92-e48

WA-28-1020GW

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

7171 Cleanwater Lane, Building 8, P.O. Box 47710 • Olympia, Washington 98504-7710

October 5, 1992

TO: Megan White
Toxics Cleanup Program, SWRO

FROM: Pam Marti PBM
Environmental Investigations and Laboratory Services Program

SUBJECT: Toftdahl Drum Long-term Monitoring Round V

The attached memo summarizes the findings from the latest sampling at the Toftdahl Drum site, Round V conducted on April 14, 1992. Low concentrations of lead, copper, and zinc were detected in the domestic wells. These concentrations were all well below state and federal drinking water standards and state ground water quality standards. Observed concentrations are consistent with previous sampling results; copper and zinc are the only analytes that are regularly detected in the private wells. These occurrences are probably related to well construction and plumbing materials. Volatile organics were also tested for during this round, none were detected. I am sending letters to the homeowners describing their results. I will be conducting Sample Round VI in April 1993. If you have any questions or comments, please call me at 586-8138.

PM:krc

cc: Lynn Singleton
D.J. Patin
Bill Yake
Kathy Reed, TCP Library
Bob Kievit, EPA

TOFTDAHL DRUM SITE
GROUND WATER MONITORING ROUND V
APRIL 14, 1992

by Pamela B. Marti
October 5, 1992

Washington State Department of Ecology
Environmental Investigations and Laboratory Services Program
Toxics, Compliance and Ground Water Investigations Section
Olympia, Washington 98504-7710

Water Body No. WA-28-1020-GW
(Segment No. 13-28-GW)

SUMMARY

Ground water samples were collected from four domestic water supply wells located near the former Toftdahl Drum Site on April 14, 1992. This sampling was part of the routine ground water monitoring conducted at the site since 1987. Low concentrations of lead, copper, and zinc were detected in the domestic wells. These concentrations were all well below state and federal drinking water standards and state ground water quality standards. Volatile organic samples were collected and analyzed for this round, none were detected. Observed concentrations are consistent with previous sampling results; copper and zinc are the only analytes that are regularly detected in the private wells. These occurrences are probably related to well construction and plumbing materials.

OBJECTIVES

The Toxics, Compliance and Ground Water Investigations Section was requested by the Toxics Cleanup Program (TCP) to monitor ground water at the Toftdahl Drum Site as required by the federally mandated Record of Decision (ROD). Monitoring objectives are as follows:

1. Provide routine ground water monitoring data for select metals (chromium, copper, lead, and zinc) annually for ten years, ending in April 2001; and

2. Determine future sampling needs at the completion of each sampling event.

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333 Ninth Ave. North
Seattle, WA 98109-5187
(206) 621-6490
(206) 621-7523 (FAX)

ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491AMSD
Matrix: Waters

Sample: 168050
Matrix Spike Duplicate
QC Report No: A491-WDOE
Project: Toftdahl Drum Site

Data Release Authorized:
Report: 04/29/92 MAC:C pat

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/23/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	-
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1:0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	-
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	-
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	-
108-90-7	Chlorobenzene	-
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	102%
Bromofluorobenzene	99.1%
d4-1,2-Dichloroethane	106%

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: Method Blank

Lab ID: MB0423
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: NA

Data Release Authorized: Ron B. Patton
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491AMS
Matrix: Waters

Sample: 168050
Matrix Spike
QC Report No: A491-WDOE
Project: Toftdahl Drum Site

Data Release Authorized:
Report: 04/29/92 MAC:C pat

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/23/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	-
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	-
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	-
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	-
108-90-7	Chlorobenzene	-
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	103%
Bromofluorobenzene	99.1%
d4-1,2-Dichloroethane	104%

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: Method Blank

Lab ID: MB0422
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: NA

Data Release Authorized:
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
3					
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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: MB0423
Matrix: Waters

Data Release Authorized:
Report: 04/29/92 MAC:C pat

Sample: Method Blank

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

VTSR: NA

Instrument: FINN 3
Date Analyzed: 04/23/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	104%
Bromofluorobenzene	98.1%
d4-1,2-Dichloroethane	102%

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VOLATILE METHOD BLANK SUMMARY

ARI Job No: A491
Lab Sample ID: F3MB0423
Date Analyzed: 04/23/92
Matrix: Waters
Instrument ID: FINN 3

Client: WDOE
Project: Toftdanl
Drum Site

Time Analyzed: 10:11
Level: Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS,MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Time Analyzed
168050 MS	A491AMS	F3A491AMS	11:14
168050 MSD	A491AMSD	F3A491AMSD	12:26

Comments:

FORM IV VOA

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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: MB0422
Matrix: Waters

Data Release Authorized:
Report: 04/29/92 MAC:C pat

Sample: Method Blank

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

VTSR: NA

Instrument: FINN 3
Date Analyzed: 04/22/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	106%
Bromofluorobenzene	93.0%
d4-1,2-Dichloroethane	98.4%

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WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

ARI Job No: A491

Client: WDOE
Project: Toftdahl Drum Site

Sample No: 168050

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONC (µg/L)	MS CONC (µg/L)	MS % REC	QC LIMITS REC
1,1-Dichloroethene	50.0	0.0	55.3	111	61-145
Trichloroethene	50.0	0.0	50.0	100	71-120
Benzene	50.0	0.0	54.6	109	76-127
Toluene	50.0	0.0	54.8	110	76-125
Chlorobenzene	50.0	0.0	53.9	108	75-130

COMPOUND	SPIKE ADDED (µg/L)	MSD CONC (µg/L)	MSD % REC	% RPD	Q C LIMITS	
					RPD	REC
1,1-Dichloroethene	50.0	52.5	105	5.2	14	61-145
Trichloroethene	50.0	48.1	96.1	3.9	14	71-120
Benzene	50.0	52.8	106	3.4	11	76-127
Toluene	50.0	50.8	102	7.5	13	76-125
Chlorobenzene	50.0	50.1	100	7.3	13	75-130

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

Asterisked values outside QC Limits

Comments: *QC Limits taken from CLP OLM01.6 (June 1991)*

DBP

Report prepared: 04/24/92 MAC:C pat

FORM III VOA-1

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VOLATILE METHOD BLANK SUMMARY

ARI Job No: A491
Lab Sample ID: F3MB0422
Date Analyzed: 04/22/92
Matrix: Waters
Instrument ID: FINN 3

Client: WDOE
Project: Toftdahl
Drum Site

Time Analyzed: 11:06
Level: Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS,MSD:

Client Sample ID	Lab Sample ID	Lab File ID	Time Analyzed
168050	A491A	F3A491A	16:49
168051	A491B	F3A491B	17:18
168052	A491C	F3A491C	17:47
168053	A491D	F3A491D	18:15
168054	A491E	F3A491E	18:44
168055	A491F	F3A491F	19:13

Comments:

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(206) 621-7523 (FAX)

ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168055

Lab ID: A491F
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: 04/17/92

Data Release Authorized:
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
3					
4					
5					
6					
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WATER VOLATILE SURROGATE RECOVERY

ARI Job No: A491

Client: WDOE
Project: Toftdahl
Drum Site

Client Sample ID	S1 (TOL)	S2 (BFB)	S3 (DCE)	Other	TOT OUT
Method Blank	106	93.0	98.4		0
168050	104	95.5	99.0		0
168051	105	95.8	103		0
168052	108	95.5	107		0
168053	106	96.3	109		0
168054	109	94.9	111		0
168055	104	96.7	108		0
Method Blank	104	98.1	102		0
168050 MS	103	99.1	104		0
168050 MSD	102	99.1	106		0

	QC LIMITS
S1 (TOL)=Toluene-d8	(88-110)
S2 (BFB=Bromofluorobenzene	(86-115)
S3 (DCE)=1,2-Dichloroethane-d4	(76-114)

Asterisked values outside QC Limits

FORM II VOA-1

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168054

Lab ID: A491E
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: 04/17/92

Data Release Authorized:
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
3					
4					
5					
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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491F
Matrix: Waters

Sample: 168055

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

Data Release Authorized:
Report: 04/29/92 MAC:C pat

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/22/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	104%
Bromofluorobenzene	96.7%
d4-1,2-Dichloroethane	108%

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168053

Lab ID: A491D
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: 04/17/92

Data Release Authorized:
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
3					
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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491E
Matrix: Waters

Sample: 168054

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

Data Release Authorized:
Report: 04/29/92 MAC:C pat

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/22/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	109%
Bromofluorobenzene	94.9%
d4-1,2-Dichloroethane	111%

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168052

Lab ID: A491C
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: 04/17/92

Data Release Authorized:
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
3					
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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491D
Matrix: Waters

Sample: 168053

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

Data Release Authorized:
Report: 04/29/92 MAC:C pat

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/22/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	106%
Bromofluorobenzene	96.3%
d4-1,2-Dichloroethane	109%

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168051

Lab ID: A491B
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: 04/17/92

Data Release Authorized:
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
3					
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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491C
Matrix: Waters

Data Release Authorized:
Report: 04/29/92 MAC:C pat

Sample: 168052

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/22/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	108%
Bromofluorobenzene	95.5%
d4-1,2-Dichloroethane	107%

