

**Draft Report  
Spring 2001 Sampling Event  
Groundwater Monitoring Investigation  
Coastal Drilling Facility  
Soldotna, Alaska**



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***Prepared for  
ADEC Contract No.  
1820121395A  
NTP No. 1820121305A***

***July 2001  
8574-00***

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**DRAFT REPORT  
SPRING 2001 SAMPLING EVENT  
GROUNDWATER MONITORING INVESTIGATION  
COASTAL DRILLING FACILITY  
SOLDOTNA, ALASKA**

**1.0 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, Township 5 North, Range 10 West, Seward Meridian), in Soldotna, Alaska (Figure 1).

Presented in this document are the results of the Groundwater Monitoring Investigation - Spring 2001 Sampling Event completed on May 25, 2001. 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).

The spring 2001 sampling event is the sixth and final event of a three-year, semi-annual groundwater monitoring investigation program 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.

**2.0 SUMMARY OF SPRING 2001 SAMPLING EVENT**

The spring 2001 field effort included sampling groundwater from four selected onsite monitoring wells; repairing wells and well casing that required maintenance; resurveying all well elevations after repairs; and measuring water levels at 11 onsite wells.

A synopsis of field methods used onsite is provided in Appendix A.

## **2.1 Hydrologic Conditions**

Water level data were obtained at all accessible wells. Water level measurements from monitoring wells suggest that in the unconfined aquifer, groundwater is mounded in the center of the site and the flow is both toward the north and toward the south.

A comparison of data from previous groundwater level measurements suggests that mounding occurs only during the spring, but the flow direction always entails a northerly and southerly direction. Water levels also tend to be higher in the spring than in the fall.

## **2.2 Water Quality**

Neither gasoline-range organics (GRO), diesel-range organics (DRO), benzene, ethylbenzene, toluene, xylenes (BTEX), volatile organic compounds (VOC), nor polychlorinated biphenyls (PCBs) were detected in any of the groundwater samples.

Dissolved metals (lead, chromium, and barium) were either not detected or detected at levels below regulatory limits (18 AAC 75.345) in any of the groundwater samples.

## **2.3 Summary of Sampling Event Findings**

The groundwater quality data from this monitoring event suggests that the contaminants are not migrating offsite in the unconfined aquifer.

Based on the evaluation of historical groundwater flow direction 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.

## **3.0 WORK PERFORMED**

### **3.1 Groundwater Sampling**

Existing monitoring wells B-2MW, B-3MW, GW-5, and GW-6 were sampled for analyses of GRO/BTEX, DRO, VOC, PCBs, and dissolved metals (lead, chromium, and barium). The samples called for dissolved metals that were

filtered in the field. 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. The field procedures used for groundwater sampling are provided in Appendix A. Commercial Testing and Engineering (CT&E) analyzed the samples using the following analytical methods:

- GRO - ADEC Method AK 101;
- DRO - ADEC Method AK 102;
- VOC (includes BTEX compounds) - U.S. Environmental Protection Agency (EPA) Method 8260B;
- PCBs - EPA Method 8082; and
- Dissolved Metals (Lead, Chromium, and Barium) - EPA Method 6010.

### **3.2 Monitoring Well Repairs**

Frost jacking had elevated monitoring wells B-3MW and GW-6. The polyvinyl chloride (PVC) riser in each of these wells was trimmed down. Welding repairs were conducted on monument covers for wells GW-1, GW-4, and B-11MW. New Master locks were installed on the wells.

### **3.3 Monitoring Well Resurvey**

The 11 monitoring wells on the site were resurveyed on June 1, 2001, after repairs had been conducted. B-3MW was used as the relative benchmark to tie into the previously surveyed elevations. The new elevations are listed in Table 1 and the field data has been included in Appendix B.

### **3.4 Groundwater Measurements**

Prior to purging and sampling of the selected four monitoring wells, groundwater levels were measured and recoded from all 11 wells on site. Groundwater levels were also measured and recorded one week after sampling, when repairs of wells and well casings were completed.

