

RECEIVED

DEC 28 2000

Department of
Environmental Conservation
KDO

***DRAFT Report Fall 2000 Sampling
Event Groundwater Monitoring
Investigation Coastal Drilling Facility
Soldotna, Alaska***



HARTCROWSER

Delivering smarter solutions

Prepared for

ADEC Contract No. 1820121395A

NTP No. 1820121305A

December 15, 2000

A-8574

RECEIVED

DEC 20 2000

DEPT. OF ENVIRONMENTAL CONSERVATION

CONTENTS

Page

INTRODUCTION	1
SUMMARY OF FINDINGS AND RECOMMENDATIONS	1
<i>Hydrologic Conditions</i>	2
<i>Water Quality</i>	2
<i>Summary and Recommendations</i>	2
WORK PERFORMED	3
<i>Groundwater Measurements</i>	3
<i>Groundwater Sampling</i>	3
<i>Investigation-Derived Waste</i>	3
RESULTS	4
<i>Hydrogeology</i>	4
<i>Groundwater Analytical Results</i>	5
<i>Data Quality Assessment</i>	6
CONCLUSIONS	6
<i>Hydrogeology</i>	6
<i>Confined and Unconfined Groundwater Quality</i>	7
RECOMMENDATIONS AND LIMITATIONS	7
<i>Recommendations</i>	7
<i>Limitations</i>	7
REFERENCES	8

TABLES

- 1 Comparative Physical Well Data Summary
- 2 Comparative Hydrocarbon, BTEX, PCB, and Metals Results
- 3 Comparative Detected HVOC Results

FIGURES

- 1 Site Location and Vicinity Map
- 2 Site Plan

APPENDIX A FIELD METHODS

APPENDIX B DATA QUALITY REVIEW AND ANALYTICAL RESULTS

**DRAFT REPORT
FALL 2000 SAMPLING EVENT
GROUNDWATER MONITORING INVESTIGATION
COASTAL DRILLING FACILITY
SOLDOTNA, ALASKA**

INTRODUCTION

The Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Response Program contracted Hart Crowser to perform a three-year groundwater monitoring investigation at the Coastal Drilling Facility. The purpose of the work is to further investigate possible groundwater contamination related to past maintenance and drilling support activities. The Coastal Drilling facility is an abandoned industrial site, approximately 7.4 acres in extent, located at Mile 0.5 of the Kenai Spur Highway (within Section 29, T5N, R10W, Seward Meridian), in Soldotna, Alaska (Figure 1).

Presented in this document are the results of the Groundwater Monitoring Investigation - Fall 2000 Sampling Event completed on November 2, 2000. This report has been prepared in accordance with ADEC Contract Number ASPs No. 18-98-0135A, Notice to Proceed No. 1820121305A, and our Final Work Plan dated November 5, 1998 (Hart Crowser 1998).

SUMMARY OF FINDINGS AND RECOMMENDATIONS

The fall 2000 sampling event is the fifth event of a three-year, semi-annual groundwater monitoring investigation to assess whether contaminants detected during previous investigations are migrating offsite and/or posing an imminent and substantial threat to the surrounding public and private drinking water wells. A site plan, with onsite monitoring well locations, is provided as Figure 2.

The fall 2000 field effort included sampling groundwater from four selected onsite monitoring wells. Water level measurements were made at the four sampled monitoring wells and at six additional onsite wells. A registered land surveyor previously established horizontal locations and vertical reference elevations at the wells.

A synopsis of field methods used onsite is provided in Appendix A. The following provides a summary of the field effort and results.

Hydrologic Conditions

- Water level data were obtained at all accessible wells. Groundwater wells GW-7 and B-4MW were not included in the groundwater contour interpretation. Water level measurements from monitoring wells suggest that in the unconfined aquifer, groundwater flow is toward the northwest.
- A comparison of fall 2000 data with data of previous sampling events suggests that the northwestern flow direction is not significantly affected by seasonality. In general, water levels tend to be higher in spring than in fall.
- The Karsten Mall drinking water well, which was screened in the confined aquifer, was decommissioned and capped over the summer (Raker 2000). Further sampling and investigation of this well is not possible.

Water Quality

- Gasoline range organics (GRO), diesel range organics (DRO), benzene, ethylbenzene, toluene, xylenes (BTEX), halogenated volatile organic compounds (HVOC), polychlorinated biphenyls (PCBs), and dissolved chromium were not detected in any of the groundwater samples.
- Dissolved lead and dissolved barium were not detected above regulatory limits (ADEC 18 AAC 75) in any of the four monitoring wells sampled.

