QUEEN CITY FARMS

INITIAL REMEDIAL MEASURES
FIRST YEAR PERFORMANCE MONITORING REPORT

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LANDAU ASSOCIATES, INC.

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FIRST YEAR PERFORMANCE MONITORING REPORT

Prepared for

The Boeing Company/Queen City Farms
Seattle, Washington

Prepared by

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FEB 29 1988

Superfund Branch

24 February 1988

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1.0 EXECUTIVE SUMMARY

This report summarizes post-IRM (Initial Remedial Measures) ground water monitoring activities conducted during 1987 at Queen City Farms (QCF). Ground water monitoring wells, installed concurrently with an impermeable cap and upgradient ground water diversion trench, were used to assess performance of the completed project. Evaluations of cap surface and subsurface drainage system performance were conducted, ground water was sampled for chemical analysis, and ground water levels were monitored.

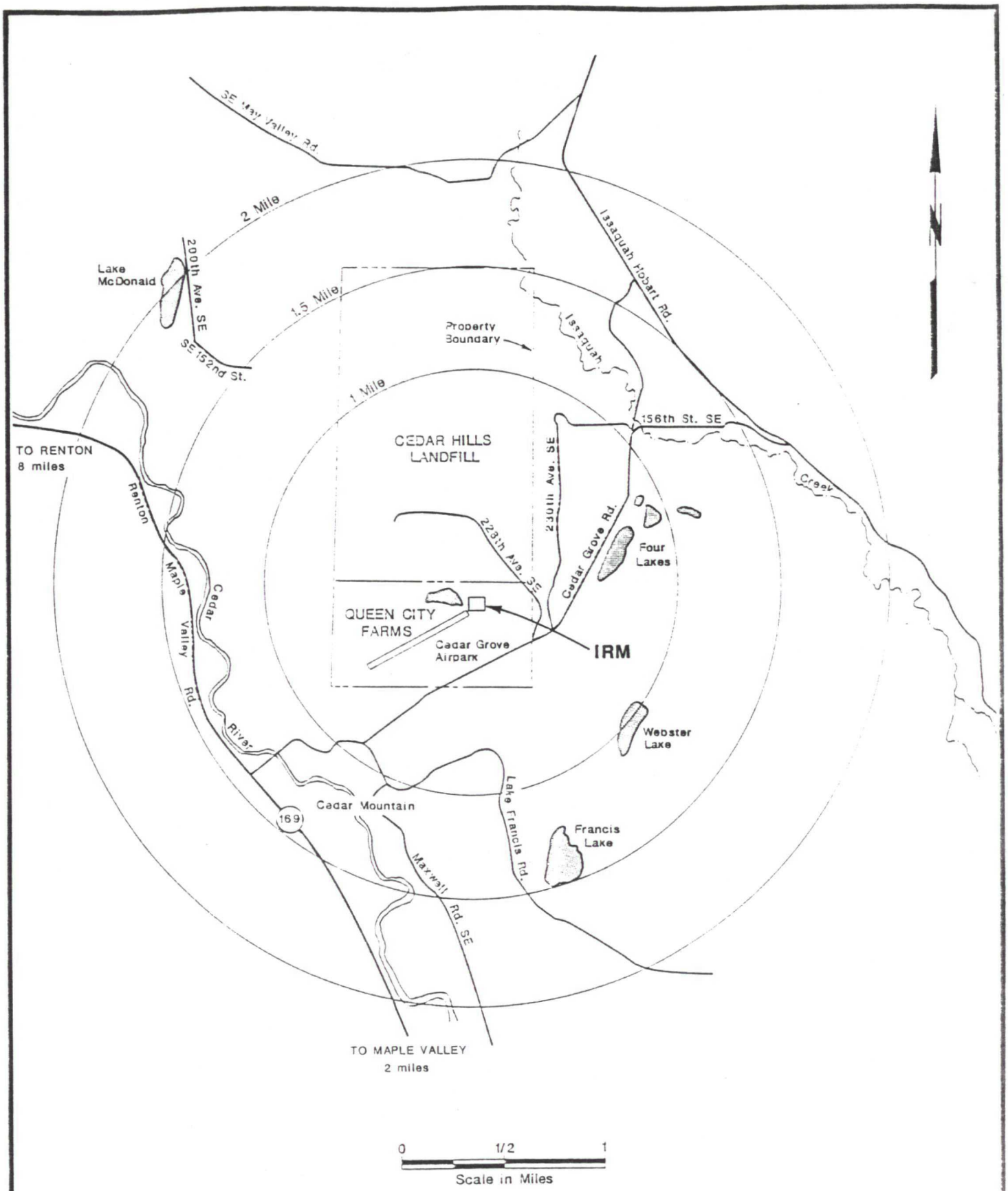
Information obtained during this year of monitoring has been of value in focusing the next phase of investigation now planned as part of the QCF Remedial Investigation/Feasibility Study (RI/FS).

2.0 IRM SITE BACKGROUND

2.1 History of IRM Site

The history and geology of the QCF property is described in various documents (see Bibliography); most recently in the "RI/FS Statement of Work", prepared by Landau Associates, Inc. and dated 29 January 1988. This property is a National Priority List (NPL) site, thus, remedial activities are conducted within the regulatory framework of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and its governing regulations, the National Oil and Hazardous Substances Contingency Plan, 40 CFR 300.

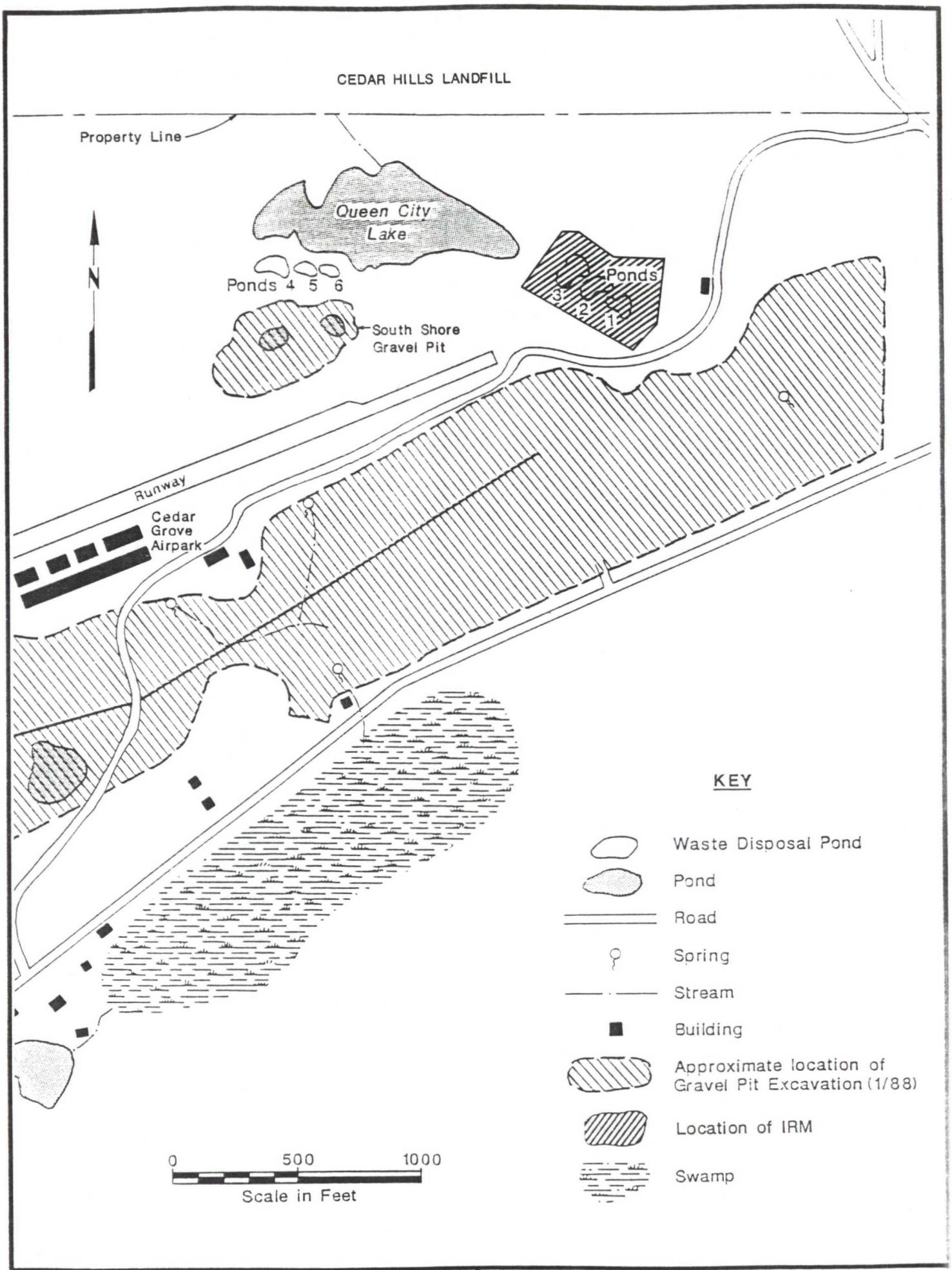
Queen City Farms (QCF) is a privately owned 320-acre parcel located on Cedar Grove Road, about three miles north of Maple Valley, Washington (Figure 1). The property comprises the south half of Section 28, Township 23 North, Range 6 East. The focal point of this report is the area within this property which includes and immediately surrounds former waste disposal Ponds 1, 2, and 3 (Figures 2 and 3). From the mid-1950s to the mid-1960s, these ponds were used for the disposal of industrial wastes. Based largely on financial records, it is believed that Ponds 1, 2, and 3 received a variety of commercial and industrial wastes from the Puget Sound area and may have included such materials as waste solvents, waste oil, paint and petroleum sludges, and metal finishing wastes. Many of the disposal operations were conducted by the industries themselves. The ponds were burned periodically to reduce the waste volume.



LANDAU ASSOCIATES, INC.

QCF General Location Map

Figure 1



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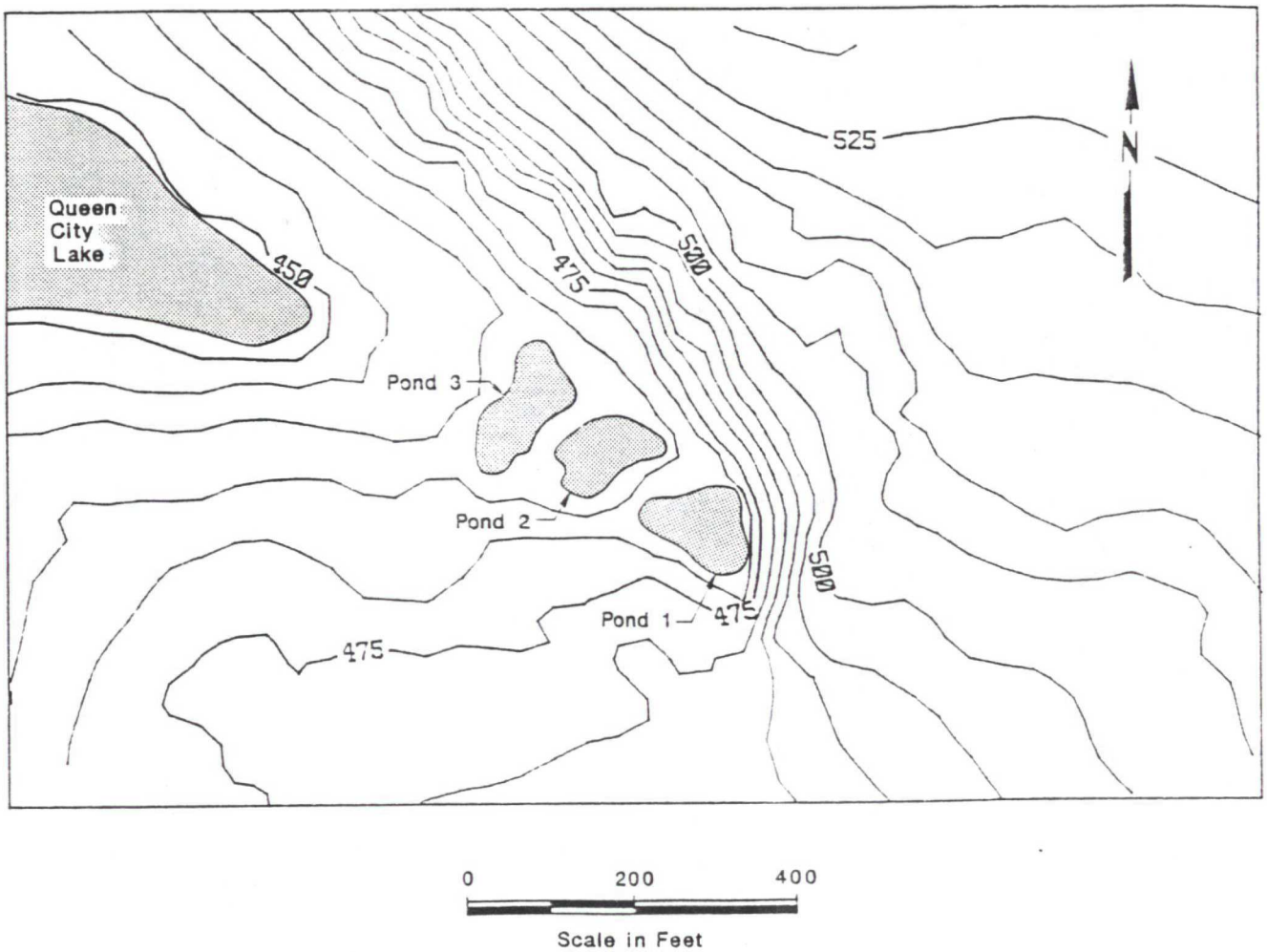
IRM Location Map

Figure 2



LANDAU ASSOCIATES, INC.	Site Topography (Pre IRM)

Figure 3

2.2 Initial Remedial Measures

The Initial Source Control Remedial Measure (referred to as IRM) included removal of contaminated sludges and other primary wastes from the ponds, construction of upgradient ground water and surface water diversion systems, and construction of an impermeable cover. The intent of the diversion systems and cover was to prevent surface water, precipitation, and upgradient ground water from flowing through soil beneath the three ponds. Evaluation of the completed IRM to date indicates that ground water does seasonally rise beneath the IRM. The significance of and the mechanism causing this condition have not yet been determined.

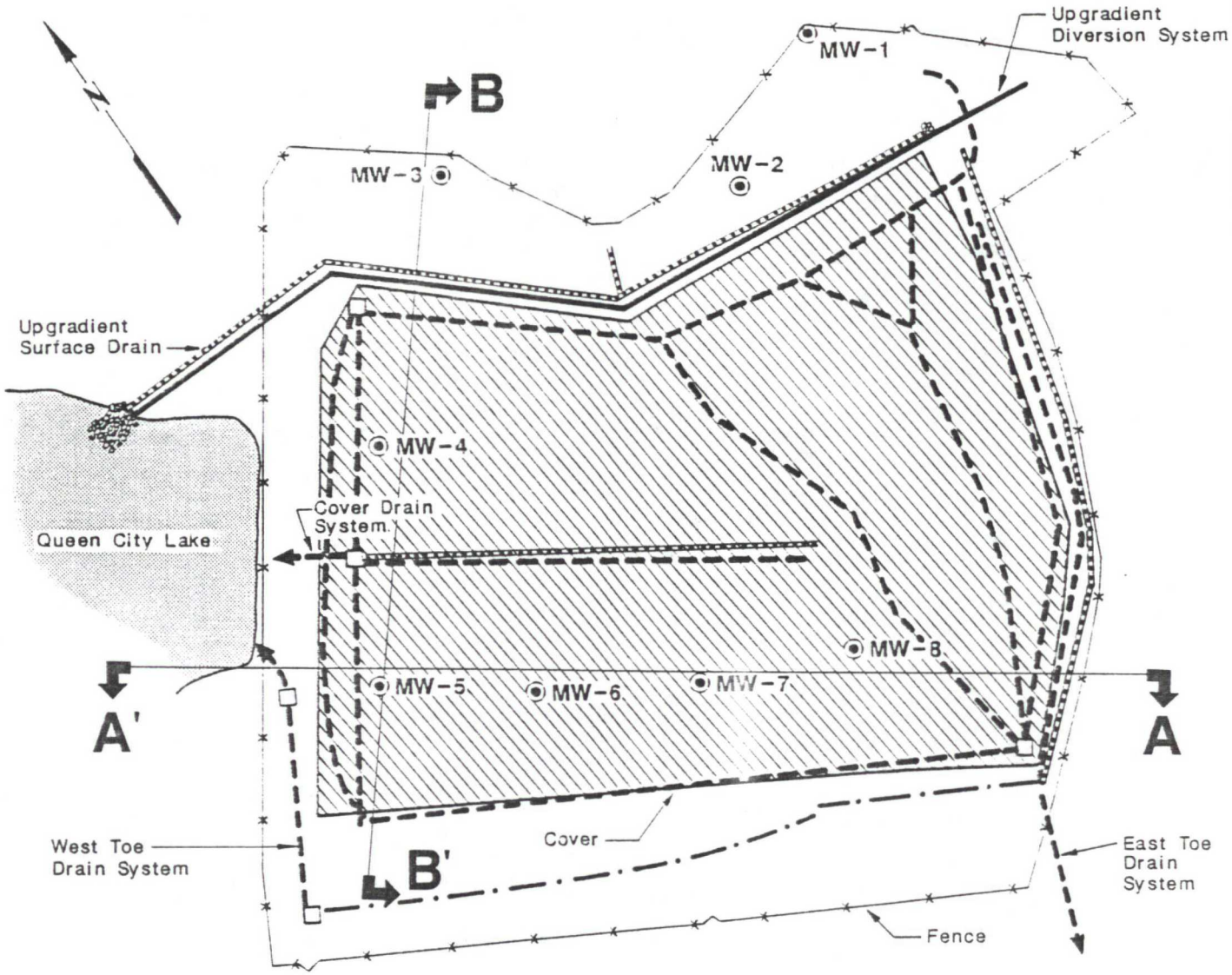
Details of the remedial activities conducted at the IRM for former Ponds 1, 2, and 3 are presented in "Site Remediation Documentation Report, Source Control Remedial Action, Queen City Farms, Washington" (Hart Crowser, 30 January 1987).

2.3 Monitoring Well Description

A total of eight monitoring wells were installed as part of the IRM. The locations of these wells are shown on Figure 4. Three of these wells, MW-1, MW-2, and MW-3, are located upgradient of the former waste ponds and outside the cap area. The remaining five wells, MW-4 through MW-8, are located to the west and south of the former ponds and are within the cap area. These wells are placed to facilitate downgradient monitoring.

These wells were all constructed using stainless steel casing and well screen. According to the well logs prepared by

IRM Site Plan



KEY

- Upgradient Diversion System
- Surface Culverts
- Surface Drainage Swale
- Subsurface Drain

0 80 160

Scale in Feet

NOTE: Generalized cross sections A-A' and B-B'.

Source: Hart-Crowser & Associates, Inc., January 1987.

LANDAU ASSOCIATES, INC.	Completed IRM Site Plan

Figure 4

Hart Crowser at the time of drilling (Appendix A), they are all screened at the contact with lower permeability soil.

The upgradient wells, MW-1, MW-2 and MW-3, are all very shallow wells (12, 13, and 11 feet, respectively) with 5-foot screens placed at the contact with the stratified glacial drift. These wells did not yield water during the dry season in summer and early fall (Appendix B).

The downgradient wells, MW-4, MW-5, MW-6, MW-7, and MW-8, are somewhat deeper (23, 52, 55, 59, and 50 feet, respectively, below the original ground surface), and all, except for MW-6, have 5-foot screens. Monitoring Well MW-6 has a 10-foot screen. Wells MW-4 and MW-8 did not yield water during the dry season. Wells MW-5, MW-6, and MW-7 are screened below the minimum water levels observed to date and yielded ground water samples throughout the year.

2.4 Monitoring Program and Schedule

Monitoring requirements are stated in the Consent Orders and in a 14 November 1986 letter from Phyllis Baas of the WDOE to Gerald Smedes of Northwest Enviroservices, Inc (WDOE, 1986). A schedule based on this letter is shown in Appendix C, page C-1. During the first year, this schedule included: monthly ground water level measurement in all upgradient (3) and downgradient (5) monitoring wells; bi-monthly chemical sampling of MW-1 and all downgradient wells for pH, conductivity, temperature, trace metals, volatile organics, and pesticides/PCB's; and semi-annual chemical sampling for cyanide, and extractable organics.

The chemical sampling and water level measurements have been conducted each period as defined in Appendix C, page C-1, in MW-1 and all downgradient wells which yielded water at the time of sampling. The data from this program are included in Appendix D (in summary form) and Appendix E (in raw data format) and are the basis for this report.

3.0 IRM MONITORING RESULTS

3.1 Ground Water and Surface Water Conditions

3.1.1 Precipitation

During the period covered by this report (1987), the Seattle area experienced the most severe and extended dry season since 1895. Total precipitation (29.93 inches) was approximately 20 percent below normal for the year (38.60 inches at Sea-Tac Airport) and was below the monthly normal for nine of the twelve months. While the seasonal period of extremely dry conditions normally occurs during July and August, the 1987 dry season that began in June lasted until mid-November.

QCF is located southeast of Seattle in an area that typically receives approximately 55 inches of precipitation annually. Precipitation for 1987 totaled approximately 41 inches or approximately 25 percent below normal. Since surface water is the presumed principal source of recharge for the shallow or first aquifer monitored beneath the IRM, water level conditions observed during this monitoring period probably fell below typical low levels by the end of the dry season in November.

3.1.2 Water Level Monitoring

Water levels at all of the monitoring wells are measured monthly using hand-held electric tape instruments. Ground water levels are presently being monitored (since November 1987) on 30-minute intervals at MW-5 and MW-7 by a "Microscout" continuous data logger. Surface water levels

in Queen City Lake and the south shore gravel pit (see Figure 2) are also being monitored with a "Microscout" data logger at 30-minute intervals. Water level and precipitation data is presented in Appendix B.

3.1.3 Water Levels - Queen City Lake

Water levels in Queen City Lake were measured monthly during 1987 (Appendix B, page B-1). The lake is historically dry during the summer months and has been observed to flood during the winter and spring. Continuous monitoring of water levels was started in November 1987. The first subsequent rains which resulted in standing water conditions in the lake occurred in December. The relationship which exists between rainfall events and water levels in the lake is evident from the data presented in Appendix B.

An attempt will be made to correlate lake water levels with water levels at other continuously measured points over the remainder of the 1987-1988 wet season, to identify and possibly quantify any role that infiltration of surface water from Queen City Lake may have on the ground water system at this site.

3.1.4 Water Levels - IRM Monitoring Wells

Water levels were measured monthly during the report period in all eight IRM monitoring wells (Appendix B, page B-1). Continuous water level measurements at MW-5 and MW-7 were started in November. Water is present in the three upgradient wells, MW-1, MW-2, and MW-3, only during the wet season. According to Hart Crowser well logs, these wells

are screened immediately above the contact with the stratified glacial drift.

Water levels in downgradient Monitoring Wells MW-4 and MW-8 also go dry seasonally. Minimum ground water levels approached Elevation 427* during 1987. Monitoring Well MW-4 is screened between approximately 435 and 440 elevation. Monitoring Well MW-8 is screened between approximately 430 and 435 elevation. Each of these wells is screened above the 1987 seasonal minimum water table elevation. Monitoring Wells MW-5, MW-6, and MW-7 are all screened below the 427 foot elevation and intercepted ground water at all times during 1987. The highest ground water level detected during the year in the downgradient monitoring wells is at approximately Elevation 448 at MW-4.

Continuous monitoring will be conducted for a minimum of one full wet season cycle as part of the site RI/FS. This data will allow evaluation of site hydrogeology. Additional monitoring points will be added if appropriate during the site RI.

3.1.5 IRM Drainage Facilities

Observations were made of flow from the IRM drain system outlets (Figure 4). This system includes five separate discharge points. During observation visits, the most consistent point of discharge was from the Cover Drain System at the west central edge of the IRM. Discharges were

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* Elevations in this report are in relation to Mean Sea Level (MSL.)

also routinely observed from the Upgradient Diversion Trench. Discharges were seldom observed from the Upgradient Surface Drain or the East and the West Toe Drains. These observations are consistent with anticipated performance and appear to be related to the extent and type of drainage system. Those discharge points with more regular flows are the larger subsurface systems. Peak flows in these subsurface systems may be attenuated by the storage capacity of overlying soils and, thus, provide more continuous discharges. No observation indicating performance failure of any of the drainage systems has been made.

3.2 Ground Water Contamination Studies

During the 1987 reporting period, ground water samples were obtained and analyzed following the schedule and using the analytical procedures identified in Appendix C. One upgradient well, MW-1, and all five downgradient wells, MW-4 through MW-8, are included in the ground water chemical analysis program and were sampled as water levels permitted. The results of all chemical analyses are summarized in Appendix D and presented in full in Appendix E. An evaluation of water quality data will be included as part of the RI/FS.

3.2.1 Ground Water Results - Dissolved Metals

During the year of monitoring, a total of six metals were determined to be present above the detection limit. These six metallic elements (barium, cadmium, chromium, copper, nickel, and zinc) were detected consistently and at various levels during the program. Background samples, as

represented by upgradient well MW-1, contained small amounts of barium, chromium, copper, and zinc (Appendix D, page D-2). Because silver was detected at the detection limit (1 parts per billion [ppb]) on only one occasion in one well, its presence in the water being withdrawn from the monitoring wells is not conclusive.

The concentration range identified for each metal in each well is shown in Table 1. The metals are listed in order by the maximum level detected in any well.

TABLE 1

RANGE DETECTED FOR METALS (ppb)

Metal	MW-1	MW-4	MW-5	MW-6	MW-7	MW-8
Chromium	ND-2	5-9	47-98	1700-5000	50-82	350-910
Copper	1-8	4-8	ND-2	120-2100	ND-3	ND-3
Nickel	ND	8-10	5-22	35-390	2-8	6-13
Barium	ND-5	8-10	42-310	29-120	9-41	12-32
Zinc	2-13	18-22	11-43	78-280	4-32	4-12
Cadmium	ND	ND-2	ND	28-120	ND-5	ND
Silver	ND	ND	ND	ND-1	ND	ND

3.2.2 Ground Water Results - Cyanide

Cyanide was sometimes found in the ground water sampled during the 1987 monitoring. Cyanide concentrations ranged from not detected to 21 ppb.

3.2.3 Ground Water Results - Volatile Organics

The presence of several volatile organic compounds is indicated by the monitoring program. Concentrations of these organic compounds are quite variable, even within successive samples from a single well. The concentration range identified for the most significant volatile organic compounds is shown in Table 2. The compounds are listed in order by the maximum level detected in any well.

TABLE 2

RANGE DETECTED FOR VOLATILE ORGANIC COMPOUNDS (p

Volatile Organic Compound	MW-1	MW-4	MW-5	MW-6	MW-7	MW-8
Methylene Chloride	ND-66	ND-410	ND-5800	200-15,000	ND-150	ND-Trace1
1,2-Dichloroethylene (total)	ND-1	ND	Trace2-520	Trace2-3800	Trace2-4600	ND-200
Trichloroethylene	ND	Trace1	11-2300	39-2000	ND-84	ND
Toluene	ND	Trace1	ND-95	10-300	46-110	52-2200
Total Xylene	ND	ND	ND-79	8-45	69-430	31-1700

Trace1 indicates an unquantifiable amount between 1-5 parts per billion.
Trace2 indicates an unquantifiable amount between 10-50 parts per billion.

3.2.4 Ground Water Results - Extractable Organics

Analyses for extractable organics were performed on the January and July 1987 samples in accordance with the schedule shown in Appendix C. The upgradient well MW-1 revealed low levels of bis(2-ethylhexyl)phthalate and di-n-octyl phthalate (Appendix D, page D-2). While phthalates were present in the original pond sludges, levels identified in MW-1 are not believed to indicate significant site contamination, particularly in view of the virtual absence of other contaminants related to the site at this upgradient location.

