88-e35

Segment No. 04-08-03

WA-08-1110

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

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TO: Gail Colburn, NWRO

FROM: Bill Yake

SUBJECT: Sampling Results from Unnamed Creek South of Queen City Farms (7/21/87)

DATE: February 5, 1988

Abstract: An unnamed, intermittent stream south of Queen City Farms was sampled at one location for a wide range of constituents (conventions, major ions, metals, organic priority pollutants, *Daphnia* bioassay). Traces of two volatile organics were detected. Results for other parameters were unremarkable.

Based on visual reconnaissance of the area, Gail Colburn and Ron Devitt (NWRO) hypothesized that there were possible groundwater/surface water linkages between Cedar Hills Landfill; Queen City Farms Lake and associated waste ponds; a series of pits, springs, and small streams at Stoneway Concrete's sand and gravel operation; and the unnamed stream which crosses Cedar Grove Road in the vicinity of 17115 Cedar Grove Road (see Figure 1). Although the major disposal ponds (1, 2, and 3) at Queen City Farms have been remediated, the potential for contamination from other sources (ponds 4, 5, and 6, and Cedar Hills Landfill) remained.

The Northwest Regional Office (NWRO) of the Department of Ecology requested the Water Quality Investigations Section's (WQIS) help in assessing the status of an unnamed creek immediately south of Queen City Farms (Brugger, 1987).

The primary objective in sampling the unnamed creek was to determine if, under low-flow conditions, the creek was measurably contaminated. A secondary purpose was to provide information on a wide array of water quality parameters that could be used in conjunction with subsequent data to better understand the ground water/surface water linkages upgradient from the creek. At the time of the stream sampling study, little general characterization of groundwater/spring/surface water had been performed in the study area, although analyses for selected metals and organics in groundwater and surface water had been conducted for Queen City Farms, Inc. (Hart Crowser & Associates, 1983).

A field inspection/visual reconnaissance of the site was conducted on June 18, 1987, by Gail Colburn - NWRO, Phyllis Baas and Michael Ruef - Hazardous Waste Cleanup Program, and Bill Yake - WQIS. The findings of this site visit are summarized by Ruef (1987).

