		
	Endrin Aldehyde	ND	2000		
	Gamma-BHC	ND	2000		
	Heptachlor	ND	2000		
	Heptachlor Epoxide	ND	2000		
	Methoxychlor	ND	2000		
	Toxaphene	ND	60000		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC ENVIRONMENTAL LABORATORY INC

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB1-8.5 *2	Aldrin	ND	20000	04/29/94	05/03/94
	Alpha-BHC	ND	20000		
	Beta-BHC	ND	20000		
	Chlordane	ND	600000		
	4,4'-DDD	ND	20000		
	4,4'-DDE	ND	20000		
	4,4'-DDT	150000	20000		
	Delta-BHC	ND	20000		
	Dieldrin	ND	20000		
	Endosulfan I	ND	20000		
	Endosulfan II	ND	20000		
	Endosulfan Sulfate	ND	20000		
	Endrin	ND	20000		
	Endrin Aldehyde	ND	20000		
	Gamma-BHC	ND	20000		
	Heptachlor	ND	20000		
	Heptachlor Epoxide	ND	20000		
	Methoxychlor	ND	20000		
	Toxaphene	ND	600000		
1A-SB1-15.0 *2	Aldrin	ND	10000	04/29/94	05/03/94
	Alpha-BHC	ND	10000		
	Beta-BHC	ND	10000		
	Chlordane	ND	300000		
	4,4'-DDD	ND	10000		
	4,4'-DDE	ND	10000		
	4,4'-DDT	63000	10000		
	Delta-BHC	ND	10000		
	Dieldrin	ND	10000		
	Endosulfan I	ND	10000		
	Endosulfan II	ND	10000		
	Endosulfan Sulfate	ND	10000		
	Endrin	ND	10000		
	Endrin Aldehyde	ND	10000		
	Gamma-BHC	ND	10000		
	Heptachlor	ND	10000		
	Heptachlor Epoxide	ND	10000		
	Methoxychlor	ND	10000		
	Toxaphene	ND	300000		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB3-3.5 *[2]	Aldrin	ND	2.0	05/04/94	05/05/94
	Alpha-BHC	ND	2.0		
	Beta-BHC	ND	2.0		
	Chlordane	ND	60		
	4,4'-DDD	ND	2.0		
	4,4'-DDE	ND	2.0		
	4,4'-DDT	25	2.0		
	Delta-BHC	ND	2.0		
	Dieldrin	ND	2.0		
	Endosulfan I	ND	2.0		
	Endosulfan II	ND	2.0		
	Endosulfan Sulfate	ND	2.0		
	Endrin	ND	2.0		
	Endrin Aldehyde	ND	2.0		
	Gamma-BHC	ND	2.0		
	Heptachlor	ND	2.0		
	Heptachlor Epoxide	ND	2.0		
	Methoxychlor	ND	2.0		
	Toxaphene	ND	60		
1A-SB4-3.5 *[2]	Aldrin	ND	2000	04/29/94	05/03/94
	Alpha-BHC	ND	2000		
	Beta-BHC	ND	2000		
	Chlordane	ND	60000		
	4,4'-DDD	ND	2000		
	4,4'-DDE	ND	2000		
	4,4'-DDT	17000	2000		
	Delta-BHC	ND	2000		
	Dieldrin	ND	2000		
	Endosulfan I	ND	2000		
	Endosulfan II	ND	2000		
	Endosulfan Sulfate	ND	2000		
	Endrin	ND	2000		
	Endrin Aldehyde	ND	2000		
	Gamma-BHC	ND	2000		
	Heptachlor	ND	2000		
	Heptachlor Epoxide	ND	2000		
	Methoxychlor	ND	2000		
	Toxaphene	ND	60000		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC ENVIRONMENTAL LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results in mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB6-5.1' *2	Aldrin	ND	10	04/29/94	05/03/94
	Alpha-BHC	ND	10		
	Beta-BHC	ND	10		
	Chlordane	ND	300		
	4,4'-DDD	ND	10		
	4,4'-DDE	ND	10		
	4,4'-DDT	ND	10		
	Delta-BHC	ND	10		
	Dieldrin	ND	10		
	Endosulfan I	ND	10		
	Endosulfan II	ND	10		
	Endosulfan Sulfate	ND	10		
	Endrin	ND	10		
	Endrin Aldehyde	ND	10		
	Gamma-BHC	ND	10		
	Heptachlor	ND	10		
	Heptachlor Epoxide	ND	10		
	Methoxychlor	ND	10		
	Toxaphene	ND	300		
1A-SB9-4.3	Aldrin	ND	0.10	04/29/94	05/03/94
	Alpha-BHC	ND	0.10		
	Beta-BHC	ND	0.10		
	Chlordane	ND	3.0		
	4,4'-DDD	ND	0.10		
	4,4'-DDE	ND	0.10		
	4,4'-DDT	0.39	0.10		
	Delta-BHC	ND	0.10		
	Dieldrin	ND	0.10		
	Endosulfan I	ND	0.10		
	Endosulfan II	ND	0.10		
	Endosulfan Sulfate	ND	0.10		
	Endrin	ND	0.10		
	Endrin Aldehyde	ND	0.10		
	Gamma-BHC	ND	0.10		
	Heptachlor	ND	0.10		
	Heptachlor Epoxide	ND	0.10		
	Methoxychlor	ND	0.10		
	Toxaphene	ND	3.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB11-3.0' *2	Aldrin	ND	5000	04/29/94	05/03/94
	Alpha-BHC	ND	5000		
	Beta-BHC	ND	5000		
	Chlordane	ND	150000		
	4,4'-DDD	ND	5000		
	4,4'-DDE	ND	5000		
	4,4'-DDT	35000	5000		
	Delta-BHC	ND	5000		
	Dieldrin	ND	5000		
	Endosulfan I	ND	5000		
	Endosulfan II	ND	5000		
	Endosulfan Sulfate	ND	5000		
	Endrin	ND	5000		
	Endrin Aldehyde	ND	5000		
	Gamma-BHC	ND	5000		
	Heptachlor	ND	5000		
	Heptachlor Epoxide	ND	5000		
	Methoxychlor	ND	5000		
	Toxaphene	ND	150000		
1A-SB13-4.7' *2	Aldrin	ND	500	04/29/94	05/03/94
	Alpha-BHC	ND	500		
	Beta-BHC	ND	500		
	Chlordane	ND	15000		
	4,4'-DDD	ND	500		
	4,4'-DDE	ND	500		
	4,4'-DDT	5000	500		
	Delta-BHC	ND	500		
	Dieldrin	ND	500		
	Endosulfan I	ND	500		
	Endosulfan II	ND	500		
	Endosulfan Sulfate	ND	500		
	Endrin	ND	500		
	Endrin Aldehyde	ND	500		
	Gamma-BHC	ND	500		
	Heptachlor	ND	500		
	Heptachlor Epoxide	ND	500		
	Methoxychlor	ND	500		
	Toxaphene	ND	15000		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results in mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB14-5.6' *2	Aldrin	ND	500	04/29/94	05/03/94
	Alpha-BHC	ND	500		
	Beta-BHC	ND	500		
	Chlordane	ND	15000		
	4,4'-DDD	ND	500		
	4,4'-DDE	ND	500		
	4,4'-DDT	5400	500		
	Delta-BHC	ND	500		
	Dieldrin	ND	500		
	Endosulfan I	ND	500		
	Endosulfan II	ND	500		
	Endosulfan Sulfate	ND	500		
	Endrin	ND	500		
	Endrin Aldehyde	ND	500		
	Gamma-BHC	ND	500		
	Heptachlor	ND	500		
	Heptachlor Epoxide	ND	500		
	Methoxychlor	ND	500		
	Toxaphene	ND	15000		
1A-SB15-10.6' *2	Aldrin	ND	20	04/29/94	05/03/94
	Alpha-BHC	ND	20		
	Beta-BHC	ND	20		
	Chlordane	ND	600		
	4,4'-DDD	ND	20		
	4,4'-DDE	ND	20		
	4,4'-DDT	400	20		
	Delta-BHC	ND	20		
	Dieldrin	ND	20		
	Endosulfan I	ND	20		
	Endosulfan II	ND	20		
	Endosulfan Sulfate	ND	20		
	Endrin	ND	20		
	Endrin Aldehyde	ND	20		
	Gamma-BHC	ND	20		
	Heptachlor	ND	20		
	Heptachlor Epoxide	ND	20		
	Methoxychlor	ND	20		
	Toxaphene	ND	600		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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PACIFIC
ENVIRONMENTAL
LABORATORY INC.

Organochlorinated Pesticides per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB15 11.6'	Aldrin	ND	0.10	04/29/94	05/03/94
	Alpha-BHC	ND	0.10		
	Beta-BHC	ND	0.10		
	Chlordane	ND	3.0		
	4,4'-DDD	ND	0.10		
	4,4'-DDE	ND	0.10		
	4,4'-DDT	0.87	0.10		
	Delta-BHC	ND	0.10		
	Dieldrin	ND	0.10		
	Endosulfan I	ND	0.10		
	Endosulfan II	ND	0.10		
	Endosulfan Sulfate	ND	0.10		
	Endrin	ND	0.10		
	Endrin Aldehyde	ND	0.10		
	Gamma-BHC	ND	0.10		
	Heptachlor	ND	0.10		
	Heptachlor Epoxide	ND	0.10		
	Methoxychlor	ND	0.10		
	Toxaphene	ND	3.0		
Method Blank	Aldrin	ND	0.10		
	Alpha-BHC	ND	0.10		
	Beta-BHC	ND	0.10		
	Chlordane	ND	3.0		
	4,4'-DDD	ND	0.10		
	4,4'-DDE	ND	0.10		
	4,4'-DDT	ND	0.10		
	Delta-BHC	ND	0.10		
	Dieldrin	ND	0.10		
	Endosulfan I	ND	0.10		
	Endosulfan II	ND	0.10		
	Endosulfan Sulfate	ND	0.10		
	Endrin	ND	0.10		
	Endrin Aldehyde	ND	0.10		
	Gamma-BHC	ND	0.10		
	Heptachlor	ND	0.10		
	Heptachlor Epoxide	ND	0.10		
	Methoxychlor	ND	0.10		
	Toxaphene	ND	3.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC ENVIRONMENTAL LABORATORY INC.

PCB's per EPA 8080
Results in mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB1-2.7 *2	PCB 1016	ND	20000	04/29/94	05/02/94
	PCB 1221	ND	20000		
	PCB 1232	ND	20000		
	PCB 1242	ND	20000		
	PCB 1248	ND	20000		
	PCB 1254	ND	20000		
	PCB 1260	ND	20000		
1A-SB1-4.0 *2	PCB 1016	ND	20000	04/29/94	05/03/94
	PCB 1221	ND	20000		
	PCB 1232	ND	20000		
	PCB 1242	ND	20000		
	PCB 1248	ND	20000		
	PCB 1254	ND	20000		
	PCB 1260	ND	20000		
1A-SB1-8.5 *2	PCB 1016	ND	200000	04/29/94	05/03/94
	PCB 1221	ND	200000		
	PCB 1232	ND	200000		
	PCB 1242	ND	200000		
	PCB 1248	ND	200000		
	PCB 1254	ND	200000		
	PCB 1260	ND	200000		
1A-SB1-15.0 *2	PCB 1016	ND	100000	04/29/94	05/03/94
	PCB 1221	ND	100000		
	PCB 1232	ND	100000		
	PCB 1242	ND	100000		
	PCB 1248	ND	100000		
	PCB 1254	ND	100000		
	PCB 1260	ND	100000		
1A-SB3-3.5 *2	PCB 1016	ND	20	05/04/94	05/05/94
	PCB 1221	ND	20		
	PCB 1232	ND	20		
	PCB 1242	ND	20		
	PCB 1248	ND	20		
	PCB 1254	ND	20		
	PCB 1260	ND	20		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

PCB's per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB4-3.5 *2	PCB 1016	ND	20000	04/29/94	05/03/94
	PCB 1221	ND	20000		
	PCB 1232	ND	20000		
	PCB 1242	ND	20000		
	PCB 1248	ND	20000		
	PCB 1254	ND	20000		
	PCB 1260	ND	20000		
1A-SB6-5.1' *2	PCB 1016	ND	100	04/29/94	05/03/94
	PCB 1221	ND	100		
	PCB 1232	ND	100		
	PCB 1242	ND	100		
	PCB 1248	ND	100		
	PCB 1254	ND	100		
	PCB 1260	ND	100		
1A-SB9-4.3	PCB 1016	ND	1.0	04/29/94	05/03/94
	PCB 1221	ND	1.0		
	PCB 1232	ND	1.0		
	PCB 1242	ND	1.0		
	PCB 1248	ND	1.0		
	PCB 1254	ND	1.0		
	PCB 1260	ND	1.0		
1A-SB11-3.0' *2	PCB 1016	ND	50000	04/29/94	05/03/94
	PCB 1221	ND	50000		
	PCB 1232	ND	50000		
	PCB 1242	ND	50000		
	PCB 1248	ND	50000		
	PCB 1254	ND	50000		
	PCB 1260	ND	50000		
1A-SB13-4.7' *2	PCB 1016	ND	5000	04/29/94	05/03/94
	PCB 1221	ND	5000		
	PCB 1232	ND	5000		
	PCB 1242	ND	5000		
	PCB 1248	ND	5000		
	PCB 1254	ND	5000		
	PCB 1260	ND	5000		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC ENVIRONMENTAL LABORATORY INC.

PCB's per EPA 8080
Results In mg/kg (ppm)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A
Received: 04/21/1994

PEL Number: 94-0992
Matrix: soil

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
1A-SB14-5.6' *2	PCB 1016	ND	5000	04/29/94	05/03/94
	PCB 1221	ND	5000		
	PCB 1232	ND	5000		
	PCB 1242	ND	5000		
	PCB 1248	ND	5000		
	PCB 1254	ND	5000		
	PCB 1260	ND	5000		
1A-SB15-10.6' *2	PCB 1016	ND	200	04/29/94	05/03/94
	PCB 1221	ND	200		
	PCB 1232	ND	200		
	PCB 1242	ND	200		
	PCB 1248	ND	200		
	PCB 1254	ND	200		
	PCB 1260	ND	200		
1A-SB15 11.6'	PCB 1016	ND	1.0	04/29/94	05/03/94
	PCB 1221	ND	1.0		
	PCB 1232	ND	1.0		
	PCB 1242	ND	1.0		
	PCB 1248	ND	1.0		
	PCB 1254	ND	1.0		
	PCB 1260	ND	1.0		
Method Blank	PCB 1016	ND	1.0		
	PCB 1221	ND	1.0		
	PCB 1232	ND	1.0		
	PCB 1242	ND	1.0		
	PCB 1248	ND	1.0		
	PCB 1254	ND	1.0		
	PCB 1260	ND	1.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SURROGATE RECOVERIES (%)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A

PEL Number: 94-0992
Received: 04/21/1994

Sample Name	Analyte	Result	Control Limits
Aromatic Volatile Organic Compounds per EPA Method 8020			
1A-SB1-2.7	4-Bromofluorobenzene	49 *3	63-126
1A-SB1-4.0	4-Bromofluorobenzene	94	63-126
1A-SB1-8.5	4-Bromofluorobenzene	84	63-126
1A-SB1-15.0	4-Bromofluorobenzene	91	63-126
1A-SB3-3.5	4-Bromofluorobenzene	22 *3	63-126
1A-SB4-3.5	4-Bromofluorobenzene	16 *3	63-126
1A-SB6-5.1'	4-Bromofluorobenzene	77	63-126
1A-SB9-4.3	4-Bromofluorobenzene	88	63-126
1A-SB11-3.0'	4-Bromofluorobenzene	46 *3	63-126
1A-SB13-4.7'	4-Bromofluorobenzene	71	63-126
1A-SB14-5.6'	4-Bromofluorobenzene	88	63-126
1A-SB15-10.6'	4-Bromofluorobenzene	84	63-126
1A-SB15 11.6'	4-Bromofluorobenzene	66	63-126

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SURROGATE RECOVERIES (%)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A

PEL Number: 94-0992
Received: 04/21/1994

Sample Name	Analyte	Result	Control Limits
Organochlorinated Pesticides per EPA 8080			
1A-SB1-2.7	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB1-4.0	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB1-8.5	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB1-15.0	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB3-3.5	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB4-3.5	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB6-5.1'	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB9-4.3	Decachlorobiphenyl	111	48-151
	2,4,5,6-Tetrachloro-m-xylene	107	64-126
1A-SB11-3.0'	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB13-4.7'	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB14-5.6'	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB15-10.6'	Decachlorobiphenyl	— *4	48-151
	2,4,5,6-Tetrachloro-m-xylene	— *4	64-126
1A-SB15 11.6'	Decachlorobiphenyl	108	48-151
	2,4,5,6-Tetrachloro-m-xylene	104	64-126

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
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LABORATORY INC.

SURROGATE RECOVERIES (%)

Client: CH2M Hill
Project: ATOCHEM PHASE 1A

PEL Number: 94-0992
Received: 04/21/1994

Sample Name	Analyte	Result	Control Limits
PCB's per EPA 8080			
1A-SB1-2.7	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB1-4.0	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB1-8.5	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB1-15.0	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB3-3.5	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB4-3.5	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB6-5.1'	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB9-4.3	Decachlorobiphenyl	111	74-127
	2,4,5,6-Tetrachloro-m-xylene	107	73-125
1A-SB11-3.0'	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB13-4.7'	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB14-5.6'	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB15-10.6'	Decachlorobiphenyl	— *4	74-127
	2,4,5,6-Tetrachloro-m-xylene	— *4	73-125
1A-SB15 11.6'	Decachlorobiphenyl	108	74-127
	2,4,5,6-Tetrachloro-m-xylene	104	73-125

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

COMMENTS

Client: CH2M Hill
Project: ATOCHEM PHASE 1A

PEL Number: 94-0992
Received: 04/21/1994

1. Detection limit is raised due to matrix interference.

2. Detection limit is raised due to dilution necessary for analysis.

3. Surrogate recovery is out of control limits due to matrix interference.

4. Unable to calculate surrogate recovery due to dilution necessary for analysis.

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PACIFIC
ENVIRONMENTAL
LABORATORY INC

May 11, 1994

CH2M Hill
825 N.E. Multnomah
Suite 1300
Portland, OR 97232

Attn: Pamela Brody

Re: Requested Quality Control Data

Enclosed is the in-house quality control data you requested on PEL project number 94-0992.

Note: Method blank results and Surrogate Recoveries are included in the final report.

QUALITY CONTROL DEFINITIONS

METHOD BLANK RESULTS

A Method Blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your sample.

No target parameters were detected in the method blank associated with your sample at the reporting limit levels noted on the data sheets in the final report.

SURROGATE STANDARD

A surrogate standard (i.e., a chemical compound not expected to occur in an environmental sample) is added to each sample, blank, and matrix spike sample just prior to extraction or processing. The recovery of the surrogate standard is used to monitor for unusual matrix effects, gross sample processing errors, etc. Surrogate recovery is evaluated for acceptance by determining whether the measured concentration falls within accepted limits.

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Accuracy is measured by percent recovery as in:

$$\textbf{\% Recovery} = \frac{\text{(Measured Concentration)}}{\text{(Actual Concentration)}} \times 100$$

Precision is measured using duplicate tests by relative percent difference.

$$\textbf{RPD} = \frac{\text{(Result of Test 1 - Result of Test 2)}}{\text{(Result of Test 1 + Result of Test 2)/2}} \times 100$$

If you should have any questions concerning this report, please contact me.

Sincerely,

Howard Boorse
QA/QC Manager

METHOD BLANK RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020 RESULTS IN UG/KG (PPB)

Analyte	Method Blank BS94006b	Detection Limit
Benzene	ND	0.50
Chlorobenzene	ND	0.50
1,2-Dichlorobenzene	ND	0.50
1,3-Dichlorobenzene	ND	0.50
1,4-Dichlorobenzene	ND	0.50
Ethylbenzene	ND	0.50
Toluene	ND	0.50
Xylenes (total)	ND	0.50
Date Prepped:	04/25/94	
Date Analyzed:	04/25/94	

Surrogate Recovery (%)		Control Limit
4-Bromofluorobenzene	92	63-126

METHOD BLANK RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020 RESULTS IN UG/KG (PPB)

Analyte	Method Blank BS94006c	Detection Limit
Benzene	ND	13
Chlorobenzene	ND	13
1,2-Dichlorobenzene	ND	13
1,3-Dichlorobenzene	ND	13
1,4-Dichlorobenzene	ND	13
Ethylbenzene	ND	13
Toluene	ND	13
Xylenes (total)	ND	13
Date Prepped:	04/25/94	
Date Analyzed:	04/26/94	

Surrogate Recovery (%)		Control Limit
4-Bromofluorobenzene	91	63-126

METHOD BLANK RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020 RESULTS IN UG/KG (PPB)

Analyte	Method Blank BS94006e	Detection Limit
Benzene	ND	0.50
Chlorobenzene	ND	0.50
1,2-Dichlorobenzene	ND	0.50
1,3-Dichlorobenzene	ND	0.50
1,4-Dichlorobenzene	ND	0.50
Ethylbenzene	ND	0.50
Toluene	ND	0.50
Xylenes (total)	ND	0.50
Date Prepped:	04/27/94	
Date Analyzed:	04/27/94	

Surrogate Recovery (%)		Control Limit
4-Bromofluorobenzene	81	63-126

METHOD BLANK RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020 RESULTS IN UG/KG (PPB)

Analyte	Method Blank BS94006g	Detection Limit
Benzene	ND	13
Chlorobenzene	ND	13
1,2-Dichlorobenzene	ND	13
1,3-Dichlorobenzene	ND	13
1,4-Dichlorobenzene	ND	13
Ethylbenzene	ND	13
Toluene	ND	13
Xylenes (total)	ND	13
Date Prepped:	04/28/94	
Date Analyzed:	04/28/94	

Surrogate Recovery (%)		Control Limit
4-Bromofluorobenzene	88	63-126

METHOD BLANK RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020 RESULTS IN UG/KG (PPB)

Analyte	Method Blank BS94006h	Detection Limit
Benzene	ND	0.50
Chlorobenzene	ND	0.50
1,2-Dichlorobenzene	ND	0.50
1,3-Dichlorobenzene	ND	0.50
1,4-Dichlorobenzene	ND	0.50
Ethylbenzene	ND	0.50
Toluene	ND	0.50
Xylenes (total)	ND	0.50
Date Prepped:	05/02/94	
Date Analyzed:	05/02/94	

Surrogate Recovery (%)		Control Limit
4-Bromofluorobenzene	85	63-126

METHOD BLANK RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020 RESULTS IN UG/KG (PPB)

Analyte	Method Blank BS94006i	Detection Limit
Benzene	ND	13
Chlorobenzene	ND	13
1,2-Dichlorobenzene	ND	13
1,3-Dichlorobenzene	ND	13
1,4-Dichlorobenzene	ND	13
Ethylbenzene	ND	13
Toluene	ND	13
Xylenes (total)	ND	13
Date Prepped:	04/29/94	
Date Analyzed:	05/02/94	

Surrogate Recovery (%)		Control Limit
4-Bromofluorobenzene	88	63-126

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020
RESULTS IN UG/KG (PPB)

Analyte	Spike Added	Sample Conc	MS Conc	MS %Rec
Benzene	20	ND	17	85
Chlorobenzene	20	ND	14	70
Ethylbenzene	20	0.68	3.9	16
Toluene	20	ND	9.8	49
o-Xylene	20	ND	2.0	10

Analyte	Spike Added	MSD Conc	MSD %Rec	RPD	QC Limits RPD	QC Limits %Rec
Benzene	20	17	85	0	42	56-123
Chlorobenzene	20	14	70	0	63	53-124
Ethylbenzene	20	4.0	17	6.1	69	45-130
Toluene	20	10	50	2.0	51	54-123
o-Xylene	20	2.2	11	9.5	66	50-127

BATCH LABORATORY CONTROL SAMPLE RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020
RESULTS IN UG/KG (PPB)

Analyte	True	Found	%Rec	QC Limit %Rec
Benzene	20	19	95	69-138
Chlorobenzene	20	19	95	72-137
Ethylbenzene	20	18	90	61-141
Toluene	20	19	95	53-151
o-Xylene	20	19	95	62-144

METHOD BLANK RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020
RESULTS IN UG/KG (PPB)

Analyte	Method Blank BS94007e	Detection Limit
Benzene	ND	0.50
Chlorobenzene	ND	0.50
1,2-Dichlorobenzene	ND	0.50
1,3-Dichlorobenzene	ND	0.50
1,4-Dichlorobenzene	ND	0.50
Ethylbenzene	ND	0.50
Toluene	ND	0.50
Xylenes (total)	ND	0.50
Date Prepped:	05/09/94	
Date Analyzed:	05/09/94	

Surrogate Recovery (%)		Control Limit
4-Bromofluorobenzene	92	63-126

BATCH MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020
RESULTS IN UG/KG (PPB)

Analyte	Spike Added	Sample Conc	MS Conc	MS %Rec
Benzene	20	ND	18	90
Chlorobenzene	20	ND	16	80
Ethylbenzene	20	ND	16	80
Toluene	20	ND	17	85
o-Xylene	20	ND	17	85

Analyte	Spike Added	MSD Conc	MSD %Rec	RPD	QC Limits RPD	QC Limits %Rec
Benzene	20	17	85	5.7	42	56-123
Chlorobenzene	20	15	75	6.5	63	53-124
Ethylbenzene	20	15	75	6.5	69	45-130
Toluene	20	15	75	13	51	54-123
o-Xylene	20	16	80	6.1	66	50-127

BATCH LABORATORY CONTROL SAMPLE RESULTS FOR AROMATIC VOLATILE ORGANIC COMPOUNDS PER EPA METHOD 8020
RESULTS IN UG/KG (PPB)

Analyte	True	Found	%Rec	QC Limit %Rec
Benzene	20	20	100	69-138
Chlorobenzene	20	18	90	72-137
Ethylbenzene	20	18	90	61-141
Toluene	20	18	90	53-151
o-Xylene	20	19	95	62-144

METHOD BLANK RESULTS FOR TOTAL PETROLEUM HYDROCARBONS PER EPA 418.1 RESULTS IN MG/KG (PPM)

Analyte	Method Blank FG94008f	Detection Limit
TPH	ND	20
Date Prepped:	04/22/94	
Date Analyzed:	04/22/94	

BATCH DUPLICATE RESULTS FOR TOTAL PETROLEUM HYDROCARBONS PER EPA 418.1 RESULTS IN MG/KG (PPM)

Analyte	Sample Conc	Dup Conc	RPD	QC Limit RPD
TPH	23	17	30	50

BATCH DUPLICATE RESULTS FOR TOTAL PETROLEUM HYDROCARBONS PER EPA 418.1 RESULTS IN MG/KG (PPM)

Analyte	Sample Conc	Dup Conc	RPD	QC Limit RPD
TPH	280000	260000	7.4	50

BATCH LABORATORY CONTROL SAMPLE RESULTS FOR TOTAL PETROLEUM HYDROCARBONS PER EPA 418.1. RESULTS IN MG/KG (PPM)

Analyte	True	Found	%Rec	QC Limit %Rec
TPH	200	210	105	50-150

METHOD BLANK RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080 RESULTS IN MG/KG (PPM)

Analyte	Method Blank PD94006a	Detection Limit
Aldrin	ND	0.10
Alpha-BHC	ND	0.10
Beta-BHC	ND	0.10
Chlordane	ND	3.0
4-4'-DDD	ND	0.10
4-4'-DDE	ND	0.10
4-4'-DDT	ND	0.10
Delta-BHC	ND	0.10
Dieldrin	ND	0.10
Endosulfan I	ND	0.10
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Endrin Aldehyde	ND	0.10
Gamma-BHC	ND	0.10
Heptachlor	ND	0.10
Heptachlor Epoxide	ND	0.10
Methoxychlor	ND	0.10
Toxaphene	ND	3.0
Date Prepped:	04/29/94	
Date Analyzed:	05/02/94	

Surrogate Recovery (%)		Control Limit
Decachlorobiphenyl	99	48-151
2,4,5,6-Tetrachloro-m-xylene	100	64-126

BATCH DUPLICATE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080 RESULTS IN MG/KG (PPM)

Analyte	Sample Conc	Dup Conc	RPD	QC Limit RPD
Aldrin	ND	ND	0	50
4,4'-DDT	180	290	47	50
Dieldrin	ND	ND	0	50
Endrin	ND	ND	0	50
Gamma-BHC	ND	ND	0	50
Heptachlor	ND	ND	0	50

BATCH MATRIX SPIKE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Spike Added	Sample Conc	MS Conc	MS %Rec	QC Limit %Rec
Aldrin	0.25	ND	0.25	100	58-121
4,4'-DDT	1.0	0.31	1.2	89	49-129
Dieldrin	1.0	ND	0.91	91	44-170
Endrin	1.0	ND	1.0	100	75-128
Gamma-BHC	0.25	ND	0.24	96	58-121
Heptachlor	0.25	ND	0.25	100	49-133

BATCH LABORATORY CONTROL SAMPLE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	True	Found	%Rec	QC Limit %Rec
Aldrin	0.25	0.25	100	69-135
4,4'-DDT	1.0	1.2	120	73-137
Dieldrin	1.0	0.84	84	69-135
Endrin	1.0	0.96	96	57-152
Gamma-BHC	0.25	0.24	96	69-131
Heptachlor	0.25	0.26	104	68-144

METHOD BLANK RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Method Blank PD94007c	Detection Limit
Aldrin	ND	0.10
Alpha-BHC	ND	0.10
Beta-BHC	ND	0.10
Chlordane	ND	3.0
4-4'-DDD	ND	0.10
4-4'-DDE	ND	0.10
4-4'-DDT	ND	0.10
Delta-BHC	ND	0.10
Dieldrin	ND	0.10
Endosulfan I	ND	0.10
Endosulfan II	ND	0.10
Endosulfan Sulfate	ND	0.10
Endrin	ND	0.10
Endrin Aldehyde	ND	0.10
Gamma-BHC	ND	0.10
Heptachlor	ND	0.10
Heptachlor Epoxide	ND	0.10
Methoxychlor	ND	0.10
Toxaphene	ND	3.0
Date Prepped:	05/04/94	
Date Analyzed:	05/04/94	

Surrogate Recovery (%)		Control Limit
Decachlorobiphenyl	102	48-151
2,4,5,6-Tetrachloro-m-xylene	96	64-126

BATCH DUPLICATE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Sample Conc	Dup Conc	RPD	QC Limit RPD
Aldrin	ND	ND	0	50
4,4'-DDT	70	89	24	50
Dieldrin	ND	ND	0	50
Endrin	ND	ND	0	50
Gamma-BHC	ND	ND	0	50
Heptachlor	ND	ND	0	50

BATCH MATRIX SPIKE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	Spike Added	Sample Conc	MS Conc	MS %Rec	QC Limit %Rec
Aldrin	0.25	ND	0.28	112	58-121
4,4'-DDT(q)	1.0	1.6	8.3	670	49-129
Dieldrin	1.0	ND	0.90	90	44-170
Endrin	1.0	ND	0.93	93	75-128
Gamma-BHC	0.25	ND	0.26	104	58-121
Heptachlor	0.25	ND	0.27	108	49-133

(q) Spike recovery is out of control limits.

