

**ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Remediation Program**

**RECORD OF DECISION
Regarding Alternative Cleanup Levels**

USGS Governmental Hill Site

SITE INFORMATION SUMMARY

Site name and location

The site located at 132 East Manor Avenue in Anchorage within the North Addition & Alaska Railroad Reservation, North ½, Southeast ¼, Section 7, Township 13 North, Range 3 West, Seward Meridian. The legal description of the property is Lot 1, Lot 2, and Lot 3, Block K, North Addition #4 of Original Townsite Subdivision, filed in the Anchorage Recording District, Third Judicial District, State of Alaska.

Name and mailing address of responsible person

U.S. Department of Interior, U.S. Geological Survey (USGS) at 345 Middlefield Rd. Mail Stop 225, Menlo Park, CA 94025. The USGS point of contact is Mr. Bill Fitzpatrick.

Database Record key

1997210104601

CS file number

File Number: CS80.01

Regulatory authority

Site Cleanup Rules under 18 AAC 75.325 – 18 AAC 75.390

Site Map

A copy of a Site Plan (figure 2) from the Shannon & Wilson December 2000 *Additional Investigation and Limited Cleanup* report is provided as Attachment #1.

Physical characteristics of site

Soil at the site is a clean to silty, sandy gravel. Based on water table elevation measurements, the local groundwater flow direction is toward the south-southeast with a hydraulic gradient of approximately 0.0087 ft/ft. Shannon & Wilson indicated that the nearest private water well is approximately ½ mile northeast of the property (listed as not in use) and the nearest municipal drinking water well is about 3.2 miles southeast of the property. The nearest surface water is Ship Creek, located approximately 0.6 miles south of the property.

Description of contaminants and media impacted

Chemicals of concern in soil include benzene, diesel-range organic (DRO) hydrocarbons, methylene chloride, and trichloroethylene. DRO is a chemical of concern in groundwater.

Prior cleanup actions taken

Interim removal actions were undertaken in 1997 to remove three underground storage tanks (USTs). In 2000, approximately 10 ½ tons of contaminated soil associated with a former dry well was excavated and removed for thermal treatment.

Current and expected future land use

The property is located in a residential neighborhood at the southwest corner of East Manor Avenue and Boyd Street in Anchorage. There are three buildings located on the property used solely for storage by the USGS. The USGS has indicated that the property may be transferred to Anchorage Historical Properties, Inc. with the possibility that one (or more) of the buildings may be restored for use as a meeting facility in the future.

Determination of current and expected future use of groundwater

The buildings on the property were built before public sewer and water service was available in the area. It is suspected that there may have been a well and a septic system used in the past. There is an Anchorage Water and Wastewater Utility (AWWU) water main located northeast and southwest along the alley next to the property. According to AWWU records, Lots 1 and 2 were connected to the water service in the past and re-connected in 1995. There is no water service information available for Lot 3. Since the property is connected to the AWWU system, use of the groundwater for drinking water purposes is not anticipated and an 18 AAC 75.350 determination might be considered.

Completed Exposure Pathways

The exposure pathways evaluated under this decision include the ingestion, inhalation, and migration to groundwater. DRO was detected in the groundwater at concentrations exceeding Table C cleanup levels.

SITE INVESTIGATION HISTORY

Phase I Assessment

Shannon & Wilson, Inc. prepared a report called *Phase I Environmental Site Assessment* dated February 1997. The report presents the results of an assessment of the presence of petroleum hydrocarbons or other hazardous substances on or near the property that may have an impact on the soils and groundwater at the site. The report provided conclusions that the potential for petroleum hydrocarbons and/or hazardous substances from on-site sources to have impacted soil and/or groundwater on the property was moderate to high.

Phase II Assessment

Shannon & Wilson, Inc. prepared a *Phase II Site Assessment* report dated October 1997. The report presented results of drilling, soil and groundwater sampling, and removal of three underground storage tanks. Four soil borings were advanced and soil samples collected. A temporary groundwater well was installed and sampled at Boring B-4. A soil sample was collected from a stained soil area near a dry well location.

Phase III Assessment

Shannon & Wilson prepared a *Phase III Environmental Site Assessment* report dated December 1998. Soil samples were collected during advancement of three borings. The borings were completed as monitoring wells and groundwater samples collected. The report contained a recommendation to remove the dry well and excavate contaminated soil at the bottom of the well. The report also contained a recommendation to install additional wells north of the site within the road right-of-way or on adjacent property to determine if contaminants may have migrated onto the property in the groundwater.