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168050

Lab ID: A491A
Matrix: Waters

QC Report No: A491-WDOE
Project No: Toftdahl Drum Site
Date Received: 04/17/92

Data Release Authorized:
Report prepared: 04/30/92 - MAC:C PAT

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No Unknown peaks >10% IS peak height	VOA	-	-
2					
3					
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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491B
Matrix: Waters

Sample: 168051

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

Data Release Authorized: _____
Report: 04/29/92 MAC:C pat

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/22/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	105%
Bromofluorobenzene	95.8%
d4-1,2-Dichloroethane	103%

14 May 1992

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(206) 621-7523 (FAX)

Stuart Magoon
Washington State Dept. of Ecology
P.O. Box 307
Manchester, WA 98353

RE: Project 'Toftdahl Drum Site' - ARI Job #A491

Dear Stuart,

Please find enclosed the reports for the above referenced samples received 04/16/91 for volatile analysis only. These samples were received in good condition with no discrepancies in paperwork.

Analysis was performed on Finn 3 which met all requirements for tuning and calibration under EPA CLP protocols. Samples were found to be clean, containing no target compounds and no unknowns above detection limits.

This data package has been presented in a format similar to that required under EPA-CLP protocols. A copy of this data package will be kept on file by ARI should you need the information.

If you have questions, please feel free to call me at any time.

Sincerely,

ANALYTICAL RESOURCES, INC.

Susan D. Rosa Dunnihoo
Project Manager

Enclosures

cc: File A491

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ORGANICS ANALYSIS DATA SHEET
Volatiles by Purge & Trap GC/MS

Lab ID: A491A
Matrix: Waters

Sample: 168050

QC Report No: A491-WDOE
Project: Toftdahl Drum Site

Data Release Authorized: Ann B. Pitt
Report: 04/29/92 MAC:C pat

VTSR: 04/17/92

Instrument: FINN 3
Date Analyzed: 04/22/92

Amount Purged: 5.0 ml
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

Surrogate Recoveries

d8-Toluene	104%
Bromofluorobenzene	95.5%
d4-1,2-Dichloroethane	99.0%

State of Washington Department of Ecology
Manchester Environmental Laboratory
7411 Beach Dr. East Port Orchard WA. 98366

Data Review
April 28, 1992

Project: **Toftdahl Drum Site**

Samples: 168050 168051 168052 168053 168054 168055

Laboratory: Analytical Resources Inc. A491

By: Stuart Magoon SM

Case Summary

These samples were received at the Manchester Environmental Laboratory on April 14, 1992, and transported to Analytical Resources on April 17, 1992 for volatiles analysis.

These analyses were reviewed for qualitative and quantitative accuracy, validity, and usefulness.

There is no need to assimilate the "dilution factor" or "sample wt/vol" into the final values reported; these calculations have already been figured into the reported values.

DATA QUALIFIER DEFINITIONS

U - The analyte was not detected at or above the reported result.

UJ - The analyte was not detected at or above the reported estimated result.

J - The analyte was positively identified. the associated numerical value is an estimate.

D - The result was derived from an analysis of a sample that required a secondary dilution.

NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.

Volatiles

Sample	Date Collect	Date Extd	Date Anlz	#Days collect to ext	#Days Collect to anal
168050	4/14	NA	4/22	NA	7 of 14
168051	4/14	NA	4/22	NA	7 of 14
168052	4/14	NA	4/22	NA	7 of 14
168053	4/14	NA	4/22	NA	7 of 14
168054	4/14	NA	4/22	NA	7 of 14
168055	4/14	NA	4/22	NA	7 of 14

These samples were analyzed within the SW-846 recommended holding time.

Method Blank:

No analytes were detected in the method blank.

GC/MS Tuning and Calibration:

Calibration against Bromofluorobenzene (BFB) is acceptable for the initial calibration, continuing calibration and all associated sample analyses.

Initial Calibration:

The initial calibration met the minimum response criteria of greater than 0.05 for the average relative response.

Continuing Calibration:

The average relative response factor for all the target analytes were all above the minimums, and the percent deviation between the initial and continuing calibration standards was within the maximum of 25%, except for Chloromethane at 29%, and Vinyl Acetate at 25.1%..

Surrogates:

All surrogate recoveries for these samples, and the associated method blanks are reasonable, acceptable, and within QC limits.

Sample Data:

This data is acceptable for use.
No target or non-target (TIC's) were detected in any of these samples.