BATCH LABORATORY CONTROL SAMPLE RESULTS FOR ORGANOCHLORINATED PESTICIDES PER EPA 8080
RESULTS IN MG/KG (PPM)

Analyte	True	Found	%Rec	QC Limit %Rec
Aldrin	0.25	0.25	100	69-135
4,4'-DDT	1.0	1.2	120	73-137
Dieldrin	1.0	0.84	84	69-135
Endrin	1.0	0.96	96	57-152
Gamma-BHC	0.25	0.24	96	69-131
Heptachlor	0.25	0.26	104	68-144

CH2M HILL
QUALITY ANALYTICAL LABORATORIES

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M HILL Project #: OPE37640.A0
Purchase Order #:
Project Name: Atochem Phase 1A
Company Name/CH2M HILL Office: CH2M HILL
Project Manager & Phone #: Mr. [ ] Ms. [X] Dr. [ ] Pamela Brody
Report Copy to:
Requested Completion Date: Normal
Sampling Requirements: SDWA [ ] NPDES [ ] RCRA [ ] OTHER ____
Sample Disposal: Dispose [ ] Return [ ]

LAB TEST CODES

SHADED AREA -- FOR LAB USE ONLY: Lab 1 # 94-0992; Lab 2 #; Quote #; Kit Request #

ANALYSES REQUESTED

Project # 94-0992; No. of Samples; Page 1 of; COC Rev; Login; LIMS Ver; Ack Gen

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	EPA 8020	EPA 8080	TPH 418.1	REMARKS	LAB 1 ID	LAB 2 ID
4/20/94	1000	X			X	1A-SB1-2.7	1	X	X		8 oz jar		
4/20/94	1012					1A-SB1-4.0		X	X	X			
	1030					1A-SB1-6.0							
	1030					1A-SB1-8.5		X	X				
	1032					1A-SB1-12.0							
	1025					1A-SB1-15.0		X	X				
	1130					1A-SB2-3.5							
	1130					1A-SB2-6.0							
	1300					1A-SB3-3.5							
	1330					1A-SB4-3.5		X	X	X			
	1330					1A-SB4-5.0							

Sampled By & Title (Please sign and print name): Scott Waichler, S.W. — Date/Time: 4/20/94
Relinquished By (Please sign and print name): Scott Waichler — Date/Time:
Received By (Please sign and print name): [signature] — Date/Time: 4-21-94 / 1715
Relinquished By (Please sign and print name): — Date/Time:
Received By (Please sign and print name): — Date/Time:
Relinquished By (Please sign and print name): — Date/Time:
Received By (Please sign and print name): — Date/Time:
Shipped Via: UPS BUS Fed-Ex Hand Other ____ — Shipping #:
Work Authorized By (Please sign and print name):
Remarks: PEL courier pick up / Hold unmarked samples (no "X") for further analysis

HAZWRAP/NESSA: Y N
QC Level: 1 2 3 Other: ____
COC Rec | ICE
Ana Req | TEMP
Cust Seal | Ph

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: ORIGINAL - LAB, Yellow - LAB, Pink - Client

CH2M HILL QUALITY ANALYTICS

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: OPE37640.A0

PROJECT NAME: Atochem Phase 1A

CLIENT NAME: Atochem

PROJECT MANAGER: Pamela Brody

COPY TO:

REQUESTED COMP. DATE: Normal

SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER ____

CLIENT ADDRESS AND PHONE NUMBER:

FOR LAB USE ONLY

LAB#:

LAB# 94-0992

PROJECT NO. 94-0992

ACK | VERIFIED

QUOTE# | BS

NO. OF SAMP | PG | OF

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS (12 CHARACTERS)	# OF CONTAINERS	EPA 8020	EPA 8080	TPH418.1	LAB ID	REMARKS
	4/20/94	1415		X	X	1A-SB5-2.5'	1					8 oz JAR
		1415				1A-SB5-4.5'						
		1440				1A-SB6-5.1'		X	X			
		1515				1A-SB7-5.0'						
		1540				1A-SB8-5.7'						
		1615				1A-SB9-4.3		X	X			
	4/21/94	0900				1A-SB11-3.0'		X	X			
		1030				1A-SB13-4.7'		X	X			
		1100				1A-SB14-5.6'		X	X			
		1145				1A-SB15-6.5'						
		1200				1A-SB15-10.6'		X	X			
		1200				1A-SB15-11.6'		X	X			

SAMPLED BY AND TITLE: [signature]	DATE/TIME: 4/21/94, 4/20/94	RELINQUISHED BY: [signature]	DATE/TIME: 4/20/94
RECEIVED BY: [signature]	DATE/TIME: 4-21-94 / 1715	RELINQUISHED BY:	DATE/TIME
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY LAB:	DATE/TIME	SAMPLE SHIPPED VIA: UPS BUS FED-EX (HAND) OTHER ____	AIR BILL#

HAZWRAP/NEESA Y N

QC LEVEL 1 2 3

COC | ICE

ANA REQ | TEMP

CUST SEAL | Ph

SAMPLE COND.

REMARKS: PEL Courier Pick-up / Hold Unmarked Samples (No "X") for Further Anal 4/21/94

ENTERED INTO LIMS ____ COC REVIEWED ____

QAL
QUALITY ANALYTICAL
LABORATORIES, INC.

November 22, 1994

Ms. Pamela Brody-Hine
CH2M Hill/PDX
825 N.E. Multnomah, Suite 1300
Portland, OR 97232-2146

RE: Analytical Data for: **Elf Atochem**
Laboratory Reference Number: **R9018**

Dear Ms. Brody-Hine:

On **November 5, 1994**, QAL, Inc. received samples with a request for analysis. The analytical results and associated quality control data are enclosed.

It is our policy to store your samples for 30 days from the date of this letter. If extended storage is required, special arrangements can be accommodated upon early notification. The disposition of samples identified as hazardous will require special handling and you will be contacted if necessary.

QAL, Inc. appreciates your business and looks forward to serving you again. If you have any questions concerning your report or need any additional information, please call me at **(916) 244-5227**.

Sincerely,

Mark Cichy

Mark Cichy
Project Manager/Client Services

Quality Analytical
Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

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Quality Analytical Laboratories Inc.

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Fax No. 916 244-4109

ORGANIC DATA QUALIFIERS

U -- Indicates the compound was analyzed for but not detected. The number adjacent to the "U" qualifier indicates the reporting limit for that compound. The reporting limit can vary from sample to sample depending on dilution factors or percent moisture adjustment when indicated.

J -- Indicates an estimated value. It is used when the data indicates the presence of a compound below the stated reporting limit.

C -- This flag applies to GC analytes only. The "C" flag indicates the presence of this compound has been confirmed by GC/MS analysis.

B -- This flag is used when the analyte is found in the associated blank as well as the sample. This notation indicates possible blank contamination and suggests the data user evaluate these compounds and their amounts carefully.

E -- This qualifier indicates that the value reported exceeds the linear calibration range for that compound. Therefore, the sample should be reanalyzed at an appropriate dilution. The "E" qualified amount is an estimated concentration, and the results of the dilution will be reported on a separate Form I.

D -- This qualifier indicates compounds which have been identified during a diluted reanalysis. "D" qualifiers are used for samples that have been analyzed initially at a lesser dilution than required for accurate quantitation.

P -- This qualifier is used for a pesticide/Aroclor target analyte when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on Form I and flagged with a "P".

N -- This qualifier indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds, where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the "N" qualifier is not used.

A -- This qualifier indicates that a TIC is a suspected aldol-condensation product.

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916 244-5227
Fax No. 916 244-4109

ORGANIC LAB SAMPLE ID QUALIFIERS

The qualifiers that may be appended to the Lab Sample ID for organic analyses are defined below:

DL Dilution Run. Indicates the sample contained compounds exceeding the calibration range. The sample was diluted and re-analyzed. Both results are reported.

R Rerun. The sample was re-analyzed. The "R" is not used if the sample was also re-extracted.

RE Re-extraction Analysis. The sample was re-extracted and re-analyzed.

MS Matrix Spike (may be followed by a digit to indicate multiple matrix spikes within a sample set)

MSD Matrix Spike Duplicate (may be followed by a digit to indicate multiple matrix spike duplicates within a sample set)

DUP Duplicate extraction and analysis. The sample was extracted and analyzed in duplicate.

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Redding, CA 96003-1412
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Fax No. 916 244-4109

ORGANIC ANALYSIS METHODS

✓ Check appropriate analysis method(s) and/or preparation method(s)

QAL Lab Reference No. R 9018

Parameter	Method	Method Source
Halogenated Volatile Organics	☐ 601	40 CFR 136
	☒ 5030A/8010A	SW-846, 3rd Ed.
Aromatic Volatile Organics	☐ 602	40 CFR 136
	☒ 5030A/8020	SW-846, 3rd Ed.
Phenols - Determinative	☐ 604	40 CFR 136
	☐ 8040A	SW-846, 3rd Ed.
- *Extraction*	☐ 3520A/3550	SW-846, 3rd Ed.
- *Clean-Up*	☐ 3640/3650A	SW-846, 3rd Ed.
Chlor. Pest./PCB - Determinative	☐ 608	40 CFR 136
	☒ 8080	SW-846, 3rd Ed.
	☐ CLP	SOW OLM01.9
- *Extraction*	☒ 3520A/3550	SW-846, 3rd Ed.
Clean-Up	☒ 3620A/3640/3660A	SW-846, 3rd Ed.
Organo-P Pesticides - Determinative	☐ 8140A	SW-846, 3rd Ed.
- *Extraction*	☐ 3520A/3550	SW-846, 3rd Ed.
- *Clean-Up*	☐ 3620A/3640	SW-846, 3rd Ed.
Chlorinated Herbicides	☐ 8150A	SW-846, 3rd Ed.
Volatile Organics	☐ 624	40 CFR 136
	☐ 524.2	EPA-600/4-88-039, 10/93
	☐ 8240A	SW-846, 3rd Ed.
	☐ CLP	SOW OLM01.9
Volatile Organics, Low Level	☐ CLP	Superfund Analytical Methods for Low Concentration Water for Organics Analysis, 10/92
Volatile Organics by GC/MS	☐ 8260	SW-846. 3rd Ed.
Semivolatile Org.- Determinative	☐ 625	40 CFR 136
	☐ 8270A	SW-846, 3rd Ed.
	☐ CLP	SOW OLM01.9
- *Extraction*	☐ 3520A/3550/3580A	SW-846, 3rd Ed.
- *Clean-Up*	☐ 3640/3650A/3660A	SW-846, 3rd Ed.

Each of the extraction methods indicated applies only to samples of the appropriate matrix.

The clean-up methods indicated do not necessarily apply to all samples in the deliver group. Refer to the case narrative or sample report for specific information.

Parameter	Method	Method Source
PAH - Determinative	☐ 610	40 CFR 136
	☐ 8310	SW-846, 3rd Ed.
- *Extraction*	☐ 3520A/3550	SW-846, 3rd Ed.
- *Clean-Up*	☐ 3630A	SW-846, 3rd Ed.
Chlorinated Phenols (CPAR)	☐ Internal	CPAR Project Report 825-1, Canadian Pulp and Paper Research Institute, 3/79
PCBs/Oil	☐ Internal	EPA-600/4-81-045
TFH/Gasoline	☐ CA LUFT	CA LUFT Manual, 5/88
	☐ AK Modified GRO	ADEC PUBL-AK 101, 2/93
	☐ WI Modified GRO	WI DNR PUBL-SW-140, 7/93
TFH/Diesel	☐ CA LUFT	CA LUFT Manual, 5/88
	☐ AK Modified DRO	ADEC PUBL-AK 101,1/93
	☐ WI Modified DRO	WI DNR PUBL-SW-141, 7/93
Formaldehyde	☐ 8315	SW-846 3rd Ed., Proposed Update II, 11/92
TCLP Extraction	☐ 1311	SW-846, 3rd Ed.

Each of the extraction methods indicated applies only to samples of the appropriate matrix.

The clean-up methods indicated do not necessarily apply to all samples in the deliver group. Refer to the case narrative or sample report for specific information.

Sample ID Cross-reference Table

QAL, Inc. Lab Sample ID		Client Sample ID	Collect Date	Sample Matrix	Additional Description
R9018001	FS	1B-GW2-A	11/03/94	Water	
R9018002	FS	1B-GW2-B	11/03/94	Water	
R9018003	FS	1B-GW3-A	11/03/94	Water	
R9018004	FS	1B-GW3-B	11/03/94	Water	
R9018005	FS	1B-GW4-A	11/03/94	Water	
R9018006	FS	1B-GW4-B	11/03/94	Water	
R9018007	FS	1B-GW1-A	11/03/94	Water	
R9018008	FS	1B-DECON	11/03/94	Water	

Quality Analytical Laboratories Inc.

5090 Caterpillar Road,
Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

CASE NARRATIVE
Inorganics

Laboratory Reference Number: R9018

Client/Project: ELF ATOCHEM

I. Holding Time:
All holding times were met.

II. Preparation/Digestion Exceptions:
None.

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. ICP Interference Check Sample:
All acceptance criteria were met.
(Not applicable for General Chemistry).

D. Spike Sample(s):
All acceptance criteria were met.

E. Duplicate Sample(s):
All acceptance criteria were met.

F. Laboratory Control Sample(s):
All acceptance criteria were met.

G. ICP Serial Dilution:
Not required for this level data package.
(Not applicable for General Chemistry).

H. Other:
None.

IV. Documentation Exceptions:
None.

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and QAL, Inc., both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

SIGNED: Fred Bickell DATE: 11/21/94
Fred R. Bickell
Inorganics Supervisor

Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Results
INORGANICS

Date Collected: 11/03/94
Date Received: 11/05/94
Sample Matrix: Water
Sample Description:

Client Sample ID: 1B-DECON
Lab ReferenceNum: R9018
Lab Sample ID: R9018008

CATEGORY NAME Analytical Parameter	Result	Units	Reporting Level	Date of Analysis	Analytical Method(s)
GENERAL					
pH	7.99	units		11/05/94	EPA150.1

(2000)

FDS

CASE NARRATIVE FOR PESTICIDES

LABORATORY: QAL

CASE NO : N/A

LAB ID : R9018

CLIENT : CH2M HILL/PDX
PROJECT : ELF ATOCHEM/PDX

CONTRACT NO.: N/A

SDG # : R9018

I. RECEIPT

A. Date: November 5, 1994

B. Sample Information:

LAB SAMPLE ID	CLIENT SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED
R9018001	1B-GW2-A	WATER	11/03/94	11/10/94	11/20/94
R9018002	1B-GW2-B	WATER	11/03/94	11/10/94	11/20/94
R9018003	1B-GW3-A	WATER	11/03/94	11/10/94	11/20/94
R9018004	1B-GW3-B	WATER	11/03/94	11/10/94	11/20/94
R9018005	1B-GW4-A	WATER	11/03/94	11/10/94	11/20/94
R9018005DL	1B-GW4-ADL	WATER	11/03/94	11/10/94	11/21/94
R9018006	1B-GW4-B	WATER	11/03/94	11/10/94	11/20/94
R9018008	1B-DECON	WATER	11/03/94	11/10/94	11/21/94
PWB11110	PWB11110	WATER	N/A	11/10/94	11/20/94

II. EXTRACTION

A. Holding Times: Holding times were met.

B. Extraction Exceptions : No exceptions were encountered.

III. ANALYSIS

A. Holding Times: Holding times were met.

B. Analytical Exceptions : Samples R9018002 (1B-GW2-B) and R9018006 (1B-GW4-B) were analyzed on a diluted basis due to the nature of the sample matrix. Reporting limits have been adjusted accordingly.

Samples R9018001 (1B-GW2-A) and R9018008 (1B-DECON) were analyzed on a diluted basis due to the concentration of target analytes. Reporting limits have been adjusted accordingly.

.1994E

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Due to the concentration of target analytes, sample R9018005 (1B-GW4-A) was re-analyzed on a diluted basis in order to obtain a detector response within the linear calibration range of the instrument. The results of both analyses are included for your information. Reporting limits have been adjusted accordingly.

IV. QUALITY CONTROL

A. Method Blank : The associated method blank met acceptable QC criteria.

B. Surrogate Recoveries : The surrogate recovery for Tetrachloro-m-xylene (TCX) in sample R9018001 (1B-GW2-A), was outside established laboratory QC limits. However, the surrogate recovery for Decachlorobiphenyl (DCB) was within laboratory limits. The method blank and laboratory control samples exhibited surrogate recoveries and target analytes within QC acceptance limits. This would indicate a possible matrix effect in this sample.

Surrogate recovery could not be determined for samples R9018002 (1B-GW2-B), R9018005 (1B-GW4-A), R9018005DL (1B-GW4-ADL), R9018006 (1B-GW4-B) and R9018008 (1B-DECON) due to the required dilutions.

C. Matrix Spike Results: N/A

V. I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Mark Fiala (for Brian Geers) 11/22/94

Brian Geers **Date**
Manager, Organics Division

mws.1994E

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-GW2-A

Sample Matrix: WATER
Dilution Factor: 10
% Moisture: N/A

Reference No : R9018001

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/20/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	0.50	U	ug/l
beta-BHC	0.50	U	ug/l
delta-BHC	0.50	U	ug/l
gamma-BHC (Lindane)	0.50	U	ug/l
Heptachlor	0.50	U	ug/l
Aldrin	0.50	U	ug/l
Heptachlor epoxide	0.50	U	ug/l
Endosulfan I	0.50	U	ug/l
Dieldrin	1.0	U	ug/l
4,4'-DDE	1.0	0.45 J	ug/l
Endrin	1.0	U	ug/l
Endosulfan II	1.0	U	ug/l
4,4'-DDD	1.0	12	ug/l
Endrin aldehyde	1.0	U	ug/l
Endosulfan sulfate	1.0	U	ug/l
4,4'-DDT	1.0	30	ug/l
Methoxychlor	5.0	U	ug/l
Chlordane (technical)	1.0	U	ug/l
Toxaphene	50	U	ug/l

Surrogate (SS1)	25	% Rec.
Surrogate (SS2)	19	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: _____

FORM I

s.1994E

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-GW2-B

Sample Matrix: WATER
Dilution Factor: 50
% Moisture: N/A

Reference No : R9018002

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/20/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	2.5	U	ug/l
beta-BHC	2.5	U	ug/l
delta-BHC	2.5	U	ug/l
gamma-BHC (Lindane)	2.5	U	ug/l
Heptachlor	2.5	U	ug/l
Aldrin	2.5	U	ug/l
Heptachlor epoxide	2.5	U	ug/l
Endosulfan I	2.5	U	ug/l
Dieldrin	5.0	U	ug/l
4,4'-DDE	5.0	U	ug/l
Endrin	5.0	U	ug/l
Endosulfan II	5.0	U	ug/l
4,4'-DDD	5.0	5.0	ug/l
Endrin aldehyde	5.0	U	ug/l
Endosulfan sulfate	5.0	U	ug/l
4,4'-DDT	5.0	11	ug/l
Methoxychlor	25	U	ug/l
Chlordane (technical)	5.0	U	ug/l
Toxaphene	250	U	ug/l

Surrogate (SS1)	ND	% Rec.
Surrogate (SS2)	ND	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: Mark Fish

FORM I

mws.1994E

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-GW3-A

Sample Matrix: WATER
Dilution Factor: 1.0
% Moisture: N/A

Reference No : R9018003

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/20/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	0.050	U	ug/l
beta-BHC	0.050	U	ug/l
delta-BHC	0.050	U	ug/l
gamma-BHC (Lindane)	0.050	U	ug/l
Heptachlor	0.050	U	ug/l
Aldrin	0.050	U	ug/l
Heptachlor epoxide	0.050	U	ug/l
Endosulfan I	0.050	U	ug/l
Dieldrin	0.100	U	ug/l
4,4'-DDE	0.100	U	ug/l
Endrin	0.100	U	ug/l
Endosulfan II	0.100	U	ug/l
4,4'-DDD	0.100	U	ug/l
Endrin aldehyde	0.100	U	ug/l
Endosulfan sulfate	0.100	U	ug/l
4,4'-DDT	0.100	0.36	ug/l
Methoxychlor	0.50	U	ug/l
Chlordane (technical)	0.100	U	ug/l
Toxaphene	5.0	U	ug/l

Surrogate (SS1)	55	% Rec.
Surrogate (SS2)	17	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: _____

FORM I

.s.1994E

Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-GW3-B

Sample Matrix: WATER
Dilution Factor: 1.0
% Moisture: N/A

Reference No : R9018004

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/20/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	0.050	U	ug/l
beta-BHC	0.050	U	ug/l
delta-BHC	0.050	U	ug/l
gamma-BHC (Lindane)	0.050	U	ug/l
Heptachlor	0.050	U	ug/l
Aldrin	0.050	U	ug/l
Heptachlor epoxide	0.050	U	ug/l
Endosulfan I	0.050	U	ug/l
Dieldrin	0.100	U	ug/l
4,4'-DDE	0.100	U	ug/l
Endrin	0.100	U	ug/l
Endosulfan II	0.100	U	ug/l
4,4'-DDD	0.100	U	ug/l
Endrin aldehyde	0.100	U	ug/l
Endosulfan sulfate	0.100	U	ug/l
4,4'-DDT	0.100	U	ug/l
Methoxychlor	0.50	U	ug/l
Chlordane (technical)	0.100	U	ug/l
Toxaphene	5.0	U	ug/l

Surrogate (SS1)	60	% Rec.
Surrogate (SS2)	15	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: _____

FORM I

mws.1994E

Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-GW4-A

Sample Matrix: WATER
Dilution Factor: 100
% Moisture: N/A

Reference No : R9018005

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/20/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	5.0	U	ug/l
beta-BHC	5.0	U	ug/l
delta-BHC	5.0	U	ug/l
gamma-BHC (Lindane)	5.0	U	ug/l
Heptachlor	5.0	U	ug/l
Aldrin	5.0	U	ug/l
Heptachlor epoxide	5.0	U	ug/l
Endosulfan I	5.0	U	ug/l
Dieldrin	10	U	ug/l
4,4'-DDE	10	U	ug/l
Endrin	10	U	ug/l
Endosulfan II	10	U	ug/l
4,4'-DDD	10	11	ug/l
Endrin aldehyde	10	U	ug/l
Endosulfan sulfate	10	U	ug/l
4,4'-DDT	10	370 E	ug/l
Methoxychlor	50	U	ug/l
Chlordane (technical)	10	U	ug/l
Toxaphene	500	U	ug/l

Surrogate (SS1)	ND	% Rec.
Surrogate (SS2)	ND	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: Mark Fowler

FORM I

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-GW4-ADL

Sample Matrix: WATER
Dilution Factor: 1000
% Moisture: N/A

Reference No : R9018005DL

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/21/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	50	U	ug/l
beta-BHC	50	U	ug/l
delta-BHC	50	U	ug/l
gamma-BHC (Lindane)	50	U	ug/l
Heptachlor	50	U	ug/l
Aldrin	50	U	ug/l
Heptachlor epoxide	50	U	ug/l
Endosulfan I	50	U	ug/l
Dieldrin	100	U	ug/l
4,4'-DDE	100	U	ug/l
Endrin	100	U	ug/l
Endosulfan II	100	U	ug/l
4,4'-DDD	100	U	ug/l
Endrin aldehyde	100	U	ug/l
Endosulfan sulfate	100	U	ug/l
4,4'-DDT	100	500	ug/l
Methoxychlor	500	U	ug/l
Chlordane (technical)	100	U	ug/l
Toxaphene	5000	U	ug/l

Surrogate (SS1)	ND	% Rec.
Surrogate (SS2)	ND	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: [signature]

FORM I

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-GW4-B

Sample Matrix: WATER
Dilution Factor: 50
% Moisture: N/A

Reference No : R9018006

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/20/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	2.5	U	ug/l
beta-BHC	2.5	U	ug/l
delta-BHC	2.5	U	ug/l
gamma-BHC (Lindane)	2.5	U	ug/l
Heptachlor	2.5	U	ug/l
Aldrin	2.5	U	ug/l
Heptachlor epoxide	2.5	U	ug/l
Endosulfan I	2.5	U	ug/l
Dieldrin	5.0	U	ug/l
4,4'-DDE	5.0	U	ug/l
Endrin	5.0	U	ug/l
Endosulfan II	5.0	U	ug/l
4,4'-DDD	5.0	U	ug/l
Endrin aldehyde	5.0	U	ug/l
Endosulfan sulfate	5.0	U	ug/l
4,4'-DDT	5.0	U	ug/l
Methoxychlor	25	U	ug/l
Chlordane (technical)	5.0	U	ug/l
Toxaphene	250	U	ug/l

Surrogate (SS1)	ND	% Rec.
Surrogate (SS2)	ND	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: _____

FORM I

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: 1B-DECON

Sample Matrix: WATER
Dilution Factor: 500
% Moisture: N/A

Reference No : R9018008

Date Sampled : 11/03/94
Date Received : 11/05/94
Date Extracted: 11/10/94
Date Analyzed : 11/21/94

Compounds	Reporting Limit	Sample Result	Units
alpha-BHC	25	U	ug/l
beta-BHC	25	U	ug/l
delta-BHC	25	U	ug/l
gamma-BHC (Lindane)	25	U	ug/l
Heptachlor	25	U	ug/l
Aldrin	25	U	ug/l
Heptachlor epoxide	25	U	ug/l
Endosulfan I	25	U	ug/l
Dieldrin	50	U	ug/l
4,4'-DDE	50	8.2 J	ug/l
Endrin	50	U	ug/l
Endosulfan II	50	U	ug/l
4,4'-DDD	50	23 J	ug/l
Endrin aldehyde	50	U	ug/l
Endosulfan sulfate	50	U	ug/l
4,4'-DDT	50	990	ug/l
Methoxychlor	250	U	ug/l
Chlordane (technical)	50	U	ug/l
Toxaphene	2500	U	ug/l

Surrogate (SS1)	ND	% Rec.
Surrogate (SS2)	ND	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.
ND = Surrogate not determined due to required dilution.

Comments:

Approved By: _____

FORM I

mws.1994E

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

PESTICIDES
Method: 8080 (MOD)

Client: CH2M HILL/PDX
Client Sample ID: PWB11110

Reference No : PWB11110

Sample Matrix: WATER
Dilution Factor: 1
% Moisture: N/A

Date Sampled : N/A
Date Received : N/A
Date Extracted: 11/10/94
Date Analyzed : 11/20/94

Compounds	Reporting Limit	Method Blank Result	Units
alpha-BHC	0.050	U	ug/l
beta-BHC	0.050	U	ug/l
delta-BHC	0.050	U	ug/l
gamma-BHC (Lindane)	0.050	U	ug/l
Heptachlor	0.050	U	ug/l
Aldrin	0.050	U	ug/l
Heptachlor epoxide	0.050	U	ug/l
Endosulfan I	0.050	U	ug/l
Dieldrin	0.100	U	ug/l
4,4'-DDE	0.100	U	ug/l
Endrin	0.100	U	ug/l
Endosulfan II	0.100	U	ug/l
4,4'-DDD	0.100	U	ug/l
Endrin aldehyde	0.100	U	ug/l
Endosulfan sulfate	0.100	U	ug/l
4,4'-DDT	0.100	U	ug/l
Methoxychlor	0.50	U	ug/l
Chlordane (technical)	0.100	U	ug/l
Toxaphene	5.0	U	ug/l

Surrogate (SS1)	63	% Rec.
Surrogate (SS2)	72	% Rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.
(SS1) Tetrachloro-m-xylene used as surrogate standard.
(SS2) Decachlorobiphenyl used as surrogate standard.

Comments:

Approved By: [signature]

FORM I

..ws.1994E

Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

CASE NARRATIVE FOR HALOCARBONS/AROMATICS

LABORATORY :	QAL	CLIENT :	CH2M Hill/PDX ELF ATOCHEM
CASE NO. :	N/A	CONTRACT NO.:	N/A
LAB REF. NO.:	R9018	SDG NO. :	R9018

I. RECEIPT

A. Date: November 5, 1994

B. Sample Information:

LAB SAMPLE ID	CLIENT SAMPLE ID	SAMPLE MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED
R9018001	1B-GW2-A	WATER	11/03/94	N/A	11/08/94
R9018001DL	1B-GW2-ADL	WATER	11/03/94	N/A	11/10/94
R9018002	1B-GW2-B	WATER	11/03/94	N/A	11/08/94
R9018002DL	1B-GW2-BDL	WATER	11/03/94	N/A	11/10/94
R9018003	1B-GW3-A	WATER	11/03/94	N/A	11/08/94
R9018003DL	1B-GW3-ADL	WATER	11/03/94	N/A	11/10/94
R9018004	1B-GW3-B	WATER	11/03/94	N/A	11/08/94
R9018004DL	1B-GW3-BDL	WATER	11/03/94	N/A	11/11/94
R9018005	1B-GW4-A	WATER	11/03/94	N/A	11/08/94
R9018005DL	1B-GW4-ADL	WATER	11/03/94	N/A	11/11/94
R9018006	1B-GW4-B	WATER	11/03/94	N/A	11/08/94
R9018006DL	1B-GW4-BDL	WATER	11/03/94	N/A	11/11/94
R9018007	1B-GW1-A	WATER	11/03/94	N/A	11/08/94
R9018007DL	1B-GW1-ADL	WATER	11/03/94	N/A	11/11/94
R9018008	1B-DECON	WATER	11/03/94	N/A	11/08/94
R9018008DL	1B-DECONDL	WATER	11/03/94	N/A	11/11/94
VWB11108	VWB11108	WATER	N/A	N/A	11/08/94
VWB11110	VWB11110	WATER	N/A	N/A	11/10/94
VWB11111	VWB11111	WATER	N/A	N/A	11/11/94

C. Documentation Exceptions : No exceptions were encountered.

II. EXTRACTION

A. Holding Times: Medium level protocol was not performed; therefore holding time is not applicable.

B. Extraction Exceptions : No exceptions were encountered.

III. ANALYSIS

A. Holding Times: All of the samples were originally analyzed within holding time. However, due to the extreme concentration of Chlorobenzene in the samples, they were re-analyzed on a diluted basis outside holding time. .(Corrective Action Report #GC-94047).

kdh.019

B. Analytical Exceptions : All of the samples were originally analyzed for Method 8020 only. Upon review of the data, it was determined that a significant number of halogenated volatiles were also present in the samples. Therefore, target analytes for both Method 8010 and 8020 will be reported. The results reported for Method 8010 are semi-quantitative only since the calibration standards did not meet method criteria for those compounds.

Due to the concentration of target analytes, all of the samples were re-analyzed on a diluted basis in order to obtain a detector response within the linear calibration range of the instrument. The results of all analyses are included for your information. Reporting limits have been adjusted accordingly.

IV. QUALITY CONTROL

A. Method Blank : The associated method blanks met QC acceptance criteria.

B. Surrogate Recoveries : The surrogate recoveries met QC acceptance criteria.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

(for Brian Geers) 11/18/94

Brian Geers
Manager, Organics Division

Date

kdh.019

Quality Analytical Laboratories Inc.