Downgradient wells MW-4 and MW-5 also exhibited low levels of extractable organics. Phenol, detected at 280 ppb at MW-4, was the contaminant identified at the highest concentration for either of these wells (Appendix D, pages D-3 and D-4).

In Monitoring Wells MW-6 and MW-7, the January samples revealed only very low levels of any extractable organics. The July samples from these wells were significantly different, with concentrations higher by one or two orders of magnitude.

The concentration range identified for the most significant extractable organic compounds is shown in Table 3. The compounds are listed in order by the maximum level detected in any well.

TABLE 3

RANGE DETECTED FOR EXTRACTABLE ORGANIC COMPOUNDS (ppb)

Extractable Organic Compound	MW-1	MW-4 (1)	MW-5	MW-6	MW-7	MW-8
Phenol	ND	280	ND	10-1300	ND-1000	24-120
4-methylphenol	ND	15	ND	ND-86	ND-490	160-540
2-methyl naphthalene	ND	ND	ND-6	6-11	16-100	190-380
2-methyl phenol	ND	9	ND	ND-30	ND-190	94-290
Naphthalene	ND	ND	ND-7	5-11	10-53	50-180

---
(1) Only sampled one time.

3.2.5 Ground Water Results - Pesticides/PCB's

Pesticides were detected at extremely low levels in MW-5, MW-6, and MW-8 (Appendix E, pages E-3, E-4, and E-6, respectively). Gamma-BHC was identified in MW-5, beta-BHC was identified in MW-5 and MW-6, and 4,4'-DDT was identified in MW-5.

PCB's were identified only in MW-8. Concentrations of PCB 1242 and PCB 1254 are well below any known human health level of concern.

4.0 RECOMMENDATION

The ground water level beneath the IRM in the first aquifer fluctuates seasonally and may be affected by precipitation events and infiltration of surface water from Queen City Lake. These fluctuations in ground water level beneath the IRM cap will be investigated during the RI.

An amended monitoring program is proposed for 1988. In order to assess the possible affect of fluctuating ground water levels on water quality, the sampling schedule (Appendix C, page C-1) should be modified to reflect anticipated water level stages. Thus, sampling would occur in February, April, June, and September (Appendix C, page C-2) rather than in February, May, August, and November. In addition, based on first-year data, continued bi-monthly monitoring for pesticides/PCB's appears to be unwarranted. It is recommended that these analyses be performed only for the February and September 1988 sampling events.

The final assessment of site conditions will be conducted as part of the QCF site RI/FS. Conclusions of the RI/FS will provide additional understanding of the hydrology beneath the IRM and evaluate the effectiveness of the IRM remedy for this portion of the site.

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LIST OF ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
IRM	Initial Remedial Measure
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
ppb	parts per billion
PCB	Polychlorinated Biphenyls
QCF	Queen City Farms
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
WDOE	Washington State Department of Ecology

APPENDICES

APPENDIX A

Hart Crowser Well Logs

Boring Log and Construction Data for Well MW-1

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 512

20
10
0
10
20
30
40
50
60
70
80

(Medium dense to very dense), moist to wet, brown, slightly silty, sandy GRAVEL.

Recessional Outwash

(Very dense), damp to wet, brown, silty, sandy GRAVEL.

Stratified Glacial Drift

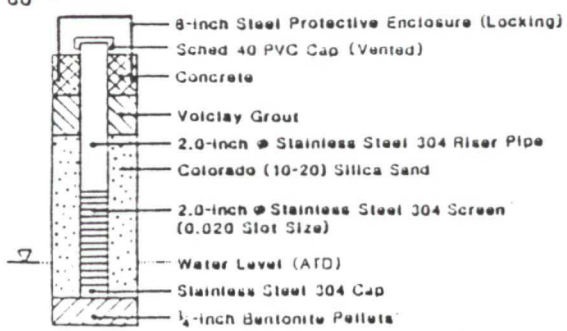
Bottom of Boring at 17.5 Feet.
Completed 7/8/86.

Sample

S-1
S-2
S-3
S-4
S-5
S-6

Well Design

Top Casing Elevation in Feet 514.08
Casing Stickup in Feet 1.9



2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

Boring Log and Construction Data for Well MW-2

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 498

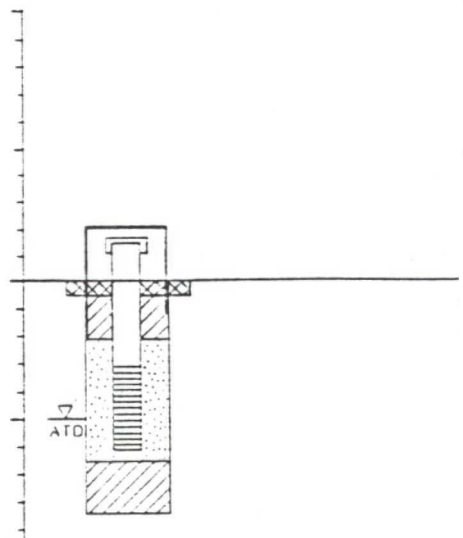
Depth (Feet)	Description	Sample
0	(Medium dense), damp, brown, slightly silty, very sandy GRAVEL. (FILL)	S-1
	(Dense), moist to wet, brown, gravelly SAND with cobbles from 6 to 8-foot-depth.	Recessional Outwash S-2
10	(Medium dense to very dense), wet to damp, brown to gray, silty, sandy to very sandy GRAVEL to silty, very gravelly SAND.	Stratified Glacial Drift S-3, S-4, S-5
	Bottom of Boring at 16.9 Feet. Completed 7/7/86.	

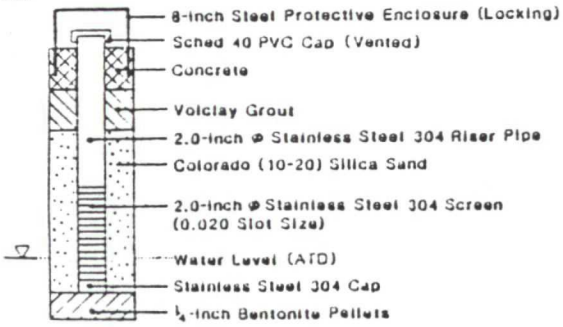
Depth scale: 20, 10, 0, 10, 20, 30, 40, 50, 60, 70, 80

Well Design

Top Casing Elevation in Feet 500.3

Casing Stickup in Feet 2.0





2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

LANDAU ASSOCIATES, INC. | Boring Log and Construction Data for Well MW-2

Figure A-2

Boring Log and Construction Data for Well MW-3

Geologic Log

Ground Surface Elevation in Feet 496

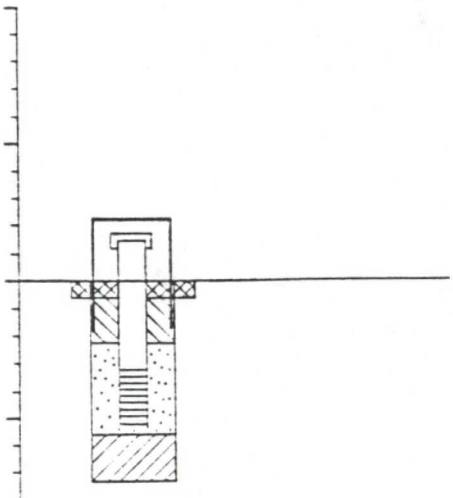
Depth in Feet	Description	Geologic Unit	Sample
0	(Dense to medium dense), moist to wet, brown to gray, slightly silty, very sandy GRAVEL to slightly silty, very gravelly SAND.	Recessional Outwash	S-1, S-2, S-3
10	(Very dense), moist to damp, brown to gray, silty, very gravelly SAND to very sandy GRAVEL.	Stratified Glacial Drift	S-4, S-5
14.5	Bottom of Boring at 14.5 Feet. Completed 7/1/86.		

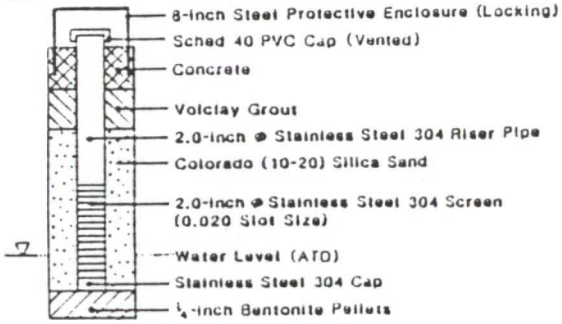
Sample

Well Design

Top Casing Elevation in Feet 498.43

Casing Stickup in Feet 2.2





2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

LANDAU ASSOCIATES, INC. | Boring Log and Construction Data for Well MW-3

Figure A-3

Boring Log and Construction Data for Well MW-4

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 469

20

10 — Cover system. See Monitor Well Seal detail, Sheet No. 8 As Built Drawings. Drilling completed prior to cover installation.

Ground Surface Elevation ATD 458 Feet

0 — (Medium dense to loose), damp to moist, gray to brown, silty to slightly silty, gravelly SAND with some brick fragments, wood, and hydrocarbon coatings. (FILL)

10 — (Loose to medium dense), moist, black, silty, fine SAND with hydrocarbon-like odor and coatings. — Recent Deposits

(Dense to very dense), moist to wet, mottled gray and red brown, slightly silty to silty, gravelly, fine to medium SAND, hydrocarbon-like odor. and black spotty hydrocarbon coatings (Sample S-6).

20 — (Very dense), moist, mottled gray and brown, silty, gravelly, fine to medium SAND. — Stratified Glacial Drift

Bottom of Boring at 28.3 Feet.
Completed 9/8/86.

30

40

50

60

70

80

Sample

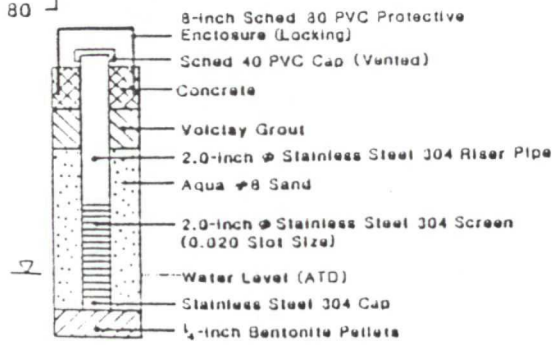
S-1
S-2
S-3
S-4
S-5
S-6
S-7
S-8
S-9
S-10
S-11

Well Design

Top Casing Elevation in Feet 471.74
Casing Stickup in Feet 2.5

ATD

Pea Gravel



2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

Boring Log and Construction Data for Well MW-5

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 471

Depth (ft)	Description
20	
10	
	Cover system. See Monitor Well Seal Detail, Sheet No. 8 As Built Drawings. Drilling completed prior to cover installation.
	Ground Surface Elevation ATD 463 Feet
0	(Dense to medium dense), moist, brown, silty, gravelly, fine to medium SAND. (FILL)
10	(Medium dense), damp to wet, gray to brown, slightly silty to clean, gravelly, medium to coarse SAND.
20	
	(Medium dense to dense), wet, gray brown to black, sandy to slightly sandy GRAVEL with hydrocarbon-like odor and coatings between 25 to 33-foot-depth and free hydrocarbon fluid from 33 to 37-foot-depth.
30	
40	(Medium dense to dense), wet, gray, gravelly SAND to SAND with hydrocarbon-like odor.
50	(Stiff), wet, mottled gray and orange, laminated fine sandy SILT.
	(Dense to very dense), wet, gray, slightly silty, gravelly SAND.
60	(Very dense), moist, mottled gray and orange, silty, gravelly, fine to medium SAND.
	Bottom of Boring at 63.8 Feet. Completed 9/6/86.
70	
80	

Recessional Outwash

Stratified Glacial Drift

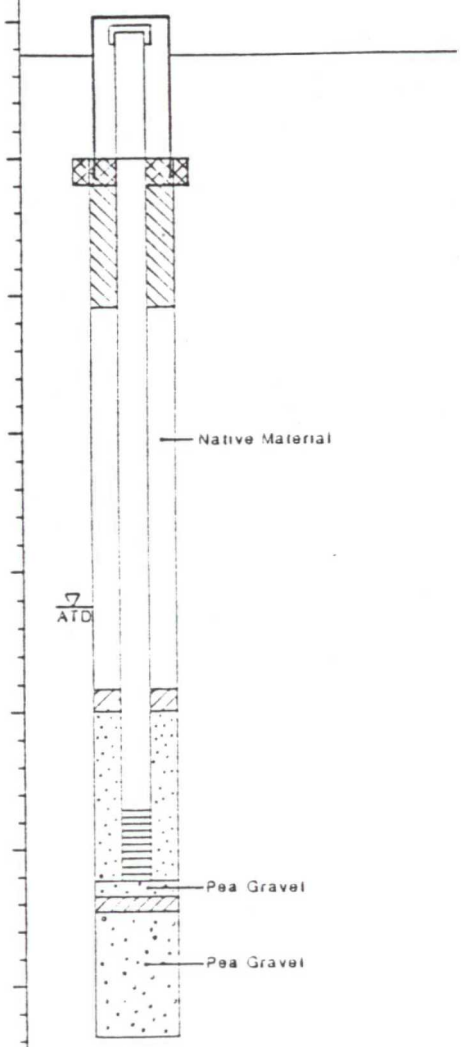
Sample

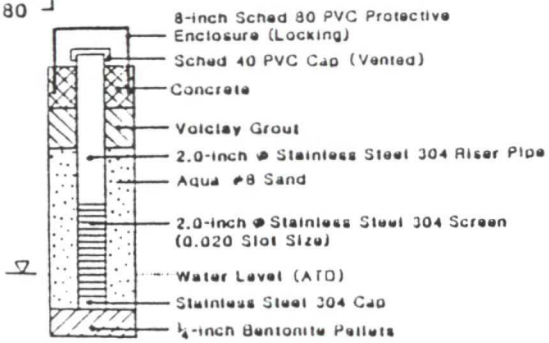
S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18

Well Design

Top Casing Elevation in Feet 473.16

Casing Stickup in Feet 2.6





2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

LANDAU ASSOCIATES, INC. | Boring Log and Construction Data for Well MW-5

Figure A-

Boring Log and Construction Data for Well MW-6

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 477

Cover system. See Monitor Well Seal detail, Sheet No. 8 As Built Drawings. Drilling completed prior to cover installation.

Ground Surface Elevation ATD 469 Feet

(Very dense to dense), damp, brown, slightly silty, very gravelly SAND. (FILL)

(Medium dense), moist brown to gray, slightly silty, very sandy GRAVEL with hydrocarbon-like coating and sheen.

(Medium dense), moist, gray, very gravelly SAND with hydrocarbon-like coating and sheen from 16 to 20-foot-depth.

(Medium dense), moist to wet, gray, sandy to slightly sandy GRAVEL with hydrocarbon-like dropplets and coatings.

Grading very sandy GRAVEL.

(Medium dense), wet, gray, gravelly and very gravelly SAND.

(Medium dense), wet, light brown to gray, fine SAND.

(Very stiff to stiff), wet, light brown to gray, slightly gravelly, slightly sandy SILT with fine sand partings, laminated.

(Very dense), wet to moist, light brown to gray, silty, very gravelly SAND to silty, very sandy GRAVEL.

Bottom of Boring at 68.8 Feet.
Completed 9/5/86.

Hucossional Outwash

Stratified Glacial Drift

Sample

S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20, S-21, S-22, S-23, S-24, S-25, S-26, S-27

Well Design

Top Casing Elevation in Feet 479.03
Casing Stickup in Feet 2.4

ATD

Native Material

Pea Gravel

8-inch Sched 80 PVC Protective Enclosure (Locking)
Sched 40 PVC Cap (Vented)
Concrete
Volclay Grout
2.0-inch ø Stainless Steel 304 Riser Pipe
Aqua #8 Sand
2.0-inch ø Stainless Steel 304 Screen (0.020 Slot Size)
Water Level (ATD)
Stainless Steel 304 Cap
¼-inch Bentonite Pellets

2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

LANDAU ASSOCIATES, INC.

Boring Log and Construction Data for Well MW-6

Figure A-6

Boring Log and Construction Data for Well MW-7

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 483

Cover system. See Monitor Well Seal detail, Sheet No. 8 As Built Drawings. Drilling completed prior to cover installation.

Ground Surface Elevation ATD 475 Feet

(Very dense), damp to moist, brown to gray, slightly silty to silty, very gravelly SAND.

(Very dense), moist, gray and black, silty, gravelly, fine to medium SAND with hydrocarbon-like coating and odor.

(Very dense), damp, red brown to green, gravelly SAND.

Hydrocarbon sheen.

Hydrocarbon-like odor from 13 to 22.5-foot-depth.

Grading very gravelly SAND.

(Very dense), damp to wet, green to brown, sandy GRAVEL to GRAVEL with hydrocarbon-like odor.

Hydrocarbon-like odor.

(Very dense), wet, black and brown, slightly silty, fine to medium SAND with hydrocarbon-like odor and coating.

(Very dense), moist to wet, brown to gray, gravelly to slightly gravelly SAND with hydrocarbon-like odor.

(Very dense), wet, gray, slightly silty, very sandy GRAVEL.

(Very dense), wet, gray, slightly silty, fine to medium SAND grading to slightly silty, gravelly SAND.

(Very dense), wet to moist, brown to gray, silty, very gravelly to gravelly SAND.

Bottom of Boring at 63.9 Feet.
Completed 9/2/86.

Recessional Outwash

Stratified Glacial Drift

Sample

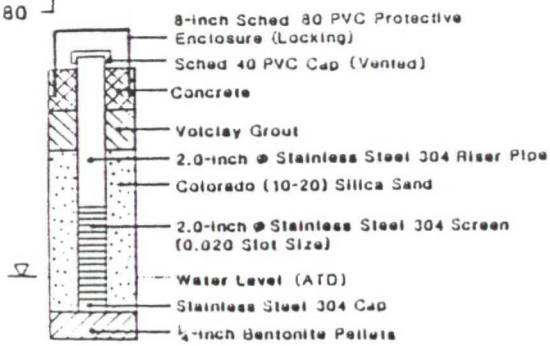
S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20, S-21, S-22, S-23, S-24, S-25

Well Design

Top Casing Elevation in Feet 485.82
Casing Stickup in Feet 2.7

ATD

Native Material and Silica Sand



2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

2.5-inch I.D. Split Spoon Sample Driven with 140-lb. Hammer

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

LANDAU ASSOCIATES, INC.

Boring Log and Construction Data for Well MW-7

Figure A-7

Boring Log and Construction Data for Well MW-8

Geologic Log

Depth in Feet

Ground Surface Elevation in Feet 487

20

10

Cover system. See Monitor Well Seal detail, Sheet No. 8 As Built Drawings. Drilling completed prior to cover installation.

Ground Surface Elevation ATD 479 Feet

0

(Dense to loose), moist, brown, silty, gravelly, fine to medium SAND with organic matter and charcoal. (FILL)

10

(Very loose to loose), moist, brown to black, sandy GRAVEL with hydrocarbon-like fluid below 12-foot-depth.

(Medium dense to dense), moist, black to gray, slightly silty to clean, gravelly SAND with hydrocarbon-like coatings and sheen to 19 feet.

20

(Medium dense), moist to damp, brown to gray, medium to coarse sandy GRAVEL.

30

(Medium dense), damp, gray and black, gravelly SAND with hydrocarbon coating.

(Medium dense), moist, gray and black, silty, gravelly, fine to medium SAND with hydrocarbon fluid.

40

(Very dense to dense), moist, black to gray, gravelly SAND with hydrocarbon coating to 44 feet.

(Stiff), moist, gray SILT.

(Very dense), moist, gray, very gravelly, silty SAND with hydrocarbon fluid.

50

(Very dense), wet, gray, silty, gravelly to very gravelly SAND with hydrocarbon coating to 53 feet.

Bottom of Boring at 55.0 Feet.
Completed 8/8/86.

60

70

80

Recessional Outwash

Stratified Glacial Drift

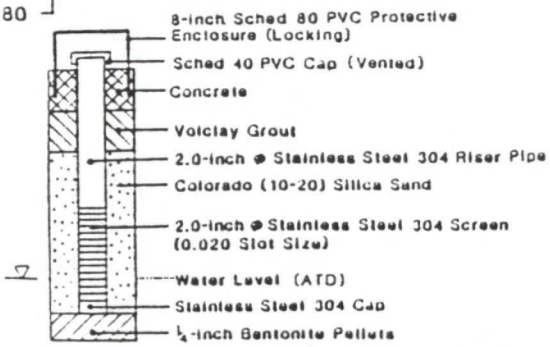
Sample

S-1
S-2
S-3
S-4
S-5
S-6
S-7
S-8
S-9
S-10
S-11
S-12
S-13
S-14
S-15
S-16
S-17
S-18
S-19
S-20
S-21

Well Design

Top Casing Elevation in Feet 490.28
Casing Stickup in Feet 3.2

ATD



2.5-inch I.D. Split Spoon Sample Driven with 300-lb. Hammer.

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

Source: Hart Crowser, August 1986.

LANDAU ASSOCIATES, INC.

Boring Log and Construction Data for Well MW-8

Figure A-8

APPENDIX B

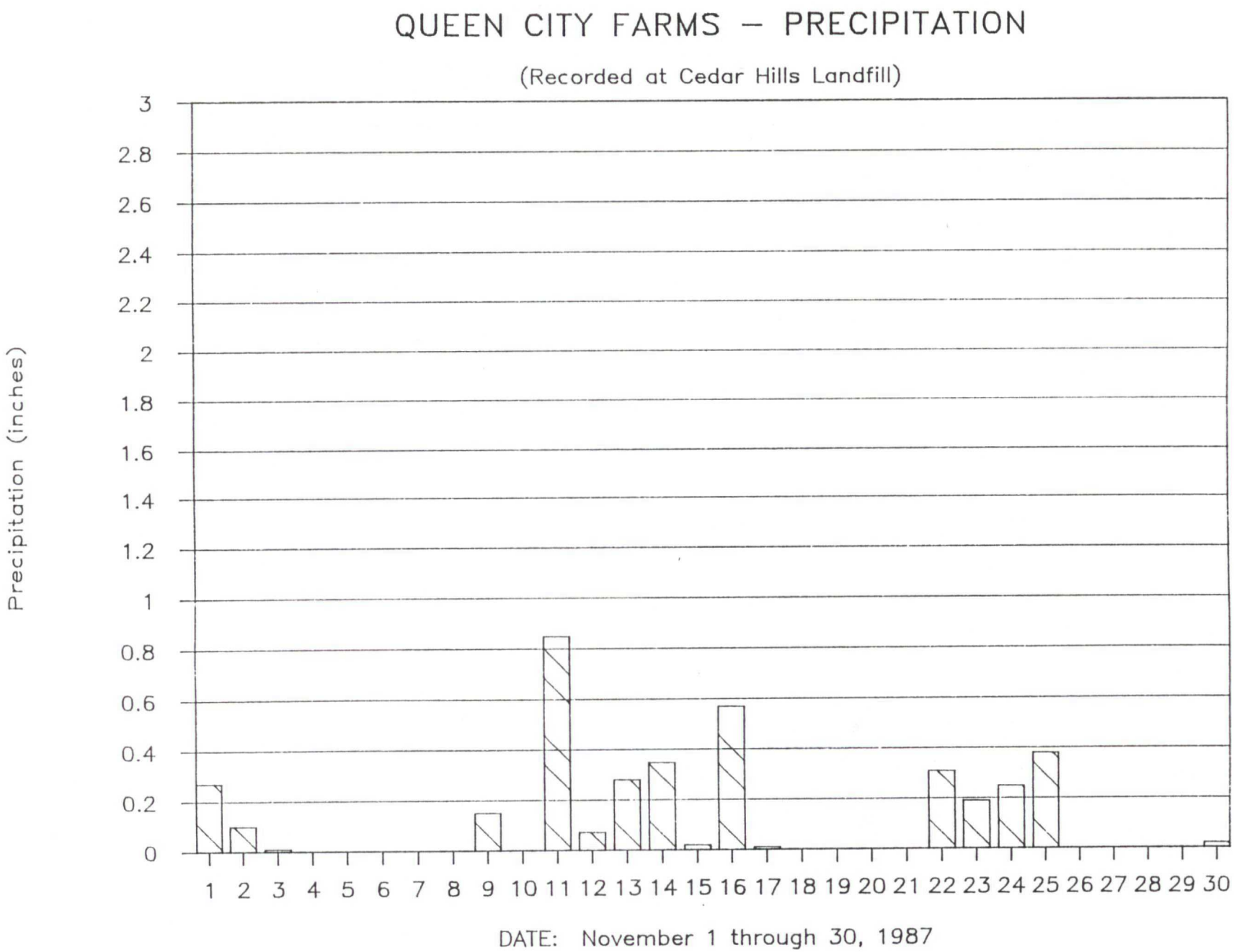
Precipitation and Ground Water Level Measurements

APPENDIX B

WATER LEVEL ELEVATIONS -- QUEEN CITY FARMS

MO	DAY	YR	LAKE	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8
8	1	86		504.18	DRY	486.33	*	*	*	*	*
8	8	86		504.08	DRY	486.43	*	*	*	*	*
8	16	86	N	503.88	DRY	486.43	*	*	*	*	*
8	23	86		503.73	DRY	DRY	*	*	*	*	*
9	6	86	O	503.33	DRY	DRY	*	*	*	*	*
9	23	86		503.13	DRY	DRY	DRY	429.61	429.63	427.72	DRY
9	27	86		504.13	DRY	DRY	DRY	429.61	429.43	429.12	DRY
10	9	86	D	504.48	DRY	DRY	DRY	429.21	429.13	428.72	DRY
10	17	86		504.18	DRY	DRY	DRY	428.91	428.88	428.47	DRY
10	24	86	A	503.58	DRY	DRY	DRY	428.71	428.63	428.17	DRY
10	28	86		507.18	491.75	DRY	DRY	429.21	429.08	428.37	DRY
11	7	86	T	508.58	492.00	DRY	DRY	433.91	433.53	431.82	DRY
11	14	86		507.88	489.90	DRY	DRY	435.81	435.63	434.12	434.58
11	19	86	A	509.28	492.10	486.03	438.09	436.71	436.63	435.22	435.88
12	5	86		509.08	491.45	490.68	447.09	446.46	446.48	445.42	446.63?
12	11	86		508.78	490.90	490.13	446.09	444.26	444.33	443.37	443.83
1	8	87	449.20	509.23	491.95	490.73	445.69	443.91	443.98	442.92	443.13
2	9	87	450.50	509.23	492.05	490.58	447.79	446.26	446.23	445.22	445.23
3	11	87	451.30	509.94	493.40	491.05	447.41	446.29	446.17	445.15	444.78?
4	6	87	449.00	509.18	DRY	490.63	444.44	440.41	440.88	440.02	439.68
5	7	87	446.60	509.41	489.93	489.98	443.39	439.56	439.34	438.68	439.88
6	2	87	DRY	507.88	DRY	DRY	441.34	436.60	436.58	435.96	436.38
7	15	87	DRY	505.27	DRY	DRY	DRY	433.93	433.90	433.36	433.28
8	13	87	DRY	DRY	DRY	DRY	DRY	431.68	431.62	431.15	DRY
9	14	87	DRY	DRY	DRY	DRY	DRY	429.98	429.83	429.41	DRY
10	15	87	DRY	DRY	DRY	DRY	DRY	428.73	428.73	428.27	DRY
11	11	87	DRY	DRY	DRY	DRY	DRY	427.87	427.85	427.43	DRY
12	10	87	448.43	509.43	492.99	DRY	DRY	436.95	436.66	433.98	434.53

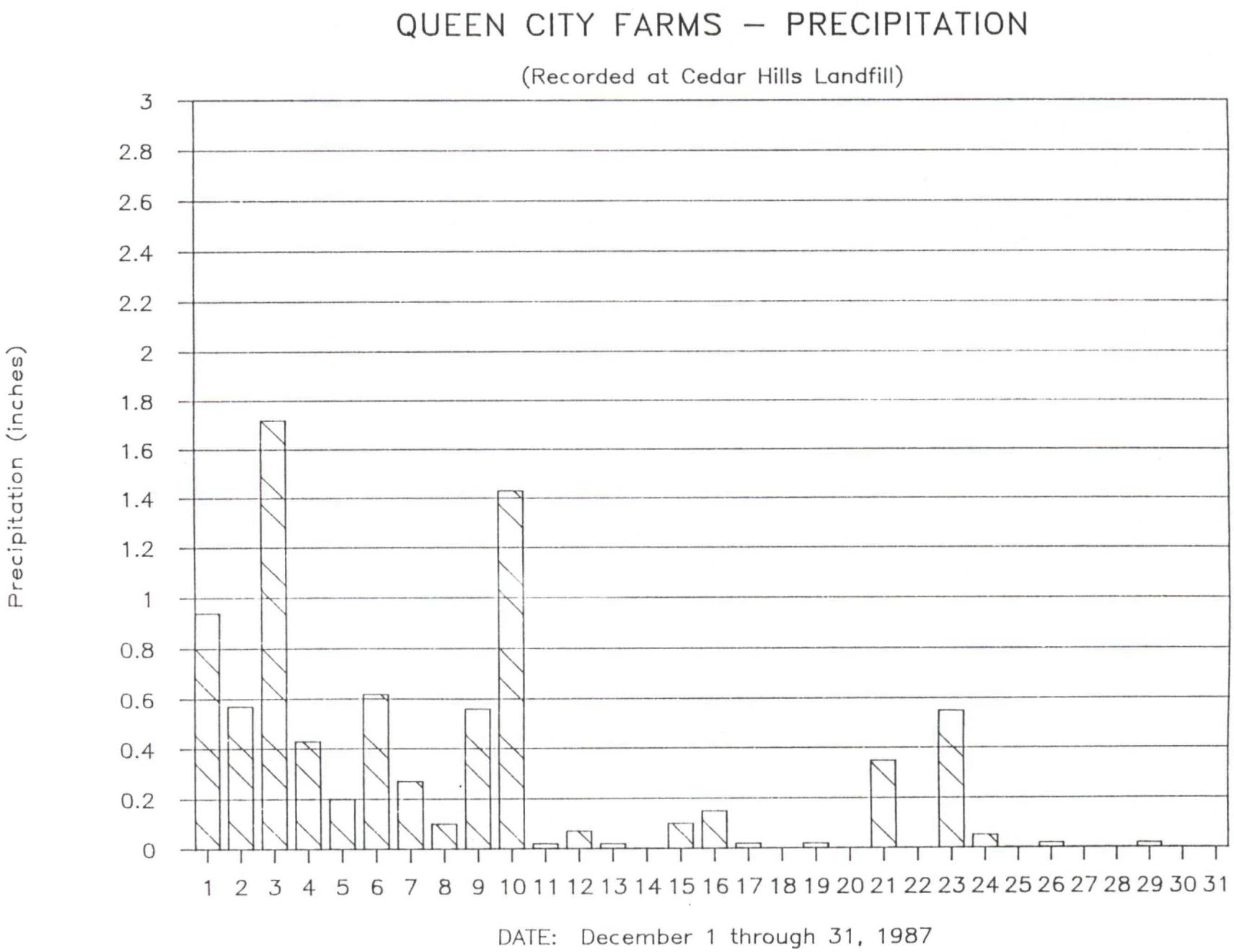
* WELLS NOT INSTALLED
? PROBE QUESTIONABLE



LANDAU ASSOCIATES, INC.