Summary and Recommendations

- The groundwater quality data from this monitoring event suggests that the contaminants are not migrating offsite in the unconfined aquifer.
- Based on evaluation of groundwater elevation data and the resulting groundwater flow direction, it appears that the four wells currently being sampled are appropriately located to intercept contaminants potentially migrating offsite within the unconfined zone. Installation of additional monitoring wells does not appear to be necessary.

WORK PERFORMED

Groundwater Measurements

Groundwater measurements were made in the four monitoring wells sampled, and in six additional monitoring wells onsite. Groundwater measurements were not made in GW-2 because the lock was rusted and could not be opened. All groundwater elevations are referenced to an arbitrary benchmark of 100 feet previously established onsite.

Groundwater Sampling

Existing monitoring wells B-2MW, B-3MW, GW-5, and GW-6 were sampled for analysis of GRO/BTEX, DRO, HVOC, PCB, and dissolved metals (lead, chromium, and barium). The Karsten Mall drinking water was not sampled as the well is no longer in use and has been capped (Raker 2000). A blind field duplicate sample was also collected at GW-6 and, in accordance with the Quality Assurance Project Plan (QAPP), was designated MW-60. Groundwater quality field parameters were also measured (Table 1). The methods used for groundwater sampling are provided in Appendix A - Field Methods. The following analytical methods were used:

- GRO - Method AK 101;
- DRO - Method AK 102;
- HVOC (includes BTEX compounds) - EPA Method 8021B;
- PCBs - EPA Method 8081; and
- Dissolved Metals (Lead, Chromium, and Barium) - EPA Method 6010.

Investigation-Derived Waste

Investigation-derived waste (IDW), the wastes generated during the field portion of this sampling event, consisted of the following:

- Water from monitoring well purging; and
- Personal protective equipment (PPE) and general debris.

Based on analytical results and with ADEC's approval, water generated during the previous sampling event (spring 2000) was to be disposed of on the ground during this sampling event. However, this water had frozen in the drum and could not be dumped. Purge water generated from fall 2000 sampling was placed in the same drum. The drum was labeled with the project number, the date, the well numbers, the designation "purge water," a contact name and

telephone number, and continues to be stored onsite. Based on analytical results for the purge water, and with the ADEC project manager's approval, Hart Crowser will dispose of the contents of the drum on the ground at the Coastal Drilling facility during the spring 2001 sampling event.

PPE and debris were placed in plastic bags and taped shut. The bags were ultimately disposed of in the Anchorage Landfill.

RESULTS

Hydrogeology

Unconfined groundwater measurements, collected at 10 onsite monitoring wells, and relative groundwater elevations are provided in Table 1 and on Figure 2. Due to the fact that GW-7 is screened at a depth significantly shallower than other monitoring wells onsite, groundwater elevation data from GW-7 was measured but was not used in the interpretation of onsite groundwater contours. Monitoring well B-4MW was found to be dry. Well GW-2 was inaccessible due to a rusted lock and could not be sampled. Inferred groundwater contours are shown on Figure 2.

November 2000 groundwater level measurements showed that groundwater flow direction is northwesternly. Hydraulic gradient was calculated at approximately 0.009 feet/foot. It should be noted that in the area by the covered pits, the gradient is shallower, and the gradient is increased toward the north of the site.

Unlike previous data, a localized groundwater high or "mound" near the covered pit was not as pronounced during this sampling event. In previous samplings, a localized high appeared to exist at the site, with the apex centered beneath the area bounded by monitoring wells GW-2, GW-3, GW-4, GW-5, and GW-6. In fall 2000 data, groundwater levels are slightly higher in GW-3, GW-4, and GW-5 than in the wells northeast and southwest of the pit area. However, differences in water elevation range only from 0.3 to 0.4 feet. While the exact reason for the localized high is unknown, it is thought that water may flow preferentially into the covered gravel pit area.

Hayward Hill may also influence localized unconfined aquifer flow.

A comparison of previous water level data suggests that groundwater is generally higher in spring than summer. However, seasonal changes in water levels does not appear to significantly change flow directions or pattern.

Groundwater Analytical Results

The following section provides a description of the analytical results from the current sampling event. Tables 2 and 3 present comparative summaries of groundwater analytical results obtained under this investigation.

