1986

I. INTRODUCTION

The State of Alaska is conducting site inspections at potential hazardous waste sites in Alaska under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. 9601) (CERCLA).

A phased approach is being taken to the site inspections. Phase I, which is the subject of this memorandum, consists of preliminary data gathering, an analysis of data gaps, a draft Hazardous Ranking System (HRS) scoring, and the preparation of Phase II work plans. Phase II consists of implementation of the work plans, including a site visit, soil and water sampling, the analysis of sample test results, and a final HRS scoring.

The purpose of the phased approach is to identify data gaps and direct further investigation and sampling toward gathering missing information.

II. DATA AVAILABILITY FOR FAIRBANKS AREA SITES

In this section, information specific to each of the invididual sites is discussed in reference to the draft Hazardous Ranking System scoring and any existing data gaps. Draft site inspection forms are included in Appendix A.

A. Alaska Battery Enterprises (ABE) - Discussion of Available Data, Draft HRS Score and Data Gaps.

A site inspection of Alaska Department of Transportation (DOT) road right-of-way surrounding ABE was conducted in April, 1986. The inspection was necessary prior to the use of Federal fundsto construct a new road in the area. Much of the information needed to score the site is contained in a report prepared by Tryck, Nyman & Hayes (TNH) and Shannon & Wilson, Inc. (S&W), as a result of their inspection to determine if hazardous wastes might have migrated from the ABE site.

Alaska Battery Enterprises is a battery manufacturing business less than one acre in size, located 1.5 miles south of downtown Fairbanks (157 Old Richardson Highway) just beyond the southern edge of the core area served by water and sewer. It is owned and operated by Mr. Earl Roman. ABE has been in business making batteries, under one owner and at this site for over 17 years. Generally, data availability is good and is available to permit HRS scoring of the site. Additional surface soil sampling would be necessary to characterize the extent of waste contamination on-site. But it may be possible to design remedial actions for the site now followed by sampling to assess clean-up adequacy.

Population

Determining the number of persons using ground water within a three mile radius was complicated by the water service area boundaries and the existence of permafrost areas.

The ABE site is just beyond the southern extent of municipal water and sewer service. ABE has on-site water and sewage disposal. The Municipal Utilities Service (MUS) wells serving the Fairbanks urban area are within three miles of the site (approximately 2.3 miles northwest). Population was calculated from the housing count of areas not served by city water and from the number of MUS service connects. The total was found to be 22,300 persons.

Permafrost

The existence of permafrost in the Fairbanks area is well documented. Permafrost areas are discontinuous and form a restriction, but not a complete block to the migration of ground water. The effect of this restriction is to cause the groundwater to travel laterally along the top of a permafrost zone until a thawed zone is reached. Groundwater can also travel around permafrost zones, thereby increasing the migration pathway length.

Waste Characteristics

During the April site inspection by TNH and S&W, most sampling occurred in the DOT right-of-way. Only one sample was taken on ABE property. Samples taken on fill material adjacent to the site had lead concentrations of 322 to 3600 mg/kgm. The sample taken on ABE

property had a lead concentration of 14,200 mg/kg. It is possible that other fill areas on the property have elevated lead concentrations. Also PCBs were detected on-site at the 3 mg/kg level.

One additional concern is the elevated lead concentration in the facility drinking water well. The measured concentration, 7 ug/l does not exceed the drinking water criteria of 50 ug/l, but it indicates possible contamination from battery manufacturing operations. Other wells sampled by TNH and Shannon & Wilson in the vicinity of the site did not contain lead above the detectable limits.

Hazardous Ranking System Scoring

The preliminary HRS score for this site is 31.00, due primarily to the shallow depth of the aquifer and the population served by the Municipal Utilities System wells. Tests of wells within the vicinity of the site do not indicate contamination. The site is small and remedial action appears to be straightforward. Lead, the contaminant of concern, is not very mobile in soil or groundwater under neutral pH conditions.

B. Fairbanks North Star Borough Landfill - Discussion of Available Data, Draft HRS Score and Data Gaps.

No evidence of hazardous waste deposition was found other than in very small amounts. It is unlikely that additional records search and interviews will uncover evidence of hazardous wastes. The monitoring program at the landfill could be improved. Recommended Phase II work effort is to test samples from selected wells in an attempt to detect hazardous wastes.

Site History

A summary of the history of the Fairbanks North Star Borough Landfill is presented by Flynn, 1985:

> "For about twenty years the site of the Fairbanks Sanitary Landfill near the Tanana River has received refuse from the Fairbanks area. Until the early 1970s disposal practices included dumping of refuse in a gravel pit excavated to below the water table and leaving the refuse uncovered. The site was largely unattended, and no restrictions were placed on the type of materials allowed in the refuse. In 1974, the landfill was closed because of deteriorating conditions..."

The start of use is described by Tetra Tech, 1984, to be "the early 1960s". The closing, September, 1972, was due to dumping by the City of Fairbanks in trenches whose bottoms were below the high water table level (DEC Northern Regional Office files).

The North Star Borough took over ownership and operation of the landfill in 1973 (DEC site files). In 1978 a bailer was put into operation to compress the trash before burial. The landfill accepts waste from private haulers, the general public, and the City of Fairbanks. A transfer station is operated in North Pole as a collection point, and the Borough maintains dumpsters throughout the area. In 1985, 51,200 tons of waste were handled, compared with 29,800 tons in 1980 (Young, 1986).

