PRELIMINARY ASSESSMENT
DATA REQUIREMENTS
FOR FEDERAL FACILITY DOCKET SITES

SITE INVESTIGATION

FOR

RED DEVIL MINE SITE

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INTRODUCTION

Background

The Red Devil mercury mine was operated by multiple operators from 1933 until 1971. During its operational life approximately 35,000 flasks of mercury were produced. One flask weighs 76 pounds and is about one quart in volume. The site consists of a surface mining area, open and collapsed adits and inclined shafts, tailing piles, settling ponds, five large fuel tanks, drum storage areas, and approximately 18 buildings used for housing, laboratory, mill, steam plant, and chemical storage sheds.

A Site Investigation was completed in June, 1989 by BLM's contractor. BLM agreed with the Environmental Protection Agency (EPA) to remove or neutralize site chemicals and electrical transformers, to annually monitor surface water, post site warnings, and restrict site access. With the results of the Site Investigation and the above stipulations, EPA designated the site No Further Action required in 1990. In the early 1990's BLM did post warnings, remove most of the PCB contaminated oil, and attempted to restrict access.

In July, 1999, BLM's contractor removed hazardous and non-hazardous wastes from the site and sampled soil, water, and sediment. The wastes included: mineral processing chemicals (copper sulfate, sodium hydroxide, potassium carbonate, sodium dichromate dihydrate), 55-gallon drums (contents included used engine oil, PCB oil, fuel, solvents, grease); lead-acid batteries, and mercury contaminated slag (soot). BLM's contractor also completed site soil, water, and sediment sampling that was requested by EPA to reevaluate the site.

Site Location and Access

The Red Devil Mine is located approximately 250 miles west of Anchorage, Alaska, 8 miles northwest of Sleetmute, and 2 miles -southeast of the community of Red Devil. The mine is on the south side of the Kuskokwim River at T. 19 N., R. 44 W., Southeast quarter of Section 6, Seward Meridian. From Anchorage, air travel is the only practical mode of transportation. A commercial aircraft can be flown to McGrath or Aniak, and then a small aircraft can be chartered to fly to the Red Devil airstrip. A small aircraft could also be chartered in Anchorage and flown to the Red Devil airstrip. An unimproved track leads to the mine site located two miles to the southeast. Heavy equipment may be barged on the Kuskokwim River, but it is less expensive to fly all equipment into the airstrip.

EPA Data Questions

EPA questions for this Site Investigation were copied verbatim as given. Therefore, question references to pages for definitions and tables do not correspond to this document. However, the referenced definitions and tables are found in Appendix 2.

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1) Supply copies of all existing sampling data, on-site and off-site, including location map, detection limits (see definitions, p. 5), raw data sheets, QA/QC documents, date(s) sampled, analytical method(s) used, well boring logs and sampling technique(s).

The most current data for on- and off-site sampling, location maps, detection limits, raw data sheets, QA/QC document, dates sampled, analytical methods used, well boring logs and sampling techniques for the Red Devil Mine site can be found in HLA/Wilder's Limited Waste Removal Action Report, Red Devil Mine, Red Devil, Alaska, 1999. Historical data have been previously forwarded to the U.S. Environmental Protection Agency (EPA); these include a 1989 Site Investigation and multiple published reports from the U.S. Geological Survey (USGS). See Figures 1 and 2 for site maps.

---

2) Locate and Identify on a topo map all known or suspected sources (see definitions, Appendix 2, p. 5). Supply all information about source(s) such as: dates of operation, use and spillage; amounts of material deposited, stored or spilled; dimensions of source(s); known or suspected hazardous substances (see definitions, Appendix 2, p. 5), etc.

See Figures 1 and 2 for site maps. The Red Devil Mine was in production from 1933 through 1971. Over 35,000 flasks of mercury were extracted from the mine during these years of operation. The primary source of contamination was from the extraction of mercury from ore. The tailings at the site naturally have high levels of mercury, antimony, and arsenic. The retorting operation caused additional mercury contamination in the tailings/soils in the vicinity of the retort building. All original sources of contamination have been removed from the site. See HLA/Wilder's Limited Waste Removal Action Report (1999), for specific details.

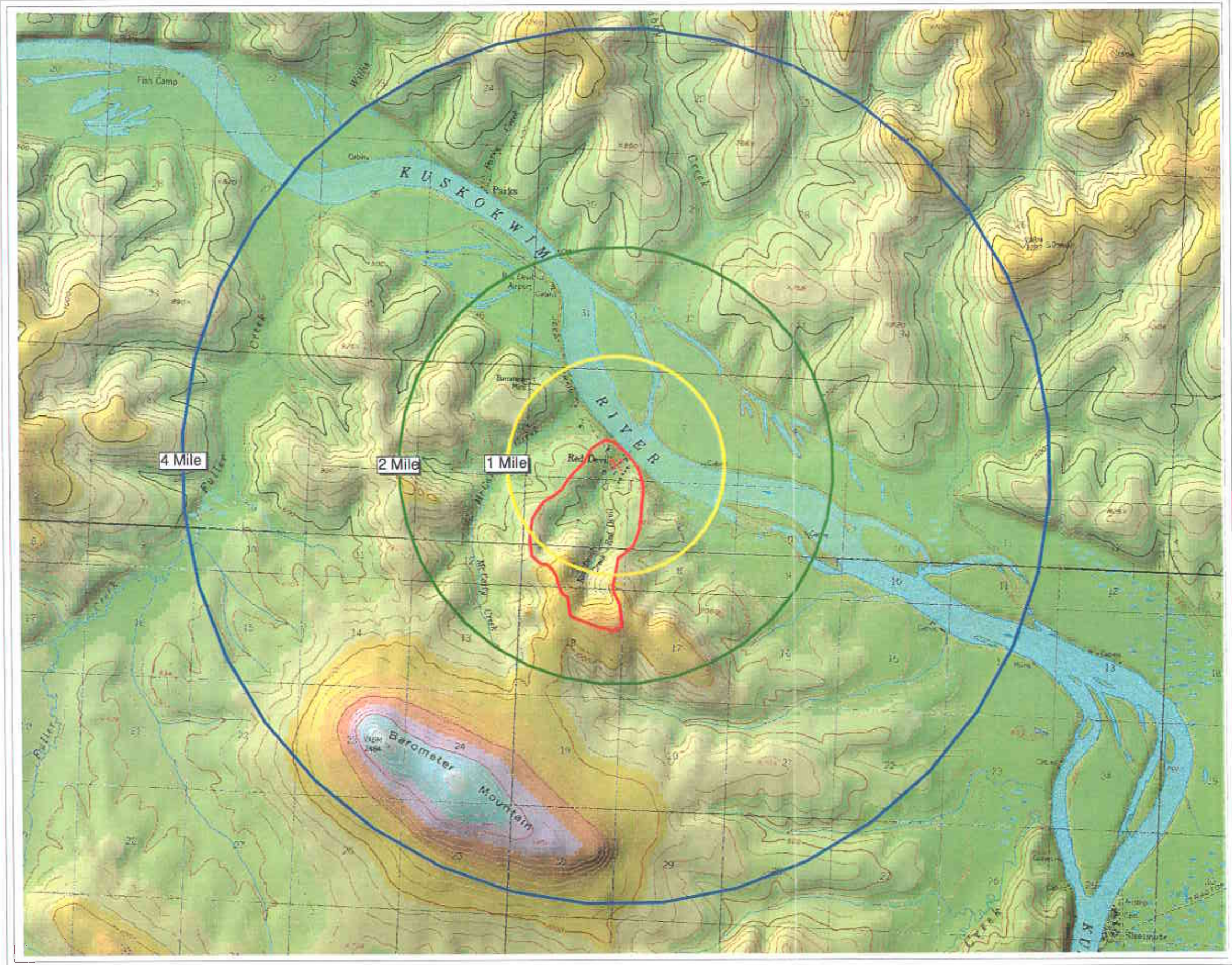


Figure 1. Red Devil Mine and vicinity within 4 miles

Red Devil Mine Site

1 Mile Radius

2 Mile Radius

4 Mile Radius

Drainage Basin Area (687 Acres)

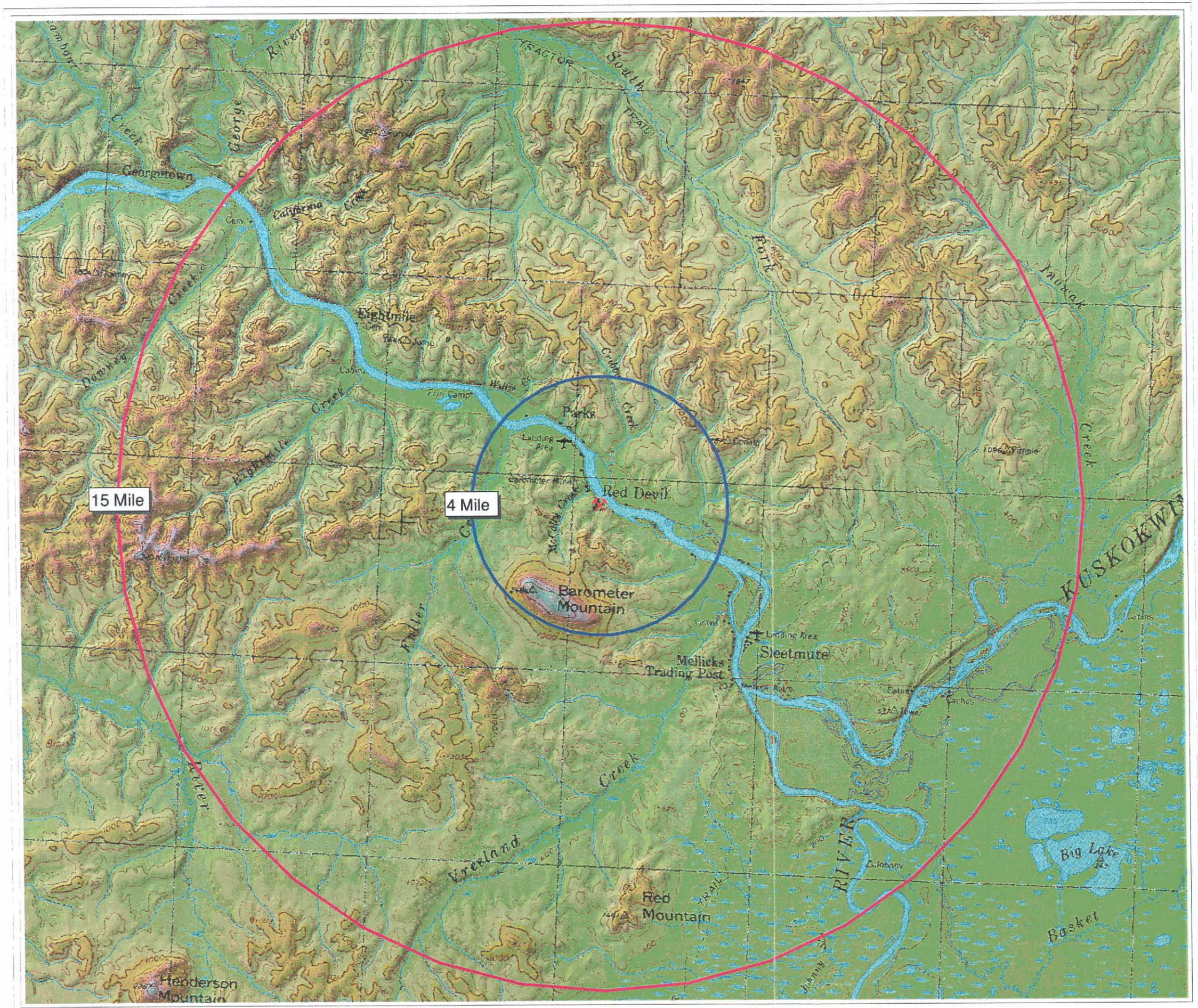
1 0 1 Miles

Countour Interval: 100 ft.

N W E S

This map was created using 1:63k USGS DRG's (Digital Raster Graphicsand USGS DEM's (Digital Elevation Model) using ArcView 3.0b.

Figure 2. Red Devil Mine and vicinity within 15 miles



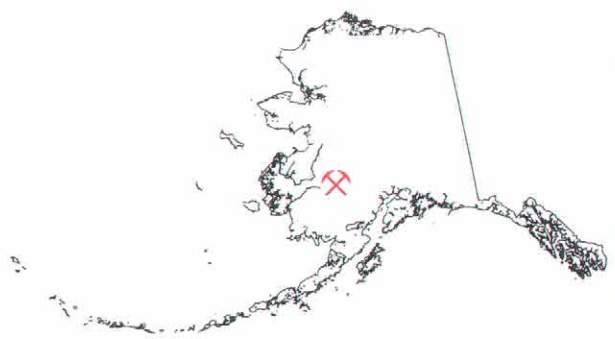
Red Devil Mine Site
4 Mile Radius
15 Mile Radius

2 0 2 4 Miles

Contour Interval: 200 ft.

N
W E
S

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT



This map was created using Sleetmute, AK 1:250k DRG (Digital Raster Graphic) and DEM's (Digital Elevation Model) using ArcView 3.0b.