It appears from the two sets of measurements that the water levels in two of the purged and sampled wells (GW-2 and GW-6) had not equilibrated over the one-week period. Therefore, the groundwater measurements made on May 25,

2001, were used to estimate the water level contours displayed in Figure 2. Adjustments for the trimmed PVC had been made to incorporate the May 25, 2001, water level measurements.

### **3.5 Investigation-Derived Waste**

Investigation-derived waste (IDW), generated during the field portion of this sampling event, consisted of 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 and fall 2000) was disposed of on the ground during this sampling event. Purge water generated from spring 2001 sampling was placed in the empty 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, the purge water is suitable for disposal to the ground.

PPE and debris were placed in plastic bags and taped shut. The bags were ultimately disposed of in the Kenai Peninsula Borough Landfill in Alaska.

## **4.0 RESULTS**

### **4.1 Hydrogeology**

Unconfined groundwater measurements, collected at 11 onsite monitoring wells, and relative groundwater elevations are provided in Table 1. The groundwater elevation in GW-7 was measured, but was not used in the interpretation of onsite groundwater contours because it is inconsistent with the other measurements and appears to be in a perched aquifer. Monitoring well B-4MW was found to be dry. Inferred groundwater contours are shown on Figure 2.

May 2001 groundwater level measurements indicated that a groundwater mound exists in the vicinity of monitoring wells GW-3, GW-4, and GW-5, and that a localized, semi-radial, flow pattern originates in the area (Figure 2). The hydraulic gradient calculated for the flow moving to the north away from the mound was approximately 0.012, and the gradient for groundwater flowing to the south of the mound was calculated to be approximately 0.0046.

This groundwater mounding effect was also observed during the previous spring sampling events of 1999 and 2000. However, the groundwater mounding has not been observed during the fall sampling events. The localized high groundwater level during the spring 2001 event 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.

## 4.2 Groundwater Analytical Results

The following section provides a description of the analytical results from the current sampling event. Groundwater samples were collected from four wells; B-2MW, B-3MW, GW-5, and GW-6. Cumulative water level measurements and groundwater parameter data are presented in Table 1(A). Table 1(B) presents cumulative water level measurements for wells not sampled. 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 to 0.10 milligrams per liter (mg/L).
- **DRO.** DRO was not detected above the detection limits ranging from 0.521 to 0.61.
- **BTEX.** Concentrations of individual BTEX analytes were not detected above the laboratory detection limits.
- **Halogenated Volatile Organic Compounds (HVOC)** No HVOC compounds were detected above the detection limits. Detection limits range from 0.01 to 0.001 mg/L.
- **PCBs.** PCBs were not detected above the laboratory detection limit of 0.000116 mg/L for each of the individual PCB compounds.
- **Dissolved Metals.** Barium was detected in each onsite well ranging from 0.021 to 0.113 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, 18 AAC 75.345; 18 AAC 80). The concentration of the maximum barium detection is one to two orders of magnitude lower than these cleanup levels. Barium concentrations during this monitoring event are consistent with barium concentrations observed during previous Hart Crowser sampling events.



Lead was detected in groundwater well GW-6 and B-3MW at 0.00699 mg/L and 0.00361 mg/L, respectively. The groundwater cleanup standard for lead is 0.015 mg/L. (Table C, 18 AAC 75.345). The concentration of the maximum lead detection is an order of magnitude lower than the cleanup level.

Chromium was detected in groundwater well GW-6 at 0.00587 mg/L. The groundwater cleanup standard for chromium is 0.1 mg/L. (Table C, ADEC 18 AAC 75). The concentration of the chromium detection is two order of magnitude lower than cleanup levels.

## **5.0 DATA QUALITY ASSESSMENT**

The review of the quality of the chemical data produced by CTE Environmental Services, Inc., included consideration of the following:

- Sample custody;
- Holding times;
- Method blank concentrations;
- Reporting limits;
- Field and laboratory duplicate precision; and
- Completeness.

The samples were submitted to the laboratory for HVOC analysis by EPA Method 8021B. However, the laboratory conducted EPA Method 8260B. EPA Method 8260B is a more definitive method. The project data quality was determined to be acceptable for the project needs; the data quality objectives were met. The analytical laboratory data, including the chain-of-custody (COC) forms, and cooler receipt forms are presented in Appendix B.