- **GRO.** Concentrations of GRO were not detected above the detection limit of 0.09 milligrams per liter (mg/L).
- **DRO.** DRO was not detected above the detection limit of 0.3 mg/L.
- **BTEX.** Concentrations of individual BTEX analytes were not detected above the detection limits of 0.001 mg/L in the onsite wells.
- **HVOC.** No HVOC compounds were detected above the detection limits. Detection limits range from 0.01 to 0.001 mg/L.
- **PCBs.** PCBs above the detection limit of 0.0001 mg/L were not detected.
- **Dissolved Metals.** Barium was detected in each onsite well ranging from 0.012 to 0.139 mg/L. The ADEC groundwater cleanup standard and state of Alaska maximum contaminant level (MCL) for barium are both 2.0 mg/L. (Table C, ADEC 18 AAC 75; ADEC 18 AAC 80). The concentration of the maximum barium detection is one to two orders of magnitude lower than these cleanup levels. Barium detection during this monitoring event is consistent with barium concentrations observed during previous sampling events.

Lead was detected in groundwater well GW-5 at 0.0051 mg/L. The groundwater cleanup standard for lead is 0.015 mg/L. (Table C, ADEC 18 AAC 75). The concentration of the maximum lead detection is one order of magnitude lower than cleanup levels.

In all other cases, lead and chromium were not detected above the detection limits of 0.005 and 0.01 mg/L, respectively.

Data Quality Assessment

The original project laboratory, MultiChem Analytical Services of Anchorage, Alaska, and Renton, Washington, went out of business in January 2000. With the approval of the ADEC project manager, CT&E Environmental Services (CTE) of Anchorage, Alaska has been contracted as a replacement.

The review of the quality of the chemical data produced by CTE included consideration of the following:

- Sample custody;
- Holding times;
- Method blank contamination;
- Reporting limits;
- Field and laboratory duplicate precision;
- Laboratory control sample/laboratory control sample duplicate accuracy; and
- Completeness.

The project data quality was determined acceptable for the project needs and the data quality objectives were met. The analytical laboratory data, including the chain-of-custody (COC) forms, and the internal data quality review for this sampling event are presented in Appendix B.

CONCLUSIONS

Hydrogeology

- Based on fall 2000 data, localized groundwater flow beneath the site is generally to the northwest. Over the past four sampling events, flow direction in the unconfined zone has remained essentially unchanged.
- Fall 2000 unconfined groundwater elevation data suggests that while a localized high in groundwater levels may exist near the covered pit, it is not as pronounced as observed during previous sampling events. In previous sampling events a localized, semi-radial groundwater flow pattern originating in the area was more evident. The radial flow pattern supports Shannon & Wilson's 1992 conclusion that the unconfined groundwater table is being recharged by surface water which is infiltrating preferentially through the disposal pits.

- Based on the interpretation of the groundwater elevation data, it appears that the four monitoring wells presently being sampled are arrayed such that they provide adequate coverage of potential groundwater flow paths and would intercept potential offsite contaminant migration.

Confined and Unconfined Groundwater Quality

- GRO, DRO, BTEX, HVOC, PCB and dissolved chromium were not detected in any wells during this sampling event. This is consistent with analytical results observed during previous sampling events.
- Dissolved barium and dissolved lead were not detected above applicable ADEC cleanup levels during this sampling event. This is consistent with analytical results observed during previous sampling events.

RECOMMENDATIONS AND LIMITATIONS

Recommendations

Based on groundwater quality and groundwater flow conditions presently existing onsite, installation of additional monitoring wells does not appear to be necessary. However, should groundwater quality degrade or flow direction change markedly, it may be necessary to reevaluate the need for additional monitoring wells or, alternately, to expand the present monitoring program to include existing wells which have been previously unsampled under this investigation.

In the spring 2001 sampling event, well caps and locks should be brought to replace lost caps and broken locks. Some monument lids are not closing properly as the PVC casings appear to have jacked up. Several casings may need to be cut and measuring point elevations resurveyed.

Limitations

Work for this project was performed, and this report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work to be completed. It is intended for the exclusive use of ADEC for specific application to the project site. This report is not meant to represent a legal opinion, and no other warranty, express or implied, is made.

REFERENCES

Hart Crowser, 1998. Final Work Plan For Groundwater Monitoring. Coastal Drilling Facility, Soldotna, Alaska. Prepared for Alaska Department of Environmental Conservation. November 5, 1998.

Hart Crowser, 1999. Final Report. Fall 1999 Sampling Event, Groundwater Monitoring Investigation. Coastal Drilling Facility, Soldotna, Alaska. Prepared for the Alaska Department of Environmental Conservation. January 4, 2000.

Raker, Jim, 2000. Personal communication with Jim Raker, the U-Haul Manager on 11/2/2000.

Shannon & Wilson, Inc., 1992. *Environmental Site Investigation, Coastal Drilling Facility, Soldotna, Alaska*. Prepared for the Alaska Department of Environmental Conservation, August 1992.