5090 Caterpillar Road, Redding, CA 96003-1412

916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018001	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW2-A

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	U	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	1.2	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	U	ug/L
107-06-2	1,2-Dichloroethane	1.0	U	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	880 E	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	U	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	U	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	2.3	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	U	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		93	% rec.
462-06-6	Fluorobenzene-SS		80	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018001DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	100	Date Analyzed:	11/10/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW2-ADL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	100	U	ug/L
74-83-9	Bromomethane	100	U	ug/L
75-71-8	Dichlorodifluoromethane	100	U	ug/L
75-01-4	Vinyl chloride	100	U	ug/L
75-00-3	Chloroethane	100	U	ug/L
75-09-2	Dichloromethane	500	U	ug/L
75-69-4	Trichlorofluoromethane	100	U	ug/L
75-35-4	1,1-Dichloroethene	100	U	ug/L
75-34-3	1,1-Dichloroethane	100	U	ug/L
156-60-5	trans-1,2-Dichloroethene	100	U	ug/L
67-66-3	Chloroform	100	U	ug/L
107-06-2	1,2-Dichloroethane	100	U	ug/L
71-55-6	1,1,1-Trichloroethane	100	U	ug/L
56-23-5	Carbon tetrachloride	100	U	ug/L
75-27-4	Bromodichloromethane	100	U	ug/L
78-87-5	1,2-Dichloropropane	100	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	100	U	ug/L
79-01-6	Trichloroethene	100	U	ug/L
124-48-1	Dibromochloromethane	100	U	ug/L
79-00-5	1,1,2-Trichloroethane	100	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	100	U	ug/L
75-25-2	Bromoform	100	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	100	U	ug/L
127-18-4	Tetrachloroethene	100	U	ug/L
108-90-7	Chlorobenzene	100	10000 D	ug/L
541-73-1	1,3-Dichlorobenzene	100	U	ug/L
95-50-1	1,2-Dichlorobenzene	100	U	ug/L
106-46-7	1,4-Dichlorobenzene	100	U	ug/L
1634-04-4	tert-Butyl methyl ether	100	U	ug/L
71-43-2	Benzene	100	U	ug/L
108-88-3	Toluene	100	U	ug/L
100-41-4	Ethylbenzene	100	U	ug/L
1330-20-7	Total xylenes	100	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		101	% rec.
462-06-6	Fluorobenzene-SS		94	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018002	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW2-B

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	U	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	2.2	ug/L
107-06-2	1,2-Dichloroethane	1.0	U	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	1100 E	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	U	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	U	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	1.1	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	U	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		95	% rec.
462-06-6	Fluorobenzene-SS		80	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018002DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	100	Date Analyzed:	11/10/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW2-BDL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	100	U	ug/L
74-83-9	Bromomethane	100	U	ug/L
75-71-8	Dichlorodifluoromethane	100	U	ug/L
75-01-4	Vinyl chloride	100	U	ug/L
75-00-3	Chloroethane	100	U	ug/L
75-09-2	Dichloromethane	500	U	ug/L
75-69-4	Trichlorofluoromethane	100	U	ug/L
75-35-4	1,1-Dichloroethene	100	U	ug/L
75-34-3	1,1-Dichloroethane	100	U	ug/L
156-60-5	trans-1,2-Dichloroethene	100	U	ug/L
67-66-3	Chloroform	100	U	ug/L
107-06-2	1,2-Dichloroethane	100	U	ug/L
71-55-6	1,1,1-Trichloroethane	100	U	ug/L
56-23-5	Carbon tetrachloride	100	U	ug/L
75-27-4	Bromodichloromethane	100	U	ug/L
78-87-5	1,2-Dichloropropane	100	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	100	U	ug/L
79-01-6	Trichloroethene	100	U	ug/L
124-48-1	Dibromochloromethane	100	U	ug/L
79-00-5	1,1,2-Trichloroethane	100	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	100	U	ug/L
75-25-2	Bromoform	100	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	100	U	ug/L
127-18-4	Tetrachloroethene	100	U	ug/L
108-90-7	Chlorobenzene	100	U	ug/L
541-73-1	1,3-Dichlorobenzene	100	9100 D	ug/L
95-50-1	1,2-Dichlorobenzene	100	U	ug/L
106-46-7	1,4-Dichlorobenzene	100	U	ug/L
1634-04-4	tert-Butyl methyl ether	100	U	ug/L
71-43-2	Benzene	100	U	ug/L
108-88-3	Toluene	100	U	ug/L
100-41-4	Ethylbenzene	100	U	ug/L
1330-20-7	Total xylenes	100	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		99	% rec.
462-06-6	Fluorobenzene-SS		96	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018003	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW3-A

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	4.5	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	1.7	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	260 E	ug/L
107-06-2	1,2-Dichloroethane	1.0	2.1	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	20	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	1.2	ug/L
108-90-7	Chlorobenzene	1.0	4500 E	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	U	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	5.8	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	8.5	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	3.1	ug/L
108-88-3	Toluene	1.0	1.3	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		89	% rec.
462-06-6	Fluorobenzene-SS		67	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018003DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	2000	Date Analyzed:	11/10/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW3-ADL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	2000	U	ug/L
74-83-9	Bromomethane	2000	U	ug/L
75-71-8	Dichlorodifluoromethane	2000	U	ug/L
75-01-4	Vinyl chloride	2000	U	ug/L
75-00-3	Chloroethane	2000	U	ug/L
75-09-2	Dichloromethane	10000	U	ug/L
75-69-4	Trichlorofluoromethane	2000	U	ug/L
75-35-4	1,1-Dichloroethene	2000	U	ug/L
75-34-3	1,1-Dichloroethane	2000	U	ug/L
156-60-5	trans-1,2-Dichloroethene	2000	U	ug/L
67-66-3	Chloroform	2000	U	ug/L
107-06-2	1,2-Dichloroethane	2000	U	ug/L
71-55-6	1,1,1-Trichloroethane	2000	U	ug/L
56-23-5	Carbon tetrachloride	2000	U	ug/L
75-27-4	Bromodichloromethane	2000	U	ug/L
78-87-5	1,2-Dichloropropane	2000	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	2000	U	ug/L
79-01-6	Trichloroethene	2000	U	ug/L
124-48-1	Dibromochloromethane	2000	U	ug/L
79-00-5	1,1,2-Trichloroethane	2000	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	2000	U	ug/L
75-25-2	Bromoform	2000	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	2000	U	ug/L
127-18-4	Tetrachloroethene	2000	U	ug/L
108-90-7	Chlorobenzene	2000	U	ug/L
541-73-1	1,3-Dichlorobenzene	2000	93000 D	ug/L
95-50-1	1,2-Dichlorobenzene	2000	U	ug/L
106-46-7	1,4-Dichlorobenzene	2000	U	ug/L
1634-04-4	tert-Butyl methyl ether	2000	U	ug/L
71-43-2	Benzene	2000	U	ug/L
108-88-3	Toluene	2000	U	ug/L
100-41-4	Ethylbenzene	2000	U	ug/L
1330-20-7	Total xylenes	2000	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		93	% rec.
462-06-6	Fluorobenzene-SS		90	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018004	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW3-B

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	3.3	ug/L
75-09-2	Dichloromethane	5.0	3.6	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	1.0	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	200 E	ug/L
107-06-2	1,2-Dichloroethane	1.0	1.7	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	12	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	1500 E	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	U	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	3.1	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	4.9	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	1.9	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		94	% rec.
462-06-6	Fluorobenzene-SS		72	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018004DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	2000	Date Analyzed:	11/11/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW3-BDL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	2000	U	ug/L
74-83-9	Bromomethane	2000	U	ug/L
75-71-8	Dichlorodifluoromethane	2000	U	ug/L
75-01-4	Vinyl chloride	2000	U	ug/L
75-00-3	Chloroethane	2000	U	ug/L
75-09-2	Dichloromethane	10000	U	ug/L
75-69-4	Trichlorofluoromethane	2000	U	ug/L
75-35-4	1,1-Dichloroethene	2000	U	ug/L
75-34-3	1,1-Dichloroethane	2000	U	ug/L
156-60-5	trans-1,2-Dichloroethene	2000	U	ug/L
67-66-3	Chloroform	2000	U	ug/L
107-06-2	1,2-Dichloroethane	2000	U	ug/L
71-55-6	1,1,1-Trichloroethane	2000	U	ug/L
56-23-5	Carbon tetrachloride	2000	U	ug/L
75-27-4	Bromodichloromethane	2000	U	ug/L
78-87-5	1,2-Dichloropropane	2000	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	2000	U	ug/L
79-01-6	Trichloroethene	2000	U	ug/L
124-48-1	Dibromochloromethane	2000	U	ug/L
79-00-5	1,1,2-Trichloroethane	2000	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	2000	U	ug/L
75-25-2	Bromoform	2000	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	2000	U	ug/L
127-18-4	Tetrachloroethene	2000	U	ug/L
108-90-7	Chlorobenzene	2000	U	ug/L
541-73-1	1,3-Dichlorobenzene	2000	24000 D	ug/L
95-50-1	1,2-Dichlorobenzene	2000	U	ug/L
106-46-7	1,4-Dichlorobenzene	2000	U	ug/L
1634-04-4	tert-Butyl methyl ether	2000	U	ug/L
71-43-2	Benzene	2000	U	ug/L
108-88-3	Toluene	2000	U	ug/L
100-41-4	Ethylbenzene	2000	U	ug/L
1330-20-7	Total xylenes	2000	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		92	% rec.
462-06-6	Fluorobenzene-SS		88	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018005	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW4-A

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	1.4	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	67	ug/L
75-09-2	Dichloromethane	5.0	1.9	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	180 E	ug/L
107-06-2	1,2-Dichloroethane	1.0	11	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	9.1	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	17	ug/L
108-90-7	Chlorobenzene	1.0	1200 E	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	2.7	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	39	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	120 E	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	4.7	ug/L
108-88-3	Toluene	1.0	2.2	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		69	% rec.
462-06-6	Fluorobenzene-SS		47	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018005DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	10000	Date Analyzed:	11/11/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW4-ADL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	10000	U	ug/L
74-83-9	Bromomethane	10000	U	ug/L
75-71-8	Dichlorodifluoromethane	10000	U	ug/L
75-01-4	Vinyl chloride	10000	U	ug/L
75-00-3	Chloroethane	10000	U	ug/L
75-09-2	Dichloromethane	50000	U	ug/L
75-69-4	Trichlorofluoromethane	10000	U	ug/L
75-35-4	1,1-Dichloroethene	10000	U	ug/L
75-34-3	1,1-Dichloroethane	10000	U	ug/L
156-60-5	trans-1,2-Dichloroethene	10000	U	ug/L
67-66-3	Chloroform	10000	U	ug/L
107-06-2	1,2-Dichloroethane	10000	U	ug/L
71-55-6	1,1,1-Trichloroethane	10000	U	ug/L
56-23-5	Carbon tetrachloride	10000	U	ug/L
75-27-4	Bromodichloromethane	10000	U	ug/L
78-87-5	1,2-Dichloropropane	10000	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	10000	U	ug/L
79-01-6	Trichloroethene	10000	U	ug/L
124-48-1	Dibromochloromethane	10000	U	ug/L
79-00-5	1,1,2-Trichloroethane	10000	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	10000	U	ug/L
75-25-2	Bromoform	10000	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	10000	U	ug/L
127-18-4	Tetrachloroethene	10000	U	ug/L
108-90-7	Chlorobenzene	10000	U	ug/L
541-73-1	1,3-Dichlorobenzene	10000	370000 D	ug/L
95-50-1	1,2-Dichlorobenzene	10000	U	ug/L
106-46-7	1,4-Dichlorobenzene	10000	U	ug/L
1634-04-4	tert-Butyl methyl ether	10000	U	ug/L
71-43-2	Benzene	10000	U	ug/L
108-88-3	Toluene	10000	U	ug/L
100-41-4	Ethylbenzene	10000	U	ug/L
1330-20-7	Total xylenes	10000	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		96	% rec.
462-06-6	Fluorobenzene-SS		87	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018006	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW4-B

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	34	ug/L
75-09-2	Dichloromethane	5.0	1.7	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	250 E	ug/L
107-06-2	1,2-Dichloroethane	1.0	11	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	5.1	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	14	ug/L
108-90-7	Chlorobenzene	1.0	4500 E	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	2.1	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	37	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	100	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	2.4	ug/L
108-88-3	Toluene	1.0	2.2	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		81	% rec.
462-06-6	Fluorobenzene-SS		58	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018006DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	5000	Date Analyzed:	11/11/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW4-BDL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	5000	U	ug/L
74-83-9	Bromomethane	5000	U	ug/L
75-71-8	Dichlorodifluoromethane	5000	U	ug/L
75-01-4	Vinyl chloride	5000	U	ug/L
75-00-3	Chloroethane	5000	U	ug/L
75-09-2	Dichloromethane	25000	U	ug/L
75-69-4	Trichlorofluoromethane	5000	U	ug/L
75-35-4	1,1-Dichloroethene	5000	U	ug/L
75-34-3	1,1-Dichloroethane	5000	U	ug/L
156-60-5	trans-1,2-Dichloroethene	5000	U	ug/L
67-66-3	Chloroform	5000	U	ug/L
107-06-2	1,2-Dichloroethane	5000	U	ug/L
71-55-6	1,1,1-Trichloroethane	5000	U	ug/L
56-23-5	Carbon tetrachloride	5000	U	ug/L
75-27-4	Bromodichloromethane	5000	U	ug/L
78-87-5	1,2-Dichloropropane	5000	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	5000	U	ug/L
79-01-6	Trichloroethene	5000	U	ug/L
124-48-1	Dibromochloromethane	5000	U	ug/L
79-00-5	1,1,2-Trichloroethane	5000	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	5000	U	ug/L
75-25-2	Bromoform	5000	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	5000	U	ug/L
127-18-4	Tetrachloroethene	5000	U	ug/L
108-90-7	Chlorobenzene	5000	170000 D	ug/L
541-73-1	1,3-Dichlorobenzene	5000	U	ug/L
95-50-1	1,2-Dichlorobenzene	5000	U	ug/L
106-46-7	1,4-Dichlorobenzene	5000	U	ug/L
1634-04-4	tert-Butyl methyl ether	5000	U	ug/L
71-43-2	Benzene	5000	U	ug/L
108-88-3	Toluene	5000	U	ug/L
100-41-4	Ethylbenzene	5000	U	ug/L
1330-20-7	Total xylenes	5000	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		96	% rec.
462-06-6	Fluorobenzene-SS		95	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

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Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018007	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW1-A

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	U	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	U	ug/L
107-06-2	1,2-Dichloroethane	1.0	U	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	U	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	410 E	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	U	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	U	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	U	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		89	% rec.
462-06-6	Fluorobenzene-SS		80	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM 1

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018007DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	20	Date Analyzed:	11/11/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-GW1-ADL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	20	U	ug/L
74-83-9	Bromomethane	20	U	ug/L
75-71-8	Dichlorodifluoromethane	20	U	ug/L
75-01-4	Vinyl chloride	20	U	ug/L
75-00-3	Chloroethane	20	U	ug/L
75-09-2	Dichloromethane	100	U	ug/L
75-69-4	Trichlorofluoromethane	20	U	ug/L
75-35-4	1,1-Dichloroethene	20	U	ug/L
75-34-3	1,1-Dichloroethane	20	U	ug/L
156-60-5	trans-1,2-Dichloroethene	20	U	ug/L
67-66-3	Chloroform	20	U	ug/L
107-06-2	1,2-Dichloroethane	20	U	ug/L
71-55-6	1,1,1-Trichloroethane	20	U	ug/L
56-23-5	Carbon tetrachloride	20	U	ug/L
75-27-4	Bromodichloromethane	20	U	ug/L
78-87-5	1,2-Dichloropropane	20	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	20	U	ug/L
79-01-6	Trichloroethene	20	U	ug/L
124-48-1	Dibromochloromethane	20	U	ug/L
79-00-5	1,1,2-Trichloroethane	20	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	20	U	ug/L
75-25-2	Bromoform	20	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	20	U	ug/L
127-18-4	Tetrachloroethene	20	U	ug/L
108-90-7	Chlorobenzene	20	870 D	ug/L
541-73-1	1,3-Dichlorobenzene	20	U	ug/L
95-50-1	1,2-Dichlorobenzene	20	U	ug/L
106-46-7	1,4-Dichlorobenzene	20	U	ug/L
1634-04-4	tert-Butyl methyl ether	20	U	ug/L
71-43-2	Benzene	20	U	ug/L
108-88-3	Toluene	20	U	ug/L
100-41-4	Ethylbenzene	20	U	ug/L
1330-20-7	Total xylenes	20	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		89	% rec.
462-06-6	Fluorobenzene-SS		84	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018008	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-DECON

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	U	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	U	ug/L
107-06-2	1,2-Dichloroethane	1.0	U	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	U	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	220 E	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	U	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	U	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	U	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	2.1	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		92	% rec.
462-06-6	Fluorobenzene-SS		81	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	CH2M Hill/PDX	Laboratory:	QAL	Date Sampled:	11/03/94
Project:	ELF ATOCHEM	Lab Sample ID:	R9018008DL	Date Received:	11/05/94
Proj No:	OPE037640.A0	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	10	Date Analyzed:	11/11/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: 1B-DECONDL

CAS Number	Compound	Reporting Limit	Sample Result	Reporting Units
74-87-3	Chloromethane	10	U	ug/L
74-83-9	Bromomethane	10	U	ug/L
75-71-8	Dichlorodifluoromethane	10	U	ug/L
75-01-4	Vinyl chloride	10	U	ug/L
75-00-3	Chloroethane	10	U	ug/L
75-09-2	Dichloromethane	50	U	ug/L
75-69-4	Trichlorofluoromethane	10	U	ug/L
75-35-4	1,1-Dichloroethene	10	U	ug/L
75-34-3	1,1-Dichloroethane	10	U	ug/L
156-60-5	trans-1,2-Dichloroethene	10	U	ug/L
67-66-3	Chloroform	10	U	ug/L
107-06-2	1,2-Dichloroethane	10	U	ug/L
71-55-6	1,1,1-Trichloroethane	10	U	ug/L
56-23-5	Carbon tetrachloride	10	U	ug/L
75-27-4	Bromodichloromethane	10	U	ug/L
78-87-5	1,2-Dichloropropane	10	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	10	U	ug/L
79-01-6	Trichloroethene	10	U	ug/L
124-48-1	Dibromochloromethane	10	U	ug/L
79-00-5	1,1,2-Trichloroethane	10	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	10	U	ug/L
75-25-2	Bromoform	10	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	10	U	ug/L
127-18-4	Tetrachloroethene	10	U	ug/L
108-90-7	Chlorobenzene	10	190 D	ug/L
541-73-1	1,3-Dichlorobenzene	10	U	ug/L
95-50-1	1,2-Dichlorobenzene	10	U	ug/L
106-46-7	1,4-Dichlorobenzene	10	U	ug/L
1634-04-4	tert-Butyl methyl ether	10	U	ug/L
71-43-2	Benzene	10	U	ug/L
108-88-3	Toluene	10	U	ug/L
100-41-4	Ethylbenzene	10	U	ug/L
1330-20-7	Total xylenes	10	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		91	% rec.
462-06-6	Fluorobenzene-SS		86	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	N/A	Laboratory:	QAL	Date Sampled:	N/A
Project:	N/A	Lab Sample ID:	VWB11108	Date Received:	N/A
Proj No:	N/A	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/08/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: VWB11108

CAS Number	Compound	Reporting Limit	Method Blank Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	U	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	U	ug/L
107-06-2	1,2-Dichloroethane	1.0	U	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	U	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	U	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	U	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	U	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	U	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		83	% rec.
462-06-6	Fluorobenzene-SS		77	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	N/A	Laboratory:	QAL	Date Sampled:	N/A
Project:	N/A	Lab Sample ID:	VWB11110	Date Received:	N/A
Proj No:	N/A	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/10/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: VWB11110

CAS Number	Compound	Reporting Limit	Method Blank Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	U	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	U	ug/L
107-06-2	1,2-Dichloroethane	1.0	U	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	U	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	U	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	U	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	U	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	U	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		89	% rec.
462-06-6	Fluorobenzene-SS		86	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road, Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

Report of Analytical Data - Purgeable Halocarbons/Aromatics

Client:	N/A	Laboratory:	QAL	Date Sampled:	N/A
Project:	N/A	Lab Sample ID:	VWB11111	Date Received:	N/A
Proj No:	N/A	% Moisture:	N/A	Date Extracted:	N/A
Method:	8010/8020(MOD)	Dilution Factor:	1	Date Analyzed:	11/11/94
Matrix:	Water	Instrument ID:	VARIAN-3600	Analyst:	J.W.
Sampler:	N/A			Date Reported:	11/18/94

Client Sample ID/Description: VWB11111

CAS Number	Compound	Reporting Limit	Method Blank Result	Reporting Units
74-87-3	Chloromethane	1.0	U	ug/L
74-83-9	Bromomethane	1.0	U	ug/L
75-71-8	Dichlorodifluoromethane	1.0	U	ug/L
75-01-4	Vinyl chloride	1.0	U	ug/L
75-00-3	Chloroethane	1.0	U	ug/L
75-09-2	Dichloromethane	5.0	U	ug/L
75-69-4	Trichlorofluoromethane	1.0	U	ug/L
75-35-4	1,1-Dichloroethene	1.0	U	ug/L
75-34-3	1,1-Dichloroethane	1.0	U	ug/L
156-60-5	trans-1,2-Dichloroethene	1.0	U	ug/L
67-66-3	Chloroform	1.0	U	ug/L
107-06-2	1,2-Dichloroethane	1.0	U	ug/L
71-55-6	1,1,1-Trichloroethane	1.0	U	ug/L
56-23-5	Carbon tetrachloride	1.0	U	ug/L
75-27-4	Bromodichloromethane	1.0	U	ug/L
78-87-5	1,2-Dichloropropane	1.0	U	ug/L
10061-01-5	cis-1,3-Dichloropropene	1.0	U	ug/L
79-01-6	Trichloroethene	1.0	U	ug/L
124-48-1	Dibromochloromethane	1.0	U	ug/L
79-00-5	1,1,2-Trichloroethane	1.0	U	ug/L
10061-02-6	trans-1,3-Dichloropropene	1.0	U	ug/L
75-25-2	Bromoform	1.0	U	ug/L
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	ug/L
127-18-4	Tetrachloroethene	1.0	U	ug/L
108-90-7	Chlorobenzene	1.0	U	ug/L
541-73-1	1,3-Dichlorobenzene	1.0	U	ug/L
95-50-1	1,2-Dichlorobenzene	1.0	U	ug/L
106-46-7	1,4-Dichlorobenzene	1.0	U	ug/L
1634-04-4	tert-Butyl methyl ether	1.0	U	ug/L
71-43-2	Benzene	1.0	U	ug/L
108-88-3	Toluene	1.0	U	ug/L
100-41-4	Ethylbenzene	1.0	U	ug/L
1330-20-7	Total xylenes	1.0	U	ug/L
110-56-5	1,4-Dichlorobutane-SS		85	% rec.
462-06-6	Fluorobenzene-SS		85	% rec.

U = Compound analyzed for but not detected above reporting limit.
SS = Surrogate Standard reported as percent recovery.

Comments:

Approved by:

FORM I

kdh.019

Quality Analytical Laboratories Inc.
5090 Caterpillar Road,
Redding, CA 96003-1412
916 244-5227
Fax No. 916 244-4109

QAL

QUALITY ANALYTICAL LABORATORIES, INC.

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

Project #: OPE37640.A0

Purchase Order #:

Project Name: Acid Plant GW Sampling

Company Name: Atochem

Project Manager & Phone #: Mr. [ ] Ms. [X] Pamela Brody-Heine Dr. [ ] (503)235-5800

Report Copy to: Pamela Brody-Heine

Requested Completion Date: 11/18/94

Sampling Requirements: SDWA [ ] NPDES [ ] RCRA [ ] OTHER ____

Sample Disposal: Dispose [X] Return [ ]

LAB TEST CODES

ANALYSES REQUESTED

SHADED AREA-- FOR LAB USE ONLY

Lab 1 #: R9018

Lab 2 #:

Quote #:

Kit Request #:

Project #:

No. of Samples: Page: of:

COC Rev: Login: LIMS Ver: Ack Gen:

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	Pesticides only 8080	8020 VOCs	Lab filter Prior to Analysis	REMARKS	LAB 1 ID	LAB 2 ID
11/3/94	1100		X	X		1B-GW2-A	3		X				
	1100		X	X		1B-GW2-A	1	X				1	
	1100		X	X		1B-GW2-B	3		X	X			
	1100		X	X		1B-GW2-B	1	X		X	Unpreserved	2	
	1330		X	X		1B-GW3-A	3		X				
	1330		X	X		1B-GW3-A	1	X				3	
	1330		X	X		1B-GW3-B	3		X	X			
	1330		X	X		1B-GW3-B	1	X		X	Unpreserved	4	
	1500		X	X		1B-GW4-A	3		X				
	1500		X	X		1B-GW4-A	1	X				5	
	1600		X	X		1B-GW4-B	3		X	X	Unpreserved	6	

Sampled By & Title (Please sign and print name): Pamela Brody-Heine Proj. manager — Date/Time: 11/4/94 10Am

Relinquished By (Please sign and print name): Pamela Brody-Heine — Date/Time: 11/4/94 10Am

~~Received By~~ (Please sign and print name): PAMELA BRODY-HEINE — Date/Time:

Relinquished By (Please sign and print name): — Date/Time:

Received By (Please sign and print name): Shawn F. Duffy — Date/Time: 11-5-94 1145

Relinquished By (Please sign and print name): — Date/Time:

Received By (Please sign and print name): — Date/Time:

Shipped Via: UPS BUS Fed-Ex Hand Other ____

Shipping #: 397 7206 782 / 397 7206 773

Work Authorized By (Please sign and print name):

Remarks: Two coolers

HAZWRAP/NESSA: Y N

QC Level 1 2 3 Other: ____

COC Rec Y — ICE Y

Ana Req Y — TEMP 3°C

Cust Seal Y — Ph

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

000035

QUALITY ANALYTICAL LABORATORIES, INC.

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

Project #: OPE37640, Ap

Purchase Order #:

Project Name: Acid Plant GW Sampling

Company Name: Atochem

Project Manager & Phone #: Mr. [ ] Ms. [x] Dr. [ ] Pamela Brady-Heine (503) 235-5800

Report Copy to: Pamela Brady-Heine

Requested Completion Date: 11/18/94

Sampling Requirements: SDWA [ ] NPDES [ ] RCRA [ ] OTHER ____

Sample Disposal: Dispose [x] Return [ ]

LAB TEST CODES

ANALYSES REQUESTED

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	Pesticides only 8080	8020 VOCs		Lab filter prior to analysis	pH								REMARKS	LAB 1 ID	LAB 2 ID
11/3/94	1500		X	X		1B-GW4-B	1	X			X										6	
	1600		X	X		1B-GW1-A	3		X											if possible, do 8080 also.	7	
	1640		X	X		1B-DECON	1	X				X									8	
	1640		X	X		1B-DECON	3		X													

SHADED AREA– FOR LAB USE ONLY

Lab 1 #: R9018

Lab 2 #:

Quote #:

Kit Request #:

Project #:

No. of Samples: Page: of

COC Rev: Login: LIMS Ver: Ack Gen:

Sampled By & Title (Please sign and print name): Pamela Brady-Heine Proj. Manager — Date/Time: 11/4/94 10AM

Relinquished By (Please sign and print name): Pamela Brady-Heine — Date/Time: 11/4/94 10AM

Received By (Please sign and print name): PAMELA BRADY-HEINE — Date/Time:

Relinquished By (Please sign and print name): — Date/Time:

Received By (Please sign and print name): Sharon P. Duffy 11-5-94 — Date/Time: 1145

Relinquished By (Please sign and print name): — Date/Time:

Received By (Please sign and print name): — Date/Time:

Shipped Via: UPS BUS Fed-Ex Hand Other ____

Shipping #: 397 7206 782 / 397 7206 773

Work Authorized By (Please sign and print name):

Remarks: Two coolers

HAZWRAP/NESSA: Y N

QC Level 1 2 3 Other: ____

COC Rec Y | ICE Y

Ana Req Y | TEMP 3°C

Cust Seal Y | Ph

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

LAB FORM 240

000036

Copy To: Ray Terry
S.C. Mark F
Mark C
Krystal

ANALYSIS CHANGE ORDER

Route To:
Cli Srv
LIMS
Acct
COC File

Sample No (s): R9018-1, 2, 3, -4, 5, -6, -7, 8

Filled Out By: Mark Cichy

Filled Out Date: 11/16/94

Requested By: Pamela Brody-Heine

Requested Date: 11/14/94

Client/Project: ELF ATOCHEM

Detailed Description of Change: Cancel ARW
Add HAW1

Manager Approval
Org ( ) Inorg ( ) CliSrv (X)
MAC 11/16/94
init/date

Reason for Change:
Client Request

LIS DEPARTMENT USE ONLY

Action Taken/Comments Cancelled all ARWs. Added HAW1 to all samples. Did LIWkgrp.

Rcvd by LIMS: _____ (init/date) Entered LIMS: LQ 11/17/94 (init/date)

CLIENT SERVICES USE ONLY

Init/Date MAC 11/16/94 Include ACO in data pkg: Yes (X) No ( )

Action Taken/Comments

Client Contact: Pamela Brody-Heine Client Phone:

Client Contacted: yes By: Mark Cichy

ACCOUNTING USE ONLY

Action Taken/Comments

Adjustment Entered: _____ (init/date) Billing Month:

000037

Appendix C

Phase 1 Data Validation

MEMORANDUM CH2M HILL

TO: Pamela Brody-Heine/PDX

FROM: Donna Morgans/CVO

DATE: December 1, 1994

SUBJECT: Evaluation of Quality Assurance/Quality Control (QA/QC) Data Associated with Samples Collected for Elf Atochem

PROJECT: OPE37640.A0

Summary

Overall, the quality of the Elf Atochem sample results is of acceptable quality. This report summarizes the results of the QA/QC data associated with the analysis of soil and groundwater samples. Soil samples were collected on April 20 and 21, 1994 and were analyzed by Pacific Environmental Laboratory located in Beaverton, Oregon and product samples were collected on November 3, 1994 and were analyzed by Quality Analytical Laboratories, INC. located in Redding, California. Holding times, method blanks, surrogate spike recoveries, precision and accuracy, and laboratory control sample recoveries are evaluated in this memorandum. Nonconformances with project DQOs or QA/QC criteria are thoroughly discussed and identified in this report. Except for several VOC results, all sample results met all QA/QC criteria for the selected QC parameters. The following is a brief summary of the overall quality of the sample results.

> VOC results for one soil sample were qualified as estimates and flagged with a "J" for positive results or a "UJ" for the detection limit because the holding time QC acceptance criteria was not met.
>
> VOC results for one water sample and four soil samples were qualified as estimates and flagged with a "J" for positive results or a "UJ" for the detection limit because surrogate spike recoveries did not meet QC acceptance criteria.

Introduction

All samples were analyzed in accordance with and QA/QC criteria were taken from, *the Test Methods for Evaluating Solid Waste (SW 846)* and *the Methods for Chemical Analysis of Water and Wastes.* The following table lists the analytical method performed, together with the respective number and type of sample for each analysis.

Number of Samples	Aromatic VOCs EPA Method 8020	Number of Samples	Halogentated/Aromatic VOCs EPA Method 8010/8020
13	Soil samples	7 1	Groundwater samples Decon sample
Number of Samples	**Pesticides/PCBs EPA Method 8080**	**Number of Samples**	**Total Petroleum Hydrocarbons EPA Method 418.1**
26 6 1	Soil samples Groundwater samples (Pesticides only) Decon sample	2	Soil samples

Analytical results and QC summaries were provided for all analyses performed by Pacific Environmental Laboratory. QC summaries included method blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent difference (RPD) results or matrix spike recoveries and laboratory duplicate RPD results and laboratory control sample recoveries. Analytical results for samples and method blanks and surrogate spike recoveries were provided by Quality Analytical Laboratory. QC summary results were reviewed following the current version of the U.S. EPA Functional Guidelines for Evaluating Organics or Inorganics Analyses, where possible.

Holding Times

Holding time criteria monitor sample integrity that may be compromised over time.

Soil samples analyzed for VOCs have a 14-day analysis holding time requirement. Unpreserved water samples have a 7-day holding time requirement. Soil samples analyzed for organochlorinated pesticides have a 14-day extraction holding time requirement and a 40-day analysis holding time requirement following extraction. Water samples analyzed for organochlorinated pesticides have a 7-day extraction holding time requirement and a 40-day analysis holding time requirement following extraction. Soil samples analyzed for TPH have a 28-day analysis holding time requirement.

Except for one soil analyzed for VOCs, all soil samples were analyzed within their respective holding time requirements. Therefore, the majority of samples met the holding time QC acceptance criteria.

Soil sample 1A-SB3-3.5 was analyzed five days past the VOC analysis holding time requirement. VOC results for sample 1A-SB3-3.5 were qualified as estimates and flagged with a "J" for positive results or a "UJ" for the detection limit.

Groundwater samples were analyzed between five and eight days after the date of collection. Although several of the groundwater samples exceeded the analysis holding time requirement

by one day, sample results were not qualified. This is because the concentrations of target analytes were very high and exceeding the holding time requirement by one day would have a negligible effect on the analytical results.

Blanks

Blank criteria monitor sample contamination through carry-over and instrument sensitivity. A method blank should be analyzed with every analytical batch and should be contamination-free to meet QC acceptance criteria.

A method blank was reported with each analytical batch and all were contamination-free, therefore meeting QC acceptance criteria.

Sensitivity

Sensitivity criteria monitor the achievement of target detection limits.

The following table shows each target analyte and the actual MRL achieved by Pacific Environmental Laboratory and QAL. For soil samples, all positive results were adjusted for moisture content and reported on a "dry weight" basis. However, MRLs were not adjusted for moisture content and were reported on an "as received" basis.

Compound	Soil MRL Achieved by PEL(µg/kg)	Water MRL Achieved by QAL (µg/l)
Aromatic/Halogenated VOCs	0.50	1.0 - 5.0
Pesticides	100 - 3000	0.05 - 5.0
PCBs	1000	Not Applicable
TPH	20000	Not Applicable

The majority of water and soil samples analyzed for VOCs and pesticides required dilutions to bring high concentrations of target and/or nontarget compounds into the linear range of the instrument. All MRLs were properly adjusted by the dilution factor. The following lists the soil samples (and the dilution factors) that were required for Method 8020.

> 1A-SB1-2.7 (2X), 1A-SB9-4.3 (5X), 1A-SB11-3.0, 1A-SB13-4.7 (5X), 1A-SB15-11.6 (5X), 1A-SB1-4.0 (26X), 1A-SB1-8.5 (26X), 1A-SB1-15 (26X), 1A-SB6-5.1 (26X), 1A-SB14-5.6 (26X), and 1A-SB15-10.6 (1260X)

The following lists the water samples (and the dilution factors) that were required for Method 8010/8020.

1B-DECON (10X), 1B-GW1-A (20X), 1B-GW2-A (100X), 1B-GW2-B (100X), 1B-GW3-A (1000X), 1B-GW3-B (2000X), 1B-GW4-B (5000X), and 1B-GW4-A (10000X)

The following lists the soil samples (and the dilution factors) that were required for Method 8080.

1A-TP1-0.5 (2X), 1A-TP5-2.0 (2X), 1A-TP2-0.5 (10X), 1A-SB3-3.5 (20X), 1A-TP3-0.5 (50X), 1A-TP5-0.5 (100X), 1A-TP6-0.5 (100X), 1A-SB6-5.1 (100X), 1A-SB15-10.6 (200X), 1A-TP4-0.5 (200X), 1A-TP4-2.0 (200X), 1A-TP6-2.0 (200X), 1A-TP2-2.0 (1000X), 1A-TP1-2.0 (2000X), 1A-SB13-4.7 (5000X), 1A-SB14-5.6 (5000X), 1A-SB1-2.7 (20000X), 1A-SB1-4.0 (20000X), 1A-SB4-3.5 (20000X), 1A-SB11-3.0 (50000X), 1A-SB1A-15 (100000X), and 1A-SB1-8.5 (200000X)

The following lists the soil samples (and the dilution factors) that were required for Method 8080.