## **6.0 CONCLUSIONS**

### **6.1 Hydrogeology**

Based on spring 2001 data, localized groundwater beneath the site flows away from the mound mainly to the north and south.

Spring 2001 unconfined groundwater elevation data suggest that a localized high in groundwater levels may exist near the covered pit. In previous spring sampling events a localized, semi-radial, groundwater flow pattern originating in the area was also 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.

## **6.2 Groundwater Quality**

Neither GRO, DRO, BTEX, VOC, nor PCBs were detected in any wells during this sampling event. This is consistent with analytical results observed during previous sampling events in 1999 and 2000.

Neither dissolved barium, dissolved chromium, nor dissolved lead were detected above applicable ADEC cleanup levels during this sampling event. This is consistent with analytical results observed during previous sampling events in 1999 and 2000.

## **7.0 RECOMMENDATIONS AND LIMITATIONS**

### **7.1 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. Additional recommendations will be addressed in the monitoring activities comprehensive report to follow under separate cover..

### **7.2 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 The 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.

## 8.0 REFERENCES

ADEC, 1999. *18 AAC 80 - Drinking Water Regulations*.

ADEC, 2000. *18 AAC 75 - Oil and Hazardous Substances Pollution Control Regulations*. August 27.

Hart Crowser, 1998. *Final Work Plan For Groundwater Monitoring. Coastal Drilling Facility, Soldotna, Alaska*. November 5.

Hart Crowser, 2000. Final Report. *Fall 1999 Sampling Event, Groundwater Monitoring Investigation. Coastal Drilling Facility, Soldotna, Alaska*. January 4.

Raker, Jim, 2000. Personal communication with Russell Grandel. November 2.

Shannon & Wilson, Inc., 1992. *Environmental Site Investigation, Coastal Drilling Facility, Soldotna, Alaska*. August.

**TABLE 1(A) - COMPARATIVE PHYSICAL WELL DATA SUMMARY  
SAMPLED WELLS**

Well Number, Screen Interval, & Date	pH	Temp °C	DO mg/L	Conductance µS/cm	Casing Elevation <sup>1</sup> ft	Casing Stick-up ft	Depth to Groundwater ft btoc	Depth to Groundwater ft bgs	Groundwater Elevation <sup>1</sup> ft
<b>B-2MW</b> (34'-44' bgs)									
5/25/2001	8.27	5.7	0.18	213	103.45	2.9	40.11	37.25	63.34
11/2/2000	6.7	3.9	4.5	171	103.46	2.9	40.59	37.73	62.87
5/10/2000	7.51	3.1	4.9	248	103.46	2.9	38.66	35.80	64.80
11/18/1999	7.29	3.9	4.8	219	103.46	2.9	39.69	36.83	63.77
5/18/1999	7.09	3.9	4.7	310	103.46	2.9	38.41	35.55	65.05
11/12/1998	7.35	4	5.2	211	103.46	2.9	40.43	37.57	63.03
<b>B-3MW</b> (30'-40' bgs)									
5/25/2001	8.33	5.7	0.68	382	102.50	2.9	37.74	34.80	64.76
11/2/2000	6.6	4.4	2.90	138	102.84	2.9	37.42	34.48	65.42
5/10/2000	7.33	2.7	2.89	311	102.84	2.9	36.83	33.89	66.01
11/18/1999	7.34	2.9	2.21	245	102.84	2.9	37.20	34.26	65.64
5/18/1999	7.15	3.3	2.31	251	102.84	2.9	37.55	34.61	65.29
11/12/1998	7.29	2.7	2.08	232	102.84	2.9	38.22	35.28	64.62
<b>GW-5</b> (30'-40' bgs)									
5/25/2001	7.62	5.3	0.20	223	100.33	1.2	35.13	33.95	65.20
11/2/2000	6.87	4.9	3.43	197	100.28	1.2	35.70	34.52	64.58
5/10/2000	7.54	2.8	3.44	292	100.28	1.2	34.11	32.93	66.17
11/18/1999	7.24	3.1	3.11	234	100.28	1.2	34.56	33.38	65.72
5/18/1999	7.27	3.1	2.79	249	100.28	1.2	34.27	33.09	66.01
11/12/1998	7.31	2.9	2.88	221	100.28	1.2	35.42	34.24	64.86
<b>GW-6</b> (31'-41' bgs)									
5/25/2001	8.08	7	0.62	172	101.18	1.7	36.37	34.65	64.81
11/2/2000	6.81	4.1	6.29	158	101.42	1.7	37.20	35.48	64.22
5/10/2000	7.27	2.7	2.49	311	101.42	1.7	35.35	33.63	66.07
11/18/1999	7.51	3.3	2.37	247	101.42	1.7	35.74	34.02	65.68
5/18/1999	7.34	3.7	2.99	255	101.42	1.7	35.95	34.23	65.47
11/12/1998	7.4	3.1	3.71	239	101.42	1.7	36.80	35.08	64.62

