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Earth and Environmental Technologies

DRAFT Report
Fall 1999 Sampling Event
Groundwater Monitoring
Investigation
Coastal Drilling Facility
Soldotna, Alaska

ADEC Contract No.
1820121395A
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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 of 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 1999 Sampling Event completed on November 18, 1999. 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 1999 sampling event is the third 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 on Figure 2.

The field effort included sampling groundwater from four selected onsite monitoring wells and an offsite drinking water well. Water level measurements were made at the four sampled 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.** Unconfined groundwater elevations and inferred groundwater contours, referenced to a previously established, arbitrary benchmark of 100 feet, are provided on Figure 2. Water level data obtained at wells GW-7 and B-4MW were not included in groundwater contour interpretation due to screened interval depth and lack of water, respectively. Water level measurements made in 8 onsite monitoring wells suggests that unconfined groundwater flow immediately beneath the site is influenced by an area of slightly elevated groundwater adjacent to and just west of the covered pit. The topographical high created by Hayward Hill, located approximately 250 feet northeast of the site, may also influence unconfined flow. The reason for a localized occurrence of "mounded" groundwater is unknown, however, it is likely a result of preferential infiltration associated with the pits area. A comparison of Spring 1999 and Fall 1999 groundwater elevation data suggests that during the year, the nature of the groundwater mound and the inferred primarily northwestern flow direction were not affected to a significant degree by seasonality.

  The presence of the groundwater mound, and likely the proximity of Hayward Hill, results in a slightly elongated, semi-radial flow pattern, the apex of which is centered under monitoring wells GW-4 and GW-5. Based on interpretation of Fall 1999 elevation data, unconfined groundwater immediately beneath the site flows primarily northwest from the apex of the mound. Due to the nature of the mounded groundwater, secondary flow to the west is also possible.

  Based on a well log provided by the ADEC, the static water level in the Karsten Mall drinking water well, which is screened in the confined aquifer, is approximately 15 feet below ground surface (bgs). A comparison of static water levels in the unconfined and confined aquifers indicates that a fairly strong upward vertical hydraulic gradient exists in the confined aquifer.

- **Confined and Unconfined Aquifer Water Quality.** Gasoline range organics (GRO), benzene, ethylbenzene, toluene, xylenes (BTEX), polychlorinated biphenyls (PCB), dissolved lead, and dissolved barium were not detected in any of the groundwater samples. Diesel range organics (DRO), halogenated volatile organic compounds (HVOC), and dissolved barium were not detected above regulatory limits in any of the four wells sampled onsite, nor in the Karsten Mall drinking water well.

- **Summary and Recommendations.** The groundwater quality data from this monitoring event suggests that the contaminants apparently are not migrating offsite in the unconfined aquifer, nor does the confined aquifer appear to have been impacted.

Based on groundwater elevation data and the resulting inferred groundwater contours presented on Figure 2, it appears that the four wells currently being sampled are appropriately located to intercept contaminants potentially migrating offsite within the unconfined zone. The four monitoring wells are arrayed such that they provide coverage of the southerly, westerly, and northerly flow directions.

Based on groundwater quality and interpretation of 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, the need for additional wells will be revisited.

WORK PERFORMED

Groundwater Measurements

Groundwater measurements were made in the four monitoring wells sampled, and in five additional monitoring wells onsite; a sixth monitoring well, GW-2, is located in a flush-mount overcasing and could not be located due to snow cover. Due to the presence of downhole plumbing and wiring which restricted access, groundwater measurements were not made within the Karsten Mall drinking water well. All groundwater elevations are referenced to an arbitrary benchmark of 100 feet previously established onsite.

During groundwater measurements, overcasing padlocks were found to be missing at monitoring wells GW-5 and B-4MW; the locks were replaced. The shackle on the padlock at monitoring well GW-6 appeared to have been bent, but the lock was still functional. The ADEC project manager was notified.