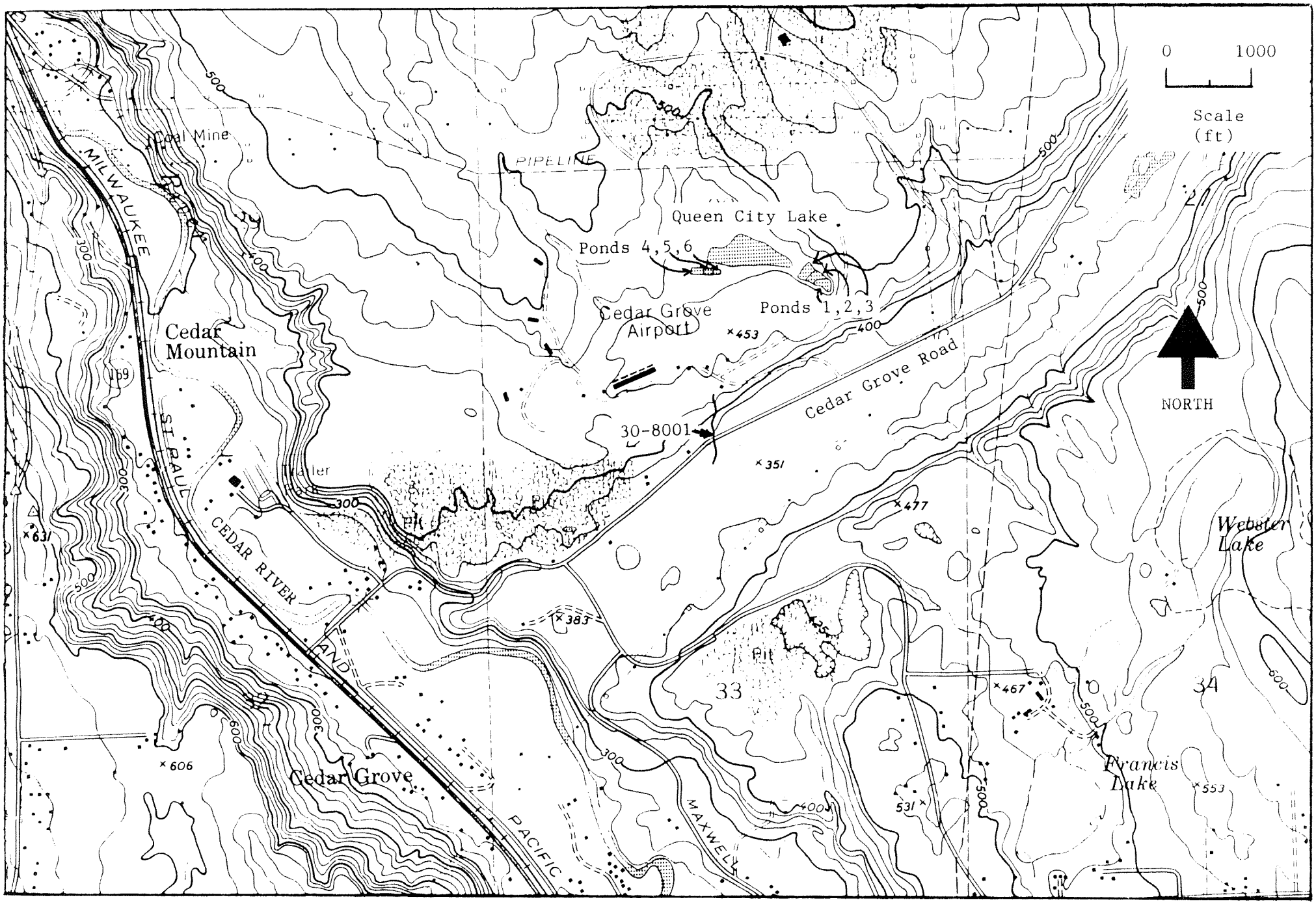

Figure 1: Queen City Farms site map.

The unnamed stream was sampled on July 21, 1987, at the apparent upstream (north) boundary of the parcel at 17115 Cedar Grove Road. Gale Colburn of the NWRO and Dale Norton and Bill Yake of WQIS were involved in the sampling. The results are summarized in Tables 1A through 1E. Additional data including results of field blank analyses, detection limits, and details of the bioassay, are included in the appendices.

Two observations made during the sampling bear noting:

1. Approximately a dozen fingerlings were seen in a small pool about five yards downstream from the sampling point. Several individuals were captured and identified as cutthroat trout. They appeared, based on superficial examination, to be healthy.

2. The stream flow was very low, and after being routed under Cedar Grove Road, the stream disappeared--apparently seeping into the ground.

The analytical results are generally unremarkable. The presence of cutthroat trout fry and the 100 percent survival rate of Daphnia imply that the water was not significantly toxic at the time of sampling and for some time prior to sampling. The cation/anion results may be useful in establishing groundwater/surface water links. This water can be characterized as containing primarily calcium bicarbonate, with secondary concentrations of sodium and sulfate. Subsequent analysis of surface waters and groundwaters upstream of the unnamed creek may find cation/anion concentrations a useful tool.

The only priority pollutant organics detected were in the volatile fraction. 4-methyl-2-pentanone (aka: methyl isobutyl ketone, hexone, isobutyl methyl ketone) was detected at 10 ug/L. NIOSH (1983) reports an aquatic toxicity rating (TLm96) of over 1000 mg/L. Hawley (1977) states that it is used as a "solvent for paints, varnishes, nitrocellulose lacquers, manufacture of methyl amyl alcohol, extraction processes. . ., organic synthesis; and denaturant for alcohol."

A trace (0.1 ug/L, est.) of styrene was also detected. NIOSH (1983) reports an aquatic toxicity rating (TLm96) of 10 to 100 mg/L. It is used in polystyrene plastics and resins (Hawley, 1977).

These two compounds should be included in organic scans of groundwater and surface water in the area to determine if they may provide clues to the source of the unnamed creek and possible contaminant migration.

Results for other water quality indicators imply that at the time of sampling, the water quality in the creek was apparently typical of streams in Western Washington.

Table 1. Results of stream sampling (7/21/87; 1100 hours).

Table 1A - Conventionals/Flow

Flow (cfs)	0.018*	Bicarbonate Alkalinity (mg as $CaCO_3$/L)	32
Temperature (^oC)	14.9*	Carbonate Alkalinity (mg as $CaCO_3$/L)	0.1
pH (S.U.)	6.8*	Total Hardness (mg as $CaCO_3$/L)	4.6
Conductivity (umhos/cm)	95*	NH_3-N (mg/L)	<0.01
	90	NO_2+NO_3-N (mg/L)	0.1
Dissolved Oxygen (mg/L)	8.9*	T-PO_4-P (mg/L)	0.01
Total Susp. Solids (mg/L)	1	Turbidity (NTUs)	8

Table 1B - Cations/Anions

Cations		Anions	
Ca (mg/L)	11.5	HCO_3 (mg/L)	19.5
Na (mg/L)	4.11	SO_4 (mg/L)	9.0
Mg (mg/L)	2.2	Cl (mg/L)	2.8
K (mg/L)	1.6	CO_3 (mg/L)	0.06

Table 1C - Metals

Arsenic (ug/L)	<1	Mercury (ug/L)	<0.05
Cadmium (ug/L)	<0.2	Manganese (ug/L)	14
Chromium (ug/L)	<5	Lead (ug/L)	<1
Copper (ug/L)	<5	Nickel (ug/L)	<5
Iron (ug/L)	435	Zinc (ug/L)	<5

Table 1D - Detected Organics

Acetone (ug/L)	+
Methylene Chloride (ug/L)	+
Styrene (ug/L)	0.1J
Toluene (ug/L)	+
4-Methyl-2-Pentanone (ug/L)	10

Table 1E - Bioassay/*Daphnia pulex*

Results: 100 percent survival

* = Field measurement
\+ = Detected in blank at similar or higher concentration
J = Estimated concentration

Additional upstream sampling will be required if groundwater/surface water linkages in the Queen City Farms/Stoneway Gravel area are to be understood. Use of cation/anion analyses and volatile organic analyses may be most helpful in establishing these relationships.