3) Provide a description of all aquifers beneath the site. Include description of overlying materials (i.e., hydraulic conductivity/permeability), thickness, composition and depth at which aquifer is first encountered. *NOTE: This data requirement involves a literature search of all current or existing geologic information.

Specific published technical data is unavailable regarding underlying aquifers at this site. No aquifer studies have been done in this immediate area due to its remote location and relative inaccessibility. EPA's request for a site groundwater study was tentatively withdrawn based on available geologic and water quality information, and the high cost of well installation at this remote site. However, the following site geologic and regional hydrogeologic information is known.

The regional geology is dominated by a thick sequence of Cretaceous age sedimentary rocks of the Kuskokwim Group (MacKevett and Berg, 1963). The rock types at the mine consist of approximately 1300 feet of well-bedded strata of graywacke and very fine grained argillaceous rocks (shales). Regionally, these rocks yield 0-10 gallons per minute (gpm) of groundwater from tested wells (Selkregg, 1975). The hydraulic conductivity can be assumed to be similar to shale, ranging between 10^{-4} to 10^{-8} gpd/ft^2 (10^{-3} to 10^{-7} m/day), (Driscoll, 1995). Three hydrothermally altered dikes of silica-carbonate rock are exposed at the mine. The dikes strike N 50°-70° E and dip 40°-65° SE and vary in thickness from 1 to 14 ft. (MacKevett and Berg, 1963). These dikes will likely restrict horizontal groundwater flow.

The surficial deposits at the mine vary in depth from zero to an estimated thirty feet and consist of loess and alluvium (MacKevett and Berg, 1963). The deposits, as well as thousands of cubic yards of gravel-like tailings, have been reworked by mine operators to build roads, building sites, ponds, and to process and dispose of ore. Regionally, these deposits yield 10-100gpm (Selkregg, 1975). The hydraulic conductivity will likely vary widely, similar to coarse gravel to loess, which ranges between 10^{6} to 10^{-3} gpd/ft^2 (10^{5} to 10^{-4} m/day), (Driscoll, 1995).

Well information gathered from owners in the community of Red Devil indicated two water bearing zones with unknown connectivity (Gail Vanderpoole and Richard Wilmarth, oral commun., 1999). A surficial aquifer, with a water table of 24-26 ft. below ground surface (bgs), is most commonly used, and consists of silt to sand size sediment. The flow rate from these wells is reportedly low, but can supply enough water for a single family residence. The lower aquifer, in which wells are screened between 80-90 feet bgs, consists of clean gravels, and produces enough water to supply the school and multiple families.

The Red Devil community lies 1 to 2.5 miles from the site. Although it is very unlikely that the community's saturated zones are hydraulicly connected to the site, it is reasonable to assume their alluvial and aeolian sediments have similar groundwater flow characteristics due to their common origin. Furthermore, the topographic differences in the site and the community will limit similarities such as sediment depth and aerial extent. The site has relatively steep terrain with bedrock outcrops, while the community is on a relatively flat depositional plain.

The Red Devil Creek, is at least in part, an influent stream, as evidenced by a feeder spring several feet above the Creek. Correlating the spring to topography, the site's water table is similar to the surficial aquifer described above, or roughly between 20-30 ft. bgs.

Another important consideration affecting the site's hydrogeology are the extensive shafts and tunnels that extend down to 450 ft. bgs, and horizontally at least 1,400 ft.(N 26° W) x 600 ft (N 64° E), (MacKevett and Berg, 1963). Although the mine surface entrances are slumped closed and restrict visual inspection, it is reasonable to assume that most, if not all, of the mine workings (shafts and tunnels) are flooded, based on the afore mentioned spring and the regional groundwater levels. These workings will obviously function as conduits for groundwater flow.

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4) For each source, choose one description from Table 1 (Appendix 2, p. 6-7) that describes the ground water containment. Provide complete documentation (i.e., engineering diagrams, photographs {originals}) as to why the source meets that description and not any other in the table.

Table 1, All sources, no liner.

Photos, documenting site conditions before remediation, are available in HLA/Wilder's Red Devil Mine, Limited Waste Removal Report, along with diagrams of the mine site, tables showing contaminant levels and hazardous materials tracking logs.

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5) Provide the location of all drinking water wells (by HRSII distance rings in table format) in all aquifers within a 4-mile radius from site (property boundary). Show on topo map all wells within 1-mile radius. Provide information on depth of well(s), screening interval(s), depth aquifer(s) encountered and population served. For multiple wells (i.e., municipal system) provide the number of wells, location of all wells (regardless of 4-mile limit), average annual pumpage of each well (regardless of 4-mile limit) and total population served by system. Include information on all standby wells.

There are no wells within a 1-mile radius of the site. There are wells between 1- and 4-miles of the site in the community of Red Devil. No well log information for these wells is known to exist. We checked federal (USGS), State, and local offices to confirm. By interviewing the local population of Red Devil, we were able to learn the following about local wells:

Table 1. Wells within four miles of site

Owner/location[1]	Depth (ft bgs[2])	Population served	Well type
Gail Vanderpool	28	single family	2" drive point
Richard Wilmarth	34	single family	2" drive point
Red Devil School[3]	85	25 (estimate)	6" drilled
Paul Kinegak	~30	single family	2" drive point

1. All listed wells are within the community of Red Devil, which is between 1- and 2.5-miles from the site. Well locations are at each of the private homes listed and at the school. No map coordinates are available.
2. bgs: below ground surface.
3. Used by school children and local population without wells. Tested monthly by Kuspuk School District.

No additional information was available for screen interval, depth of aquifer, or average annual pumpage. No standby wells were found. There are several temporarily abandoned wells at private residences that are not used because of poor water quality or low water production. Based on information from a local resident who has installed local wells, there are two utilized saturated zones (Richard Wilmarth, oral commun., 1999). The surficial aquifer, with a water table of 24-26 feet bgs, generally can supply enough water of good quality for a single family residence. The lower aquifer, in which wells are screened between 80-90 feet bgs, is composed of "gravel" (approximately pebble size). The Red Devil School well is the only known well currently using this lower aquifer. The water from the well at the Red Devil School is reportedly of good quality and is analyzed monthly by the Kuspuk School District (Kuspuk School District maintenance staff, oral commun., 1999). Local residents who don't have a well, haul water from the school well. Another local well screened in the lower aquifer was temporarily abandoned due to excessively high iron content in the water (Richard Wilmarth, oral commun., 1999).

6) Provide information and location of wells within 4-miles (on topo map show all wells within 1-mile radius) that are used:

a) to irrigate 5 or more acres of commercial food or forage crops
0

b) for watering of commercial livestock
0

c) as an ingredient in commercial food preparation
0

d) as a supply to aquaculture, or
0

e) as a supply for a major or designated water recreation area, excluding drinking water use. 0

None of these activities are known to exist within 4 miles of the site.

---

7) What is the average number of persons per residence (Borough, city, village, community, etc.) that site is located in.

The total number of residents in the nearby village of Red Devil is 44, according to Alaska Department of Community and Regional Affairs' (1999), Red Devil Community Profile.

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8) Identify and locate all surface water bodies within two miles of the site. Indicate the drainage routes (shown on topo map) from each source to applicable water bodies. Provide the average annual flow (cubic feet per second) for each surface water body within 15 miles downstream (river, stream, etc.) or 15-mile radius (lakes, bays, etc.) from the point of probable entry into surface water. For lakes, provide information on inflow and outflow.

Surface water bodies located within two miles of the Red Devil Mine include the Kuskokwim River and its tributaries (Red Devil Creek, McCally Creek, Cribby Creek), oxbow lakes, and smaller unnamed creeks fed by runoff from Barometer Mountain, surrounding highlands, and ridges (Figure 1). The average annual flow for the Kuskokwim River below the Red Devil mine is 38,890 ft^3/sec (Wang, 1999). Water discharge from Red Devil Creek is 1.16 ft^3/sec (Bureau of Land Management, unpub. data, 1999).

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9) For each source, choose one description from Table 2 (Appendix 2, p. 7-8) that best describes the surface water containment. Provide complete documentation (i.e., engineering diagrams, original photographs) as to why the source meets that description and not any other in the table.

All Sources; (a) Neither of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system.

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10) What is the number of acres in each drainage basin?

Red Devil Creek drainage basin: 687 acres (Bureau of Land Management, unpub. data, 1999). Kuskokwim River drainage basin below the Red Devil Mine: 18.82 million acres (Wang, 1999).

---

11) From Table 3 (Appendix 2, p. 8), choose the predominant soil group (surface soil) which comprises the largest total area within each drainage area.

Moderately fine-textured soils with low infiltration rates (silt loam), for both the Red Devil Creek drainage area, and the Kuskokwim River Drainage area (Tolbert and Sprouse, 1964).

---

12) What is the 2-year, 24-hour rainfall? What is the Annual Net Precipitation?

There are no official weather stations in the immediate vicinity of Red Devil. However, climatological studies have been completed that include this area. Site data from these studies can be extrapolated from climatological maps included in these reports. The two-year, 24-hour rainfall for the Red Devil Mine is approximately 1.5 inches (Miller, 1963). The annual net precipitation for the Red Devil Mine is approximately 25 inches (Jones and Fahl, 1994).

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13) From Table 4 (Appendix 2, p. 8), choose the flood plain category for each source (supply Federal Emergency Management Agency or U.S. Army Corps of Engineers flood plain map) and determine if each source meets the criteria from Table 5 (Appendix 2, p. 9).

Table 4: None of the above. There is no known evidence of source flooding. There are no Federal Emergency Management Agency or U.S. Army Corps of Engineers (ACE) flood plain maps for this area (Harlan Legare, U.S. Army Engineer District, Alaska, oral and written commun., 1999). However, ACE installed a flood gauge in the community of Red Devil, which indicates the highest recorded flood to be 212.84 feet, which occurred in 1971. The lowest elevation at the site is approximately 279 feet, a difference of approximately 66 feet. There is no containment at the source.

---

14) Provide the location (by HRSII distance rings in table format) of all drinking water intakes within 15 miles downstream (rivers, streams, etc.) or 15-mile radius (lakes, bays, etc.). Show on topo map all intakes within 1-mile radius/downstream. Provide information on population served. For multiple intakes (i.e., municipal system) provide information on the number of intakes, location of all intakes (regardless of 15-mile limit), average annual pumpage of each intake (regardless of 15-mile limit), and total population served by system. Include information on all standby intakes.

There are no known drinking water intakes within 15 miles downstream of the site. It is unlikely that water from the Kuskokwim River is used for drinking water purpose in this vicinity due to its high suspended sediment load. Water would need to be filtered and boiled (or otherwise treated) to be potable. It is much more likely that individual households that do not have wells collect water from small creeks, since these sources have a lower sediment content and are less likely to be contaminated by human activities. Some residents in Red Devil haul water from the school well.

The largest communities down river are Aniak and Bethel. They are about 80 and 180 miles down river, with populations of 604 and 5,471, respectively. These communities do not use river water for drinking water purposes (Alaska Department of Community and Regional Affairs, 1999).

---

15) Provide information and location of intakes within 15 miles downstream (rivers, streams, etc.) or 15-mile radius (lakes, bays, etc.) that are used:*

a) to irrigate 5 or more acres of commercial food or forage crops,
b) for watering of commercial livestock,
c) as an ingredient in commercial food preparation,
d) as a supply for aquaculture, or
e) as a supply for a major or designate water recreation area, excluding drinking water use.

*On topo map show location of intakes within 1-mile radius/downstream.

There are no known intakes within 15 miles downstream of the site that are used for any of the above purposes.

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16) What is the average human food chain production (pounds per year per acre) for each surface water body within 15 miles downstream (rivers, streams, etc) or 15-mile radius (lakes, bays, etc)?

Average annual human food chain production of surface water bodies within 15 miles downstream = 9.06 pounds/acre

The surface water body within 15 miles downstream is the Kuskokwim River. It covers 2,640 acres. The average annual weight of fish harvested is 23,928 pounds. This number was calculated from published and unpublished data received from the Alaska Department of Fish and Game (Burkey and others, 1998), (Mike Coffing, oral commun., 1999). It includes all available data for fish harvest in this area. Counted fish include Chinook, Sockeye, Coho, and Chum salmon. Uncounted fish known to be harvested in the Kuskokwim River include: Whitefish, Grayling, Sheefish, Dolly Varden, and Pike.

While no data is available for resident fish, several other factors may balance out the use of the calculated number. Salmon do make up the majority of the fish harvested and consumed by weight. Some of the salmon (Chum especially), although harvested, are not consumed by humans, but are often fed to dogs. Salmon are anadromous, meaning they spend only a fraction of their life in fresh waters, and most of their life in the ocean.

Studies of fish in the Kuskokwim watershed have shown detectible levels of mercury in fish (Duffy, Rodgers, and Patton, 1998), (Gray and others, 1996). Resident and anadromous fish collected in tributaries of the Kuskokwim River contained up to 0.62 and 0.08 ppm Hg, respectively (Gray and others, 1996). The Food and Drug Administration action level for mercury advisories is 1 ppm, while EPA uses 0.2 ppm as a hazard assessment model human critical value threshold. These studies clearly indicate that mercury levels in fish is a regional phenomena, verses a site specific phenomena. This is due to the region's geology being naturally

abundant in mercury and other metals, as well as the mining activities that have further liberated these metals into the water systems.