IDENTIFICATION OF CHEMICALS OF CONCERN

Chemicals of concern include those chemicals found in concentrations greater than the 18 AAC 75.341 Tables B1 and B2, and 18 AAC 75.345 Table C. Chemicals of concern at the USGS Government Hill site include the chemicals listed in Table 1 below. The table includes chemical concentrations reported in soil prior to conducting interim removal actions at the site.

Table 1: Maximum reported concentrations in soil and method two soil cleanup levels for the Under 40 inch Precipitation Zone Before Removal Actions				
Chemical name	Maximum concentration (mg/kg)	Soil Cleanup Level-Ingestion (mg/kg)	Soil Cleanup Level-Inhalation (mg/kg)	Soil Cleanup Level-Migration to Groundwater (mg/kg)
DRO	6,000	10,250	12,500	250
RRO	26,000	10,000	22,000	11,000
Benzene	0.152	290	9	0.02
Arsenic	6.4	5.5	Not applicable	2
Cadmium	5.8	100	Not applicable	5
Chromium	50	510	Not applicable	26
Lead	850	400 (residential land use)	400 (residential land use)	400 (residential land use)
Methylene chloride	0.32	1,100	180	0.015
PCBs	5.0	1 (residential land use)	1 (residential land use)	1 (residential land use)
Trichloroethylene	0.029	750	43	0.027

COMPLETED REMOVAL ACTIONS

1997 - Underground Storage Tank Removals

Three underground storage tanks (USTs) and associated piping were drained of fuel and removed from the property. Tank 1 and Tank 2 each had a capacity of approximately 500 gallons and were used to supply home heating oil to buildings on the property. Tank 3 had a capacity of about 300 gallons. The soil removed from each tank excavation was used with imported fill material to backfill each excavation. The highest levels of DRO reported were 331, 462, and 369 mg/kg respectively at Tank 1, Tank 2, and Tank 3. Tank 3 also reported benzene at a maximum concentration of 0.152 mg/kg. However, a trip blank sample also detected benzene at 0.0634 mg/kg and the report indicated that some cross-contamination might have occurred.

2000 - Dry Well Decommissioning/soil removal

Soil was excavated to approximately 6 feet below ground surface (bgs) from a 10-foot square area surrounding the former dry well sump on September 29, 2000. In December 2000, Shannon & Wilson prepared a report entitled *Additional Investigation and Limited Cleanup*. This report documented the decommissioning process of the dry well and the excavation and disposal of contaminated soil associated with it. It was estimated that approximately 10½ tons of contaminated soil was excavated and transported to the Chemron Alaska treatment facility in Palmer, AK. The soil was reportedly treated using a thermal desorption process. The report also provided the results of additional data gathering efforts to further assess groundwater quality and flow direction and to characterize soil.

EXTENT OF CONTAMINATION (After Removal Actions)

Dry Well Area

TCE (collected at 8 to 10 feet bgs) was detected in soil remaining in place at 0.0289 mg/kg, which slightly exceeds the migration to groundwater Method Two cleanup level of 0.027 mg/kg. The soil samples also indicated that DRO, RRO, PCBs, and lead achieved the Method Two cleanup levels for these chemicals.

UST Tank 1 Area

DRO was reported in one sample from the excavation pit at 331 mg/kg at 3.0 feet bgs. It exceeded the migration to groundwater Method Two cleanup level of 250 mg/kg.

UST Tank 2 Area

DRO was reported in two excavation pit samples: 427 mg/kg at 4.0 feet bgs and 463 mg/kg at 5.8 feet bgs. The samples exceeded the migration to groundwater Method Two cleanup level of 250 mg/kg.

UST Tank 3 Area

DRO was reported at a concentration exceeding the Method Two cleanup level in two excavation pit samples: 334 mg/kg and 369 mg/kg, both at 4.5 feet bgs. DRO was also reported at 283 mg/kg near the soil/groundwater interface at 40 to 42.0 feet bgs.

Monitoring Well MW-2 Area

DRO was reported in soil at a concentration exceeding the Method Two cleanup level in a sample from soil boring B4 at 1,500 mg/kg at 37.5 to 38.0 feet bgs near the soil/groundwater interface.