The diversion of surface water from springs on the Stoneway Gravel property may pose a problem, as summer low flows in the unnamed creek are inadequate to maintain the stream. Salmonids apparently spawn in the stream although it is doubtful that the fry survive through summers as dry as 1987.

BY:cp
Attachments

cc: Gary Brugger
Carol Fleskes
Phyllis Baas
Michael Ruef
Dale Norton

REFERENCES

Brugger, G., 1987. Letter to Bill Yake, "Contaminated Stream at 17115 Cedar Grove Road, Issaquah, Washington," dated June 17, 1987, 2 pp.

Hart Crowser & Associates, Inc., 1983. Assessment of Hydrogeology and Ground Water Quality; Surficial Aquifer; Queen City Farms; King Co., Wa. 12 pp + Appendices

Hawley, G.G., 1977. The Condensed Chemical Dictionary. Van Nostrand Reinhold Co. 957 pp.

NIOSH, 1983. Registry of Toxic Effects of Chemical Substances. V.3, 988 pp.

Ruef, M., 1987. Memorandum to Phyllis Baas, "Field Reconnaissance in the Stoneway Gravel Pit and the Area South of Queen City Lake," dated July 9, 1987, 3 pp.

APPENDIX

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Post Office Box 346 • Manchester, Washington 98353-0346 • (206) 895-4740

M E M O R A N D U M

August 6, 1987

To: Bill Yake

From: Margaret Stinson

Re: Queen City Farms - Sample #30-8001
Daphnid Bioassay

Introduction

A bioassay was conducted on one sample from a stream that flows through Queen City Farms. Queen City Farms, formerly a chemical disposal site, has been the object of an extensive cleanup effort. Despite those efforts, there is concern that toxic compounds may still be present, causing contamination within the stream. The purpose of the test was to assess the stream water's toxicity to aquatic life. Acute toxicity to *Daphnia pulex* was measured.

Methods

The sample was collected July 21, 1987, as a grab, and was held on ice until delivery at Manchester Environmental Laboratory the following day. The test was initiated July 22, 1987.

The test was conducted by the method described in the U.S. EPA (1985) "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms." Two hundred milliliters of test solution was placed in each of five two hundred fifty milliliter beakers. Five daphnids (less than 24 hours old) were randomly distributed to four of the five beakers. Food was added to each replicate and the beakers were placed in a 20 degree C incubator. The fifth beaker was used as a "dummy" for measurement of dissolved oxygen, pH, conductivity, hardness, and alkalinity at the beginning of the test.

Test organisms were challenged with 100% concentration of the effluent. Dechlorinated Manchester city water, adjusted to 80-90 mg/L $CaCO_3$ hardness and aerated, was used as a control.

After forty eight hours, the daphnids in each replicate were counted and percent survival was recorded. All chemical analyses performed at 0 hour were also conducted at 48 hours.

Results

Both the Queen City sample and the control supported 100% of the organisms after 48 hours exposure. Test results are tabulated in Table 1.

Table 1. Results of bioassay for Queen City Farms using *Daphnia pulex*.

Sample	Percent Survival	pH		Dissolved Oxygen (mg/L)		Alkalinity (mg/L CaCO3)		Hardness (mg/L CaCO3)		Conductivity (umhos/cm)	
		0 hr	48 hr	0 hr	48 hr	0 hr	48 hr	0 hr	48 hr	0 hr	48 hr
30-8001	100	7.4	7.5	9.4	8.1	31	34	30	34	91	96
Control	100	7.9	7.8	8.6	8.1	60	59	82	82	303	297

EPA Region X Lab Management System
Sample/Project Analysis Results

Project: DOE-590A QUEEN CITY FARMS, MAPLE VALLEY Officer: WEY Account: 422

Sample No: 87 308001 Begin Sample Date: 87/07/21 : Source: Ambient Stream/River Depth: QA Code:

Laboratory: WE Description: 1

Gen Inorg/Phys-Speci Parameter		Water-Total Result	Units
Cond@25C	Meter	90	umho/cm
pH LAB	Meter	7.4	Std Unts
Alk-Tot	CaCO3	32	mg/l
Alk-HCO3	CaCO3	32	mg/l
Alk-CO3	CaCO3	0.1	mg/l
Hard-Tot	CaCO3	46	mg/l
Turbidty	Meter	8	NTU