1B-GW2-A (10X), 1B-GW2-B (50X), 1B-GW4-B (50X), 1B-GW4-A (100X & 1000X), and 1B-DECON (500X)

Surrogate Spike Recovery

Surrogate spike recoveries monitor instrument specificity and accuracy.

VOCs

All soil samples analyzed for aromatic VOCs were spiked with 4-bromofluorobenzene (BFB) and all groundwater samples analyzed for halogenated/aromatic VOCs were spiked with 1,4-dichlorobutane and fluorobenzene prior to analysis. Surrogate recoveries should be within the laboratory QC control limits.

Except for four soil samples, all surrogate spike recoveries met the QC acceptance criteria. The surrogate recoveries of 4-BFB were reported below the lower QC control limit for samples 1A-SB1-2.7 (49%), 1A-SB3-3.5 (22%), 1A-SB4-3.5 (16%), and 1A-SB11-3.0 (46%). VOC results for these samples were qualified as estimates and flagged with a "J" for positive results or an "UJ" for nondetected results.

Except for one groundwater sample, all surrogate spike recoveries met the QC acceptance. The surrogate recovery of fluorobenzene for sample 1B-GW4-A (47%) was below the lower QC control limit. VOC results for this samples were qualified as estimates and flagged with a "J" for positive results or an "UJ" for nondetected results.

Pesticide/PCBs

All samples analyzed for pesticide/PCBs were spiked with decachlorobiphenyl (DCB) and 2,4,5,6-tetrachloro-m-xylene (TCMX) prior to extraction. Surrogate spike recoveries should be within the laboratory QC control limits. Except for six soil surrogate spike recoveries, all surrogate compounds were diluted from the sample extract or recoveries did not meet the QC acceptance criteria.

The surrogate compounds for the following soil samples could not be calculated because of the dilutions required for analysis, therefore surrogate spike recoveries could not be evaluated.

> 1A-SB1-2.7, 1A-SB1-4.0, 1A-SB1-8.5, 1A-SB1-15.0, 1A-SB3-3.5, 1A-SB4-3.5, 1A-SB6-5.1, 1A-SB11-3.0, 1A-SB13-4.7, 1A-SB14-5.6, 1A-SB15-10.6, 1A-TP1-2.0, 1A-TP2-0.5, 1A-TP2-2.0, 1A-TP3-0.5, 1A-TP4-0.5, 1A-TP4-2.0, 1A-TP5-0.5, 1A-TP6-0.5, 1A-TP6-2.0

The surrogate compounds for the following water samples could not be calculated because of the dilutions required for analysis, therefore surrogate spike recoveries could not be evaluated.

> 1B-GW2-B, 1B-GW4-A, 1B-GW4-B, 1B-DECON

The surrogate recovery of TCMX for sample 1B-GW2-A (25%) was below the lower QC control limit. The surrogate recovery of DCB for samples 1B-GW3-A (17%) and 1B-GW3-B (15%) were below the lower QC control limit. Sample results do not require qualification when only one surrogate recovery does not meet QC acceptance criteria.

Precision and Accuracy

Precision criteria monitor analytical reproducibility and accuracy criteria monitor agreement with "true values" as determined by analytical spike recovery.

Matrix Spike/Matrix Spike Duplicates

MS/MSDs should be analyzed at a frequency of 5 percent to meet frequency QC acceptance criteria. Precision and accuracy analyses were performed as MS/MSDs for all parameters.

VOCs

Two MS/MSDs (non-client) were analyzed and reported, therefore meeting frequency QC acceptance criteria. The MS/MSDs were spiked with 5 target compounds and recoveries and RPDs should be within the laboratory stated QC control limits for soil and water samples.

Except for one ethylbenzene, one toluene, and one o-xylene MS/MSD recovery, all recoveries and RPDs met the QC acceptance criteria. The MS/MSD recoveries of ethylbenzene (16% & 17%), toluene (51% & 50%), and o-xylene (10% & 11%) were below the lower QC control limits. According to the functional guidelines, sample results do not require qualification when recoveries or RPDs do not meet QC acceptance criteria.

Pesticide/PCBs

Three MS/MSDs (1A-SB11-3.0, 1A-TP5-2.0, and 1A-TP5-2.0) were analyzed and reported, therefore meeting frequency QC acceptance criteria. The MS/MSD samples were spiked with six target compounds and recoveries and RPDs should be within the laboratory stated QC control limits for soil and water samples.

Except for one 4,4'-DDT, all recoveries and RPDs met the QC acceptance criteria for sample 1A-SB11-3.0. The recovery of 4,4'-DDT (670%) was above the upper QC control limit. According to the functional guidelines, sample results do not require qualification when recoveries or RPDs do not meet QC acceptance criteria.

Laboratory Control Samples

Laboratory control samples (LCS) monitor analytical performance and proper compound identification. LCSs should be analyzed with each analytical batch to meet frequency QC acceptance criteria. LCS recoveries should be within the laboratory stated QC control limits.

LCS recoveries were reported for every analytical method reported by PEL and all LCS recoveries met QC acceptance criteria. LCS results were not reported by QAL, therefore analytical performance could not be evaluated.

Appendix D

Phase 2 Sampling and Analysis Plan

Appendix D

Sampling and Analysis Plan

Elf Atochem
Acid Plant Project
Phase 2
Portland, Oregon

Prepared for
Elf Atochem

Prepared by
CH2M HILL

June 1995

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Section 1
Introduction

This sampling and analysis plan (SAP) presents the sampling program objectives of Elf Atochem's Phase 2 investigation of the Acid Plant project in its Portland, Oregon, facility. The area included in this investigation is referred to as the Acid Plant Area. Two areas within the Acid Plant Area are included in this investigation: the General Acid Plant Area and the Former Manufacturing Process Residue Pond (Former Residue Pond), which is located within the General Acid Plant Area. The Former Residue Pond includes the area of the pond as well as a possible overflow trench.

Elf Atochem previously conducted a preliminary soil and groundwater investigation (Phase 1) in the Acid Plant Area. The results of the investigation indicated the presence of DDT residue and related compounds. A detailed description of the Phase 1 investigation results is presented in Section 3 of the Work Plan.

This investigation includes the following objectives:

- Evaluate the lateral and vertical extent of DDT residue in soil in the General Acid Plant Area.
- Further delineate the lateral and vertical extent of the affected soil around the Former Residue Pond.
- Assess the presence and, if appropriate, the extent of the affected soil around the overflow trench of the Former Residue Pond.
- Evaluate the presence and extent of DDT residue and related compounds, if any, in the uppermost groundwater in the vicinity of the Former Residue Pond area.
- Characterize the local stratigraphy, including determining the presence or absence of a silt layer underlying the uppermost groundwater.
- Assess groundwater flow direction and gradient in the uppermost groundwater.
- Collect the data necessary to develop remedial action objectives.

This SAP describes the following items:

- Soil sampling procedures
- Drilling and well construction procedures
- Groundwater monitoring program
- Field quality assurance

- Sample preservation, packaging, and shipping
- Documentation
- Decontamination
- Handling of investigation-derived wastes

Section 2
Phase 2 Soil Sampling Program

The soil sampling program includes five soil borings in the General Acid Plant Area and up to 20 soil borings in the vicinity of the Former Residue Pond. In addition, up to four soil samples will be collected from each of the four monitoring wells that are to be installed, as outlined in the Drilling and Well Construction section of this plan.

Field Preparation

The following tasks will be completed prior to drilling:

- Each location will be cleared for subsurface and overhead utilities and marked with paint or staking. Utility representatives and site facility operators will be consulted for locations of subsurface and overhead utilities.

- All downhole drilling equipment (including rods, bits, temporary casings, and drive samplers) will be decontaminated before use in each new boring. All sampling equipment used for potential chemical analysis sampling also will be decontaminated between sampling efforts.

- Field monitoring equipment (such as the Mini-Ram dust monitor) will be tested and calibrated.

- Health and safety preparations will be conducted in accordance with the site Health and Safety Plan (Appendix F).

Sample Locations and Depths

General Acid Plant Area

Five soil borings will be advanced within the General Acid Plant Area to a depth of approximately 10 feet (Figure D-1). The objective is to assess the lateral and vertical extent of DDT residue. Six soil samples will be collected from each of the soil borings at depths of approximately ½, 2, 4, 6, 8, and 10 feet. Samples from depths of ½, 2, 4, and 6 feet will be submitted for laboratory analysis. Samples collected at depths of 8 and 10 feet will be archived for possible future analysis if results of shallower samples indicate the presence of DDT residue deeper than 6 feet.

Former Residue Pond

This Phase 2 soil investigation in the vicinity of the Former Residue Pond includes the area of the pond as well as the overflow trench. The objective of the Phase 2 soil sampling program in the Former Residue Pond area is to further delineate the subsurface extent of the affected soil in the vadose zone near the Former Residue Pond.

A total of up to 20 soil borings will be installed in the vicinity of the Former Residue Pond (Figure D-2). Up to 10 of these borings will be installed around the inferred edges of the Former Residue Pond and the remaining 10 borings will be installed in the potential area of the overflow trench.

During the Phase 1 investigation, the near-surface (within 5 to 7 feet of the ground surface) horizontal dimensions of the affected soil around the inferred edges of the Former Residue Pond were estimated to be approximately 60 feet by 56 feet. The vertical extent of the affected soil was estimated to exceed 15 feet bgs.

The borings around the inferred edges of the Former Residue Pond will be installed to a depth of approximately 25 to 30 feet or to first encountered groundwater, whichever is shallower. Four of these borings will be advanced approximately 10 feet beyond the inferred edges of the Former Residue Pond (Figure D-2). Continuous soil samples will be collected and the samples will be visually inspected by a CH2M HILL representative for pink-colored soil. A direct correlation between affected soil and pink-colored soil was supported by analytical results during the Phase 1 investigation. If pink-colored soil is identified in a soil boring, the soil boring will be terminated and a new boring will be advanced approximately 5 to 10 feet closer to the inferred area of the Former Residue Pond.

Overflow Trench

The overflow trench is reported to have been approximately 5 to 6 feet wide, 5 to 6 feet deep, and approximately 200 feet long, extending from the northeastern corner (plant north) of the Former Residue Pond. The trench is thought to have been used for only 1 to 2 years, receiving overflow occasionally. As shown in Figure D-2, up to five soil borings will be advanced to a depth of approximately 10 feet, located about 25 feet north (plant north) of the Former Residue Pond, to evaluate the presence of the overflow trench. The borings will be spaced approximately 5 feet apart. If the trench is located, using the presence of pink-colored soil as an indicator, five additional borings will be advanced to a depth of up to 25 to 30 feet bgs, or first encountered groundwater, whichever is shallower, to delineate the length and vertical extent of the trench.

Sample Analysis

Up to 22 selected soil samples will be submitted to the laboratory for analysis. Samples of both the visibly affected soil and the visibly unaffected soil will be analyzed to confirm field

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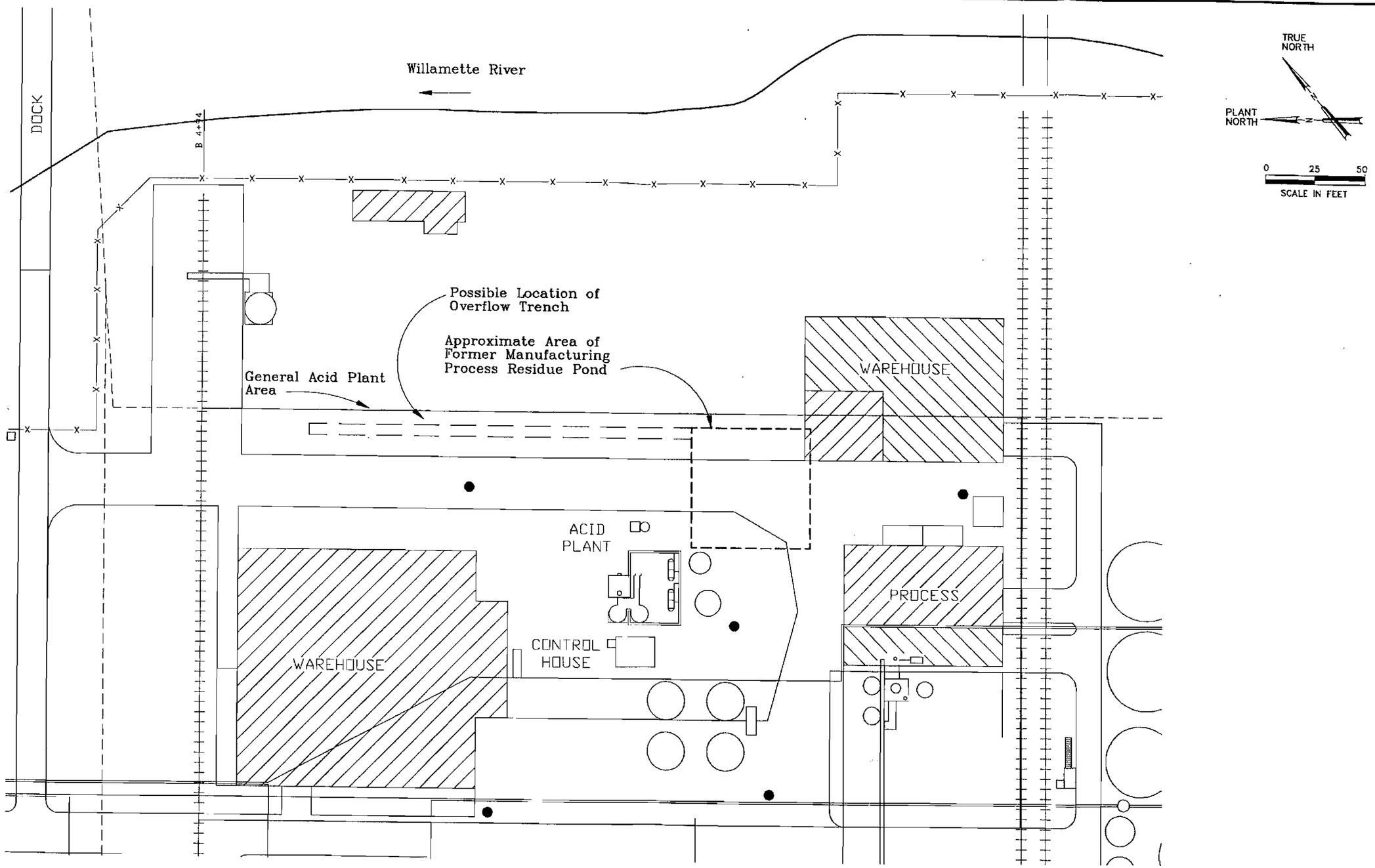

Legend

● Proposed Location of Phase 2 Soil Boring

Figure D-1

Phase 2 Soil Sampling Locations General Acid Plant Area

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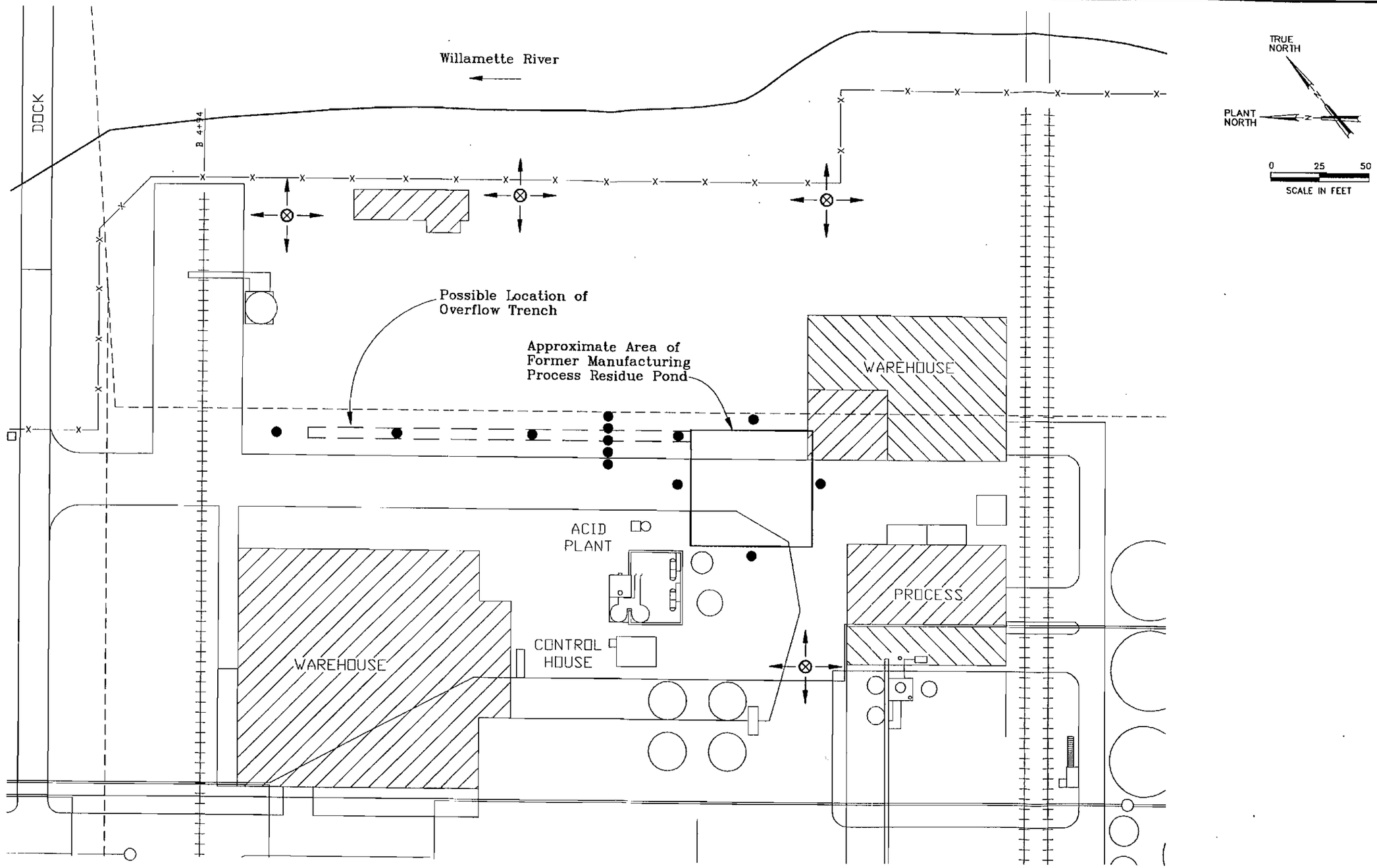

Legend

- ● Proposed Location of Residue Pond Soil Boring
- ⊗ Proposed Location of Shallow Monitoring Well

Figure D-2
Phase 2 Soil Borings and Monitoring Well Locations
Former Residue Pond Area
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PORTLAND, OREGON

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observations of the extent of the affected soil Samples that are not selected for analysis will be labeled and submitted to the laboratory to be archived for possible future analysis.

Sample Collection Procedures

Borehole soil samples will be collected with a 5-foot-long split-barrel continuous sampling tube placed inside the lead auger section. Soil coring and lithologic logging will be continuous to total borehole depth. Soil samples will be collected using a clean, disposable spoon and placed in a laboratory prepared glass jar. Field personnel will wear gloves during all soil-handling activities.

Soil will be visually classified by a CH2M HILL representative in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure, ASTM D 2487-85).

Laboratory Analysis

The samples will be submitted to the laboratory for analysis in accordance with EPA Manual SW846. Table D-1 lists analytical parameters for soils collected during Phase 2 activities.

Table D-1
Sampling and Analysis Summary
Phase 2

		Sampling Methodology			Number of Analyses				
Medium	**Investigation Area**	**Type**	**Number**	**Approximate Boring/ Well Depth (feet)**	**Organochlorinated Pesticides (EPA 8080)**	**VOCs (EPA 8240)**	**Total Organic Carbon (EPA 9060)**	**Vertical Permeability (ASTM D-5084)**	**Particle Size Distribution (ASTM D-422)**
Soil	General Acid Plant	Soil borings	5	10	20	0	10	0	2
	Former Residue Pond	Soil borings (pond)	Up to 10	30	Up to 12	Up to 12	4	0	2
		Soil borings (trench)	Up to 10	10-30	Up to 10	Up to 10	2	0	0
		Shallow monitoring well installation	4	40	16	16	8	4	2
	QA/QC samples								
	Equipment blanks				3	2	0	0	0
	Trip blanks				0	2	0	0	0
	Total Phase 2 soil samples				Up to 61	Up to 42	24	4	6
Groundwater	Former Residue Pond	Shallow monitoring well installation	4	40	4	4	0	0	0
	QA/QC samples								
	Duplicates				1	1	0	0	0
	Equipment blanks				1	1	0	0	0
	Trip blanks				0	1	0	0	0
	Total Phase 2 groundwater samples				6	7	0	0	0

Section 3
Phase 2 Drilling and Well Construction

Four shallow groundwater monitoring wells will be installed in the uppermost water-bearing zone in the vicinity of the Former Residue Pond. Proposed well locations are shown in Figure D-2. The wells will be drilled and constructed in accordance with OAR 690-240 and the Oregon Department of Environmental Quality's (DEQ's) *Final Groundwater Monitoring Well Drilling and Construction, and Decommissioning* guidance dated August 1992. Field preparation and monitoring well drilling and installation procedures are discussed below.

Field Preparation

The following tasks will be completed prior to drilling:

- A start card will be filed with the Oregon Water Resources Department (OWRD) by the drilling contractor.
- Each location will be cleared for subsurface and overhead utilities and marked with paint or staking. Utility representatives and site facility operators will be consulted for locations of subsurface and overhead utilities.
- All downhole drilling equipment (including rods, bits, temporary casings, and drive samplers) will be decontaminated before use in each new boring. All sampling equipment used for potential chemical analysis sampling will also be decontaminated between sampling efforts.
- Field monitoring equipment (such as the Mini-Ram dust monitor) will be tested and calibrated.
- Health and safety preparations will be conducted in accordance with the site Health and Safety Plan (Appendix F).

Shallow Monitoring Well Installation

Drilling Method

Shallow monitoring wells (MWA-1, MWA-2, MWA-3, and MWA-4) will be drilled using a truck-mounted, hollow-stem auger drilling rig with continuous soil sampling. Boreholes will be advanced through fill and unconsolidated alluvial deposits to an estimated depth of approximately 40 feet below ground surface (bgs) and completed by a licensed monitoring well constructor. The actual depths will be selected in the field by the project hydrogeologist and may vary depending on field conditions and lithology encountered. It is anticipated that

the boreholes will extend to the top of a silt layer estimated to be present at approximately 40 to 45 feet bgs. The borehole diameter for the monitoring wells will be approximately 10 inches.

Addition of fluids during drilling will be avoided to aid in detection of the first-encountered groundwater and to minimize effects on groundwater quality. If it is necessary to introduce water during drilling, tap water will be used and the total volume of water for each well will be recorded. The tap water may be sampled and analyzed for the constituents of concern at the discretion of project personnel. Petroleum-based oil, grease, or other lubricating compounds will not be used on downhole tools.

Borehole Sampling and Lithologic Logging

During hollow-stem auger drilling, borehole soil samples will be collected with a 5-foot-long split-barrel continuous sampling tube placed inside the lead auger section. Soil sampling and lithologic logging will be continuous to total borehole depth. Up to four soil samples will be selected for analysis based on field indicators. If the silt layer is encountered, one of the four soil samples will be collected from the silt layer. Soil samples will be collected using a clean, disposable spoon and placed in a laboratory-prepared glass jar. Field personnel shall wear gloves during all soil-handling activities.

Soil will be visually classified by a CH2M HILL representative in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure, ASTM D 2487-85). The lithologic description and soil classification will be recorded on the monitoring well lithologic and construction log.

Laboratory Analysis

The samples will be submitted to the laboratory for analysis in accordance with EPA Manual SW846. Table D-1 lists analytical parameters for soils collected during Phase 2 activities.

Well Construction

Proposed well construction details are shown in a generalized well construction diagram in Figure D-3. Actual well construction may be revised in the field based on the results of lithologic logging and water level information.

Shallow monitoring wells MWA-1, MWA-2, MWA-3, and MWA-4 will be completed with 2-inch, Schedule 10, flush-threaded stainless steel screen casing. Screen and casing sections that are not individually wrapped at the factory will be decontaminated prior to installation. Screen slot size and Colorado silica sand filter pack size are anticipated to be 0.010 inch and 10×20, respectively. Final well design may be revised by the field hydrogeologist, depending on the lithology encountered. Ten-foot-long, wire-wrapped screened intervals are anticipated, and screened intervals will not extend to within 6 feet of the ground surface.

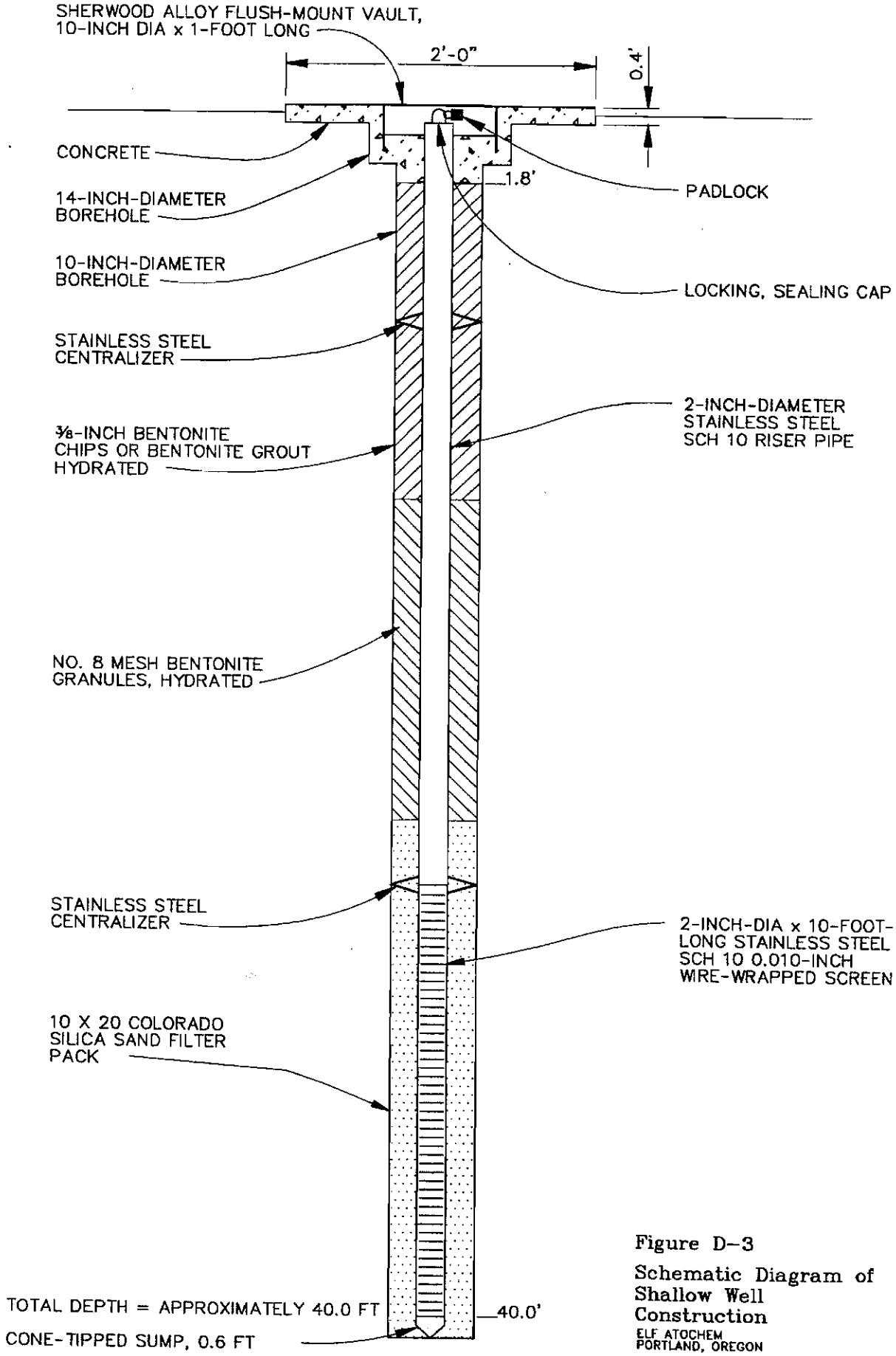

Figure D-3

Schematic Diagram of Shallow Well Construction

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The filter pack will be tremied through the hollow-stem augers into the borehole annulus from the total well depth to not more than 2 feet above the top of the well screen. During filter pack emplacement, the stainless steel casing will be suspended at the appropriate design depth, and the hollow-stem auger string will be withdrawn slowly as the filter pack is emplaced. The depth to the top of the poured sand will be measured frequently during the process to check for bridging. Prior to placement of the well seal, the well will be surged to promote closer packing of the sand. A minimum 3-foot-thick bentonite pellet or chip seal will be placed above the sand pack. If the bentonite seal is placed in an interval that lies above the water table, the dry bentonite will be hydrated with tap water to promote swelling and the formation of an effective seal. A 20-minute period will be allowed for bentonite hydration prior to grout emplacement.

The annulus above the granular bentonite seal will be sealed with either bentonite chips (or granules) or high-solids bentonite grout. Bentonite chips will be poured through the hollow-stem auger and hydrated. If bentonite grout is used, it will be pumped into the bottom of the borehole until the overflow at ground surface has a minimum density of 9.5 pounds per gallon, as determined by the field hydrogeologist. If the grout seal is installed below the water table, it will be pumped through a tremie pipe that extends to within 3 feet of the top of the granular bentonite seal. If bentonite grout is to be emplaced above the water table, the grout will be pumped into the annulus at ground surface. A minimum 12-hour curing time will be allowed following grout emplacement, and the grout will be supplemented as necessary to bring the grout level to within 5 feet of the surface. The remaining depth interval between the top of the grout and the surface completion will be filled with granular bentonite and hydrated. Monitoring well surface completions will consist of a flush-mounted traffic box set in concrete. Construction will include a locking, sealing well cap and well number identification.

Well installation descriptions and material depths and intervals will be recorded on the lithologic log and monitoring well construction diagram. Volumes of well construction materials used at each well will also be recorded.

Well Development

Well development activities will occur no sooner than 24 hours after the well seal has been completed. Each of the wells will be developed by preliminary swabbing and bailing to remove the most silt-laden waters, then surged and bailed or pumped until field parameters stabilize and turbidity ceases to decrease in the estimation of the field hydrogeologist. Purge volumes, discharge rates, sample collection times, and visual groundwater descriptions will be documented on the well development sheet. Measurements of pH, temperature, and electrical conductivity will be recorded at periodic intervals during well development. Purge water will be temporarily stored in either 55-gallon drums or bulk storage containers until the proper disposal is determined. Containers will be properly labeled and stored in an area designated by Elf Atochem. Proper disposal and handling of the containers are the responsibility of Elf Atochem.

Wellhead Elevation Survey

After well surface completion, the horizontal coordinates of each well will be surveyed to within 1 foot on a local grid or state plane coordinates. The following elevations will be surveyed to within 0.01-foot accuracy relative to the National Geodetic Vertical Datum of 1929 (NGVD). The well completion will be surveyed at two locations: (1) the top of the stainless-steel well casing, and (2) the top of the traffic box well cover (that is, approximate ground surface elevation). Elevation survey points will be permanently marked.

Aquifer Testing

Aquifer tests will be conducted on the four wells to assess the hydraulic conductivity of the materials in which the monitoring wells are screened. The aquifer tests will consist of slug withdrawal tests in which the rate of water level recovery in a well is monitored before and after a known volume (slug) is quickly withdrawn from below the water table under static conditions. The slug test data will be analyzed by using appropriate analytical models (for example, Cooper et al. [1967] and Bouwer-Rice [1976]).

Section 4
Groundwater Monitoring Program

The groundwater monitoring program, including water level measurements and groundwater sample collection, is described below.

Water Level Measurements

Water level measurements will be made using the following procedures:

- Water levels will be measured with an electronic water level sounder with respect to the north side, top of stainless steel well casing, as marked during the survey task. Water level measurements will be taken until two consecutive readings agree to within one-hundredth of a foot. The well sounder will be decontaminated between wells as described in this plan.

- The time, date, and consecutive water level measurements will be recorded in the daily field diary.

Groundwater Sample Collection Procedures

Groundwater samples will be collected at each of the four shallow monitoring wells installed during Phase 2. Groundwater samples will be collected from the monitoring wells no sooner than 7 days following well development activities. Quality control samples that include equipment blanks, duplicates, and trip blanks will be collected during the groundwater sampling collection period, as described in this plan.

