A Department of Ecology Report

WASHINGTON STATE DEPARTMENT OF ECOLOGY

# TOFTDAHL DRUM SITE GROUND WATER MONITORING ROUND VII, JUNE 21, 1994

## Summary

This document is one of a series describing the results of ground water sampling at the Toftdahl Drums site near Vancouver, Washington (Chern, 1990; Marti, 1990 - Marti, 1993). Ground water samples were collected from four domestic water supply wells located near the former Toftdahl Drum Site on June 21, 1994. This sampling is part of the routine ground water monitoring conducted at the site since 1987. Samples were collected and analyzed for selected metals (chromium, copper, lead, and zinc). Low concentrations of copper, zinc and lead were detected in the domestic wells. These concentrations were all well below state and federal drinking water 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.

### Site Background

In the early 1970s, about 200 drums containing unknown quantities and types of waste were cleaned for resale on the Toftdahl property. Approximately 50 drums contained residual industrial 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. Ecology has conducted routine ground water monitoring at the site since 1987. Ground water monitoring was conducted for all priority pollutants semi-annually for five years, ending in April 1991. Currently, samples are collected annually from four domestic water supply wells located near the former Toftdahl Drum Site. Each year the sample program is re-evaluated to determine if it should be expanded based on the current years sampling results. Routine monitoring is scheduled for the next six years, ending in 2001. At the completion of the monitoring period, if no contaminants are observed other than copper, zinc and lead, long-term monitoring should be discontinued.



by Pamela B. Marti
January 1995

Waterbody No. WA-28-1020-GW
(Segment No. 13-28-GW)

Ecology Report #95-302

The hydrogeology of the site was described in detail in the Final Remedial Investigation (Dames & Moore, 1986) and is summarized as follows. Based on on-site well logs, two aquifer systems, designated the "shallow" (7 to 30 feet) and "deep" (69 to 98 feet) aquifers, have been identified beneath the Toftdahl Drum site. All four of the domestic wells that are sampled are drilled to the deep aquifer and range in depth from 72 to 110 feet. Both the shallow and deep aquifer systems consist of several discontinuous water-bearing zones separated by layers of clay and silt. The Boone well is considered to be upgradient of the site and the Bedoff, Homala and Kyle wells downgradient. Figure 1 shows the locations of the sampled wells and the approximate ground water flow direction.

# Results

## Field Observations

Table 1 lists field observation data: pH, temperature, specific conductance and purged volume. Temperature was about 11°C and pH ranged from 6.5 to 7.0, which are typical values for western Washington. Specific conductance ranged from 88 to 120 umhos/cm which represents ground water with low dissolved solids.

## Laboratory Results

Table 1 summarizes laboratory results. Low concentrations of copper, zinc and lead were detected in both the up- and downgradient wells. These concentrations were all below state and federal drinking water standards (Table 1). Observed concentrations are consistent with previous sampling results; copper and zinc are the only analytes that are regularly detected (Table 2). The laboratory reporting sheets are presented in Appendix A.

# Methods

## Ground Water Sampling

The four domestic wells were sampled from upgradient (Boone) to downgradient (Bedoff, Homala, and Kyle). 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. All wells were sampled for selected total metals including chromium, copper, lead and zinc. Metal samples were preserved with 1 mL of nitric acid to a $pH < 2$.

Chain-of-custody procedures were followed in accordance with Manchester Laboratory protocol (Ecology, 1994). All samples were analyzed by the Ecology/EPA Laboratory in

Manchester. Samples were analyzed for total recoverable metals using EPA Methods 200.7 and 239.2 (EPA, 1983).

### Quality Assurance

Bill Kammin of Manchester Laboratory evaluated laboratory quality assurance. His memorandum and the quality assurance results are included in Appendix A. The quality of the results are good with the following exceptions. Sample results qualified with a "P" indicate the analyte was detected above the instrument detection limit but below the minimum quantitation limit. The minimum quantitation limit for metals is ten times the instrument detection limit. All spike recoveries were within acceptable limits of 75-125%. Relative percent difference (%RPD) for a spike and spike duplicate were within $\pm 20\%$.

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. The relative percent difference of the blind duplicate samples (Kyle and Smith) were within $\pm 13\%$, and satisfying data quality objectives.

## References

Chern, L., 1990. Toftdahl Drum Site Monitoring Round I - October, 1989. Department of Ecology - Environmental Investigations.