Solids - Specified Parameter		Water-Total Result	Units
Solids	T-Suspen	1	mg/l

Nutrients - Specifie Parameter		Water-Total Result	Units
NH3-N	Total	.01K	mg/l
NO2NO3-N	Total	.10	mg/l
Phos	Total	.01	mg/l

Metals - Specified Parameter		Water-Total Result	Units
Calcium	Ca-Total	11.5	mg/l
Mgnsium	Mg-Total	2.2	mg/l
Sodium	Na-Total	4.11	mg/l
Potssium	K -Total	1.6	mg/l

Metals - Total Recov Parameter		Water-Total Result	Units
Nickel	Tot-Rec	5U	ug/l
Zinc	Tot-Rec	5U	ug/l
Cadmium	Tot-Rec	0.2U	ug/l
Lead	Tot-Rec	1U	ug/l
Chromium	Tot-Rec	5U	ug/l
Copper	Tot-Rec	5U	ug/l
Mangnese	Tot-Rec	14	ug/l
Mercury	Tot-Rec	0.05U	ug/l
Arsenic	Tot-Rec	1U	ug/l
Iron	Tot-Rec	435	ug/l

VOA - PP Scan (GCMS) Parameter	Water-Total Result	Units
Carbon Tetrachloride	5U	ug/l
Acetone	0.7UJ	ug/l
Chloroform	5U	ug/l
Benzene	5U	ug/l
1,1,1-Trichloroethane	5U	ug/l
Bromomethane	10U	ug/l
Chloromethane	10U	ug/l
Chloroethane	10U	ug/l
Vinyl Chloride	10U	ug/l
Methylene Chloride	3UJ	ug/l
Carbon Disulfide	5U	ug/l
Bromoform	5U	ug/l
Bromodichloromethane	5U	ug/l
1,1-Dichloroethane	5U	ug/l
1,1-Dichloroethene	5U	ug/l
Trichlorofluoromethane	5U	ug/l
1,2-Dichloropropane	5U	ug/l
2-Butanone	10U	ug/l
1,1,2-Trichloroethane	5U	ug/l
Trichloroethene	5U	ug/l
1,1,2,2-Tetrachloroetha	10U	ug/l
Total Xylenes	5U	ug/l
Ethylbenzene	5U	ug/l
Styrene	0.1J	ug/l
1,2-Dichloroethane	5U	ug/l
Vinyl Acetate	10U	ug/l
4-Methyl-2-Pentanone	10	ug/l
Toluene	0.1UJ	ug/l
Chlorobenzene	5U	ug/l
Dibromochloromethane	5U	ug/l
Tetrachloroethene	5U	ug/l
Cis-1,2-Dichloroethene	5U	ug/l
trans-1,2-Dichloroethen	5U	ug/l
2-Hexanone	10U	ug/l
cis-1,3-Dichloropropene	5U	ug/l
trans-1,3-Dichloroprope	5U	ug/l
Spike D4-1,2-Dichloroet	149%	% Recov
Spike 1,4-Bromofluorobe	104%	% Recov
Spike D8-Toluene	100%	% Recov

B/N/Acid Scan Parameter	Water-Total Result	Units
Benzo(a)pyrene	5U	ug/l
2,4-Dinitrophenol	25U	ug/l
Dibenzo(a,h)anthracene	5U	ug/l
Benzo(a)anthracene	5U	ug/l
4-Chloro-3-Methylphenol	5U	ug/l
Benzoic acid	25U	ug/l
Hexachloroethane	5U	ug/l
Hexachlorocyclopentadie	5U	ug/l
Isophorone	5U	ug/l
Acenaphthene	5U	ug/l
Diethylphthalate	5U	ug/l
Di-n-Butylphthalate	5U	ug/l
Phenanthrene	5U	ug/l
Butylbenzylphthalate	5U	ug/l
N-Nitrosodiphenylamine	5U	ug/l
Fluorene	5U	ug/l
Hexachlorobutadiene	5U	ug/l
Pentachlorophenol	25U	ug/l
2,4,6-Trichlorophenol	5U	ug/l
2-Nitroaniline	25U	ug/l
2-Nitrophenol	5U	ug/l
Naphthalene	5U	ug/l
2-Methylnaphthalene	5U	ug/l
2-Chloronaphthalene	5U	ug/l
3,3'-Dichlorobenzidine	10U	ug/l
2-Methylphenol	5U	ug/l
1,2-Dichlorobenzene	5U	ug/l
o-Chlorophenol	5U	ug/l
2,4,5-Trichlorophenol	25U	ug/l
Nitrobenzene	5U	ug/l
3-Nitroaniline	25U	ug/l
4-Nitroaniline	25U	ug/l
4-Nitrophenol	25U	ug/l
Benzyl Alcohol	5U	ug/l
4-Bromophenyl-phenyleth	5U	ug/l
2,4-Dimethylphenol	5U	ug/l
4-Methylphenol	5U	ug/l
1,4-Dichlorobenzene	5U	ug/l
4-Chloroaniline	5U	ug/l
Phenol	5U	ug/l
bis(2-Chloroethyl)Ether	5U	ug/l
bis(2-Chloroethoxy)Meth	5U	ug/l
bis(2-Ethylhexyl)Phthal	5U	ug/l
Di-n-Octyl Phthalate	5U	ug/l
Hexachlorobenzene	5U	ug/l