---

17) Identify all sensitive environments (Table 6, Appendix 2, p. 9) that exist within a 4-mile radius on land, 15 miles downstream (rivers, streams, etc), or 15 mile radius (lakes, bays, etc, in HRSII distance ring table format. Provide original documentation (U.S. Fish and Wildlife, Natural Heritage Database, State agencies, National Oceanic and Atmospheric Administration, etc) and locate each environment within 1-mile on a topo map. Note that there could be multiple sensitive environments within the appropriate limit.

See Figure 1 for a 1-mile radial view of the site.

Table 6, Sensitive Environments:
1. Spawning areas critical for the maintenance of fish/shellfish species within river, lake, or coastal waters.
2. Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal waters in which the fish spend extended periods of time.

Fish found in this stretch of the Kuskokwim River include: Chinook, Sockeye, Coho, and Chum salmon; Whitefish, Grayling, Sheefish, Dolly Varden, and Pike. (Mike Coffing, Alaska Department of Fish and Game, oral commun., 1999), (Van Waggoner, Bruce Seppi, Jeff Denton, Bureau of Land Management, oral commun., 1999).

All the above sources, as well as representatives from the U.S. Fish and Wildlife (oral commun., Gary Wheeler, Nov 2, 1999), and Natural Heritage Database (Julie Michaelson, oral and written commun., 1999) confirmed there are no recognized threatened or endangered species within 15 miles of the site. No other Sensitive Environment categories from Table 6 apply to this site.

---

18) What is the linear frontage (miles) of all wetlands 15 miles downstream (rivers, streams, etc) or 15-mile radius (lakes, bays, etc)? *All sides of water body.

The downstream linear frontage of wetlands within 15 miles downstream of the site is 7.7 miles. This number was determined from U.S. Fish and Wildlife National Wetlands Inventory maps. Figure 3 shows this map within 4 miles of the site. Only small portions have been mapped as wetlands by the U.S. Fish and Wildlife (Figure 3).

The entire river bank generally does not fit EPA's definition of a wetland, that being a marsh, bog, swamp (U.S. Environmental Protection Agency, 1991, page 133). However, the river banks do experience fluctuations in water levels, and thus water coverage, due to precipitation and seasonal discharge fluctuations.

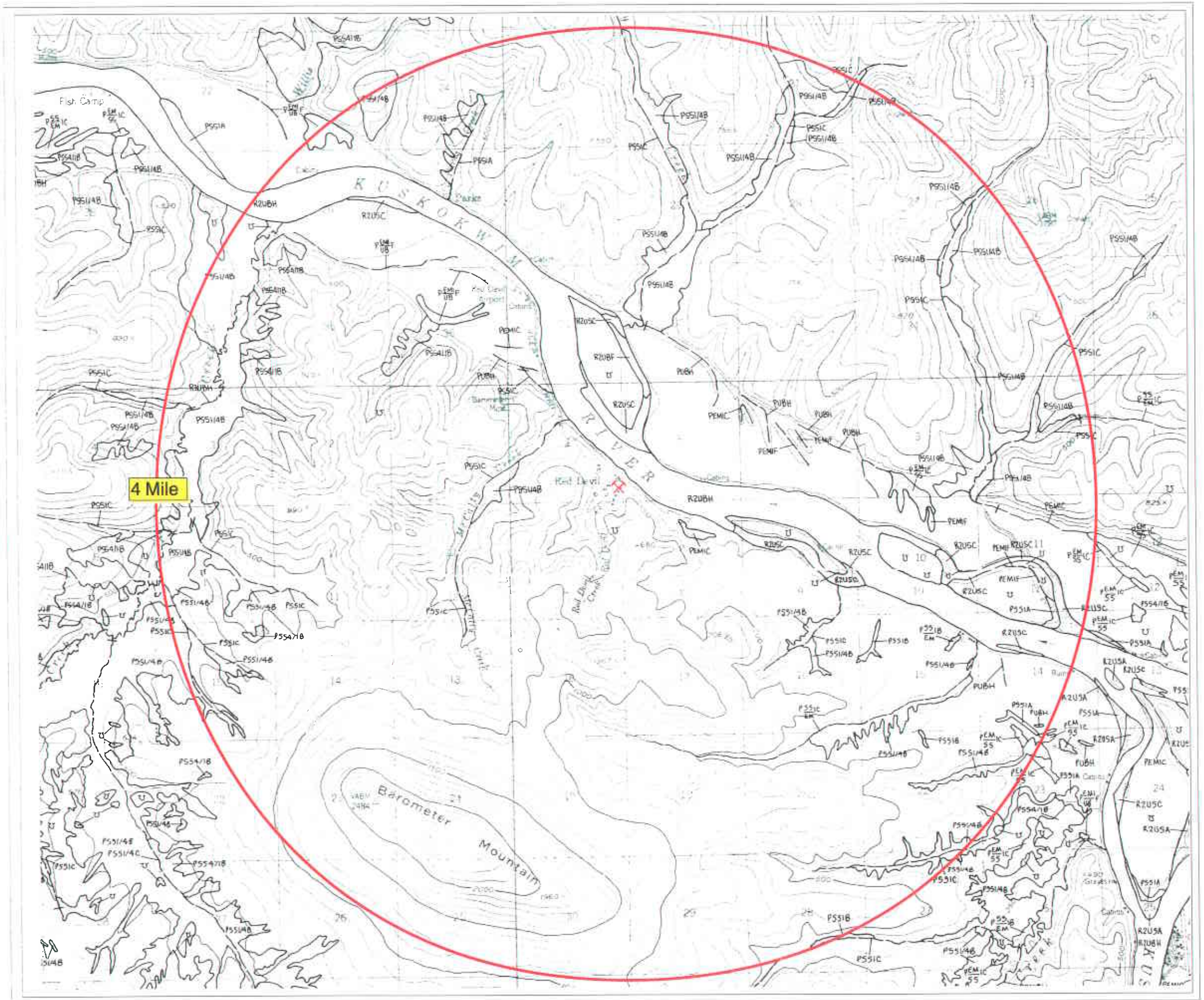


Figure 3. National Wetlands Inventory

Red Devil Mine and
vicinity within 4 miles

Red Devil Mine Site

4 Mile Radius

1 0 1 Miles

Contour Interval: 100 ft.

N
W E
S

This map was created from scanned U.S. Fish and Wildlife Service NWI (National Wetlands Inventory) 1:40k maps Sleetmute C-4 and D-4. The 4 mile boundary was created using ArcView 3.0b. The scanned image was not georectified and should only be used as a general reference.

Figure 3a. Classification Scheme for National Wetlands Inventory

SYSTEM — **M – MARINE**

SUBSYSTEM — **1 – SUBTIDAL**

CLASS	RB – ROCK BOTTOM	UB – UNCONSOLIDATED BOTTOM	AB – AQUATIC BED	RF – REEF	OW – *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Submergent Vascular 3 Rooted Vascular 4 Floating-Leaved Vascular 6 *Unknown Submergent* 7 *Unknown Surface*	1 Coral 3 Worm	

SUBSYSTEM — **2 – INTERTIDAL**

CLASS	AB – AQUATIC BED	RF – REEF	RS – ROCKY SHORE	FL – FLATS	BB – BEACH/BAR	US – UNCONSOLIDATED SHORE
Subclass	1 Algal 2 Submergent Vascular 3 Rooted Vascular 4 Floating-Leaved Vascular 6 *Unknown Submergent* 7 *Unknown Surface*	1 Coral 3 Worm	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Cobble-Gravel 2 Sand	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated

SYSTEM — **R – RIVERINE**

SUBSYSTEM — **1 – TIDAL**

CLASS	RB – ROCK BOTTOM	UB – UNCONSOLIDATED BOTTOM
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic

SUBSYSTEM — **2 – LOWER PERENNIAL**

CLASS	*SB – STREAMBED	AB – AQUATIC BED	RS – ROCKY SHORE	FL – FLATS	BB – BEACH/BAR	US – UNCONSOLIDATED SHORE	**EM – EMERGENT
Subclass	1 Bedrock 2 Rubble 3 Cobble-Gravel 4 Sand 5 Mud 6 Organic 7 Vegetated	1 Algal 2 Submergent Vascular 3 Rooted Vascular 4 Floating-Leaved Vascular 5 Floating Vascular 6 *Unknown Submergent* 7 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Cobble-Gravel 2 Sand	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent

SUBSYSTEM — **3 – UPPER PERENNIAL**

SUBSYSTEM — **4 – INTERMITTENT**

SUBSYSTEM — ***5 – UNKNOWN PERENNIAL***

CLASS	OW – *OPEN WATER/ Unknown Bottom*

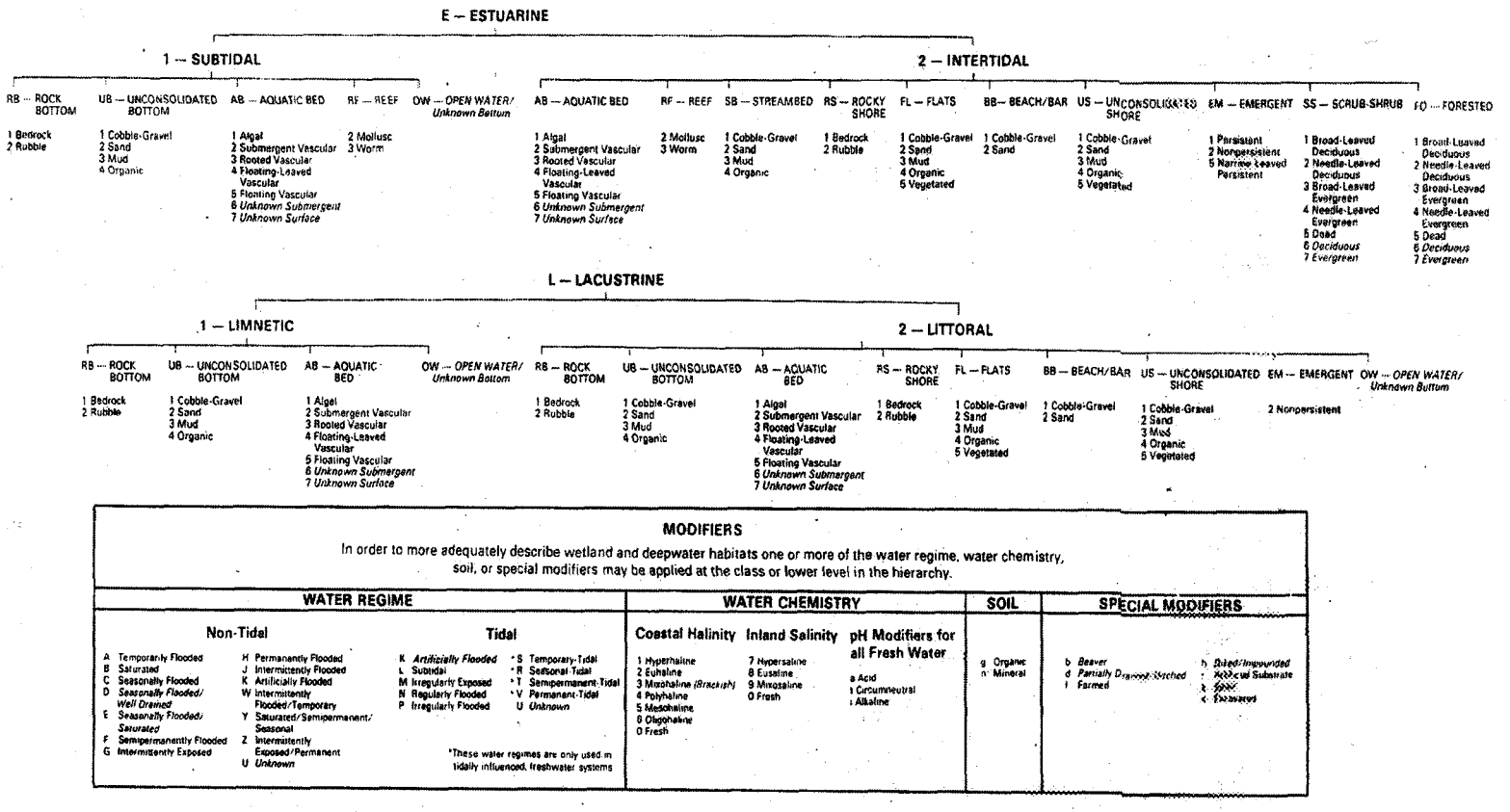
*STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM

**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

SYSTEM — **P – PALUSTRINE**

CLASS	RB – ROCK BOTTOM	UB – UNCONSOLIDATED BOTTOM	AB – AQUATIC BED	FL – FLATS	US – UNCONSOLIDATED SHORE	ML – MOSS-LICHEN	EM – EMERGENT	SS – SCRUB-SHRUB	FO – FORESTED	OW – *OPEN WATER Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Submergent Vascular 3 Rooted Vascular 4 Floating-Leaved Vascular 5 Floating Vascular 6 *Unknown Submergent* 7 *Unknown Surface*	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent 5 Narrow-Leaved Persistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	

Figure 3b. Classification Scheme for National Wetlands Inventory



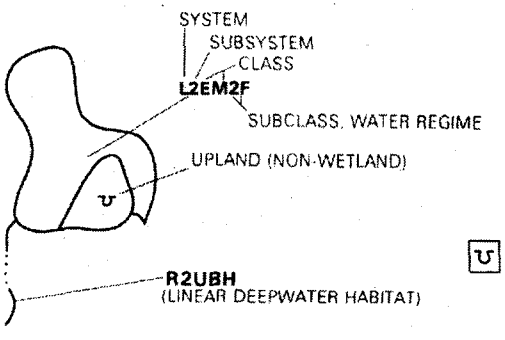
MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy.