Well Purging

Before sampling, wells will be purged of a minimum of three well-bore volumes until chemical parameters have stabilized. Water levels will be measured prior to well purging using an electric water level indicator. The resulting data will be used to document static water level conditions and to calculate well volumes for purging activities.

All sampling equipment will be decontaminated and calibrated before use as described in this plan. The purge volume will be calculated at each well and recorded on the groundwater sampling form. Water quality measurements will be taken at periodic intervals during purging, including specific conductance, temperature, and pH. If the well is purged dry before three well-bore volumes have been discharged, the well will be allowed to recover sufficiently and then a sample will be collected. Wells will be purged using a pump with a dedicated sampling line.

Sample Collection

Samples will be collected using a pump with a dedicated sampling line or Teflon bailer. Clean vinyl or latex gloves will be worn during all sampling activities. Gloves will be changed between wells. Samples will be placed in a clean ice chest with ice.

Analytical Parameters

The groundwater samples will be submitted to the laboratory and analyzed in accordance with EPA Manual SW846. Table D-1 lists analytical parameters for groundwater during Phase 2.

Section 5
Field Quality Assurance

This section is a brief summary of the field and laboratory quality assurance (QA) procedures that will be followed during the Elf Atochem Phase 2 investigation. Field QA procedures to be followed include the collection of equipment blanks and duplicate samples and the completion of all appropriate sample documentation. Field QA samples will represent a minimum of 5 percent of the total number of samples collected. Detailed QA procedures are described in the Quality Assurance Project Plan (Appendix E).

Sample Nomenclature

All samples collected during the sampling program will be assigned a unique alphanumeric code that will identify the sample location, sample type, sample depth, and sample matrix. Each sample will be referred to in all field documentation using this sample nomenclature system. Under this system, a sample might be assigned the following code:

RP-SB16-0-0105

where

RP = area of sample collection

RP = Former Residue Pond
GA = General Acid Plant Area

SB16 = sample location (Soil Boring 16)

SB = soil boring
MWA = shallow monitoring well
MWB = deeper monitoring well
TP = test pit
CS = composite sample
GW = GeoProbe

0 = sample matrix (soil sample)

0 = soil sample
1 = water sample
2 = field duplicate sample
3 = equipment rinse blank
4 = trip blank

0105 = sample depth (10.5 feet bgs)

(Note: A depth is not required during groundwater sampling.)

Phase 2 soil borings will be designated beginning with SB16 because soil borings SB1 through SB15 were advanced during Phase 1.

Equipment Blanks

To assess effective cleaning of the soil sampling equipment used, equipment blank samples will be collected and analyzed for the same constituents as for other site samples. A minimum of one equipment blank per sampling method will be collected for each task except when dedicated or disposable equipment is used, in which case no equipment blank samples will be collected. Equipment blanks for monitoring well groundwater samples will also be collected at a frequency of one per sampling day unless dedicated or disposable equipment is used, in which case no equipment blank sample will be collected. The following procedures will be followed for soil and groundwater sampling equipment blank collection:

- Sampling equipment that has come in contact with any potentially contaminated materials will be decontaminated.

- One aliquot will be prepared for equipment. For example, if a pan and trowel are used for sample collection, the trowel will be placed in the pan and organic-free deionized (DI) water poured in the pan so that all pan and trowel surfaces that contacted the sample are in contact with the DI water. DI water will be poured from the pan into appropriate laboratory-prepared sample containers.

Duplicate Samples

Duplicate samples will be collected for the purpose of evaluating the precision of the analytical results. Duplicate samples will be collected at a rate of approximately 5 percent of groundwater samples taken. Duplicate samples will also be analyzed for the same analytical parameters as for the other samples. The duplicates will be labeled in such a manner that the identity is unknown to the laboratory. The actual sampling locations will be recorded in the field logbook.

Calibration Procedures

The instruments and equipment used during this project will be operated, calibrated, and maintained according to the manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained

in these procedures. A routine schedule and record of instrument calibration and maintenance will be maintained in the project logbook throughout this project. At a minimum, instrument calibration will be checked daily and recalibrated if the reading is outside established control limits.

Section 6
Sample Preservation, Packaging, and Shipping

Sample Preservation

The preservation and holding time requirements for soil and groundwater samples are outlined in Table D-2. All samples will be cooled to 4°C until they are analyzed by the laboratory.

Table D-2
Sample Container, Preservation, and Holding Time Requirements for Soil and Groundwater Samples

Parameter	Analytical Method	Container Requirement	Preservation	Holding Time
Soil				
Pesticides	EPA 8080	One 16-ounce jar	Cool, 4°C	14 days until extraction; 40 days after extraction
Volatile organic compounds	EPA 8240	Two 4-ounce jars	Cool, 4°C	14 days
Total organic carbon	EPA 9060	One 8-ounce jar	Cool, 4°C	28 days
Groundwater				
Pesticides	EPA 8080	One 1.25-liter amber glass	Cool, 4°C	7 days until extraction; 14 days after extraction
Volatile organic compounds	EPA 8240	Two 40-ml glass jars	HCL pH <2, cool, 4°C	14 days

Sample Packaging

Samples will be placed in appropriate bottles, depending on the sample matrix and analysis. Each bottle will be appropriately labeled according to the sample nomenclature. Each sample bottle will then be placed in a Ziploc bag. The samples will then be placed in metal or plastic coolers and packaged with inert material (such as vermiculite) to avoid breakage of the bottles. Ice will be placed in Ziploc bags and will be placed in the coolers to keep the samples cooled to 4°C. The chain-of-custody form, return label, and any other documentation will be sealed inside a Ziploc bag and placed inside the cooler. The cooler will then be secured with strapping tape, and custody seals will be attached in such a manner that the seals will break if the cooler is opened.

Sample Shipment

Samples will be shipped to or driven to the laboratory not more than 2 days after they were collected.

Section 7
Documentation

The following list identifies the project forms and logbooks that will be used for sample documentation. Sample forms are shown in Attachment 1.

1. Project logbook
2. Well drilling and geologic log form
3. Well construction diagram
4. Groundwater sampling form
5. Sample label
6. Shipment custody seal
7. Chain-of-custody form

Sample Labels

A sample label will be affixed to each sample container and will include the following information:

- Sample identification number (a unique number assigned to every sample)
- Project name (Elf Atochem)
- Date the sample was collected (month, day, and year)
- Time the sample was collected (in military time)
- Sample collector's name
- Any important remarks to the laboratory

Project Logbook

Field personnel will update the project logbooks daily. The logbooks will include such investigation data as water level data, drilling and well construction data, well development records, and groundwater and soil sampling data. These records may supplement the documentation completed on other project forms, such as the drilling logs and groundwater sampling forms. In addition to these investigation data, the following site activity records will be documented in the project logbooks:

- Time of arrival and departure from the site
- Project personnel and subcontractor personnel onsite
- Equipment calibration records
- Health and safety monitoring records
- Subcontractor pay quantities, downtime, or equipment breakage
- Equipment present and equipment used

- Sample splits and receiving parties
- Names of visitors, their association, and purpose of visit

Field Investigation Data Forms

In addition to the project logbooks, investigation records will also be documented on several project field data forms. Samples of these forms are presented in Attachment 1. Drilling-related data will be recorded on a well drilling and geologic log form and will include information on drill method, date, depth, borehole diameter, drive sample depth, blow counts and recovery, and depth to water during drilling. Well construction records will be documented and will include construction materials and volumes, depth specifications, and installation dates. Well development sampling data will be recorded in the project logbook and will include depth to water, calculated purge volume, pH, conductivity, visual water description, and actual purge volume for each well.

Photographs

Photographs of sampling locations, sampling procedures, and any significant findings will be taken during the sampling program.

Chain-of-Custody Procedures

Sample possession must be traceable throughout collection, preparation, shipping, and analysis. Chain-of-custody procedures maintain and document sample possession during collection and analysis. The custody documentation procedure, as referenced in the *Compendium of Superfund Field Operating Methods* (USEPA, 1987), will be used for sample collection and preparation and is summarized below.

Field Custody Procedures

A sample is considered to be in an individual's custody if any of the following criteria are met:

- It is in that individual's possession.
- It is in that individual's view after being in that individual's possession.
- It was in that individual's possession and was then secured or transferred to a designated secure area.

The field sampling person who performs the sample collection and separation assumes responsibility for the care and custody of the samples until they are transferred or dispatched properly.

After collecting the samples, the field sampling personnel will complete the chain-of-custody form (Attachment 1). A chain-of-custody form will accompany each sample shipment to the laboratory. The following information will be specified for each sample on the chain-of-custody form:

- Sample location (boring number and depth)
- Date and time of sample collection
- Sample type (grab or composite)
- Number of sample containers
- Analysis requested
- Air bill number, if applicable

The original record will accompany the shipment; the pink copy will be retained by the field manager. When transferring samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the form. This form documents sample custody transfer from the sampler, often through another person, to the analyst in the offsite laboratory.

Shipping containers are sealed, and custody seals are attached prior to shipment to the laboratory. The method of shipment, courier name, and other pertinent information are entered in the "Remarks" section of the chain-of-custody form.

Laboratory Custody

A designated sample custodian will accept custody of the shipped samples and will verify that the identification numbers on the sample labels match those on the chain-of-custody form. The custodian will also verify that custody seals on the sample shipment containers are intact. The custodian will then enter the identification numbers in a bound notebook. The custodian will either use the identification number or assign a unique laboratory number to each sample and will ensure that all samples are transferred to the proper analyst or stored in the appropriate secure area.

The custodian will distribute the samples to the appropriate analysts. Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted or returned to the custodian. When sample analyses and necessary quality assurance checks have been completed, the unused portion of the sample must be disposed of properly.

Section 8
Decontamination

The purpose of decontamination is to prevent the introduction of contaminants into samples from sampling equipment or other samples; to prevent contamination from leaving the sampling site by way of sampling equipment, drilling equipment, or construction materials; to prevent cross-contamination; and to prevent exposure of field personnel to contaminated materials. This section outlines procedures that will be followed to meet decontamination objectives. Decontamination of personnel is addressed in the Health and Safety Plan (Appendix F).

All downhole drilling equipment will be decontaminated between boring locations. All soil sampling equipment will be decontaminated between each sample collection according to the procedures outlined in this subsection. Decontamination wastewaters will be collected in a decontamination trailer. Downhole equipment will be placed across the decontamination trailer during decontamination, allowing the decontamination waters to drain into the collection basin of the trailer. Field exploration personnel, along with the sampling equipment, must exit the site at this decontamination location. All equipment that leaves the site will be thoroughly decontaminated using the procedure described below. In addition, to minimize the potential for cross-contamination, all sampling equipment will be decontaminated before each sample collection. The decontamination procedure will consist of the following steps:

1. Scrape and remove all earthen materials from the equipment.
2. Wash with tap water and Liquinox or Alconox detergent solution.
3. Rinse with tap water.
4. Rinse with a dilute methanol, isopropyl alcohol, or hexane solution.
5. Rinse with distilled water.
6. Air dry as long as possible.
7. Place in a clean plastic bag.
8. Put decontamination residues and liquids in a DOT-approved, Type 17H, 55-gallon drum and store at the Elf Atochem facility for future disposal.

Section 9
Handling of Investigation-Derived Wastes

Investigation-derived wastes generated during the performance of the sampling program will be placed in 17H 55-gallon drums manufactured in accordance with DOT requirements. The drums will be labeled with the drum ID number, dates of generation, owner, and contents. All investigation-derived wastes will be the responsibility of Elf Atochem.

Soil

Material excavated from shallow soil sampling sites and all cuttings derived from drilling efforts will be temporarily stored onsite in DOT-approved 55-gallon drums. Drums will be labeled and segregated according to the borehole or area from which the material was taken.

Water

Water generated during drilling activities, well development, and groundwater sampling and decontamination wastewater will be temporarily stored onsite in either 55-gallon drums or portable poly-tanks. Drums and poly-tanks will be appropriately labeled and segregated according to the borehole or activity from which the water was taken.

Attachment 1
Project Logs and Forms

Attachment 1
Project Logs and Forms

The following samples of project logs and forms to be used during the Elf Atochem Phase 2 investigation are presented in this attachment:

- Project logbook
- Soil boring log
- Well construction diagram
- Groundwater sampling field data sheet
- Sample label
- Shipment custody seal
- Chain-of-custody form

DAILY INSPECTION DIARY

PAGE _____ OF _____

PROJECT NO. _____

(1) DAY: _____ DATE: __ __ __ __ WORK PERIOD _____ A.M. P.M. TO _____ A.M. P.M. REPORT NO. _____

WEATHER _____ TEMP. MAX _____°F: MIN _____°F: PRECIPITATION _____

(2) NUMBER AND CLASS OF PERSONNEL EMPLOYED:

(3)

MAJOR EQUIPMENT ON PROJECT AND AMOUNT OF USE			
NO.	DESCRIPTION	SIZE/CAPACITY	HRS. OPER.

(4) WORK ACCOMPLISHED TODAY:

(5)

RESIDENT'S SIGNATURE _____ DATE _____

FORM 21C

CH2M HILL

PROJECT NUMBER	BORING NUMBER SHEET OF

SOIL BORING LOG

PROJECT LOCATION

ELEVATION DRILLING CONTRACTOR

DRILLING METHOD AND EQUIPMENT

WATER LEVELS START FINISH LOGGER

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

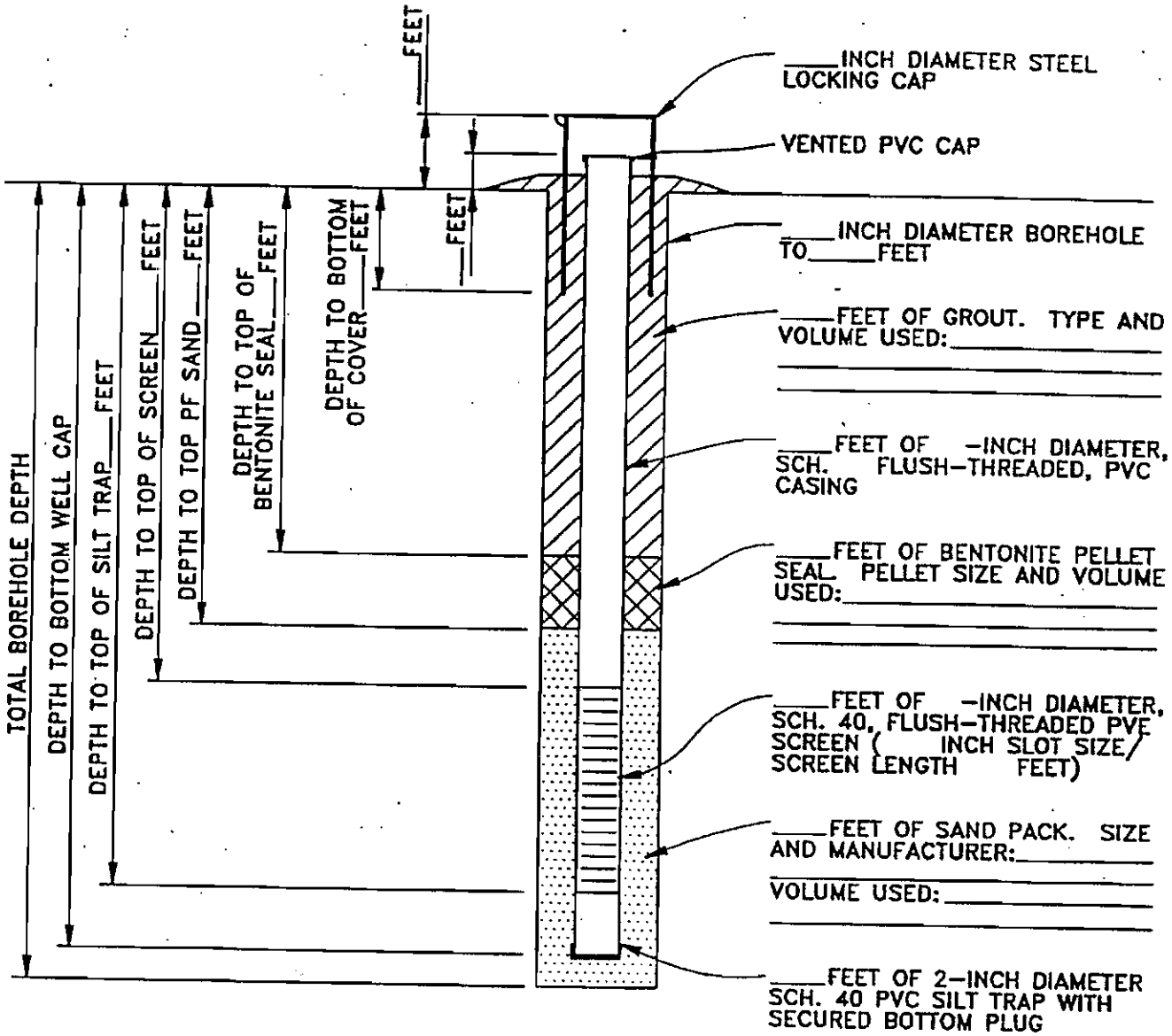
WELL CONSTRUCTION DIAGRAM

PROJECT NAME _____ WELL NUMBER _____

PROJECT NO. _____ INSTALLATION DATES _____

OBSERVED BY _____ SITE LOCATION _____

DRILLING CONTRACTOR _____



COMMENT: _____

GROUNDWATER SAMPLING
FIELD DATA SHEET
PART 1

PROJECT NAME _____ DATE _____

WELL NUMBER _____ FIELD TEAM _____

FIELD CONDITIONS _____

FIELD MEASUREMENT/ COLLECTION EQUIP.	MAKE/MODEL	SERIAL/ID NUMBER	CALIBRATION COMMENTS
pH METER			
CONDUCTIVITY METER			
THERMOMETER			
WATER LEVEL INDICATOR			
BAILER/PUMP			
D. O. METER			
EH METER			

DECONTAMINATION

_____

PURGE INFORMATION

DATE _____ START TIME _____ END TIME _____

INITIAL DEPTH TO WATER _____ WELL DEPTH _____ EST. WELL VOL. _____

METHOD _____

VOLUME PURGED	TEMPERATURE	pH	CONDUCTIVITY	APPEARANCE

FINAL DEPTH TO WATER _____ TOTAL VOL. PURGED _____ DISCHARGE RATE _____

GROUNDWATER SAMPLING
FIELD DATA SHEET
PART 2

DATE _____

WELL NO. _____

FIELD MEASUREMENTS

	TIME	TEMP.	pH	CONDUCTIVITY	D.O.	Eh
INITIAL						
FINAL						

SAMPLE NO.	TIME	BOTTLE TYPE/VOLUME	PRESERVATIVE	COMMENTS

COMMENTS/EXCEPTIONS TO SAP AND QAPP

_____

_____

_____

_____

_____

_____

SHIPPING INFORMATION

SHIPPED VIA _____

LABORATORY _____

DATE SHIPPED _____

GROUNDWATER SAMPLING
FIELD DATA SHEET

EAGLE PICHER

ENVIRONMENTAL SERVICES

36 B.J. TUNNELL BLVD, MIAMI, OK 74354-3360

1-800-331-7425

Specially Cleaned Sample Container

LOT NO.:

DATE:	TIME:	COLLECTED BY:

SAMPLING SITE:

SAMPLE TYPE

☐ Grab ☐ Composite ☐ Other _____

TESTS REQUIRED:	PRESERVATIVE

CH2M HILL

CUSTODY SEAL

Date

Signature

CH2M HILL *QUALITY ANALYTICS*

CHAIN OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
CLIENT NAME	
PROJECT MANAGER	COPY TO:
REQUESTED COMP. DATE	SAMPLING REQUIREMENTS SDWA ☐ NPDES ☐ RCRA ☐ OTHER ____

CLIENT ADDRESS AND PHONE NUMBER

ANALYSES REQUESTED

FOR LAB USE ONLY		
LAB#		
LAB#		
PROJECT NO.		
ACK	VERIFIED	
QUOTE#	BS	
NO. OF SAMP	PG	OF

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS (12 CHARACTERS)	# OF CONTAINERS		LAB ID	REMARKS

SAMPLED BY AND TITLE	DATE/TIME	RELINQUISHED BY	DATE/TIME	HAZWRAP/NEESA Y N QC LEVEL 1 2 3
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME	COC / ICE ANA REQ / TEMP
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME	CUST SEAL / Ph SAMPLE COND.
RECEIVED BY LAB:	DATE/TIME	SAMPLE SHIPPED VIA UPS BUS FED-EX HAND OTHER ____	AIR BILL#	

REMARKS

ENTERED INTO LIMS ____ COC REV ____

REV 6/89 FORM 340

Appendix E

Phase 2 Quality Assurance Project Plan

Appendix E

Phase 2 Quality Assurance Project Plan

Elf Atochem
Acid Plant Project
Phase 2 Investigation
Portland, Oregon

Prepared for
Elf Atochem

Prepared by
CH2M HILL

June 1995

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Section 1
Introduction

The purpose of a quality assurance (QA) program is to define the nature and scope of activities necessary to provide data that are representative of the media sampled, is scientifically valid, and is legally defensible. These objectives are met by having data of known precision, accuracy, and completeness and that are representative and comparable.

This section describes QA methods and procedures for both field and laboratory personnel participating in the investigation at the Elf Atochem facility. QA procedures exist for field and laboratory documentation, sample collection, handling and custody, equipment use and calibration, laboratory analyses, and reporting.

The Quality Assurance Project Plan (QAPP) is developed in conjunction with, and is supplemented by, the following other documents:

- **Work Plan.** This document presents the objectives, rationale, and approach to the groundwater investigation and the scope of work to be completed.

- **Work Plan–Appendix D (Sampling and Analysis Plan (SAP)).** The SAP provides detailed information on the nature of field tasks to be performed, type of equipment used, number or samples to be collected, and analysis to be performed. It will be the primary reference document for all work performed.

- **Work Plan–Appendix F (Health and Safety Plan (HASP)).** The HASP describes health and safety procedures to be used during field operations. The objective is to protect personnel from potential hazards that investigation activities may present.

Section 2
Project Organization and Responsibilities

The investigation is initialized by Elf Atochem and conducted by CH2M HILL.

Primary responsibility for the overall project coordination will rest with CH2M HILL's project manager (PM). This person is responsible for accomplishing the scope of work specified in the contract, the assignment of resources, and the review of deliverables for quality assurance (QA); the PM also monitors budgets and schedules.

Individual team members, assigned as task managers and field team leaders, are responsible for specific elements of the Work Plan and shall adhere to the procedures described in the Work Plan and SAP. Task managers are responsible for the defined subtask (for example, groundwater investigation), and field team leaders are responsible for all field activities (such as drilling, environmental sampling, and H&S compliance). Necessary variances required by field conditions are requested of and approved by the PM. When QA problems or deficiencies requiring special action arise, the PM will identify the appropriate corrective action to be initiated and implemented. The problems will be documented in writing along with the corrective actions taken.

Section 3
Quality Assurance Objectives for Measurements

Quality assurance objectives (QAOs) define the level of quality that the generated data should have. These objectives are developed based on the intended use of the data, available laboratory procedures, and available resources.

Objectives

The overall QAOs for field and laboratory activities for the Elf Atochem Phase 2 investigation are to develop and implement the following items:

- Project quality control (QC) *requirements* or *criteria* for laboratory analyses that are appropriate for obtaining and evaluating data to achieve project objectives as specified in the Work Plan

- Project QC *procedures* to provide analytical data of known quality in terms of precision, accuracy, completeness, representativeness, and comparability

Data Quality Objectives

Data quality objectives (DQOs) are related to each specific activity planned for the Elf Atochem facility. DQOs are defined as the qualitative and quantitative statements that characterize the data needed to support a particular data usage. Therefore, DQOs for collection and analysis are based on the end use of the data.

The proposed activities, objectives, data uses, and laboratory support requirements are presented in Table E-1. This table summarizes data needs for each activity and the data quality objectives.

Analytical data can be obtained at several different levels, based on criteria provided by EPA's Data Quality Objectives document[1]. The following five analytical support levels are defined in this document:

- Level I is field screening or analysis using portable instruments. Results are available in real time. It is the least costly of the analytical options. Soil and water samples will undergo field screening to determine the presence of ionizable organic constituents (using a photoionization detector).

[1] *Data Quality Objectives for Remedial Response Activities, Volume 1-Development Process*, EPA 540/G-87/003A (OSWER) (Directive 9335.0-7B), March 1987.

Table E-1
Data Quality Objectives Summary for Phase 2

Environmental Media	Data Uses	Data Types	Data Acquisition	Data Quality/ Analytical Level	Levels of Concern
Soil	Refine conceptual model Conduct screening risk evaluation	Evaluate the extent of DDT residue and related compounds in soil	Soil sampling	Validated Laboratory Analysis (Level III)	See Table E-2
Groundwater	Refine conceptual model Conduct screening risk evaluation	Groundwater flow patterns Evaluate presence of DDT residue and related compounds in ground-water and assess subsurface stratigraphy	Groundwater elevation measurements Install shallow monitoring wells	Elevation measurements to ±0.01 foot Validated Laboratory Analysis (Level III)	Not applicable See Table E-3

- Level II is field analysis using more sophisticated portable analytical instruments. In some cases, the instruments may be set up in a mobile laboratory.

- Level III analyses are performed by an offsite analytical laboratory. Level III analyses for water and soil samples will be performed using EPA-approved analytical methods.

- Level IV is CLP routine analytical services (RAS). All analyses are performed in an offsite laboratory, which may or may not be a CLP laboratory. Method development or method modification may be required for specific constituents or detection limits.

- Level V is CLP special analytical services (SAS) analyses.

Samples collected for the Phase 2 investigation will be analyzed according to Level III requirements.

Quality Assurance Objectives

The quality assurance objectives (QAOs) for analytical data generated from sampling activities will be tracked with field duplicates and equipment blanks. These duplicate and blank samples and their method of collection will be defined for each activity in the SAP.

Specific QAOs are as follows:

- Establish sampling techniques in such a manner that the analytical results are representative of the media and conditions being measured.

- Collect and analyze a sufficient number of field duplicate samples (two samples that are either temporally or spatially separated and are intended for measurement of station monitoring variability) to establish a sampling precision of an average ±20 relative percent difference (RPD) for water and soil samples. Field duplicate sample results will help to establish sampling precision among replicate samples collected from the same sample location.

- Collect and analyze a sufficient number of equipment blank samples to evaluate the potential for contamination from sampling equipment and sample collection techniques.

- Analyze method blanks, laboratory duplicates, and matrix spikes to evaluate results and compare to QA goals established for precision and accuracy.

Another important QA objective of this project is to develop and implement procedures to provide analytical data of known quality. Data quality is assessed in terms of representa-

tiveness, comparability, precision, accuracy, and completeness. These criteria are discussed below for analytical support Level III.

Representativeness

Representativeness is a measure of how closely the measured results reflect the actual concentration or distribution of the chemical constituent in the matrix sampled.

Representativeness is accomplished as follows:

- Choose the numbers of samples, sample locations, and sampling procedures that will produce results that depict as accurately and precisely as possible the matrix and conditions being measured.

- Develop protocols for storage, preservation, and transportation that preserve the representativeness of the collected samples.

- Use documentation methods that ensure that protocols have been followed and identify samples so that their integrity is maintained.

Equipment blanks will be collected for each sampling method to assess field decontamination procedures. Field duplicate samples will be collected for each medium type at a frequency of 5 percent to assess sampling and analysis variation.

Comparability

Data generated during the investigation will be either directly comparable or comparable within defined limitations to literature, existing data, or any applicable criteria.

Comparability of the data will be maintained by EPA-defined procedures in both the sampling activities and the analytical methods used. The sampling activities are addressed in this SAP. The compounds, analytical methods, and target detection limits for this project are discussed in this section. Actual detection limits may vary during analysis depending on the nature of the particular sample, the presence of high concentrations of target compounds, or the presence of matrix interferences.

Accuracy

Accuracy is a measure of the error between reported test results and the true sample concentration. Because true sample concentrations are not known, accuracy is usually inferred from recovery data, as determined by sample spiking. Accuracy is affected by the sample matrix and matrix interferences that may be present in the sample. Acceptable matrix spike recoveries for the parameters of interest to this project are shown in Table E-2.

Table E-2 Analytical Methods, Target Detection Limits, and Quality Assurance Objectives for Soil Samples					
Parameter	**Analytical Method**	**Target Detection Limit (µg/kg)**	**Accuracy (percent spike recovery)**	**Precision (relative percent difference)**	**Completeness**
Pesticides	EPA 8080[a]	0.7 to 170	CLP[b]	CLP[b]	90
Volatile organic compounds	EPA 8240[a]	10	CLP[b]	CLP[b]	90
Total organic carbon	EPA 9060[a]	25,000	75 to 125	±20	90

[a]Test Methods for Evaluating Solid Waste (SW 846), 3rd ed., September 1986.
[b]USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Document OLM01.8.

Precision

Precision is a measure of the scatter of the data when more than one measurement is made on the same sample. Scatter is commonly attributable to sampling activities or chemical analysis, or both. Analysis of field duplicate samples will serve to measure the precision of sampling, while analysis of laboratory duplicate samples will serve to measure the precision of laboratory procedures. Acceptable laboratory duplicate RPD results for the parameters of interest to this project are shown in Table E-2.

Completeness

Completeness is defined as the total number of samples taken for which acceptable analytical data are generated, divided by the total number of samples analyzed, multiplied by 100. Under perfect conditions, completeness would be 100 percent. An overall completeness goal for this project has been set at 90 percent.

Section 4
Sample Documentation

Sampling activities will be recorded in the following documents:

- **Field logbooks**: record descriptions of the sampling procedures, sample materials, and sampling conditions
- **Chain-of-custody record forms**: document the physical transfer of samples and requested analyses
- **Labels**: show the time and date of sampling, the type of analysis requested, and the sample preservative

Field diaries and logbooks will be labeled with sequential page and volume numbers prior to their use in the field. Corrections to field documentation records are to be made by the individual responsible for the error. If an error is made on a document, the responsible individual will make the correction by placing a single strike mark through the error, entering the correct information, and initialing and dating the corrected entry. The erroneous information will not be obliterated. Any subsequent error discovered on a document will be corrected, signed (initial plus last name), and dated by the person who made the entry.

Section 5
Sample Custody and Document Control Procedures

Sample custody and document control procedures function to identify and document the tracking and handling of samples and sample documents. Samples and documents must be under custody so that their possession is traceable from sample collection, transfer or transportation, analysis, disposal, archiving, and filing. A sample is considered to be in your custody if any of the following statements are true:

- The sample is in your possession.
- The sample is in your view after being in your possession.
- The sample was in your possession and was locked up or transferred to a designated secure area by you.

A chain-of-custody record form is used to track possession of a sample and to document the type of analyses requested. Each time the sample bottles or samples change hands, both the sender and receiver sign and date the chain-of-custody record form. When a sample shipment is transported to the laboratory, the top copy of the chain-of-custody form is enclosed in plastic and secured to the inside of the cooler. A second copy of the chain-of-custody record form is retained in the project files.

Field Custody Procedures

Custody seals will be attached to sample coolers before shipment to the analytical laboratory. Custody seals are used to indicate whether the cooler has been opened before it reaches the intended receiver. Custody seals are used when the cooler meets the conditions of the third bullet above.

The chain-of-custody record form for samples collected for this project will provide the following information:

- Sample identification number
- Sample collector's signature
- Date and time of collection
- Description of sample
- Shipper's name
- Receiver's name
- Signatures of persons involved in chain of custody
- Inclusive dates and times of possession
- Requested analyses

Laboratory Custody Procedures

The contracted laboratory shall use procedures essentially equivalent to those listed below.

- Designation of laboratory sample and document custodian(s)
- Inspection of sample containers for conditions that would compromise sample integrity
- Sample logbook to acknowledge sample relinquishment and receipt (date, time, signatures), field identification, corresponding laboratory identification number, sample description (matrix, characteristics), sample type (grab, composite), analysis request, and sample disposal information
- Security for sample storage by laboratory access constraints
- Sample tracking using laboratory identification numbers on work and data sheet, instrument logbooks, analysis containers, instrument output, and data handling and reporting hard copy
- Internal chain-of-custody procedures (analyst responsibilities and check-in/check-out procedures for any laboratory operation)
- External chain-of-custody procedures for transfer of samples to disposal location
- Sample disposal procedures (including authorized instructions and environmental regulations)
- Sample archiving for purposes such as reanalysis

Document Control

Document control ensures that all documents generated during a particular project are accounted for when the project is completed. The contracted laboratory is therefore expected to have a document control program that provides the following minimum activities:

- Recording in clear, comprehensive manner using indelible ink
- Correcting data and logbooks by initialing and dating the correction
- Cross checking analytical results with relevant records and client requirements prior to release of data
- Document archiving in accordance with contract requirements

- Recording observations and results with project number, date, analyst, and reviewer signatures, as appropriate

- Laboratory-internal data tracking procedures

Section 6
Instrument Calibration Procedures

All instruments and equipment used during this project will be operated, calibrated, and maintained according to the manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance will be maintained throughout the duration of this project. Calibration will be documented in the daily logbook and will contain information such as personnel performing the calibration, date of calibration, standards used, acceptance criteria, results of calibration, problems, and corrective actions.