Queen City Farms – Precipitation
November 1-30, 1987

Figure B-2

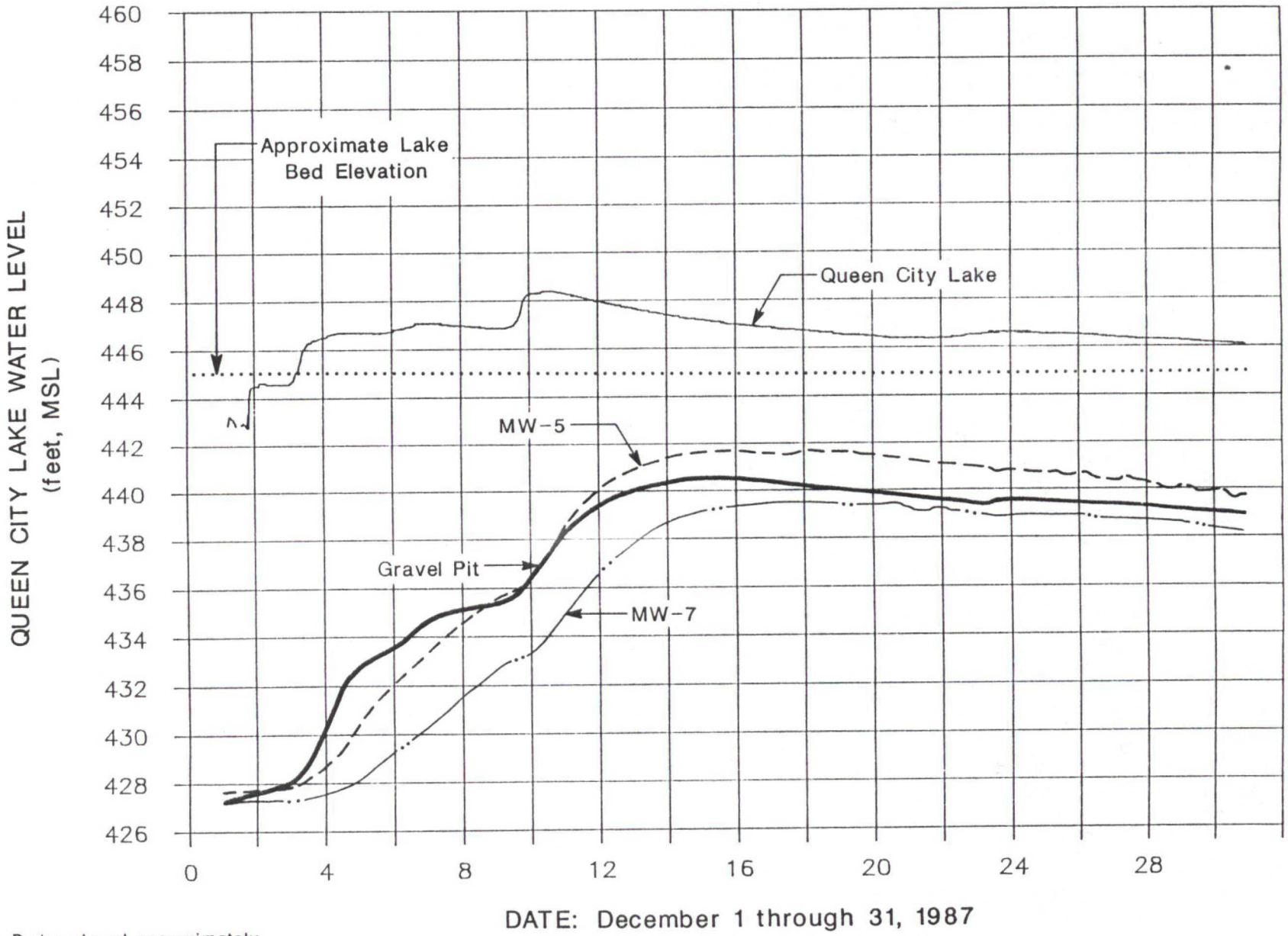


LANDAU ASSOCIATES, INC.

Queen City Farms – Precipitation
December 1-31, 1987

Figure B-3

QUEEN CITY FARMS WATER LEVEL STUDY



NOTE: Probe placed approximately
2 feet below lake bed surface.

LANDAU ASSOCIATES, INC.

Queen City Farms Water Level Study
December 1-31, 1987

Figure B-4

APPENDIX C

Monitoring Schedules

APPENDIX C

IRM MONITORING SCHEDULE[1]

Year	1987												1988												1989
Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J
Measure Water Levels	X	X	X	X	X	X	X	X	X	X	X	X		O			O			O			O		
pH, Temperature	X	X	X	X	X	X	X	X	X	X	X	X		O			O			O			O		
Chemistry Sampling																									
Trace Metals (6000/7000)	X		X		X		X		X		X			O			O			O			O		
Cyanide (9010)	X						X																		
Volatile Organics (8240)	X		X		X		X		X		X			O			O			O			O		
Extractable Organics (8270)	X						X																		
Pesticides/PCB's (8080)	X		X		X		X		X		X			O			O			O			O		

X = Work completed as of this report.
O = Work planned.

(1) Establish by letter from Phyllis Baas (WDOE) to Gerald Smedes (Northwest Enviroservices, Inc.) dated November 14, 1986.

APPENDIX C (CONTINUED)

PROPOSED IRM MONITORING SCHEDULE
(MODIFIED FOR 1988)

Year	1987												1988												1989
Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J
Measure Water Levels	X	X	X	X	X	X	X	X	X	X	X	X		O		O		O			O				
pH, Temperature	X	X	X	X	X	X	X	X	X	X	X	X		O		O		O			O				
Chemistry Sampling																									
Trace Metals (6000/7000)	X		X		X		X		X		X			O		O		O			O				
Cyanide (9010)	X						X																		
Volatile Organics (8240)	X		X		X		X		X		X			O		O		O			O				
Extractable Organics (8270)	X						X																		
Pesticides/PCB's (8080)	X		X		X		X		X		X			O							O				

X = Work completed as of this report.
O = Work planned.

APPENDIX D

Summary of Chemical Analysis Data

APPENDIX D

List of Compounds Not Detected in Any
Analyses Performed During First Year
Monitoring of IRM Wells

Metals (Methods 6010 and 7000)

Antimony
Arsenic
Beryllium
Lead
Mercury
Selenium
Thallium

Volatile Organics (Method 8240)

Chloromethane
Bromomethane
Chloroethane
Acrolein
Acrylonitrile
1,2-Dichloroethane
Carbon Tetrachloride
Vinyl Acetate
Bromodichloromethane
1,2-Dichloropropane
Chlorodibromomethane
2-Chloroethyl vinyl ether
Bromoform
1,1,2,2-Tetrachloroethane
Chlorobenzene
trans-1,3-Dichloropropene
cis-1,3-Dichloropropene
Styrene

Pesticides/PCB's (Method 8080)

alpha-BHC
delta-BHC
Heptachlor
Aldrin
Heptachlor epoxide
Endosulfan I
Dieldrin
4,4'-DDE
Endrin
Endosulfan II
4,4'-DDD
Endosulfan sulfate
Methoxychlor
Endrin ketone
Toxaphene
PCB-1016
PCB-1221
PCB-1232
PCB-1248
PCB-1260
Tech Chlordane

Extractable Organics (Method 8270)

N-nitrosodimethylamine
Bis(2-chloroethyl)ether
2-Chlorophenol
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichlorobenzene
Bis(2-chloroisopropyl)ether
Hexachloroethane
N-nitroso-di-n-propylamine
Nitrobenzene
Bis(2-chloroethoxy)methane
2,4-Dichlorophenol
1,2,4-Trichlorobenzene
Hexachlorobutadiene
4-Chloro-m-cresol
Hexachlorocyclopentadiene
2,4,6-Trichlorophenol
2-Chloronaphthalene
Dimethylphthalate
2,6-Dinitrotoluene
2,4-Dinitrophenol
2,4-Dinitrotoluene
4-Nitrophenol
4-Chlorophenyl phenyl ether
Diethylphthalate
4,6-Dinitro-o-cresol
1,2-Diphenylhydrazine
4-Bromophenyl phenyl ether
Hexachlorobenzene
Pentachlorophenol
Dibutylphthalate
Fluoranthene
Pyrene
Benzidine
Butyl benzyl phthalate
Benzo(a)anthracene
Chrysene
3,3'-Dichlorobenzidine
N-nitrosodiphenylamine
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenzo(ah)anthracene
Benzo(ghi)perylene
Aniline
4-Chloroaniline
Dibenzofuran
2-Nitroaniline
3-Nitroaniline
4-Nitroaniline
2,4,5-Trichlorophenol

APPENDIX D (Continued)

CHEMICAL ANALYSIS OF WELL SAMPLE
QUEEN CITY FARMS - MW-1

ANALYTE	MONTH SAMPLED					
	1/87	3/87	5/87	7/87	9/87	11/87
INDICATOR PARAMETERS						
pH	5.6	6.2	5.4	NA	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Specific Conductance (umhos)	70	80	59	NA		
METALS, DISSOLVED (ug/l) 6010/7000						
Barium	5	5	4	ND	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Cadmium	ND	ND	ND	ND		
Chromium	ND	ND	2	ND		
Copper	8	5	1	2		
Nickel	ND	ND	ND	ND		
Silver	ND	ND	ND	ND		
Zinc	12	9	13	2		
CYANIDE, total 9010	ND	NA	NA	ND	NO SMPL	NO SMPL
ORGANICS, VOLATILE (ug/l) 8240						
Vinyl Chloride	ND	ND	ND	ND	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Methylene Chloride	ND	T	66	ND		
Acetone	ND	ND	ND	ND		
Carbon Disulfide	ND	ND	ND	ND		
1,1-Dichloroethylene	ND	ND	ND	ND		
1,1-Dichloroethane	ND	ND	ND	ND		
1,2-Dichloroethylene, total	ND	ND	ND	1		
Chloroform	ND	ND	ND	ND		
2-Butanone	ND	ND	ND	ND		
1,1,1-Trichloroethane	ND	ND	ND	ND		
Trichloroethylene	ND	ND	ND	ND		
Benzene	ND	ND	ND	ND		
1,1,2-Trichloroethane	ND	ND	ND	ND		
4-Methyl-2-pentanone	ND	ND	ND	ND		
2-Hexanone	ND	ND	ND	ND		
Tetrachloroethylene	ND	ND	ND	ND		
Toluene	ND	ND	ND	ND		
Ethylbenzene	ND	ND	ND	ND		
Total-Xylene	ND	ND	ND	ND		
ORGANICS, EXTRACTABLE (ug/l) 8270						
Phenol	ND	NA	NA	ND	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Isophorone	ND	NA	NA	ND		
2-Nitrophenol	ND	NA	NA	ND		
2,4-Dimethylphenol	ND	NA	NA	ND		
Naphthalene	ND	NA	NA	ND		
Acenaphthylene	ND	NA	NA	ND		
Acenaphthene	ND	NA	NA	ND		
Fluorene	ND	NA	NA	ND		
Phenanthrene	ND	NA	NA	ND		
Anthracene	ND	NA	NA	ND		
Bis(2-ethylhexyl)phthalate	34	NA	NA	5		
Di-n-octyl phthalate	44	NA	NA	ND		
Benzoic Acid	ND	NA	NA	ND		
Benzyl Alcohol	ND	NA	NA	ND		
2-Methylnaphthalene	ND	NA	NA	ND		
2-Methylphenol	ND	NA	NA	ND		
4-Methylphenol	ND	NA	NA	ND		
PESTICIDES (ug/l) 8080						
4,4'-DDT	ND	ND	ND	ND	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
PCB 1242	ND	ND	ND	ND		
PCB 1254	ND	ND	ND	ND		
beta-BHC	ND	ND	ND	ND		
gamma-BHC (LINDANE)	ND	ND	ND	ND		

T indicates analyte detectible but not quantifiable (<10 ppb) LANDAU ASSOCIATES, INC.
ND indicates analyte not detected at detection limit.
Analytes not listed were not detected.
NA indicates "Not Analyzed"
Note: Field and laboratory blanks were analyzed for each sampling event. Data is available but not shown.

APPENDIX D (Continued)

CHEMICAL ANALYSIS OF WELL SAMPLE
QUEEN CITY FARMS - MW-4

ANALYTE	MONTH SAMPLED					
	1/87	3/87	5/87	7/87	9/87	11/87
INDICATOR PARAMETERS						
pH	6.2	5.9	5.3	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Specific Conductance (umhos)	680	470	410			
METALS, DISSOLVED (ug/l) 6010/7000						
Barium	10	10	8	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Cadmium	2	1	ND			
Chromium	9	6	5			
Copper	6	4	8			
Nickel	8	10	9			
Silver	ND	ND	ND			
Zinc	18	22	19			
CYANIDE, total 9010	10	NA	NA	NO SMPL	NO SMPL	NO SMPL
ORGANICS, VOLATILE (ug/l) 8240						
Vinyl Chloride	6	T	ND	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Methylene Chloride	27	T	410			
Acetone	18	25	ND			
Carbon Disulfide	ND	ND	ND			
1,1-Dichloroethylene	ND	ND	ND			
1,1-Dichloroethane	ND	ND	ND			
1,2-Dichloroethylene, total	ND	ND	ND			
Chloroform	ND	ND	ND			
2-Butanone	11	31	ND			
1,1,1-Trichloroethane	ND	ND	ND			
Trichloroethylene	T	T	T			
Benzene	ND	ND	ND			
1,1,2-Trichloroethane	ND	ND	ND			
4-Methyl-2-pentanone	10	10	ND			
2-Hexanone	ND	ND	ND			
Tetrachloroethylene	ND	ND	ND			
Toluene	T	T	ND			
Ethylbenzene	ND	ND	ND			
Total-Xylene	ND	ND	ND			
ORGANICS, EXTRACTABLE (ug/l) 8270						
Phenol	280	NA	NA	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Isophorone	ND	NA	NA			
2-Nitrophenol	ND	NA	NA			
2,4-Dimethylphenol	ND	NA	NA			
Naphthalene	ND	NA	NA			
Acenaphthylene	ND	NA	NA			
Acenaphthene	ND	NA	NA			
Fluorene	ND	NA	NA			
Phenanthrene	ND	NA	NA			
Anthracene	ND	NA	NA			
Bis(2-ethylhexyl)phthalate	ND	NA	NA			
Di-n-octyl phthalate	ND	NA	NA			
Benzoic Acid	ND	NA	NA			
Benzyl Alcohol	ND	NA	NA			
2-Methylnaphthalene	ND	NA	NA			
2-Methylphenol	9	NA	NA			
4-Methylphenol	15	NA	NA			
PESTICIDES (ug/l) 8080						
4,4'-DDT	ND	ND	ND	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
PCB 1242	ND	ND	ND			
PCB 1254	ND	ND	ND			
beta-BHC	ND	ND	ND			
gamma-BHC (LINDANE)	ND	ND	ND			

T indicates analyte detectible but not quantifiable (<10 ppb) LANDAU ASSOCIATES, INC.
ND indicates analyte not detected.
Analytes not listed were not detected at detection limit.
NA indicates "Not Analyzed"
Note: Field and laboratory blanks were analyzed for each sampling event. Data is available but not shown.

APPENDIX D (Continued)

CHEMICAL ANALYSIS OF WELL SAMPLE
QUEEN CITY FARMS - MW-5

ANALYTE	MONTH SAMPLED					
	1/87	3/87	5/87	7/87	9/87	11/87
INDICATOR PARAMETERS						
pH	5.7	5.7	5.7	NA	5.1	5.4
Specific Conductance (umhos)	230	290	238	NA	275	682
METALS, DISSOLVED (ug/l) 6010/7000						
Barium	42	51	46	49	60	310
Cadmium	ND	ND	ND	ND	ND	ND
Chromium	56	54	47	80	63	98
Copper	2	ND	ND	2	ND	1
Nickel	9	9	5	15	10	22
Silver	ND	ND	ND	ND	ND	ND
Zinc	18	16	17	43	11	30
CYANIDE, total 9010	10	NA	NA	ND	NA	NA
ORGANICS, VOLATILE (ug/l) 8240						
Vinyl Chloride	31	38	16	18	ND	46
Methylene Chloride	30	T	92	ND	ND	5800
Acetone	87	T	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	ND	ND	ND	ND	ND	1
1,1-Dichloroethane	T	T	ND	ND	ND	1
1,2-Dichloroethylene, total	14	7	T	111	49	520
Chloroform	ND	ND	ND	ND	ND	8
2-Butanone	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND
Trichloroethylene	120	98	22	13	11	2300
Benzene	10	7	T	5	ND	35
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	2
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND
2-Hexanone	T	T	ND	ND	ND	ND
Tetrachloroethylene	T	T	ND	ND	ND	6
Toluene	T	T	ND	ND	ND	95
Ethylbenzene	7	29	11	3	3	15
Total-Xylene	14	17	T	ND	ND	79
ORGANICS, EXTRACTABLE (ug/l) 8270						
Phenol	ND	NA	NA	ND	NA	NA
Isophorone	ND	NA	NA	ND	NA	NA
2-Nitrophenol	ND	NA	NA	ND	NA	NA
2,4-Dimethylphenol	ND	NA	NA	ND	NA	NA
Naphthalene	ND	NA	NA	7	NA	NA
Acenaphthylene	ND	NA	NA	ND	NA	NA
Acenaphthene	ND	NA	NA	ND	NA	NA
Fluorene	ND	NA	NA	ND	NA	NA
Phenanthrene	ND	NA	NA	ND	NA	NA
Anthracene	ND	NA	NA	ND	NA	NA
Bis(2-ethylhexyl)phthalate	7	NA	NA	ND	NA	NA
Di-n-octyl phthalate	ND	NA	NA	ND	NA	NA
Benzoic Acid	ND	NA	NA	ND	NA	NA
Benzyl Alcohol	ND	NA	NA	ND	NA	NA
2-Methylnaphthalene	ND	NA	NA	6	NA	NA
2-Methylphenol	ND	NA	NA	ND	NA	NA
4-Methylphenol	ND	NA	NA	ND	NA	NA
PESTICIDES (ug/l) 8080						
4,4'-DDT	ND	ND	ND	ND	ND	ND
PCB 1242	ND	ND	ND	ND	ND	ND
PCB 1254	ND	ND	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	0.81	ND
gamma-BHC (LINDANE)	ND	ND	ND	ND	0.08	ND

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ND indicates analyte not detected.
Analytes not listed were not detected at detection limit.
NA indicates "Not Analyzed"
Note: Field and laboratory blanks were analyzed for each sampling event. Data is available but not shown.

LANDAU ASSOCIATES, INC.

APPENDIX D (Continued)

CHEMICAL ANALYSIS OF WELL SAMPLE
QUEEN CITY FARMS - MW-6

ANALYTE	MONTH SAMPLED					
	1/87	3/87	5/87	7/87	9/87	11/87
INDICATOR PARAMETERS						
pH	5.3	4.2	4.6	NA	4.5	4.6
Specific Conductance (umhos)	330	380	433	NA	459	238
METALS, DISSOLVED (ug/l) 6010/7000						
Barium	48	53	56	120	46	29
Cadmium	49	47	49	120	49	28
Chromium	1700	2000	2200	5000	2800	1700
Copper	120	140	2100	430	200	130
Nickel	88	100	150	390	100	35
Silver	ND	ND	ND	1	ND	ND
Zinc	150	150	180	280	120	78
CYANIDE, total 9010	ND	NA	NA	7	NA	NA
ORGANICS, VOLATILE (ug/l) 8240						
Vinyl Chloride	110	92	20	18	ND	38
Methylene Chloride	260	210	3000	15000	3100	200
Acetone	74	T	ND	ND	ND	8
Carbon Disulfide	ND	ND	ND	2	ND	ND
1,1-Dichloroethylene	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	T	T	ND	ND	ND	ND
1,2-Dichloroethylene, total	12	12	T	400	3800	230
Chloroform	ND	ND	T	11	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	3	ND	ND
Trichloroethylene	93	120	520	2000	410	39
Benzene	13	9	18	25	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	2	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	T	ND	ND	ND	ND
Tetrachloroethylene	T	T	T	1	ND	ND
Toluene	26	17	74	300	66	10
Ethylbenzene	6	T	6	9	16	34
Total-Xylene	16	8	22	45	29	22
ORGANICS, EXTRACTABLE (ug/l) 8270						
Phenol	10	NA	NA	1300	NA	NA
Isophorone	ND	NA	NA	7	NA	NA
2-Nitrophenol	ND	NA	NA	87	NA	NA
2,4-Dimethylphenol	ND	NA	NA	100	NA	NA
Naphthalene	5	NA	NA	11	NA	NA
Acenaphthylene	ND	NA	NA	ND	NA	NA
Acenaphthene	ND	NA	NA	ND	NA	NA
Fluorene	ND	NA	NA	ND	NA	NA
Phenanthrene	ND	NA	NA	ND	NA	NA
Anthracene	ND	NA	NA	ND	NA	NA
Bis(2-ethylhexyl)phthalate	3	NA	NA	ND	NA	NA
Di-n-octyl phthalate	ND	NA	NA	ND	NA	NA
Benzoic Acid	ND	NA	NA	ND	NA	NA
Benzyl Alcohol	ND	NA	NA	3	NA	NA
2-Methylnaphthalene	6	NA	NA	11	NA	NA
2-Methylphenol	ND	NA	NA	30	NA	NA
4-Methylphenol	ND	NA	NA	86	NA	NA
PESTICIDES (ug/l) 8080						
4,4'-DDT	ND	ND	ND	ND	ND	ND
PCB 1242	ND	ND	ND	ND	ND	ND
PCB 1254	ND	ND	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	1.1	ND
gamma-BHC (LINDANE)	ND	ND	ND	ND	ND	ND

T indicates analyte detectible but not quantifiable (<10 ppb)
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NA indicates "Not Analyzed"
Note: Field and laboratory blanks were analyzed for each sampling event. Data is available but not shown.

LANDAU ASSOCIATES, INC.

APPENDIX D (Continued)

CHEMICAL ANALYSIS OF WELL SAMPLE
QUEEN CITY FARMS - MW-7

ANALYTE	MONTH SAMPLED					
	1/87	3/87	5/87	7/87	9/87	11/87
INDICATOR PARAMETERS						
pH	6.1	5.8	6.2	NA	5.7	5.9
Specific Conductance (umhos)	260	300	335	NA	400	198
METALS, DISSOLVED (ug/l) 6010/7000						
Barium	11	15	14	41	19	9
Cadmium	ND	ND	5	ND	ND	ND
Chromium	57	79	58	82	58	50
Copper	1	2	1	3	ND	ND
Nickel	2	6	4	8	4	3
Silver	ND	ND	ND	ND	ND	ND
Zinc	12	10	6	32	4	6
CYANIDE, total 9010	7	NA	NA	21	NA	NA
ORGANICS, VOLATILE (ug/l) 8240						
Vinyl Chloride	50	9	64	96	ND	98
Methylene Chloride	30	7	25	ND	150	ND
Acetone	T	16	ND	670	ND	14
Carbon Disulfide	ND	ND	ND	ND	ND	ND
1,1-Dichlorothylene	ND	ND	T	ND	ND	1
1,1-Dichloroethane	T	T	7	ND	ND	1
1,2-Dichloroethylene, total	T	13	30	4600	1600	150
Chloroform	T	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND
Trichloroethylene	84	25	11	ND	22	2
Benzene	T	T	8	ND	ND	8
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	T	14	ND	ND	ND	ND
2-Hexanone	T	T	ND	ND	ND	ND
Tetrachloroethylene	T	ND	ND	ND	ND	ND
Toluene	65	88	46	110	94	94
Ethylbenzene	22	61	86	100	84	140
Total-Xylene	69	250	290	430	330	270
ORGANICS, EXTRACTABLE (ug/l) 8270						
Phenol	ND	NA	NA	1000	NA	NA
Isophorone	ND	NA	NA	ND	NA	NA
2-Nitrophenol	ND	NA	NA	ND	NA	NA
2,4-Dimethylphenol	ND	NA	NA	32	NA	NA
Naphthalene	10	NA	NA	53	NA	NA
Acenaphthylene	ND	NA	NA	ND	NA	NA
Acenaphthene	ND	NA	NA	ND	NA	NA
Fluorene	3	NA	NA	ND	NA	NA
Phenanthrene	ND	NA	NA	ND	NA	NA
Anthracene	ND	NA	NA	ND	NA	NA
Bis(2-ethylhexyl)phthalate	ND	NA	NA	ND	NA	NA
Di-n-octyl phthalate	ND	NA	NA	ND	NA	NA
Benzoic Acid	ND	NA	NA	65	NA	NA
Benzyl Alcohol	ND	NA	NA	ND	NA	NA
2-Methylnaphthalene	16	NA	NA	100	NA	NA
2-Methylphenol	ND	NA	NA	190	NA	NA
4-Methylphenol	ND	NA	NA	490	NA	NA
PESTICIDES (ug/l) 8080						
4,4'-DDT	ND	ND	ND	ND	ND	ND
PCB 1242	ND	ND	ND	ND	ND	ND
PCB 1254	ND	ND	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	ND	ND
gamma-BHC (LINDANE)	ND	ND	ND	ND	ND	ND

T indicates analyte detectible but not quantifiable (<10 ppb)

LANDAU ASSOCIATES, INC.