\*Past sampling event results are shaded.

Notes:

1 = All elevations surveyed on 6/1/01 use reference well B-3MW as a benchmark with a relative elevation of 102.5 feet.

bgs = Below ground surface

btoc = Below top of casing

DO = Dissolved Oxygen

ft = feet

mg/L = Milligrams per Liter

µS/cm = Microsiemens per centimeter

TABLE 1(B) - COMPARATIVE PHYSICAL WELL DATA SUMMARY\*

UNSAMPLED WELLS

Well Number, Screen Interval & Date	pH	Temp °C	DO mg/L	Conductance µS/cm	Casing Elevation <sup>1</sup> ft	Casing Stick-up ft	Depth to Groundwater ft btoc	Depth to Groundwater ft bgs	Groundwater Elevation <sup>1</sup> ft
<b>B-4MW (32.5'-42.5' bgs)</b>									
5/25/2001	NM	NM	NM	NM	104.56	1.8	38.23	Dry	66.33
11/2/2000	NM	NM	NM	NM	102.34	1.8		Dry	
5/10/2000	NM	NM	NM	NM	102.34	1.8		Dry	
11/18/1999	NM	NM	NM	NM	102.34	1.8		Dry	
5/18/1999	NM	NM	NM	NM	102.34	1.8	37.39	35.55	64.95
<b>B-11MW (32'-42' bgs)</b>									
5/25/2001	NM	NM	NM	NM	102.97	2.8	39.78	36.98	63.19
11/2/2000	NM	NM	NM	NM	103.10	2.8	40.48	37.68	62.62
5/10/2000	NM	NM	NM	NM	103.10	2.8	38.46	35.66	64.64
11/18/1999	NM	NM	NM	NM	103.10	2.8	39.60	36.80	63.50
5/18/1999	NM	NM	NM	NM	103.10	2.8	38.30	35.50	64.80
<b>GW-1 (32'-42' bgs)</b>									
5/25/2001	NM	NM	NM	NM	101.91	1.7	37.28	35.62	64.63
11/2/2000	NM	NM	NM	NM	101.86	1.7	37.70	36.04	64.16
5/10/2000	NM	NM	NM	NM	101.86	1.7	36.40	34.74	65.46
11/18/1999	NM	NM	NM	NM	101.86	1.7	36.70	35.04	65.16
5/18/1999	NM	NM	NM	NM	101.86	1.7	37.00	35.34	64.86
<b>GW-2 (32'-42' bgs)</b>									
5/25/2001	NM	NM	NM	NM	102.49	0.0	37.74	37.76	64.75
11/2/2000	NM	NM	NM	NM	Could not open well due to rusted lock				
5/10/2000	NM	NM	NM	NM	99.78	-0.02	33.73	33.75	66.05
11/18/1999	NM	NM	NM	NM	Unable to locate well due to snow cover				
5/18/1999	NM	NM	NM	NM	99.78	-0.02	34.35	34.37	65.43
<b>GW-3 (30'-40' bgs)</b>									
5/25/2001	NM	NM	NM	NM	102.11	2.5	36.98	34.52	65.13
11/2/2000	NM	NM	NM	NM	102.06	2.5	37.55	35.09	64.51
5/10/2000	NM	NM	NM	NM	102.06	2.5	35.98	33.52	66.08
11/18/1999	NM	NM	NM	NM	102.08	2.5	36.34	33.88	65.72
5/18/1999	NM	NM	NM	NM	102.06	2.5	36.56	34.10	65.50
<b>GW-4 (31'-41' bgs)</b>									
5/25/2001	NM	NM	NM	NM	101.29	2.0	36.16	34.21	65.13
11/2/2000	NM	NM	NM	NM	101.25	2.0	36.75	34.80	64.50
5/10/2000	NM	NM	NM	NM	101.25	2.0	35.17	33.22	66.08
11/18/1999	NM	NM	NM	NM	101.25	2.0	35.57	33.62	65.68
5/18/1999	NM	NM	NM	NM	101.25	2.0	35.30	33.35	65.95
<b>GW-7 (24'-34' bgs)</b>									
5/25/2001	NM	NM	NM	NM	103.45	2.7	32.88	30.14	70.57
11/2/2000	NM	NM	NM	NM	103.44	2.7	32.94	30.20	70.50
5/10/2000	NM	NM	NM	NM	103.44	2.7	32.81	30.07	70.63
11/18/1999	NM	NM	NM	NM	103.44	2.7	32.87	30.13	70.57
5/18/1999	NM	NM	NM	NM	103.44	2.7	32.76	30.02	70.68