Section 7
Analytical Procedures

The criteria for appropriate method selection are discussed in Section 4; specific DQOs are shown in Table E-1. Analytical procedures, target detection limits, and quality assurance objectives for soil and water analyses are shown in Tables E-2 and E-3.

Table E-3
Analytical Methods, Target Detection Limits, and Quality Assurance Objectives for Water Samples

Parameter	Analytical Method	Target Detection Limit (µg/kg)	Accuracy (percent spike recovery)	Precision (relative percent difference)	Completeness
Pesticides	EPA 8080[a]	0.2 to 5.0	CLP[b]	CLP[b]	90
Volatile organic compounds	EPA 8240[a]	10	CLP[b]	CLP[b]	90

[a]Test Methods for Evaluating Solid Waste (SW 846), 3rd ed., September 1986.
[b]USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Document OLM01.8.

Section 8
Data Reduction, Validation, and Reporting

The proper management of collected data is of equal importance to proper analysis and custody procedures in ensuring that the data represent the environment from which the sample was taken. Data reduction, validation, and reporting procedures assist in the control of data handling from field through laboratory and data processing to the final data user. Validity of analytical data will be determined based on precision, accuracy, and completeness objectives, quality assurance objectives, and data assessment procedures.

Data Reduction

Each analyst is responsible for the recording and reduction of all raw data associated with the analyses. Equations and calculations for data reduction will be performed in accordance with the procedures detailed in the analytical methods. Computations and recorded results will carry the common units of measurement from the methods.

Data reduction will be performed using a programmable calculator or microcomputer as applicable to the analytical method. The computational algorithms will be periodically verified through cross calculation (identical and reordered hand calculations). The units of the results will be verified by using valueless units and canceling them during the progression of the calculation to see whether the result units match the normal reporting units of concentration.

As part of the reduction process, the analyst will proofread all transcriptions in order to check the accuracy of data transfer, whether from handwritten form to handwritten form or to microcomputer form. After reduction, analytical values and qualifiers will be manually entered by the analyst into a program data base on a microcomputer.

Data Validation

Designated personnel will evaluate the quality of the analytical data using applicable protocol from the current versions of the USEPA Contract Laboratory Program (CLP) *National Functional Guidelines for Organic and Inorganic Data Review,* where possible. The data evaluation will determine the overall quality of the data based on achievement of reporting limits and quality assurance objectives stated in Section 7. Evaluation procedures will also be taken from the relevant analytical method.

Upon completion of the data evaluation, designated personnel will be responsible for developing a QA/QC report describing the usability of the analytical data based on the QA/QC criteria.

All data will be stored and maintained according to the standard procedures of CH2M HILL.

Field QA/QC, including equipment blanks and field duplicates, will be evaluated. These samples will be evaluated by applying laboratory acceptance criteria as provisional control limits.

Data Deliverables and Reporting

The identified laboratories will be required to provide QA/QC information associated with the analysis of each water and soil sample. The laboratory will provide analytical results for all field samples, a copy of the chain of custody, and a case narrative explaining any unusual difficulties with or exceptions to the analytical methods. Initially, the laboratory will be required to provide the CLP-like data packages. The CLP-like data packages will include the following QA/QC information and raw data for organic analyses: tuning performance, initial and continuing calibration, method blank, surrogate spike analysis, and matrix spike/matrix spike duplicate (MS/MSD) analysis results.

All soil sample results will be reported by the laboratory on a "dry weight" basis. Sample concentrations reported from GC and GC/MS methods that are between the Method Detection Limit and the Instrument Detection Limit will be reported as estimates and flagged with a "J."

Section 9
Internal Quality Control

Internal QC monitors and documents the performance of sampling and laboratory activities. QC checks ensure that the QC process establishes the quality of the data produced.

The QC acceptance criteria for field sampling and laboratory analyses are method specific. The frequency of the QC checks are dependent upon the DQOs and the site-specific sampling instructions written for each task. To ensure that data are of known quality, the following field and laboratory QC checks will be implemented.

Field Sampling Quality Assurance

Field Sampling Checks

Sampling checks will be implemented by having the following kinds of samples submitted to the laboratory as unknowns or blind samples:

- At least one blind duplicate sample of each sample parameter (for each medium, if more than one was sampled) or a minimum of 5 percent, whichever is greater, will be collected for each task.

- Equipment rinsate blanks will be collected and analyzed for selected tasks.

Equipment Blanks

Equipment blanks are collected after the equipment has been used to collect field samples. The equipment will be decontaminated according to the procedures in the SAP, and the equipment blanks sample will be collected immediately following this procedure. When equipment blanks are collected and analyzed, they will be analyzed for the same parameters as the samples with which they are associated.

Field Duplicates

Field duplicate samples are independent soil samples collected as close as possible to each other in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. Field duplicates are useful in documenting the precision (variability) of the sample and analytical process.

The results from field duplicate samples will be used to calculate sampling and analytical precision, expressed as relative percent difference (RPD).

Sample Containers, Preservation, and Holding Times

Sample containers, preservation, and holding times for each analysis parameter are listed in Tables E-4 and E-5.

Table E-4
Container, Preservative, and
Holding Time Requirements for Soil Samples

Parameter	Analytical Method	Container Requirement	Preservative	Holding Time
Pesticides	EPA 8080*	One 16-ounce jar	Cool, 4°C	14 days until extraction; 40 days after extraction
Volatile organic compounds	EPA 8240*	Two 4-ounce jars	Cool, 4°C	14 days
Total organic carbon	EPA 9060*	One 8-ounce jar	Cool, 4°C	28 days

*Test Methods for Evaluating Solid Waste (SW 846), 3rd ed., September 1986.

Table E-5
Container, Preservative, and
Holding Time Requirements for Water Samples

Parameter	Analytical Method	Container Requirement	Preservative	Holding Time
Pesticides	EPA 8080*	One 1.25-liter amber glass TLC	Cool, 4°C	7 days until extraction; 14 days after extraction
Volatile organic compounds	EPA 8240*	Two 40-ml glass TLSs	HCL pH <2/cool, 4°C	14 days

*Test Methods for Evaluating Solid Waste (SW 846), 3rd ed., September 1986.
TLC = Teflon-lined cap.
TLS = Teflon-lined septum.

Laboratory Analysis QC Checks

Laboratory quality control samples are a required procedure that is part of each approved analytical method. The analysis of QC samples and the quality assurance procedures discussed below provide information about the overall quality of the analytical data with

respect to precision, accuracy, achievement of detection limits, and other quality indicators. The following quality assurance procedures will be followed for organics analysis to determine whether project quality assurance objectives have been achieved: Calibration curve verification, method blank analysis, surrogate spike analysis, MS/MSD analysis, and laboratory control sample analysis.

Matrix Spike and Matrix Spike Duplicate Samples. MS/MSDs will be analyzed at a frequency of 5 percent or once per analytical batch, whichever is more frequent. This sample is used to determine the accuracy of an analysis by identifying conditions that bias the results. This bias is most often associated with the sample matrix and generally occurs in soil samples. The matrix spike sample will be collected by filling a second container in the field and submitting it to the laboratory labeled as a matrix spike sample. Known quantities of target analytes are added to a sample matrix before sample extraction/digestion and analysis. Samples are split into duplicates, spiked, and analyzed. These data are used to determine accuracy by calculating the percent recovery and precision from the RPD.

Method Blank. A blank will be analyzed at a frequency of 5 percent or once per analytical batch, whichever is more frequent. The blank will be carried through the entire extraction and analytical procedure. It is used to evaluate possible contamination of analytical processes by target analytes.

Laboratory Control Samples. An EPA or National Institute of Standards and Technology (NIST) reference quality control sample or EPA or NIST traceable quality control sample will be analyzed at a frequency of 5 percent, or once per analytical batch, whichever is more frequent. Laboratory control samples have acceptance ranges for analytical results that an analyst uses to evaluate system performance.

Section 10
Data Assessment Procedures

The procedures and calculations presented here are used to help determine whether the results of sampling and analysis have met the data quality objectives and quality assurance objectives outlined in Section 7, and to indicate whether corrective actions may be needed. Data will be assessed for their precision, accuracy, and completeness. For a more thorough presentation of the statistical approach, see EPA's Data Quality Objectives document[2].

Precision

The relative percent of difference (RPD) is used to assess the precision of the sampling and the analytical method and is calculated using the following equation:

$$RPD = \frac{\frac{X_S - X_D}{X_S + X_D}}{(2)}$$

where

X_S	is the analytical result in mg/L or ppm obtained for the sample
X_D	is the analytical result in mg/L or ppm obtained for the duplicate sample

Accuracy

The accuracy of the data set is determined from the analysis of spiked samples. The accuracy (or percent recovery) is calculated using the following equation:

$$A = 100 \quad \frac{X_{SS} - X_S}{T}$$

where

A	is the recovery for the added spike
X_{SS}	is the analytical result in mg/L or ppm obtained for the spiked sample
X_S	is the analytical result in mg/L or ppm obtained for the sample
T	is the true value of the added spike in mg/L or ppm

[2]*Data Quality Objectives for Remedial Response Activities, Volume 1–Development Process*, EPA 540/G-87/003A (OSWER) (Directive 9335.0-7B), March 1987.

The overall accuracy is the arithmetic mean of all spiked samples. It is calculated using the following equation:

$$\bar{A} = \frac{i\Sigma\ 1^{A}\ 1}{n}$$

where

$\bar{A}$	is the mean percent recovery or overall accuracy
A_i	is the individual recovery for each spike
n	is the number of spiked samples

Completeness

Completeness of the data is determined using the following equation:

$$Completeness\ (\%) = \frac{Number\ of\ samples\ having\ acceptable\ data}{Number\ of\ samples\ analyzed}\ x\ 100$$

Section 11
Performance and Systems Audits

Performance and systems audits are independent assessments of sample collection and analysis procedures. Audit results can be used to evaluate a project's ability to meet data quality objectives, satisfy quality control criteria, and identify areas requiring correction action. The audits include checks of proper documentation, chain-of-custody procedures, and QA/QC procedures. If time and resources permit, CH2M HILL will perform these audits.

Section 12
Preventive Maintenance

Routine maintenance procedures and schedules for sampling equipment are described in the manufacturers' instruction manuals. Specialized inspection and maintenance of major equipment items will be performed by trained service personnel from the manufacturer in accordance with instrument service contracts. All records and maintenance activities will be documented in the field diary.

Section 13
Corrective Actions

If QC checks detect unacceptable conditions or data, the CH2M HILL PM will be responsible for developing and initiating corrective action. Corrective action may include the following activities:

- Reanalyzing the samples, if holding time criteria permit
- Resampling and reanalysis
- Evaluating and amending sampling and analytical procedures
- Accepting data and acknowledging a level of uncertainty or inaccuracy by flagging the data and providing an explanation for their qualification

Documentation of corrective action steps will include the following information:

- Description of the problem
- Individuals assigned responsibility for investigating the problem
- Description of the investigation
- Actions taken to correct the problem
- Methods used to monitor the effectiveness of the corrective actions
- Verification that the problem was eliminated

Section 14
Quality Assurance Reporting

Data validation results and other quality assurance issues are reported to the PM and appropriate members of the project team. A QA report is compiled documenting the implementation of the QAPP. It can be attached to the data report and will include a brief summary of the following items:

- QA management changes, if any
- Encountered problems and solutions
- Corrective actions taken for any problems previously identified
- Results of performance or systems audits, if they were performed
- Assessment of analytical data in terms of precision, accuracy, and completeness and assignment of data qualifiers, as necessary
- QA-related training

Copies of the QA report will be submitted to the PM for review.

Appendix F

Phase 2 Site Health and Safety Plan

CH2M HILL HEALTH AND SAFETY PLAN
Elf Atochem Acid Plant Project–Phase 2

This plan will be kept onsite during field activities and will be reviewed and updated as necessary. This plan adopts, by reference, the standards of practice (SOP) contained in the CH2M HILL *Corporate Health and Safety Program–Program and Training Manual, Volumes 1 and 2,* and other applicable CH2M HILL SOPs as appropriate. The Site Safety Coordinator (SSC) is to be familiar with these SOPs. In addition, this plan adopts procedures contained in the work plan for the project. All personnel working under this plan must sign Attachment 1 indicating that they have read and agree to follow it.

1.0 PROJECT INFORMATION AND DESCRIPTION

CLIENT OR OWNER: Elf Atochem North America, Inc. **PROJECT NO:** OPE37640.A0

PROJECT MANAGER: Pamela Brody-Heine **OFFICE:** PDX

PROPERTY NAME: Elf Atochem-Portland

PROPERTY ADDRESS: 6400 NW Front Avenue, Portland, Oregon

DATE HEALTH AND SAFETY PLAN PREPARED: February 1995

DATE(S) OF INITIAL VISIT FOR ACID PLANT PROJECT: March 1993

DATE(S) OF SITE WORK: March 1995-March 1996

PROPERTY ACCESS: The site is fenced and entrance is gained through a locked gate protected by a security guard.

PROPERTY SIZE: Approximately 50 acres. The area included in this investigation, the Acid Plant Area, is approximately 2 acres.

SITE TOPOGRAPHY: Relatively flat; 2 percent grade to river

SITE DESCRIPTION AND HISTORY:

The inorganic chlor-alkali chemical manufacturing plant makes chlorine, caustic, acids, and bases. DDT was manufactured at the Acid Plant Area from approximately 1947 until 1952. DDT was manufactured by mixing monochlorobenzene (MCB) and trichloroacetaldehyde (chloral) in the presence of fuming sulfuric acid (oleum). CH2M HILL has identified material believed to be DDT residue and related compounds in the Acid Plant Area.

2.0 PROJECT ORGANIZATION AND TASKS TO BE PERFORMED UNDER THIS PLAN

2.1 PROJECT ORGANIZATION

Client: Elf Atochem North America, Inc.–Larry Patterson

CH2M HILL

- Project Manager–Pamela Brody-Heine
- Project Administrator–Ken Shump
- Health and Safety Manager (HSM)–Mollie Netherland
- SSC-D–Bill Griffin, John Childs, Scott Waichler
- SSC-C–Bill Griffin, John Childs
- Field Support–Bill Griffin

2.2 DESCRIPTION OF TASKS

This investigation is focused on evaluating the presence of DDT residual or DDT-related compounds in the vicinity of the former manufacturing process residue pond area and the general acid plant area. Specific activities include:

- Well development and sampling
- Well installation
- Soil boring
- Soil sampling
- Test pit excavation and sampling

This investigation will occur only in the Acid Plant Area.

2.3 DESCRIPTION OF CH2M HILL SUBCONTRACTORS

- Drilling subcontractor
- Heavy equipment subcontractor

GeoTech Explorations and Westerberg Drilling will provide drilling services and Cascade Corporation will provide heavy equipment services. It is CH2M HILL's policy to be responsible for their subcontractor's health and safety if CH2M HILL controls the subcontractor's work. When CH2M HILL is responsible for the subcontractor's health and safety, the subcontractor must follow CH2M HILL's health and safety plan or develop a plan that is at least as stringent. If the subcontractor opts to follow CH2M HILL's health and safety plan, they must provide a supplemental document that outlines the health and safety for the areas in which they are experts. GeoTech Explorations and Westerberg Drilling are required to submit a document outlining drilling safety and Cascade Corporation is required to submit a document outlining heavy equipment operation safety. CH2M HILL will monitor the subcontractors' compliance with the plan they submit.

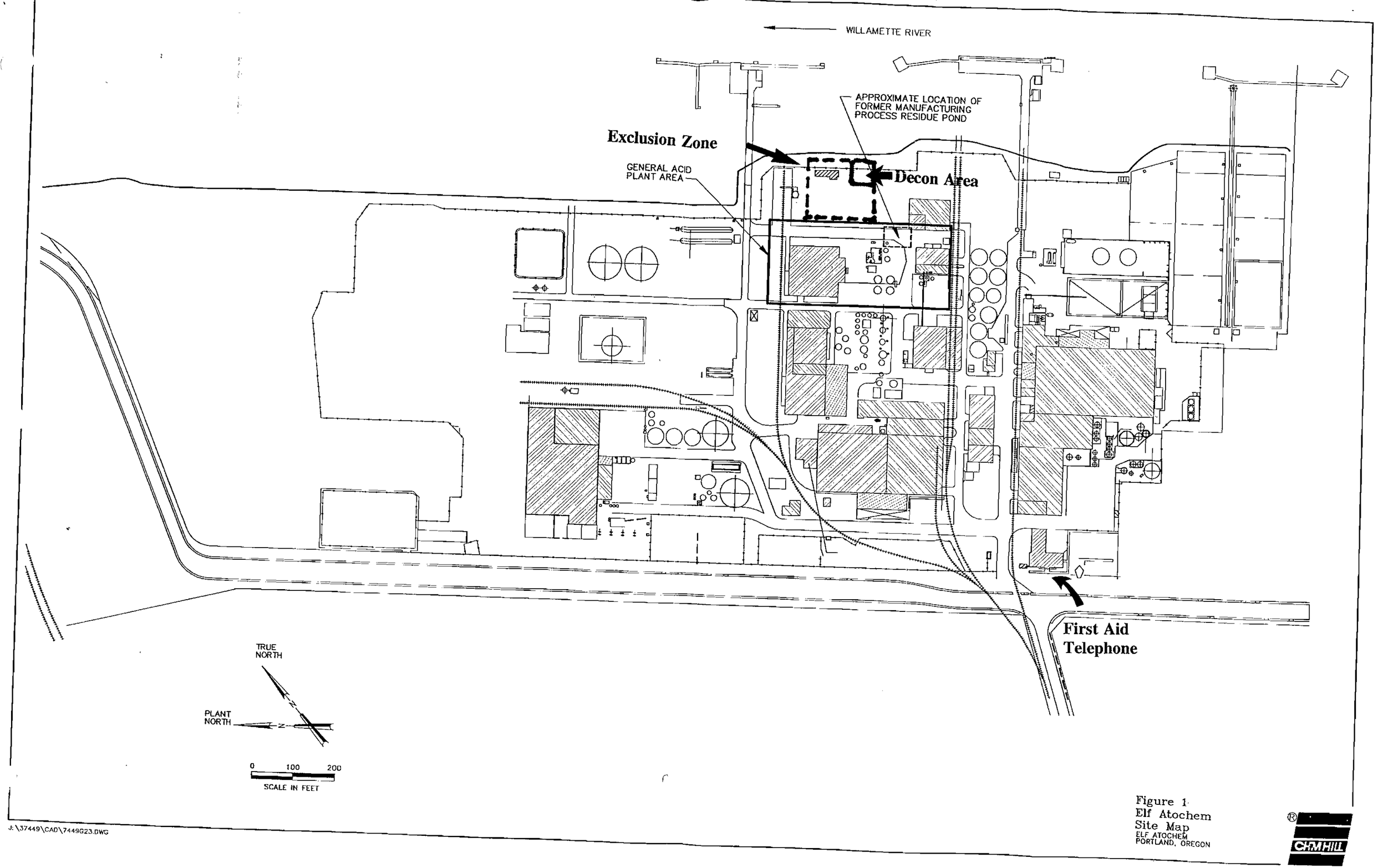

Figure 1
Elf Atochem
Site Map
ELF ATOCHEM
PORTLAND, OREGON

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CH2M HILL

3.0 HAZARD EVALUATION AND CONTROL

3.1 HEAT AND COLD STRESS (REFERENCE CH2M HILL SOP HS-09)

3.1.1 GUIDELINES FOR WORKING IN TEMPERATURE EXTREMES WHILE WEARING PERSONAL PROTECTIVE EQUIPMENT (PPE)

Temperature	Work Cycle	Rest Cycle	Control Measures
<32° F or <55° F & raining	2 hrs	15 min	Review cold stress in safety meeting. Rest in a warm area. Drink at least 8 ounces of warm non-caffeinated, non-alcoholic beverage at each rest break. Schedule a mid-day lunch break of at least 30 minutes in a warm area to begin not later than 5 hours after startup.
72° to 77° F	2 hrs	5 min	Review heat stress in safety meeting. Take resting pulse rate before beginning work. Drink 8 ounces of cool water before beginning work, and 4 ounces at rest break. Have ice available.
77° to 82° F	2 hrs	5 min	As above, but seated rest break. Monitor pulse rate. (See below.)
82° to 87° F	60 min	15 min	As above, but rest area to be shaded.
87° to 90° F	30 min	15 min	As above. Try to provide a shaded work area.
>90° F	15 min	15 min	As above. Provide a shaded area with seats in the work area for team members to use as needed. Try to reschedule work to avoid mid-day heat.

3.1.2 SYMPTOMS AND TREATMENT OF HEAT AND COLD STRESS

Heat Stroke	Heat Exhaustion	Frostbite	Hypothermia
Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high body temperature.	Pale, clammy, moist skin; profuse sweating; weakness; normal temperature; headache; dizzy; vomiting.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Cool victim rapidly by soaking in cool (not cold) water. Get medical attention immediately!!	Remove victim to a cool, air conditioned place. Loosen clothing, place head in low position. Have victim drink cool (not cold) water.	Remove victim to a warm place. Rewarm area quickly in warm (not hot) water. Have victim drink warm fluids--not coffee or alcohol. Do not break any blisters. Elevate the injured area and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids--not coffee or alcohol. Get medical attention.

3.2 GENERAL PHYSICAL (SAFETY) HAZARDS AND CONTROLS

Engineering and administrative controls and work practices are generally to be implemented by the party in control of the site or hazard (i.e., CH2M HILL, subcontractor, or contractor). CH2M HILL employees must, at a minimum, remain aware of hazards affecting them, regardless of who is responsible for controlling the hazards.

Hazard (Refer to SOP, or HSP Section)	Engineering Controls, Administrative Controls, and Work Practices	Tasks		
		Test Pit Excavation	Soil Boring, Drilling, and Monitoring Well Installation	Groundwater Sampling
Flying debris/objects (HS-07)	Provide shielding and PPE; maintain distance. When opening pressurized wells, open slowly and stand to the side.	X	X	
Noise > 85 dBA	Noise protection and monitoring required.	X	X	
Steep terrain/unstable surface	Brace and shore equipment.	X	X	
Gas cylinders (HS-21)	Instruct employees in the safe use of compressed gases. Make certain gas cylinders are properly anchored and chained. Keep cylinders away from ignition sources.	X	X	
Electrical	• Make certain third wire is properly grounded. Do not tamper with electrical wiring unless qualified to do so. Ground as appropriate. • Heavy equipment (e.g., drill rig) to remain at least 15 feet from overhead powerline for powerlines of 50 kV or less. For each 10 Kv > 50, increase distance by ½ foot. • Project field sites should have ground fault circuit interrupters (GFCIs) installed for all wiring, including extension cords. • Heavy equipment (e.g., drill rig) should remain at least 15 feet from overhead powerline for power-lines of 50 kV or less. For each 10 Kv > 50, increase distance by ½ foot. • Operate and maintain equipment according to manufacturer's instructions. • Use only extension cords that are three-wire grounded. Cords passing through work areas must be covered or elevated to protect from damage. • Use only electrical tools and equipment that area either effectively grounded or double-insulated UL approved. • Properly label switches, fuses, and circuit breakers. • Remove cord from an outlet by grasping the plug, not pulling the cord. • Protect all electrical equipment, tools, switches, etc., from elements. • Avoid physical contact with power circuit. • Only qualified electricians are to install and work on electrical circuits and equipment.	X	X	
Suspended loads	Work not permitted under suspended loads.	X	X	
Buried utilities, drums, tanks, etc. (Section 3.3)	Locate buried utilities, drums, tanks, etc. prior to digging or drilling and mark location.	X	X	
Slip, trip, fall hazards	Use wood pallets or similar devices in muddy work areas. Provide slip resistant surfaces.	X	X	X

3.2 GENERAL PHYSICAL (SAFETY) HAZARDS AND CONTROLS

Engineering and administrative controls and work practices are generally to be implemented by the party in control of the site or hazard (i.e., CH2M HILL, subcontractor, or contractor). CH2M HILL employees must, at a minimum, remain aware of hazards affecting them, regardless of who is responsible for controlling the hazards.

Hazard (Refer to SOP, or HSP Section)	Engineering Controls, Administrative Controls, and Work Practices	Tasks		
		Test Pit Excavation	Soil Boring, Drilling, and Monitoring Well Installation	Groundwater Sampling
Back injury (HS-29)	Use proper lifting techniques, or provide mechanical lifting aids.	X	X	X
Confined space entry (Section 9.0)	Space must be evaluated by qualified person. Additional controls and monitoring, and an approved entry permit are generally required.	Not approved	Not approved	Not approved
Trenches/excavations (HS-32)	Make certain trench meets Cal/OSHA standard before entering. All excavations > 4 feet deep must be sloped or shored and have a ladder every 25 feet. Personnel and equipment remain 2 feet from edge of trench at all times.	X		
Protruding objects	Flag visible objects.	X	X	X
Visible lightning	Cease work.	X	X	X
Vehicle traffic (HS-24)	Provide temporary traffic controls, including trained flaggers and lookouts. Implement traffic control program when required.			
Stairways, ladders, and scaffolds (HS-25)	Stairways or ladders are generally required where there is a break in elevation of 19 inches or more. Keep access ways clear. Equipment provided must meet OSHA specifications. Document employee training.			
Elevated work area/falls (HS-31)	Provide guardrail, safety net, floor covers, body harness, and monitoring system, where applicable. Document employee training.			
Work where equipment must shut down (HS-33)	Shut down and isolate equipment, apply lockout/tagout devices, and verify that equipment won't start. Document required employee training.			X
Fire/Explosion	• No spark sources within exclusion or decontamination zones. • Only use intrinsically safe, explosion proof equipment inside the exclusion zone • Spark arrestors required on all equipment • Appropriate fire fighting equipment must be available onsite. • Extinguishers are to be inspected and maintained. • Open flames are prohibited in the vicinity of flammable materials. • Combustible materials stored outside should be at least 10 feet from the building. • Unnecessary combustible materials and flammable or combustible liquids must not be allowed to accumulate. • Flammable or combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.	X	X	

3.2 GENERAL PHYSICAL (SAFETY) HAZARDS AND CONTROLS

Engineering and administrative controls and work practices are generally to be implemented by the party in control of the site or hazard (i.e., CH2M HILL, subcontractor, or contractor). CH2M HILL employees must, at a minimum, remain aware of hazards affecting them, regardless of who is responsible for controlling the hazards.

Hazard (Refer to SOP, or HSP Section)	Engineering Controls, Administrative Controls, and Work Practices	Tasks		
		Test Pit Excavation	Soil Boring, Drilling, and Monitoring Well Installation	Groundwater Sampling
Welding	Whenever possible, move welding activities away from explosive atmospheres. If welding must be conducted above the boring, nitrogen will be pumped into the hole. An intrinsically safe blower will be used to dissipate explosive gases, and a platform will be built to remove the welding from the head of the borehole. The boring will be covered to prevent sparks from falling into the boring.			
Inadequate illumination	Site work will be performed during daylight hours whenever possible. Any work conducted during hours of darkness will require enough illumination intensity "to read a newspaper without difficulty."	X	X	X
Drilling	CH2M HILL employees must be aware of the safety hazards affecting them, related to the operation of drilling equipment. NOTE that the operator (a specialty subcontractor) is responsible for safe operations of drilling equipment and the safety of his employees. CH2M HILL employees are not to operate the drilling equipment, or assist the operator. General work practices to be followed while working around drilling equipment include: • The drill rig is not to be operated in inclement weather. • The driller is to verify that the rig is properly leveled and stabilized before raising the mast. • Personnel should be cleared from the sides and rear of the rig before the mast is raised. • The driller is not to drive the rig with the mast in the raised position. • The driller must check for overhead power lines before raising the mast. A minimum distance of 15 feet, between mast and overhead lines (<50 kV), is recommended. Increased separation may be required for lines greater than 50 kV. • Personnel should stand clear before rig start-up. • The driller is to verify that the rig is in neutral when the operator is not at the controls. • Become familiar with the hazards associated with the drilling method used (i.e., cable tool, air rotary, hollow-stem auger, etc.). • Do not wear loose fitting clothing, watches, etc, that could get caught in moving parts. • Do not smoke or permit other spark-producing equipment around the drill rig. • The drill rig must be equipped with a kill wire or switch, and personnel are to be informed of its location. • Be aware and stand clear of heavy objects that are hoisted overhead.			

3.2 GENERAL PHYSICAL (SAFETY) HAZARDS AND CONTROLS

Engineering and administrative controls and work practices are generally to be implemented by the party in control of the site or hazard (i.e., CH2M HILL, subcontractor, or contractor). CH2M HILL employees must, at a minimum, remain aware of hazards affecting them, regardless of who is responsible for controlling the hazards.

Hazard (Refer to SOP, or HSP Section)	Engineering Controls, Administrative Controls, and Work Practices	Tasks		
		Test Pit Excavation	Soil Boring, Drilling, and Monitoring Well Installation	Groundwater Sampling
Drilling (cont.)	• The driller is to verify that the rig is properly maintained in accordance with the drilling company's maintenance program. • The driller is to verify that all machine guards are in place while the rig is in operation. • The driller is responsible for housekeeping (maintaining a clean work area). • The drill rig should be equipped with at least one fire extinguisher. • In the event the drill rig comes into contact with electrical wires and becomes electrically energized, do not touch any part of the rig or any person in contact with the rig, and stay as far away as possible. Notify emergency personnel immediately.		X	
Heavy Equipment	CH2M HILL employees must be aware of the safety hazards affecting them, related to the operation of heavy equipment. NOTE that the operator (a specialty subcontractor) is responsible for the safe operations of heavy equipment and the safety of his employees. CH2M HILL employees are not to operate the heavy equipment, or assist the operator. General work practices to be followed while working around heavy equipment include: • Become familiar with hazards particular to the equipment being used. • Always confirm that operator is aware of your location–particularly when you approach or pass by equipment. • Do not count on back up alarms always functioning. Look around when alarm sounds. • Do not ride equipment not designed for passengers. • Do not climb on operating equipment. • Do not place yourself between fixed and moving parts or objects. • Do not stand adjacent to the equipment. • Stay clear of equipment on cross slopes and unstable terrain. • Stay clear of pile-driving operations. • Remain outside of the turning radius of the equipment. • Operators using all terrain vehicles (ATV) must be trained; other ATV requirements may apply. • Back-up alarm required for heavy equipment. • Observer remains in contact with operator and signals safe back-up. • Personnel to remain outside of turning radius.	X	X	

3.3 PROCEDURES TO LOCATE BURIED UTILITIES

Elf Atochem will provide personnel to provide utility locating services to identify all possible buried utilities or features in the investigation area prior to drilling or excavation activities. The SSC will verify that the utility search has been conducted. If there is any question that a sample location is within 10 feet of a buried object, the sampling location will be moved.

3.4 BIOLOGICAL HAZARDS AND CONTROLS

Hazards	Location and Control Measures
Bloodborne pathogens (Hepatitis B and HIV)	Personnel performing first aid and CPR can be exposed to bloodborne pathogens. All CH2M HILL trained to perform first aid or CPR must also be trained in bloodborne pathogens. If an exposure occurs, the human resources department must be contacted immediately.

3.5 TICK BITES, LYME DISEASE, AND ROCKY MOUNTAIN SPOTTED FEVER (RMSF)

Check often for tick bites. If bitten, carefully remove tick with tweezers, making certain to remove pincers, being careful not to crush the tick. After removing the tick, wash your hands. Disinfect area, and dress. If the tick resists or cannot be completely removed, seek medical attention.

Look for symptoms of lyme disease or RMSF. Lyme: rash that looks like a "bulls-eye," with small welt in center, several days to weeks after tick bite. RMSF: Rash comprising red spots under skin, 3 to 10 days after tick bite. For both, chills, fever, headache, fatigue, stiff neck, bone pain. If symptoms appear, seek medical attention.

3.6 RADIOLOGICAL HAZARDS AND CONTROLS

Refer to the CH2M HILL *Corporate Health and Safety Program–Program and Training Manual, Volume 2*, for standards of practice for operating in contaminated areas.

Hazards	Controls
None anticipated.	None anticipated.

3.7 HAZARDS POSED BY CHEMICALS BROUGHT ONSITE

Refer to CH2M HILL *Hazard Communication Program Manual*, which is available from the Corporate Human Resources Department in Denver. The Project Manager is to request Material Safety Data Sheets (MSDSs) from the client, or contractors and subcontractors, for chemicals that CH2M HILL employees are potentially exposed to the MSDSs for the compounds listed below are provided in Attachment 2.