ND indicates analyte not detected.
Analytes not listed were not detected at detection limit.
NA indicates "Not Analyzed"
Note: Field and laboratory blanks were analyzed for each sampling event. Data is available but not shown.

APPENDIX D (Continued)

CHEMICAL ANALYSIS OF WELL SAMPLE
QUEEN CITY FARMS - MW-8

ANALYTE	MONTH SAMPLED					
	1/87	3/87	5/87	7/87	9/87	11/87
INDICATOR PARAMETERS						
pH	6.3	6.0	6.3	NA	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Specific Conductance (umhos)	370	390	870	NA		
METALS, DISSOLVED (ug/l) 6010/7000						
Barium	12	20	32	20	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Cadmium	ND	ND	ND	ND		
Chromium	400	360	910	350		
Copper	3	ND	ND	ND		
Nickel	8	10	13	6		
Silver	ND	ND	ND	ND		
Zinc	12	10	6	4		
CYANIDE, total 9010	13	NA	NA	14	NO SMPL	NO SMPL
ORGANICS, VOLATILE (ug/l) 8240						
Vinyl Chloride	8	400	29	150	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Methylene Chloride	T	T	ND	ND		
Acetone	T	100	75	180		
Carbon Disulfide	ND	ND	ND	ND		
1,1-Dichloroethylene	ND	ND	ND	ND		
1,1-Dichloroethane	ND	ND	ND	ND		
1,2-Dichloroethylene, total	ND	T	T	200		
Chloroform	ND	ND	ND	ND		
2-Butanone	ND	200	180	ND		
1,1,1-Trichloroethane	ND	ND	ND	ND		
Trichloroethylene	ND	ND	ND	ND		
Benzene	ND	T	ND	ND		
1,1,2-Trichloroethane	ND	ND	ND	ND		
4-Methyl-2-pentanone	ND	71	ND	ND		
2-Hexanone	ND	ND	ND	ND		
Tetrachloroethylene	ND	ND	ND	ND		
Toluene	52	2200	220	1200		
Ethylbenzene	7	350	37	250		
Total-Xylene	31	1700	190	1400		
ORGANICS, EXTRACTABLE (ug/l) 8270						
Phenol	120	NA	NA	24	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
Isophorone	ND	NA	NA	ND		
2-Nitrophenol	ND	NA	NA	ND		
2,4-Dimethylphenol	160	NA	NA	160		
Naphthalene	50	NA	NA	180		
Acenaphthylene	14	NA	NA	ND		
Acenaphthene	29	NA	NA	ND		
Fluorene	47	NA	NA	15		
Phenanthrene	100	NA	NA	40		
Anthracene	23	NA	NA	ND		
Bis(2-ethylhexyl)phthalate	3	NA	NA	ND		
Di-n-octyl phthalate	ND	NA	NA	ND		
Benzoic Acid	ND	NA	NA	14		
Benzyl Alcohol	ND	NA	NA	ND		
2-Methylnaphthalene	380	NA	NA	190		
2-Methylphenol	94	NA	NA	290		
4-Methylphenol	160	NA	NA	540		
PESTICIDES (ug/l) 8080						
4,4'-DDT	0.52	ND	ND	ND	NO SAMPLE WELL DRY	NO SAMPLE WELL DRY
PCB 1242	ND	ND	ND	3.8		
PCB 1254	46	280	31	27		
beta-BHC	ND	ND	ND	ND		
gamma-BHC (LINDANE)	ND	ND	ND	ND		

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LANDAU ASSOCIATES, INC.

APPENDIX E

Laboratory Test Results

Laucks
Testing Laboratories, Inc.
940 South Harney St., Seattle, Washington 98108 (206)767-5060
Chemistry, Microbiology, and Technical Services

Certificate

CLIENT: Hart Crowser
1910 Fairview Ave. E.
Seattle, WA 98102-3699
ATTN: Phillip Spadaro

LABORATORY NO: 1793

DATE: Feb. 25, 1987

JOB# 1264-09

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 1/14/87 and identified as shown below:

1) S-1 1/14/87 MW-6 1400
2) S-1 1/14/87 MW-7 1200
3) S-1 1/14/87 MW-8 1300

Submitted 1/15/87 and identified as shown below:

4) S-1 1/15/87 MW-5 1200
5) S-2 1/15/87 MW-5 1200
6) S-1 1/15/87 MW-4 1300
7) S-1 1/15/87 MW-1 1400

TESTS PERFORMED AND RESULTS:

Samples were analyzed for priority pollutants in accordance with Test Methods for Evaluating Solid Waste, (SW-846), U.S.E.P.A., 1982, Methods 8240 (volatile organics), 8270 (semi-volatile extractables), 8080 (pesticides and PCB's), 9010 (cyanide), 6010 and the 7000 series (metals analysis).

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Certificate

Hart Crowser

LABORATORY NO: 1793

Inorganics

parts per billion (ug/L)

	1	2	3	4
Antimony	L/5.	L/5.	L/5.	L/5.
Arsenic	L/5.	L/5.	L/5.	L/5.
Beryllium	L/1.	L/1.	L/1.	L/1.
Cadmium	49.	L/1.	L/1.	L/1.
Chromium	1700.	57.	400.	56.
Copper	120.	1.	3.	L/1.
Lead	L/10.	L/10.	L/10.	L/10.
Mercury	L/1.	L/1.	L/1.	L/1.
Nickel	88.	2.	8.	9.
Selenium	L/5.	L/5.	L/5.	L/5.
Silver	L/1.	L/1.	L/1.	L/1.
Thallium	L/5.	L/5.	L/5.	L/5.
Zinc	150.	12.	12.	13.
Total Cyanide	L/5.	7.	13.	10.
Barium	48.	11.	12.	41.

	5	6	7	Lab Blank
Antimony	L/5.	L/5.	L/5.	L/5.
Arsenic	L/5.	L/5.	L/5.	L/5.
Beryllium	L/1.	L/1.	L/1.	L/1.
Cadmium	L/1.	2.	L/1.	L/1.
Chromium	56.	9.	L/1.	L/1.
Copper	2.	6.	8.	1.
Lead	L/10.	L/10.	L/10.	L/10.
Mercury	L/1.	L/1.	L/1.	L/1.
Nickel	7.	8.	L/2.	L/2.
Selenium	L/5.	L/5.	L/5.	L/5.
Silver	L/1.	L/1.	L/1.	L/1.
Thallium	L/5.	L/5.	L/5.	L/5.
Zinc	18.	18.	12.	4.
Total Cyanide	10.	10.	L/5.	L/5.
Barium	42.	10.	5.	L/2.

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Hart Crowser

LABORATORY NO: 1793

Volatile Organics (by GC/MS)

parts per billion (ug/L)

	1	2	3	4	5
Chloromethane	L/1.	L/1.	L/1.	L/1.	L/1.
Bromomethane	L/1.	L/1.	L/1.	L/1.	L/1.
Vinyl Chloride	110.	50.	8.	31.	28.
Chloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
Methylene Chloride	260.	trace	trace	30.	8.
Acrolein	L/5.	L/5.	L/5.	L/5.	L/5.
*Acetone	74.	16.	trace	87.	16.
Acrylonitrile	L/5.	L/5.	L/5.	L/5.	L/5.
*Carbon Disulfide	L/1.	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethane	trace	trace	L/1.	trace	trace
trans-1,2-Dichloroethylene	12.	trace	L/1.	13.	14.
Chloroform	L/1.	trace	L/1.	L/1.	L/1.
*2-Butanone	L/1.	L/1.	L/1.	L/1.	L/1.
1,2-Dichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
1,1,1-Trichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
*Vinyl Acetate	L/1.	L/1.	L/1.	L/1.	L/1.
Bromodichloromethane	L/1.	L/1.	L/1.	L/1.	L/1.
Carbon Tetrachloride	L/1.	L/1.	L/1.	L/1.	L/1.
1,2-Dichloropropane	L/1.	L/1.	L/1.	L/1.	L/1.
Trichloroethylene	93.	84.	L/1.	120.	110.
Benzene	13.	trace	L/1.	10.	10.
Chlorodibromomethane	L/1.	L/1.	L/1.	L/1.	L/1.

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Chemistry, Microbiology, and Technical Services

Certificate

Hart Crowser

LABORATORY NO: 1793

parts per billion (ug/L)

	1	2	3	4	5
1,1,2-Trichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
2-Chloroethyl vinyl ether	L/1.	L/1.	L/1.	L/1.	L/1.
Bromoform	L/1.	L/1.	L/1.	L/1.	L/1.
*4-Methyl-2-pentanone	L/1.	trace	L/1.	L/1.	L/1.
*2-Hexanone	L/1.	trace	L/1.	trace	trace
1,1,2,2-Tetrachloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
Tetrachloroethylene	trace	trace	L/1.	trace	trace
Toluene	26.	65.	52.	trace	trace
Chlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.
trans-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.	L/1.
Ethylbenzene	6.	22.	7.	trace	7.
cis-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.	L/1.
*Styrene	L/1.	L/1.	L/1.	L/1.	L/1.
*Total Xylenes	16.	69.	31.	14.	14.

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Testing Laboratories, Inc.
940 South Harney St., Seattle, Washington 98108 (206)767-5060
Chemistry, Microbiology, and Technical Services

Certificate

Hart Crowser

LABORATORY NO: 1793

parts per billion (ug/L)

	6	7	Field Blank	Lab 1 Blank	Lab 2 Blank
Chloromethane	L/1.	L/1.	L/1.	L/1.	L/1.
Bromomethane	L/1.	L/1.	L/1.	L/1.	L/1.
Vinyl Chloride	6.	L/1.	L/1.	L/1.	L/1.
Chloroethane	L/1.	trace	trace	L/1.	L/1.
Methylene Chloride	27.	L/1.	L/1.	L/1.	L/1.
Acrolein	L/5.	L/5.	L/5.	L/5.	L/5.
*Acetone	18.	L/1.	L/1.	L/1.	L/1.
Acrylonitrile	L/5.	L/5.	L/5.	L/5.	L/5.
*Carbon Disulfide	L/1.	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
trans-1,2-Dichloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.
Chloroform	L/1.	L/1.	L/1.	L/1.	L/1.
*2-Butanone	11.	L/1.	L/1.	L/1.	L/1.
1,2-Dichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
1,1,1-Trichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
*Vinyl Acetate	L/1.	L/1.	L/1.	L/1.	L/1.
Bromodichloromethane	L/1.	L/1.	L/1.	L/1.	L/1.
Carbon Tetrachloride	L/1.	L/1.	L/1.	L/1.	L/1.
1,2-Dichloropropane	L/1.	L/1.	L/1.	L/1.	L/1.
Trichloroethylene	trace	L/1.	L/1.	L/1.	L/1.
Benzene	L/1.	L/1.	L/1.	L/1.	L/1.
Chlorodibromomethane	L/1.	L/1.	L/1.	L/1.	L/1.

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parts per billion (ug/L)

	6	7	Field Blank	Lab 1 Blank	Lab 2 Blank
1,1,2-Trichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
2-Chloroethyl vinyl ether	L/1.	L/1.	L/1.	L/1.	L/1.
Bromoform	L/1.	L/1.	L/1.	L/1.	L/1.
*4-Methyl-2-pentanone	10.	L/1.	L/1.	L/1.	L/1.
*2-Hexanone	L/1.	L/1.	L/1.	L/1.	L/1.
1,1,2,2-Tetrachloroethane	L/1.	L/1.	L/1.	L/1.	L/1.
Tetrachloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.
Toluene	trace	L/1.	L/1.	L/1.	L/1.
Chlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.
trans-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.	L/1.
Ethylbenzene	L/1.	L/1.	L/1.	L/1.	L/1.
cis-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.	L/1.
*Styrene	L/1.	L/1.	L/1.	L/1.	L/1.
*Total Xylenes	L/1.	L/1.	L/1.	L/1.	L/1.

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LABORATORY NO: 1793

Extractables (by GC/MS)

	parts per billion (ug/L)			
	1	2	3	4
N-nitrosodimethylamine	L/1.	L/1.	L/4.	L/1.
Bis(2-chloroethyl)ether	L/1.	L/1.	L/4.	L/1.
2-Chlorophenol	L/1.	L/1.	L/2.	L/1.
Phenol	10.	L/1.	120.	L/1.
1,3-Dichlorobenzene	L/1.	L/1.	L/4.	L/1.
1,4-Dichlorobenzene	L/1.	L/1.	L/4.	L/1.
1,2-Dichlorobenzene	L/1.	L/1.	L/4.	L/1.
Bis(2-chloroisopropyl)ether	L/1.	L/1.	L/4.	L/1.
Hexachloroethane	L/1.	L/1.	L/4.	L/1.
N-nitroso-di-n-propylamine	L/1.	L/1.	L/4.	L/1.
Nitrobenzene	L/1.	L/1.	L/4.	L/1.
Isophorone	L/1.	L/1.	L/4.	L/1.
2-Nitrophenol	L/1.	L/1.	L/2.	L/1.
2,4-Dimethylphenol	L/1.	L/1.	160.	L/1.
Bis(2-chloroethoxy)methane	L/1.	L/1.	L/4.	L/1.
2,4-Dichlorophenol	L/1.	L/1.	L/2.	L/1.
1,2,4-Trichlorobenzene	L/1.	L/1.	L/4.	L/1.
Naphthalene	5.	10.	50.	L/1.
Hexachlorobutadiene	L/1.	L/1.	L/4.	L/1.
4-Chloro-m-cresol	L/1.	L/1.	L/2.	L/1.
Hexachlorocyclopentadiene	L/1.	L/1.	L/4.	L/1.
2,4,6-Trichlorophenol	L/1.	L/1.	L/2.	L/1.
2-Chloronaphthalene	L/1.	L/1.	L/4.	L/1.
Acenaphthylene	L/1.	L/1.	14.	L/1.
Dimethylphthalate	L/1.	L/1.	L/4.	L/1.

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	parts per billion (ug/L)			
	1	2	3	4
2,6-Dinitrotoluene	L/1.	L/1.	L/4.	L/1.
Acenaphthene	L/1.	L/1.	28.	L/1.
2,4-Dinitrophenol	L/1.	L/1.	L/2.	L/1.
2,4-Dinitrotoluene	L/1.	L/1.	L/4.	L/1.
4-Nitrophenol	L/1.	L/1.	L/2.	L/1.
Fluorene	L/1.	3.	47.	L/1.
4-Chlorophenyl phenyl ether	L/1.	L/1.	L/4.	L/1.
Diethylphthalate	L/1.	L/1.	L/4.	L/1.
4,6-Dinitro-o-cresol	L/1.	L/1.	L/4.	L/1.
1,2-Diphenylhydrazine	L/1.	L/1.	L/4.	L/1.
4-Bromophenyl phenyl ether	L/1.	L/1.	L/4.	L/1.
Hexachlorobenzene	L/1.	L/1.	L/4.	L/1.
Pentachlorophenol	L/1.	L/1.	L/2.	L/1.
Phenanthrene	L/1.	L/1.	100.	L/1.
Anthracene	L/1.	L/1.	23.	L/1.
Dibutylphthalate	L/1.	L/1.	L/4.	L/1.
Fluoranthene	L/1.	L/1.	L/4.	L/1.
Pyrene	L/1.	L/1.	L/4.	L/1.
Benzidine	L/1.	L/1.	L/4.	L/1.
Butyl benzyl phthalate	L/1.	L/1.	L/4.	L/1.
Benzo(a)anthracene	L/1.	L/1.	L/4.	L/1.
Chrysene	L/1.	L/1.	L/4.	L/1.
3,3'-Dichlorobenzidine	L/1.	L/1.	L/4.	L/1.
Bis(2-ethylhexyl)phthalate	3.	L/1.	3.	L/1.
N-nitrosodiphenylamine	L/1.	L/1.	L/4.	L/1.
Di-n-octyl phthalate	L/1.	L/1.	L/4.	L/1.
Benzo(b)fluoranthene	L/1.	L/1.	L/4.	L/1.
Benzo(k)fluoranthene	L/1.	L/1.	L/4.	L/1.

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parts per billion (ug/L)

	1	2	3	4
Benzo(a)pyrene	L/1.	L/1.	L/4.	L/1.
Indeno(1,2,3-cd)pyrene	L/1.	L/1.	L/4.	L/1.
Dibenzo(ah)anthracene	L/1.	L/1.	L/4.	L/1.
Benzo(ghi)perylene	L/1.	L/1.	L/4.	L/1.
*Aniline	L/1.	L/1.	L/4.	L/1.
*Benzoic Acid	L/1.	L/1.	L/2.	L/1.
*Benzyl Alcohol	L/1.	L/1.	L/4.	L/1.
*4-Chloroaniline	L/1.	L/1.	L/4.	L/1.
*Dibenzofuran	L/1.	L/1.	L/4.	L/1.
*2-Methylnaphthalene	6.	16.	380.	L/1.
*2-Methylphenol	L/1.	L/1.	94.	L/1.
*4-Methylphenol	L/1.	L/1.	160.	L/1.
*2-Nitroaniline	L/1.	L/1.	L/4.	L/1.
*3-Nitroaniline	L/1.	L/1.	L/4.	L/1.
*4-Nitroaniline	L/1.	L/1.	L/4.	L/1.
*2,4,5-Trichlorophenol	L/1.	L/1.	L/2.	L/1.

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parts per billion (ug/L)

	5	6	7	Lab Blank
N-nitrosodimethylamine	L/1.	L/1.	L/1.	L/1.
Bis(2-chloroethyl)ether	L/1.	L/1.	L/1.	L/1.
2-Chlorophenol	L/1.	L/1.	L/1.	L/1.
Phenol	L/1.	280.	L/1.	L/1.
1,3-Dichlorobenzene	L/1.	L/1.	L/1.	L/1.
1,4-Dichlorobenzene	L/1.	L/1.	L/1.	L/1.
1,2-Dichlorobenzene	L/1.	L/1.	L/1.	L/1.
Bis(2-chloroisopropyl)ether	L/1.	L/1.	L/1.	L/1.
Hexachloroethane	L/1.	L/1.	L/1.	L/1.
N-nitroso-di-n-propylamine	L/1.	L/1.	L/1.	L/1.
Nitrobenzene	L/1.	L/1.	L/1.	L/1.
Isophorone	L/1.	L/1.	L/1.	L/1.
2-Nitrophenol	L/1.	L/1.	L/1.	L/1.
2,4-Dimethylphenol	L/1.	L/1.	L/1.	L/1.
Bis(2-chloroethoxy)methane	L/1.	L/1.	L/1.	L/1.
2,4-Dichlorophenol	L/1.	L/1.	L/1.	L/1.
1,2,4-Trichlorobenzene	L/1.	L/1.	L/1.	L/1.
Naphthalene	L/1.	L/1.	L/1.	L/1.
Hexachlorobutadiene	L/1.	L/1.	L/1.	L/1.
4-Chloro-m-cresol	L/1.	L/1.	L/1.	L/1.
Hexachlorocyclopentadiene	L/1.	L/1.	L/1.	L/1.
2,4,6-Trichlorophenol	L/1.	L/1.	L/1.	L/1.
2-Chloronaphthalene	L/1.	L/1.	L/1.	L/1.
Acenaphthylene	L/1.	L/1.	L/1.	L/1.
Dimethylphthalate	L/1.	L/1.	L/1.	L/1.
2,6-Dinitrotoluene	L/1.	L/1.	L/1.	L/1.
Acenaphthene	L/1.	L/1.	L/1.	L/1.
2,4-Dinitrophenol	L/1.	L/1.	L/1.	L/1.
2,4-Dinitrotoluene	L/1.	L/1.	L/1.	L/1.
4-Nitrophenol	L/1.	L/1.	L/1.	L/1.
Fluorene	L/1.	L/1.	L/1.	L/1.
4-Chlorophenyl phenyl ether	L/1.	L/1.	L/1.	L/1.
Diethylphthalate	L/1.	L/1.	L/1.	L/1.
4,6-Dinitro-o-cresol	L/1.	L/1.	L/1.	L/1.

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parts per billion (ug/L)

	5	6	7	Lab Blank
1,2-Diphenylhydrazine	L/1.	L/1.	L/1.	L/1.
4-Bromophenyl phenyl ether	L/1.	L/1.	L/1.	L/1.
Hexachlorobenzene	L/1.	L/1.	L/1.	L/1.
Pentachlorophenol	L/1.	L/1.	L/1.	L/1.
Phenanthrene	L/1.	L/1.	L/1.	L/1.
Anthracene	L/1.	L/1.	L/1.	L/1.
Dibutylphthalate	L/1.	L/1.	L/1.	L/1.
Fluoranthene	L/1.	L/1.	L/1.	L/1.
Pyrene	L/1.	L/1.	L/1.	L/1.
Benzidine	L/1.	L/1.	L/1.	L/1.
Butyl benzyl phthalate	L/1.	L/1.	L/1.	L/1.
Benzo(a)anthracene	L/1.	L/1.	L/1.	L/1.
Chrysene	L/1.	L/1.	L/1.	L/1.
3,3'-Dichlorobenzidine	L/1.	L/1.	L/1.	L/1.
Bis(2-ethylhexyl)phthalate	7.	L/1.	34.	L/1.
N-nitrosodiphenylamine	L/1.	L/1.	L/1.	L/1.
Di-n-octyl phthalate	L/1.	L/1.	44.	L/1.
Benzo(b)fluoranthene	L/1.	L/1.	L/1.	L/1.
Benzo(k)fluoranthene	L/1.	L/1.	L/1.	L/1.
Benzo(a)pyrene	L/1.	L/1.	L/1.	L/1.
Indeno(1,2,3-cd)pyrene	L/1.	L/1.	L/1.	L/1.
Dibenzo(ah)anthracene	L/1.	L/1.	L/1.	L/1.
Benzo(ghi)perylene	L/1.	L/1.	L/1.	L/1.
*Aniline	L/1.	L/1.	L/1.	L/1.
*Benzoic Acid	L/1.	L/1.	L/1.	L/1.
*Benzyl Alcohol	L/1.	L/1.	L/1.	L/1.
*4-Chloroaniline	L/1.	L/1.	L/1.	L/1.
*Dibenzofuran	L/1.	L/1.	L/1.	L/1.
*2-Methylnaphthalene	L/1.	L/1.	L/1.	L/1.
*2-Methylphenol	L/1.	9.	L/1.	L/1.
*4-Methylphenol	L/1.	15.	L/1.	L/1.
*2-Nitroaniline	L/1.	L/1.	L/1.	L/1.
*3-Nitroaniline	L/1.	L/1.	L/1.	L/1.
*4-Nitroaniline	L/1.	L/1.	L/1.	L/1.
*2,4,5-Trichlorophenol	L/1.	L/1.	L/1.	L/1.

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Pesticides (by GC/ECD)

parts per billion (ug/L)

	Lab Blank	1	2	3	4
alpha-BHC	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
beta-BHC	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
delta-BHC	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
gamma-BHC (lindane)	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
aldrin	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor epoxide	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
dieldrin	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
4,4'-DDE	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
4,4'-DDD	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04
endosulfan sulfate	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04
4,4'-DDT	L/0.04	L/0.04	L/0.04	0.52	L/0.04
chlordane	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04
alpha endosulfan	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04
beta endosulfan	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04
endrin	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04
endrin aldehyde	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04
toxaphene	L/10.	L/10.	L/10.	L/10.	L/10.
PCB 1016	L/2.	L/2.	L/2.	L/2.	L/2.
PCB 1221	L/2.	L/2.	L/2.	L/2.	L/2.
PCB 1232	L/2.	L/2.	L/2.	L/2.	L/2.
PCB 1242	L/2.	L/2.	L/2.	L/2.	L/2.
PCB 1248	L/2.	L/2.	L/2.	L/2.	L/2.
PCB 1254	L/2.	L/2.	L/2.	46.	L/2.
PCB 1260	L/2.	L/2.	L/2.	L/2.	L/2.
Methoxychlor	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2
Endrin Ketone	L/0.04	L/0.04	L/0.04	L/0.04	L/0.04

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parts per billion (ug/L)

	Lab Blank	5	6	7
alpha-BHC	L/0.02	L/0.02	L/0.02	L/0.02
beta-BHC	L/0.02	L/0.02	L/0.02	L/0.02
delta-BHC	L/0.02	L/0.02	L/0.02	L/0.02
gamma-BHC (lindane)	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor	L/0.02	L/0.02	L/0.02	L/0.02
aldrin	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor epoxide	L/0.02	L/0.02	L/0.02	L/0.02
dieldrin	L/0.02	L/0.02	L/0.02	L/0.02
4,4'-DDE	L/0.02	L/0.02	L/0.02	L/0.02
4,4'-DDD	L/0.04	L/0.04	L/0.04	L/0.04
endosulfan sulfate	L/0.04	L/0.04	L/0.04	L/0.04
4,4'-DDT	L/0.04	L/0.04	L/0.04	L/0.04
chlordane	L/0.04	L/0.04	L/0.04	L/0.04
alpha endosulfan	L/0.04	L/0.04	L/0.04	L/0.04
beta endosulfan	L/0.04	L/0.04	L/0.04	L/0.04
endrin	L/0.04	L/0.04	L/0.04	L/0.04
endrin aldehyde	L/0.04	L/0.04	L/0.04	L/0.04
toxaphene	L/10.	L/10.	L/10.	L/10.
PCB 1016	L/2.	L/2.	L/2.	L/2.
PCB 1221	L/2.	L/2.	L/2.	L/2.
PCB 1232	L/2.	L/2.	L/2.	L/2.
PCB 1242	L/2.	L/2.	L/2.	L/2.
PCB 1248	L/2.	L/2.	L/2.	L/2.
PCB 1254	L/2.	L/2.	L/2.	L/2.
PCB 1260	L/2.	L/2.	L/2.	L/2.
Methoxychlor	L/0.2	L/0.2	L/0.2	L/0.2
Endrin Ketone	L/0.04	L/0.04	L/0.04	L/0.04

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Key

L/ indicates "less than"
* indicates additional compounds from the EPA's Hazardous Substances List.
trace indicates an unquantifiable amount between 1-5 parts per billion.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