Dames and Moore, 1986. Final Report Remedial Investigation for the Toftdahl Drum Site. Volumes I & II, July 17, 1986.

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Washington State Department of Ecology, 1994. Manchester Environmental Laboratory - Laboratory Users Manual. Edited by D. Huntamer and J. Hyre.

## Contacts

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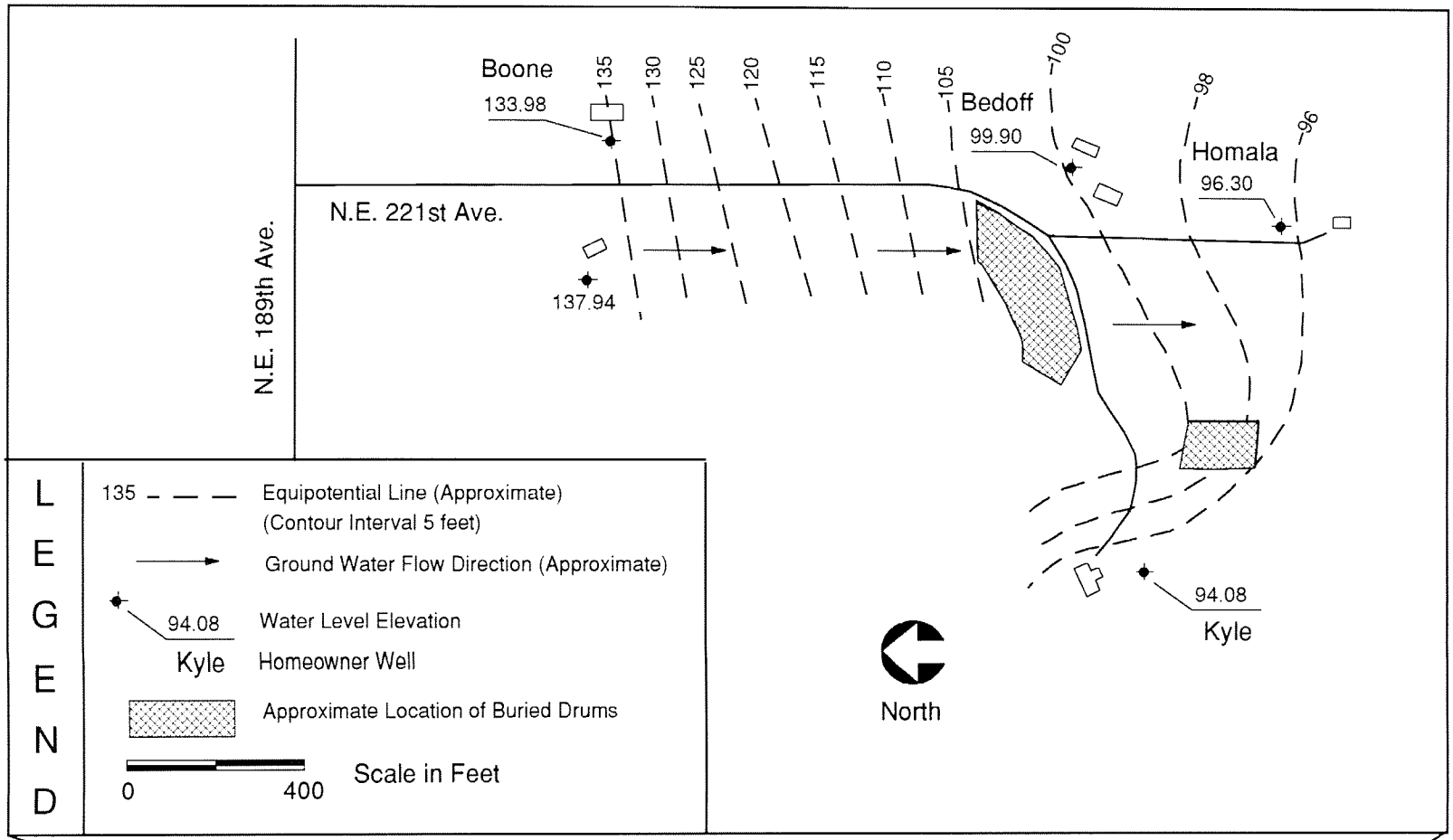