Waste Characteristics

The landfill site was visited by John Cronin of Shannon & Wilson, Inc. on August 5, 1986. His observations are reported in a site visit memorandum contained in the files. Significant findings related to the presence of hazardous waste are discussed here.

Although the landfill does not accept hazardous wastes, 55-gallon drums are found occasionally in the loading room of the bailer or in other areas. If these contain fluid, they are segregated. About 250 drums have accumulated. Soil near the drums is oil stained. Their contents have been composited and tested by a contractor on behalf of the Borough. The results are due in late August, 1986.

Waste oil is collected and stored in a 20,000 gallon underground storage tank. The waste oil is sold to a recycler. The oil is tested before being removed. Oil container contents are visually checked before being dumped in the storage tank. Those containing something other than waste oil are set aside for unspecified separate disposal. About a dozen drums were present at the time of the site visit.

Batteries are segregated and stored in a wooden shed. When sufficient numbers are accumulated, they are sold to Alaska Battery Enterprises.

Telephone interviews were conducted with Mr. Charles Wehner and Mr. Wally Droz. Mr. Wehner was a public works foreman for the City of Fairbanks which had operational control over the landfill in the early years. His duties included landfill operation during the years 1966-1977. He said the landfill had a locked gate during most of this period. Occasionally the lock would be found cut off, but the gate usually served to restrict access. He never saw large containers (greater than five gallons) that might have contained hazardous wastes going into the landfill. The only extraneous material was coal fly ash from the local power plant that was used for cover. Military waste went to a separate landfill on base.

Mr. Droz, former Fairbanks City Manager, confirmed that the landfill was locked most of the time during non-business hours. He did not know of any hazardous wastes being placed in the landfill.

A system of monitoring wells has been placed along the west and north boundaries of the site. The solid waste permit requires testing for pH, conductance, alkalinity, hardness, iron, chloride, total dissolved solids, total solids, nitrates, PCBs and a yearly IR scan. The PCB testing and IR scan are not being performed (McMullen, 1986). Testing for the parameters other than PCBs would not detect most hazardous wastes.

Flynn, 1985, tested for additional parameters and did report the presence of monochloroethylene in the wells located within the landfill at the 150-170 ppb range. Limit of detection was 3 ppb. Wells located at the edge of the landfill did not show detectable levels.

Geology and Groundwater Regime

The Borough landfill is located on the floodplain alluvium of the Tanana River. The Tanana is located less than one-half mile south of the site. Typical subsurface soil conditions on the floodplain consist of several feet of surficial silt, underlain by sands and gravels to considerable depth. Silt-filled sloughs generally represent former positions of rivers and streams.

The thickness of alluvial sediments overlying bedrock in the vicinity of the site is unknown, but in the Fairbanks area is estimated to be as great as four hundred to five hundred feet (Pewe and Bell, 1975A).

Fairbanks is in a subarctic zone underlain by discontinuous permafrost. Groundwater is generally present at a shallow depth throughout the floodplain, except in areas where permafrost is present at a depth shallower than the potentiometric surface. Water table depth at the landfill is about six to eight feet, with a seasonal variation of about three feet (Flynn, 1985). According to Nelson, 1978, the predominant gradient of groundwater is to the northwest. The gradient is on the order of four feet per mile. Three distinct hydrologic regimes exist on the floodplain: 1) water perched above the permafrost; 2) water confined below the permafrost; and 3) water

present in an entirely thawed soil profile. In general, these three regimes are hydraulically connected. However, the unpredictable discontinuous distribution of permafrost makes it difficult to determine the path of hydraulic connection at a given site. This concept is illustrated schematically in Pewe and Bell, 1975B.

Surface Water

The landfill is separated from the Tanana River by the Tanana Levee, which is part of the Chena Lakes flood control project and which runs along the southern boundary of the landfill property. Beginning at the west boundary of the landfill, Ditch "A" intercepts seepage under the levee and surface water runoff from the site (Flynn, 1985). The ditch drains to the Tanana River four miles away.

Population Served by Groundwater

The landfill site is outside the area of Fairbanks served by the municipal water system. The wells for the municipal system are 3.1 miles away.

Wells serving the southern portion of Ft. Wainwright are within three miles of the site (Gysler, 1986). Details of water distribution on Ft. Wainwright are also unknown. Approximately 3/4 of the total population of 4,679, was included as an estimate of served population (pers. comm., Carl Gysler, U.S. Army Environmental Engineering, Ft. Richardson, 8/18/86).

The population in that area of Fairbanks not served by either the municipal system and the Ft. Wainwright system (but lying within three

miles of the site) is 3,764. Some of these individual wells may be as shallow as twenty feet. Total population using groundwater drawn from within a three mile radius is therefore 6,239 + 3,764 = 10,003.

There is a well at the bailer building which would be used for fire protection, if necessary, but it is not used for drinking.

The nearest wells are located at businesses along South Cushman Street, 0.3 miles away, not at the trailer court, 3/4 miles away, as mentioned in previous studies.

HRS Scoring

No evidence of hazardous waste deposition was found. Therefore, the site could not be scored. All other information necessary for scoring is available. If hazardous wastes were present, the score would probably be fairly high due to the large population and small distance to groundwater. All other information necessary for scoring is available and was collected as part of this study.