\*Past monitoring event results are shaded.

Notes:

1 = All elevations surveyed on 6/1/01 use reference well B-3MW as a benchmark with a relative elevation of 102.5 feet.

bgs = Below ground surface

btoc = Below top of casing

DO = Dissolved Oxygen

ft = feet

mg/L = Milligrams per Liter

µS/cm = Microsiemens per centimeter

TABLE 2 - COMPARATIVE HYDROCARBON, BTEX, PCBS, AND METALS CONCENTRATIONS\*

Well Number and Date	BTEX										PCBs			Dissolved Metals (EPA 6010)			
	GRO		DRO		EPA 8021B(EPA 8260B)		Xylenes		PCBs		Lead		Chromium		Barium		
	AK101 mg/L	mg/L	AK102 mg/L	mg/L	Benzene mg/L	Ethylbenzene mg/L	Toluene mg/L	mg/L	(EPA 8081) mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
<b>B-2MW</b>																	
5/25/2001	0.0900	U	0.532	U	0.00100	U	0.00100	U	0.00100	U	0.00100	U	0.000104	U	0.000400	U	0.0201
11/2/2000	0.09	U	0.36	U	0.0010	U	0.0010	U	0.0020	U	0.0020	U	0.0001	U	0.005	U	0.020
5/10/2000	0.09	U,J	0.32	U,J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0001	U,J	0.005	U,J	0.017
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	0.018
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	U	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	0.040
<b>B-3MW</b>																	
5/25/2001	0.0900	U	0.532	U	0.00100	U	0.00100	U	0.00100	U	0.00100	U	0.000104	U	0.00361	U	0.0380
11/2/2000	0.09	U	0.34	U	0.0010	U	0.0010	U	0.0020	U	0.0020	U	0.0001	U	0.005	U	0.139
5/10/2000	0.09	U,J	0.45	J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0001	U,J	0.005	U,J	0.015
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	0.013
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	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	0.017
<b>GW-5</b>																	
5/25/2001	0.0900	U	0.521	U	0.00100	U	0.00100	U	0.00100	U	0.00100	U	0.000104	U	0.0004	U	0.113
11/2/2000	0.09	U	0.31	U	0.0010	U	0.0010	U	0.0020	U	0.0020	U	0.0001	U	0.0051	U	0.133
5/10/2000	0.09	U,J	0.33	J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0001	U,J	0.005	U,J	0.085
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	0.13
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	0.068
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	0.16
<b>GW-6</b>																	
5/25/2001	0.0900	U	0.61	U	0.00100	U	0.00100	U	0.00100	U	0.00100	U	0.000104	U	0.00699	U	0.0591
11/2/2000	0.09	U	0.32	U	0.0010	U	0.0010	U	0.0020	U	0.0020	U	0.0001	U	0.005	U	0.012
5/10/2000	0.09	U,J	0.78	J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0020	U,J	0.0001	U,J	0.005	U,J	0.012
11/18/1999	0.10	U	0.71	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.00047	U	0.003	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	U	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	0.019
<b>GW-60</b>																	
(duplicate)																	
5/25/2001	0.0900	U	0.532	U	0.00100	U	0.00100	U	0.00100	U	0.00100	U	0.000104	U	0.00470	U	0.0376
<b>ADEC</b>																	
<b>CLEANUP LEVEL<sup>1</sup></b>	1.3		1.5		0.005		0.7		1		10		0.0005		0.015		2.0