Project: DOE-0080 TOFTDAHL DRUM SITE

Officer: PZM

Account: D3P01

Blank ID: EWPB 17.59

Metals - Blank #1	Specified	Water-Total Result	Units
Lead	Pb-Total	1.0U	ug/l

Metals - Blank #1	ICP Scan	Water-Total Result	Units
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	3.0U	ug/l
Lead	Pb-Total	20U	ug/l
Zinc	Zn-Total	4.0U	ug/l

(Sample Complete)

Project: DOE-0080 TOFTDAHL DRUM SITE Officer: PZM Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 92 168054 Description: SMITH Source: Drinking Water (At tap)

Begin Date: 92/04/14 :

Metals - Specified		Water-Total Result	Units
Lead	Pb-Total	1.0U	ug/l

Metals - ICP Scan		Water-Total Result	Units
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	45.0 *	ug/l
Lead	Pb-Total	20U	ug/l
Zinc	Zn-Total	25 *	ug/l

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP

(Sample Complete)

Project: DOE-0080 TOFTDAHL DRUM SITE

Officer: PZM Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 92 168055 Description: TRANSPOR

Source: Drinking Water (At tap)

Begin Date: 92/04/14 :

Metals - Specified		Water-Total Result	Units
Lead	Pb-Total	1.0U	ug/l

Metals - ICP Scan		Water-Total Result	Units
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	3.0U	ug/l
Lead	Pb-Total	20U	ug/l
Zinc	Zn-Total	4.0U	ug/l

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP

(Sample Complete)

Washington State Department of Ecology
Sample/Project Analysis Results

Project: DOE-0080 TOFTDAHL DRUM SITE

Officer: PZM Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 92 168052 Description: HOMALA

Source: Drinking Water (At tap)

Begin Date: 92/04/14 :

Metals - Specified		Water-Total Result	Units
Lead	Pb-Total	1.0U	ug/l

Metals - ICP Scan		Water-Total Result	Units
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	7.4P*	ug/l
Lead	Pb-Total	20U	ug/l
Zinc	Zn-Total	55.4 *	ug/l

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP

(Sample Complete)

Project: DOE-0080 TOFTDAHL DRUM SITE

Officer: PZM Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 92 168053 Description: KYLE

Source: Drinking Water (At tap)

Begin Date: 92/04/14 :

Metals - Specified		Water-Total Result	Units
Lead	Pb-Total	1.0U	ug/l

Metals - ICP Scan		Water-Total Result	Units
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	45.1 *	ug/l
Lead	Pb-Total	20U	ug/l
Zinc	Zn-Total	26 *	ug/l

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP

(Sample Complete)

Washington State Department of Ecology
Sample/Project Analysis Results

Project: DOE-0080 TOFTDAHL DRUM SITE

Officer: PZM Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 92 168050 Description: BOONE

Source: Drinking Water (At tap)

Begin Date: 92/04/14 :

All lab contract Data

Metals - Specified		Water-Total Result	Units
Lead	Pb-Total	1.0U	ug/l

Metals - ICP Scan		Water-Total Result	Units
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	50.5 *	ug/l
Lead	Pb-Total	20U	ug/l
Zinc	Zn-Total	112 *	ug/l

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP

(Sample Complete)

Project: DOE-0080 TOFTDAHL DRUM SITE Officer: PZM Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 92 168051 Description: BEDOFF Source: Drinking Water (At tap)

Begin Date: 92/04/14 :

Metals - Specified		Water-Total Result	Units
Lead	Pb-Total	2.7PB*	ug/l

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP

Metals - Specified Matrix Spike #1		Water-Total Result	Units
Lead	Pb-Total	90	% Recov

Metals - Specified Matrix Spike #2		Water-Total Result	Units
Lead	Pb-Total	122	% Recov

Metals - ICP Scan		Water-Total Result	Units
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	48.8 *	ug/l
Lead	Pb-Total	20U	ug/l
Zinc	Zn-Total	4.0U	ug/l

Metals - ICP Scan Matrix Spike #1		Water-Total Result	Units
Chromium	Cr-Total	97	% Recov
Copper	Cu-Total	104	% Recov
Lead	Pb-Total	97	% Recov
Zinc	Zn-Total	102	% Recov

Metals - ICP Scan Matrix Spike #2		Water-Total Result	Units
Chromium	Cr-Total	96	% Recov
Copper	Cu-Total	102	% Recov
Lead	Pb-Total	98	% Recov
Zinc	Zn-Total	101	% Recov

(Sample Complete)

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

May 14, 1992

TO: Pam Marti

FROM: Despina Strong

SUBJECT: Toftdhal Metals Results

SAMPLE RECEIPT:

The samples from the Toftdhal project were received by the Manchester Laboratory on 4/15/92 in good condition.