WATER REGIME				WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS	
Non-Tidal		Tidal		Coastal Halinity	Inland Salinity	pH Modifiers for all Fresh Water			
A Temporarily Flooded	H Permanently Flooded	K *Artificially Flooded*	*S Temporary-Tidal	1 Hyperhaline	7 Hypersaline	a Acid	g Organic	b *Beaver*	h *Diked/Impounded*
B Saturated	J Intermittently Flooded	L Subtidal	*R Seasonal-Tidal	2 Euhaline	8 Euhaline	i Circumneutral	n Mineral	d *Partially Drained/Ditched*	[illegible] Artificial Substrate
C Seasonally Flooded	K Artificially Flooded	M Irregularly Exposed	*T Semipermanent-Tidal	3 Mixohaline *(Brackish)*	9 Mixosaline	i Alkaline		f Farmed	[illegible] Spoil
D *Seasonally Flooded/ Well Drained*	W Intermittently Flooded/Temporary	N Regularly Flooded	*V Permanent-Tidal	4 Polyhaline	0 Fresh				[illegible] Excavated
E *Seasonally Flooded/ Saturated*	Y Saturated/Semipermanent/ Seasonal	P Irregularly Flooded	U *Unknown*	5 Mesohaline					
F Semipermanently Flooded	Z Intermittently Exposed/Permanent			6 Oligohaline					
G Intermittently Exposed	U *Unknown*			0 Fresh					

*These water regimes are only used in tidally influenced, freshwater systems

SYMBOLOGY EXAMPLE



Primarily represents **upland** areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.

19) What is the location and number of persons residing, working, attending school or day care within 200 feet of each source?

Zero.

---

20) Identify all terrestrial sensitive environments (Table 7, page 10) that exist on-site. Provide original documentation (U.S. Fish and Wildlife, Natural Heritage Database, State agencies, National Oceanic and Atmospheric Administration, etc) and locate each on a topo map. Note that there may be multiple sensitive environments within the site limits/boundaries.

The Red Devil Mine site does not have any terrestrial sensitive environments as listed in Table 7. U.S. Fish and Wildlife, Natural Heritage Database, Alaska Department of Fish and Game were consulted (Gary Wheeler, oral commun., 1999), (Julie Michaelson, oral and written commun., 1999), (Mike Coffing, oral and written commun., 1999), (Van Waggoner, Bruce Seppi, Jeff Denton, Bureau of Land Management, oral commun., 1999) . All sources indicated this site does not have sensitive environments as defined. This site was analyzed for impacts to threatened and endangered species due to a removal action completed in 1999 during a National Environmental Policy Act (NEPA) Environmental Assessment (EA) (EA#: AK-040-99-013). No impacts were found.

---

21) For each source, choose one description from Table 8 (Appendix 2, p. 10) that describes the accessibility of the site. Provide complete documentation (i.e., engineering diagrams, original photographs) as to why the source meets that description and not any other in the table.

From Table 8: Slightly accessible, with some public recreation use.

There is no road access to the site. The site is approximately 250 miles from Anchorage, Alaska. The entire region is very sparsely populated. The closest community is Red Devil, which has 44 residents between 1-2.5 miles away. There is an unimproved dirt track leading to the site from the community of Red Devil. The next closest community is Sleetmute, 8 miles upstream, with no road access. Sleetmute has 103 residents. No other communities lie within 15 miles of the site (Alaska Department of Community and Regional Affairs, 1999). The communities of Parks and Eightmile were not in the database and are likely abandoned.

Warning signs and no trespassing signs have been posted at the site since about 1990. The trail/track linking the community of Red Devil has been closed with a chain gate several times, only to have the chain stolen. Local residents are known to enter the site to scavenge construction materials from the building ruins.

22) What is the total number of people within the following distance categories?:
(Use current/available Census data and/or actual house counts. Document how calculated.)

0-1/4 mile:	0; Confirmed by site visit.
1/4-1/2 mile:	0; Confirmed by site visit.
½-1 mile:	2; Two people live in a small cabin on the north side of McCally Creek. These people are trespassing on federal lands. They have been notified. The BLM is in the process of removing them from this location. Final resolution of trespass cases in remote locations often take considerable time to resolve. If EPA determines these occupants are at risk, and thus BLM's Hazards Ranking Score would be elevated, BLM can accelerate this process. Confirmed by site visit and local interviews.
1-2 miles:	35; Estimate based on the official population of Red Devil (44) and the known layout of the community.
2-3 miles	6; Estimate based on topographic map and local interviews; none confirmed living in this zone.
3-4 miles	3; Estimate based on topographic map and local interviews; none confirmed living in this zone.

---

23) For each source, choose one description from Table 9 (Appendix 2, p. 10) that describes the gaseous containment. From Table 10 (Appendix 2, p. 11), choose the appropriate description of each source type. For each source, choose one description from Table 11 (Appendix 2, p. 11) that describes the particulate containment. Provide complete documentation (i.e., engineering diagrams, original photographs) as to why the source meets that description and not any other in the table.

Table 9, Gas containment descriptions: All situations except those listed below.
Ambient air quality at the site is good. Air quality at the site has been monitored with a mercury vapor monitor and a Photo Ionization Detector to monitor for mercury and Volatile Organic Compounds. Both measures indicated the air quality was within Permissible Exposure Limits for site workers. Air quality in immediate work area was temporarily degraded when mercury contaminated soot was shoveled into disposal containers during the removal action. This degradation was primarily from particulate aeration.

Table 10, Source type: 1) Contaminated soil, and 2) Pile: tailings pile, and other waste piles.
The primary site contaminant is mercury. Other contaminants include: antimony, arsenic, lead and asbestos. All containerized waste has been removed from the site. See HLA/Wilder JV (1999).

Table 11, Particulate containment description: All situations except those specifically listed below.
Ambient air quality at the site is good. Air quality at the site has been monitored with a mercury vapor monitor and a Photo Ionization Detector to monitor for mercury and Volatile Organic

Compounds. Both measures indicated the air quality was within Permissible Exposure Limits for site workers. Air quality in immediate work area was temporarily degraded when mercury contaminated soot was shoveled into disposal containers during the removal action.

---

24) What is the location and area (in acres) of all wetlands within 4 miles of the site?

See Figure 3 for wetland locations. No wetlands are on the site. Based on U.S. Fish and Wildlife maps, less than 5% of the land within 4 miles of the site are classified as wetlands. This computes to <1,609 acres per 50.26 mi^2.

---

25) Contact EPA Regional Office immediately if any radionuclides are present or suspected at site and supply all radiological information known to date. Have any removals or remedial actions taken place at site? If yes, then submit ALL information pertaining to action taken.

No radionuclides are present or suspected at the site. Non-radio nuclei removals have taken place with coordination of EPA. All information has been forwarded to EPA.

---

26) For all of the above information, use primary data sources and supply 2 copies or specify where copies may be obtained.

Data sources are limited for this remote Alaskan site. Published scientific data was used as available. Applicable federal and state agencies were contacted for input. Data sources are documented and/or explained for each question above. A bibliography follows.

---

27) Has any of the above information been previously submitted to the EPA Superfund Program? If yes, please specify the reference (page and paragraph) or provide a copy of the document.

Yes, some information above has previously been submitted to EPA as indicated above.

References

Alaska Department of Community and Regional Affairs, 1999, Community Profiles: http://www.comregaf.state.ak.us/.

Burkey, Charles, Jr., Coffing, Mike; Menard, Jim; Molyneaux, D.B., Salomone, Paul; Utermoble, Charles; Vania, Thomas, 1998, Annual management report for the subsistence and commercial fisheries of the Kuskokwim area: Alaska Department of Fish and Game, Division of Commercial Fisheries.

Driscoll, F.G.,1995, Groundwater and wells, 2nd ed.: Johnson Screens, St. Paul, Minnesota, 1108 p.

Duffy, L.K., Rodgers, Tauni, and Patton, Molly, 1998, Regional health assessment relating to mercury content of fish caught in the Yukon-Kuskokwim Delta rivers system: Alaska Medicine, vol. 40, no. 4.

U.S. Environmental Protection Agency, 1991, Guidance for performing preliminary assessments under CERCLA: Publication 9345.0-01A.

Gray, J.E., Meier, A.L., O'Leary, R.M., Outwater, Carol, and Theodorakos, P.M., 1996, Environmental geochemistry of mercury deposits in Southwestern Alaska: mercury contents in fish, stream-sediment, and stream-water samples: Geologic studies in Alaska by the U.S. Geological Survey, 1994, U.S. Geological Survey Bulletin 2152, pp 17-29.

HLA/Wilder JV, 1999, Limited waste removal action report, Red Devil Mine, Red Devil, Alaska: Bureau of Land Management, Anchorage Field Office, variously paged.

Jones, S.H., Fahl, C.B., 1994, Magnitude and frequency of floods in Alaska and conterminous basins of Canada: U.S. Geological Survey, Water-Resources Investigations Report 93-4179.

Leslie, L.D., 1989, Alaska climate summaries, technical note no. 5, 2nd ed.: Arctic Environmental Information and Data Center, University of Alaska.

MacKevett, E.M., and Berg, H.C., 1963, Geology of the Red Devil Quicksilver Mine, Alaska: U.S. Geological Survey Bulletin 1142-G, 16 p., 7 plates.

Miller, J.F., 1963, Probable maximum precipitation and rainfall-frequency data for Alaska, Technical Paper no. 47: U.S. Weather Bureau, Washington, D.C.

Selkregg, L., 1975, Alaska regional profiles-Southwest region: University of Alaska, Arctic Environmental Information and Data Center, 313 p.

Tolbert, J.G. and Sprouse, O.G., 1964, Soils of the Red Devil area, Alaska: Soil Conservation Service, U.S. Department of Agriculture, 24 p.

Wang, Bronwen, 1999, Spacial distribution of chemical constituents in the Kuskokwim River, Alaska: U.S. Geological Survey, Water-Resources Investigations Report 99-4177, 33 p.

Weston, Roy F., Inc., 1989, Red Devil mine site investigation, Red Devil, Alaska: Bureau of Land Management, Anchorage Field Office, variously paged.

Appendix 1

Selected Written Communications

The Alaska Natural Heritage Program

University of Alaska, Anchorage Environment and Natural Resources Institute
707 A Street Anchorage Alaska 99501 Tel: (907) 257-2783 Fax: (907) 257-2789

RECEIVED

DEC 1 1999

BUREAU OF LAND MANAGEMENT
Campbell Tract Facility
Anchorage Field Office

November 22, 1999

Harrison Griffin
Physical Scientist
Bureau of Land Management
6881 Abbott Loop Road
Anchorage, Alaska 99507-2599

Dear Harrison,

I am writing in response for rare species information in the area of Red Devil Mining site near Sleetmute, Alaska. A review of the heritage database reveled no species with federal Status known specifically from your area of concern. Please keep in mind that very little survey data is available for your specific area of concern and a ground field survey would be required to definitively prove presence of particular species. As we discussed in our phone conversation there is a possibility of peregrine falcon (*Falco peregrinus anatum)* use of the area or adjacent areas however. Per our discussion we agreeded that Robert Ambrose of U.S. Fsh and Wildlife Service and Van Waggoner of BLM would be the best source for information on the species. The peregrine falcon is federally listed under the Federal Threatened and Endangered Species Act as Endangered and listed by the State of Alaska as a species of special concern.

There are however a few migratory bird species that pass through your area seasonally, that should be considered in any environmental review of the general area of Sleetmute. These are as follows:

1. Olive-sided Flycatcher (*Contopus borealis)* Former Category 2 species under USFWS Federal Endangered Species Act, currently a State Species of Special Concern under administrative authority. The Heritage Rank is global G5T2 and State rank S2B.
2. Gray-Cheeked Thrush (*Catharus minimus)* heritage: G5 State S3B. State species of special Concern
3. Townsends Warbler (*Dendroica townsendi*) Heritage G5 S3B State of Alaska Species of Special Concern
4. Blackpoll Warbler (*Dendroica striata*) heritage G5 S3B, State of Alaska Species of Special Concern
5. Hudsonian Godwit (*Limosa haemastica*) G4 S3B.

I have enclosed a copy of the breeding bird survey range maps showing concentration areas throughout Alaska. These are very general in nature but are the only range maps we currently have for these species. I have provided a species account of the Olive-sided Flycatcher put out by Alaska Dept. of Fish and Game.