J. M. Owens

JMO:dr

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APPENDIX A

Matrix Spike/Matrix Spike Duplicate Report

		parts per billion (ug/L)				ug/L			QC LIMITS	
Samp	Analyte	Spike Added	Sample Result	MS Result	% Rec	MSD Result	% Rec	RPD	RPD	Rec
3	Mercury	10.	L/1.	9.	92.	10.	96.	-4.2	*	*
4	Arsenic	20.	L/5.	18.	89.	—	—	—	*	*
4	Selenium	20.	L/5.	14.	70.	14.	70.	0.	*	*
1	Cyanide	50.	L/5.	49.	93.	49.	93.	0.	*	*
7	Beryllium	50.	L/1.	49.	98.	49.	99.	1.0	14	75-111
7	Cadmium	50.	L/1.	46.	92.	45.	90.	2.2	10	78-117
7	Chromium	50.	L/1.	49.	98.	49.	98.	0.	24	68-127
7	Copper	50.	8.	57.	98.	57.	97.	1.0	14	70-123
7	Lead	50.	L/10.	45.	91.	52.	104.	13.	21	59-132
7	Nickel	50.	L/2.	45.	91.	47.	95.	4.3	14	72-122
7	Zinc	50.	12.	65.	105.	63.	101.	3.9	24	67-121
7	Silver	50.	L/1.	43.	86.	43.	86.	0.	15	82-116
7	Barium	50.	5.	50.	90.	52.	95.	5.4	13	74-132
7	Antimony	50.	L/5.	42.	84.	39.	78.	7.4	27	33-168
1	Thallium	50.	L/5.	44.	87.	45.	89.	2.3	*	*
1	r-BHC	0.20	0.	0.182	91.0	0.212	106.	15.0	15	56-123
1	Heptachlor	0.20	0.	0.154	77.0	0.187	93.5	19.3	20	40-131
1	Aldrin	0.20	0.	0.146	73.0	0.164	82.0	11.6	22	40-120
1	Dieldrin	0.50	0.	0.280	56.0	0.308	61.6	9.5	18	52-126
1	Endrin	0.50	0.	0.446	89.2	0.484	96.8	8.2	21	56-121
1	DDT	0.50	0.	0.294	58.8	0.340	68.0	14.5	27	38-127

MS = Matrix Spike
MSD = Matrix Spike Duplicate
Rec = Recovery
RPD = Relative Percent Difference
* = none established

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APPENDIX B

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
Lab Blank 1	d4-1,2-Dichloroethane	50.0	49.0	98.0	77-120
	d8-Toluene	50.0	44.8	89.6	86-119
	p-Bromofluorobenzene	50.0	49.9	99.8	85-121
1	d4-1,2-Dichloroethane	50.0	45.9	91.8	77-120
	d8-Toluene	50.0	45.2	90.4	86-119
	p-Bromofluorobenzene	50.0	48.7	97.4	85-121
2	d4-1,2-Dichloroethane	50.0	50.5	101.	77-120
	d8-Toluene	50.0	45.4	90.8	86-119
	p-Bromofluorobenzene	50.0	50.0	100.	85-121
3	d4-1,2-Dichloroethane	50.0	51.4	103.	77-120
	d8-Toluene	50.0	47.6	95.2	86-119
	p-Bromofluorobenzene	50.0	49.6	99.2	85-121
Lab Blank 2	d4-1,2-Dichloroethane	50.0	53.0	106.	77-120
	d8-Toluene	50.0	49.5	99.0	86-119
	p-Bromofluorobenzene	50.0	48.9	97.8	85-121

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Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
4	d4-1,2-Dichloroethane	50.0	50.7	101.	77-120
	d8-Toluene	50.0	51.0	102.	86-119
	p-Bromofluorobenzene	50.0	49.5	99.0	85-121
5	d4-1,2-Dichloroethane	50.0	52.7	105.	77-120
	d8-Toluene	50.0	49.4	98.8	86-119
	p-Bromofluorobenzene	50.0	50.2	100.	85-121
6	d4-1,2-Dichloroethane	50.0	49.0	98.0	77-120
	d8-Toluene	50.0	50.9	102.	86-119
	p-Bromofluorobenzene	50.0	48.9	97.8	85-121
6 MS	d4-1,2-Dichloroethane	50.0	53.6	107.	77-120
	d8-Toluene	50.0	51.3	103.	86-119
	p-Bromofluorobenzene	50.0	48.3	96.6	85-121
6 MSD	d4-1,2-Dichloroethane	50.0	51.5	103.	77-120
	d8-Toluene	50.0	50.8	102.	86-119
	p-Bromofluorobenzene	50.0	50.0	100.0	85-121
7	d4-1,2-Dichloroethane	50.0	50.0	100.	77-120
	d8-Toluene	50.0	52.9	106.	86-119
	p-Bromofluorobenzene	50.0	46.7	93.4	85-121
Field Blank	d4-1,2-Dichloroethane	50.0	48.5	97.0	77-120
	d8-Toluene	50.0	53.1	106.	86-119
	p-Bromofluorobenzene	50.0	47.7	95.4	85-121

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Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
Lab Blank 1	2-Fluorophenol	200.	82.8	41.4	21-100
	d5-Phenol	200.	59.8	29.9	10-94
	2-Bromophenol	200.	130.	65.2	62-96
	2,4,6-Tribromophenol	200.	140.	70.2	10-123
	d5-Nitrobenzene	100.	100.	100.	35-114
	2-Fluorobiphenyl	100.	71.1	71.1	43-116
	d10-Azobenzene	100.	74.0	74.0	62-127
	d14-Terphenyl	100.	81.4	81.4	33-141
1	2-Fluorophenol	267.	10.7	4.0*	21-100
	d5-Phenol	267.	12.5	4.7*	10-94
	2-Bromophenol	267.	52.3	19.6*	62-96
	2,4,6-Tribromophenol	267.	56.9	21.3	10-123
	d5-Nitrobenzene	133.	88.6	66.6	35-114
	2-Fluorobiphenyl	133.	76.5	57.5	43-116
	d10-Azobenzene	133.	90.0	67.7	62-127
	d14-Terphenyl	133.	89.2	67.1	33-141
1 MS	2-Fluorophenol	267.	71.0	26.6	21-100
	d5-Phenol	267.	72.4	27.1	10-94
	2-Bromophenol	267.	145.	54.4	62-96
	2,4,6-Tribromophenol	267.	41.1	15.4	10-123
	d5-Nitrobenzene	133.	127.	95.8	35-114
	2-Fluorobiphenyl	133.	107.	80.5	43-116
	d10-Azobenzene	133.	92.6	69.6	62-127
	d14-Terphenyl	133.	85.9	64.6	33-141

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Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
1 MSD	2-Fluorophenol	267.	45.1	16.9	21-100
	d5-Phenol	267.	50.5	18.9	10-94
	2-Bromophenol	267.	109.	41.0	62-96
	2,4,6-Tribromophenol	267.	92.9	34.8	10-123
	d5-Nitrobenzene	133.	107.	80.5	35-114
	2-Fluorobiphenyl	133.	94.3	70.9	43-116
	d10-Azobenzene	133.	93.0	69.9	62-127
	d14-Terphenyl	133.	174.	65.0	33-141
2	2-Fluorophenol	238.	84.3	35.4	21-100
	d5-Phenol	238.	62.6	26.3	10-94
	2-Bromophenol	238.	151.	63.4	62-96
	2,4,6-Tribromophenol	238.	105.	44.0	10-123
	d5-Nitrobenzene	119.	109.	91.6	35-114
	2-Fluorobiphenyl	119.	81.2	68.2	43-116
	d10-Azobenzene	119.	83.3	70.0	62-127
	d14-Terphenyl	119.	91.5	76.9	33-141
4	2-Fluorophenol	217.	89.0	41.0	21-100
	d5-Phenol	217.	65.1	30.0	10-94
	2-Bromophenol	217.	149.	68.8	62-96
	2,4,6-Tribromophenol	217.	158.	72.8	10-123
	d5-Nitrobenzene	109.	91.2	83.7	35-114
	2-Fluorobiphenyl	109.	73.5	67.4	43-116
	d10-Azobenzene	109.	72.7	66.7	62-127
	d14-Terphenyl	109.	83.5	76.6	33-141

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Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
5	2-Fluorophenol	233.	92.0	39.5	21-100
	d5-Phenol	233.	70.4	30.2	10-94
	2-Bromophenol	233.	147.	62.9	62-96
	2,4,6-Tribromophenol	233.	192.	82.3	10-123
	d5-Nitrobenzene	116.	102.	87.5	35-114
	2-Fluorobiphenyl	116.	68.3	58.9	43-116
	d10-Azobenzene	116.	84.8	73.1	62-127
	d14-Terphenyl	116.	88.2	76.0	33-141
6	2-Fluorophenol	233.	79.9	34.3	21-100
	d5-Phenol	233.	60.3	25.9	10-94
	2-Bromophenol	233.	104.	60.3	62-96
	2,4,6-Tribromophenol	233.	134.	57.4	10-123
	d5-Nitrobenzene	116.	107.	92.3	35-114
	2-Fluorobiphenyl	116.	82.5	71.1	43-116
	d10-Azobenzene	116.	81.1	69.9	62-127
	d14-Terphenyl	116.	77.5	66.8	33-141
7	2-Fluorophenol	286.	116.	40.5	21-100
	d5-Phenol	286.	94.1	32.9	10-94
	2-Bromophenol	286.	157.	54.8	62-96
	2,4,6-Tribromophenol	286.	209.	70.9	10-123
	d5-Nitrobenzene	143.	105.	73.2	35-114
	2-Fluorobiphenyl	143.	76.5	53.5	43-116
	d10-Azobenzene	143.	86.1	60.2	62-127
	d14-Terphenyl	143.	95.1	66.5	33-141

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Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
3	2-Fluorophenol	217.	116.	53.3	21-100
	d5-Phenol	217.	85.3	39.3	10-94
	2-Bromophenol	217.	171.	78.6	62-96
	2,4,6-Tribromophenol	217.	169.	77.9	10-123
	d5-Nitrobenzene	109.	61.6	56.5	35-114
	2-Fluorobiphenyl	109.	80.8	74.1	43-116
	d10-Azobenzene	109.	71.3	65.4	62-127
	d14-Terphenyl	109.	47.2	43.3	33-141
1 re-extract	2-Fluorophenol	—	—	6.4*	21-100
	d5-Phenol	—	—	5.5*	10-94
	2-Bromophenol	—	—	26.3*	62-96
	2,4,6-Tribromophenol	—	—	29.4	10-123
	d5-Nitrobenzene	—	—	81.5	35-114
	2-Fluorobiphenyl	—	—	80.7	43-116
	d10-Azobenzene	—	—	80.5	62-127
	d14-Terphenyl	—	—	74.8	33-141

*Due to poor recovery of surrogate compounds this sample was subjected to re-extraction and re-analysis. The persistence of low recoveries in this second processing suggests a matrix interference problem with the sample.

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Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
Lab Blank	Isodrin	50.	24.5	49.0	43-118
1	Isodrin	50.	31.4	62.8	43-118
1 MS	Isodrin	50.	28.3	56.6	43-118
1 MSD	Isodrin	50.	33.3	66.6	43-118
2	Isodrin	50.	38.0	76.0	43-118
3	Isodrin	50.	44.1	88.2	43-118
4	Isodrin	50.	30.6	61.2	43-118
5	Isodrin	50.	26.0	52.0	43-118
6	Isodrin	50.	28.3	56.6	43-118
Lab Blank 2	Isodrin	50.	25.9	51.8	43-118
7	Isodrin	50.	32.9	65.8	43-118
Lab Blank	Dibutylchlorendate	100.	63.1	63.1	24-150
1	Dibutylchlorendate	100.	83.9	83.9	24-150
1 MS	Dibutylchlorendate	100.	71.8	71.8	24-150
1 MSD	Dibutylchlorendate	100.	76.8	76.8	24-150
2	Dibutylchlorendate	100.	76.2	76.2	24-150
3	Dibutylchlorendate	100.	62.3	62.3	24-150
4	Dibutylchlorendate	100.	59.4	59.4	24-150
5	Dibutylchlorendate	100.	53.1	53.1	24-150
6	Dibutylchlorendate	100.	54.7	54.7	24-150
Lab Blank 2	Dibutylchlorendate	100.	75.4	75.4	24-150
7	Dibutylchlorendate	100.	79.4	79.4	24-150

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APPENDIX C

Matrix Spike/Duplicate Spike Quality Control

Reported below are the results of additional QC compounds utilized in the analysis of organic compounds. Compounds of interest are spiked into two additional sample aliquots prior to extraction and/or analysis to monitor for matrix effects, sample processing errors, and to calculate percent recoveries of compunds of interest and relative error in the analysis. The control limits represent the 95% confidence interval established in the laboratory through repetitive analysis of these sample types.

Sample 6

	ug/L				ug/L				
Compound	Conc Spike	Conc Samp	Conc MS	% REC	Conc MSD	% REC	RPD	RPD Limit	REC Limit
1,1-Dichloroethene	50.	0.	47.3	94.6	48.8	97.6	-3.1	14	61-145
Trichloroethene	50.	0.5	54.6	108.	53.4	106.	1.9	14	71-120
Chlorobenzene	50.	0.	49.3	98.6	51.4	103.	-4.4	13	75-130
Toluene	50.	1.0	49.0	96.0	49.5	97.0	-1.0	13	76-125
Benzene	50.	0.	51.2	102.	50.3	101.	1.0	11	76-127

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Sample 1

Compound	ug/L Conc Spike	ug/L Conc Samp	ug/L Conc MS	% REC	ug/L Conc MSD	% REC	RPD	RPD Limit	REC Limit
1,2,4-Trichlorobenzene	133.	0.	111.	83.4	93.1	70.0	17.5	28	39-98
Acenaphthene	133.	0.	120.	90.2	115.	86.4	4.3	31	46-116
2,4-Dinitrotoluene	133.	0.	80.6	60.6	81.0	60.9	-0.5	38	24-96
Pyrene	133.	0.	119.	89.1	119.	89.6	-0.6	31	26-127
N-Nitrosodipropylamine	133.	0.	115.	86.3	95.9	72.1	17.9	38	41-116
1,4-Dichlorobenzene	133.	0.	117.	88.3	94.2	70.8	22.0	28	36-97
Pentachlorophenol	267.	0.	307.	115.	275.	103.	11.0	50	9-103
Phenol	267.	10.	138.	47.3	89.4	29.3	47.0	42	12-89
2-Chlorophenol	267.	0.	118.	44.1	89.7	33.6	27.0	40	27-123
P-Chloro-m-cresol	267.	0.	85.2	31.9	59.5	22.3	35.4	42	23-97
4-Nitrophenol	267.	0.	83.8	31.4	79.8	29.9	4.9	50	10-80

Conc = Concentration
Samp = Sample
MS = Matrix Spike
MSD = Matrix Spike Duplicate
REC = Recovery
RPD = Relative Percent Difference

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APPENDIX D

Tentatively Identified Compounds

Listed below are tentatively identified compounds reported in estimated amounts using total peak area relative to internal standard areas. These compounds were major components in the sample that were not identified as priority pollutants. Mass spectra were matched against NBS Library spectra for best fit. If no match is found, the peak is reported as "UNKNOWN" along with any information (i.e. 'phthalate' or 'fatty acid') that can be assigned by mass spectral analysis.

Tentatively Identified Compounds	parts per billion (ug/L) Estimated Concentration
Sample 1	
cis-1,2-Dichloroethene	1100.
Methyl cyclohexane	12.
Unknown	6.
1-Ethyl-2-Methylbenzene	8.
Sample 2	
cis-1,2-Dichloroethene	750.
Cyclohexane	61.
cis-1,3-dimethyl cyclopentane	85.
Methyl cyclohexane	100.
Unknown	29.
Ethyl cyclohexane	10.
Unknown	12.
1-ethyl-2-methylbenzene	41.
1,2,4-trimethylbenzene	55.
(1-methylethyl)benzene	69.

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Tentatively Identified Compounds	parts per billion (ug/L) Estimated Concentration
Sample 4	
cis-1,2-Dichloroethene	1000.
1-ethyl-2-methylbenzene	10.
Sample 5	
cis-1,2-Dichloroethene	980.
Cyclohexane	7.
Methyl cyclohexane	10.
1-ethyl-2-methylbenzene	10.

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LAB # 1793
SMPL# 3

CLIENT - HART CROWSER

LISTED BELOW ARE TENATIVELY IDENTIFIED COMPOUNDS REPORTED IN ESTIMATED AMOUNTS USING TOTAL PEAK AREA RELATIVE TO INTERNAL STANDARD AREAS. THESE COMPOUNDS WERE MAJOR COMPONENTS IN THE SAMPLE THAT WERE NOT IDENTIFIED AS PRIORITY POLLUTANTS. MASS SPECTRA WERE MATCHED AGAINST NBS LIBRARY SPECTRA FOR BEST FIT. IF NO MATCH IS FOUND, THE PEAK IS REPORTED AS "UNKNOWN" ALONG WITH ANY INFORMATION (I.E. `PHTHALATE' OR `HYDROCARBON') THAT CAN BE ASSIGNED BY MASS SPECTRAL ANALYSIS.

VOLATILE ORGANICS
ANALYSIS DATA SHEET
TENATATIVELY IDENTIFIED COMPOUNDS

NO	NAME	SCAN	EST CONC UG/L
1	CIS-1,2-DICHLORO-ETHENE	223	12
2	UNKNOWN	797	7
3	2,4-DIMETHYL-HEXANE	823	5
4		0	0
5		0	0
6		0	0
7		0	0
8		0	0
9		0	0
10		0	0
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

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CLIENT: Hart Crowser
1910 Fairview Avenue East
Seattle, WA 98102-3699
ATTN: Phillip Spadaro

RECEIVED
APR 28 1987
HART CROWSER & ASSOC., INC.

LABORATORY NO. 2887

DATE: April 28, 1987

JOB#: 1264-09

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 03/11/87 and identified as shown below:

1) S-1 MW-1 B.E.C. 03/11/87 08:00
2) S-1 MW-4 B.E.C. 03/11/87 09:00
3) S-1 MW-5 B.E.C. 03/11/87 10:00
4) S-1 MW-6 B.E.C. 03/11/87 13:00
5) S-1 MW-7 B.E.C. 03/11/87 11:00
6) S-1 MW-8 B.E.C. 03/11/87 12:00
7) S-2 MW-8 B.E.C. 03/11/87 12:00

TESTS PERFORMED AND RESULTS:

Samples were analyzed for priority pollutants in accordance with Test Methods for Evaluating Solid Waste (SW 846) U.S.E.P.A., 1982 Method 8240 (volatile organics), 8080 (pesticides and PCB's) and the 7000 series (metals analysis).

	parts per billion (ug/L)			
Inorganics	1	2	3	4
Antimony	L/5.	L/5.	L/5.	L/5.
Arsenic	L/5.	L/5.	L/5	L/5.
Barium	5.	10.	51.	53.
Beryllium	L/1.	L/1.	L/1.	L/1.
Cadmium	L/1.	1.	L/1.	47.
Chromium	L/1.	6.	54.	2000.
Copper	5.	4.	L/1.	140.
Lead	L/10.	L/10.	L/10.	L/10.
Mercury	L/1.	L/1.	L/1.	L/1.
Nickel	L/2.	10.	9.	100.
Selenium	L/5.	L/5.	L/5.	L/5.
Silver	L/1.	L/1.	L/1.	L/1.
Thallium	L/5.	L/5.	L/5.	L/5.
Zinc	9.	22.	16.	150.

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parts per billion (ug/L)

Inorganics	5	6	7	Method Blank
Antimony	L/5.	L/5.	L/5.	L/5.
Arsenic	L/5.	L/5.	L/5.	L/5.
Barium	15.	20.	12.	L/1.
Beryllium	L/1.	L/1.	L/1.	L/1.
Cadmium	L/1.	L/1.	L/1.	L/1.
Chromium	79.	360.	240.	L/1.
Copper	2.	L/1.	L/1.	L/1.
Lead	L/10.	L/10.	L/10.	L/10.
Mercury	L/1.	L/1.	L/1.	L/1.
Nickel	6.	10.	6.	L/2.
Selenium	L/5.	L/5.	L/5.	L/5.
Silver	L/1.	L/1.	L/1.	L/1.
Thallium	L/5.	L/5.	L/5.	L/5.
Zinc	10.	10.	4.	L/1.

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Volatile Organics (GC/MS)	parts per billion (ug/L) 1	2	3	4
Chloromethane	L/1.	L/1.	L/1.	L/1.
Bromomethane	L/1.	L/1.	L/1.	L/1.
Vinyl Chloride	L/1.	trace1	38.	92.
Chloroethane	L/1.	L/1.	L/1.	L/1.
Methylene Chloride	trace1	trace1	trace1	210.
Acrolein	L/5.	L/5.	L/5.	L/5.
*Acetone	L/1.	25.	trace1	trace1
Acrylonitrile	L/5.	L/5.	L/5.	L/5.
*Carbon Disulfide	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethylene	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethane	L/1.	L/1.	trace1	trace1
trans-1,2-Dichloroethylene	L/1.	L/1.	7.	12.
Chloroform	L/1.	L/1.	L/1.	L/1.
*2-Butanone	L/1.	31.	L/1.	L/1.
1,2-Dichloroethane	L/1.	L/1.	L/1.	L/1.
1,1,1-Trichloroethane	L/1.	L/1.	L/1.	L/1.
*Vinyl Acetate	L/1.	L/1.	L/1.	L/1.
Bromodichloromethane	L/1.	L/1.	L/1.	L/1.
Carbon Tetrachloride	L/1.	L/1.	L/1.	L/1.
1,2-Dichloropropane	L/1.	L/1.	L/1.	L/1.
Trichloroethylene	L/1.	trace1	98.	120.
Benzene	L/1.	L/1.	7.	9.
Chlorodibromomethane	L/1.	L/1.	L/1.	L/1.
1,1,2-Trichloroethane	L/1.	L/1.	L/1.	L/1.
2-Chloroethyl vinyl ether	L/1.	L/1.	L/1.	L/1.
Bromoform	L/1.	L/1.	L/1.	L/1.
*4-Methyl-2-pentanone	L/1.	10.	L/1.	L/1.

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Volatile Organics (GC/MS)	parts per billion (ug/L) 1	2	3	4
*2-Hexanone	L/1.	L/1.	trace1	trace1
1,1,2,2-Tetrachloroethane	L/1.	L/1.	L/1.	L/1.
Tetrachloroethylene	L/1.	L/1.	trace1	trace1
Toluene	L/1.	trace1	trace1	17.
Chlorobenzene	L/1.	L/1.	L/1.	L/1.
trans-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.
Ethylbenzene	L/1.	L/1.	29.	trace1
cis-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.
*Styrene	L/1.	L/1.	L/1.	L/1.
*o-Xylene	L/1.	L/1.	17.	8.

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Volatile Organics (GC/MS)	parts per billion (ug/L) 5	6	7	Method Blank
Chloromethane	L/1.	L/10.	L/10.	L/1.
Bromomethane	L/1.	L/10.	L/10.	L/1.
Vinyl Chloride	9.	400.	350.	L/1.
Chloroethane	L/1.	L/10.	L/10.	L/1.
Methylene Chloride	7.	L/10.	trace2	L/1.
Acrolein	L/5.	L/50.	L/50.	L/5.
*Acetone	16.	100.	100.	trace1
Acrylonitrile	L/5.	L/50.	L/50.	L/5.
*Carbon Disulfide	L/1.	L/10.	L/10.	L/1.
1,1-Dichloroethylene	L/1.	L/10.	L/10.	L/1.
1,1-Dichloroethane	trace1	L/10.	L/10.	L/1.
trans-1,2-Dichloroethylene	13.	trace2	L/10.	L/1.
Chloroform	L/1.	L/10.	L/10.	L/1.
*2-Butanone	L/1.	190.	200.	L/1.
1,2-Dichloroethane	L/1.	L/10.	L/10.	L/1.
1,1,1-Trichloroethane	L/1.	L/10.	L/10.	L/1.
*Vinyl Acetate	L/1.	L/10.	L/10.	L/1.
Bromodichloromethane	L/1.	L/10.	L/10.	L/1.
Carbon Tetrachloride	L/1.	L/10.	L/10.	L/1.
1,2-Dichloropropane	L/1.	L/10.	L/10.	L/1.
Trichloroethylene	25.	L/10.	L/10.	L/1.
Benzene	trace1	trace2	trace2	L/1.
Chlorodibromomethane	L/1.	L/10.	L/10.	L/1.
1,1,2-Trichloroethane	L/1.	L/10.	L/10.	L/1.
2-Chloroethyl vinyl ether	L/1.	L/10.	L/10.	L/1.
Bromoform	L/1.	L/10.	L/10.	L/1.
*4-Methyl-2-pentanone	14.	71.	66.	L/1.

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Volatile Organics (GC/MS)	parts per billion (ug/L) 5	6	7	Method Blank
*2-Hexanone	trace1	L/10.	L/10.	L/1.
1,1,2,2-Tetrachloroethane	L/1.	L/10.	L/10.	L/1.
Tetrachloroethylene	L/1.	L/10.	L/10.	L/1.
Toluene	88.	2100.	2200.	L/1.
Chlorobenzene	L/1.	L/10.	L/10.	L/1.
trans-1,3-Dichloropropene	L/1.	L/10.	L/10.	L/1.
Ethylbenzene	61.	350.	330.	L/1.
cis-1,3-Dichloropropene	L/1.	L/10.	L/10.	L/1.
*Styrene	L/1.	L/10.	L/10.	L/1.
*o-Xylene	250.	1700.	1600.	L/1.