State of Alaska, Department of Environmental Conservation, 1999. 18 AAC 75 - Oil and Hazardous Substances Pollution Control Regulations.

State of Alaska, Department of Environmental Conservation, 1999. 18 AAC 80 - Drinking Water Regulations.

TABLE 1 - COMPARATIVE PHYSICAL WELL DATA SUMMARY*

Well Number, Screen Interval & Date	pH	Temp (°C)	D.O. (mg/L)	Conductance (uS/cm)	Depth to Groundwater (ft btoc)	Depth to Groundwater (ft bgs)	Groundwater Elevation ¹ (ft)
SAMPLED WELLS							
B-2MW (34'-44' bgs)							
11/2/2000	6.7	3.9	4.5	171	40.59	37.73	62.9
5/10/2000	7.51	3.1	4.9	248	38.66	35.80	64.8
11/18/1999	7.29	3.9	4.8	219	39.69	36.83	63.8
5/18/1999	7.09	3.9	4.7	310	38.41	35.55	65.1
11/12/1998	7.35	4	5.2	211	40.43	37.57	63.0
B-3MW (30'-40' bgs)							
11/2/2000	6.6	4.4	2.9	138	37.42	34.48	65.4
5/10/2000	7.33	2.7	2.89	311	36.83	33.89	66.0
11/18/1999	7.34	2.9	2.21	245	37.20	34.26	65.6
5/18/1999	7.15	3.3	2.31	251	37.55	34.61	65.3
11/12/1998	7.29	2.7	2.08	232	38.22	35.28	64.6
GW-5 (30'-40' bgs)							
11/2/2000	6.87	4.9	3.43	197	35.7	34.52	64.6
5/10/2000	7.54	2.8	3.44	292	34.11	32.93	66.2
11/18/1999	7.24	3.1	3.11	234	34.56	33.38	65.7
5/18/1999	7.27	3.1	2.79	249	34.27	33.09	66.0
11/12/1998	7.31	2.9	2.88	221	35.42	34.24	64.9
GW-6 (31'-41' bgs)							
11/2/2000	6.81	4.1	6.29	158	37.2	35.48	64.2
5/10/2000	7.27	2.7	2.49	311	35.35	33.63	66.1
11/18/1999	7.51	3.3	2.37	247	35.74	34.02	65.7
5/18/1999	7.34	3.7	2.99	255	35.95	34.23	65.5
11/12/1998	7.4	3.1	3.71	239	36.80	35.08	64.6
UNSAMPLED WELLS							
B-4MW (32.5'-42.5' bgs)							
11/2/2000	NM	NM	NM	NM		Dry	
5/10/2000	NM	NM	NM	NM		Dry	
11/18/1999	NM	NM	NM	NM		Dry	
5/18/1999	NM	NM	NM	NM	37.39	35.55	65.0
B-11MW (32'-42' bgs)							
11/2/2000	NM	NM	NM	NM	40.48	37.68	62.6
5/10/2000	NM	NM	NM	NM	38.46	35.66	64.6
11/18/1999	NM	NM	NM	NM	39.60	36.80	63.5
5/18/1999	NM	NM	NM	NM	38.30	35.50	64.8
GW-1 (32'-42' bgs)							
11/2/2000	NM	NM	NM	NM	37.7	36.04	64.2
5/10/2000	NM	NM	NM	NM	36.40	34.74	65.5
11/18/1999	NM	NM	NM	NM	36.70	35.04	65.2
5/18/1999	NM	NM	NM	NM	37.00	35.34	64.9
GW-2 (32'-42' bgs)							
11/2/2000	Could not open well due to rusted lock						
5/10/2000	NM	NM	NM	NM	33.73	33.75	66.1
11/18/1999	Unable to locate well due to snow cover						
5/18/1999	NM	NM	NM	NM	34.35	34.37	65.4
GW-3 (30'-40' bgs)							
11/2/2000	NM	NM	NM	NM	37.55	35.09	64.5
5/10/2000	NM	NM	NM	NM	35.98	33.52	66.1
11/18/1999	NM	NM	NM	NM	36.34	33.88	65.7
5/18/1999	NM	NM	NM	NM	36.56	34.10	65.5
GW-4 (31'-41' bgs)							
11/2/2000	NM	NM	NM	NM	36.75	34.80	64.5
5/10/2000	NM	NM	NM	NM	35.17	33.22	66.1
11/18/1999	NM	NM	NM	NM	35.57	33.62	65.7
5/18/1999	NM	NM	NM	NM	35.30	33.35	66.0
GW-7 (24'-34' bgs)							
11/2/2000	NM	NM	NM	NM	32.94	30.20	70.5
5/10/2000	NM	NM	NM	NM	32.81	30.07	70.6
11/18/1999	NM	NM	NM	NM	32.87	30.13	70.6
5/18/1999	NM	NM	NM	NM	32.76	30.02	70.7

*Past sampling event results are shaded.