(Continued on next page)

Project: DOE-590A QUEEN CITY FARMS, MAPLE VALLEY Officer: WEY Account: 422

Sample No: 87 308001 Begin Sample Date: 87/07/21 : Source: Ambient Stream/River Depth: QA Code:

Laboratory: WE Description: 1

B/N/Acid Scan *** Continued *** Parameter	Water-Total Result	Units
Anthracene	5U	ug/l
1,2,4-Trichlorobenzene	5U	ug/l
2,4-Dichlorophenol	5U	ug/l
2,4-Dinitrotoluene	5U	ug/l
Pyrene	5U	ug/l
Dimethylphthalate	5U	ug/l
Dibenzofuran	5U	ug/l
Benzo(ghi)perylene	5U	ug/l
Indeno(1,2,3-cd)pyrene	5U	ug/l
Benzo(b)fluoranthene	5U	ug/l
Fluoranthene	5U	ug/l
Benzo(k)fluoranthene	5U	ug/l
Acenaphthylene	5U	ug/l
Chrysene	5U	ug/l
4,6-Dinitro-2-methylphe	25U	ug/l
1,3-Dichlorobenzene	5U	ug/l
2,6-Dinitrotoluene	5U	ug/l
N-Nitroso-di-n-Propylam	5U	ug/l
Spike D5-Phenol	55%	ug/l
Spike D10-Pyrene	94%	ug/l
Spike 2-Fluorophenol	69%	ug/l
Spike D5-Nitrobenzene	90%	ug/l
Spike 2-Fluorobiphenyl	101%	ug/l
Spike D14-Terphenyl	159%	ug/l
4-Chlorophenyl-phenylet	5U	ug/l
bis(2-Chloroisopropyl)E	5U	ug/l

Pest/PCB - PP Scan *** Continued *** Parameter	Water-Total Result	Units
Heptachlor epoxide	.001U	ug/l
Endosulfan sulfate	.001U	ug/l
Endrin aldehyde	.001U	ug/l
Toxaphene	.060U	ug/l
PCB - 1260	.020U	ug/l
PCB - 1254	.020U	ug/l
PCB - 1221	.020U	ug/l
PCB - 1232	.020U	ug/l
PCB - 1248	.020U	ug/l
PCB - 1016	.020U	ug/l
beta-Endosulfan	.001U	ug/l
PCB - 1242	.020U	ug/l
Spike o,p'-DDE	89%	% Recov

Ion Chromatography Parameter	Water-Total Result	Units
Chloride	2.8	mg/l
Sulfate Total	9.0	mg/l

Microbiological Parameter	Water-Total Result	Units
Coliform Fecal	57	#/100mL

Pest/PCB - PP Scan Parameter	Water-Total Result	Units
4,4'-DDT	.001U	ug/l
Chlordane	.001U	ug/l
gamma-BHC (Lindane)	.001U	ug/l
Dieldrin	.001U	ug/l
Endrin	.001U	ug/l
4,4'-DDD	.001U	ug/l
4,4'-DDE	.001U	ug/l
Heptachlor	.001U	ug/l
Aldrin	.001U	ug/l
alpha-BHC	.001U	ug/l
beta-BHC	.001U	ug/l
delta-BHC	.001U	ug/l
alpha-Endosulfan	.001U	ug/l

(Sample Complete)

Project: DOE-590A QUEEN CITY FARMS, MAPLE VALLEY Officer: WEY Account: 422

Sample No: 87 308003 Begin Sample Date: 87/07/21 : Source: Ambient Stream/River Depth: QA Code:

Laboratory: WE Description: B1

Metals - Total Recov Parameter		Water-Total Result	Units
Nickel	Tot-Rec	5U	ug/l
Zinc	Tot-Rec	5U	ug/l
Cadmium	Tot-Rec	0.2U	ug/l
Lead	Tot-Rec	1U	ug/l
Chromium	Tot-Rec	5U	ug/l
Copper	Tot-Rec	5U	ug/l
Mangnese	Tot-Rec	5U	ug/l
Mercury	Tot-Rec	0.05U	ug/l
Arsenic	Tot-Rec	1	ug/l
Iron	Tot-Rec	10U	ug/l