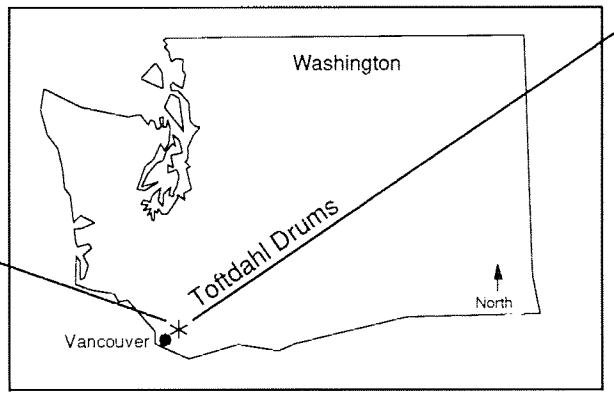


Figure 1:
Location
and
Potentiometric Surface Map (May 2, 1986)
(Deep Aquifer)

Table 1: Summary of Field Parameters and Detected Analytes from June 21, 1994

| Location | pH (s.u.) | Temperature (°C) | Specific Conductance (umhos/cm) | Purge Volume (gallons) | Copper (ug/L) | Zinc (ug/L) | Lead (ug/L) |
|---|---|---|---|---|---|---|---|
| Boone | 6.68 | 11.9 | 109 | 150 | 54.8 | 86.8 | 1.9 P |
| Bedoff | 6.96 | 11.5 | 120 | 150 | 40 P | 4.0 U | 1.0 U |
| Kyle | 6.54 | 11.8 | 87 | 120 | 37 P | 22 P | 2.1 P |
| Smith (duplicate) | -- | -- | -- | -- | 42.1 | 23 P | 1.0 U |
| Homala | 6.69 | 10.7 | 88 | 165 | 6 P | 17 P | 1.0 P |
| Transport | -- | -- | -- | -- | 4.0 U | 4.0 U | 1.0 U |
| Maximum Contaminant Level (MCL) | -- | -- | -- | -- | 1000 ** | 5000 ** | 50 * |

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

Table 2: Summary of Sampling Results from September 1988 to June 1994

| | Boone | Bedoff | Kyle | Smith | Homala | MCL's |
|---|---|---|---|---|---|---|
| **September 12, 1988** | | | | | | |
| Copper | 76 | 121 | 42 | -- | -- | 1000** |
| Zinc | 389 | 6 | 52 | -- | -- | 5000** |
| **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** |
| 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** |
| 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* |
| **April 6, 1993** | | | | | | |
| Copper | 41.5 | 32.4 | 61.6 | 64.5 | 4.0 P | 1000** |
| Zinc | 91.8 B | 4.0 J | 37.4 B | 38.4 B | 56.2 B | 5000** |
| Lead | 20 U | 20 U | 20 U | 20 U | 20 U | 50* |
| **June 21, 1994** | | | | | | |
| Copper | 54.8 | 40 P | 37 P | 42.1 | 6 P | 1000** |
| Zinc | 86.8 | 4.0 U | 22 P | 23 P | 17 P | 5000** |
| Lead | 1.9 P | 1.0 U | 2.1 P | 1.0 U | 1.0 P | 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 (MCL) are based on chronic and acute health effects.

**: Secondary Maximum Contaminant Levels (MCL) are based on factors such as taste, odor or color.

# APPENDIX A

Analytical Results
Toftdahl Drums
June 21, 1994

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
MANCHESTER ENVIRONMENTAL LABORATORY
7411 Beach Drive East • Port Orchard, Washington 98366-8204 • (206) 871-8860 • SCAN 871-8860

July 22, 1994

TO: Pam Marti

FROM: Bill Kammin, Environmental_Lab_Director

SUBJECT: Metals Quality Assurance memo for the Toftdahl Drums Project

## SAMPLE INFORMATION

These samples from the Toftdahl Drums project were received by the Manchester Laboratory on 6/22/94 in good condition.

## HOLDING TIMES

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

## 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 relevant USEPA (CLP) control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting CLP calibration requirements.

## PROCEDURAL BLANKS

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

## SPIKED SAMPLE ANALYSES

Spike and duplicate spike sample analyses were performed on this data set. All spike recoveries were within the CLP acceptance limits of +/- 25%.

PRECISION DATA

The results of the spike and duplicate spike samples were used to evaluate precision on this sample set. The Relative Percent Difference (RPD) for all analytes was within the 20% CLP acceptance window for duplicate analysis.

LABORATORY CONTROL SAMPLE (LCS) ANALYSES

LCS analyses were within the windows established for each parameter.