\*Past sampling event results are shaded.

Notes:

1 = 18 AAC 75.345, 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 CONCENTRATIONS**

Sampling Event	Sampling Date	Well Number	Detected		Concentration mg/L	ADEC Cleanup Level <sup>1</sup> mg/L
			HVOC	EPA Method 8260B		
Spring 2001	5/25/2001	All <sup>2</sup>	None		NA	NA
Fall 2000	11/2/2000	All <sup>2</sup>	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-Dichloroethane		0.00028	NA
			1,1-Dichloroethane		0.00067	3.65
Spring 1999	5/18/1999	GW-6	1,2-Dichloroethane		0.0011	0.005
			1,2-Dichloropropane		0.00023	0.005
			cis-1,2-Dichloroethane		0.0012	NA
			1,1-Dichloroethane		0.0048	3.65
Fall 1998	11/12/1998	KM-1	1,2-Dichloroethane		0.00065	0.005
			1,4-Dichlorobenzene		0.0012	0.075
		B-2MW	1,1-Dichloroethane		0.00022	3.65

\*Past sampling event results are shaded.

Notes:

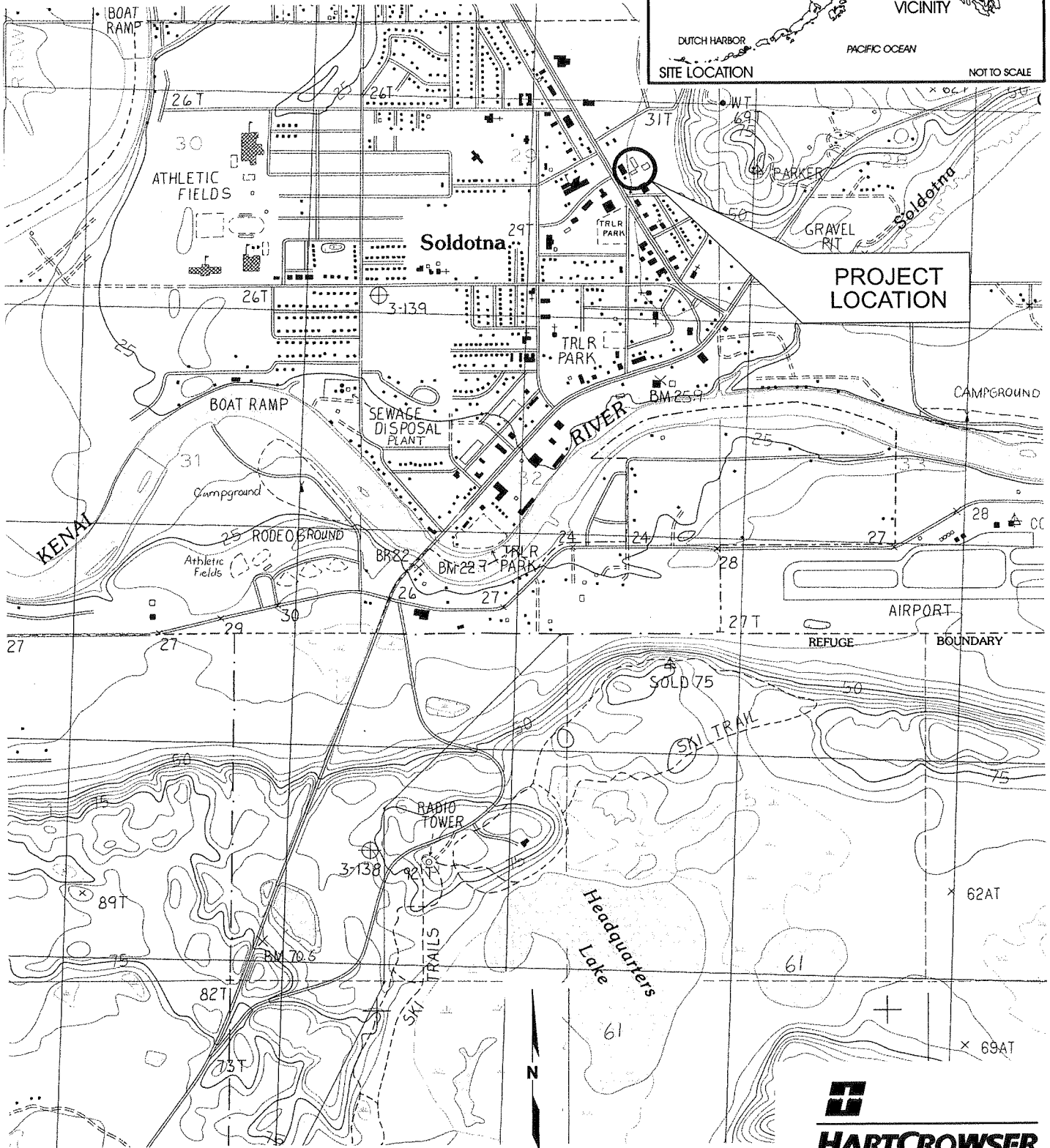
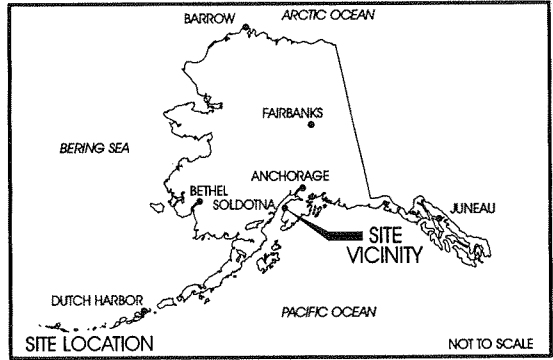
- 1 = 18 AAC 75, Table C
- 2 = All sampled wells (B-2MW, B-3MW, GW-5, and GW-6)
- HVOC = Halogenated Volatile Organic Compounds
- J = Result should be considered to be an estimate due to analysis outside of acceptable sample holding time limits.
- NA = Not available