VOA - PP Scan (GCMS) Parameter	Water-Total Result	Units
Carbon Tetrachloride	5U	ug/l
Acetone	1UJ	ug/l
Chloroform	5U	ug/l
Benzene	5U	ug/l
1,1,1-Trichloroethane	5U	ug/l
Bromomethane	10U	ug/l
Chloromethane	10U	ug/l
Chloroethane	10U	ug/l
Vinyl Chloride	10U	ug/l
Methylene Chloride	4UJ	ug/l
Carbon Disulfide	5U	ug/l
Bromoform	5U	ug/l
Bromodichloromethane	5U	ug/l
1,1-Dichloroethane	5U	ug/l
1,1-Dichloroethene	5U	ug/l
Trichlorofluoromethane	0.6J	ug/l
1,2-Dichloropropane	5U	ug/l
2-Butanone	4UJ	ug/l
1,1,2-Trichloroethane	5U	ug/l
Trichloroethene	5U	ug/l
1,1,2,2-Tetrachloroetha	10U	ug/l
Total Xylenes	5U	ug/l
Ethylbenzene	5U	ug/l
Styrene	5U	ug/l
1,2-Dichloroethane	5U	ug/l
Vinyl Acetate	10U	ug/l
4-Methyl-2-Pentanone	10U	ug/l
Toluene	5U	ug/l
Chlorobenzene	5U	ug/l
Dibromochloromethane	5U	ug/l

VOA - PP Scan (GCMS) *** Continued *** Parameter	Water-Total Result	Units
Tetrachloroethene	5U	ug/l
Cis-1,2-Dichloroethene	5U	ug/l
trans-1,2-Dichloroethen	5U	ug/l
2-Hexanone	10U	ug/l
cis-1,3-Dichloropropene	5U	ug/l
trans-1,3-Dichloroprope	5U	ug/l
Spike D4-1,2-Dichloroet	143%	% Recov
Spike 1,4-Bromofluorobe	102%	% Recov
Spike D8-Toluene	102%	% Recov

B/N/Acid Scan Parameter	Water-Total Result	Units
Benzo(a)pyrene	3U	ug/l
2,4-Dinitrophenol	17U	ug/l
Dibenzo(a,h)anthracene	3U	ug/l
Benzo(a)anthracene	3U	ug/l
4-Chloro-3-Methylphenol	3U	ug/l
Benzoic acid	17U	ug/l
Hexachloroethane	3U	ug/l
Hexachlorocyclopentadie	3U	ug/l
Isophorone	3U	ug/l
Acenaphthene	3U	ug/l
Diethylphthalate	3U	ug/l
Di-n-Butylphthalate	3U	ug/l
Phenanthrene	3U	ug/l
Butylbenzylphthalate	3U	ug/l
N-Nitrosodiphenylamine	3U	ug/l
Fluorene	3U	ug/l
Hexachlorobutadiene	3U	ug/l
Pentachlorophenol	17U	ug/l
2,4,6-Trichlorophenol	3U	ug/l
2-Nitroaniline	17U	ug/l
2-Nitrophenol	3U	ug/l
Naphthalene	3U	ug/l
2-Methylnaphthalene	3U	ug/l
2-Chloronaphthalene	3U	ug/l
3,3'-Dichlorobenzidine	7U	ug/l
2-Methylphenol	3U	ug/l
1,2-Dichlorobenzene	3U	ug/l
o-Chlorophenol	3U	ug/l
2,4,5-Trichlorophenol	17U	ug/l
Nitrobenzene	3U	ug/l

B/N/Acid Scan *** Continued *** Parameter	Water-Total Result	Units
3-Nitroaniline	17U	ug/l
4-Nitroaniline	17U	ug/l
4-Nitrophenol	17U	ug/l
Benzyl Alcohol	3U	ug/l
4-Bromophenyl-phenyleth	3U	ug/l
2,4-Dimethylphenol	3U	ug/l
4-Methylphenol	3U	ug/l
1,4-Dichlorobenzene	3U	ug/l
4-Chloroaniline	3U	ug/l
Phenol	3U	ug/l
bis(2-Chloroethyl)Ether	3U	ug/l
bis(2-Chloroethoxy)Meth	3U	ug/l
bis(2-Ethylhexyl)Phthal	3U	ug/l
Di-n-Octyl Phthalate	3U	ug/l
Hexachlorobenzene	3U	ug/l
Anthracene	3U	ug/l
1,2,4-Trichlorobenzene	3U	ug/l
2,4-Dichlorophenol	3U	ug/l
2,4-Dinitrotoluene	3U	ug/l
Pyrene	3U	ug/l
Dimethylphthalate	3U	ug/l
Dibenzofuran	3U	ug/l
Benzo(ghi)perylene	3U	ug/l
Indeno(1,2,3-cd)pyrene	3U	ug/l
Benzo(b)fluoranthene	3U	ug/l
Fluoranthene	3U	ug/l
Benzo(k)fluoranthene	3U	ug/l
Acenaphthylene	3U	ug/l
Chrysene	3U	ug/l
4,6-Dinitro-2-methylphe	17U	ug/l
1,3-Dichlorobenzene	3U	ug/l
2,6-Dinitrotoluene	3U	ug/l
N-Nitroso-di-n-Propylam	3U	ug/l
Spike D5-Phenol	36%	ug/l
Spike D10-Pyrene	94%	ug/l
Spike 2-Fluorophenol	46%	ug/l
Spike D5-Nitrobenzene	94%	ug/l
Spike 2-Fluorobiphenyl	105%	ug/l
Spike D14-Terphenyl	158%	ug/l
4-Chlorophenyl-phenylet	3U	ug/l
bis(2-Chloroisopropyl)E	3U	ug/l