Groundwater Sampling

Existing monitoring wells B-2MW, B-3MW, GW-5, and GW-6, and the Karsten Mall drinking water well were sampled for analysis of GRO/BTEX, DRO, HVOC, PCB, and dissolved metals (lead, chromium, and barium). A blind field duplicate sample was also collected at B-2MW and, in accordance with the Quality Assurance Project Plan (QAPP), was designated MW-50. Groundwater quality

field parameters were measured prior to sampling (Table 1). The methods used for groundwater sampling are provided in Appendix A - Field Methods. The analytical methods used were:

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

Repair Monitoring Well B-11MW

The repair of monitoring well B-11MW was attempted as recommended in the Spring 1999 report (Hart Crowser, 1999). The well was found to be broken below ground level during the Fall 1998 sampling event. An attempt to excavate around the well to the depth of the break was unsuccessful due to frozen ground. The repair will be completed during the Spring 2000 sampling event.

Investigation-Derived Waste

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 2000 sampling event.

PPE and debris were placed in plastic bags and taped shut. The bags were placed, with permission from the Soldotna U-Haul manager Mr. Jim Raker, in the U-Haul dumpster, and ultimately, the Kenai Peninsula Borough 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. Thus, a total of 8 wells were used in the interpretation of unconfined flow beneath the site. Inferred groundwater contours are shown on Figure 2.

November 1999 groundwater level measurements, similarly to all previous water level measurements under this investigation, indicated that a groundwater high or "mound" appeared to exist at the site. The apex of the mound was centered beneath monitoring wells GW-4 and GW-5. The reason for a localized occurrence of "mounded" groundwater is unknown, however, it is likely a result of preferential infiltration associated with the pits area.

Localized groundwater flow in the unconfined aquifer can be generally inferred as trending from the apex of the mound toward the northwest. The data indicates that a westerly, localized flow component is possible as well. Additionally, Hayward Hill may also influence localized unconfined aquifer flow.

A comparison of water level data from the Spring 1999 and Fall 1999 sampling events suggests that the groundwater mound's presence and its effect on localized flow patterns, specifically the inferred primarily northwestern flow direction, was apparently not greatly affected by seasonality. Though seasonal changes in the height and shape of the mound are apparent, the mound's location, and its effect on localized flow in the unconfined aquifer, appears to have remained essentially unchanged since the last sampling event.

Static water levels in the unconfined aquifer were on average, approximately 20 feet lower than the reported static water level of the confined aquifer, thus suggesting that a strong upward vertical gradient exists between the confined and unconfined aquifers. Such a gradient significantly decreases the susceptibility of the confined aquifer to impacts associated with potential downward contaminant migration from the unconfined aquifer.

Groundwater Analytical Results

The project data quality was determined acceptable for the project needs and the data quality objectives were met. The review of the quality of the chemical data produced by MultiChem Analytical Services of Anchorage, Alaska, and Renton, Washington, included consideration of the following:

- Sample custody;
- Holding times;
- Method blank contamination;
- Reporting limits;
- Field and laboratory duplicate precision;
- Matrix spike and surrogate accuracy; and
- Completeness.

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

- **GRO.** Concentrations of GRO were not detected above the detection limit of 0.10 milligrams per liter (mg/L) in the onsite wells or in the Karsten Mall drinking water well.

- **DRO.** DRO was detected in GW-6 at a concentration of 0.71 mg/L. Concentrations of DRO above the maximum detection limit of 0.26 mg/L were not detected in any of the other onsite wells or in the Karsten Mall well. The groundwater cleanup standard for DRO is 1.5 mg/L (Table C, ADEC 18 AAC 75). The detected DRO concentration is an order of magnitude below this cleanup standard. DRO has not previously been detected in GW-6.

- **BTEX.** Concentrations of individual BTEX analytes were not detected above the detection limit of 0.0005 mg/L in the onsite wells or in the Karsten Mall well.

- **HVOC.** The compounds 1,2-dichloropropane, cis-1, 2-dichloroethene, 1,1-dichloroethane and 1, 2-dichloroethane were detected in the sample from monitoring well GW-6. HVOC above their respective detection limits (Appendix B) were not detected in any of the other wells onsite. The detected HVOC concentrations are all below the appropriate cleanup levels

for their respective compounds (Table C, ADEC 18 AAC 75), and similar in magnitude to HVOC detections previously made under this investigation.