C. University of Alaska Landfill - Discussion of Available Data, Draft HRS Score and Data Gaps.

No evidence of substantial hazardous waste deposition was found. It is unlikely that additional records search and interviews will uncover evidence of hazardous wastes. If the Alaska Department of Environmental Conservation wishes to investigate this site further, a single observation well could be placed at the top of permafrost and seasonal groundwater sampled and tested. Costs for such a program are included in Section IV.

Site History

(Unless otherwise referenced, all information in the remainder of this section was gathered by J. Cronin in July, 1986.)

Two old University of Alaska dump sites are discussed in this report. The oldest is located about 200 feet east of Farmers Loop Road about 100 feet north of the intersection with Tanana Drive, and will be referred to as the Farmers Loop Site. This site has an ERRIS Number, ADK 048769567. It was the subject of a Preliminary Assessment by Tetra Tech, Inc. dated September 25, 1984. The second site is located about 200 feet north of Kuskokwim Way, across the street from the New Married Student Housing, about 0.2 miles west of Tanana Drive. It will be referred to as the NMSH site. It was the subject of a Preliminary Assessment by EPA in June 1980 (site no. AK10,014). In addition to the two sites discussed in this report, a third dump site is known, at the base of the bluff west of Farmers Loop Road and north of Taku Drive (the "East Entrance" to the University)(Riley, 1986).

The Farmers Loop site was used as a dump by both the University and the residents of the surrounding area at least as early as 1948. The site was used by the University until 1963 (Cox, 1986) or 1965 (Mendenhall, 1986). The opening of the NMSH site apparently was due to complaints about rodent problems at the Farmers Loop site from residents of the newly opened Ballaine Lake Subdivision to the north (Cox, 1986). The NMSH site is shown on the 1966 USGS Fairbanks D-2 SW Quadrangle topographic map (USGS, 1966). Some time after 1969 the University ceased using the NMSH site and began hauling trash to what is now the Fairbanks North Star Borough Landfill (Mitchell, 1986; Cox, 1986). The Farmers Loop site may have continued to be used by residents of the community after the University ceased using it, to avoid paying dumping fees at the old Fairbanks City Dump on Second Avenue (Mendenhall, 1986). The Farmers Loop site never had restricted access; the NMSH site was locked at night for parts of its life, and permits were required for use by off-campus residents (Cox, 1986; Mendenhall, 1986).

At the Farmers Loop site, dumping was directly on the natural ground surface. At the NMSH site, excavations were occasionally made down to the permafrost, about 5 to 10 feet; otherwise, dumping was on the natural ground surface. Both sites have "better than one foot" of cover consisting of ash from the University power plant and silt (Cox, 1986).

No definitive information has been uncovered on the material disposed of in these two dump sites. Apparently they were the primary or sole

point of disposal for the University and nearby residents for 20 years or more. Therefore, it was assumed they received laboratory and other wastes, among them low-level radioactive wastes, solvents, fly ash, pesticides, and biological wastes (Tetra Tech, 1984). In addition, there is an unknown contribution of potentially hazardous materials resulting from public use, particularly at the Farmers Loop site because it was unrestricted. Reference has been made to the possible dumping of small quantities (bottles rather than drums) of excess or old military surplus chemicals which had been obtained by the University (Cox, 1986).

In 1969 there were eight licenses for radioactive material use at the University, but not much work was going on under those licenses at the time. Carbon 14 and Tritium amounted to about 90 percent of the material used, and much of that was probably flushed down the sewer (an allowable practice by AEC). Any radioactive wastes which were disposed in the dumps would most likely have been buried uncontained, in accordance with allowable AEC practices at the time. Sealed sources were never disposed, but always returned (entire paragraph: Holleman, 1986).

Rodenticide was applied to both dumps at an unknown time or times to control rat problems (Beach, 1986).

The amount of hazardous material disposed of in the two dump sites may be proportional to the relatively small student enrollment during the time period the dumps were in use.

Site Condition

Both sites were visited by Mr. John Cronin of Shannon & Wilson, Inc. on August 2, 1986. The Farmers Loop site occupies about one and one-quarter acres, with an apparent depth of filling of ten to twenty feet on the surface of a wetland adjacent to Farmers Loop Road. The area to the east of the dump is spruce forest, while the area to the west (between the dump and Farmers Loop Road) is deciduous second growth. Trash consisting of car bodies, concrete, and metal scrap is abundant in the bank at the east edge of the dump. The surface is relatively clean, though irregular, and drains generally towards the road. The site is currently inactive, and trees are beginning to grow on the edge of the fill bank. Access to the site is not restricted.

The NMSH site occupies about one and one-third acres, with an apparent depth of filling of ten feet, locally fifteen feet. The surrounding area is spruce forest, although a zone about fifty feet wide of deciduous regrowth between the dump and the forest suggests that a larger area was cleared at one time. The edges of the dump appear to still be in use for dumping vegetation cuttings. The surface of the dump is relatively clean, and slopes gently to the northeast. Access to the site is not restricted, but an "Authorized Vehicles Only" sign is posted on the access road.

Geology and Groundwater Regime

Both sites are underlain by perennially frozen silt (permafrost) probably to a depth of one hundred feet or more (Pewe and Bell, 1974). This silt is, in turn, underlain by schist bedrock and/or sand

and gravel alluvium. The depth of the active layer, or that portion of the surficial soils which thaw and refreeze each year, typically ranges from about five to ten feet in this type of soil. Locally, because of disturbance to the vegetative ground cover, a perennially thawed zone may exist between the bottom of the active layer and the top of the permafrost. This thawed zone typically contains a water table perched above the permafrost, as does the active layer.