Enclosed also is the review of rare plants provided by Rob Likin, program botanist for your area of concern.
Please feel free to contact us if you require further information.
Best of Luck with your project.

Sincerely
Julie Michaelson

Julie Michaelson
Data Manager
Alaska Natural Heritage Program

Review of Red Devil Mining Area for Rare and Sensitive Plant Species 11/23/99

As you already know, we have no records of rare plants for the mine site and immediate vicinity. We should stress, as is often the case, that this may be due to the lack of any botanical investigations of the area.

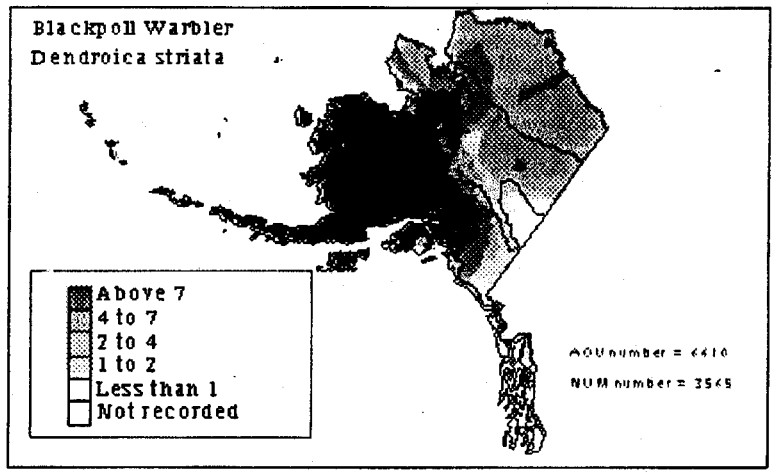
What might be there? I would have liked to have more details on the habitat in the area and what sort of substrate, but given the general location and making the assumption that it is basically riparian type habitat, there a couple of plants that could be expected. On non-calcareous or acidic substrate, Aphragmus eschscholtzianus and Thlaspi arcitcum might both be found on moist streamside gravels or mossy areas. These are both G3 S3, each with less than 50 known locations worldwide, mostly fairly small populations. It is likely that some additional populations will be found, though I doubt either will ever be regarded as common. Arnica lessingii ssp. norbergii G5T2Q S2 is known from the Russian Mountains, 15 km east of Aniak. The habitat was reported as "near small watercourses" of the headwaters of a creek. All other locations (less than 20 worldwide) are from southcentral and southeast AK. There are some questions about the validity of this taxon, but the FS is still listing it as Sensitive and this should be considered a serious possible rare plant for the Red Devil area.

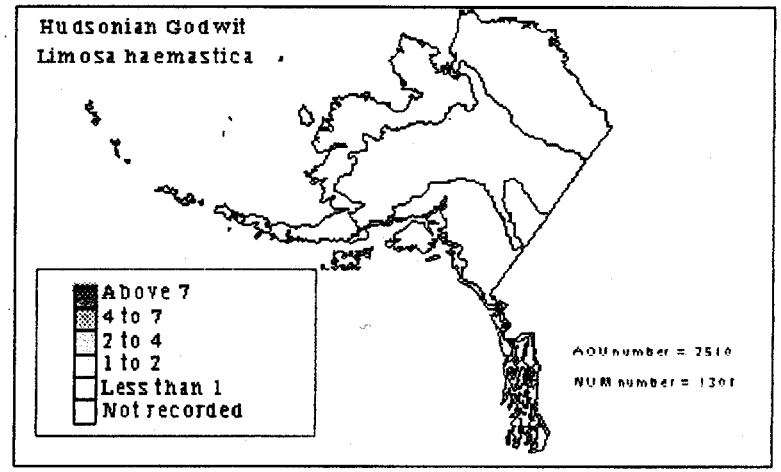
Recent surveys in the Lime Hills found several rare species, but these were all on calcareous alpine sites. If this habitat is of concern at Red Devil, they should contact us for additional information.

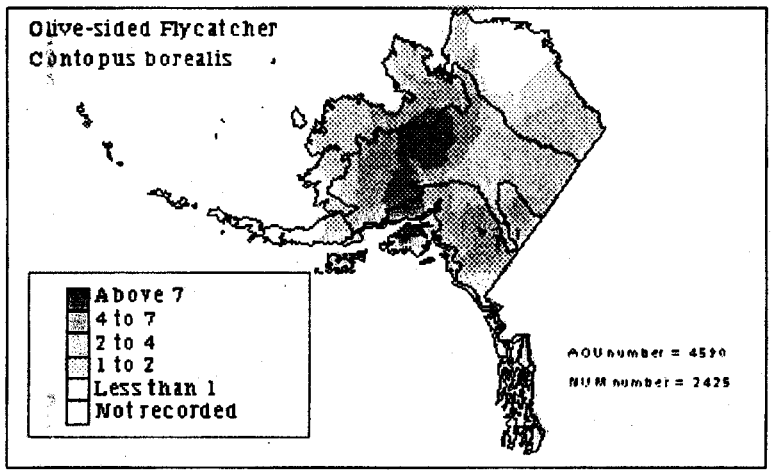
Please contact me if they need further details.

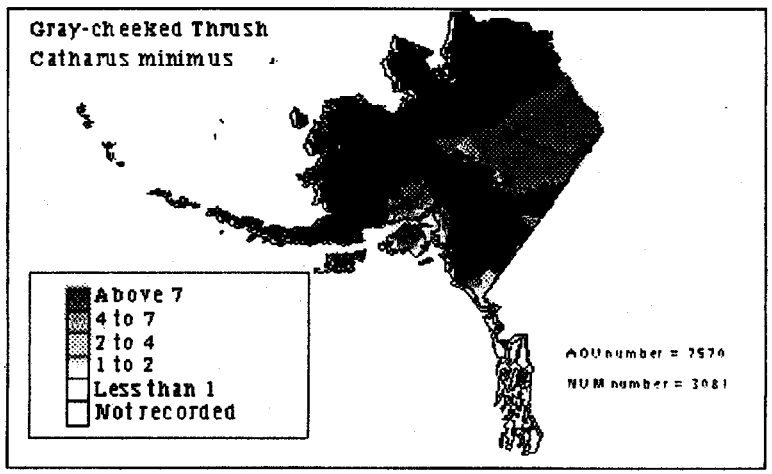
Rob Lipkin
AKNHP Botanist

Breeding Bird Survey - Range Maps

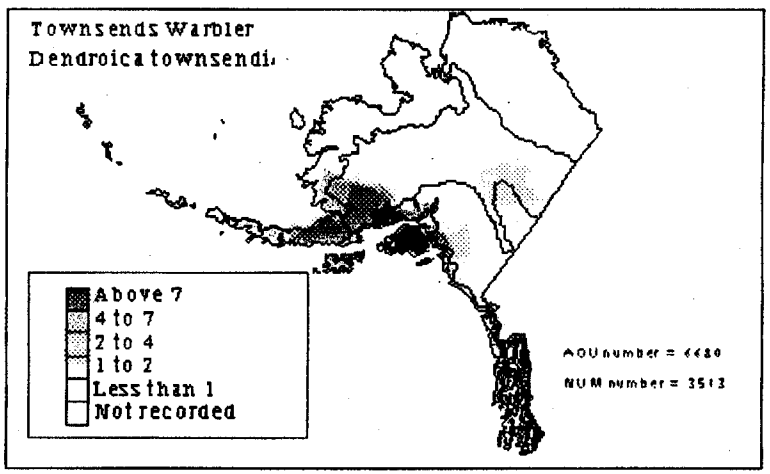








Breeding Bird Survey - Range Map



U.S. ARMY ENGINEER
DISTRICT, ALASKA
P.O. BOX 898
Anchorage, Alaska 99506-0898

10 Nov 99

Fax

To: HARRISON

From: HARLAN LEGARE

Fax:

Pages: 3

Phone:

Date:

Re:

CC:

☐ Urgent ☐ For Review ☐ Please Comment ☑ Please Reply ☐ Please Recycle

• Comments:

ALASKA DISTRICT CORPS OF ENGINEERS
FLOOD PLAIN MANAGEMENT SERVICES

HIGH WATER ELEVATION IDENTIFICATION

Community: **RED DEVIL**

Date of Visit: July 17-18, 1996

DRAFT

General Observations/Comments:

Red devil is located on both banks of the Kuskokwim River, 73 miles east of Aniak. The community is primarily situated on the west bank with a small number of private dwellings north of the airstrip on the opposite bank.

Historical Record of High Water:

Red devil has been flooded in 1964, May 1971, May 1987 and May 1991. The highest event was the 1971 flood, caused by an ice jam. The elevation of the water was estimated to be 0.7 feet below the lettering "Red Devil School". The elevation of the lettering was measured to be 213.54 feet.

People Interviewed:

Gail Vanderpool; Council Member

Actions Taken:

A flood gauge was installed on a telephone pole 100 feet riverward from the Post Office. A High Water Elevation (HWE) sign was placed on the gauge with the water symbol at the 1971 flood level of 212.84 feet.

Miscellaneous:

The recommended building elevation is 215.84 feet, three feet above the 1971 flood level.

The following elevations were based upon a Alaska Division of Aviation 1.5 inch galvanized pipe with brass cap (brass cap missing at this survey) located at station 78+10 at the SSE end of the airstrip. This monument has a published elevation of 203.9 feet. Data was provided by State of Alaska DOT&PF.

Typical bottom of fuel tank farm	210.95 ft
Ground at village powerhouse	201.66 ft
First floor of village powerhouse	206.88 ft

1991 flood at village powerhouse	207.86 ft
First floor of school's powerhouse	205.43 ft
Typical runway centerline at tarmac	204.24 ft
Ground at Post Office	203.61 ft
First floor of Post Office	207.06 ft
Ground flood gauge telephone pole	200.97 ft
Typical bottom of school's fuel tank farm	206.39 ft
Sill of front door of George Willis Sr. School	211.21 ft
School basketball court	204.49 ft
Sill of riverfront side of red Devil School	206.7 ft
Ground at Robert Dolfay's house	204.91 ft
First floor of Robert Dolfay's house	209.23 ft
Ground at TBM-1	204.49 ft
Typical road on top of left riverbank	203.27 ft
Typical overbank at Roadhouse	203.11 ft
First floor oldest sect. Roadhouse	210.62 ft

facsimile
TRANSMITTAL

Name:	Harrison Griffen
Organization:	BLM
Fax:	267-1304
Phone:	267-1446
From:	Larry Rundquist
Date:	Nov 5, 1999
Subject:	Pcpn data
Pages:	6

Comments: Attached are the references that provide pcpn frequency and annual pcpn. The Oregon State University study that was referred to is not yet final nor is it published. The web address that was provided is also not public and should not be distributed. We expect for this study to be final at the end of the year, so there may be a more recent reference for mean annual precipitation next year. Please feel free to call if the attached information is not sufficient to meet your needs.

U.S. DEPARTMENT OF COMMERCE
LUTHER H. HODGES, Secretary

WEATHER B
F. W. REICHELDERI

NOV-20-1999 13:02 NWS WSH/HYDRU P.02

TECHNICAL PAPER NO. 47

PROBABLE MAXIMUM PRECIPITATION AND RAINFALL-FREQUENCY DATA FOR ALASKA

for Areas to 400 Square Miles, Durations to 24 Hours and Return Periods from 1 to 100 Years

Prepared by

JOHN F. MILLER

Cooperative Studies Section, Hydrologic Services Division, U.S. Weather Bureau
for
Engineering Division, Soil Conservation Service, U.S. Department of Agriculture

WASHINGTON, D.C.