Notes:

1 = All elevations are referenced to an arbitrary benchmark of 100' previously established onsite

btoc = Below top of casing

bgs = Below ground surface

NM = Not measured

TABLE 2 - COMPARATIVE HYDROCARBON, BTEX, PCB, AND METALS RESULTS*

Well Number and Date	GRO (mg/L)	DRO (mg/L)	BTEX					PCB (EPA 8081) (mg/L)	Dissolved Metals (EPA 6010)			
			EPA 8021B		Toluene (mg/L)	Xylenes (mg/L)	Lead (mg/L)		Chromium (mg/L)	Barium (mg/L)		
			Benzene (mg/L)	Ethylbenzene (mg/L)								
B-2MW												
11/2/2000	0.09 U	0.36 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0001 U	0.005 U	0.010 U	0.020		
5/10/2000	0.09 UJ	0.32 UJ	0.0005 UJ	0.0020 UJ	0.0020 UJ	0.0020 UJ	0.0001 UJ	0.005 UJ	0.010 UJ	0.017 J		
11/18/1999	0.10 U	0.27 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00052 U	0.003 U	0.010 U	0.018		
5/18/1999	0.10 U	0.25 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.00048 U	0.0091	0.037	0.160		
11/12/1998	0.10 U	0.25 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0011 U	0.030 U	0.010 U	0.040		
B-3MW												
11/2/2000	0.09 U	0.34 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0001 U	0.005 U	0.010 U	0.139		
5/10/2000	0.09 UJ	0.45 J	0.0005 UJ	0.0020 UJ	0.0020 UJ	0.0020 UJ	0.0001 UJ	0.005 UJ	0.010 UJ	0.015 J		
11/18/1999	0.10 U	0.25 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00042 U	0.003 U	0.010 U	0.013		
5/18/1999	0.10 U	0.26 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.00048 U	0.0042	0.010 U	0.063		
11/12/1998	0.10 U	0.25 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00094 U	0.030 U	0.010 U	0.017		
GW-5												
11/2/2000	0.09 U	0.31 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0001 U	0.0051	0.010 U	0.133		
5/10/2000	0.09 UJ	0.33 J	0.0005 UJ	0.0020 UJ	0.0020 UJ	0.0020 UJ	0.0001 UJ	0.005 UJ	0.010 UJ	0.085 J		
11/18/1999	0.10 U	0.25 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00049 U	0.003 U	0.010 U	0.13		
5/18/1999	0.10 U	0.26 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.00048 U	0.003 U	0.010 U	0.068		
11/12/1998	0.10 U	0.29 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00097 U	0.030 U	0.010 U	0.16		
GW-6												
11/2/2000	0.09 U	0.32 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0001 U	0.005 U	0.010 U	0.012		
5/10/2000	0.09 UJ	0.78 J	0.0005 UJ	0.0020 UJ	0.0020 UJ	0.0020 UJ	0.0001 UJ	0.005 UJ	0.010 UJ	0.012 J		
11/18/1999	0.10 U	0.71	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00047 U	0.003 U	0.010 U	0.013		
5/18/1999	0.10 U	0.25 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.00048 U	0.0087	0.021	0.096		
11/12/1998	0.10 U	0.25 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00097 U	0.030 U	0.010 U	0.019		
GW-60 (duplicate)												
11/2/2000	0.09 U	0.341 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0001 U	0.005 U	0.010 U	0.010 U		
ADEC												
CLEANUP LEVEL¹	1.3	1.5	0.005	0.7	1	10	0.0005	0.015	0.1	2.0		

*Past sampling event results are shaded.

Notes:

1 = 18 AAC 75, Table C

U = Not detected above detection limit indicated

J = Value should be considered to be an estimate due to cooler temperatures which were below the acceptable range.