(Continued on next page)

Project: DOE-590A QUEEN CITY FARMS, MAPLE VALLEY Officer: WEY Account: 422

Sample No: 87 308003 Begin Sample Date: 87/07/21 : Source: Ambient Stream/River Depth: QA Code:

Laboratory: WE Description: B1

Pest/PCB - PP Scan Parameter	Water-Total Result	Units
4,4'-DDT	.001U	ug/l
Chlordane	.001U	ug/l
gamma-BHC (Lindane)	.001U	ug/l
Dieldrin	.001U	ug/l
Endrin	.001U	ug/l
4,4'-DDD	.001U	ug/l
4,4'-DDE	.001U	ug/l
Heptachlor	.001U	ug/l
Aldrin	.001U	ug/l
alpha-BHC	.001U	ug/l
beta-BHC	.001U	ug/l
delta-BHC	.001U	ug/l
alpha-Endosulfan	.001U	ug/l
Heptachlor epoxide	.001U	ug/l
Endosulfan sulfate	.001U	ug/l
Endrin aldehyde	.001U	ug/l
Toxaphene	.060U	ug/l
PCB - 1260	.020U	ug/l
PCB - 1254	.020U	ug/l
PCB - 1221	.020U	ug/l
PCB - 1232	.020U	ug/l
PCB - 1248	.020U	ug/l
PCB - 1016	.020U	ug/l
beta-Endosulfan	.001U	ug/l
PCB - 1242	.020U	ug/l
Spike o,p'-DDE	84%	% Recov

(Sample Complete)

Project: DOE-590A QUEEN CITY FARMS, MAPLE VALLEY Officer: WEY Account: 422

Sample No: 87 308004 Begin Sample Date: 87/07/21 : Source: Ambient Stream/River Depth: QA Code:

Laboratory: WE Description: B2

VOA - PP Scan (GCMS) Parameter	Water-Total Result	Units
Carbon Tetrachloride	5U	ug/l
Acetone	3UJ	ug/l
Chloroform	5U	ug/l
Benzene	5U	ug/l
1,1,1-Trichloroethane	5U	ug/l
Bromomethane	10U	ug/l
Chloromethane	10U	ug/l
Chloroethane	10U	ug/l
Vinyl Chloride	10U	ug/l
Methylene Chloride	4UJ	ug/l
Carbon Disulfide	5U	ug/l
Bromoform	5U	ug/l
Bromodichloromethane	5U	ug/l
1,1-Dichloroethane	5U	ug/l
1,1-Dichloroethene	5U	ug/l
Trichlorofluoromethane	5U	ug/l
1,2-Dichloropropane	5U	ug/l
2-Butanone	6UJ	ug/l
1,1,2-Trichloroethane	5U	ug/l
Trichloroethene	5U	ug/l
1,1,2,2-Tetrachloroetha	10U	ug/l
Total Xylenes	5U	ug/l
Ethylbenzene	5U	ug/l
Styrene	5U	ug/l
1,2-Dichloroethane	5U	ug/l
Vinyl Acetate	10U	ug/l
4-Methyl-2-Pentanone	1UJ	ug/l
Toluene	0.1UJ	ug/l
Chlorobenzene	5U	ug/l
Dibromochloromethane	5U	ug/l
Tetrachloroethene	5U	ug/l
Cis-1,2-Dichloroethene	5U	ug/l
trans-1,2-Dichloroethen	5U	ug/l
2-Hexanone	1UJ	ug/l
cis-1,3-Dichloropropene	5U	ug/l
trans-1,3-Dichloroprope	5U	ug/l
Spike D4-1,2-Dichloroet	138%	% Recov
Spike 1,4-Bromofluorobe	100%	% Recov
Spike D8-Toluene	104%	% Recov