Groundwater Monitoring Results

Groundwater monitoring results obtained during sampling events in 1997, 1998, and 2000 are summarized in Table 2 below.

Table 2: Groundwater Monitoring Results			
Monitoring Well	Date sampled	DRO (mg/L) Table C cleanup level = 1.5 mg/L	RRO (mg/L) Table C cleanup level = 1.1 mg/L
B-4 (temporary well)	7/31/1997	1.6	Not analyzed
MW-1	11/11/1998	0.141	<0.549
	11/11/1998	0.176 (dup.)	<0.595 (dup.)
	11/09/2000	<0.353	<0.588
MW-2	11/11/1998	14.3	0.573
	11/09/2000	1.10	<0.581
	11/09/2000	0.881 (dup.)	<0.588 (dup.)
MW-3	11/11/1998	2.37	0.176
	11/09/2000	0.799	<0.588

CLEANUP LEVELS

Proposed Method Three Alternative Cleanup Levels

Shannon & Wilson, Inc. proposed alternative soil cleanup levels using a Method Three approach as provided in 18 AAC 75.340(e). They calculated alternative cleanup levels for trichloroethylene (TCE) and for DRO by using a modified value for the fraction of organic carbon parameter. Shannon & Wilson used default values from the July 28, 1999 ADEC *Guidance on Cleanup Levels Equations and Input Parameters* for all other parameters in the migration to groundwater equation. Based on site-specific data, they modified the fraction organic carbon (foc) parameter in order to calculate alternative migration to groundwater pathway cleanup levels in soil for TCE and DRO.

According to the *Additional Investigation and Limited Cleanup* report prepared by Shannon & Wilson, Inc., five soil samples were analyzed for total organic carbon as shown in the table below.

Soil Depth (ft bgs)	Total Organic Carbon (TOC) (mg/kg)	Fraction Organic Carbon (foc) (unitless)
3.0	20,770	0.0208
4.0	27,480	0.0275
4 – 4.5	45,810	0.0458
6-6.5	33,520	0.0335
18-20	1,458	0.0015

Shannon & Wilson proposed a foc value of 0.00146 for TCE and a foc value of 0.0208 for DRO. Based on these modifications, they proposed alternative cleanup levels of 0.0396 mg/kg for TCE and 5,077 mg/kg for DRO.

ADEC evaluation of proposed alternative cleanup levels

The Table 4 presented below shows that DRO, benzene, arsenic, chromium, methylene chloride, and trichloroethylene were reported in soil at concentrations exceeding Method Two cleanup levels for the migration to groundwater pathway.

Chemical name	Maximum concentration (mg/kg)	Soil Cleanup Level-Ingestion (mg/kg)	Soil Cleanup Level-Inhalation (mg/kg)	Soil Cleanup Level-Migration to Groundwater (mg/kg)
DRO	1,500	10,250	12,500	250
RRO	185	10,000	22,000	11,000
Benzene	0.152	290	9	0.02
Arsenic	4.6	5.5	Not applicable	2
Cadmium	0.56	100	Not applicable	5
Chromium	29	510	Not applicable	26
Lead	5.8	400 (residential land use)	400 (residential land use)	400 (residential land use)
Methylene chloride	0.32	1,100	180	0.015
PCBs	ND (<0.0465)	1 (residential land use)	1 (residential land use)	1 (residential land use)
Trichloroethylene	0.029	750	43	0.027

The maximum concentrations reported at the site of 4.6 mg/kg for arsenic, 0.56 mg/kg for cadmium and 29 mg/kg for chromium were obtained from soil boring B3. But soil samples collected from soil boring B1 which is located upgradient from suspected sources of contamination, reported arsenic at 3.9 mg/kg, cadmium at 0.40 mg/kg, and chromium at 29 mg/kg. ADEC considers boring B1 to represent a background sampling location.

ADEC reviewed a U.S. Geological Survey Professional Paper 1458, entitled *Element Concentrations in Soils and Other Surficial Materials of Alaska*. Maximum reported concentrations of arsenic and chromium at the site were less than the arithmetic and geometric mean concentrations of naturally occurring concentrations in Alaska. The USGS paper indicates the arithmetic mean concentrations as 9.6 mg/kg and 64 mg/kg for arsenic and chromium, respectively. It indicates the geometric mean concentrations as 6.7 mg/kg and 50 mg/kg for arsenic and chromium, respectively. Cadmium was not addressed in the paper.