- **PCB.** PCB above detection limits which ranged from 0.00042 to 0.00052 mg/L were not detected in the onsite wells or in the Karsten Mall well.

- **Dissolved Metals.** Barium was detected in each onsite well, and in the Karsten Mall well at concentrations that ranged from 0.013 to 0.13 mg/L. The groundwater cleanup standard for barium is 2.0 mg/L. (Table C, ADEC 18 AAC 75*)*. The Alaska maximum contaminant level (MCL) for barium is also 2.0 mg/L (ADEC 18 AAC 80*)*. The concentration of the maximum barium detection is two orders of magnitude lower than these cleanup levels.

  Concentrations of lead and chromium were not detected above their detection limits of 0.003 and 0.010 mg/L, respectively, in the onsite wells or in the Karsten Mall well.

CONCLUSIONS AND RECOMMENDATIONS

Hydrogeology

- Based on Fall 1999 data, localized groundwater flow beneath the site is inferred as being in a primarily northwesterly direction. Possible localized secondary trendings to the west were also noted. Over the past six months flow direction in the unconfined zone has remained essentially unchanged.

- Fall 1999 unconfined groundwater elevation data suggests that a groundwater mound exists in the vicinity of monitoring wells GW-4 and GW-5, and that a localized, semi-radial groundwater flow pattern originates in that area. The data, and potential 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. A comparison of Spring 1999 and Fall 1999 groundwater elevation data suggests that the location of the mound, and its influence on the localized groundwater flow, changed little in the six months between the sampling events.

- When elevation data from the unconfined and confined aquifers are compared, it is apparent that an upward vertical gradient exists between the

aquifers. Such a gradient decreases the susceptibility of the confined aquifer to impacts associated with potential downward contaminant migration from the unconfined aquifer.

- 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, BTEX, and PCB were not detected either onsite or in the Karsten Mall drinking water well during this sampling event.
- DRO was not detected above ADEC cleanup levels either onsite or in the Karsten Mall well during this sampling event
- HVOC were not detected above ADEC cleanup levels either onsite or in the Karsten Mall well during this sampling event.
- Dissolved barium was not detected above applicable ADEC cleanup levels either onsite or in the Karsten Mall well during this sampling event.
- Dissolved lead and chromium were not detected either onsite or in the Karsten Mall drinking water well during this sampling event.

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 worsen or flow direction change markedly, it will be necessary to reevaluate the need for additional new wells or, alternately, to expand the present monitoring program to include existing wells which have been previously unsampled under this investigation.

An initial attempt to repair the broken PVC casing at monitoring well B-11MW was unsuccessful due to frozen ground. It is recommended that the repair be completed during the Spring 2000 sampling event. Following the repair, it is recommended that a registered land surveyor reestablish the vertical reference elevation at B-11MW.

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. Spring 1999 Sampling Event, Groundwater Monitoring Investigation. Coastal Drilling Facility, Soldotna, Alaska. Prepared for the Alaska Department of Environmental Conservation. July 8, 1999.

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)	Elevation[1] (Groundwater) (ft)
SAMPLED WELLS							
B-2MW (34'-44' bgs)							
11/18/1999	7.3	3.9	4.8	219	39.69	36.83	63.8
5/18/1999	7.1	3.9	4.7	310	38.41	35.55	65.1
11/12/1998	7.4	4	5.2	211	40.43	37.57	63.0
B-3MW (30'-40' bgs)							
11/18/1999	7.3	2.9	2.21	245	37.20	34.26	65.6
5/18/1999	7.2	3.3	2.31	251	37.55	34.61	65.3
11/12/1998	7.3	2.7	2.08	232	38.22	35.28	64.6
GW-5 (30'-40' bgs)							
11/18/1999	7.2	3.1	3.11	234	34.56	33.38	65.7
5/18/1999	7.3	3.1	2.79	249	34.27	33.09	66.0
11/12/1998	7.3	2.9	2.88	221	35.42	34.24	64.9
GW-6 (31'-41' bgs)							
11/18/1999	7.5	3.3	2.37	247	35.74	34.02	65.7
5/18/1999	7.3	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
KM-1 (Open casing at 73' bgs)							
11/18/1999	6.1	6.7	2.38	265	NM	NM	NM
5/18/1999	6.5	7.4	2.34	268	NM	NM	NM
11/12/1998	6.1	6.2	2.19	278	NM	NM	NM
UNSAMPLED WELLS							
B-4MW (32.5'-42.5' bgs)							
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)							
11/18/1999	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)							
11/18/1999	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)							
11/18/1999	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)							
11/18/1999	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)							
11/18/1999	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)							
11/18/1999	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.**