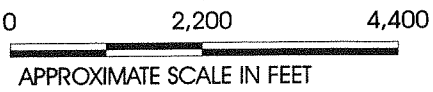
# Site Location and Vicinity Map

## Coastal Drilling Facility

### Soldotna, Alaska

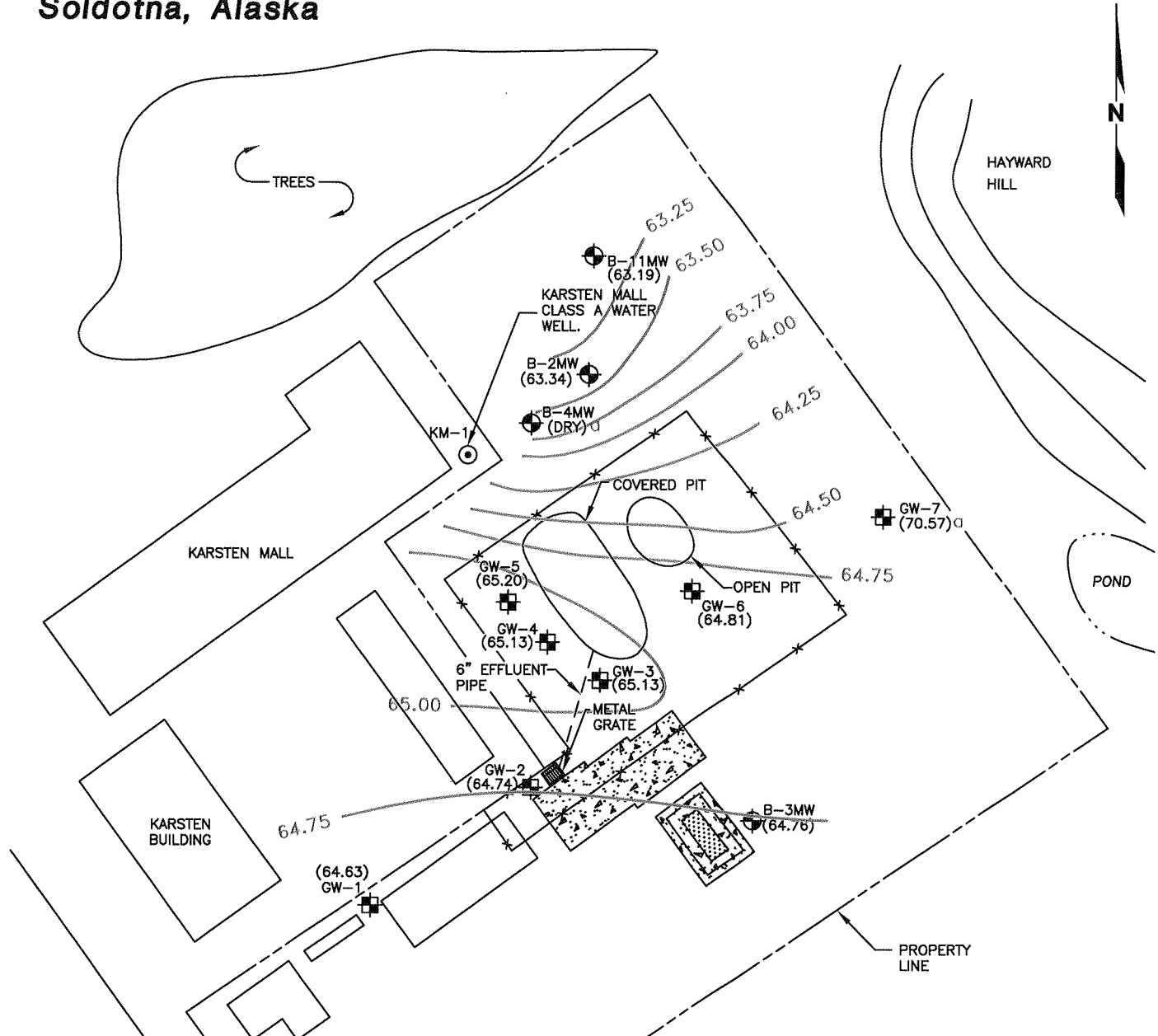


SOURCE: USGS 1:25,000, KENAI (B-3)  
NW, ALASKA 1986



**HARTCROWSER**  
A-8574 7/01  
Figure 1

# Site Plan Coastal Drilling Facility Soldotna, Alaska



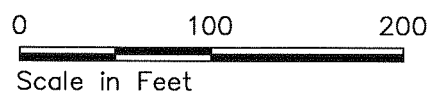
SOURCE: SHANNON & WILSON, INC.  
AUGUST, 1992

**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).



**A-8574**      **7/01**  
**Figure 2**



BHJ 1=1  
10398

**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. Dedicated pumps, if present, were removed. All measurements were made to the nearest 0.01 foot and referenced to the top of the polyvinyl chloride (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 were purged from each well. After purging, pH, temperature, specific 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 standard chain-of-custody procedures. A trip blank accompanied each cooler containing benzene, toluene, ethylbenzene, and total xylenes (BTEX), gasoline-range organics (GRO), and volatile organic compounds (VOC) samples.

One blind duplicate sample 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 work plan, purge water 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 Kenai Peninsula Borough landfill.