TABLE 3: COMPARATIVE DETECTED HVOC RESULTS

Sampling Event	Sampling Date	Well Number	Detected HVO Compound (EPA Method 8021B)	Concentration (mg/L)	ADEC Cleanup Level ¹ (mg/L)
Fall 2000	11/2/2000	All ²	None	NA	NA
Spring 2000	5/10/2000	GW-6	1,2-Dichloroethane	0.00104 J	0.005
		KM-1	1,4-Dichlorobenzene	0.00129 J	0.075
Fall 1999	11/18/1999	GW-6	1,2-Dichloropropane	0.00037	0.005
			cis-1,2-Dichloroethene	0.00028	NA
			1,1-Dichloroethane	0.00067	3.65
			1,2-Dichloroethane	0.0011	0.005
Spring 1999	5/18/1999	GW-6	1,2-Dichloropropane	0.00023	0.005
			cis-1,2-Dichloroethene	0.0012	NA
			1,1-Dichloroethane	0.0048	3.65
			1,2-Dichloroethane	0.00065	0.005
Fall 1998	11/12/1998	KM-1	1,4-Dichlorobenzene	0.0012	0.075
		B-2MW	1,1-Dichloroethane	0.00022	3.65

*Past sampling event results are shaded.

Notes:

1 = 18 AAC 75, Table C

2 = All sampled wells (B-2MW, B-3MW, GW-5, and GW-6)

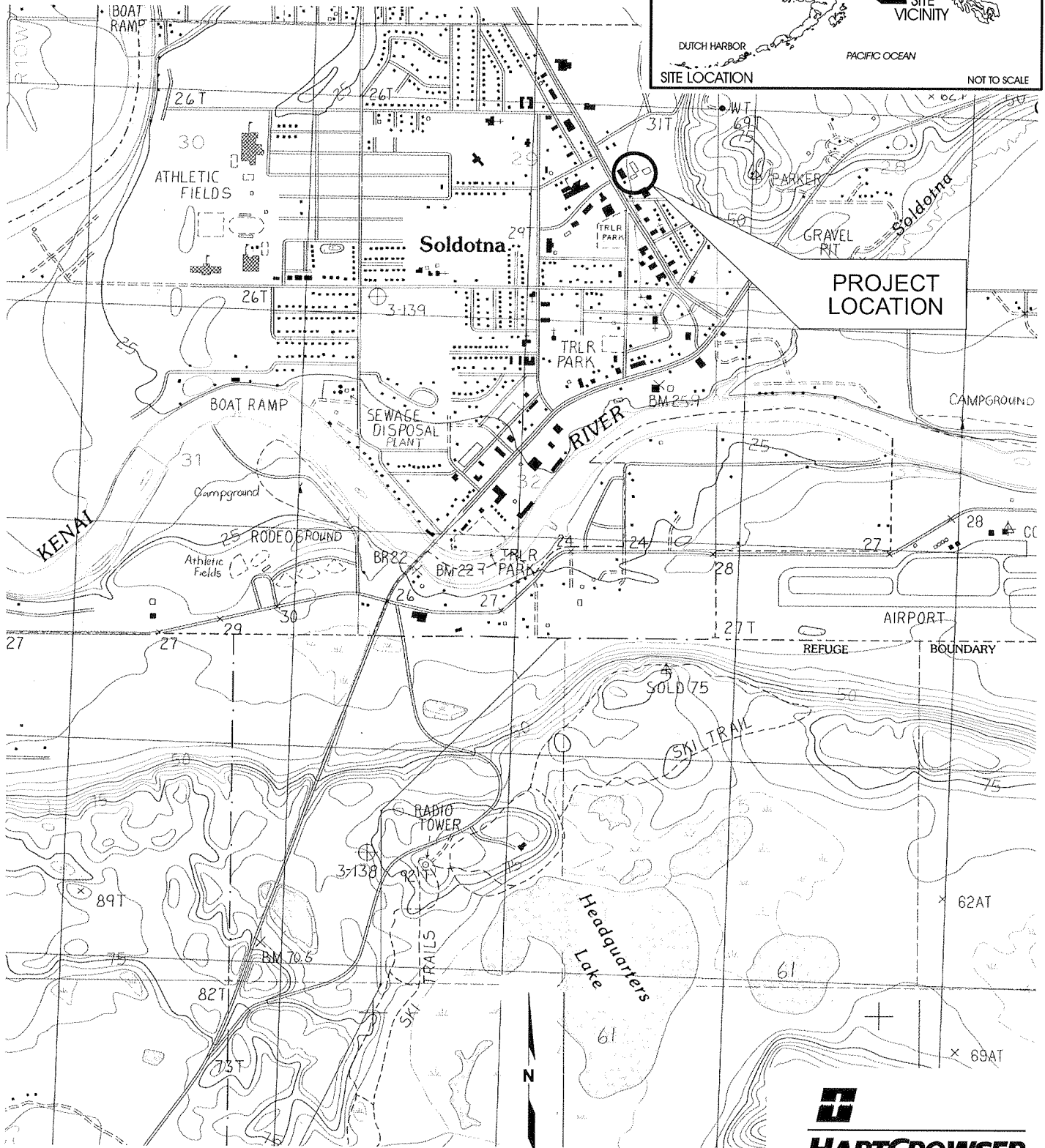
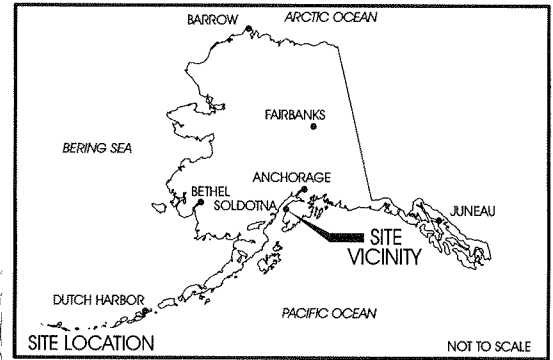
NA = Not available