B/N/Acid Scan Parameter	Water-Total Result	Units
Benzo(a)pyrene	3U	ug/l
2,4-Dinitrophenol	16U	ug/l
Dibenzo(a,h)anthracene	3U	ug/l
Benzo(a)anthracene	3U	ug/l
4-Chloro-3-Methylphenol	3U	ug/l
Benzoic acid	16U	ug/l
Hexachloroethane	3U	ug/l
Hexachlorocyclopentadie	3U	ug/l
Isophorone	3U	ug/l
Acenaphthene	3U	ug/l
Diethylphthalate	3U	ug/l
Di-n-Butylphthalate	3U	ug/l
Phenanthrene	3U	ug/l
Butylbenzylphthalate	3U	ug/l
N-Nitrosodiphenylamine	3U	ug/l
Fluorene	3U	ug/l
Hexachlorobutadiene	3U	ug/l
Pentachlorophenol	16U	ug/l
2,4,6-Trichlorophenol	3U	ug/l
2-Nitroaniline	16U	ug/l
2-Nitrophenol	3U	ug/l
Naphthalene	3U	ug/l
2-Methylnaphthalene	3U	ug/l
2-Chloronaphthalene	3U	ug/l
3,3'-Dichlorobenzidine	6U	ug/l
2-Methylphenol	3U	ug/l
1,2-Dichlorobenzene	3U	ug/l
o-Chlorophenol	3U	ug/l
2,4,5-Trichlorophenol	16U	ug/l
Nitrobenzene	3U	ug/l
3-Nitroaniline	16U	ug/l
4-Nitroaniline	16U	ug/l
4-Nitrophenol	16U	ug/l
Benzyl Alcohol	3U	ug/l
4-Bromophenyl-phenyleth	3U	ug/l
2,4-Dimethylphenol	3U	ug/l
4-Methylphenol	3U	ug/l
1,4-Dichlorobenzene	3U	ug/l
4-Chloroaniline	3U	ug/l
Phenol	3U	ug/l
bis(2-Chloroethyl)Ether	3U	ug/l
bis(2-Chloroethoxy)Meth	3U	ug/l
bis(2-Ethylhexyl)Phthal	3U	ug/l
Di-n-Octyl Phthalate	3U	ug/l
Hexachlorobenzene	3U	ug/l

B/N/Acid Scan *** Continued *** Parameter	Water-Total Result	Units
Anthracene	3U	ug/l
1,2,4-Trichlorobenzene	3U	ug/l
2,4-Dichlorophenol	3U	ug/l
2,4-Dinitrotoluene	3U	ug/l
Pyrene	3U	ug/l
Dimethylphthalate	3U	ug/l
Dibenzofuran	3U	ug/l
Benzo(ghi)perylene	3U	ug/l
Indeno(1,2,3-cd)pyrene	3U	ug/l
Benzo(b)fluoranthene	3U	ug/l
Fluoranthene	3U	ug/l
Benzo(k)fluoranthene	3U	ug/l
Acenaphthylene	3U	ug/l
Chrysene	3U	ug/l
4,6-Dinitro-2-methylphe	16U	ug/l
1,3-Dichlorobenzene	3U	ug/l
2,6-Dinitrotoluene	3U	ug/l
N-Nitroso-di-n-Propylam	3U	ug/l
Spike D5-Phenol	29%	ug/l
Spike D10-Pyrene	77%	ug/l
Spike 2-Fluorophenol	43%	ug/l
Spike D5-Nitrobenzene	95%	ug/l
Spike 2-Fluorobiphenyl	97%	ug/l
Spike D14-Terphenyl	360%	ug/l
4-Chlorophenyl-phenylet	3U	ug/l
bis(2-Chloroisopropyl)E	3U	ug/l

Pest/PCB - PP Scan Parameter	Water-Total Result	Units
4,4'-DDT	.001U	ug/l
Chlordane	.001U	ug/l
gamma-BHC (Lindane)	.001U	ug/l
Dieldrin	.001U	ug/l
Endrin	.001U	ug/l
4,4'-DDD	.001U	ug/l
4,4'-DDE	.001U	ug/l
Heptachlor	.001U	ug/l
Aldrin	.001U	ug/l
alpha-BHC	.001U	ug/l
beta-BHC	.001U	ug/l
delta-BHC	.001U	ug/l
alpha-Endosulfan	.001U	ug/l

(Continued on next page)

Project: DOE-590A QUEEN CITY FARMS, MAPLE VALLEY Officer: WEY Account: 422

Sample No: 87 308004 Begin Sample Date: 87/07/21 : Source: Ambient Stream/River Depth: QA Code:

Laboratory: WE Description: B2

Pest/PCB - PP Scan Water-Total
*** Continued ***

Parameter	Result	Units
Heptachlor epoxide	.001U	ug/l
Endosulfan sulfate	.001U	ug/l
Endrin aldehyde	.001U	ug/l
Toxaphene	.060U	ug/l
PCB - 1260	.020U	ug/l
PCB - 1254	.020U	ug/l
PCB - 1221	.020U	ug/l
PCB - 1232	.020U	ug/l
PCB - 1248	.020U	ug/l
PCB - 1016	.020U	ug/l
beta-Endosulfan	.001U	ug/l
PCB - 1242	.020U	ug/l
Spike o,p'-DDE	76%	% Recov

(Sample Complete)