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Notes:

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

bgs = Below ground surface

NM = Not measured

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

Well Number and Date	GRO AK101 (mg/L)	DRO AK102 (mg/L)	BTEX EPA 8021B Benzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes (mg/L)	PCB (EPA 8081) (mg/L)	Dissolved Metals (EPA 6010) Lead (mg/L)	Chromium (mg/L)	Barium (mg/L)
B-2MW										
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-2MW (duplicate)										
11/18/1999	0.10 U	0.26 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00047 U	0.003 U	0.010 U	0.020
11/12/1998	0.10 U	0.25 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00098 U	0.030 U	0.079	0.27
B-3MW										
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										
11/18/1999	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-5 (duplicate)										
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	0.061
GW-6										
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
KM-1										
11/18/1999	0.10 U	0.24 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.00048 U	0.003 U	0.010 U	0.063
5/18/1999	0.10 U	0.25 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.00048 U	0.003 U	0.010 U	0.085
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	0.074
ADEC CLEANUP LEVEL[1]	**1.3**	**1.5**	**0.005**	**0.7**	**1**	**10**	**0.0005**	**0.015**	**0.1**	**2.0**

***Past sampling event results are shaded.**

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Notes:

U = Not detected above detection limit indicated

1 = 18 AAC 75, Table C

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 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
		KM-1	1,4-Dichlorobenzene	0.0012	0.075
Fall 1998	11/12/1998	B-2MW	1,1-Dichloroethane	0.00022	3.65

*Past sampling event results are shaded.