J = Result should be considered to be an estimate due to analysis outside of sample holding time.

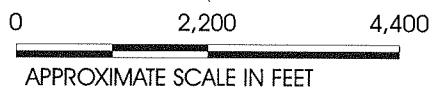
Site Location and Vicinity Map

Coastal Drilling Facility

Soldotna, Alaska

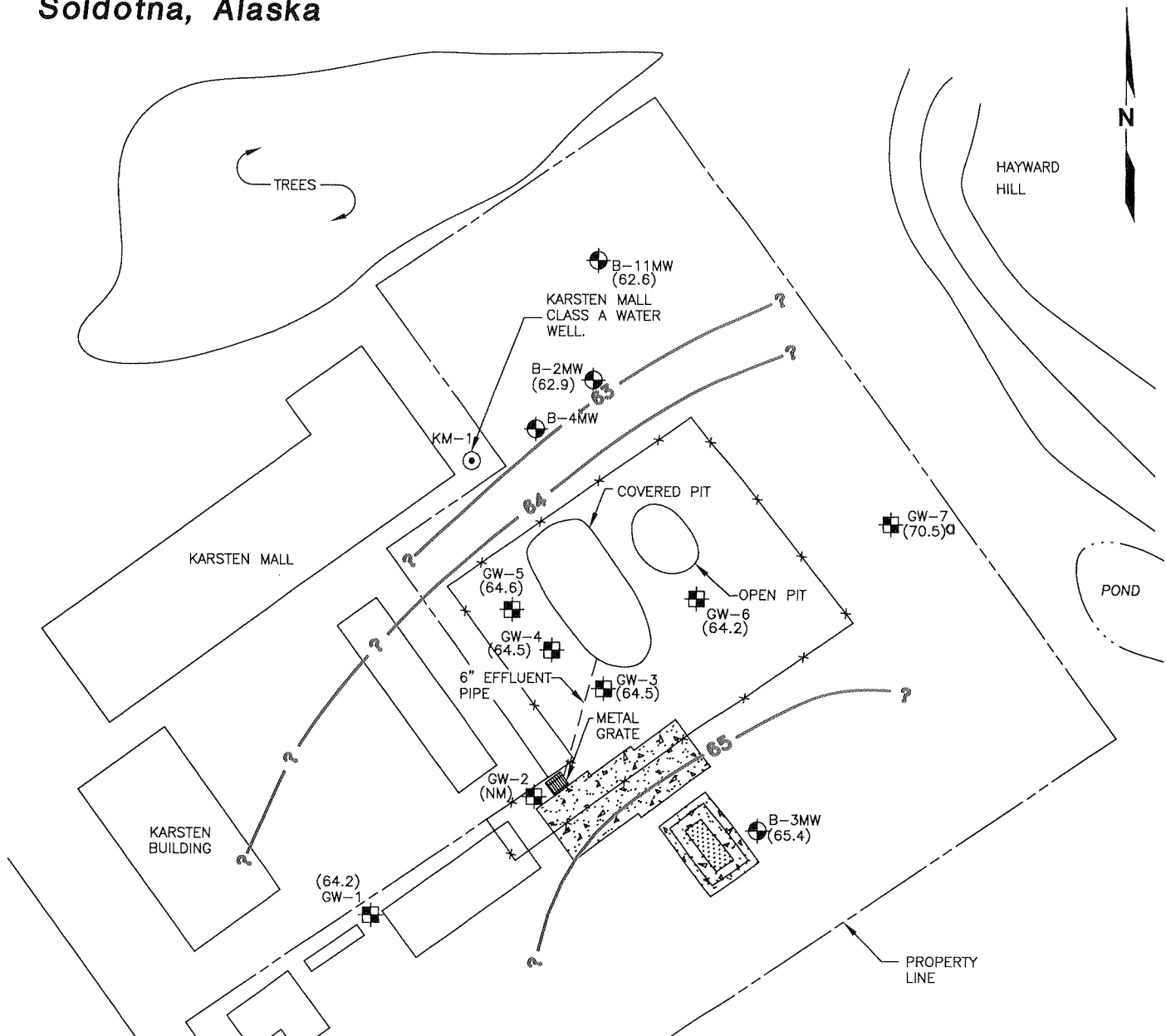


SOURCE: USGS 1:25,000, KENAI (B-3)
NW, ALASKA 1986

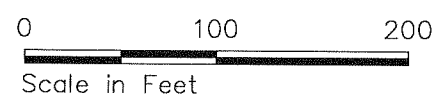


HARTCROWSER
A-8574 12/00
Figure 1

Site Plan Coastal Drilling Facility Soldotna, Alaska



SOURCE: SHANNON & WILSON, INC.
AUGUST, 1992



LEGEND

- GW-2 MONITORING WELL INSTALLED BY ENSR (1988) AND HARDING LAWSON (1990)
- KM-1 CLASS A WATER WELL
- B-4MW BORING/MONITORING WELL INSTALLED BY SHANNON & WILSON, INC. (1991-1992)
- (65.7) UNCONFINED GROUNDWATER ELEVATION ON 5/10/2000 REFERENCED TO AN ARBITRARY BENCHMARK OF 100 FEET PREVIOUSLY ESTABLISHED ONSITE.
- ◻ NOT INCLUDED IN GROUNDWATER CONTOUR INTERPRETATION.
- 65 INFERRED GROUNDWATER CONTOUR LINE (1.0 FOOT CONTOUR INTERNAL).
- (NM) NOT MEASURED

BHU 1=1
925B

**APPENDIX A
FIELD METHODS**

APPENDIX A FIELD METHODS

All fieldwork conducted for this project was performed in accordance with Alaska Department of Environmental Conservation (ADEC) 18 AAC 78, *Underground Storage Tanks Procedures Manual*.

Monitoring Well Water Level Measurements

Prior to groundwater sampling, monitoring wells were opened and the water level was measured using an electronic water level indicator. All measurements were made to the nearest 0.01 foot and referenced to the top of the PVC well casing.

Monitoring Well Sampling

After water level measurements were made, the casing volume was calculated and a minimum of three casing volumes of water was purged from each well. After purging, pH, temperature, conductance, and dissolved oxygen were measured. Samples were collected using single-use disposable bailers. Samples for analysis of volatile analytes were collected first, followed by samples for non-volatile analytes. Dissolved metals samples were not filtered in the field. Immediately after collection, the samples were labeled and placed in a cooler with "blue-ice" for delivery to the laboratory under chain-of-custody (COC) procedures. A trip blank accompanied each cooler containing benzene, toluene, ethylbenzene, and total xylenes (BTEX), gasoline range organics (GRO), and halogenated volatile organics (HVO) samples.