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Pesticides (by GC/ECD)	parts per billion (ug/L) 1	2	3	4
alpha-BHC	L/0.02	L/0.02	L/0.02	L/0.02
beta-BHC	L/0.02	L/0.02	L/0.02	L/0.02
delta-BHC	L/0.02	L/0.02	L/0.02	L/0.02
gamma-BHC (lindane)	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor	L/0.02	L/0.02	L/0.02	L/0.02
aldrin	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor epoxide	L/0.02	L/0.02	L/0.02	L/0.02
dieldrin	L/0.02	L/0.02	L/0.02	L/0.02
4,4'-DDE	L/0.04	L/0.04	L/0.04	L/0.04
4,4'-DDD	L/0.04	L/0.04	L/0.04	L/0.04
endosulfan sulfate	L/0.04	L/0.04	L/0.04	L/0.04
4,4'-DDT	L/0.04	L/0.04	L/0.04	L/0.04
chlordane	L/0.04	L/0.04	L/0.04	L/0.04
alpha endosulfan	L/0.04	L/0.04	L/0.04	L/0.04
beta endosulfan	L/0.04	L/0.04	L/0.04	L/0.04
endrin	L/0.04	L/0.04	L/0.04	L/0.04
endrin aldehyde	L/0.04	L/0.04	L/0.04	L/0.04
toxaphene	L/10.	L/10.	L/10.	L/10.
PCB 1016	L/2.	L/2.	L/2.	L/2.
PCB 1221	L/2.	L/2.	L/2.	L/2.
PCB 1232	L/2.	L/2.	L/2.	L/2.
PCB 1242	L/2.	L/2.	L/2.	L/2.
PCB 1248	L/2.	L/2.	L/2.	L/2.
PCB 1254	L/2.	L/2.	L/2.	L/2.
PCB 1260	L/2.	L/2.	L/2.	L/2.
Methoxychlor	L/0.2	L/0.2	L/0.2	L/0.2
Endrin Ketone	L/0.4	L/0.4	L/0.4	L/0.4

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parts per billion (ug/L)

Pesticides (by GC/ECD)	5	6	7	Method Blank
alpha-BHC	L/0.02	L/0.02	L/0.02	L/0.02
beta-BHC	L/0.02	L/0.02	L/0.02	L/0.02
delta-BHC	L/0.02	L/0.02	L/0.02	L/0.02
gamma-BHC (lindane)	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor	L/0.02	L/0.02	L/0.02	L/0.02
aldrin	L/0.02	L/0.02	L/0.02	L/0.02
heptachlor epoxide	L/0.02	L/0.02	L/0.02	L/0.02
dieldrin	L/0.02	L/0.02	L/0.02	L/0.02
4,4'-DDE	L/0.04	L/0.04	L/0.04	L/0.04
4,4'-DDD	L/0.04	L/0.04	L/0.04	L/0.04
endosulfan sulfate	L/0.04	L/0.04	L/0.04	L/0.04
4,4'-DDT	L/0.04	L/0.04	L/0.04	L/0.04
chlordane	L/0.04	L/0.04	L/0.04	L/0.04
alpha endosulfan	L/0.04	L/0.04	L/0.04	L/0.04
beta endosulfan	L/0.04	L/0.04	L/0.04	L/0.04
endrin	L/0.04	L/0.04	L/0.04	L/0.04
endrin aldehyde	L/0.04	L/0.04	L/0.04	L/0.04
toxaphene	L/10.	L/10.	L/10.	L/10.
PCB 1016	L/2.	L/2.	L/2.	L/2.
PCB 1221	L/2.	L/2.	L/2.	L/2.
PCB 1232	L/2.	L/2.	L/2.	L/2.
PCB 1242	L/2.	L/2.	L/2.	L/2.
PCB 1248	L/2.	L/2.	L/2.	L/2.
PCB 1254	L/2.	100.	280.	L/2.
PCB 1260	L/2.	L/2.	L/2.	L/2.
Methoxychlor	L/0.2	L/0.2	L/0.2	L/0.2
Endrin Ketone	L/0.4	L/0.4	L/0.4	L/0.4

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Key

L/ indicates "less than"
* indicates additional compounds from the EPA's Hazardous Substances List.
trace1 indicates an unquantifiable amount between 1-5 parts per billion.
trace2 indicates an unquantifiable amount between 10-50 parts per billion.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

J. M. Owens

JMO:laj

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APPENDIX A

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

Sample Number	Surrogate Compound	% Recovery	Control Limits
MB	d4-1,2-Dichloroethane	102.	77-120
	d8-Toluene	96.8	86-119
	p-Bromofluorobenzene	91.4	85-121
1	d4-1,2-Dichloroethane	110.	77-120
	d8-Toluene	97.8	86-119
	p-Bromofluorobenzene	93.6	85-121
2	d4-1,2-Dichloroethane	104.	77-120
	d8-Toluene	97.6	86-119
	p-Bromofluorobenzene	90.6	85-121
3	d4-1,2-Dichloroethane	105.	77-120
	d8-Toluene	93.4	86-119
	p-Bromofluorobenzene	96.0	85-121
4	d4-1,2-Dichloroethane	102.	77-120
	d8-Toluene	93.8	86-119
	p-Bromofluorobenzene	92.2	85-121

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Sample Number	Surrogate Compound	% Recovery	Control Limits
5	d4-1,2-Dichloroethane	103.	77-120
	d8-Toluene	93.8	86-119
	p-Bromofluorobenzene	98.4	85-121
6	d4-1,2-Dichloroethane	108.	77-120
	d8-Toluene	99.6	86-119
	p-Bromofluorobenzene	97.0	85-121
7	d4-1,2-Dichloroethane	113.	77-120
	d8-Toluene	98.2	86-119
	p-Bromofluorobenzene	100.	85-121
1 MS	d4-1,2-Dichloroethane	109.	77-120
	d8-Toluene	94.0	86-119
	p-Bromofluorobenzene	98.6	85-121
1 MSD	d4-1,2-Dichloroethane	113.	77-120
	d8-Toluene	97.8	86-119
	p-Bromofluorobenzene	94.2	85-121

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Chemistry, Microbiology, and Technical Services

Certificate

Hart Crowser

LABORATORY NO. 2887

APPENDIX B

Spike Quality Control Report

Sample #	Analyte	Sample Found (ug/L)	Spike Level (ug/L)	Samp & Spike Found (ug/L)	% Recovery	Control Limit
4	Silver	L/1.	50.	41.	81.	82-116
4	Beryllium	L/1.	50.	46.	92.	75-111
4	Cadmium	47.	50.	90.	86.	78-117
4	Chromium	2000.	2500.	4400.	95.	68-127
4	Copper	140.	250.	370.	92.	70-123
4	Lead	L/10.	50.	39.	79.	59-132
4	Nickel	100.	100.	180.	74.	72-122
4	Zinc	150.	250.	330.	75.	67-121
4	Barium	53.	50.	100.	93.	74-132

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Chemistry, Microbiology, and Technical Services

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Hart Crowser

LABORATORY NO. 2887

APPENDIX B

Matrix Spike/Matrix Spike Duplicate Report

		parts per billion (ug/L)				ug/L			QC Limits	
Sample	Analyte	Spike Added	Sample Result	MS Result	% Rec	MSD Result	% Rec	RPD	RPD	REC
3	Silver	50.	L/1.	45.	90.	44.	88.	2.	15	82-116
3	Beryllium	50.	L/1.	52.	105.	51.	102.	3.	14	75-111
3	Cadmium	50.	L/1.	52.	104.	50.	100.	4.	10	78-117
3	Chromium	50.	54.	120.	123.	110.	111.	10.	24	68-127
3	Copper	50.	L/1.	55.	109.	55.	108.	1.	14	70-123
3	Lead	50.	L/10.	49.	96.	46.	91.	5.	21	59-132
3	Nickel	50.	9.	58.	97.	57.	95.	2.	14.	72-122
3	Zinc	50.	16.	61.	90.	63.	94.	4.	24	67-121
3	Barium	50.	51.	98.	94.	97.	92.	2.	13	74-116
2	Selenium	20.	L/5.	18.	88.	17.	86.	2.	*	*
4	Antimony	50.	L/5.	46.	91.	96.	192.	#	*	*
1	Thallium	L/25.	L/5.	26.	106.	26.	102.	3.8	*	*
7	Mercury	0.010	L/0.001	0.008	84.	0.009	86.	2.4	*	*

* None established
#Appears to have been inadvertantly spiked twice in the MSD fraction.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
Rec = Recovery
RPD = Relative Percent Difference

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APPENDIX C

Matrix Spike/Duplicate Spike Quality Control

Organics

Reported below are the results of additional QC compounds utilized in the analysis of organic compounds. Compounds of interest are spiked into two additional sample aliquots prior to extraction and/or analysis to monitor for matrix effects, sample processing errors, and to calculate percent recoveries of compunds of interest and relative error in the analysis. The control limits represent the 95% confidence interval established in the laboratory through repetitive analysis of these sample types.

Sample 1

	ug/L				ug/L				
Compound	Conc Spike	Conc Samp	Conc MS	% REC	Conc MSD	% REC	RPD	RPD Limit	REC Limit
1,1-Dichloroethene	50.	0.	52.3	105.	50.1	100.	4.9	14	61-145
Trichloroethene	50.	0.	52.7	105.	50.8	102.	2.9	14	71-120
Chlorobenzene	50.	0.	52.2	104.	50.7	101.	2.9	13.	75-130
Toluene	50.	0.	49.5	99.0	49.0	98.0	1.0	13	76-125
Benzene	50.	0.	51.6	103.	52.0	104.	-1.0	11	76-127

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Sample 4

Compound	ug/L Conc Spike	ug/L Conc Samp	ug/L Conc MS	% REC	ug/L Conc MSD	% REC	RPD	RPD Limit	REC Limit
Lindane	0.2	0.	0.254	127.	0.308	154.	-19.	*	*
Heptachlor	0.2	0.	0.234	117.	0.264	132.	-12.	*	*
Aldrin	0.2	0.	0.187	94.	0.21	105.	-12.	*	*
Dieldrin	0.5	0.	0.456	91.	0.506	101.	-10.	*	*
Endrin	0.5	0.	0.726	145.	0.788	157.	-8.	*	*
DDT	0.5	0.	0.696	189.	0.731	146.	-5.	*	*

* Matrix interference. Presence of unknown constituents in the sample (which were not on your list of analytes and therefore were not determined) will occasionally interfere with our ability to detect your target compounds at a more sensitive level, or will mask or enhance the measurement of spiking compound concentrations.'

Key

Conc = Concentration
Samp = Sample
MS = Matrix Spike
MSD = Matrix Spike Duplicate
REC = Recovery
RPD = Relative Percent Difference

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JOB No. 2887 DATE: 04/02/87

Sample No. BLANK Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	94		24 - 150
Isodrin	54		43 - 118

Sample No. 1 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	84		24 - 150
Isodrin	49		43 - 118

Sample No. 2 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	99		24 - 150
Isodrin	68		43 - 118

Sample No. 3 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	95		24 - 150
Isodrin	56		43 - 118

Sample No. 4 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	91		24 - 150
Isodrin	64		43 - 118

Sample No. 4MS Matrix: WATER Analysis: PEST

Surrogate	Percent		Control

Compound	Recovery	Comment	Limits
Dibutylchlorendate	111		24 - 150
Isodrin	78		43 - 118

Sample No. 4MSD Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	117		24 - 150
Isodrin	93		43 - 118

Sample No. 5 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	38		24 - 150
Isodrin	36	D	43 - 118

Sample No. 6 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	136		24 - 150
Isodrin	83		43 - 118

Sample No. 7 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	84		24 - 150
Isodrin	92		43 - 118

D: Persistently poor surrogate and spike recoveries, signal a laboratory problem and the need for re-extraction and re-analysis. However, occasional outliers are regarded as anomolies and, in this case, re-analysis was not deemed necessary because other indicator were in control.

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LAB # 2887
SMPL# 2

CLIENT - HART CROWSER

LISTED BELOW ARE TENATIVELY IDENTIFIED COMPOUNDS REPORTED IN ESTIMATED AMOUNTS USING TOTAL PEAK AREA RELATIVE TO INTERNAL STANDARD AREAS. THESE COMPOUNDS WERE MAJOR COMPONENTS IN THE SAMPLE THAT WERE NOT IDENTIFIED AS PRIORITY POLLUTANTS. MASS SPECTRA WERE MATCHED AGAINST NBS LIBRARY SPECTRA FOR BEST FIT. IF NO MATCH IS FOUND, THE PEAK IS REPORTED AS "UNKNOWN" ALONG WITH ANY INFORMATION (I.E. 'PHTHALATE OR HYDROCARBON') THAT CAN BE ASSIGNED BY MASS SPECTRAL ANALYSIS.

VOLATILE ORGANICS
ANALYSIS DATA SHEET
TENATATIVELY IDENTIFIED COMPOUNDS

NO	NAME	SCAN	EST CONC UG/L
1	CIS-1,2-DICHLORO-ETHENE	198	7
2	1,2,3-TRIMETHYL-BENZENE	809	9
3		0	0
4		0	0
5		0	0
6		0	0
7		0	0
8		0	0
9		0	0
10		0	0
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

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LAB # 2887
SMPL# 3

CLIENT - HART CROWSER

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VOLATILE ORGANICS
ANALYSIS DATA SHEET
TENATATIVELY IDENTIFIED COMPOUNDS

NO	NAME	SCAN	EST CONC UG/L
1	CIS-1,2-DICHLORO-ETHENE	199	940
2	CYCLOHEXANE	236	11
3	PROPYL-BENZENE	739	5
4	1-ETHYL-2-METHYL-BENZENE	754	11
5	1,2,3-TRIMETHYL-BENZENE	763	6
6	(1-METHYLETHYL)-BENZENE	786	22
7	1,2,4-TRIMETHYL-BENZENE	809	47
8		0	0
9		0	0
10		0	0
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

17-Mar-87

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(206)-767-5060

LAB # 2887
SMPL# 4

CLIENT - HART CROWSER

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VOLATILE ORGANICS
ANALYSIS DATA SHEET
TENATATIVELY IDENTIFIED COMPOUNDS

NO	NAME	SCAN	EST CONC UG/L
1	DICHLOROFLUORO-METHANE	72	5
2	CIS-1,2-DICHLORO-ETHENE	199	1,300
3	2-METHYL-1-PENTENE	236	5
4	UNKNOWN	270	8
5	METHYL-CYCLOHEXANE	325	15
6	1-ETHYL-2-METHYL-BENZENE	785	9
7	1,2,4-TRIMETHYL-BENZENE	808	12
8		0	0
9		0	0
10		0	0
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

17-Mar-87

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LAB # 2887
SMPL# 5

CLIENT - HART CROWSER

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VOLATILE ORGANICS
ANALYSIS DATA SHEET
TENATATIVELY IDENTIFIED COMPOUNDS

NO	NAME	SCAN	EST CONC UG/L
1	CIS-1,2-DICHLORO-ETHENE	191	1,800
2	CYCLOHEXANE	229	57
3	CIS-1,3-DIMETHYL-CYCLOPENTANE	265	87
4	METHYL-CYCLOHEXANE	319	120
5	(1-METHYLETHYL)-BENZENE	688	36
6	PROPYL-BENZENE	739	50
7	1-EHTYL-2-METHYL-BENZENE	753	240
8	1,2,3-TRIMETHYL-BENZENE	763	110
9	1-ETHYL-4-METHYL-BENZENE	786	120
10	1-EHTYL-3-METHYL-BENZENE	809	430
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

17-Mar-87

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(206)-767-5060

LAB # 2887
SMPL# 6

CLIENT - HART CROWSER

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VOLATILE ORGANICS
ANALYSIS DATA SHEET
TENATATIVELY IDENTIFIED COMPOUNDS

ND	NAME	SCAN	EST CONC UG/L
1	2,2,4-TRIMETHYL-PENTANE	268	340
2	OCTANE	444	270
3	UNKNOWN (HYDROCARBON)	671	630
4	UNKNOWN (HYDROCARBON)	686	380
5	UNKNOWN (HYDROCARBON)	721	660
6	1-ETHYL-2-METHYL-BENZENE	751	680
7	UNKNOWN (HYDROCARBON)	763	640
8	DECANE	778	1,800
9	1,2,3-TRIMETHYL-BENZENE	808	1,300
10	2,6-DIMETHYL-NONANE	816	480
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

17-Mar-87

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LAB # 2887
SMPL# 7

CLIENT - HART CROWSER

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VOLATILE ORGANICS
ANALYSIS DATA SHEET
TENATATIVELY IDENTIFIED COMPOUNDS

NO	NAME	SCAN	EST CONC UG/L
1	2,2-DIMETHYL-HEXANE	270	190
2	METHYL-CYCLOHEXANE	327	220
3	UNKNOWN (HYDROCARBON)	673	150
4	UNKNOWN (HYDROCARBON)	689	170
5	1-ETHYL-2-METHYL-BENZENE	753	440
6	1,2,4-TRIMETHYL-BENZENE	764	240
7	DECANE	779	350
8	1-ETHYL-4-METHYL-BENZENE	786	210
9	1,2,3-TRIMETHYL-BENZENE	809	1,000
10		0	0
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

17-Mar-87

HART CROWSER & associates inc.
GEOTECHNICAL & HYDROGEOLOGIC CONSULTANTS
1910 Fairview Avenue East • Seattle WA 98102-3699 • (206) 324-9530

Chain of Custody Record

DATE 3-11-87 PAGE 1 OF 1

CLIENT HART CROWSER
ADDRESS
PROJECT J-1264-07
SAMPLERS (SIGNATURE) Brian E Christensen

TESTING PARAMETERS: TO BE SPECIFIED BY PAS TO DG

SAMPLE NO	DATE	TIME	LOCATION	NUMBER OF CONTAINERS	OBSERVATIONS/ COMMENTS
S-1	3-11-87	0800	MW-1	9	
S-1	✓	0900	MW-4	9	
S-1	✓	1000	MW-5	9	
S-1	✓	1300	MW-6	9	
S-1	✓	1100	MW-7	9	
S-1	✓	1200	MW-8	9	
S-2	✓	1200	MW-8	9	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Brian E Christensen	3-11-87	Signature		Signature		Signature	
Printed Name: Brian E Christensen	TIME 1442	Printed Name	TIME	Printed Name	TIME	Printed Name	TIME
Company: Hart Crowser		Company		Company		Company	
RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature		Signature		Signature		Signature: Terri Gordon	3/11
Printed Name	TIME	Printed Name	TIME	Printed Name	TIME	Printed Name: Laucks Testing	TIME 1442
Company		Company		Company		Analytical Technologies, Inc.	

63 TOTAL NUMBER OF CONTAINERS

METHOD OF SHIPMENT: HAND CARRY

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: Keep Cool

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Testing Laboratories, Inc.

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LABORATORY NO. 3915

DATE: June 23, 1987

CLIENT: Hart Crowser
1910 Fairview Ave. E.
Seattle, WA 98102
ATTN: Philip Spadaro

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 05/07/87 and identified as shown below:

1)	S-1	MW-1	PAS	05/07/87	1530
2)	S-1	MW-4	PAS	05/07/87	1445
3)	S-1	MW-5	PAS	05/07/87	1415
4)	S-1	MW-6	PAS	05/07/87	1315
5)	S-1	MW-7	PAS	05/07/87	1230
6)	S-2	MW-7	PAS	05/07/87	1230
7)	S-1	MW-8	PAS	05/07/87	1130

TESTS PERFORMED AND RESULTS:

Samples were analyzed for priority pollutants in accordance with Test Methods for Evaluating Solid Waste (SW-846) U.S.E.P.A. 1982 Method 8240 (volatile organics), 8080 (pesticides and PCB's) and 6010 and the 7000 series (metals analysis).

Inorganics — parts per billion (ug/L)

	1	2	3	4	5
Antimony	<5.	<5.	<5.	<5.	<5.
Arsenic	<5.	<5.	<5.	<5.	<5.
Barium	4.	8.	46.	56.	14.
Beryllium	<1.	<1.	<1.	<1.	<1.
Cadmium	<1.	<1.	<1.	49.	5.
Chromium	2.	5.	47.	2200.	58.
Copper	1.	8.	<1.	2100.	1.
Lead	<10.	<10.	<10.	<10.	<10.
Mercury	<1.	<1.	<1.	<1.	<1.
Nickel	<2.	9.	5.	150.	2.
Selenium	<5.	<5.	<5.	<5.	<5.
Silver	<1.	<1.	<1.	<1.	<1.
Thallium	<5.	<5.	<5.	<5.	<5.
Zinc	13.	19.	17.	180.	5.

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parts per billion (ug/L)

	6	7	Lab Blank
Antimony	<5.	<5.	<5.
Arsenic	<5.	<5.	<5.
Barium	14.	32.	<2.
Beryllium	<1.	<1.	<1.
Cadmium	<1.	<1.	<1.
Chromium	57.	910.	<1.
Copper	1.	<1.	<1.
Lead	<10.	<10.	<10.
Mercury	<1.	<1.	<1.
Nickel	4.	13.	<2.
Selenium	<5.	<5.	<5.
Silver	<1.	<1.	<1.
Thallium	<5.	<5.	<5.
Zinc	6.	6.	2.

Volatile Organics (GC/MS)

parts per billion (ug/L)

	1	2	3	4	5	6	7
Chloromethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Bromomethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Vinyl Chloride	<1.	<1.	16.	20.	54.	64.	29.
Chloroethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Methylene Chloride	66.	410.	92.	3,000.	25.	<1.	<1.
Acrolein	<5.	<5.	<5.	<5.	<5.	<5.	<5.
*Acetone	<1.	<1.	<1.	<1.	<1.	<1.	75.
Acrylonitrile	<5.	<5.	<5.	<5.	<5.	<5.	<5.
*Carbon Disulfide	<1.	<1.	<1.	<1.	<1.	<1.	<1.
1,1-Dichloroethylene	<1.	<1.	<1.	<1.	Trace	Trace	<1.
1,1-Dichloroethane	<1.	<1.	<1.	<1.	7.	7.	<1.
trans-1,2-Dichloroethylene	<1.	<1.	Trace	Trace	28.	30.	Trace
Chloroform	<1.	<1.	<1.	Trace	<1.	<1.	<1.
*2-Butanone	<1.	<1.	<1.	<1.	<1.	<1.	180.
1,2-Dichloroethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
1,1,1-Trichloroethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.

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parts per billion (ug/L)

	1	2	3	4	5	6	7
*Vinyl Acetate	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Bromodichloromethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Carbon Tetrachloride	<1.	<1.	<1.	<1.	<1.	<1.	<1.
1,2-Dichloropropane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Trichloroethylene	<1.	Trace	22.	520.	11.	11.	<1.
Benzene	<1.	<1.	Trace	18.	7.	8.	<1.
Chlorodibromomethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
1,1,2-Trichloroethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
2-Chloroethyl vinyl ether	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Bromoform	<1.	<1.	<1.	<1.	<1.	<1.	<1.
*4-Methyl-2-pentanone	<1.	<1.	<1.	<1.	<1.	<1.	<1.
*2-Hexanone	<1.	<1.	<1.	<1.	<1.	<1.	<1.
1,1,2,2-Tetrachloroethane	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Tetrachloroethylene	<1.	<1.	<1.	Trace	<1.	<1.	<1.
Toluene	<1.	<1.	<1.	74.	44.	46.	220.
Chlorobenzene	<1.	<1.	<1.	<1.	<1.	<1.	<1.
trans-1,3-Dichloropropene	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Ethylbenzene	<1.	<1.	11.	6.	86.	82.	37.
cis-1,3-Dichloropropene	<1.	<1.	<1.	<1.	<1.	<1.	<1.
*Styrene	<1.	<1.	<1.	<1.	<1.	<1.	<1.
Total-Xylene	<1.	<1.	Trace	22.	280.	290.	190.

	Lab Blank	Field Blank
Chloromethane	<1.	<1.
Bromomethane	<1.	<1.
Vinyl Chloride	<1.	<1.
Chloroethane	<1.	<1.
Methylene Chloride	<1.	<15.
Acrolein	<5.	<5.
*Acetone	<1.	<1.
Acrylonitrile	<5.	<5.
*Carbon Disulfide	<1.	<1.
1,1-Dichloroethylene	<1.	<1.
1,1-Dichloroethane	<1.	<1.

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parts per billion (ug/L)

	Lab Blank	Field Blank
trans-1,2-Dichloroethylene	<1.	<1.
Chloroform	<1.	<1.
*2-Butanone	<1.	<1.
1,2-Dichloroethane	<1.	<1.
1,1,1-Trichloroethane	<1.	<1.
*Vinyl Acetate	<1.	<1.
Bromodichloromethane	<1.	<1.
Carbon Tetrachloride	<1.	<1.
1,2-Dichloropropane	<1.	<1.
Trichloroethylene	<1.	<1.
Benzene	<1.	<1.
Chlorodibromomethane	<1.	<1.
1,1,2-Trichloroethane	<1.	<1.
2-Chloroethyl vinyl ether	<1.	<1.
Bromoform	<1.	<1.
*4-Methyl-2-pentanone	<1.	<1.
*2-Hexanone	<1.	<1.
1,1,2,2-Tetrachloroethane	<1.	<1.
Tetrachloroethylene	<1.	<1.
Toluene	<1.	<1.
Chlorobenzene	<1.	<1.
trans-1,3-Dichloropropene	<1.	<1.
Ethylbenzene	<1.	<1.
cis-1,3-Dichloropropene	<1.	<1.
*Styrene	<1.	<1.
Total-Xylene	<1.	<1.

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Pesticides (by GC/ECD)

parts per billion (ug/L)

	1	2	3	4	5	6
alpha-BHC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC (lindane)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
heptachlor	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
aldrin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
heptachlor epoxide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
dieldrin	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
4,4'-DDE	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
4,4'-DDD	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
endosulfan sulfate	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
4,4'-DDT	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
chlordane	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
alpha endosulfan	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta endosulfan	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
endrin	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
endrin aldehyde	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
toxaphene	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
PCB 1016	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
PCB 1221	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
PCB 1232	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
PCB 1242	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
PCB 1248	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
PCB 1254	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
PCB 1260	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
Methoxychlor	<0.53	<0.53	<0.53	<0.53	<0.53	<0.53
Endrin Ketone	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11

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parts per billion (ug/L)

	7	Lab Blank
alpha-BHC	<0.05	<0.05
beta-BHC	<0.05	<0.05
delta-BHC	<0.05	<0.05
gamma-BHC (lindane)	<0.05	<0.05
heptachlor	<0.05	<0.05
aldrin	<0.05	<0.05
heptachlor epoxide	<0.05	<0.05
dieldrin	<0.11	<0.11
4,4'-DDE	<0.11	<0.11
4,4'-DDD	<0.11	<0.11
endosulfan sulfate	<0.11	<0.11
4,4'-DDT	<0.11	<0.11
chlordane	<0.53	<0.53
alpha endosulfan	<0.05	<0.05
beta endosulfan	<0.11	<0.11
endrin	<0.11	<0.11
endrin aldehyde	<0.11	<0.11
toxaphene	<1.1	<1.1
PCB 1016	<0.53	<0.53
PCB 1221	<0.53	<0.53
PCB 1232	<0.53	<0.53
PCB 1242	<0.53	<0.53
PCB 1248	<0.53	<0.53
PCB 1254	31.	<1.1
PCB 1260	<1.1	<1.1
Methoxychlor	<0.53	<0.53
Endrin Ketone	<0.11	<0.11

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Key

< indicates less than
* indicates additional compounds from the EPA's Hazardous Substances List.
trace indicates an unquantifiable amount between 1-5 parts per billion.

Attachments:

Appendix A: Matrix Spike Inorganics/Organics
Appendix B: Surrogate Compound

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

J. M. Owens

JMO:jm

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APPENDIX A

Matrix Spike/Matrix Spike Duplicate Report

Inorganics/Metals Analyses

		parts per billion (ug/L)				ug/L			QC Limits	
Sample	Analyte	Spike Added	Sample Result	MS Result	% Rec	MSD Result	% Rec	RPD	RPD	REC
3	Silver	50.	<1.	48.	95.	48.	95.	0.	15	82-116
3	Beryllium	50.	<1.	53.	107.	53.	106.	1.	14	75-111
3	Cadmium	50.	<1.	46.	91.	46.	91.	0.	10	78-117
3	Chromium	50.	47.	96.	98.	93.	92.	6.	24	68-127
3	Copper	50.	<1.	49.	97.	47.	93.	4.	14	70-123
3	Lead	50.	<1.	48.	96.	47.	94.	2.	21	59-132
3	Nickel	50.	5.	55.	99.	50.	89.	11.	14	72-122
3	Zinc	50.	17.	62.	89.	55.	76.	16.	24	67-121
3	Barium	50.	46.	97.	102.	97.	103.	1.	13	74-132
4	Mercury	10.	<1.	11.	105.	11.	105.	0.	NE	
6	Selenium	20.	<5.	20.	100.	20.	100.	0.	NE	
7	Arsenic	10.	<5.	12.	110.	11.	100.	10.	NE	
3	Antimony	50.	<5.	33.	66.	30.	60.	10.	NE	
1	Thallium	25.	<5.	18.	70.	18.	72.	2.	NE	

MS = Matrix Spike
MSD = Matrix Spike Duplicate
NE = None Established

Rec = Recovery
RPD = Relative Percent Difference

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APPENDIX A

Matrix Spike/Duplicate Spike Quality Control

Organics

Reported below are the results of additional QC compounds utilized in the analysis of organic compounds. Compounds of interest are spiked into two additional sample aliquots prior to extraction and/or analysis to monitor for matrix effects, sample processing errors, and to calculate percent recoveries of compunds of interest and relative error in the analysis. The control limits represent the 95% confidence interval established in the laboratory through repetitive analysis of these sample types.

Sample #1

	ug/L				ug/L				
Compound	Conc Spike	Conc Samp	Conc MS	% REC	Conc MSD	% REC	RPD	RPD Limit	REC Limit
1,1-Dichloroethene	50.0	0.	49.2	98.4	49.8	99.6	-1.2	14	61-145
Trichloroethene	50.0	0.	51.0	102.	51.8	104.	-1.9	14	71-120
Chlorobenzene	50.0	0.	50.0	100.	51.0	102.	-2.0	13	75-130
Toluene	50.0	0.	46.3	92.6	49.1	98.2	-5.9	13	76-125
Benzene	50.0	0.	47.8	95.6	50.3	101.	-5.5	11	76-127

Key

Conc = Concentration
Samp = Sample
MS = Matrix Spike
MSD = Matrix Spike Duplicate
REC = Recovery
RPD = Relative Percent Difference

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GC COLUMN: DB-5 CAPILLARY
GC INSTRUMENT ID: HP 5890-10

LABORATORY NUMBER: 3915
DATE: 6/19/87

SPIKE	ANALYTE	SPIKE ADDED	SAMPLE RESULT	SPIKE RESULT	% REC	RPD
LINDANE	MS	0.2	0	0.179	89.5	-5
	MSD	0.2	0	0.189	94.5	
HEPTACHLO	MS	0.2	0	0.196	98.0	-13
	MSD	0.2	0	0.224	112.0	
ALDRIN	MS	0.2	0	0.152	76.0	-16
	MSD	0.2	0	0.179	89.5	
DIELDRIN	MS	0.5	0	0.442	88.4	-5
	MSD	0.5	0	0.466	93.2	
ENDRIN	MS	0.5	0	0.612	122.4	-8 *
	MSD	0.5	0	0.664	132.8	*
DDT	MS	0.5	0	0.465	93.0	-10
	MSD	0.5	0	0.512	102.4	

* COMMENT D

FORM III

D. Persistently poor surrogate and spike recoveries signal a laboratory problem and the need for re-extraction and re-analysis. However, occasional outliers are regarded as anomolies and, in this case, re-analysis was not deemed necessary because other indicators were in control.