SUMMARY

Transport blank was also clean.

The data generated by the analysis of these samples can be used noting the data qualifications discussed in this memo.

Please call Bill Kammin at SCAN 206-871-8801 to further discuss this project.

WRK:wrk

Washington State Department of Ecology
Sample/Project Analysis Results

Project: DOE-145X TOFTDAHL DRUMS  Officer: PZM  Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 94 258020  Description: BOONE  Source: Drinking Water (At tap)

Begin Date: 94/06/21

| Metals - Specified | | Water-Total Result | Units |
|---|---|---|---|
| Lead | Pb-Total | 1.9P* | ug/l |

| Metals - ICP Scan | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 5U | ug/l |
| Copper | Cu-Total | 54.8 * | ug/l |
| Zinc | Zn-Total | 86.8 * | ug/l |

(Sample Complete)

Washington State Department of Ecology
Sample/Project Analysis Results



Project: DOE-145X TOFTDAHL DRUMS  Officer: PZM  Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 94 258021  Description: BEDOFF  Source: Drinking Water (At tap)

Begin Date: 94/06/21

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

| Metals - ICP Scan | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 5U | ug/l |
| Copper | Cu-Total | 40P* | ug/l |
| Zinc | Zn-Total | 4U | ug/l |

(Sample Complete)

Project: DOE-145X TOFTDAHL DRUMS  Officer: PZM  Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 94 258022  Description: HOMALA  Source: Drinking Water (At tap)

Begin Date: 94/06/21 :

| Metals - Specified | | Water-Total Result | Units |
|---|---|---|---|
| Lead | Pb-Total | 1.0P* | ug/l |

| Metals - ICP Scan | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 5U | ug/l |
| Copper | Cu-Total | 6P* | ug/l |
| Zinc | Zn-Total | 17P* | ug/l |

(Sample Complete)

Project: DOE-145X TOFTDAHL DRUMS  Officer: PZM  Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 94 258023  Description: KYLE  Source: Drinking Water (At tap)

Begin Date: 94/06/21 :

| Metals - Specified | | Water-Total Result | Units |
|---|---|---|---|
| Lead | Pb-Total | 2.1P* | ug/l |

| Metals - Specified Matrix Spike #1 | | Water-Total Result | Units |
|---|---|---|---|
| Lead | Pb-Total | 93 | % Recov |

| Metals - Specified Matrix Spike #2 | | Water-Total Result | Units |
|---|---|---|---|
| Lead | Pb-Total | 89 | % Recov |

| Metals - ICP Scan | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 5U | ug/l |
| Copper | Cu-Total | 37P* | ug/l |
| Zinc | Zn-Total | 22P* | ug/l |

(Sample Complete)

Project: DOE-145X TOFTDAHL DRUMS  Officer: PZM  Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 94 258024  Description: SMITH  Source: Drinking Water (At tap)

Begin Date: 94/06/21

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

| Metals - ICP Scan | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 5U | ug/l |
| Copper | Cu-Total | 42.1 * | ug/l |
| Zinc | Zn-Total | 23P* | ug/l |

| Metals - ICP Scan Matrix Spike #1 | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 98 | % Recov |
| Copper | Cu-Total | 102 | % Recov |
| Zinc | Zn-Total | 99 | % Recov |

| Metals - ICP Scan Matrix Spike #2 | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 99 | % Recov |
| Copper | Cu-Total | 104 | % Recov |
| Zinc | Zn-Total | 102 | % Recov |

(Sample Complete)

Washington State Department of Ecology
Sample/Project Analysis Results



Project: DOE-145X TOFTDAHL DRUMS

Officer: PZM Account: D3P01

Laboratory: Ecology, Manchester

Sample No: 94 258025 Description: TRANSPORT

Source: Drinking Water (At tap)

Begin Date: 94/06/21

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

| Metals - ICP Scan | | Water-Total Result | Units |
|---|---|---|---|
| Chromium | Cr-Total | 5U | ug/l |
| Copper | Cu-Total | 4U | ug/l |
| Zinc | Zn-Total | 4U | ug/l |

(Sample Complete)

Project: DOE-145X TOFTDAHL DRUMS  Officer: PZM  Account: D3P01

Blank ID: EWPB 25.77

| 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 | 5U | ug/l |
| Copper | Cu-Total | 4U | ug/l |
| Zinc | Zn-Total | 4U | ug/l |

(Sample Complete)