Groundwater tapped by private wells in Ballaine Lake Subdivision immediately north of the Farmers Loop site is confined beneath the permafrost at a depth of one hundred feet or more in bedrock and/or sand and gravel. Many of these wells may no longer be in use, as College Utilities Corporation has eighteen residences hooked up to its water mains in the subdivision (Dufur, 1986B). This same confined aquifer is tapped by the residences with wells in the sector north of the sites. The gradient of this aquifer in the uplands north of the sites is to the south or southeast (Kane, 1981). About five-eighths of a mile south of the Farmers Loop site, in the vicinity of College Road, this aquifer becomes unconfined in the sand and gravel flood-plain alluvium. Depth of bedrock beneath this alluvium is unknown, but apparently exceeds several hundred feet (Pewe and Bell, 1976). The groundwater gradient in the alluvium is generally westerly (Nelson, 1978). A supply well used by the University of Alaska, drawing water from about eighty feet, is located about one mile south-southwest of the Farmers Loop site, west of Fairbanks Street, north of Geist Road (Riley, 1986). A well used by College Utilities Corporation, also drawing water from about eight feet, is located

about one and three-quarters miles south of the Farmers Loop site, on Fairbanks Street at the north bank of the Chena River (Ref. A). Both these wells are essentially downgradient of the site. A "complete gas chromatograph scan" on a sample from the University well a few years ago showed "traces of gasoline" (Riley, 1986). The water supply wells used by the City of Fairbanks are located about two and three-quarters miles southeast of the Farmers Loop site on the south bank of the Chena River in the vicinity of First Avenue and Badger Street. These wells, which produce from the alluvium at a depth of 90 to 120 feet (Burgess, 1986), are upgradient from the sites.

Water perched above the permafrost at the Farmers Loop site will tend to flow along the permafrost, generally to the south or southeast following the surface topography. This flow path will be through the surficial peat and/or silt soils until about 5/8 of a mile south of the site, near College Road, where this perched water can infiltrate the thawed sand and gravel alluvium and mix with the aquifer which is used as a drinking water source. Although the NMSH site's location one-third of a mile southwest of the Farmers Loop site makes it closer to the floodplain alluvium and its wells, the flowpath would most likely be to the Farmers Loop site and thence to the alluvium, effectively lengthening the path.

Depending on local topography, soil and permafrost conditions, there is a remote possibility that some of the perched water from the sites could flow north along Farmers Loop Road to Ballaine Lake, a small surface water feature.

Population and Drinking Water Supply

Groundwater is the only source of drinking water within a 3-mile radius of the Farmers Loop site. The population using groundwater was estimated from North Star Borough population records (Burke, 1986) and University of Alaska residence figures (Sweeney, 1986), Following is a summary of this information:

Population	Area
12,690	Fairbanks MUS Service Area.
4,772	Total population in CUC service area.
1,447	Employees of the University.
1,138	Residents living north of the University.
1,976	Residents of the University.
22,023	Total

Surface Water

Surface water flows from both landfill sites are to a wetland located to the east of the Farmers Loop site and thence across College Road to Noyes Slough, 1.5 miles away. The wetland is considered the nearest surface water.

Hazardous Ranking System Scoring

No evidence of substantial hazardous waste deposition was found. Without such evidence, no HRS score could be compiled. All other information necessary for scoring is available and has been collected for the file.

D. North Pole Refining (MAPCO) - Discussion of Available Data, Draft HRS Score and Data Gaps.

No evidence of hazardous wastes at the MAPCO site was found in two previous site surveys by Tetra Tech, 1984 and E & E, 1980. Nor were any uncovered by Mr. John Cronin during a site visit on July 11, 1986. Based on the oil spill history of the site, there is a potential that hazardous wastes are present on the ground and in groundwater.

Because there is no confirmation of hazardous wastes on-site, a hazardous ranking system score could not be computed.

Recommended Phase II work efforts include sampling of groundwater surface soils and subsurface soils.

Site History and Conditions

(Unless otherwise referenced, all information in the remainder of this section is based on Johnson, 1986A, or on observations during a site visit by John Cronin on July 11, 1986. A site map provided by MAPCO is provided for reference).

Refinery operation began in the fall of 1977. Feedstock crude oil is obtained from a buried pipeline from the TransAlaska Pipeline System (TAPS), and the residuals left after refining are returned to the TAPS by a second buried pipeline. Since startup, the refinery has produced JP-4, jet fuel, and #1 and #2 heating and diesel fuel, and turbine fuel, which is used on-site to run a GVEA electrical generating

plant. Unit 2 was recently constructed to expand refining capacity. Both Unit 1 and Unit 2 use a distillation process. Asphalt production by a vacuum process was begun in Spring, 1985. Production of leaded and unleaded gasoline began in the fall of 1985. This uses a water wash regeneration process using Sulfolane, a Texaco-patented solvent, in a closed system.

Total capacity is 90,000 bpd, and the refinery currently operates at about 50,000 bpd. A 50,000 bbl crude storage tank is generally kept full. A 30,000 bbl return product tank is generally kept nearly empty. There is tankage on-site for about 400,000 bbls of product storage, generally about 50% full. In cases of excess production, refined product is reinjected into the TAPS. Product delivery off-site is by rail or truck, except that JP-4 is delivered to Fort Wainright and Eielson AFB by the Haines Pipeline.