One blind duplicate sample (1 per every 10 samples) was collected and submitted to the laboratory for analysis. In accordance with the quality assurance project plan (QAPP), the duplicate was labeled MW-60. A notation in the field notes clearly indicated the location from which the duplicate was collected.

Sample Numbering System

Groundwater samples were labeled with the name of the monitoring well and included the date, the time of sampling, and the sampler's initials. The duplicate groundwater sample was labeled MW-60.

Field Documentation Procedures

The Hart Crowser field representative maintained a record of field activities in a logbook and on standard chain of custody forms. All field logbook entries were dated and signed. Activities and observations noted in the logbook or field report form included weather, sampling observations, and deviations from the workplan, development amounts, and water quality measurements.

Decontamination Procedures

All sampling equipment was designed for one-time use and decontamination was not necessary.

Investigation-Derived Wastes

Investigation-derived waste (IDW), the wastes generated during the field portion of the sampling event, consisted of the following:

- Water from monitoring well purging; and
- Personal protective equipment (PPE) and general debris.

Water generated from purging was bulked in a single drum, labeled with the project number, the date, the well numbers, the designation "purge water," and a contact name and telephone number. The drum was stored onsite. Based on analytical results for the purge water, and with the ADEC project manager's approval, Hart Crowser will dispose of the contents of the drum on the ground at the Coastal Drilling facility during the Spring 2001 sampling event.

PPE and debris was placed in plastic bags. The bags were disposed of at the Anchorage landfill.