1963

For Sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price $1.00

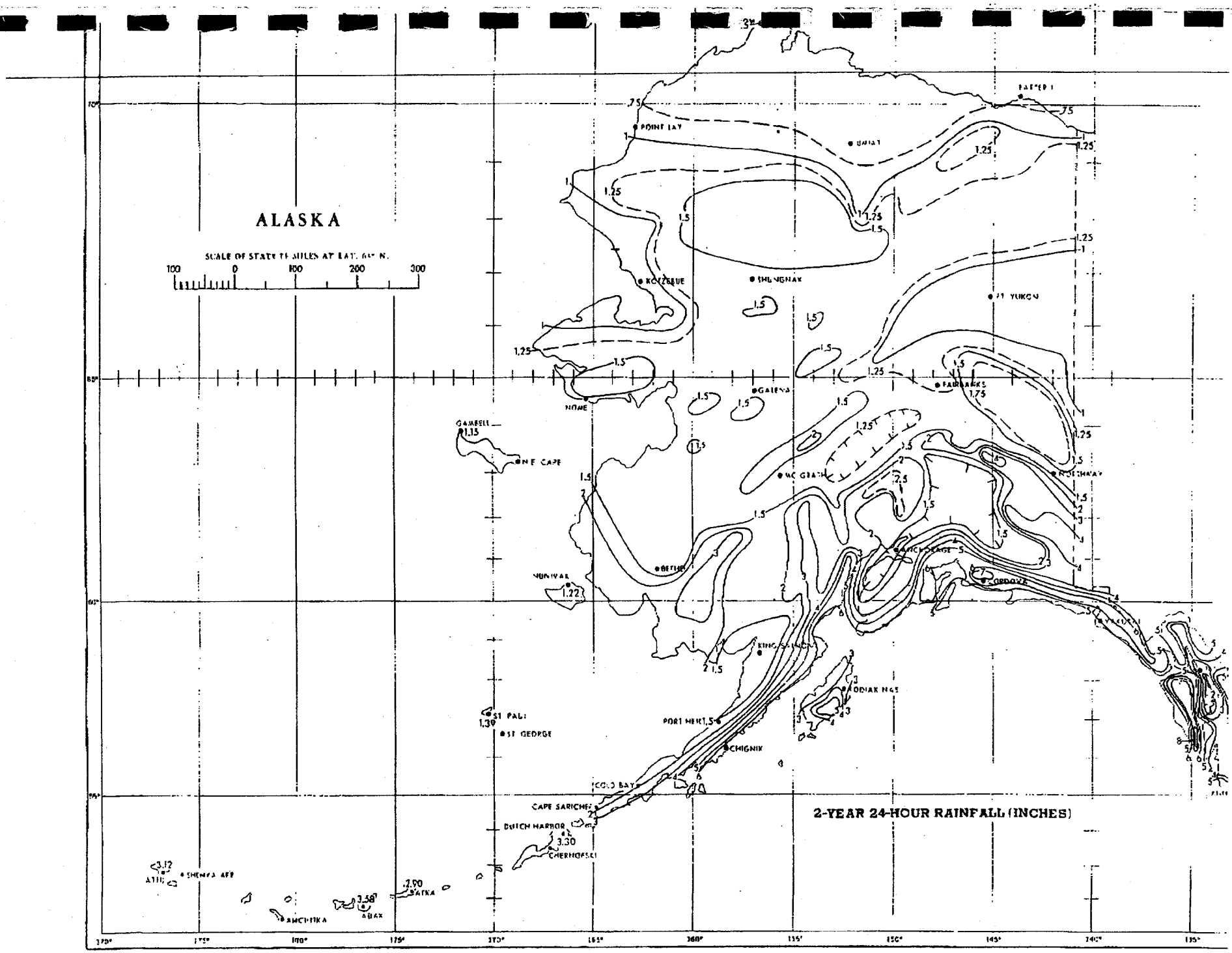


FIGURE 3-54.—2-yr. 24-hr. rainfall (in.).

Magnitude and Frequency of Floods in Alaska and Conterminous Basins of Canada

By Stanley H. Jones *and* Charles B. Fahl

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 93-4179

Prepared in cooperation with the

STATE OF ALASKA, DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
and
FEDERAL HIGHWAY ADMINISTRATION

Anchorage, Alaska
1994

PRECIPITATION MAP

The diverse physiography and climate in Alaska and in conterminous basins of Canada cause precipitation to vary significantly with latitude from south to north, with distance from the Gulf of Alaska, and with elevation. The mean annual precipitation ranges from more than 300 in. along islands and coastal areas of southeast Alaska to less than 7 in. along the Arctic coast. Mean annual precipitation is the most significant climatic characteristic for estimating floods.

A regionalized mean annual precipitation map for the period 1951-80 for Alaska west of longitude 141° (plate 2) was developed by analysis of data from climatological stations, snow survey data, and runoff from streamflow stations. Lines of mean annual precipitation were drawn using data from 304 climatological stations, 102 snow surveys, and 223 streamflow stations in Alaska west of longitude 141°. Climatological stations with short periods of record were adjusted to the 30-year normal period 1951-80, as recommended by the World Meteorological Organization (1983). The lines of mean annual precipitation for southeast Alaska, 1941-70, are based on information from Schwartz and Miller (1983, p. 13); those for conterminous basins of Canada, 1951-80, are from Wahl and others (1987, p. 209). Mean annual precipitation lines were modified to create uniform intervals and smooth lines along the Coast Mountains in southeast Alaska, the St. Elias Mountains, and the Alaska-Canada border equivalent to 141° longitude.

SUMMARY

Methods for estimating the magnitude and frequency of floods on unregulated streams, nonurban streams, and streams having no history of failure of natural dams in Alaska and conterminous basins of Canada are given in this report. A log-Pearson Type III frequency distribution was used to develop flood-frequency curves for the at-site individual stations. Alaska and conterminous basins of Canada were divided into five flood-frequency areas, and a set of equations for estimating peak discharges with recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years was developed for each area. Peak-discharge and basin-characteristics data from 260 gaging stations and crest-stage partial-record stations in Alaska and 72 gaged locations in Canada were used in multiple-regression analysis to develop the equations. Basin characteristics shown to be significant in estimating flood magnitude include drainage area, mean annual precipitation, percentage area of lakes and ponds, mean minimum January temperature, mean basin elevation, and percentage area of forest. Average standard error of prediction ranged from 26 to 77 percent. Maximum known floods at 722 sites in Alaska and conterminous basins of Canada are tabulated.

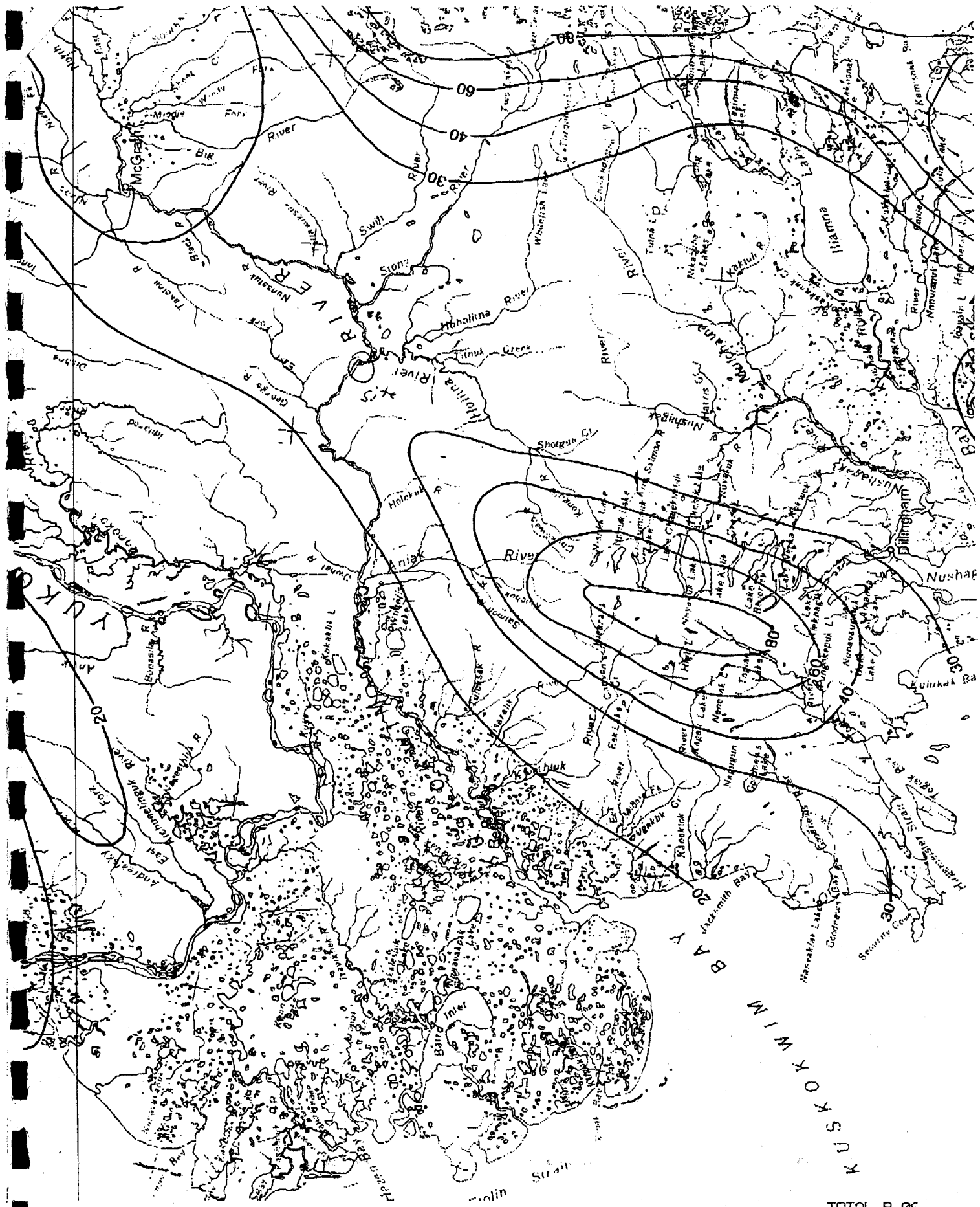
REFERENCES CITED

Berwick, V.K., Childers, J.M., and Kuentzel, M.A., 1964, Magnitude and frequency of floods in Alaska south of the Yukon River: U.S. Geological Survey Circular 493, 15 p.

Brabets, T.P., 1986, Quantity and quality of urban runoff from the Chester Creek basin, Anchorage, Alaska: U.S. Geological Survey Water-Resources Investigations Report 86-4312, 58 p.

Butler, D.R., 1989, Snow avalanche dams and resultant hazards in Glacier National Park, Montana: Northwest Science, v. 63, no. 3, p. 109-115.

Canada Department of Indian and Northern Affairs, 1984, Yukon water resources hydrometric program, 1975-83: Canada Department of Indian and Northern Affairs, Historical Summary, 214 p.


McGrath
Swift
Stony
Hoholitna
Tilnuk Creek
Site
Shotgun Cr
Holokuk R
Salmon R
Nushagak
Dillingham
Kulukak Ba
Iliamna
Kokhuk
Jackscrew Bay
Security Creek
Baird Inlet
Strait
80
60
40
30
20

ANNUAL MANAGEMENT REPORT FOR THE SUBSISTENCE AND COMMERCIAL FISHERIES OF THE KUSKOKWIM AREA

1998

By:
Charles Burkey Jr.
Mike Coffing
Jim Menard
Douglas B. Molyneaux
Paul Salomone
Charles Utermohle
Thomas Vania

Regional Information Report[1] No. 3A99-36

Alaska Department of Fish and Game
Division of Commercial Fisheries
AYK Region
333 Raspberry Road
Anchorage, Alaska 99518

November, 1999

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[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports to this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

Appendix A.10. Kuskokwim Area subsistence Chinook salmon harvest by community, 1989 - 1998.

Community	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Red Devil	189	273	168	328	487	379	425	337	452	262
Sleetmute	420	711	770	801	1,767	1,327	885	1,230	1,171	947

Appendix A.11. Kuskokwim Area subsistence sockeye salmon harvest by community, 1989 - 1998.

Community	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Red Devil	356	445	426	315	717	311	620	977	697	346
Sleetmute	776	1,060	1,164	855	1,609	1,158	1,083	1,304	1,458	1,398

Appendix A.12. Kuskokwim Area subsistence Coho salmon harvest by community, 1989 - 1998.

Community	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Red Devil	1,591	866	1,132	1,160	1,812	994	1,557	1,274	1,391	425
Sleetmute	1,009	1,023	1,557	1,132	880	649	1,075	846	419	301

Appendix A.13. Kuskokwim Area subsistence chum salmon harvest by community, 1989 - 1998.

Community	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Red Devil	1,376	1,466	1,236	1,523	1,004	1,220	882	787	551	565
Sleetmute	1,813	1,874	1,862	3,151	681	1,533	1,758	1,215	417	981

- Northern Pike
- Sheefish in Kuskokwim
- whitefish
-

- grayling
- dolly varden

Coffman

Red Devil subsistence harvest, 1989-1998

	chinook	sockeye	coho	chum	
1989	189	356	1591	1376	
1990	273	445	866	1466	
1991	168	426	1132	1236	
1992	328	315	1160	1523	
1993	487	717	1812	1004	
1994	379	311	994	1220	
1995	425	620	1557	882	
1996	337	977	1274	787	
1997	452	697	1391	551	
1998	262	346	425	565	
	3300	5210	12202	10610	sub total
				31322	Total fish
	17	6.2	6.8	6.4	edible wt./fish (lbs)
	56100	32302	82973.6	67904	edible wt. harvested (lbs)
				239280	Total weight (10 years)
				23928	average total wt./year

Approximate number of acres of surface water bodies within 15 miles downstream = 2640 acres
[Kuskokwim River is the only significant surface water body; ave width (1450 ft)x(15 miles)]

Average human food chain production of surface water bodies within 15 miles downstream
= 23928 pounds/2640 acres = **9.06 pounds/acre**

reference: (Burkey, et al, 1998);
(oral comm. Mike Coffing, Alaska Department of Fish and Game, Nov 19, 1999)

STATE OF ALASKA

TONY KNOWLES, GOVERNOR

MAIN OFFICE
3601 C STREET, SUITE 800
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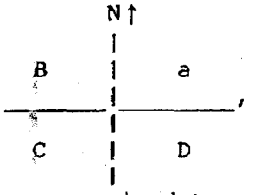
November 8, 1999

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINING, LAND & WATER

HYDROLOGIC SURVEY

The USGS number is our representation of the township/range convention. In CD***-***-**CDAB, for example, the first CD means Copper meridian ("C") and SE quadrant ("D"), as below. The township , range and sections follow, and then the final one to four letters at the end of the field represent the four quarters, from largest to smallest, taken counter clockwise, also as below. Similarly, CDAB (decoded and reversed) means NW 1/4("B") of NE 1/4("A") of SE 1/4("D") of SW 1/4("C"). Missing values indicate a lack of data.