HOLDING TIMES:

All analyses were performed within the specified holding times for metals analysis.

INSTRUMENT CALIBRATION:

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards were within the control limits of +/- 10%. AA calibration gave correlation coefficients greater than the criteria of 0.995. A correlation coefficient of 0.995 or higher means that the calibration is acceptable.

PROCEDURAL BLANKS:

The procedural blanks associated with these samples showed no detectable levels of analytes.

SPIKED SAMPLE ANALYSIS:

Spiked sample and duplicate spiked sample analysis were performed on sample number(168051). All spike recoveries were within the acceptable limits of +/- 25% for water sample analysis.

PRECISION DATA:

The duplicate results of the spiked and duplicate spiked sample were used to calculate precision related to the analysis of these samples. The % RPD for all parameters was well within the +/- 20% window for duplicate analysis except for the lead analysis by AA. There is no clear reason why the precision fall outside the range. One possibility could be that the spike was added incorrectly resulting in the high recovery in the one sample.
In my opinion the results should be used without any qualification because both spike recoveries were within the recommended windows for water analysis.

STANDARD REFERENCE MATERIAL:

Standard reference material or external verification standards were all within the windows established for each parameter.

SUMMARY:

The data generated by the analysis of the above referenced samples can be used without qualification.

If you have any questions about the results or the methods used to obtain these results please call me at SCAN 744-4737.

APPENDIX A

Analytical Results
Toftdahl Drums
April 14, 1992

Table 3: Summary of Sampling Results from September 1988 to April 1992

	Boone	Bedoff	Kyle	Smith	Homala	MCL's
September 12, 1988						
Copper	76	121	42	--	--	1000**
Zinc	389	6	52	--	--	5000**
Mercury	0.08 U	0.08 U	0.08 U	--	--	2.0*
October 17, 1989						
Copper	50	50	30	--	ND	1000**
Zinc	290	ND	20	--	20	5000**
Mercury	0.06 U	0.06 U	0.1 B	--	0.16 B	2.0*
April 11, 1990						
Copper	77.6	37.6	46.1	46.1	3.3 J	1000**
Zinc	160	5.0 U	31 B	22 JB	80.3	5000**
Mercury	0.05 J	0.08 J	0.04 J	0.02 U	0.04 J	2.0*
October 23, 1990						
Copper	83.9	45.9	25.8	28.4	2.0 U	1000**
Zinc	480	6.2 JB	12 JB	15 JB	34.0	5000**
Mercury	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	2.0*
Chromium	6 J	5.0 U	5.0 U	5.0 U	5.0 U	50*
Lead	1.1 J	1.0 U	1.0 U	1.0 U	1.5 J	50*
April 23, 1991						
Copper	120	58.4	64.1	61.9	2.0 U	1000**
Zinc	178	5.5 J	19 J	22	64.3	5000**
Mercury	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	2.0*
Lead	1.2 J	20 U	2.4 J	NAR	NAR	50*
April 14, 1992						
Copper	50.5	48.8	45.1	45.0	7.4 P	1000**
Zinc	112	4.0 U	26	25	55.4	5000**
Lead	1.0 U	2.7	1.0 U	1.0 U	1.0 U	50*

--: Not analyzed J: Estimated Value ND: Not Detected

U: The compound was not detected at or above the listed numerical value.

B: Analyte was also found in an analytical blank.

P: Analyte detected above the instrument detection limit but below the minimum quantitation limit.

*: Primary Maximum Contaminant Levels (MCLs) are based on chronic and acute health effects.

**: Secondary Maximum Contaminant Levels (MCLs) are based on factors other than health effects such as taste, odor or color.

DISCUSSION AND CONCLUSIONS

All detected concentrations for this round of sampling were well below the maximum contaminant levels (MCLs) established for state and federal drinking water supplies as shown in Table 3. Table 3 also summarizes results for all routine sample rounds to date.

Results from routine monitoring for 1988 to the present supports the Remedial Investigation (RI) findings that the degree of contamination at the site is probably small and does not appear to be a threat to public health or the environment via the ground water. Copper and zinc are the only analytes that are consistently detected in the wells, and concentrations are consistently higher in the upgradient Boone well than in the downgradient wells. These occurrences are probably related to well construction and plumbing materials.

RECOMMENDATIONS

1. Based on past analytical results and the Record of Decision (ROD), routine monitoring should continue annually until 2001. Due to the presence of acetone in Sample Round IV, volatile organics should be analyzed for at least one more year. Selected metals; chromium, copper, lead and zinc; should be tested for the next nine years.