Other feedstocks, totalling about 15 compounds, include tetraethyl lead, emulsifiers, methyl cellulose (a mil spec additive for JP-4), and corrosion inhibitors to protect the refinery process equipment. Sulfuric acid and sodium hydroxide are used for pH control according to the 1975 application for a waste disposal permit (ADEC NRO files). A single rail shipment of tetraethyl lead provided all future needs for a considerable period of time, and the material is stored in a contained system in the metering building. Methyl cellulose is delivered by tank truck. The other additives are delivered in barrels and transferred to tanks. Lubricating oils and solvents are used for plant vehicles and maintenance. A circulating propylene glycol system

is used to heat trace product piping. Material safety data sheets on some of the additives have been collected for the file.

Water used in the refining process is obtained from two 55-foot deep wells on-site, with a permit appropriation of 45,000 gallons per day (ADEC NRO files). Originally, waste water was treated and discharged through a pipeline to the Tanana River, under NPDES and State Liquid Waste Disposal permits. Continuing problems were encountered with freezing of this pipeline, and at some point its use was discontinued, with waste water apparently now vaporized in the stacks (ADEC NRO files).

A sump drain system serves most of the facility. Leakage and/or water collected by drains is directed to one of about a dozen sumps, and then to a buried oil/water separator tank. Oil from the separator is either re-fined, sent back to the TAPS, or burned as fuel on-site. Water from the separator is vaporized in the stack.

Records on-site list a total of 67,000 gallons of product spills in an 88 month time period. This number includes spills into containment areas which were later recovered. There have been three primary sources of spills which have contaminated the soil and groundwater at the site:

1) The dozen sumps in the drainage system were concrete boxes. The discovery of contaminated soil and water in 1982 was traced to these sumps having cracked from freezing and thawing.

2) Old military bolted tanks were used for JP-4 storage. These tanks leaked, and it was discovered that the pond liner used for containment had been punctured during construction. The spilled JP-4 migrated to some extent out of the immediate area of the tanks.

3) Prior to the recent construction of an expanded drain system, overflowing of cars resulted in spills at the rail loading area.

During the period of 1978 to 1982, several leaks of return product occurred in the vicinity of the return pumps, which had no containment curb at that time (Janssen, 1986). Quantity spilled is estimated at 500 to 5,000 gallons. The most recent large spill involved 2,000 to 4,000 gallons of HAGO during hose transfer from the distillation unit to the asphalt unit on April 29, 1986 (Janssen, 1986).

The problem of oil contamination on the water table became apparent in 1982. Beginning at that time, the concrete sump boxes were repaired with steel liners, the last one installed in 1985. The extent of the spill from the bolted JP-4 tanks was found to be greater than the tank farm itself by excavating around the tank farm. Holes dug for expansion of the facility during the 1984 and 1985 construction seasons were used to define locations with oil in the ground or on the groundwater. Current oil recovery efforts, which had recovered about 23,000 gallons by mid-July, are the first general facility-wide cleanup. This recovery is being accomplished by skimming oil off the ground-

water at various locations. Overflows at the rail loading area are now caught by an expanded drain system. Some problems also occurred at the old truck loading rack adjacent to the rail loading area. A new load rack with a drain system was constructed in 1983. No testing of contaminated water or soil has been performed (Janssen, 1986). Recovered free product is tested to determine its source so that leakage can be mitigated (Johnson, 1986B).

Oil from the recovery operations is sent to the oil/water separator. Contaminated soil is spread on roads within the facility for dust control.

The facility has no overall surface drainage collection system. At present, a large portion of the site is unpaved. Surface drainage from the Unit 1 area flows to a lined contaminated water pond at the southwestern corner of the property. Water from this pond is used for dust control within the facility. This pond overflowed in August or September of 1985, and the dike is being raised this year. The overflow went into an adjacent gravel pit which has since been filled in for construction of a flare unit (Janssen, 1986). The pond had a "bathtub ring" of oil material at the time of the site visit. All tank farms are diked and lined. Water collected inside containment dikes is normally allowed to evaporate. In cases where the berms would overflow, the water is piped to the contaminated water pond (Johnson, 1986B).

According to the results of a survey by Duane Miller & Associates on October 26, 1983, in a report dated November 30, 1983, groundwater flow is to the north-northwest, with a gradient of 1 foot per 1,000 feet. Groundwater occurs at a depth of about 5 to 8 feet, fluctuating with the season. The eastern three-fourths of the northern site boundary is supposed to be underlain by fine-grained slough deposits of relatively low permeability. A subsurface barrier consisting of dike liner material was placed along the northern one-third of western site boundary to prevent migration of spilled product from the rail loading area. Placement of a barrier along the western one-fourth of the northern boundary is planned.

Surface Water

The refinery is separated from the Tanana River by the Tanana Levee, which is part of the Chena Lakes flood control project. Beginning about 1/2 mile northwest of the refinery, Ditch "C" is located inland of the levee, and intercepts seepage from the river through or under the levee (Nelson, 1978). During periods of high water table, in an area about 2 miles northwest of the site, groundwater flow is toward the ditch (Krumhardt, 1982). The ditch drains approximately 3.5 miles to Chena Slough, which in turn drains to the Chena River.

Drinking Water Supply & Population

Drinking water in a 3-mile radius of the refinery is supplied by wells in the floodplain alluvium. The City of North Pole has a water system which serves 141 single family residences, 51 duplexes and larger multi-family residences, and 58 commercial or community buildings.