, et cetera. Meridians are S (Seward), C (Copper River), K (Kateel), U (Umiat), F (Fairbanks)

This list is by no means complete and does not show all well logs for the area! All well drillers are required to submit well logs to this agency, but compliance is not complete. If known, water rights numbers are shown.

I searched the WELTS database for the location specified, "Red Devil", and did not find any well logs, other than two near to Sleetmute.

(MERID = 'SB' .AND. (TWNSHP >= 018 .AND. TWNSHP <= 022) .AND. (RANGE >= 042 .AND. RANGE <= 048)) .OR. 'SLEETMUTE' $ PDESC .OR. 'SLEETMUTE $ OWNER .OR. 'RED DEVIL' $ PDESC .OR. 'RED DEVIL' $ OWNER

KEY	OWNER	DPTH	USGS #	DRILLER	REG	PDESC	S	TAGS	DOC	LAS #
023689	VILLAGE OF SLEETMUTE	0046	SB019-044-36BDDD	MOFFIT CONTRACTING	12	SLEETMUTE, SOUTH	U	P	06/30/90	LAS 13390
024760	CARLSON, R	0050	SB018-043-27BBAC	UNKNOWN	13	TEENIE OACH L06 USS 9357	U	N	/ /	LAS 22706

Not within 4 miles of site
- Mac

Post-it® Fax Note 7671	Date	# of pages ▶
To HARRISON GRIFFIN	From ROY IRELAND	
Co./Dept. BLM	Co. DNR DMLW	
Phone # 267 1446	Phone # 269 8639	
Fax # 267 1304	Fax # 562-1384	

Appendix 2

Environmental Protection Agency
Request Letter and Tables

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

RECEIVED
OCT 1 ? 1998
BUREAU OF LAND MANAGEMENT

Reply To
Attn Of: ECL-115

October 7, 1998

Tom Allen, Director
Bureau of Land Management
222 West 7th Avenue, #13
Anchorage, Alaska 99513-7599

Dear Mr. Allen:

The U.S. Environmental Protection Agency (EPA) has reviewed the recently submitted work plan concerning the removal action at the Red Devil Mine site. EPA is also in receipt of a letter from the Alaska Inter-Tribal Council concerning possible releases from the Red Devil Mine, and impacts to tribal members and associated downstream lands. Based on their concerns, and a review of existing file information, EPA request that the Bureau of Land Management complete a site investigation of the facility. EPA must reevaluate the site with current information to calculate a hazard ranking score and to complete a removal assessment. Information in existing EPA files is approximately 10 years old and new information is necessary to assess the current condition of the site. Accordingly, please supply the following information:

- Collect between three and five samples from each tailings pile located at the site (analyze for target analyte list (TAL) metals).
- Collect three sediment and three water samples from each pond located on site (TAL).
- Collect three soil and three surface water samples from each of the following locations; the battery disposal area, transformer area and drum disposal area (TAL and target compound list (TCL organics).
- Collect two sediment samples from Red Devil Creek between the most down gradient source and the Kuskohwim River. Collect five sediment and surface water samples on 550 centers from the Kuskokwin River beginning at the mouth of Red Devil Creek (TAL)
- Install 3 monitoring wells between the onsite sources and Red Devil Creek (TAL).
- Collect background samples for each matrix and from each stream sampled (TAL & TCL).

EPA would like to be involved in the development and review of the work plan for this field work. Please contact me to discuss a schedule and any questions concerning these comments at 206-553-1808.

Mark Ader,

Site Assessment Manager

cc: Mike Alcorn, BLM
Wayne Svejnoho, BLM
Rick Albright, EPA A/AOO
Matt Carr, EPA A/AOO
Chris Field, EPA

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PRELIMINARY ASSESSMENT (PA)
DATA REQUIREMENTS
FOR FEDERAL FACILITY DOCKET SITES

1. Supply copies of all existing sampling data, on-site and off-site, including location map, detection limits (see definitions, pg.5), raw data sheets, QA/QC documents, date(s) sampled, analytical method(s) used, well or boring logs, and sampling technique(s).

2. Locate and identify on a topo map all known or suspected sources (see definitions, pg. 5). Supply all information about source(s) such as; dates of operation, use, and spillage; amounts of material deposited, stored, or spilled; dimensions of source(s); known or suspected hazardous substances (see definitions, pg. 5), etc.

3. Provide a description of all aquifers beneath the site. Include description of overlying materials (i.e., hydraulic conductivity/permeability), thickness, composition, and depth aquifer is first encountered. *NOTE: This data requirement involves a literature search of all current or existing geologic information.

4. For each source, choose one description from Table 1 (page 6-7) that describes the ground water containment. Provide complete documentation (i.e., engineering diagrams, photographs {originals}) as to why the source meets that description and not any other in the table.

5. Provide the location of all drinking water wells (by HRSII distance rings in table format) in all aquifers within 4-mile radius from site (property boundary). Show on topo map all wells within 1-mile radius. Provide information on depth of well(s), screening interval(s), depth aquifer(s) encountered, and population served. For multiple wells (i.e., municipal system) provide the number of wells, location of all wells (regardless of 4-mile limit), average annual pumpage of each well (regardless of 4-mile limit), and total population served by system. Include information on all standby wells.

6. Provide information and location of wells within 4-miles (on topo map show all wells within 1-mile radius) that are used:

a) to irrigate 5 or more acres of commercial food or forage crops,
b) for watering of commercial livestock,
c) as an ingredient in commercial food preparation,
d) as a supply to aquaculture, or
e) as a supply for a major or designated water recreation area, excluding drinking water use.

7. What is the average number of persons per residence (Borough, city, village,

community, etc.) that site is located in?

8. Identify and locate all surface water bodies within 2 miles of site. Indicate the drainage routes (shown on topo map) from each source to applicable surface water bodies. Provide the average annual flow (cubic feet per second) for each surface water body within 15 miles downstream (river, stream, etc.) or 15-mile radius (lakes, bays, etc.) from the point of probable entry into surface water. For lakes, provide information on inflow and outflow.

9. For each source, choose one description from Table 2 (page 7-8) that best describes the surface water containment. Provide complete documentation (i.e., engineering diagrams, photographs {originals}) as to why the source meets that description and not any other in the table.

10. What is the number of acres in each drainage basin?

11. From Table 3 (page 8), choose the predominant soil group (surface soil) which comprises the largest total area within each drainage area.

12. What is the 2-year, 24-hour rainfall? What is the Annual Net Precipitation?

13. From Table 4 (page 8), choose the floodplain category for each source (supply Federal Emergency Management Agency or U.S. Army Corps of Engineers floodplain map) and determine if each source meets the criteria from Table 5 (page 9) (engineer's certification).

14. Provide the location (by HRSII distance rings in table format) of all drinking water intakes within 15 miles downstream (rivers, streams, etc.) or 15-mile radius (lakes, bays, etc.). Show on topo map all intakes within 1-mile radius/downstream. Provide information on population served. For multiple intakes (i.e., municipal system) provide information on the number of intakes, location of all intakes (regardless of 15-mile limit), average annual pumpage of each intake (regardless of 15-mile limit), and total population served by system. Include information on all standby intakes.

15. Provide information and location of intakes within 15 miles downstream (rivers, streams, etc.) or 15-mile radius (lakes, bays, etc.) that are used:*

a) to irrigate 5 or more acres of commercial food or forage crops,
b) for watering of commercial livestock,
c) as an ingredient in commercial food preparation,
d) as a supply for aquaculture, or
e) as a supply for a major or designated water recreation area, excluding drinking water use.

*On topo map show location of intakes within 1-mile radius/downstream.

16. What is the average human food chain production (pounds per year per acre) for each surface water body within 15 miles downstream (rivers, streams, etc.) or 15-mile radius (lakes, bays, etc.)?

17. Identify all sensitive environments (Table 6, page 9) that exist within a 4-mile radius on land, 15 miles downstream (rivers, streams, etc.), or 15-mile radius (lakes, bays, etc.), in HRSII distance ring table format. Provide original documentation (U.S. Fish & Wildlife, Natural Heritage Database, State agencies, National Oceanic and Atmospheric Administration, etc.) and locate each environment within 1-mile on a topo map. Note that there could be multiple sensitive environments within the appropriate limit.

18. What is the linear frontage (miles) of all wetlands 15 miles downstream (rivers, streams, etc.) or 15-mile radius (lakes, bays, etc.)? *All sides of waterbody.

19. What is the location and number of persons residing, working, attending school or day care within 200 feet of each source?

20. Identify all terrestrial sensitive environments (Table 7, page 10) that exist on-site. Provide original documentation (U.S. Fish & Wildlife, Natural Heritage Database, State agencies, National Oceanic and Atmospheric Administration, etc.) and locate each on a topo map. Note that there may be multiple sensitive environments within the site limits/boundaries.

21. For each source, choose one description from Table 8 (page 10) that describes the accessibility of the site. Provide complete documentation (i.e., engineering diagrams, photographs {originals}) as to why the source meets that description and not any other in the table.

22. What is the total number of people within the following distance categories?:
    0 - 1/4 mile
    1/4 - 1/2 mile
    1/2 - 1 mile
    1 - 2 miles
    2 - 3 miles
    3 - 4 miles

Use current/available Census data and/or actual house counts. Document how calculated.

23. For each source, choose one description from Table 9 (page 10) that describes the gaseous containment. From Table 10 (page 11), choose the appropriate description of each source type. For each source, choose one description from Table 11 (page 11) that describes the particulate containment. Provide complete documentation (i.e., engineering diagrams, photographs {originals}) as to why the source meets that description and not any other in the table.

24. What is the location and area (in acres) of all wetlands within 4 miles of site?

25. Contact EPA Regional Office immediately if any radionuclides are present or suspected at site and supply all radiological information known to date.26. Have any removals or remedial actions taken place at site? If yes, then submit ALL information pertaining to action taken.

26. For all of the above information, use primary data sources and supply 2 copies or specify where copies may be obtained.

27. Has any of the above information been previously submitted to the EPA Superfund Program? If yes, please specify the reference (page and paragraph) or provide a copy of the document.

DEFINITIONS

Detection Limit (DL): Lowest amount that can be distinguished from the normal random "noise" of an analytical instrument or method. For this submission, the detection limit used is the method detection limit (MDL), or for real-time instruments, the detection limit of the instrument as used in the field.

Hazardous Substance: CERCLA hazardous substances, pollutants, and contaminant as defined in CERCLA sections 101(14) and 101(33).

Method Detection Limit (MDL): Lowest concentration of an analyte that a method can detect reliably in either a sample or blank.

Primary Sources: Primary sources include geological publications, field observations/measurements, analytical results, and waste manifests. Primary references are the original materials in which the information was given.

Sample Quantitation Limit (SQL): Quantity of a substance that can reasonably be quantified given the methods of analysis and sample characteristics that may affect quantification (for example, dilution/concentration).

Secondary References: Materials that refer to the original source of information. Such references may include, for example: (1) allegations of buried drums; (2) estimates of the depth of landfills or lagoons; and (3) summaries of analytical results without actual laboratory data. Note that PA and SI reports may contain a large amount of secondary information (e.g., collected from file materials and published reports). Therefore, the actual documents referenced in these reports should be used as the primary references.

Site: Area(s) where a hazardous substance has been deposited, stored, disposed, or placed, or has otherwise come to be located. Such areas may include multiple sources and may include areas between sources.

Source: Any area where a hazardous substance has been deposited, stored, disposed, or placed, plus those soils that have become contaminated from migration of a hazardous substance. Sources do not include those volumes of air, ground water, surface water, or surface water sediments that have become contaminated by migration, except: in the case of either a ground water plume with no identified source or contaminated surface water sediments with no identified source, the plume may be considered a source.

Table 1

All Sources (Except Surface Impoundments, Land Treatment, Containers, and Tanks)

Evidence of hazardous substance migration from source area (i.e. source area includes source and any associated containment structures).
No liner
No evidence of hazardous substance migration from source area, a liner, *and:*

(a) None of the following present (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system. or (3) functioning leachate collection and removal system immediately above liner.
(b) Any one of the three items in (a) present
(c) Any two of the items in (a) present
(d) All three items in (a) present plus a functioning ground water monitoring system
(e) All items in (d) present plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area.

No evidence of hazardous substance migration from source area, double liner with functioning leachate collection and removal system above and between liners, functioning ground water monitoring system, and:
(f) Only one of the following deficiencies present in containment (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or (2) no or nonfunctioning or nonmaintained runon control system and runoff management system, or (3) no or nonmaintained engineered cover.
(g) None of the deficiencies in (f) present
Source area inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate is generated, liquids or materials containing free liquids not deposited in source area, and functioning and maintained run-on control present

Surface Impoundment

Evidence of hazardous substance migration from surface impoundment
No liner
Free liquids present with either no diking, unsound diking, or diking that is not regularly inspected and maintained
No evidence of hazardous substance migration from surface impoundment, free liquids present, sound diking that is regularly inspected and maintained, adequate freeboard, *and:*

(a) Liner
(b) Liner with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.
(c) Double liner with functioning leachate collection and removal system between liners, and functioning ground water monitoring system.