Chemical	Location
Isopropyl alcohol	Decontamination area
Alconox	Decontamination area
Methanol	Decontamination area
Hexane	Decontamination area
Isobutylene	Calibration gas
Pentane	Calibration gas
Methane	Calibration gas
Hydrogen	Fuel gas for OVA

3.8 KNOWN CONTAMINANTS OF CONCERN

Contaminant	Location and Highest Concentration (Solid Media: mg/kg; Liquid Media: ug/l)	PEL, REL, or TLV[3] (ppm)	IDLH[4] (ppm)	Symptoms and Effects of Exposure	PIP[5]
1,1,1-Trichloroethane (1,1,1-TCA)	GW: 20J ug/l	350 ppm	1,000 ppm	Headache, lassitude, CNS depression, poor equilibrium, eye irritation, dermatitis	11.00
1,1-Dichloroethane	GW: 1.7J ug/l	100 ppm	4,000 ppm	CNS depression, skin irritation	11.06
Benzene	GW: 4.7J ug/l	0.1 ppm	Ca[6] (3,000 ppm)	Eye, nose, and respiratory irritation; headache; nausea; dermatitis; fatigue; giddiness	9.24
Carbon Tetrachloride	GW: 9.1J ug/l	2 ppm	Ca (300 ppm)	CNS depression, nausea, vomiting, skin irritation	11.47
Chloroform	GW: 260EJ ug/l	2 ppm	Ca (1,000 ppm)	Dizziness, mental dullness, nausea, disorientation, headache, fatigue, eye and skin irritation	11.42
Chloromethane (Methyl chloride)	GW: 1.4J ug/l	50 ppm	Ca (10,000 ppm)	Dizziness, nausea, vomiting, visual disturbance, staggering, slurred speech	11.28
4,4'-DDT	GW: 500D ug/l S: 150,000 mg/kg TPS: 2,700 mg/kg	0.5 mg/m3	Ca (NE)	Paresthesia tongue, lips, and face; tremors; dizziness; confusion; headache; fatigue; convulsions; eye and skin irritation	NL[7]
4,4'-DDD	GW: 12 ug/l TPS: 15 mg/kg	NL	NL	No information found in the NIOSH pocket guide.	NL
4,4'-DDE	GW: 0.45J ug/l TPS: 0.9 mg/kg	NL	NL	No information found in the NIOSH pocket guide.	NL
Ethyl Chloride (Chloroethane)	GW: 67J ug/l	1,000 ppm	20,000 ppm	Incoordination, inebriation, abdominal cramps	10.97
Methylene Chloride (Dichloride Methane)	GW: 3.6J ug/l	50 ppm	Ca (5,000 ppm)	Fatigue, weakness, sleepiness, light headedness, numbness and tingling of limbs, nausea, eye and skin irritation	11.32
Tetrachloroethene	GW: 17J ug/l	25 ppm	Ca (500 ppm)	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; headache	9.32
Toluene	GW: 2.2 ug/l	100 ppm	2,000 ppm	Fatigue, weakness, confusion, dizziness, headache, dilated pupils, muscle fatigue, dermatitis	8.82
Xylenes, Total	S: 0.011 mg/kg	100 ppm	1,000 ppm	Dizziness; excitement; drowsiness; staggering gait; eyes, nose, and throat irritation; nausea; vomiting; dermatitis	8.44 - 8.56
o-Dichlorobenzene (1,2-Dichlorobenzene)	GW: 39 ug/l S: 1.3 mg/kg	50 ppm C	1,000 ppm	Nose and eye irritation	9.06

3.8 KNOWN CONTAMINANTS OF CONCERN

Contaminant	Location and Highest Concentration (Solid Media: mg/kg; Liquid Media: ug/l)	PEL, REL, or TLV[3] (ppm)	IDLH[4] (ppm)	Symptoms and Effects of Exposure	PIP[5]
p-Dichlorobenzene (1,4-Dichlorobenzene)	GW: 120EJ ug/l S: 0.1 mg/kg	75 ppm	Ca (1,000 ppm)	Headache, eye irritation, nausea, vomiting	8.98
m-Dichlorobenzene (1,3-Dichlorobenzene)	GW: 2.7 ug/l S: 0.051 mg/kg	NL	NL	No information found in the NIOSH pocket guide.	NL
Monochlorobenzene (Benzene Chloride) (Chlorobenzene)	GW: 370,000 ug/l S: 200 mg/kg	10 ppm	2,400 ppm	Skin, eye, and nose irritation, drowsiness, incoordination.	9.07
1,2-Dichloroethane	GW: 11J ug/l	NL	NL	No information found in the NIOSH pocket guide.	NL
Sulfuric acid	Not analyzed for	1 mg/m^3	80 mg/m^3	Eye, nose, and throat irritation; bronchitis, dental erosion	NL

Note 1: GW: Groundwater in Pond Area; S: Soil in Pond Area; TPS: Soil in Dry Storage and General Acid Plant Areas
Note 2: J = Estimated value; D = Sample required dilution; E = Estimated value outside linear calibration range for that compound
Note 3: Lowest numerical value listed.
Note 4: IDLHs - immediately dangerous to life and health.
Note 5: PIP - photoionization potential.
Note 6: CA - Carcinogen.
Note 7: NL - no limit found in reference materials.

3.9 POTENTIAL ROUTES OF EXPOSURE

DERMAL: Dermal contact with contaminated media will be controlled through use of PPE.	**INHALATION:** Inhalation of volatile vapors and contaminated dust will be controlled through the implementation of engineering controls (such as fans and blowers to reduce concentrations in the breathing zone) and work practices (such as working from an upwind position), and the use of PPE.	**OTHER:** Incidental ingestion can occur if personnel do not wash their hands and face prior to eating, drinking, or smoking.

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4.0 PERSONNEL

4.1 CH2M HILL EMPLOYEES (REFERENCE CH2M HILL SOP HS-01 AND HS-02)

Employees listed below are enrolled in the CH2M HILL chemical protection program (CPP) and meet the medical surveillance, 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training requirements as required by state and federal hazardous waste regulations. Employees designated "SSC" have received 8 hours of supervisor and 8 hours of instrument training and can serve as site safety coordinator (SSC) for the level of protection indicated. There must be one SSC present during any task performed in exclusion or decontamination zones with the potential for exposure to safety and health hazards. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. There must be one FA-CPR designated employee present during any task performed in exclusion or decontamination zones with the potential for exposure to safety and health hazards. The "buddy system" requirements as required by state and federal hazardous waste regulations are to be met at all times.

Employee Name	Office	Responsibility	SSC/FA-CPR
Michael Abbott	PDX	Field Team Member	SSC Level D; FA-CPR
Janeen Adamo	PDX	Field Team Member	FA-CPR
Jeffrey Barry	PDX	Field Team Member	SSC Level D; FA-CPR
Lauren Bradford	PDX	Field Team Member	SSC Level D; FA-CPR
Phillip Brown	PDX	Field Team Member	SSC Level D; FA-CPR
John Childs	PDX	Field Team Member	SSC Level C; FA-CPR
Ty Daniel	PDX	Field Team Member	SSC Level C; FA-CPR
Ivan Gall	PDX	Field Team Member	FA-CPR
Bill Griffin	PDX	Field Team Member	SSC Level C; FA-CPR
Dean Harris	PDX	Field Team Member	SSC Level D; FA-CPR
Bruce Heine	PDX	Field Team Member	FA-CPR
Pamela Brody Heine	PDX	Field Team Member	FA-CPR
Mignon Hess	PDX	Field Team Member	FA-CPR
Heidi Hoffman	PDX	Field Team Member	SSC Level C; FA-CPR
Richard Johns	PDX	Field Team Member	SSC Level D; FA-CPR
Mike Keating	PDX	Field Team Member	SSC Level C; FA-CPR
Robert Koster	PDX	Field Team Member	FA-CPR
Marcus Krekos	PDX	Field Team Member	SSC Level B; FA-CPR
Carole Newvine	PDX	Field Team Member	SSC Level D; FA-CPR
Stephen O'Malley	PDX	Field Team Member	SSC Level C; FA-CPR
Gerald Ochs	PDX	Field Team Member	FA-CPR
Rockey Oetken	PDX	Field Team Member	SSC Level C; FA-CPR
John Porcello	PDX	Field Team Member	SSC Level C; FA-CPR
Steven Reynolds	PDX	Field Team Member	FA

Employee Name	Office	Responsibility	SSC/FA-CPR
Ross Rieke	PDX	Field Team Member	FA-CPR
Susan Rineholt	PDX	Field Team Member	FA-CPR
Jason Smith	PDX	Field Team Member	FA-CPR
Andrea Volkmann	PDX	Field Team Member	SSC Level D; FA-CPR
Scott Waichler	PDX	Field Team Member	FA

4.2 HEALTH AND SAFETY AND FIELD TEAM CHAIN OF COMMAND AND PROCEDURES

4.2.1 CLIENT

Elf Atochem North America, Inc.: Larry Patterson, 503/225-7210

4.2.2 CH2M HILL

The SSC is the primary contact for health and safety issues that arise in the field. The HSM will be consulted as necessary and in the event of an emergency, the procedures outlined in Sections 11.0, 12.0, and 13.0 will be followed.

4.2.3 SUBCONTRACTOR

GeoTech Explorations
Contact: Bill Closterman
503/692-6400

Cascade Corporation
Contact: John Murnane
206/485-8908

Westerberg Drilling
Contact: Steve Stadeli
503/829-2526

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) SPECIFICATION (REFERENCE CH2M HILL SOP HS-07 and HS-08)

Task	Level	Body	Foot	Head[1]	Eye	Hand	Respirator
• All tasks in Acid Plant area	Modified D	Tyvek Coated tyvek will be used when wet or muddy conditions are encountered	Rubber steel-toed, steel-shanked boots	Hardhat Hearing protection in vicinity of heavy equipment or if conversations must be shouted at more than 3 feet	Safety glasses Splash shield during decontamination	Nitrile or latex inner gloves and nitrile outer gloves	Chlorine escape masks must be carried at all times
• All task in Pond area[2] • All tasks in Acid Plant area when action levels exceeded	C[3]	Tyvek Coated tyvek will be used when wet or muddy conditions are encountered	Rubber steel-toed, steel-shanked boots taped to tyvek	Hardhat Hearing protection in vicinity of heavy equipment or if conversations must be shouted at more than 3 feet	Not applicable with full-face respirator	Nitrile or latex inner gloves and Nitrile outer gloves taped to tyvek	APR, full face, MSA Ultratwin or equivalent, cartridges: GMC-H Chlorine escape masks must be carried at all times
• Chlorine release	C[3]	As required above	As required above	As required above	As required above	As required above	Chlorine escape mask

Notes:
[1]The SSC shall specify hardhat areas.
[2]Level C must be used initially. Downgrading to modified Level D is allowed if readings on the PID or FID are consistently less than 5 ppm.
[3]Level C SSC is onsite prior to using Level C protective equipment.

5.1 REASONS TO UPGRADE OR DOWNGRADE LEVEL OF PROTECTION

Upgrade	Downgrade
· Request of individual performing task. · Change in work task that will increase contact or potential contact with hazardous materials. · Occurrence or likely occurrence of gas or vapor emission. · Known or suspected presence of dermal hazards. · Instrument action levels (Section 6.0) exceeded.	· New information indicating that situation is less hazardous than originally thought. · Change in site conditions that decreases the hazard. · Change in work task that will reduce contact with hazardous materials.

6.0 AIR MONITORING EQUIPMENT SPECIFICATION (REFERENCE CH2M HILL SOP HS-06)

Instrument	Tasks	Action Levels		Frequency	Calibration
CGI: MSA 260 or 261	Drilling in all area	0-10% LEL 10-25% LEL >25% LEL	No expl.[1] hazard Pot.[2] expl. hazard Expl. hazard; evacuate or vent	Continuously. Record readings every 30 minutes.	Daily
O_2 meter: MSA 260 or 261	Drilling in all area	>25.0% O_2 20.9% O_2 <19.5% O_2	Expl. hazard; evacuate or vent Normal O_2 O_2 def.[3]; vent or use SCBA	Continuously. Record readings every 30 minutes.	Daily
Dust Monitor: Visual	All tasks in pond area	No visual dust Visual dust	Level C Stop work	Record conditions each morning and as conditions change	N/A[5]
Photoionization Detector (PID): HNu or OVM (11.7ev lamp or greater) or Flame Ionization Detector (FID): OVA 128	All tasks in pond area	<25 ppm[ab4] >25 ppm[ab]	Level C (If readings are consistently below 5 ppm above background, modified Level D PPE can be used) Stop work	Record readings every 30 minutes	Daily
Photoionization Detector (PID): HNu or OVM (11.7ev lamp or greater) or Flame Ionization Detector (FID): OVA-128	All tasks in acid plant area	<5 ppm[ab] 5-25 ppm[ab] >25 ppm[ab]	Level D Level C Stop work	Record readings every 30 minutes	Daily
Dust Monitor: Miniram	All tasks in acid plant area	<0.83 mg/m^3 0.83 - 3.0 mg/m^3 >3.0 mg/m^3	Level D Level C Stop work	Continuously record readings every 30 to 60 minutes	Zero daily

Note 1: expl = explosion Note 2: pot = potential Note 3: def = deficient Note 4: All action levels are based on breathing zone readings for 5 minutes.
Note 5: N/A = not applicable

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6.1 CALIBRATION SPECIFICATION

Instrument	Gas	Span	Reading	Method
PID: HNu, 11.7 ev probe	100 ppm isobutylene	5.0 ± 2.0	68 ppm	1.5 l/m reg T-tubing 0.25 l/m reg direct tubing
PID: OVM, 11.8 ev lamp	100 ppm isobutylene	RF initially set to 1.00 and then reset to 0.68	68 ppm when RF reset to 0.68	1.5 l/m reg T-tubing
FID: OVA	100 ppm methane	3.0 ± 1.5	100 ppm	1.5 l/m reg T-tubing
Dust Monitor: Miniram	N/A	N/A	N/A	Per manufacturers' instructions
CGI: MSA 260, 261, 360, or 361	0.75% pentane	N/A	50% LEL ± 5% LEL	1.5 l/m reg direct tubing

6.2 AIR SAMPLING

If there is evidence of gas under pressure being released, a canister grab sample will be analyzed for volatiles using EPA method 8240. The HSM will be notified of all air sampling results as soon as they are available.

7.0 DECONTAMINATION SPECIFICATION (REFERENCE CH2M HILL SOP HS-13)

Personnel	Sample Equipment	Heavy Equipment
• Boot wash/rinse	• Wash/rinse equipment	• Power wash
• Glove wash/rinse	• Solvent rinse equipment	• Steam clean
• Outer glove removal	• Solvent disposal method: containerize	• Water disposal method: containerize
• Body suit removal		
• Inner glove removal		
• Respirator removal		
• Hand wash/rinse		
• Face wash/rinse		
• Shower ASAP		
• PPE disposal method: containerize		
• Water disposal method: containerize		

7.1 DIAGRAM OF PERSONNEL DECONTAMINATION LINE

Figure 3 depicts the decontamination line for Level C activities. The decontamination line for Level D activities will be the same as that shown in Figure 3 except there will not be the stations associated with respirator use.

8.0 SPILL CONTAINMENT PROCEDURES

Large scale spill containment procedures are not required because large quantities of liquid materials are not being handled. No groundwater is expected to be purged, sampled, or encountered.

9.0 CONFINED SPACE ENTRY

No confined space entry is planned or expected. Excavations deeper than 4 feet are considered a confined space, but it is not necessary for personnel to enter excavations. If excavations must be entered, a confined space entry health and safety plan and a permit will be developed prior to doing so. Refer to CH2M HILL SOP HS-17, contained in the *Corporate Health and Safety Program–Program and Training Manual, Volume 1.*

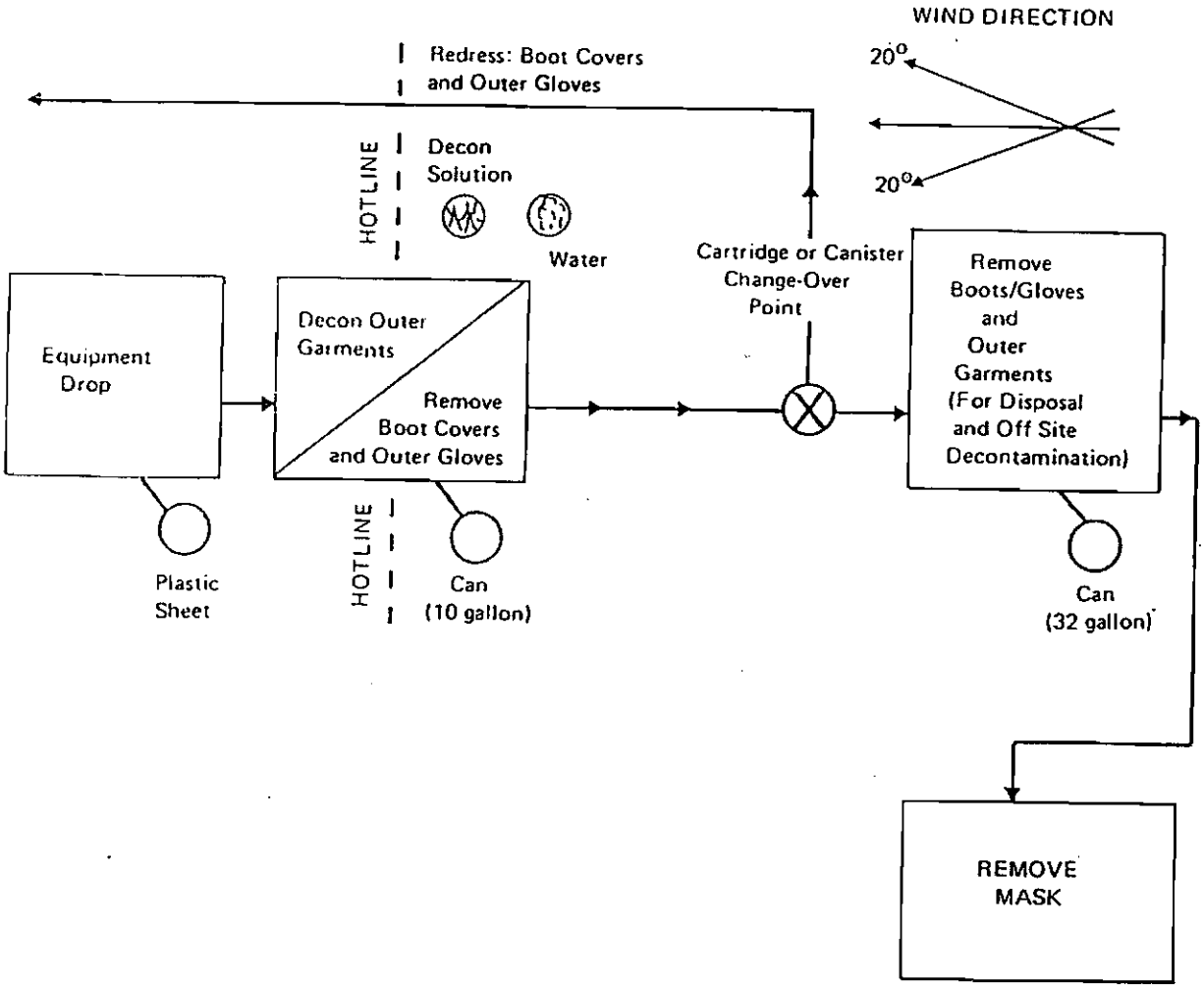
FIGURE 3

F.S.O.P.

PROCESS DECON PROCEDURES

MINIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION



10.0 WORK PROCEDURES

10.1 WORK PRACTICES

- No spark sources within exclusion or decontamination zones.
- Avoid visibly contaminated areas.
- No eating, drinking, or smoking in contaminated areas, or exclusion or decontamination zones.
- SSC to establish areas for eating, drinking, smoking.
- No contact lenses in exclusion or decontamination zones.
- No facial hair that would interfere with respirator fit if Level C or B is anticipated.
- Site work will be performed during daylight hours whenever possible. Any work conducted during hours of darkness will require enough illumination intensity "to read a newspaper without difficulty."

10.2 SITE CONTROL MEASURES

- Site safety coordinator (SSC) to conduct site safety briefing (see below) before starting field activities, or as tasks and site conditions change.
- SSC records safety briefing attendance in logbook, and documents topics discussed.
- Post OSHA job site poster in a central and conspicuous location at the site.
- Determine wind direction.
- Establish work zones: support, decontamination, and exclusion zones, and delineate work zones with flagging or cones as appropriate. Support zone upwind of site.
- Establish decontamination procedures, including respirator decontamination procedures, and test.
- Utilize access control at the entry and exit from each work zone.
- Chemicals to be stored in proper containers.
- MSDSs are available for onsite chemicals employees are exposed to.
- Establish onsite communications. These should consist of:
  - Line of sight/hand signals
  - Air horn
  - Two-way radio or cellular phone if available
- Establish emergency signals. For example:
  - Grasping throat with hand--EMERGENCY--HELP ME
  - Grasping buddy wrist--LEAVE AREA NOW
  - Thumbs up--OK, UNDERSTOOD
  - Two short blasts on air horn--ALL CLEAR
  - Continuous air horn--EMERGENCY--EVACUATE
- Establish offsite communications.
- Establish "buddy" system.
- Establish procedures for disposal of material generated onsite.
- Initial air monitoring conducted by SSC in appropriate level of protection.
- SSC to conduct periodic inspections of work practices to determine effectiveness of this plan. Deficiencies to be noted, reported to HSM, and corrected.
- Site safety briefing topics: general discussion of health and safety plan; site specific hazards; location of work zones; PPE requirements; equipment; special procedures; emergencies.

11.0 EMERGENCY RESPONSE PLAN (REFERENCE CH2M HILL SOP HS-12)

11.1 PRE-EMERGENCY PLANNING

The SSC performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency service providers as appropriate.

- Locate nearest telephone to the site and inspect onsite communications.
- Locate chemical, safety, radiological, biological hazards.
- Confirm and post emergency telephone numbers and route to hospital.
- Post site map marked with location of emergency equipment and supplies.
- Review emergency response plan for applicability to any changed site conditions, alterations in onsite operations, or personnel availability.
- Evaluate capabilities of local response teams.
- Where appropriate and acceptable to the client, inform emergency room/ambulance service and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment and supplies.
- Review emergency procedures for personnel injury, exposures, fires, explosions, chemical and vapor releases with field personnel.
- Locate onsite emergency equipment and supplies of clean water.
- Verify local emergency contacts, hospital routes, evacuation routes, and assembly points.
- Drive route to hospital.
- Review names of onsite personnel trained in first aid and CPR.
- Review notification procedures for contacting CH2M HILL's medical consultant and team member's occupational physician.
- Rehearse the emergency response plan once prior to site activities.
- Brief new workers on the emergency response plan.

11.2 EMERGENCY EQUIPMENT AND SUPPLIES

The SSC marks the locations of emergency equipment on the site map and posts the map in the support zone.

- 20 lb ABC fire extinguisher
- Industrial first aid kit
- Emergency Escape Mask(s) (Chlorine Gas) to be provided by Elf Atochem Inc.

11.3 EMERGENCY MEDICAL TREATMENT

- The SSC will assume charge during a medical emergency until the ambulance arrives, or the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR.
- Call the ambulance and hospital.
- Determine if decontamination will make injury worse. Yes--seek medical treatment immediately.
- Make certain that injured person is accompanied to emergency room.
- Notify the Project Manager of the injury.
- Notify the District or Regional Health and Safety Manager.
- Notify the injured person's human resources department.
- Prepare an incident report. Submit this to the Corporate Director Health and Safety (WDC) and Corporate Human Resources Department (DEN) within 48 hours.

11.4 EVACUATION

- Evacuation routes will be designated by Elf Atochem personnel prior to beginning of work. Elf Atochem requires all onsite personnel to attend a 1-hour training session focused on emergency response procedures related to plant operations.
- Evacuation routes from the CH2M HILL work area will be reviewed by the SSC prior to beginning of work.
- Onsite and offsite assembly points will be designated prior to beginning of work.
- Personnel will exit the exclusion zone and assemble at the onsite assembly point upon hearing the emergency signal for evacuation of the exclusion zone.
- Personnel will assemble at the offsite point upon hearing the emergency signal for a site evacuation.
- The SSC and a "buddy" will remain onsite after the site has been evacuated (if possible) to assist local responders and advise them of the nature and location of the incident.
- SSC accounts for all personnel in the onsite assembly zone.
- A person designated by the SSC (prior to work) will account for personnel at the offsite assembly area.
- The SSC is to write up the incident as soon as possible after it occurs, and submit a report to the Corporate Director Health and Safety.

11.5 EVACUATION ROUTES AND ASSEMBLY POINTS

CH2M HILL personnel and subcontractors are required to attend an Elf Atochem health and safety meeting where personnel will be briefed on routes, assembly points, Elf Atochem health and safety requirements, emergency signals and procedures. Copies of the Elf Atochem emergency procedures plan and escape-masks (for chlorine gas) will be provided.

Personnel will excavate area using an upwind or crosswind route whenever possible. The SSC will identify specific evacuation routes and assembly points prior to starting work.

11.6 EVACUATION SIGNALS

Exclusion Zone	Site
The buddy system (see Section 10.2)	Chemical incident–slow whoop Fire–siren Medical Emergency–steady horn

12.0 EMERGENCY RESPONSE TELEPHONE NUMBERS

PROPERTY ADDRESS:	6400 NW Front Avenue	**Phone:**	503/225-7210
Police		**Phone:**	911
Fire		**Phone:**	911
Ambulance		**Phone:**	911
Water:	Portland Water Bureau	**Phone:**	823-4874
Gas:	Northwest Natural Gas	**Phone:**	1-800-882-3377
Electric:	Portland General Electric	**Phone:**	464-7777

Hospital: Good Samaritan **Phone:** 503/229-7711
Address: 1015 NW 22nd

Route to Hospital: (See Figure 4)

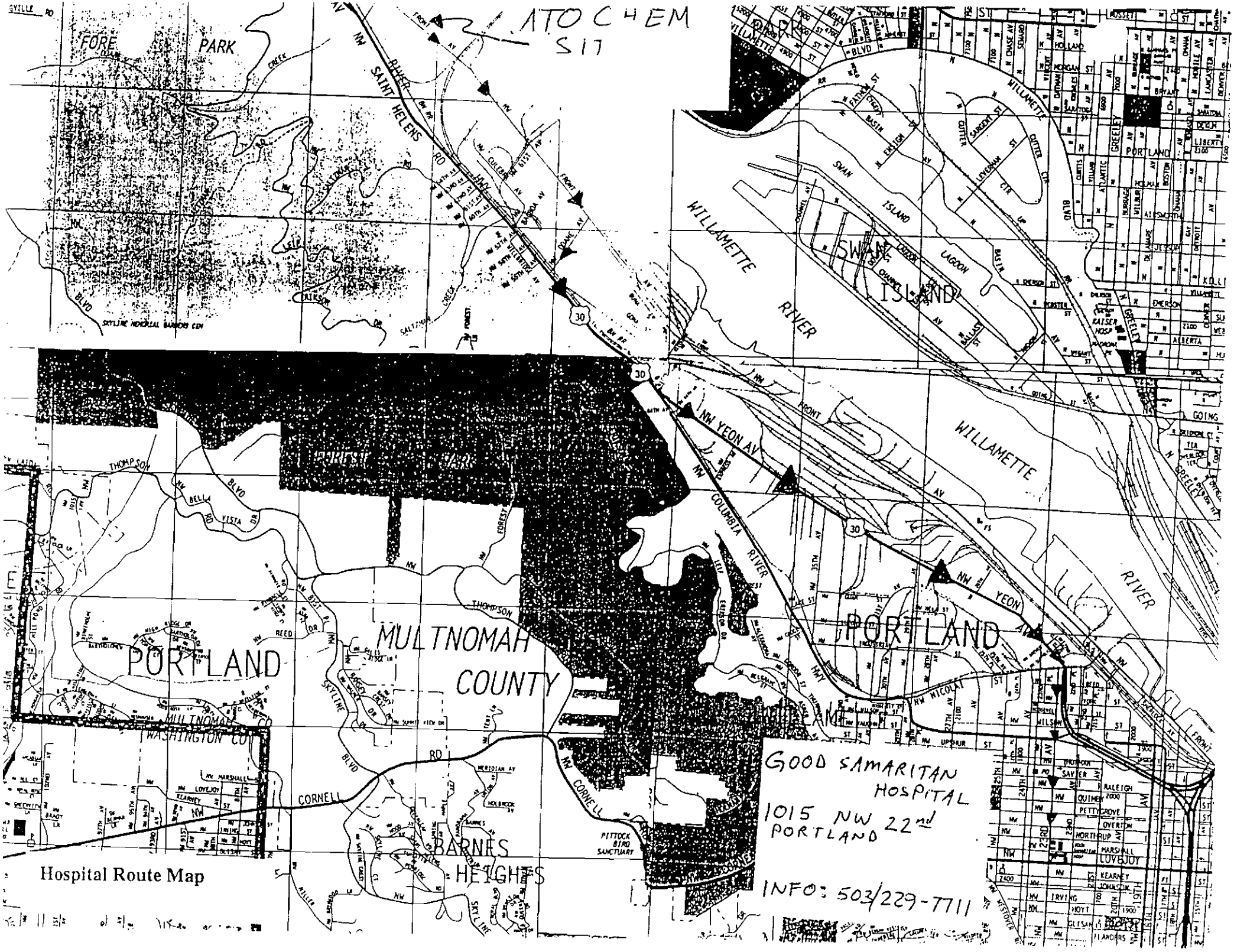
- South on Front Avenue for approximately 1/2 mile
- West on Doane for approximately 1/4 mile
- South on Hwy 30 to St. Helens Rd, South to Vaughn St, approximately 3 miles
- East on Vaughn approximately 1 mile
- South on NW 22nd approximately 1 mile to Good Samaritan Hospital, on right

12.1 GOVERNMENT AGENCIES INVOLVED IN PROJECT

Federal: Not applicable

State: Not applicable

Local: Not applicable



Hospital Route Map

13.0 EMERGENCY CONTACTS

CH2M HILL Medical Consultant

Dr. Elayne F. Theriault, M.D.
Medical Director
Environmental Medicine Resources, Inc.
4860 Chamblee Dunwoody Dr.
Atlanta, GA 30341
800-229-3674

PDX Occupational Physician

Dr. Kirby Griffin
Northwest Occupational Health Associates
9370 S.W. Greenburg Road, Suite 605
Portland, Oregon 97223
503/246-7030

SEA Occupational Physician

Dr. Randal Franke
206/822-3651

Corporate Director Health and Safety

Name: David Waite/FGL/SEA
Phone: 703/471-1441

Site Safety Coordinator (SSC)

Name: John Childs/PDX
Phone: 503/235-5000

Health and Safety Manager (HSM)

Name: Mollie Netherland/CORP/SEA
Phone: 206/453-5000

Regional Manager

Name: Mark Lasswell/PDX
Phone: 503/235-5000

Radiation Health Manager (RHM)

Name: Frank Petelka/ORO
Phone: 615/483-9032

Project Manager

Name: Pamela Brody-Heine/PDX
Phone: 503/235-5000

PDX Human Resources Department

Name: Lynne Robertson/CVO
Phone: 503/752-4271

SEA Human Resources Department

Name: Bob Danks/SEA
Phone: 206/453-5000

Corporate Human Resources Department

Name: Suzanne Thomas/DEN
Phone: 303/771-0952

If an injury occurs, notify the injured person's personnel office as soon as possible after obtaining medical attention for the injured. Notification MUST be made within 24 hours of the injury.

Client

Larry Patterson
Elf Atochem North America, Inc.
6400 N.W. Front Avenue
Portland, Oregon 97210
503/225-7210

14.0 PLAN APPROVAL

This site safety plan has been written for use by CH2M HILL. CH2M HILL claims no responsibility for its use by others, unless specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if these conditions change.

PLAN WRITTEN BY: Bill Griffin **DATE:** July 8, 1994

PLAN APPROVED BY: Mollie Netherland **DATE:** July 8, 1994

14.1 PLAN AMENDMENTS

DATE: February 1995 **CHANGES MADE BY:** John Childs/PDX

CHANGES TO PLAN: In February 1995, the HSP was re-written, affecting all sections of the HSP.

APPROVED: M. Netherland **DATE:** February 22, 1995

14.2 PLAN AMENDMENTS

DATE: February 28, 1995 **CHANGES MADE BY:** Pamela Brody-Heine

CHANGES TO PLAN:

- Project information and description
- Site description and history
- Route to hospital
- Description of tasks
- Emergency response telephone numbers

APPROVED: M. Netherland **DATE:** February 28, 1995

15.0 ATTACHMENTS TO PLAN

Attachment 1: Employee signoff

Attachment 2: Applicable MSDSs

Note: Once approved, a copy of this plan should be forwarded to Cindy Carr/WDC.