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APPENDIX B

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
Method Blank	d4-1,2-Dichloroethane	50.0	47.5	95.0	77-120
	d8-Toluene	50.0	48.9	97.8	86-119
	p-Bromofluorobenzene	50.0	47.6	95.2	85-121
Field Blank	d4-1,2-Dichloroethane	50.0	51.4	103.	77-120
	d8-Toluene	50.0	48.6	97.2	86-119
	p-Bromofluorobenzene	50.0	49.7	99.4	85-121
1	d4-1,2-Dichloroethane	50.0	45.5	91.0	77-120
	d8-Toluene	50.0	47.7	95.4	86-119
	p-Bromofluorobenzene	50.0	50.1	100.	85-121
1MS	d4-1,2-Dichloroethane	50.0	47.0	94.0	77-120
	d8-Toluene	50.0	49.0	98.0	86-119
	p-Bromofluorobenzene	50.0	50.7	101.	85-121
1MSD	d4-1,2-Dichloroethane	50.0	45.4	90.8	77-120
	d8-Toluene	50.0	50.9	102.	86-119
	p-Bromofluorobenzene	50.0	52.4	105.	85-121

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Sample No.	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limit
		parts per billion (ug/L)			
	d4-1,2-Dichloroethane	50.0	46.2	92.4	77-120
2	d8-Toluene	50.0	49.1	98.2	86-119
	p-Bromofluorobenzene	50.0	49.6	99.2	85-121
	d4-1,2-Dichloroethane	50.0	45.3	90.6	77-120
2RI	d8-Toluene	50.0	48.5	97.0	86-119
	p-Bromofluorobenzene	50.0	51.1	102.	85-121
	d4-1,2-Dichloroethane	50.0	43.6	87.2	77-120
3	d8-Toluene	50.0	50.8	102.	86-119
	p-Bromofluorobenzene	50.0	49.7	99.4	85-121
	d4-1,2-Dichloroethane	50.0	44.9	89.8	77-120
4	d8-Toluene	50.0	48.7	97.4	86-119
	p-Bromofluorobenzene	50.0	52.1	104.	85-121
	d4-1,2-Dichloroethane	50.0	44.7	89.4	77-120
4RI	d8-Toluene	50.0	48.9	97.8	86-119
	p-Bromofluorobenzene	50.0	50.3	101.	85-121
	d4-1,2-Dichloroethane	50.0	46.7	93.4	77-120
5	d8-Toluene	50.0	52.3	105.	86-119
	p-Bromofluorobenzene	50.0	58.7	117.	85-121
	d4-1,2-Dichloroethane	50.0	46.4	92.8	77-120
6	d8-Toluene	50.0	52.7	105.	86-119
	p-Bromofluorobenzene	50.0	57.7	115.	85-121
	d4-1,2-Dichloroethane	50.0	46.1	92.2	77-120
7	d8-Toluene	50.0	48.5	97.0	86-119
	p-Bromofluorobenzene	50.0	53.2	106.	85-121

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LABORATORY: LAUCKS TESTING LABORATORY
GC COLUMN: DB-5 CAPILLARY
GC INSTRUMENT ID: HP 5890-10

LABORATORY NUMBER: 3915
DATE: 6/19/87

SURROGATE RECOVERY	% ISODRIN	% DBC	COMMENT
0511PSB1	70	110	
1	67	111	
1 MS	64	102	
1 MSD	68	107	
2	73	98	
3	58	100	
4	92	110	
5	71	101	
6	88	105	
7	14	61	

CONTROL LIMITS 43 - 118 20 - 150

~~NOT ESTABLISHED~~

FORM II

Laucks Testing Laboratories, Inc.

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SEP 18 1987

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CLIENT: Landau Associates
P.O. Box 694
Edmonds, WA 98020
ATTN: John Baker

LABORATORY NO. 4933

DATE: September 15, 1987

Project: QCF
Project No: 25-13

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 07/15/87 and identified as shown below:

1) MW-5	Queen City Farms	K.G.C./B.E.	07/15/87	09:40
2) MW-6	Queen City Farms	K.G.C./B.E.	07/15/87	10:30
3) MW-7	Queen City Farms	K.G.C./B.E.	07/15/87	11:40
4) MW-8	Queen City Farms	K.G.C./B.E.	07/15/87	12:50
5) MW-1	Queen City Farms	K.G.C./B.E.	07/15/87	14:00
6) Dup-1	Queen City Farms	K.G.C./B.E.	07/15/87	

TESTS PERFORMED AND RESULTS:

	1	2	3	4	5	6
pH, glass electrode at 25°C	5.5	4.3	5.5	5.9	5.7	4.4

Samples were analyzed for priority pollutants in accordance with Test Methods for Evaluating Solid Waste, (SW 846) U.S.E.P.A., 1982, Method 8240 (volatile organics), 8270 (semi-volatile extractables), 8080 (pesticides and PCBs), 9010 (cyanide), the 7000 series (metals analysis).

parts per billion (ug/L)

Inorganics	1	2	3	4
Antimony	<5.	<5.	<5.	<5.
Arsenic	<5.	<5.	<5.	<5.
Barium	49.	110.	41.	20.
Beryllium	<1.	<1.	<1.	<1.
Cadmium	<1.	120.	<1.	<1.
Chromium	80.	5,000.	82.	350.
Copper	2.	430.	3.	<1.
Lead	<10.	<10.	<10.	<10.
Mercury	<1.	<1.	<1.	<1.
Nickel	15.	380.	8.	6.
Selenium	<5.	<5.	<5.	<5.
Silver	<1.	1.	<1.	<1.
Thallium	<5.	<5.	<5.	<5.
Zinc	43.	280.	32.	4.
Total Cyanide	<5.	7.	21.	14.

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parts per billion (ug/L)

Inorganics	5	6
Antimony	<5.	<5.
Arsenic	<5.	<5.
Barium	<2.	120.
Beryllium	<1.	<1.
Cadmium	<1.	120.
Chromium	<1.	5,000.
Copper	2.	430.
Lead	<10.	<10.
Mercury	<1.	<1.
Nickel	<2.	390.
Selenium	<5.	<5.
Silver	<1.	<1.
Thallium	<5.	<5.
Zinc	2.	280.
Total Cyanide	<5.	7.

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Volatile Organics (GC/MS)	1	2	3	4
Chloromethane	<1.	<1.	<20.	<20.
Bromomethane	<1.	<1.	<20.	<20.
Vinyl Chloride	18.	18.	96.	150.
Chloroethane	<1.	<1.	<20.	<20.
Methylene Chloride	<1.	15,000.	<20.	<20.
Acrolein	<5.	<5.	<100.	<100.
*Acetone	<1.	<1.	670.	180.
Acrylonitrile	<5.	<5.	<100.	<100.
*Carbon Disulfide	<1.	2.	<20.	<20.
1,1-Dichloroethylene	<1.	<1.	<20.	<20.
1,1-Dichloroethane	<1.	<1.	<20.	<20.
total-1,2-Dichloroethylene**	110.	400.	4,600.	200.
Chloroform	<1.	11.	<20.	<20.
*2-Butanone	<1.	<1.	<20.	<20.
1,2-Dichloroethane	<1.	<1.	<20.	<20.
1,1,1-Trichloroethane	<1.	3.	<20.	<20.
*Vinyl Acetate	<1.	<1.	<20.	<20.
Bromodichloromethane	<1.	<1.	<20.	<20.
Carbon Tetrachloride	<1.	<1.	<20.	<20.
1,2-Dichloropropane	<1.	<1.	<20.	<20.
Trichloroethylene	13.	2,000.	<20.	<20.
Benzene	5.	25.	<20.	<20.
Chlorodibromomethane	<1.	<1.	<20.	<20.
1,1,2-Trichloroethane	<1.	2.	<20.	<20.
2-Chloroethyl vinyl ether	<1.	<1.	<20.	<20.
Bromoform	<1.	<1.	<20.	<20.
*4-Methyl-2-pentanone	<1.	<1.	<20.	<20.
*2-Hexanone	<1.	<1.	<20.	<20.
1,1,2,2-Tetrachloroethane	<1.	<1.	<20.	<20.
Tetrachloroethylene	<1.	1.	<20.	<20.
Toluene	<1.	300.	110.	1,200.
Chlorobenzene	<1.	<1.	<20.	<20.
trans-1,3-Dichloropropene	<1.	<1.	<20.	<20.
Ethylbenzene	3.	9.	100.	250.
cis-1,3-Dichloropropene	<1.	<1.	<20.	<20.
*Styrene	<1.	<1.	<20.	<20.
Total Xylenes	<1.	45.	430.	1,400.

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Volatile Organics (GC/MS)	parts per billion (ug/L) 5	6	Field Blank
Chloromethane	<1.	<20.	<1.
Bromomethane	<1.	<20.	<1.
Vinyl Chloride	<1.	<20.	<1.
Chloroethane	<1.	<20.	<1.
Methylene Chloride	<1.	14,000.	<1.
Acrolein	<5.	<100.	<5.
*Acetone	<1.	<20.	<1.
Acrylonitrile	<5.	<100.	<5.
*Carbon Disulfide	<1.	<20.	<1.
1,1-Dichloroethylene	<1.	<20.	<1.
1,1-Dichloroethane	<1.	<20.	<1.
total-1,2-Dichloroethylene**	1.	360.	<1.
Chloroform	<1.	<20.	<1.
*2-Butanone	<1.	<20.	<1.
1,2-Dichloroethane	<1.	<20.	<1.
1,1,1-Trichloroethane	<1.	<20.	<1.
*Vinyl Acetate	<1.	<20.	<1.
Bromodichloromethane	<1.	<20.	<1.
Carbon Tetrachloride	<1.	<20.	<1.
1,2-Dichloropropane	<1.	<20.	<1.
Trichloroethylene	<1.	1,900.	<1.
Benzene	<1.	<20.	<1.
Chlorodibromomethane	<1.	<20.	<1.
1,1,2-Trichloroethane	<1.	<20.	<1.
2-Chloroethyl vinyl ether	<1.	<20.	<1.
Bromoform	<1.	<20.	<1.
*4-Methyl-2-pentanone	<1.	<20.	<1.
*2-Hexanone	<1.	<20.	<1.
1,1,2,2-Tetrachloroethane	<1.	<20.	<1.
Tetrachloroethylene	<1.	<20.	<1.
Toluene	<1.	230.	<1.
Chlorobenzene	<1.	<20.	<1.
trans-1,3-Dichloropropene	<1.	<20.	<1.
Ethylbenzene	<1.	<20.	<1.
cis-1,3-Dichloropropene	<1.	<20.	<1.
*Styrene	<1.	<20.	<1.
Total Xylenes	<1.	45.	4.

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parts per billion (ug/L)

Volatile Organics (GC/MS)	Method Blank B0721MVDWS1	Method Blank B0720MVDWS1
Chloromethane	<1.	<1.
Bromomethane	<1.	<1.
Vinyl Chloride	<1.	<1.
Chloroethane	<1.	<1.
Methylene Chloride	<1.	<1.
Acrolein	<5.	<5.
*Acetone	<1.	<1.
Acrylonitrile	<5.	<5.
*Carbon Disulfide	<1.	<1.
1,1-Dichloroethylene	<1.	<1.
1,1-Dichloroethane	<1.	<1.
total-1,2-Dichloroethylene**	<1.	<1.
Chloroform	<1.	<1.
*2-Butanone	<1.	<1.
1,2-Dichloroethane	<1.	<1.
1,1,1-Trichloroethane	<1.	<1.
*Vinyl Acetate	<1.	<1.
Bromodichloromethane	<1.	<1.
Carbon Tetrachloride	<1.	<1.
1,2-Dichloropropane	<1.	<1.
Trichloroethylene	<1.	<1.
Benzene	<1.	<1.
Chlorodibromomethane	<1.	<1.
1,1,2-Trichloroethane	<1.	<1.
2-Chloroethyl vinyl ether	<1.	<1.
Bromoform	<1.	<1.
*4-Methyl-2-pentanone	<1.	<1.
*2-Hexanone	<1.	<1.
1,1,2,2-Tetrachloroethane	<1.	<1.
Tetrachloroethylene	<1.	<1.
Toluene	<1.	<1.
Chlorobenzene	<1.	<1.
trans-1,3-Dichloropropene	<1.	<1.
Ethylbenzene	<1.	<1.
cis-1,3-Dichloropropene	<1.	<1.
*Styrene	<1.	<1.
Total Xylenes	<1.	<1.

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Extractables (by GC/MS)	parts per billion (ug/L) 1	2	3	4
N-nitrosodimethylamine	<1.	<1.	<2.	<10.
Bis(2-chloroethyl)ether	<1.	<1.	<2.	<10.
2-Chlorophenol	<1.	<10.	<2.	<1.
Phenol	<1.	1,300.	1,000.	24.
1,3-Dichlorobenzene	<1.	<1.	<2.	<10.
1,4-Dichlorobenzene	<1.	<1.	<2.	<10.
1,2-Dichlorobenzene	<1.	<1.	<2.	<10.
Bis(2-chloroisopropyl)ether	<1.	<1.	<2.	<10.
Hexachloroethane	<1.	<1.	<2.	<10.
N-nitroso-di-n-propylamine	<1.	<1.	<2.	<10.
Nitrobenzene	<1.	<1.	<2.	<10.
Isophorone	<1.	6.	<2.	<10.
2-Nitrophenol	<1.	81.	<2.	<1.
2,4-Dimethylphenol	<1.	93.	32.	160.
Bis(2-chloroethoxy)methane	<1.	<1.	<2.	<10.
2,4-Dichlorophenol	<1.	<1.	<2.	<1.
1,2,4-Trichlorobenzene	<1.	<1.	<2.	<10.
Naphthalene	7.	10.	53.	180.
Hexachlorobutadiene	<1.	<1.	<2.	<10.
4-Chloro-m-cresol	<1.	<10.	<2.	<1.
Hexachlorocyclopentadiene	<1.	<1.	<2.	<10.
2,4,6-Trichlorophenol	<1.	<10.	<2.	<1.
2-Chloronaphthalene	<1.	<1.	<2.	<10.
Acenaphthylene	<1.	<1.	<2.	<10.
Dimethylphthalate	<1.	<1.	<2.	<10.
2,6-Dinitrotoluene	<1.	<10.	<2.	<10.
Acenaphthene	<1.	<1.	<2.	<10.
2,4-Dinitrophenol	<1.	<10.	<2.	<1.
2,4-Dinitrotoluene	<1.	<1.	<2.	<10.
4-Nitrophenol	<1.	<10.	<2.	<1.
Fluorene	<1.	<1.	<2.	15.
4-Chlorophenyl phenyl ether	<1.	<1.	<2.	<10.
Diethylphthalate	<1.	<1.	<2.	<10.
4,6-Dinitro-o-cresol	<1.	<10.	<2.	<1.
1,2-Diphenylhydrazine	<1.	<1.	<2.	<10.
4-Bromophenyl phenyl ether	<1.	<1.	<2.	<10.
Hexachlorobenzene	<1.	<1.	<2.	<10.

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Extractables (by GC/MS)	parts per billion (ug/L) 1	2	3	4
Pentachlorophenol	<1.	<10.	<2.	<1.
Phenanthrene	<1.	<1.	<2.	40.
Anthracene	<1.	<1.	<2.	<10.
Dibutylphthalate	<1.	<1.	<2.	<10.
Fluoranthene	<1.	<1.	<2.	<10.
Pyrene	<1.	<1.	<2.	<10.
Benzidine	<1.	<1.	<2.	<10.
Butyl benzyl phthalate	<1.	<1.	<2.	<10.
Benzo(a)anthracene	<1.	<1.	<2.	<10.
Chrysene	<1.	<1.	<2.	<10.
3,3'-Dichlorobenzidine	<1.	<1.	<2.	<10.
Bis(2-ethylhexyl)phthalate	<1.	<1.	<2.	<10.
N-nitrosodiphenylamine	<1.	<1.	<2.	<10.
Di-n-octyl phthalate	<1.	<1.	<2.	<10.
Benzo(b)fluoranthene	<1.	<1.	<2.	<10.
Benzo(k)fluoranthene	<1.	<1.	<2.	<10.
Benzo(a)pyrene	<1.	<1.	<2.	<10.
Indeno(1,2,3-cd)pyrene	<1.	<1.	<2.	<10.
Dibenzo(ah)anthracene	<1.	<1.	<2.	<10.
Benzo(ghi)perylene	<1.	<1.	<2.	<10.
*Aniline	<1.	<1.	<2.	<10.
*Benzoic Acid	<1.	<10.	65.	14.
*Benzyl Alcohol	<1.	3.	<2.	<1.
*4-Chloroaniline	<1.	<1.	<2.	<10.
*Dibenzofuran	<1.	<1.	<2.	<10.
*2-Methylnaphthalene	6.	11.	100.	190.
*2-Methylphenol	<1.	20.	190.	290.
*4-Methylphenol	<1.	86.	490.	540.
*2-Nitroaniline	<1.	<1.	<2.	<10.
*3-Nitroaniline	<1.	<1.	<2.	<10.
*4-Nitroaniline	<1.	<1.	<2.	<10.
*2,4,5-Trichlorophenol	<1.	<10.	<2.	<1.

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Extractables (by GC/MS)	parts per billion (ug/L) 5	6	Method Blank
N-nitrosodimethylamine	<1.	<1.	<1.
Bis(2-chloroethyl)ether	<1.	<1.	<1.
2-Chlorophenol	<1.	<10.	<1.
Phenol	<1.	1,300.	<1.
1,3-Dichlorobenzene	<1.	<1.	<1.
1,4-Dichlorobenzene	<1.	<1.	<1.
1,2-Dichlorobenzene	<1.	<1.	<1.
Bis(2-chloroisopropyl)ether	<1.	<1.	<1.
Hexachloroethane	<1.	<1.	<1.
N-nitroso-di-n-propylamine	<1.	<1.	<1.
Nitrobenzene	<1.	<1.	<1.
Isophorone	<1.	7.	<1.
2-Nitrophenol	<1.	87.	<1.
2,4-Dimethylphenol	<1.	100.	<1.
Bis(2-chloroethoxy)methane	<1.	<1.	<1.
2,4-Dichlorophenol	<1.	<10.	<1.
1,2,4-Trichlorobenzene	<1.	<1.	<1.
Naphthalene	<1.	11.	<1.
Hexachlorobutadiene	<1.	<1.	<1.
4-Chloro-m-cresol	<1.	<10.	<1.
Hexachlorocyclopentadiene	<1.	<1.	<1.
2,4,6-Trichlorophenol	<1.	<10.	<1.
2-Chloronaphthalene	<1.	<1.	<1.
Acenaphthylene	<1.	<1.	<1.
Dimethylphthalate	<1.	<1.	<1.
2,6-Dinitrotoluene	<1.	<1.	<1.
Acenaphthene	<1.	<1.	<1.
2,4-Dinitrophenol	<1.	<10.	<1.
2,4-Dinitrotoluene	<1.	<1.	<1.
4-Nitrophenol	<1.	<10.	<1.
Fluorene	<1.	<1.	<1.
4-Chlorophenyl phenyl ether	<1.	<1.	<1.
Diethylphthalate	<1.	<1.	<1.
4,6-Dinitro-o-cresol	<1.	<10.	<1.
1,2-Diphenylhydrazine	<1.	<1.	<1.
4-Bromophenyl phenyl ether	<1.	<1.	<1.
Hexachlorobenzene	<1.	<1.	<1.

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parts per billion (ug/L)

Extractables (by GC/MS)	5	6	Method Blank
Pentachlorophenol	<1.	<10.	<1.
Phenanthrene	<1.	<1.	<1.
Anthracene	<1.	<1.	<1.
Dibutylphthalate	<1.	<1.	<1.
Fluoranthene	<1.	<1.	<1.
Pyrene	<1.	<1.	<1.
Benzidine	<1.	<1.	<1.
Butyl benzyl phthalate	<1.	<1.	<1.
Benzo(a)anthracene	<1.	<1.	<1.
Chrysene	<1.	<1.	<1.
3,3'-Dichlorobenzidine	<1.	<1.	<1.
Bis(2-ethylhexyl)phthalate	5.	<1.	<1.
N-nitrosodiphenylamine	<1.	<1.	<1.
Di-n-octyl phthalate	<1.	<1.	<1.
Benzo(b)fluoranthene	<1.	<1.	<1.
Benzo(k)fluoranthene	<1.	<1.	<1.
Benzo(a)pyrene	<1.	<1.	<1.
Indeno(1,2,3-cd)pyrene	<1.	<1.	<1.
Dibenzo(ah)anthracene	<1.	<1.	<1.
Benzo(ghi)perylene	<1.	<1.	<1.
*Aniline	<1.	<1.	<1.
*Benzoic Acid	<1.	<10.	<1.
*Benzyl Alcohol	<1.	3.	<1.
*4-Chloroaniline	<1.	<1.	<1.
*Dibenzofuran	<1.	<1.	<1.
*2-Methylnaphthalene	<1.	<1.	<1.
*2-Methylphenol	<1.	30.	<1.
*4-Methylphenol	<1.	79.	<1.
*2-Nitroaniline	<1.	<1.	<1.
*3-Nitroaniline	<1.	<1.	<1.
*4-Nitroaniline	<1.	<1.	<1.
*2,4,5-Trichlorophenol	<1.	<10.	<1.

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parts per billion (ug/L)

Pesticides (by GC/ECD)	1	2	3	4
alpha-BHC	<0.05	<0.05	<0.05	<0.05
beta-BHC	<0.05	<0.05	<0.05	<0.05
delta-BHC	<0.05	<0.05	<0.05	<0.05
gamma-BHC (lindane)	<0.05	<0.05	<0.05	<0.05
heptachlor	<0.05	<0.05	<0.05	<0.05
aldrin	<0.05	<0.05	<0.05	<0.05
heptachlor epoxide	<0.05	<0.05	<0.05	<0.05
dieldrin	<0.11	<0.11	<0.11	<0.11
4,4'-DDE	<0.11	<0.11	<0.11	<0.11
4,4'-DDD	<0.11	<0.11	<0.11	<0.11
endosulfan sulfate	<0.11	<0.11	<0.11	<0.11
4,4'-DDT	<0.11	<0.11	<0.11	<0.11
chlordane	<0.53	<0.53	<0.53	<0.53
alpha endosulfan	<0.05	<0.05	<0.05	<0.05
beta endosulfan	<0.11	<0.11	<0.11	<0.11
endrin	<0.11	<0.11	<0.11	<0.11
endrin ketone	<0.11	<0.11	<0.11	<0.11
toxaphene	<1.1	<1.1	<1.1	<1.1
PCB 1016	<0.53	<0.53	<0.53	<0.53
PCB 1221	<0.53	<0.53	<0.53	<0.53
PCB 1232	<0.53	<0.53	<0.53	<0.53
PCB 1242	<0.53	<0.53	<0.53	3.8
PCB 1248	<0.53	<0.53	<0.53	<0.53
PCB 1254	<1.1	<1.1	<1.1	27.
PCB 1260	<1.1	<1.1	<1.1	<1.1

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parts per billion (ug/L)

Pesticides (by GC/ECD)	5	6	Method Blank
alpha-BHC	<0.05	<0.05	<0.05
beta-BHC	<0.05	<0.05	<0.05
delta-BHC	<0.05	<0.05	<0.05
gamma-BHC (lindane)	<0.05	<0.05	<0.05
heptachlor	<0.05	<0.05	<0.05
aldrin	<0.05	<0.05	<0.05
heptachlor epoxide	<0.05	<0.05	<0.05
dieldrin	<0.11	<0.11	<0.11
4,4'-DDE	<0.11	<0.11	<0.11
4,4'-DDD	<0.11	<0.11	<0.11
endosulfan sulfate	<0.11	<0.11	<0.11
4,4'-DDT	<0.11	<0.11	<0.11
chlordane	<0.53	<0.53	<0.53
alpha endosulfan	<0.05	<0.05	<0.05
beta endosulfan	<0.11	<0.11	<0.11
endrin	<0.11	<0.11	<0.11
endrin Ketone	<0.11	<0.11	<0.11
toxaphene	<1.1	<1.1	<1.1
PCB 1016	<0.53	<0.53	<0.53
PCB 1221	<0.53	<0.53	<0.53
PCB 1232	<0.53	<0.53	<0.53
PCB 1242	<0.53	<0.53	<0.53
PCB 1248	<0.53	<0.53	<0.53
PCB 1254	<1.1	<1.1	<1.1
PCB 1260	<1.1	<1.1	<1.1

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Key

< indicates less than
* indicates additional compounds from the EPA's Hazardous Substances List.
** The sum of trans- and cis-1,2-dichloroethylene.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:laj

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LABORATORY NO. 4933

APPENDIX A

Method Blank Report

Blank Name	Sample Numbers	Analyte	Result	Units	SDL	MDL
B0810ICP.W01	1 through 6	Silver	L/1.	ug/L	1.	---
B0810ICP.W01	1 through 6	Beryllium	L/1.	ug/L	1.	---
B0810ICP.W01	1 through 6	Cadmium	L/1.	ug/L	1.	---
B0810ICP.W01	1 through 6	Chromium	L/1.	ug/L	1.	---
B0810ICP.W01	1 through 6	Copper	L/1.	ug/L	1.	---
B0810ICP.W01	1 through 6	Lead	L/10.	ug/L	10.	---
B0810ICP.W01	1 through 6	Nickel	L/2.	ug/L	2.	---
B0810ICP.W01	1 through 6	Zinc	1.	ug/L	1.	---
B0810ICP.W01	1 through 6	Barium	L/2.	ug/L	2.	---
B0724HY.W01	1 through 6	Arsenic	L/5.	ug/L	5.	1.
B0724HY.W01	1 through 6	Selenium	L/5.	ug/L	5.	2.
B0720CN.W01	1 through 6	Cyanide	L/0.005	mg/L	0.005	0.002
B0722Hg.W01	1 through 6	Mercury	L/1.	mg/L	1.	1.
B0722Hg.W02	1 through 6	Mercury	L/1.	mg/L	1.	1.

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APPENDIX B

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

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LABORATORY NO. 4933

JOB No. 4933 DATE: 07/28/87

Sample No. B0720MPP.WLM Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	34		21 - 100
d5-Phenol	35		10 - 94
2-Bromophenol	98		40 - 107
d5-Nitrobenzene	86		35 - 114
2-Fluorobiphenyl	87		43 - 116
d10-Azobenzene	82		62 - 127
2.4.6-Tribromophenol	69		10 - 123
d14-p-Terphenyl	98		33 - 141

Sample No. 1 Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	43		21 - 100
d5-Phenol	31		10 - 94
2-Bromophenol	87		40 - 107
d5-Nitrobenzene	84		35 - 114
2-Fluorobiphenyl	93		43 - 116
d10-Azobenzene	79		62 - 127
2.4.6-Tribromophenol	69		10 - 123
d14-p-Terphenyl	86		33 - 141

Sample No. 2 ACID DL Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	33		21 - 100
d5-Phenol	28		10 - 94
2-Bromophenol	86		40 - 107
2.4.6-Tribromophenol	37		10 - 123

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LABORATORY NO. 493

Sample No. 2 B/N Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
d5-Nitrobenzene	76		35 - 114
2-Fluorobiphenyl	82		43 - 116
d10-Azobenzene	71		62 - 127
d14-p-Terphenyl	47		33 - 141

Sample No. 3 DL Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	47		21 - 100
d5-Phenol	31		10 - 94
2-Bromophenol	99		40 - 107
d5-Nitrobenzene	76		35 - 114
2-Fluorobiphenyl	104		43 - 116
d10-Azobenzene	79		62 - 127
2.4.6-Tribromophenol	66		10 - 123
d14-p-Terphenyl	112		33 - 141

Sample No. 4 B/N DL Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
d5-Nitrobenzene	74		35 - 114
2-Fluorobiphenyl	115		43 - 116
d10-Azobenzene	67		62 - 127
d14-p-Terphenyl	56		33 - 141

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LABORATORY NO. 4933

JOB No. 4933 DATE: 07/29/87

Sample No. 3 DL Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	45		21 - 100
d5-Phenol	32		10 - 94
2-Bromophenol	98		40 - 107
d5-Nitrobenzene	78		35 - 114
2-Fluorobiphenyl	96		43 - 116
d10-Azobenzene	97		62 - 127
2.4.6-Tribromophenol	74		10 - 123
d14-p-Terphenyl	86		33 - 141

Sample No. 4 ACID DL Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	55		21 - 100
d5-Phenol	41		10 - 94
2-Bromophenol	119	D	40 - 107
2.4.6-Tribromophenol	83		10 - 123

D: Persistently poor surrogate and spike recoveries signal a laboratory problem and the need for re-extraction and re-analysis. However, occasional outliers are regarded as anomolies and, in this case, re-analysis was not deemed necessary because other indicators were in control.