Domestic water has been obtained from an on-site well 90 to 100 feet deep. This well has been monitored by refinery personnel, with no positive test results. There may be more than one on-site domestic well (ADEC NRO files). Domestic water and sewer service will be obtained from the City of North Pole this summer.

About 65 percent of the crude oil is returned to the TAPS. Solvents and waste oil generated by the facility are also put into the TAPS. Tank bottoms from cleaning are put into the TAPS. The heat exchanger has been cleaned once and was disposed of in the sump system.

Solid wastes include empty feedstock drums and product filters. Barrels are steamed and either sold or crushed and sent to the Borough landfill. Filters are air dried and/or washed and sent to the Borough landfill.

One incident has occurred involving a tetraethyl lead spill within the containment building. Material from the cleanup operation filled a single salvage drum which is presently stored on-site awaiting shipment to a disposal facility.

Geology and Groundwater Regime

The MAPCO Refinery is located on the floodplain alluvium of the Tanana River, which is located less than one mile southwest of the site (surface water flow is to the Chena River). Typical subsurface soils and groundwater conditions are the same as those encountered at the Fairbanks North Star Borough Landfill site located 14 miles away and described in Section II.B of this report

E. Red Devil Mine - Discussion of Available Data, Draft HRS Score and Data Gaps.

Red Devil Mine was a hard rock underground mercury mine located on Red Devil Creek near Sleetmute. The mine operated until 1971. Reopening of the mine is under consideration. Tailings produced in the crushing and heating operations were used for site work and the construction of three tailings ponds. Site runoff flows through the ponds and into Red Devil Creek. The toe of the tailing pond area is within the apparent flood plain of the creeks but is not being actively eroded at this time.

Two site surveys by Environmental Protection Agency personnel have provided data on mercury and arsenic levels in the tailings ponds, Red Devil Creek and the Kuskokwim River.

Based on these two agency inspections and the site inspection conducted on June 26-27, 1986, sufficient information is available for a Hazardous Ranking System Scoring.

Geohydrology

According to local residents, drinking water is taken from a weathered bedrock aquifer lying 28 to 40 feet below the surface under river deposited sands and silts. Two deeper wells, depth unknown, have been emplaced for the school water supply. All these wells are located about 1.3 miles from the tailing ponds.

The wells for this system are located about one mile north of the refinery (Howard, 1986). The balance of the population obtains water from private wells, many of them as shallow as 20 feet (Krumhardt, 1982). Total population, derived from North Star Borough housing counts, is 7,277 persons using groundwater drawn from within three miles of the site.

Waste Characterization

As stated previously, there is no confirmation of hazardous waste releases at this site. However, since the first site survey by E & E (1980), there has been an increase in production of over 50%. Also, 23,000 gallons of spilled product has been recovered, with more remaining in the ground. The spilled material should be tested to see if there are any hazardous components. Sampling in four areas is recommended: near the return product line pumps, near the JP-4 spills, at the surface drainage containment pond and at suspect sumps. Testing of these samples would determine if any hazardous wastes were released to the environment.

Hazardous Ranking System Scoring

Scoring of the North Pole Refinery site under CERCLA is not appropriate. Petroleum and petroleum products are exempted from consideration.

Population

The Red Devil Mine area is rural. Only fifty people live within three miles of the site.

Waste Characterization

Mercury and arsenic have been measured in the sediments of Red Devil Creek. Samples taken by J. Sceva in 1971 showed mercury and arsenic concentrations of 0.3 and 39 mg/l in Red Devil Creek below the tailings ponds compared to 0.0003 and <0.0006 mg/l in the creek above the ponds. The metals were thought to be present in the sulfide form (particulate). Samples taken by R. Morris in 1979 did not indicate the presence of dissolved mercury in concentrations above background level in the creek. A single sample of sediment in tailing pond #1 had a mercury concentration of 216 ug/gm wet weight.

In evaluating the impacts of mercury and arsenic release to the environment, a reviewer should be aware that the Kuskokwim Basin is one of the largest mercury provinces in the world.

Hazardous Ranking System Scoring

Sufficient information is available to compute a Hazardous Ranking System Score. The score is 14.02. There is only one significant contamination route, the groundwater route. There are no surface water intakes within three miles of the site. The score is low due to the low target population.

SUMMARY MEMORANDUM AND WORK PLAN

FOR

CERCLA SITE INSPECTION

AT

RED DEVIL MINE

AK-D980495618

1.0 CONCLUSIONS AND RECOMMENDATIONS

A records search and data synthesis were performed by Tryck, Nyman & Hayes (TNH) and Shannon & Wilson, Inc. (S&W) to determine the potential for hazardous waste presence at the Red Devil Mine. The CERCLA listed hazardous waste present at this site are mercury and arsenic, which were measured in the sediments of associated tailing ponds, in the sediments of Red Devil Creek, and in the Kuskokwim River. The preliminary HRS score for the Red Devil Mine is Sm = 14.02 (Sgw = 20.41; Ssw = 13.09; Sa = 0). There are no data gaps. All information necessary to score the site is available.

2.0 BACKGROUND DATA REVIEW

Red Devil Mine was a hard rock underground mercury mine located eight miles downstream from Sleetmute on Red Devil Creek, a tributary to the Kuskokwim River. The mine operated until 1971. During the last few years of operation, ore (cinnabar) was concentrated and shipped to Japan for processing. Cinnabar at the Red Devil Mine is associated with arsenic and antimony. Reopening of the mine is under consideration. The mine is owned by Alaska Mines and Minerals, Inc. The mine buildings are still intact.