EMPLOYEE SIGNOFF

The employees listed below have been provided a copy of this health and safety plan, have read and understood it, and agree to abide by its provisions.

EMPLOYEE NAME	EMPLOYEE SIGNATURE / DATE

Appendix G

CH2M HILL Staff Resumes

Pamela Brody-Heine, P.E.

Environmental Engineer/Groundwater Hydrologist

Distinguishing Qualifications

- Project manager for the Swift Adhesives state Superfund site for Reichhold Chemicals, Inc.
- Extensive experience in the assessment and remediation of complex environmental sites

Relevant Experience

Ms. Brody-Heine is an environmental engineer/groundwater hydrologist in CH2M HILL's Portland office. She has 9 years of experience in the assessment and remediation of complex environmental sites, including site characterization, aquifer analysis, fate and transport evaluations, regulatory agency interaction, and evaluation of remedial alternatives.

Ms. Brody-Heine is the project manager for the Swift Adhesives state Superfund site for Reichhold Chemicals, Inc. The project has included a site investigation, removal action, remedial investigation, feasibility study, remedial action plan, and remedial design. For the Swift Adhesives project, she has successfully negotiated one of the few Record of Decisions (ROD) issued by DEQ in the State of Oregon. The total project cost is approximately $1.5 million.

Ms. Brody-Heine is also the project manager for a site investigation/remedial action project at a former pesticide formulation facility. She has been working with DEQ to streamline and expedite the regulatory process to reach a solution that meets that agencies needs while providing significant cost saving for the client.

Ms. Brody-Heine was the project manager for a remedial cost estimation project for nonradiological restoration of a nonoperational nuclear power plant. Tasks included performing a focused site investigation, identifying potentially applicable federal and state regulation, estimating remedial quantities and, identifying remedial alternatives for a wide range of potential contaminants as well as media, and estimating remedial costs.

Ms. Brody-Heine has conducted numerous Phase I and Phase II environmental site assessments for property transfers.

She was project manager for a groundwater investigation and remediation plan for an area surrounding a crude oil pipeline in southern California. This investigation included characterization of hydrogeology and groundwater flow systems; hydrocarbon recovery and slug testing; fate and mobility analysis; and evaluation of remedial options. At the site of an abandoned oil field, also in southern California, she evaluated the migration of both miscible and immiscible contaminants in a fate and mobility study of the unsaturated zone.

As project manager for a geologic, geophysical, and subsurface investigation of the area surrounding a gas compressor station in eastern San Bernardino County, Ms. Brody-Heine was responsible for characterization of the complex groundwater flow system, installation of monitoring wells, analysis of aquifer and slug test data, hydrologic budget analysis, and design of a groundwater monitoring program.

Ms. Brody-Heine has conducted a fate and mobility study of hydrocarbons in the subsurface for a site in Las Vegas, Nevada. This evaluation included the migration of bulk hydrocarbons and dissolved

constituents through the unsaturated zone, as well as the migration of dissolved constituents in groundwater in both horizontal and vertical directions.

Education

M.S., Civil Engineering, University of Colorado, Boulder
B.A., Geology, University of California, Berkeley

John L. Childs, P.E.
Environmental Engineer

Distinguishing Qualifications

- Managed two environmental land audits for the Bonneville Power Administration (BPA), which analyzed the presence of PCBs, VOCs, petroleum hydrocarbons, and herbicides
- Provided field support during investigation and remediation of PCB- and TPH-contaminated soil located at a Portland General Electric facility
- Supervised sediment sample collections from the Columbia River before and after removal of a Weyerhaeuser Company diffuser that previously discharged into the river

Relevant Experience

Mr. Childs duties as a member of CH2M HILL's Environmental Division have included project management, report preparation, regulatory support, field sampling, and contractor oversite during environmental projects.

He is project manager for the GNB facility in Beaverton, Oregon, which previously manufactured lead acid batteries. Remediation of approximately 3,000 tons of lead-contaminated soil occurred from April to August 1994. The DEQ intends to provide a no furtherance action (NFA) for the site, excluding a deed restriction for a small area beneath a building.

Mr. Childs has managed a variety of projects for Weyerhaeuser Company. He helped develop the RI/FS Study Work Plan; wrote an independent cleanup action report as required by the Model Toxics Control Act (MTCA); served as resident observer for the removal of a diffuser that previously discharged into the Columbia River; and supervised sediment sample collections from the Columbia River before and after the diffuser removal. He currently manages the quarterly groundwater monitoring program for the 19 wells at the Chlora-Alkali facility in Longview, Washington.

He was field manager for two environmental land audits for the Bonneville Power Administration (BPA), which analyzed the presence of polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), petroleum hydrocarbons, and herbicides. The project served as a pilot test for other potential sales of substations.

He was field manager for a Portland General Electric (PGE) site during site investigations that included the collection of soil and sediment samples from a creek and remedial activities. He provided field support during investigation and remediation of PCB- and TPH-contaminated soil located at PGE's Station L facility in downtown Portland.

Mr. Childs coordinated a quarterly groundwater sampling program for Swift Adhesives, a division of Reichhold Chemicals. and was task manager for the disposal of the investigative-derived waste (IDW). He provided RCRA and TSCA regulatory support and performed PCB analysis for PacifiCorp prior to remedial activities for disposal of hazardous and nonhazardous soil and debris. He also led a surface soil and sediment sampling project for GNB Battery in Beaverton, Oregon.

He has served as resident observer for sediment sampling from a barge in the Columbia River, for excavation of diesel and gasoline contaminated soil following removal of underground storage, and for soil excavation after a derailment of train cars carrying contaminated soil.

Education

M.S., Environmental Engineering, University of California, Davis
B.S., Agricultural Engineering, Oregon State University

Jeffrey F. Dresser, P.E.
Environmental Engineer

Distinguishing Qualifications

- Was project manager for Pendleton Woolen Mills' RCRA corrective action program for its 77-acre facility near the Columbia River
- Was project manager for preparation of RCRA permit applications for the U.S. Army's chemical agent demilitarization program
- Was project manager for preparation of a RCRA Part B permit for decontamination of an Occidental Chemical Corporation facilit

Relevant Experience

For more than 10 years at CH2M HILL, Mr. Dresser has specialized in helping private sector clients develop appropriate environmental compliance programs. He is an environmental engineer, regulatory program specialist, and project manager in the hazardous and toxic waste management field. He currently serves as CH2M HILL's firmwide technical group leader for RCRA regulations, compliance services, and environmental assessments of real property.

Mr. Dresser's environmental compliance work includes evaluation of hazardous waste generation, storage, and disposal practices at more than 30 facilities. He has been the manager, lead engineer/auditor, or regulatory program specialist on more than 25 management programs for hazardous waste generators (spill prevention, control, and countermeasure plans; contingency/emergency procedures; and training plans) and has worked on more than 40 environmental audits of hazardous waste generator or treatment, storage, and disposal facilities, including truck manufacturing, specialty metals, jet aircraft engine manufacturing, textiles, shipbuilding, and commercial hazardous waste incineration facilities.

He was project manager for Pendleton Woolen Mills' Resource Conservation and Recovery Act (RCRA) corrective action program for a 77-acre facility within 500 feet of the Columbia River. Mr. Dresser prepared a draft report to the U.S. Environmental Protection Agency (EPA) Region 10. Corrective measures for the site recently have been evaluated and the results have been submitted to EPA. By using groundwater modeling and soil leaching data, CH2M HILL demonstrated that groundwater corrective action would not be necessary for long-term protection of the river. Remedial actions thus far undertaken include clean closure of an unlined surface impoundment; cleanup of pesticide-contaminated soil; and handling of several hundred drums containing dry waste. All interim cleanup and stabilization actions were completed with no interruption to plant operations.

Mr. Dresser was project manager for preparation of RCRA permit applications for the U.S. Army's chemical agent demilitarization program. Permits were sought for eight army installations with arsenals of deteriorating chemical warfare agents, including nerve gases. Remedial planning for the $4 million project involved decontamination and decommissioning of structures and facilities that had manufactured lethal chemicals.

He was project manager for preparation of RCRA Part B permit for facility decontamination and closure of a waste pile and container storage area. The facility, owned by Occidental Chemical Corporation,

contained numerous hazardous and toxic wastes generated by chlorine and caustic soda production. He also conducted a site investigation to identify acceptable cleanup levels; prepared engineering evaluations to verify performance of closure actions; managed cost control; and led the negotiations with regulatory agencies.

Mr. Dresser was also lead engineer for pre-RCRA permitting assistance to four commercial hazardous waste treatment facilities in Washington state. His responsibilities ranged from development of regulatory strategies, to evaluation of technical issues, to senior project review and management.

Education

M.S., Environmental Engineering, Oregon State University
B.S., Civil Engineering, Oregon State University

Nadine Muoio

Data Management/Data Validation

Distinguishing Qualifications

- Was a member of an environmental applications design team that designed, developed, and managed chemical and physical data
- Has managed GIS and data management staff for environmental projects

Related Experience

Ms. Muoio is proficient in relational database design, programming and implementation. She has managed geographic information systems (GIS) and data management staff for environmental projects. She was a member of an environmental applications design team involved in designing, developing, and managing chemical and physical data to facilitate its analysis with geographic applications. These applications included an electronic data-loading system for chemical data, a soil boring and well information system, automated stratigraphic tools for display and analysis of geologic data, and a presentation system for three-dimensional contaminant plumes.

Ms. Muoio has also served as a field geologist, supervising field drilling, well installation, groundwater and soil sampling, and maintaining geologic boring logs.

Education

B.S., Geology/Biology, University of Rochester, New York

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ATO

ELF ATOCHEM NORTH AMERICA, INC.
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Portland, Oregon 97210

(503) 228-7655

August 30, 1996

Mr. Matt McClincy
Department of Environmental Quality
Northwest Region
2020 S.W. Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Mr. McClincy:

By letter dated June 24, 1996 we received your comments on Elf Atochem North America's Phase 2 Work Plan for the Acid Plant Project. Attached you will find a detailed response (Work Plan Addendum) which was prepared by CH_2M Hill.

We appreciate your thorough review of the Work Plan. We believe the Addendum addresses all of your comments, and it is our intent to proceed with the work schedule as soon as we receive your final approval.

As we have previously discussed, we feel very strong that facilities which are participating in the Voluntary Cleanup Program should not be referred to the DEQ Site Discovery Program for placement on the Confirmed Release List or the Inventory. Please refer to pages 5 and 6 of the Addendum for a more detailed discussion of this matter.

If you have any questions, please feel free to contact me at 225-7210.

Sincerely,
Elf Atochem North America

Larry D. Patterson

Larry D. Patterson
Environmental Manager

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CH2MHILL

August 29, 1996

115946.PM.ZZ

Larry Patterson
ELF Atochem North America
6400 N.W. Front Avenue
Portland, Oregon 97210

Subject: Addendum to the Phase 2 Soil and Groundwater Investigation Workplan
Acid Plant Project
Elf Atochem Portland Plant

Dear Larry:

This addendum to the Phase 2 Soil and Groundwater Investigation Work Plan for Elf Atochem's Acid Plant Project was prepared in response to Oregon Department of Environmental Quality (DEQ) Voluntary Cleanup Program's (VCP) Review Comments of the Phase 2 Soil and Groundwater Investigation Work Plan summarized in the two memorandums from DEQ dated June 11, 1996.

Our responses to each of DEQ's comments are summarized below. In addition, this memorandum includes a description of additional proposed groundwater investigation tasks and an investigation derived waste (IDW) management plan.

Response to VCP Review Comments

DEQ's comments on the Phase 2 Work Plan are provided in two memorandums, both dated June 11, 1996; 1) the File Review Memorandum, and 2) the VCP Review Comments of the June 1995 Proposed Phase 2 Soil and Groundwater Investigation of the Acid Plant Project. Our responses to the comments are addressed in the order presented in VCP's memorandums. DEQ's comments are shown in italics, with our responses provided below each comment.

File Review Memorandum - Data Gaps and Recommendations

1. The full nature and extent of hazardous substance contamination in the Acid Plant Area (soils and groundwater) has not be determined.

Recommendation: Atochem has already prepared a work plan to further investigate the nature and extent of this contamination. DEQ review comments are presented in an attached review memorandum.

Comment noted.

2. Known or suspected storage and transfer areas (e.g. rail and truck loading docks) for DDT base stocks or finished products in the former DDT manufacturing area have not been investigated for releases of hazardous substances.

Recommendation: A conceptual model for how DDT-related compounds were managed in the DDT manufacturing area should be developed. Screening level sampling for DDT-related compounds should be performed in those areas where releases of these compounds reasonably may have occurred. It is anticipated that this sampling would occur in a subsequent phase of work after the Phase 2 investigation.

The area designated as the General Acid Plant Area in the Work Plan was selected to address all materials handling operations associated with the manufacture and handling of DDT manufacturing process waste and related compounds. It was our intent to include all process areas, loading areas, and waste handling areas within the designated perimeter.

The actual production of DDT occurred inside the Process Building noted on Figure 1-3 of the Work Plan. Raw materials for the process consisted of 98 percent sulfuric acid, oleum, monochlorobenzene, and chloral. Each of these materials, with the exception of chloral, were stored in above ground tanks located immediately adjacent to the east side (plant east) of the Process Building. The chloral tank was apparently located above ground inside the process building on concrete floors. All reactions to form DDT occurred inside the building. Portable metal pans several feet square were filled with hot DDT in the Process Building. After the DDT had cooled, the material in the pans was broken with a jackhammer which resulted in large chunks of crystalline material. These chunks of DDT were moved and temporarily stored on an asphalt slab located within the General Acid Plant Area designated on Figure 1-2 of the Work Plan. When referring to Figure 1-2 of the Work Plan, the material storage area would have been located near the bottom center of the General Acid Plant Area.

The DDT chunks from the storage slab were periodically moved into the southwest corner of the Warehouse shown on the bottom left of Figure 1-3. Apparently milling and grinding of the chunks occurred inside the Warehouse. Dry processed DDT was loaded into bags

and transported from the plant by railcar. The railcar loading area was located inside the General Acid Plant Area on the north side of the processing Warehouse. Apparently a small amount of material was dissolved in diesel fuel and loaded into trucks as a solution. The above ground dissolving tanks were located immediately adjacent to the west (plant west) side of the Process Building.

Wastes from the process were blown by air through piping to a monochlorobenzene recovery system. The system was apparently located immediately west (plant west) of the former manufacturing process residue pond. The recovery system consisted of a steam stripping system where monochlorobenzene was stripped from the waste and returned to the process. The entire system was located on a curbed concrete slab. Wastes from the system were apparently periodically drained to the process residue pond.

Because diesel was apparently used to dissolve small quantities of DDT, a soil sample will be collected from along the railroad tracks south of the Process Building where the diesel/DDT mixture may have been loaded onto the railcars. The sample will be collected from a depth of 3 to 4 feet using the hollow stem auger rig, if access to the area is available. The sample will be analyzed for total petroleum hydrocarbons (TPH)-diesel (EPA Method 8015-modified). Groundwater samples will also be collected from the four monitoring wells and analyzed for TPH-diesel (EPA Method 8015-modified). However, the presence of DDT and monochlorobenzene may interfere with laboratory analysis (detection and quantification) of TPH.

3. The identification of contaminants of concern (COCs) in the Acid Plant Area soil and shallow groundwater is incomplete. Phase 1 investigation was limited to organochlorinated pesticides, VOCs and TPH.

Recommendation:

> *A. Atochem should identify any hazardous substances currently and historically used in this area which could impact: the mobilization of DDT manufacturing wastes, treatability of these wastes, waste management, and endangerment assessment and incorporate them into the characterization of the Acid Plant Area as appropriate.*

There are no available records or anecdotal information of releases of spills or disposition of any hazardous substances other than DDT manufacturing process waste and related compounds historically used in the general acid plant area which could impact mobilization of DDT manufacturing wastes, treatability of these wastes, waste management, and endangerment assessments. If substances used in the area historically could have impacts on our project, those impacts may be associated with diesel used to dissolve small quantities of DDT or possible residues which might affect soil and groundwater pH.

Historic activities included short term production, during the late 1950s to mid-1960s, of ammonium perchlorate (NH_4ClO_4), made as a rocket fuel for use by the federal government. Sodium perchlorate (Na ClO_4) was reacted with ammonia to form ammonium perchlorate. Hydrochloric acid (HCl) may have also been involved with the reaction. Ammonium perchlorate and sodium perchlorate degrade quickly into chlorides, nitrate compounds and sodium.

Atochem currently produces hydrochloric acid at a location marked Acid Plant on Figure 1-3 of the Work Plan. Hydrogen gas is burned in the presence of chlorine gas and the vapor is absorbed in water. Two different grades of HCl are currently produced. Measurements of pH will be collected during groundwater sampling.

B. Chloral, one of the base chemicals used to manufacture DDT at the Portland plant, is a CERCLA hazardous substance. Atochem should either add chloral as a COC for the characterization of the Acid Plant Area or provide an argument as to why it should be eliminated as a COC.

Chloral (trichloroacetaldehyde) was not included in the laboratory analysis suite for two reasons; 1) chloral degrades readily and is not likely to be found in the environment, and 2) we have been unable to locate a laboratory capable of analyzing for chloral. Chloral is highly soluble in water, and if released to the environment, is not expected to bind to soil. Chloral is hydrolyzed readily to chloral hydrate, and is not likely to be found in the environment. There are no data available on the fate of chloral hydrate in soil or water. However, chloral hydrate is metabolized rapidly in humans and laboratory animals, suggesting that it is also readily degraded in the environment.

Chloral hydrate degrades in the environment into chloroform and formic acid, or formate. Formic acid degrades readily in soil and water both biologically and abiologically. Formic acid is produced naturally by plants and insects.

Based on the relative nonpersistence of chloral and intermediates of chloral degradation (chloral hydrate and formic acid) in soil and groundwater, the potential presence of chloral contamination will be assessed through the presence of a more persistent degradation product such as chloroform. The sampling and analysis plan already includes analyzing for chloroform (VOCs using EPA Method 8240). If high levels of chloroform are detected, a subsequent phase of work may include analyses of chloral hydrate.

C. The detection of VOCs in Phase 1 groundwater results, such as carbon tetrachloride and tetrachloroethane, suggest the presence of either unknown upgradient contaminant sources or possible additional contaminants present in the DDT manufacturing process residue. Analysis to date have covered a wide range of compounds but have not included a full scan

for semivolatile compounds. Because of the uncertainty associated with the contaminants in this area, a full scan for semivolatile compounds should be completed on representative pond residue and groundwater samples.

As described above in response to comment #3A, there are no available records or anecdotal information of releases or spills or disposition of any hazardous substances other than DDT manufacturing process waste and related compounds which were historically used in the General Acid Plant Area. The concentrations of VOCs detected is generally low, with the exception of monochlorobenzene and chloroform. As previously discussed, these two compounds are directly related to DDT manufacturing process wastes. There are no available records or information indicating potential sources of semivolatile compounds. We do not believe there is evidence to support analysis of semivolatile compounds.

D. The rationale for dropping TPH as a COC should be presented.

In Phase 1, TPH was not initially identified as a COC. However, during the field activities a thin (less than 11 inches) layer of black stratified carbon-rich material was observed between 3.6 feet bgs and 4.5 feet bgs in boring SB-1 which was drilled through the former location of the pond. The two samples collected from this thin localized layer appeared to have a hydrocarbon-like odor and sheen. No other indications of hydrocarbon contamination were observed during the Phase 1 field activities.

As described in our responses to Comments #2 and 3A, diesel was used to dissolve small quantities of DDT and then loaded into trucks and possibly railcars. Diesel may be included in a subsequent phase of the investigation, specifically in the soil in the area where the diesel/DDT mixture may have been loaded onto railcars, and in the groundwater. However, as was noted previously in our response to Comment #2, high concentrations of DDT and/or monochlorobenzene may interfere with laboratory analysis of diesel.

4. Listing

The results of the Phase 1 investigation document releases of hazardous substances to soil and groundwater at the facility. Based on this data, it is recommended that the facility be referred to the DEQ Site Discovery Program for placement on the DEQ list of facilities where a release of hazardous substances has been documented (Confirmed Release List) and the list of facilities where a site assessment has determined that additional work, investigation or remedial measures are necessary (Inventory List).

We do not agree that any part of the Elf Atochem plant should be referred to the DEQ Site Discovery Program for placement on the Confirmed Release List or the Inventory. When we first met with DEQ staff to explore our options for entry into the Voluntary Cleanup Program ("VCP"), no one told us or indicated in any way that our participation in the

program would automatically result in our plant being listed on any of DEQ's hazardous substance release lists. Also, we did not find a discussion of this result in any of DEQ's printed information concerning the VCP or in any of the rules and regulations governing the program.

Inclusion in the Site Discovery Program lists carries a very negative perception amongst the regulated community because many of the companies have been reluctant to address issues on their properties. The companies that have been proactive and have studied their sites, are also looked at negatively once they are included on the Site Discovery Program lists. Elf Atochem strongly encourages DEQ to consider developing a new list which would be specific for companies participating in the voluntary cleanup program.

VCP Review Comments of the June 1995 Proposed Phase 2 Soil and Groundwater Investigation of the Acid Plant Project

1. The Phase 2 Work Plan Sampling and Analysis Plan (SAP) and Health and Safety Plan (HASP) components should be updated to include any additional contaminants of concern identified as a result of comment #3 in the Data Gaps and Recommendations Section of the June 11, 1996 VCP Elf Atochem File Review Memorandum.

The Health and Safety Plan will be updated to include chloral and chloral hydrate.

2. Concentrations of monochlorobenzene are sufficiently high in soil and groundwater to suggest that free (non-dissolved) phase product is present. Any significant concentrations of free-phase liquids (or DNAPL) are likely to be confined to the immediate area of release, however physical features such as sloped bedding could allow some lateral movement of this material. Care should therefore be taken to minimize the potential for exacerbating contamination during drilling.

Comment noted. If DNAPL is detected during drilling, the boring will be terminated.

3. Soil and groundwater samples should be screened (e.g. hydrophobic dye or UV fluorescence) for the presence of free-phase liquids (DNAPL) contamination where field observations or PID head space readings indicate such material may be present. The work plan should specify the screening protocol to be used.

Soil and groundwater samples will be screened in the field for the presence of phase-separated liquids if field observations indicate such material may be present. If available, both a UV fluorescent light and a hydrophobic dye will be brought into the field, and field tested. If one method appears to be more appropriate to detect phase-separated liquid, if present, that method will be used as the field screening tool.

4. DEQ understands that some monitoring well boreholes will be advanced into a silt layer estimated to be present at approximately 45 feet bgs, however boreholes will not be advanced a significant distance beyond the upper boundary of the silt, and that the portion of the borehole advanced into the silt will be grouted prior to monitoring well installation. This plan is acceptable with the proviso discussed below. This information and the procedures to be used for abandonment of the lower portions of the boreholes should be included in the work plan.

- If DNAPL or elevated soil gas vapors are detected in the monitoring well borings, CH2M HILL will forego the advancement of the boring into the top of the silt layer unless protective casing or other methods are employed to prevent the movement of contamination across what may be a hydrogeologic boundary.

The monitoring well boreholes will be advanced to the upper boundary of the silt layer, if present. A sampler will be driven a maximum of 2 feet into the silt layer to collect a representative sample. If elevated ionizable organic vapors are detected in a monitoring well boring, the boring will not be advanced beyond the depth necessary to complete the well in an equivalent horizon to the other monitoring wells. If DNAPL is detected in a monitoring well boring, the boring will be terminated. In either case, the sampler will not be driven into the underlying silt layer.

If a sample of the silt layer is collected, the bottom of the borehole, up to approximately one foot above the upper boundary of the silt layer, will be abandoned using a bentonite-cement grout or bentonite chips or pellets. Bentonite chips or pellets will not be used where DNAPL is suspected to be present because hydration of the bentonite might be compromised in the presence of DNAPL. In addition, separate-phase or high concentrations of chlorinated solvents, such as monochlorobenzene can desiccate clays.

The bentonite-cement grout or bentonite chips or pellets will be placed in the bottom of the borehole using a 2-inch tremie pipe. The bentonite-cement grout will be allowed to set for at least 24 hours prior to installing the well. The bentonite chips or pellets will be allowed to hydrate for at least 1 hour prior to installing the well.

5. The work plan notes that all four of the wells will be completed in the shallow aquifer at the depths determined by the project hydrogeologist based on field conditions and lithologies encountered. In order to simplify the interpretation of groundwater flow direction and gradient, DEQ recommends that all of the monitoring wells be screened in an equivalent horizon within the aquifer. The work plan should also discuss in which portion of the shallow aquifer the wells are anticipated to be screened and the rational for the selection.

We agree that the monitoring wells should be screened in a generally equivalent horizon within the aquifer to simplify the interpretation of groundwater flow direction.

Selection of the well screen depth will be based on 1) the depth to the groundwater, 2) the presence (and depth) or absence of the silt layer, and 3) the potential groundwater level fluctuations resulting from river stage fluctuations. Our intention is to place the well screen in the lower part of the aquifer to monitor the portion of the aquifer where the highest concentrations of contaminants would be expected. It is anticipated that groundwater will be at approximately 20 to 25 feet bgs and the silt layer will be at approximately 45 feet bgs. Based on these assumptions, and given the potential for the groundwater level to fluctuate 5 to 10 feet in response to river stage fluctuations, the well screen would be placed between 30 and 45 feet bgs.

Additional Groundwater Investigation Tasks

Additional groundwater investigation tasks are being proposed to collect subsurface stratigraphy and groundwater quality information prior to installation of the three downgradient monitoring wells. The groundwater quality information will be used to locate the three downgradient monitoring wells.

These additional groundwater investigation tasks include three cone penetrometer tests and collection of ten groundwater samples with a Geoprobe. It is anticipated that the three cone penetrometer tests will be conducted first to evaluate the subsurface stratigraphy. The cone penetrometer tests have the capability to get immediate information on the subsurface stratigraphy. The test will go to a depth of 45 to 50 feet bgs, or to the first encountered silt or clay layer below the depth of the water table (approximately 20 feet), which ever occurs first.

The Geoprobe groundwater sampling will be used to evaluate the lateral extent of DDT manufacturing process waste or related compounds in groundwater, if present, in the assumed downgradient direction (plant east) from the Former Residue Pond. The three wells will be located as far plant east as possible, given the possible presence of subsurface construction debris. If DDT manufacturing process waste or related compounds are detected in groundwater during the Geoprobe sampling, one well will be located in the central portion of the detected DDT manufacturing process waste or related compounds. The two other downgradient wells will be located plant north and plant south just outside of the area of detected DDT manufacturing process waste or related compounds, if any.

The ten Geoprobe groundwater samples will be collected using a BAT sampling system and analyzed for VOCs using EPA Method 8240. The BAT sampling system collects a groundwater sample in a sterilized glass vial that has been evacuated. The groundwater sample enters the vial at the tip through a syringe system such that the sample is not

exposed to air, thereby reducing volatile loss. Sample handling will be conducted as described in the Sampling and Analysis Plan in the Phase 2 workplan. Table D-1 (attached) from the Sampling and Analysis Plan has been update to include this additional groundwater sampling.

Management of Investigation Derived Waste

Provided in the Table 1 is guidance for managing the investigation derived waste (IDW) generated during the Phase 2 Soil and Groundwater Investigation, Acid Plant Project at Elf Atochem's Portland facility. It is the intent of Elf Atochem to transport and dispose of the IDW at Chemical Waste Management's subtitle C facility in Arlington, Oregon.

One composite sample will be collected from each of the following types of IDW generated:

- Soil cuttings from borings in the General Acid Plant Area
- Soil cuttings from borings in the Former Residue Pond Area
- Soil cuttings from the unsaturated zone of the monitoring well borings
- Soil cuttings from the saturated zone of the monitoring well borings
- Groundwater
- Decon water

Soil cuttings will be analyzed for total VOCs (EPA Method 8240) and, depending on the total VOC results possibly TCLP VOCs, and organochlorinated pesticides (EPA Method 8080). The decon water will be analyzed for VOCs and organochlorinated pesticides.

To the extent possible, decon water will be blended with soil cuttings. One inch of diatomaceous earth (provided by Elf Atochem) will be placed on the bottom of each drum, prior to filling, to absorb excess liquid. PPE and consumables will also be placed in drums with soil cuttings. The groundwater may be blended with the soil cuttings after the groundwater analytical results have been received.

Please contact me if you have any questions or need additional information.
Sincerely,

CH2M HILL

Pamela Brody-Heine

Pamela Brody-Heine, P.E.
Project Manager

Table 1
Management of Investigation Derived Waste
Phase 2 Soil and Groundwater Investigation
Acid Plant Project
Elf Atochem

Soil Cuttings	• If exceeds toxicity characteristic levels (MCB $\geq$ 100 mg/L or chloroform $\geq$ 6 mg/L) then = RCRA characteristic waste* • If below toxicity characteristic levels, but above LDRs (DDT > 0.087 mg/kg, MCB > 6.0 mg/kg, or chloroform > 6.0 mg/kg) then = State X004 waste - dispose of at a Subtitle C facility • If below toxicity characteristic levels, and below LDRs (DDT < 0.087 mg/kg, MCB < 6.0 mg/kg, and chloroform < 6.0 mg/kg) then = have option to dispose of at a Subtitle D facility
Groundwater	Based on groundwater results for the four wells: • If exceeds toxicity characteristics levels (MCB $\geq$ 100 mg/L or chloroform $\geq$ 6 mg/L) then = RCRA characteristic waste* • If below toxicity characteristic levels, but above LDRs (DDT > 0.0039 mg/L, MCB > 0.057 mg/L, or chloroform > 0.046 mg/L) then = State X004 waste - dispose of at a Subtitle C facility • If below toxicity characteristic levels, and below LDRs (DDT < 0.0039 mg/L, MCB < 0.057 mg/L, and chloroform < 0.046 mg/L) then = have option to dispose of at a Subtitle D facility
Decon Water	• If exceeds toxicity characteristics levels (MCB $\geq$ 100 mg/L or chloroform $\geq$ 6 mg/L) then = RCRA characteristic waste (blend with soil characteristic waste, if available)* • If below toxicity characteristic levels, but above LDRs (DDT > 0.0039 mg/L, MCB > 0.057 mg/L, or chloroform > 0.046 mg/L) then = State X004 waste - dispose of at a Subtitle C facility (blend with appropriate soil IDW, if available) • If below toxicity characteristic levels, and below LDRs (DDT < 0.0039 mg/L, MCB < 0.057 mg/L, and chloroform < 0.046 mg/L) then = have option to dispose of at a Subtitle D facility (blend with appropriate soil IDW, if available)
PPE/ Consumables	Assume to be State X004 Waste - Blend with appropriate soil cuttings

* If IDW is a RCRA characteristic waste, then the Universal Treatment Rules apply and the following treatment standards must be met; DDT soil - 0.087 mg/kg, DDT wastewater - 0.0039 mg/L, MCB soil - 6.0 mg/kg, MCB wastewater - 0.057 mg/L, chloroform - soil 6.0 mg/kg and chloroform wastewater - 0.046 mg/L.

Table D-1
Sampling and Analysis Summary
Phase 2
(Revised 8/28/96)

		Sampling Methodology			Number of Analyses					
Medium	Investigation Area	Type	Number	Approximate Boring/ Well Depth (feet)	Organo-chlorinated Pesticides (EPA 8080)	VOCs (EPA 8240)	TPH-Diesel (EPA 8015-modified)	Total Organic Carbon (EPA 9060)	Vertical Permeability (ASTM D-5084)	Particle Size Distribution (ASTM D-422)
Soil	General Acid Plant	Soil borings	1	3-4	0	0	1	0	0	0
		Soil borings	5	10	20	0	0	10	0	2
	Former Residue Pond	Soil borings (pond)	Up to 10	30	Up to 12	Up to 12	0	4	0	2
		Soil borings (trench)	Up to 10	10-30	Up to 10	Up to 10	0	2	0	0
		Shallow monitoring well installation	4	40	16	16	0	8	4	2
	QA/QC samples									
	Equipment blanks				3	2	0	0	0	0
	Trip blanks				0	2	0	0	0	0
	Total Phase 2 soil samples				Up to 61	Up to 42	1	24	4	6
Groundwater	Former Residue Pond	Geoprobes	10	15-35	0	10	0	0	0	0
	Former Residue Pond	Shallow monitoring well installation	4	40	4	4	4	0	0	0
	QA/QC samples									
	Duplicates				1	1	1	0	0	0
	Equipment blanks				1	1	1	0	0	0
	Trip blanks				0	1	0	0	0	0
	Total Phase 2 groundwater samples				6	17	6	0	0	0