2. Three downgradient wells (Bedoff, Homala, and Kyle) and one upgradient well (Boone) should continue to be sampled.

3. At the completion of the ten year monitoring period, if no contaminants are observed other than copper, zinc and lead, long-term monitoring should be discontinued.

Table 2: Summary of Field Parameters and Detected Analytes from April 14, 1992

Location	pH (s.u.)	Temperature (°C)	Specific Conductance (umhos/cm)	Purge Volume (gallons/min)	Lead (ug/L)	Copper (ug/L)	Zinc (ug/L)
Boone	6.70	11.8	98	116	1.0 U	50.5	112
Bedoff	6.91	11.1	102	98	2.7	48.8	4.0 U
Kyle	6.69	12.0	64	108	1.0 U	45.1	26
Smith (duplicate)	--	--	--	--	1.0 U	45.0	25
Homala	6.71	11.0	72	92	1.0 U	7.4 P	55.4
Transport	--	--	--	--	1.0 U	3.0 U	4.0 U
Maximum Contaminant Level (MCL)	--	--	--	--	50 *	1000 **	5000 **

Note: Samples were collected and analyzed for volatile organics. None were detected.

P: Analyte detected above the instrument detection limit but below the minimum quantitation limit.
U: The compound was not detected at or above the associated numerical value.
--: Not Analyzed
*: Primary Maximum Contaminant Levels (MCLs) are based on chronic and acute health effects.
**: Secondary Maximum Contaminant Levels (MCL) are based on factors other than health effects.

Table 1: Parameters, Analytical Methods and Detection Limits

Analytical Parameters	Method	Detection Limit
Field Parameters:		
pH	Beckman pH Meter	0.1 Std Units
Specific Conductance	Beckman RC-15C Conductivity Bridge	10 unhos/cm
Temperature	Precision Thermometer	0.1°C
Volatile Organics	#624	1.0 μg/L
Metals (Total Recoverable):		
Chromium	#200.7	5.0 μg/L
Copper	#200.7	2.0 μg/L
Lead	#239.2	1.0 μg/L
Zinc	#200.7	2.0 μg/L

U.S. EPA, 1983. Methods for the Chemical Analysis of Water and Wastes. Environmental Monitoring and Support Laboratory, March 1983.

Quality Assurance Samples

In addition to laboratory calibration standards and method blanks, field quality assurance samples consisted of a blind duplicate and a transport blank. A blind duplicate sample, labeled "Smith," was collected from the Kyle well. Duplicate samples are two sets of samples collected from a well at the same time and submitted to the laboratory with different identification.

Stuart Magoon and Despina Strong of Manchester Laboratory evaluated laboratory quality assurance results which are included in Appendix A. The quality of the results are good for both the volatile organics and metals analyses. All spike recoveries were within acceptable limits of 75-125%. Relative percent difference (%RPD) for a spike and spike duplicate were within $\pm$25%. The relative percent difference of the blind duplicate samples (Kyle and Smith) were within $\pm$5%.

ANALYTICAL RESULTS

Table 2 is a summary of field and laboratory results for sample Round V conducted on April 14, 1992. No volatile organics were detected in any of the samples.

Copper and zinc were detected at low concentrations in both the up- and downgradient wells. Lead was detected in the Bedoff well just above the detection limit. Laboratory reporting sheets are attached in Appendix A. Data were managed using the ENVIS database software package.