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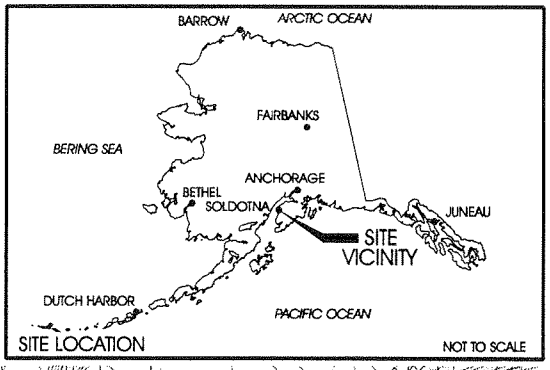
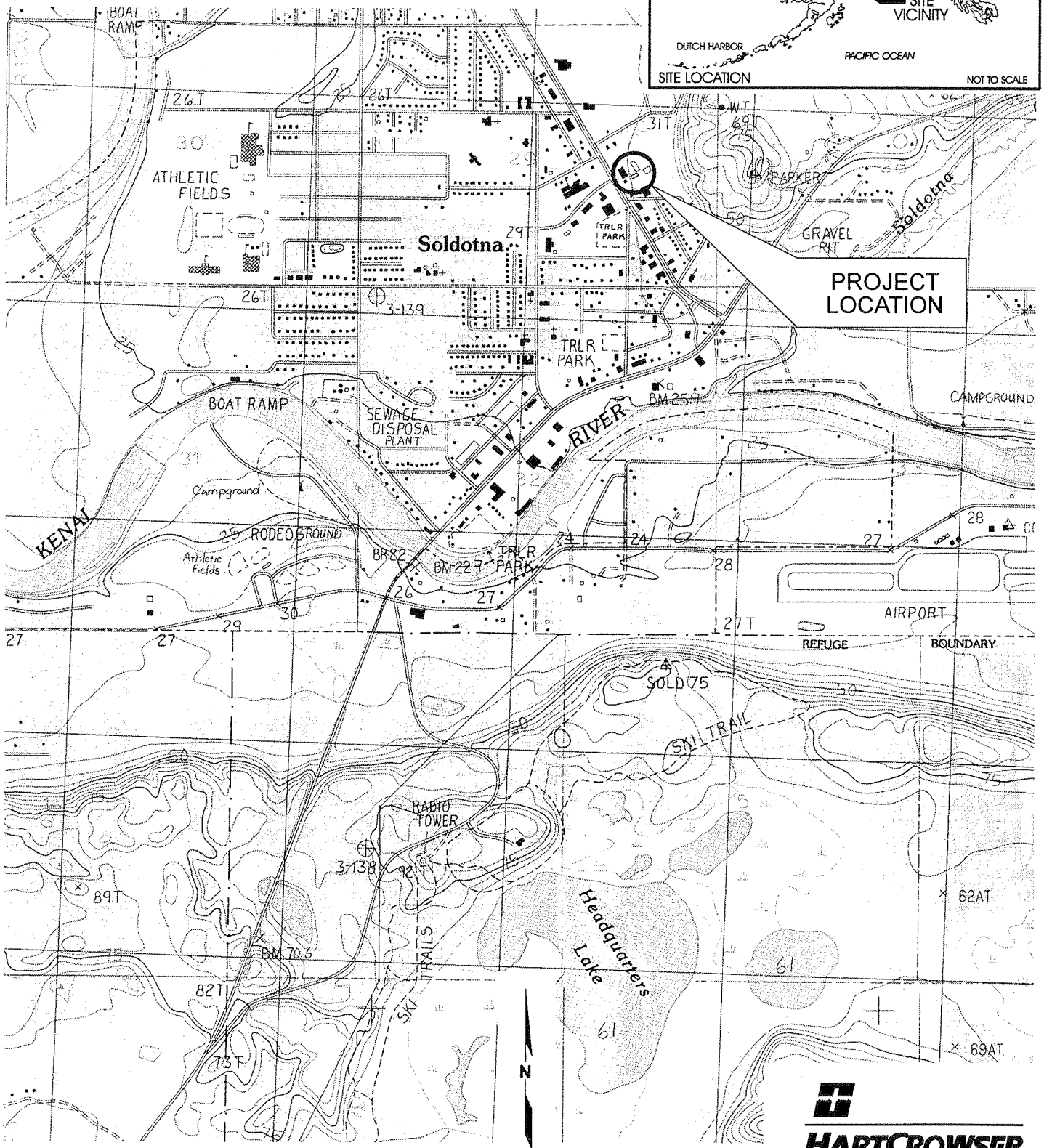
Notes:

1 = 18 AAC 75, Table C

NA = Not available

Site Location and Vicinity Map
Coastal Drilling Facility
Soldotna, Alaska





0 2,200 4,400

APPROXIMATE SCALE IN FEET

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

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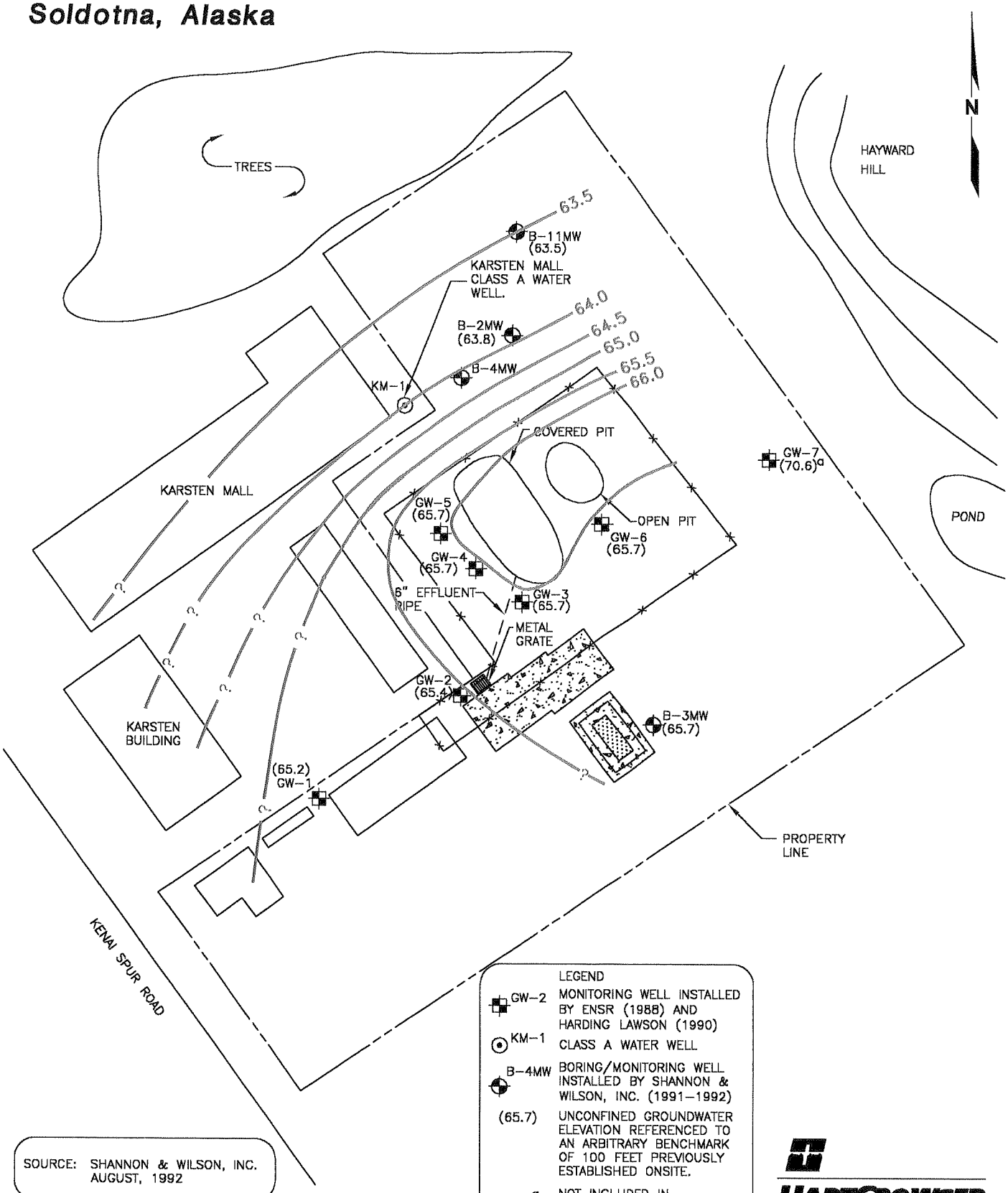
A-8574 1/00

Figure 1

Site Plan
Coastal Drilling Facility
Soldotna, Alaska



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 REFERENCED TO AN ARBITRARY BENCHMARK OF 100 FEET PREVIOUSLY ESTABLISHED ONSITE.
a	NOT INCLUDED IN GROUNDWATER CONTOUR INTERPRETATION.
65.0	INFERRED GROUNDWATER CONTOUR LINE (0.5 FOOT CONTOUR INTERNAL).

SOURCE: SHANNON & WILSON, INC. AUGUST, 1992

0 100 200

Scale in Feet

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Figure 2

BHJ 6/99 1=1
558B

APPENDIX A
FIELD METHODS

APPENDIX A
FIELD METHODS

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

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 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 (one 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-50. 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-50.

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 2000 sampling event.

PPE and debris was placed in plastic bags and taped shut. The bags were disposed of, with permission from the Soldotna U-Haul manager Mr. Jim Raker, in the U-Haul dumpster, and ultimately, the Kenai Borough landfill.