ADEC also reviewed two other reports regarding background soil concentrations of metals in the Anchorage area. ADEC reviewed a U.S. Air Force Elmendorf Air Force Base January 1993 *Basewide Background Sampling Report* prepared by CH2M HILL, and a U.S. Army Fort Richardson January 1996 *Background Data Analysis Report* prepared by Ecology and Environment, Inc. Information about arsenic, cadmium, and chromium from these two reports is summarized in a table below.

Table 5: Background Soil Concentrations			
		Elmendorf AFB	Ft. Richardson
Chemical	Depth Range	Mean Concentration (mg/kg)	Mean Concentration (mg/kg)
Arsenic	Surface	7.2	6.9
	Root Zone	6.87	6.7
	Deep	5.46	5.9
Cadmium	Surface	1.07	Not analyzed
	Root Zone	1.62	Not analyzed
	Deep	1.63	Not analyzed
Chromium	Surface	19.8	32
	Root Zone	31.8	28.8
	Deep	31.8	32

Based on a review of background data, ADEC concludes that the mean arsenic, cadmium, and chromium concentrations at the USGS site would be less than the 95th upper confidence limit of the mean background concentrations in the vicinity. Therefore, the applicable cleanup level for arsenic, cadmium and chromium have been achieved in accordance with 18 AAC 75.340 (h) (1) and these three chemicals can be eliminated as chemicals of concern at the site.

After the removal actions, lead and PCBs were reported at less than 1/10th the Method Two cleanup levels. Therefore, in accordance with the December 15, 2000 Final Draft of the ADEC *Guidance on Calculating Cumulative Risk*, lead and PCBs can be eliminated as chemicals of concern.

The remaining chemicals of concern in soil at the USGS site are DRO, benzene, methylene chloride, and trichloroethylene (TCE). Benzene, methylene chloride, and TCE have not been reported in groundwater at the site, but DRO was detected at concentrations exceeding Table C cleanup levels in a temporary well and in two monitoring wells during the 1997 and 1998 sampling events.

Shannon & Wilson proposed foc values of 0.00146 for TCE and 0.0208 for DRO. However, the total organic carbon (TOC) levels decrease significantly with depth at the site. TOC from soil collected at 18 to 20 feet bgs was reportedly more than 10 times less than TOC results from samples collected at 3 to 6.5 feet bgs. Instead of using two different values for foc, ADEC considers a foc value of 0.002 to be conservative and appropriate for use in a Method Three calculation. Different foc values may be proposed, but would require additional soil characterization of TOC data from depths between 7 feet and the water table.

Also, ADEC modified the default value for hydraulic gradient and used a value of 0.009 ft/ft for this site. Using modified parameters for foc and hydraulic gradient and the Web-Based Method Three Calculator, ADEC calculated the following Method Three cleanup levels for the migration to groundwater pathway (see Attachment #2):

Table 6: Alternative Cleanup Levels	
Chemical	Method Three Cleanup Level (mg/kg)
Benzene	0.03
DRO	700
Methylene Chloride	0.02
Trichloroethylene	0.05

Cumulative Risk

ADEC evaluated cumulative risk criteria for alternative cleanup levels with the ADEC Web-based calculator (see Attachment #2). The alternative soil cleanup levels calculated by ADEC for DRO, benzene, methylene chloride, and TCE would not exceed cumulative risk standards provided at 18 AAC 75.325 (g).

ADEC DECISION

ADEC approves of the alternative cleanup levels listed in Table 6. The default foc and hydraulic gradient parameters were modified by ADEC to calculate these levels. Since the levels are different than those proposed by USGS (and their consultant), they shall be afforded the option to collect additional data from the site to be considered in establishing alternative cleanup levels.

As a condition of establishing alternative cleanup levels, ADEC requires the installation of groundwater monitoring wells north of the site within the road right-of-way to evaluate on-site transport of contaminants from adjacent property. In addition, ADEC requests another groundwater sample event from monitoring wells MW-2 and MW-3 with samples analyzed for BTEX and DRO. The MW-2 sample should also be analyzed for methylene chloride. Following the review of the analytical data from these samples, ADEC shall evaluate the need for additional sampling and/or other cleanup actions.

ADEC Project Manager Approval:

Scott Pexton, Environmental Specialist

Date

ADEC Site Remediation Section Manager Approval:

Jim Frechione, Environmental Conservation Manager

Date