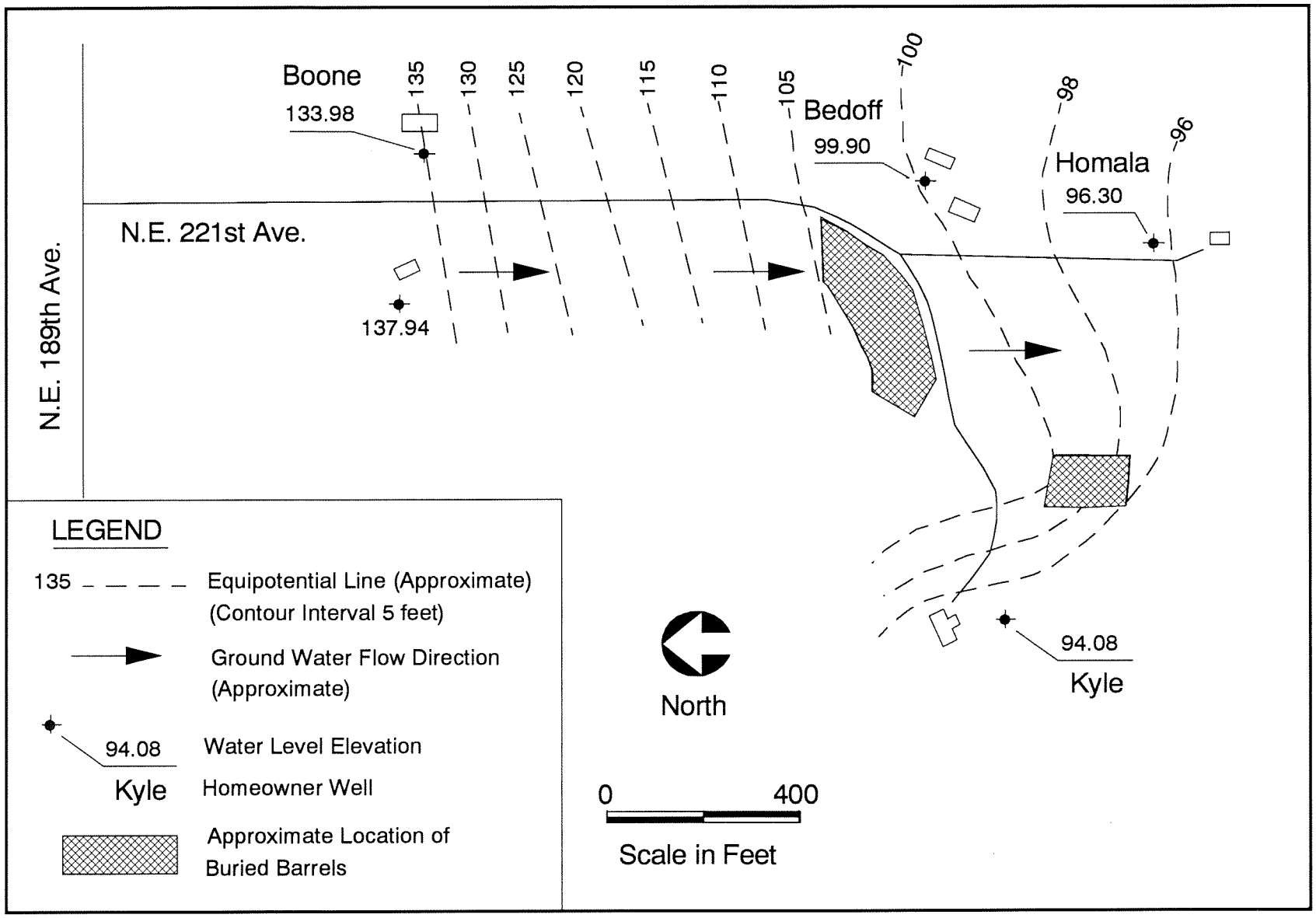

Figure 2: Potentiometric Surface Map for May 2, 1986 (Deep Aquifer)