In evaluating the impacts of mercury and arsenic release to the environment, a reviewer should be aware that the Kuskokwim Basin is one of the largest mercury provinces in the world. Mines similar to Red Devil Mine are located in nearby drainages.

At Red Devil Mine, tailings produced in the crushing and heating operations were used for site work and the construction of three tailing ponds. The toe of the tailing pond area is within the flood plain of Red Devil Creek, but is not being actively eroded at this time. Since the pond surfaces are well above Red Devil Creek, flooding is not expected to occur. However, site runoff flows through the ponds and into Red Devil Creek. Red Devil Creek enters the Kuskokwim River 1/4 mile downstream.

There is evidence of mercury and arsenic release to the sediments of Red Devil Creek. In 1971, Jack Sceva and Steve Provant of the Environmental Protection Agency (EPA) inspected the site and took samples of Red Devil Creek and the Kuskokwim River. The inspection and sampling took place just after the mine closed. The mill (but not the retort) was still operating. There was a

4.0 PERSONNEL SELECTION AND TRAINING

Report writing for the Red Devil Mine site will be performed by TNH team personnel selected from the following:

- Mr. Dan Crevensten (TNH) - Project Manager
- Mr. Keith Fabing (TNH)
- Ms. Mari Lynn Thurber (TNH)
- Mr. Richard Greiling (SAIC)
- Ms. Patt O'Flaherty (SAIC)
- Ms. Leigh Starlin (SAIC)
- Dr. Donald Weston (SAIC)
- Mr. Fred Brown (S&W)
- Mr. Tim Terry (S&W)

All personnel are trained, as appropriate, in the performance of site inspections, sampling, data interpretation, and regulatory programs.

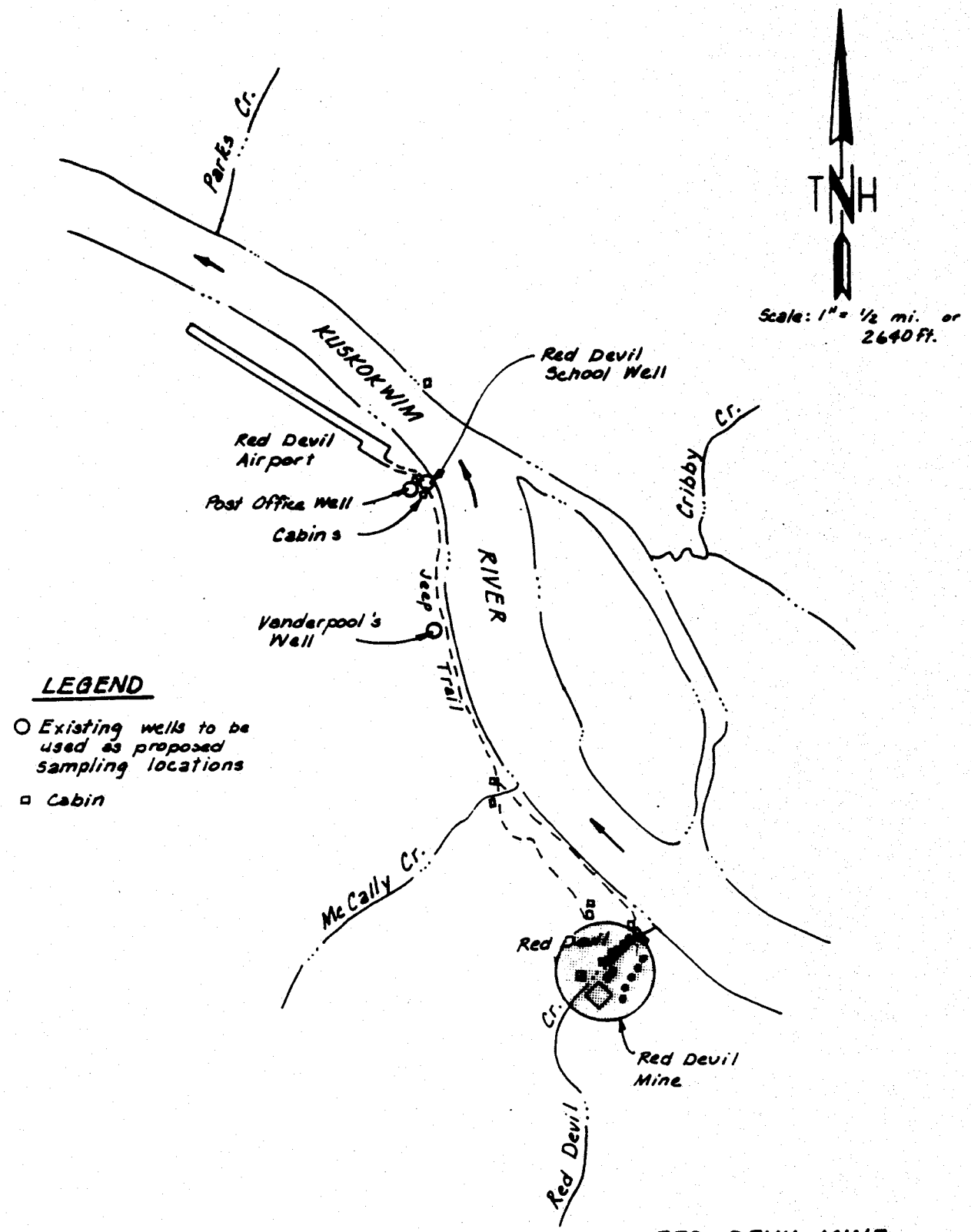
5.0 HEALTH AND SAFETY PLAN

A detailed health and safety plan has been submitted to DEC in connection with previous TNH team site inspections. There will be no field inspection or sampling investigations at the Red Devil Mine site. Therefore, a site-specific health and safety plan is not necessary.