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LABORATORY NO. 4933

Sample No. 4 ACID Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	51		21 - 100
d5-Phenol	37		10 - 94
2-Bromophenol	101		40 - 107
2.4.6-Tribromophenol	90		10 - 123

Sample No. 5 Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	44		21 - 100
d5-Phenol	30		10 - 94
2-Bromophenol	93		40 - 107
d5-Nitrobenzene	85		35 - 114
2-Fluorobiphenyl	82		43 - 116
d10-Azobenzene	84		62 - 127
2.4.6-Tribromophenol	76		10 - 123
d14-p-Terphenyl	68		33 - 141

Sample No. 6 B/N Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
d5-Nitrobenzene	90		35 - 114
2-Fluorobiphenyl	93		43 - 116
d10-Azobenzene	81		62 - 127
d14-p-Terphenyl	52		33 - 141

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LABORATORY NO. 4933

Sample No. 6 ACID DL Matrix: WATER Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	34		21 - 100
d5-Phenol	27		10 - 94
2-Bromophenol	79		40 - 107
2,4,6-Tribromophenol	36		10 - 123

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LABORATORY NO. 4933

JOB No. 4933 DATE: 08/06/87

Sample No. B0721MVOWS1 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	98		86 - 115
d4-1,2-Dichloroethane	99		76 - 114
d8-Toluene	111	D	88 - 110

D: Persistently poor surrogate and spike recoveries signal a laboratory problem and the need for re-extraction and re-analysis. However, occasional outliers are regarded as anomolie: and in this case, re-analysis was not deemed necessary because other indicators were in control.

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LABORATORY NO. 4933

JOB No. 4933 DATE: 08/06/87

Sample No. B0720MVOWS1 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	96		86 - 115
d4-1.2-Dichloroethane	96		76 - 114
d8-Toluene	101		88 - 110

Sample No. 4933VFB Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	94		86 - 115
d4-1.2-Dichloroethane	96		76 - 114
d8-Toluene	90		88 - 110

Sample No. 4933-01RI Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	93		86 - 115
d4-1.2-Dichloroethane	93		76 - 114
d8-Toluene	88		88 - 110

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LABORATORY NO. 4933

Sample No. 4933-02 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	94.		86 - 115
d4-1.2-Dichloroethane	94.		76 - 114
d8-Toluene	91.		88 - 110

Sample No. 4933-02DL Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	99.		86 - 115
d4-1.2-Dichloroethane	98.		76 - 114
d8-Toluene	103.		88 - 110

Sample No. 4933-03 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	96		86 - 115
d4-1.2-Dichloroethane	94		76 - 114
d8-Toluene	90		88 - 110

Sample No. 4933-04 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	100		86 - 115
d4-1.2-Dichloroethane	94		76 - 114
d8-Toluene	96		88 - 110

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LABORATORY NO. 4933

Sample No. 4933-05 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	97		86 - 115
d4-1.2-Dichloroethane	95		76 - 114
d8-Toluene	87		88 - 110

Sample No. 4933-06 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	95		86 - 115
d4-1.2-Dichloroethane	94		76 - 114
d8-Toluene	86		88 - 110

Sample No. 4933-06DL Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	95		86 - 115
d4-1.2-Dichloroethane	93		76 - 114
d8-Toluene	86		88 - 110

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LABORATORY NO. 4933

JOB No. 4933 DATE: 07/24/87

Sample No. B0770GPX.WL8 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	84		24 - 150
Isodrin	58		43 - 118

Sample No. 1 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	85		24 - 150
Isodrin	55		43 - 118

Sample No. 2 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	85		24 - 150
Isodrin	94		43 - 118

Sample No. 3 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	83		24 - 150
Isodrin	78		43 - 118

Sample No. 4 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	26		24 - 150
Isodrin	52		43 - 118

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Sample No. 5 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	84		24 - 150
Isodrin	83		43 - 118

Sample No. 6 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	97		24 - 150
Isodrin	65		43 - 118

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APPENDIX C

Copy of Chain-of-Custody Attached

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Landau Associates, Inc.
Edmonds, WA (206) 778-0907

Chain of Custody Record

Date 7-15-87
Page 1 of 1

Project Queen City Farms Project No. 25-13
Client Boeing
Project Location Queen City Farms
Sampler's Name Ken Chaput

#4933 -

Testing Parameters: PH & ~~Temp~~ KCP; VOAs Method 8240; Solvent Extractable Organic Compounds 8270; PCB/Pesticides 8080; Trace Metals 6000/7000 Series; Cyanide 9010

Sample No.	Date	Time	Location	No. of Containers	PH & ~~Temp~~ KCP	VOAs Method 8240	Solvent Extractable Organic Compounds 8270	PCB/Pesticides 8080	Trace Metals 6000/7000 Series	Cyanide 9010					Observations/Comments
MW-5	7-15-87	0940		8	↓	↓	↓	↓	↓	↓					Per Ken Chaput 7-17-87
MW-6	↓	1030		8	↓	↓	↓	↓	↓	↓					Metals are:
MW-7	↓	1140		8	↓	↓	↓	↓	↓	↓					
MW-8	↓	1250		8	↓	↓	↓	↓	↓	↓					Sb-As-Be-Cd-Cr-Cu-
MW-1	↓	1400		8	↓	↓	↓	↓	↓	↓					Pb-Hg-Ni-Se-Ag-Tl-Zn-Ba
Dup-1	↓	—		8	↓	↓	↓	↓	↓	↓					↗ = PP metals + Ba
															Metals were field filtered

Special Shipment/Handling or Storage Requirements

Method of Shipment

Relinquished by	Received by	Relinquished by	Received by
Ken Chaput	Sample Receipt acknowledged pending verification of sample count. We will be notified within one working day of any discrepancies found. Signed [illegible] Date 7/08 Time 3:09 p		Judy Ecklund
Signature	Signature	Signature	Signature
Ken Chaput			Judy Ecklund
Printed Name	Printed Name	Printed Name	Printed Name
Landau Assoc			Laucks
Company	Company	Company	Company
Date 7-15-87 Time 1513	Date ____ Time ____	Date ____ Time ____	Date 7/15/87 Time ____

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PAGE NO. 27
LABORATORY NO. 4

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OCT 14 1987

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Chemistry, Microbiology, and Technical Services

CLIENT: Landau Associates
P.O. Box 694
Edmonds, WA 98020
ATTN: Ken Chaput

LABORATORY NO. 5944

DATE: October 8, 1987

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 09/15/87 and identified as shown below:

1)	25-13-15	MW-5	QCF	09/13/87	11:15	KGC	
2)	25-13-16	MW-6	QCF	09/13/87	12:30	KGC	
3)	25-13-17	MW-7	QCF	09/13/87	13:25	KGC	
4)	25-13-19		QCF	09/13/87		KGC	(DUPLICATE)

TESTS PERFORMED AND RESULTS:

Samples were analyzed in accordance with Test Methods for Evaluating Solid Waste (SW-846), U.S.E.P.A., 1982, method 6010 and the 7000 series (metals analysis).

Inorganics

parts per billion (ug/L)

	1	2	3	4	Method Blank
Antimony	<5.	<5.	<5.	<5.	<5.
Arsenic	<5.	<5.	<5.	<5.	<5.
Beryllium	<1.	<1.	<1.	<1.	<1.
Cadmium	<1.	48.	<1.	49.	<1.
Chromium	63.	2700.	58.	2800.	<1.
Copper	<1.	200.	<1.	200.	<1.
Lead	<10.	<10.	<10.	<10.	<10.
Mercury	<1.	<1.	<1.	<1.	<1.
Nickel	10.	99.	4.	100.	<2.

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parts per billion (ug/L)

	1	2	3	4	Method Blank
Selenium	<5.	<5.	<5.	<5.	<5.
Silver	<1.	<1.	<1.	<1.	<1.
Thallium	<5.	<5.	<5.	<5.	<5.
Zinc	11.	120.	4.	120.	2.
Barium	60.	44.	19.	46.	<2.

Samples were analyzed in accordance with Test Methods for Evaluating Solid Waste (SW-846), U.S.E.P.A., 1982, Method 8240 (volatile organics).

Volatile Organics (by GC/MS)

parts per billion (ug/L)

	1	2	3	4	Method Blank
Chloromethane	<1.	<10.	<20.	<5.	<1.
Bromomethane	<1.	<10.	<20.	<5.	<1.
Vinyl Chloride	<1.	<10.	<20.	<5.	<1.
Chloroethane	<1.	<10.	<20.	<5.	<1.
Methylene Chloride	<1.	2700.	150.	3100.	<1.
Acrolein	<5.	<50.	<100.	<25.	<1.
*Acetone	<1.	<10.	<20.	<5.	<1.
Acrylonitrile	<5.	<50.	<100.	<25.	<1.
*Carbon Disulfide	<1.	<10.	<20.	<5.	<1.
1,1-Dichloroethylene	<1.	<10.	<20.	<5.	<1.

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parts per billion (ug/L)

	1	2	3	4	Method Blank
1,1-Dichloroethane	<1.	<10.	<20.	<5.	<1.
total-1,2-Dichloroethylene**	49.	3300.	1600.	3800.	<1.
Chloroform	<1.	<10.	<20.	<5.	<1.
*2-Butanone	<1.	<10.	<20.	<5.	<1.
1,2-Dichloroethane	<1.	<10.	<20.	<5.	<1.
1,1,1-Trichloroethane	<1.	<10.	<20.	<5.	<1.
Carbon Tetrachloride	<1.	<10.	<20.	<5.	<1.
*Vinyl Acetate	<1.	<10.	<20.	<5.	<1.
Bromodichloromethane	<1.	<10.	<20.	<5.	<1.
1,2-Dichloropropane	<1.	<10.	<20.	<5.	<1.
Trichloroethylene	11.	410.	22.	410.	<1.
Benzene	<1.	<10.	<20.	<5.	<1.
Chlorodibromomethane	<1.	<10.	<20.	<5.	<1.
1,1,2-Trichloroethane	<1.	<10.	<20.	<5.	<1.
2-Chloroethyl vinyl ether	<1.	<10.	<20.	<5.	<1.
Bromoform	<1.	<10.	<20.	<5.	<1.
*4-Methyl-2-pentanone	<1.	<10.	<20.	<5.	<1.
*2-Hexanone	<1.	<10.	<20.	<5.	<1.
1,1,2,2-Tetrachloroethane	<1.	<10.	<20.	<5.	<1.
Tetrachloroethylene	<1.	<10.	<20.	<5.	<1.
Toluene	<1.	66.	94.	65.	<1.
Chlorobenzene	<1.	<10.	<20.	<5.	<1.
trans-1,3-Dichloropropene	<1.	<10.	<20.	<5.	<1.
Ethylbenzene	3.	16.	84.	16.	<1.
cis-1,3-Dichloropropene	<1.	<10.	<20.	<5.	<1.
*Styrene	<1.	<10.	<20.	<5.	<1.
*Total-Xylene	<1.	29.	330.	28.	<1.

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LABORATORY NO. 5944

Samples were analyzed in accordance with Test Methods for Evaluating Solid Waste (SW-846), U.S.E.P.A., 1982, Method 8080 (pesticides and PCB's).

Pesticides (by GC/ECD)

parts per billion (ug/L)

	1	2	3	4	Method Blank
alpha-BHC	<0.02	<0.02	<0.02	<0.02	<0.02
beta-BHC	0.81	1.10	<0.02	<0.02	<0.02
delta-BHC	<0.02	<0.02	<0.02	<0.02	<0.02
gamma-BHC (lindane)	0.08	<0.02	<0.02	<0.02	<0.02
Heptachlor	<0.02	<0.02	<0.02	<0.02	<0.02
Aldrin	<0.02	<0.02	<0.02	<0.02	<0.02
Heptachlor epoxide	<0.02	<0.02	<0.02	<0.02	<0.02
Endosulfan I	<0.04	<0.04	<0.04	<0.04	<0.04
Dieldrin	<0.02	<0.02	<0.02	<0.02	<0.02
4,4'-DDE	<0.02	<0.02	<0.02	<0.02	<0.02
Endrin	<0.04	<0.04	<0.04	<0.04	<0.04
Endosulfan II	<0.04	<0.04	<0.04	<0.04	<0.04
4,4'-DDD	<0.04	<0.04	<0.04	<0.04	<0.04
Endosulfan sulfate	<0.04	<0.04	<0.04	<0.04	<0.04
4,4'-DDT	<0.04	<0.04	<0.04	<0.04	<0.04
Methoxychlor	<0.02	<0.02	<0.02	<0.02	<0.02
Endrin ketone	<0.04	<0.04	<0.04	<0.04	<0.04
Toxaphene	<10.	<10.	<10.	<10.	<10.
Aroclor-1016	<2.	<2.	<2.	<2.	<2.
Aroclor-1221	<2.	<2.	<2.	<2.	<2.
Aroclor-1232	<2.	<2.	<2.	<2.	<2.
Aroclor-1242	<2.	<2.	<2.	<2.	<2.
Aroclor-1248	<2.	<2.	<2.	<2.	<2.
Aroclor-1254	<2.	<2.	<2.	<2.	<2.
Aroclor-1260	<2.	<2.	<2.	<2.	<2.
Tech Chlordane	<0.04	<0.04	<0.04	<0.04	<0.04

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Key

* = additional compounds from the EPA's Hazardous Substances List
** = the sum of trans-1,2-dichloroethylene and cis-1,2-dichloroethylene.
< = "less than"

Respectfully submitted,

Laucks Testing Laboratories, Inc.

Barbara Gleason

BG:emt

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JOB No. 5944 DATE: 09/21/87

Sample No. B0917MVOWJ1 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	96		86 - 115
d4-1,2-Dichloroethane	100		76 - 114
d8-Toluene	98		88 - 110

Sample No. 5944-01 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	91		86 - 115
d4-1,2-Dichloroethane	105		76 - 114
d8-Toluene	95		88 - 110

Sample No. 5944-02 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	95		86 - 115
d4-1,2-Dichloroethane	104		76 - 114
d8-Toluene	97		88 - 110

Sample No. 5944-02DL Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	94		86 - 115
d4-1,2-Dichloroethane	106		76 - 114
d8-Toluene	100		88 - 110

Sample No. 5944-03 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	96		86 - 115
d4-1.2-Dichloroethane	106		76 - 114
d8-Toluene	97		88 - 110

Sample No. 5944-04 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	95		86 - 115
d4-1.2-Dichloroethane	105		76 - 114
d8-Toluene	99		88 - 110

Sample No. 5944-04DL Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	93		86 - 115
d4-1.2-Dichloroethane	104		76 - 114
d8-Toluene	97		88 - 110

Sample No. 5944-04DL Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits

JOB No. 5944 DATE: 09/21/87

Sample No. B0918MVOWJ1 Matrix: WATER Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
p-Bromofluorobenzene	91		86 - 115
d4-1.2-Dichloroethane	102		76 - 114
d8-Toluene	98		88 - 110

JOB No. 5944 DATE: 09/23/87

Sample No. B0919GPX.WLI Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	123		24 - 150
Isodrin	79		43 - 118

Sample No. 1 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	126		24 - 150
Isodrin	85		43 - 118

Sample No. 2 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	97		24 - 150
Isodrin	63		43 - 118

Sample No. 3 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	130		24 - 150
Isodrin	88		43 - 118

Sample No. 4 Matrix: WATER Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	129		24 - 150
Isodrin	93		43 - 118

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Chemistry, Microbiology, and Technical Services

CLIENT: Landau Associates
P.O. Box 694
Edmonds, WA 98020
ATTN: John Baker

LABORATORY NO. 6866

DATE: December 16, 1987

JOB NO. 25-13.15

REPORT ON: WATER

SAMPLE IDENTIFICATION: Submitted 11/11/87 and identified as shown below:

1) MW-5 11/11/87 09:55
2) MW-6 11/11/87 10:35
3) MW-7 11/11/87 11:15
4) Field Dupl 11/11/87 MW-7

TESTS PERFORMED AND RESULTS:

Samples were analyzed in accordance with Test Methods for Evaluating Solid Waste (SW-846) U.S.E.P.A. 1982 Method 8240 (volatile organics),8080 (pesticides and PCB's),and 6010 and the 7000 series (metals analysis).

Inorganics

parts per billion (ug/L)

	1	2	3	4	Lab Blank
Antimony	<5.	<5.	<5.	<5.	<5.
Arsenic	<5.	<5.	<5.	<5.	<5.
Beryllium	<1.	<1.	<1.	<1.	<1.
Cadmium	<1.	28.	<1.	<1.	<1.
Chromium	98.	1,700.	50.	48.	<1.
Copper	1.	130.	<1.	<1.	<1.
Lead	<10.	<10.	<10.	<10.	<10.
Mercury	<1.	<1.	<1.	<1.	<1.
Nickel	22.	35.	2.	3.	<2.
Selenium	<5.	<5.	<5.	<5.	<5.
Silver	<1.	<1.	<1.	<1.	<1.
Thallium	<2.	<2.	<2.	<2.	<2.
Zinc	30.	78.	6.	5.	1.
Barium	310.	29.	9.	9.	<2.

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Volatile Organics (GC/MS) — parts per billion (ug/L)

	1	2	3	4
Chloromethane	<1.	<1.	<1.	<1.
Bromomethane	<1.	<1.	<1.	<1.
Vinyl Chloride	46.	38.	91.	98.
Chloroethane	<3.	<3.	<3.	<3.
Methylene Chloride	5,800.	200.	<1.	<1.
Acrolein	<1.	<1.	<1.	<1.
*Acetone	<5.	8.	14.	12.
Acrylonitrile	<1.	<1.	<1.	<1.
*Carbon Disulfide	<1.	<1.	<1.	<1.
1,1-Dichloroethylene	1.	<1.	1.	1.
1,1-Dichloroethane	2.	<1.	1.	1.
Total-1,2-Dichloroethylene	520.	230.	150.	150.
Chloroform	8.	<1.	<1.	<1.
*2-Butanone	<3.	<3.	<3.	<3.
1,2-Dichloroethane	<1.	<1.	<1.	<1.
1,1,1-Trichloroethane	<1.	<1.	<1.	<1.
Carbon Tetrachloride	<1.	<1.	<1.	<1.
*Vinyl Acetate	<1.	<1.	<1.	<1.
Bromodichloromethane	<1.	<1.	<1.	<1.
1,2-Dichloropropane	<1.	<1.	<1.	<1.
Trichloroethylene	2,300.	39.	2.	1.
Benzene	35.	<1.	8.	7.
Chlorodibromomethane	<3.	<3.	<3.	<3.
1,1,2-Trichloroethane	2.	<1.	<1.	<1.
2-Chloroethyl vinyl ether	<1.	<1.	<1.	<1.
Bromoform	<1.	<1.	<1.	<1.
*4-Methyl-2-pentanone	<3.	<3.	<3.	<3.
*2-Hexanone	<3.	<3.	<3.	<3.
1,1,2,2-Tetrachloroethane	<3.	<3.	<3.	<3.
Tetrachloroethylene	6.	<1.	<1.	<1.
Toluene	95.	10.	94.	85.
Chlorobenzene	<3.	<3.	<3.	<3.
trans-1,3-Dichloropropene	<3.	<3.	<3.	<3.
Ethylbenzene	15.	34.	140.	130.
cis-1,3-Dichloropropene	<3.	<3.	<3.	<3.
*Styrene	<1.	<1.	<1.	<1.
*Total Xylene	79.	22.	270.	260.

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Volatile Organics (GC/MS)

parts per billion (ug/L)

	Method Blank 1	Method Blank 2
Chloromethane	<1.	<1.
Bromomethane	<1.	<1.
Vinyl Chloride	<1.	<1.
Chloroethane	<3.	<3.
Methylene Chloride	<1.	<1.
Acrolein	<1.	<1.
*Acetone	<8.	<5.
Acrylonitrile	<1.	<1.
*Carbon Disulfide	<1.	<1.
1,1-Dichloroethylene	<1.	<1.
1,1-Dichloroethane	<1.	<1.
Total-1,2-Dichloroethylene	<1.	<1.
Chloroform	<1.	<1.
*2-Butanone	<3.	<3.
1,2-Dichloroethane	<1.	<1.
1,1,1-Trichloroethane	<1.	<1.
Carbon Tetrachloride	<1.	<1.
*Vinyl Acetate	<1.	<1.
Bromodichloromethane	<1.	<1.
1,2-Dichloropropane	<1.	<1.
Trichloroethylene	<1.	<1.
Benzene	<1.	<1.
Chlorodibromomethane	<3.	<3.
1,1,2-Trichloroethane	<1.	<1.
2-Chloroethyl vinyl ether	<1.	<1.
Bromoform	<1.	<1.
*4-Methyl-2-pentanone	<3.	<3.
*2-Hexanone	<3.	<3.
1,1,2,2-Tetrachloroethane	<3.	<3.
Tetrachloroethylene	<1.	<1.
Toluene	<1.	<1.
Chlorobenzene	<3.	<3.
trans-1,3-Dichloropropene	<3.	<3.
Ethylbenzene	<1.	<1.
cis-1,3-Dichloropropene	<3.	<3.
*Styrene	<1.	<1.
*Total Xylene	<1.	<1.

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Pesticides (by GC/ECD)

parts per billion (ug/L)

	1	2	3	4
alpha-BHC	<0.05	<0.05	<0.05	<0.05
beta-BHC	<0.05	<0.05	<0.05	<0.05
delta-BHC	<0.05	<0.05	<0.05	<0.05
gamma-BHC (lindane)	<0.05	<0.05	<0.05	<0.05
heptachlor	<0.05	<0.05	<0.05	<0.05
aldrin	<0.05	<0.05	<0.05	<0.05
heptachlor epoxide	<0.05	<0.05	<0.05	<0.05
Endosulfan I	<0.05	<0.05	<0.05	<0.05
dieldrin	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	<0.10	<0.10	<0.10	<0.10
Endrin	<0.10	<0.10	<0.10	<0.10
Endosulfan II	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	<0.10	<0.10	<0.10	<0.10
endosulfan sulfate	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	<0.10	<0.10	<0.10	<0.10
Methoxychlor	<0.50	<0.50	<0.50	<0.50
Endrin keton	<0.10	<0.10	<0.10	<0.10
alpha-Chlordane	<0.05	<0.05	<0.05	<0.05
gamma-Chlordane	<0.05	<0.05	<0.05	<0.05
Toxaphene	<1.0	<1.0	<1.0	<1.0
Aroclor-1016	<0.5	<0.5	<0.5	<0.5
Aroclor-1221	<0.5	<0.5	<0.5	<0.5
Aroclor-1232	<0.5	<0.5	<0.5	<0.5
Aroclor-1242	<0.5	<0.5	<0.5	<0.5
Aroclor-1248	<0.5	<0.5	<0.5	<0.5
Aroclor-1254	<1.0	<1.0	<1.0	<1.0
Aroclor-1260	<1.0	<1.0	<1.0	<1.0

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Key

< indicates less than
* indicates additional compounds from the EPA's Hazardous Substances List.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

J. M. Owens

JMO:emt

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APPENDIX

Surrogate Recovery Quality Control Report

Attached are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

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JOB No. 6866 DATE: 11/29/87

Sample No. B1113GPX.WLQ Matrix: Water Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	104		20 - 155
Isodrin	64		20 - 127

Sample No. 1 Matrix: Water Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	107		20 - 155
Isodrin	76		20 - 127

Sample No. 2 Matrix: Water Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	141		20 - 155
Isodrin	78		20 - 127

Sample No. 3 Matrix: Water Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	125		20 - 155
Isodrin	64		20 - 127

Sample No. 4 Matrix: Water Analysis: PEST

Surrogate Compound	Percent Recovery	Comment	Control Limits
Dibutylchlorendate	124		20 - 155
Isodrin	58		20 - 127

JOB No. 6866 DATE: 12/01/87

Sample No. B1120MVOWS1 Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	106		76 - 114
d8-Toluene	106		88 - 110
p-Bromofluorobenzene	96		86 - 115

Sample No. 6866-01 Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	106		76 - 114
d8-Toluene	102		88 - 110
p-Bromofluorobenzene	96		86 - 115

Sample No. 6866-01DL Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	110		76 - 114
d8-Toluene	103		88 - 110
p-Bromofluorobenzene	102		86 - 115

Sample No. 6866-02 Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	103		76 - 114
d8-Toluene	98		88 - 110
p-Bromofluorobenzene	101		86 - 115

JOB No. 6866 DATE: 12/14/87

Sample No. 1DL#2 Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	94		76 - 114
d8-Toluene	93		88 - 110
p-Bromofluorobenzene	86		86 - 115

Sample No. B1124MVOWS1 Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	103		76 - 114
d8-Toluene	108		88 - 110
p-Bromofluorobenzene	98		86 - 115

Sample No. 6866-03 Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	96		76 - 114
d8-Toluene	106		88 - 110
p-Bromofluorobenzene	100		86 - 115

Sample No. 6866-04 Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	92		76 - 114
d8-Toluene	96		88 - 110
p-Bromofluorobenzene	91		86 - 115

Sample No. 6866-03DL Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	97		76 - 114
d8-Toluene	107		88 - 110
p-Bromofluorobenzene	100		86 - 115

Sample No. 6866-04DL Matrix: Water Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	101		76 - 114
d8-Toluene	103		88 - 110
p-Bromofluorobenzene	98		86 - 115

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Edmonds, WA (206) 778-0907

Chain of Custody Record

Date 11-[illegible]-8[illegible]
Page 1 of [illegible]

Project Queen City Farms Project No. 25-13.15
Client Boeing
Project Location
Sampler's Name Ken Chapnit

Sample No.	Date	Time	Location	No. of Containers	VOAs method 5240	Pest. method 8080	Metals method 6010/7000								Observations/Comments
MW-5	11-11-87	0955	QCF	4	✓	✓	✓								metals as per phone
MW-6	11-11-87	1035	QCF	4	✓	✓	✓								Call 11-16-87.
MW-7	11-11-87	1115	QCF	4	✓	✓	✓								
Field Dup 1	11-11-87	—	QCF	4	✓	✓	✓								

Testing Parameters

Special Shipment/Handling or Storage Requirements

Method of Shipment

Relinquished by	Received by	Relinquished by	Received by
Signature: Ken Chapnit	Signature: Judy Ecklund	Signature:	Signature:
Printed Name: Ken Chapnit	Printed Name: Judy Ecklund	Printed Name:	Printed Name:
Company: Landau Assoc	Company: Laucks	Company:	Company:
Date 11-11-87 Time 1401	Date 11/11/87 Time 1401	Date Time	Date Time

QUEEN CITY FARMS

INITIAL REMEDIAL MEASURES
FIRST YEAR PERFORMANCE MONITORING REPORT

LANDAU ASSOCIATES, INC.