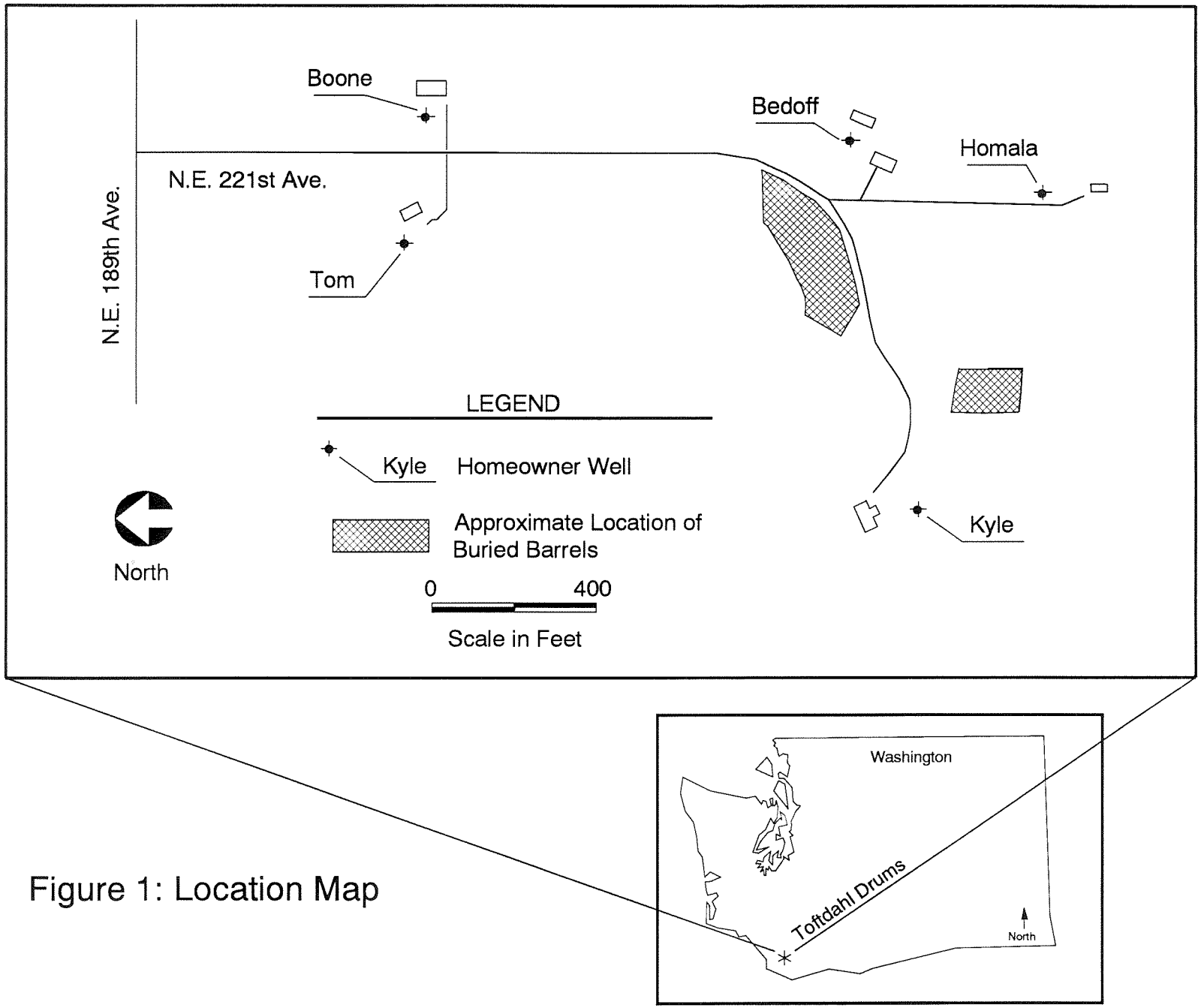

Figure 1: Location Map

SITE BACKGROUND

In the early 1970s, drums containing unknown quantities and types of waste were cleaned for resale on the Toftdahl property. The drums allegedly contained industrial wastes from a plywood manufacturing facility. It is estimated that between 100 and 200 drums were cleaned on the site. Approximately 50 drums contained residual wastes and could not be sold. These drums were buried on-site (see Figure 1). In 1985, the buried drums and wastes were removed. A Remedial Investigation conducted after drum removal concluded that no significant soil or ground water contamination existed. Low concentrations of PAHs, PCBs, VOCs, and BNAs were detected sporadically in nearby domestic water-supply wells during the initial phases of the site investigation. These contaminants have not been detected since the first routine sample round in 1987. Ground water monitoring was conducted for all priority pollutants semi-annually for five years, ending in April 1991. Ground water monitoring will continue for ten years for selected contaminants ending in 2001. In 1989, the site was delisted from the National Priorities List.

Geology of the area was defined in the Final Remedial Investigation (1986) as consisting of a complex sequence of discontinuous sediments, sedimentary rocks and volcanic layers. Extensive weathering and/or hydrothermal alteration of the original rock units and deposits makes stratigraphic correlation uncertain. Generally, ground water occurs in coarser stratified sand, gravel and clayey gravel zones at various depths. Based on on-site well logs two aquifer systems, designated the shallow and deep aquifers, have been identified beneath the site. Both systems consist of several discontinuous water-bearing zones separated by layers of clay and silt. The shallow system ranges in depth from about 7 to 30 feet and the deep system ranges in depth from 69 to 98 feet. Water levels in some deep borings are within 50 feet of the ground surface indicating at least partially confining conditions. The four private wells sampled during the compliance monitoring are all drilled to the deep zone and range in depth from 72 to 110 feet. Ground water in the deep system is generally thought to flow to the south. The Boone well is considered to be upgradient of the site and the Bedoff, Homala and Kyle wells downgradient. Figure 2 shows the locations of the domestic wells sampled and the approximate ground water flow direction.

METHODS

Ground Water Sampling

Prior to sample collection, domestic wells were purged by allowing taps to run until pH, temperature, and specific conductance measurements stabilized. Samples were then collected from the tap nearest the well. Wells were sampled from upgradient to downgradient. All wells were sampled for volatile organics, and select total metals (chromium, copper, lead and zinc). Volatile organic samples were preserved with two drops of 1:1 hydrochloric acid, and metal samples were preserved with 1 mL of nitric acid to a pH$<$2. Chemical analyses, analytical methods, and detection limits are shown in Table 1.