No evidence of hazardous substance migration from surface impoundment and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).

Land Treatment

Evidence of hazardous substance migration from land treatment zone
No functioning, maintained, run-on control and runoff management system
No evidence of hazardous substance migration from land treatment zone *and:*

(a) Functioning and maintained run-on control and runoff management system
(b) Functioning and maintained run-on control and runoff management system, and vegetative cover established over entire land treatment area.
(c) Land treatment area maintained in compliance with 40 CFR 264.280

Containers

All containers buried
Evidence of hazardous substance migration from container area (i.e., container area includes containers and any associated containment structures).
No liner (or no essentially impervious base) under container area
No diking (or no similar structure) surrounding container area
Diking surrounding container area unsound or not regularly inspected and maintained
No evidence of hazardous substance migration from container area, container area surrounded by sound diking that is regularly inspect ed and maintained, and:

(a) Liner (or essentially impervious base) under container area
(b) Essentially impervious base under container area with liquids collection and removal system
(c) Containment system includes essentially impervious base, liquids collection system, sufficient contain 10 percent of volume of all containers, and functioning and maintained run-on control; plus functioning ground water monitoring system, and spilled or leaked hazardous substances and accumulated precipitation removed in timely manner to prevent overflow of collection system, at least weekly inspection of containers, hazardous substances in leaking or deteriorating containers transferred to containers in good condition, and containers sealed except when waste is added or removed.
(d) Free liquids present containment system has sufficient capacity to hold total volume of all containers and to provide adequate freeboard, single liner under container area with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.
(e) Same as (d) except: double liner under container area with functioning leachate collection and removal system between liners.

Containers inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any unsealed or ruptured containers, liquids or materials containing free liquids not deposited in any container, and functioning and maintained run-off control present
No evidence of hazardous substance migration from container area, containers leaking, and all free liquids eliminated at closure (either by removal of liquid or solidification of remaining wastes and waste residues).

Tank

Below-ground tank
Evidence of hazardous substance migration from tank area (i.e., tank area includes tank, ancillary equipment such as piping, and any associated containment structures).
Tank and ancillary equipment not provided with secondary containment, (e.g., liner under tank area, vault system, double wall).
No diking (or no similar structure) surrounding tank and ancillary equipment
Diking surrounding tank and ancillary equipment unsound or not regularly inspected and maintained.
No evidence of hazardous substance migration from tank area. tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained, and:

(a) Tank and ancillary equipment provided with secondary containment
(b) Tank and ancillary equipment provided with secondary containment with leak detection and collection system.
(c) Tank and ancillary equipment provided with secondary containment system that detects and collects spilled or leaked hazardous substances and accumulated precipitation and has sufficient,capacity to contain 110 percent of volume of largest tank within containment area, spilled or leaked hazardous substances and accumulated precipitation removed in timely manner, at least weekly inspection of tank and secondary containment system, all leaking or unfit-for-use tank systems promptly responded to, and functioning ground water monitoring system.
(d) Containment system has sufficient capacity to hold volume of all tanks within tank containment area and to provide adequate freeboard, single liner under that containment area with functioning leachate collection and removal system below liner, and functioning ground water monitoring system.
(e) Same as (d) except double liner under tank containment area with functioning leachate collection and removal system between liners.

Tank is above ground, and inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any material released from tank, liquids or materials containing free liquids not deposited in any tank, and functioning and maintained run-on control present.

Table 2

All Sources (Except Surface Impoundments, Land Treatment, Containers, and Tanks)

Evidence of hazardous substance migration from source area (i.e., source area includes source and any associated containment structures)
No evidence of hazardous substance migration from source areas and:

(a) Neither of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system.
(b) Any one of the two items in (a) present
(c) Any two of the following present. (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system, or (3) liner with functioning leachate collection and removal system immediately above liner.
(d) All items in (c) present
(e) All items in (c) present, plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area

No evidence of hazardous substance migration from source area, double liner with functioning leachate collection and removal system above and between liners, and:

(f) Only one of the following deficiencies present in containment: (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or (2) no or nonfunctioning or nonmaintained runon control system and runoff management system. or (3) no or nonmaintained engineered cover.
(g) None of the deficiencies in (f) present

Source area inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate is generated, liquids or materials containing free liquids not deposited in source area, and functioning and maintained run-on control present

Surface Impoundment

Evidence of hazardous substance migration from surface impoundment
Free liquids present with either no diking, unsound diking, or diking that is not regularly inspected and maintained
No evidence of hazardous substance migration from surface impoundment, free liquids present, sound diking that is regularly inspected and maintained, adequate freeboard, *and:*

(a) No liner
(b) Liner
(c) Liner with functioning leachate collection and removal system below liner
(d) Double liner with functioning leachate collection and removal system between liners

No evidence of hazardous substance migration from surface impoundment and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).

Land Treatment

Evidence of hazardous substance migration from land treatment zone
No functioning and maintained run-on control and runoff management system
No evidence of hazardous substance migration from land treatment zone *and:*

(a) Functioning and maintained run-on control and runoff management system
(b) Functioning and maintained run-on control and runoff management system, and vegetative cover established over entire land treatment area.
(c) Land treatment area maintained in compliance with 40 CFR 264.280

Containers

All containers buried
Evidence of hazardous substance migration from container area (i.e., container area includes containers and any associated containment structures).
No diking (or no similar structure) surrounding container area
Diking surrounding container area unsound or not regularly inspected and maintained
No evidence of hazardous substance migration from container area and container area surrounded by sound diking that is regularly inspected and maintained.
No evidence of hazardous substance migration from container area, container area surrounded by sound diking that is regularly inspected and maintained, and:

(a) Essentially impervious base under container area with liquids collection and removal system;
(b) Containment system includes essentially impervious base, liquids collection system, sufficient capacity to contain 10 percent of volume of all containers, and functioning and maintained run-on control; and spilled or leaked hazardous substances and accumulated precipitation removed in timely manner to prevent overflow of collection system, at least weekly inspection of containers, hazardous substances in leaking or deteriorating containers transferred to containers in good condition, and containers sealed except when waste is added or removed.
(c) Free liquids present containment system has sufficient capacity to hold total volume of all containers and to provide adequate freeboard, and single liner under container area with functioning leachate collection and removal system below finer.
(d) Same as (c) except: double liner under container area with functioning leachate collection and removal system between liners Containers inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any unsealed or ruptured containers, liquids or materials containing tree liquids not deposited in any container, and functioning and maintained run-on control present.

No evidence of hazardous substance migration from container area, containers leaking, and all free liquids eliminated at closure (either by removal of liquids or solidification of remaining wastes and waste residues).

Tank

Below-ground tank
Evidence of hazardous substance migration from tank area (i.e., tank area includes tank, ancillary equipment such as piping, and any associated containment structures).
No diking (or no similar structure) surrounding tank and ancillary equipment
Diking surrounding tank and ancillary equipment unsound or not regularly inspected and maintained
No evidence of hazardous substance migration from tank area and tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained.
No evidence of hazardous substance migration from tank area, tank and ancillary equipment surrounded by sound diking that is regularly inspected and maintained, and:

(a) Tank and ancillary equipment provided with secondary containment (e.g., liner under tank area, vault system, double-wall) with leak detection and collection system.
(b) Tank and ancillary equipment provided with secondary containment system that detects and collects spilled or leaked hazardous substances and accumulated precipitation and has sufficient capacity to contain 110 percent of volume of largest tank within containment area, spilled or leaked hazardous substances and accumulated precipitation removed in a timely manner, at least weekly inspection of tank and secondary containment system, and all leaking or unfit-for-use tank systems promptly responded to.
(c) Containment system has sufficient capacity to hold total volume of all tanks within the tank containment area and to provide adequate freeboard, and single liner under tank containment area with functioning leachate collection and removal system below liner.
(d) Same as (c) except double liner under tank containment area with functioning leachate collection and removal system between liners.

Tank is above ground, and inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate would be generated from any material released from tank, liquids or materials containing free liquids not deposited in any tank, and functioning and maintained run-on control present.

Table 3

Surface Soil Description

Course-textured soils with high infiltration rates (for example, sands, loamy sands)
Medium-textured soils with moderate infiltration rates (for example, sandy loams, loams)
Moderately fine-textured soils with low infiltration rates (for example, silty loams, silts, sandy clay loams)
Fine-textured soils with very low infiltration rates (for example, clays, sandy clays, silty clay loams, clay loams, silty clays); or impermeable surfaces (for example, pavement)

Table 4

Floodplain Categories

Source floods annually
Source in 10-year floodplain
Source in 100-year floodplain
Source in 500-year floodplain
None of the above

Table 5

Flood Containment

Documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by the flood being evaluated (see floodplain category)

Table 6

Sensitive Environments

Critical habitat[a] for Federal designated endangered or threatened species
Marine Sanctuary
National Park
Designated Federal Wilderness Area
Areas identified under Coastal Zone Management Act[b]
Sensitive areas identified under National Estuary Program[c] or Near Coastal Waters Program[d]
Critical areas identified under the Clean Lakes Program[e]
National Monument[f]
National Seashore Recreational Area
National Lakeshore Recreational Area
Habitat known to be used by Federal designated or proposed endangered or threatened species
National Preserve
National or State Wildlife Refuge
Unit of Coastal Barrier Resources System
Coastal Barrier (undeveloped)
Federal land designated for protection of natural ecosystems
Administratively Proposed Federal Wilderness Area
Spawning areas critical[g] for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters
Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time
Terrestrial areas utilized for breeding by large or dense aggregations of animals[h]
National river reach designated as Recreational
Habitat known to be used by State designated endangered or threatened species
Habitat known to be used by species under review as to its Federal endangered or threatened status
Coastal Barrier (partially developed)
Federal designated Scenic or Wild River
State land designated for wildlife or game management
State designated Scenic or Wild River
State designated Natural Areas
Particular areas, relatively small in size, important to maintenance of unique biotic communities
State designated areas for projection or maintenance of aquatic life[i]

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a Critical habitat as defined in 50 CFR 424.02.
b Areas identified in State Coastal Zone Management plans as requiring protection because of ecological value
c National Estuary Program study areas (Subareas within subareas) identified in Comprehensive Conservation and Management Plans as requiring protection because they support critical life stages of key estuarine species (Section 320 of Clean Water Act, as amended).
d Near Coastal Waters as defined in Sections 104(b)(3), 304(1), 319, and 320 of Clean Water Act, as amended.
e Clean Lakes Program critical areas (subareas within lakes, or in some cases entire small lakes) identified by State Clean Lake Plans as critical habitat (Section 314 of Clean Water Act, as amended).
f Use only for air migration pathway.
g Limit to areas described as being used for intense or concentrated spawning by a given species.
h For the air migration pathway, limit to terrestrial vertebrate species. For the surface water migration pathway, limit to terrestrial vertebrate species with aquatic or semiaquatic foraging habits.
i Areas designated under Section 305(a) of Clean Water Act, as amended.

Table 10

Source type

Active fire area
Burn pit
Containers or tanks (buried/belowground):
- o Evidence of biogas release
- o No evidence of biogas release

Containers or tanks, not elsewhere specified
Contaminated soil (excluding land treatment)
Landfarm/land treatment
Landfill:
- o Evidence of biogas release
- o No evidence of biogas release

Pile:
- o Tailings pile
- o Scrap metal or junk pile
- o Trash pile
- o Chemical waste pile
- o Other waste piles

Surface impoundments (buried/ backfilled):
- o Evidence of biogas release
- o No evidence of biogas release

Surface impoundment (not buried/backfilled):
- o Dry
- o Other

Other types of sources, not elsewhere specified

Table 11

Particulate containment description

All situations except those specifically listed below
Source contains only particulate hazardous substances totally covered by liquids
Source substantially surrounded by engineered windbreak and no other containment specifically described in this table applies
Source covered with essentially impermeable, regularly inspected, maintained cover
Uncontaminated soil cover > 3 feet:
- Source substantially vegetated with little or no exposed soil
- Source lightly vegetated with much exposed soil
- Source substantially devoid of vegetation

Uncontaminated soil cover ≥ 1 foot and ≤ 3 feet:
- Source heavily vegetated with essentially no exposed soil:
  - -Cover soil type resistant to gas migration[a]
  - -Cover soil type not resistant to gas migration[a] or unknown
- Source substantially vegetated with little exposed soil and cover soil type resistant to gas migration[a]
- Other

Uncontaminated soil cover < 1 foot:
- Source heavily vegetated with essentially no exposed soil and cover soil type resistant to gas migration[a]
- Other

Totally or partially enclosed within structurally intact building and no other containment specifically described in this table applies
Source consists solely of containers:
- All containers contain only liquids
- All containers intact, seated, and totally protected from weather by regularly inspected, maintained cover
- All containers intact and sealed
- Other

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a Consider moist fine-grained and saturated coarse-grained soils resistant to gas migration, consider all other soils nonresistant.