TABLE I
RED DEVIL MINE
COST ESTIMATE
DEVIL.MP

	P-4	P-3	P-2	P-1	CLER						TTL HRS	COST
	23.9	17.5		10.5	11							
ALL TASKS	32	65		24	16						137	$2330.30
TOTAL DOLLARS	764.8	1138	0	252	176	0	0	0	0	0	137	$2330.30

TOTAL DIRECT LABOR	$2330.30
SALARY OVERHEAD (0.3619)	$843.34
GEN. AND ADMIN. OVER. (1.2375)	$2883.75
TOTAL	$6057.38
PROFIT (10%)	$605.74
TOTAL	$6663.12
TRAVEL AND PERDIEM	
AIRFARE	$0.00
LODGING	$0.00
CAR RENTAL	$0.00
SUBTOTAL	$0.00
SUBTOTAL + 5% HANDLING	$0.00
DIRECT EXPENSES	
INSTRUMENT RENTAL	$0.00
SUPPLIES	$0.00
PACKAGING, AIRFRIEGHT	$0.00
SAFETY EQUIP.	$0.00
L.D. TELEPHONE	$35.00
POSTAGE, MAILING, MISC.	$25.00
COPIES(40*50pgs*$.15/pg)	$300.00
SUBTOTAL	$360.00
SUBTOTAL + 5%	$378.00
GRAND TOTAL TNH COSTS	$7041.12
SAIC COST	$1161.00
SHANNON & WILSON COST	$529.80
SUBTOTAL FOR SUBCONSULTANTS	$1775.34
TOTAL	$8816.46



RED DEVIL MINE

SUMMARY MEMORANDUM

POTENTIAL HAZARDOUS WASTE SITES

PHASE I INVESTIGATIONS

FAIRBANKS AREA SITES

Prepared For:

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

JUNEAU, ALASKA

Prepared By:

TRYCK, NYMAN & HAYES

Anchorage, Alaska

SHANNON & WILSON, INC.

Anchorage, Alaska

AUGUST, 1986

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B. Fairbanks North Star Borough Landfill - Discussion of Available Data, Draft HRS Score and Data Gaps (AK-D045771235).

C. University of Alaska Landfill - Discussion of Available Data, Draft HRS Score and Data Gaps (AK-D048679567).

D. North Pole Refining (MAPCO) - Discussion of Available Data, Draft HRS Score and Data Gaps (AK-D083350389).

E. Red Devil Mine - Discussion of Available Data, Draft HRS Score and Data Gaps (AK-D980495618).

discharge from the uppermost pond into Red Devil Creek. Water samples were collected, but the ones taken of the tailing pond effluent and of Red Devil Creek below the discharge contained sediment. Samples were analysed by EPA's Taft Center laboratory in Cincinatti. Following are the results:

SAMPLE LOCATION	Hg (mg/l)	As(mg/l)
1. Red Devil Creek above mine & mill	0.3	<6
2. Mill Effluent from Tailing Pond #1 (uppermost)	12,850	85,000
3. Red Devil Creek below Tailing Pond #1	265	39,000
4. Kuskokwim River Above mouth of Red Devil Creek	1.7	56
5. Kuskokwim River at Red Devil Air Strip (below Red Devil Creek)	1.0	32

Test results from samples 1, 2 & 3 show respectively background, the waste stream and the receiving water, and document a release of mercury and arsenic to the environment. Samples 4 & 5 indicate a lack of impact on the Kuskoswim River.

An earlier sampling trip was conducted by Steve Provant in March 1971. Water containing sediment taken from Red Devil Creek below the discharge from Tailing Pond #1 had 9,000 mg/l of mercury. An upstream, background sample could not be taken because open water could not be found.

According to local residents, drinking water is taken from a weathered bedrock aquifer lying 28 to 40 feet below the surface under river deposited sands and

silts. Two deeper wells (depths unknown) have been emplaced for the school water supply. All of these wells are located about 1.3 miles northwest of the tailing ponds.

The area surrounding Red Devil Mine is rural. Fifty people live within three miles of the site. All use ground water for drinking.

A site visit was made by Tim Terry of Shannon & Wilson, Inc. on June 26, 1986. He visited the mine, tailing ponds and tailing piles, and Red Devil Creek. He also interviewed local residents.

There are no data gaps. All information necessary for scoring is available. The HRS score for this site is Sm = 14.02 (Sgw = 20.41; Ssw = 13.09; Sa = 0). In spite of the release of mercury and arsenic to the environment, the score is relatively low due to the low population and the distance to drinking water wells. A site investigation would not add significantly to the data base. The U.S. Department of the Interior (DOI) is considering a survey at the Red Devil Mine in 1987. If further information were required, it could be gathered by the DOI's contractor.

3.0 PHASE II WORK PLAN

In Phase II, TNH team members will compile all of the data collected in Phase I into a final report. This report can then be used in support of further DEC action. The cost of Phase II work is described in Table I.