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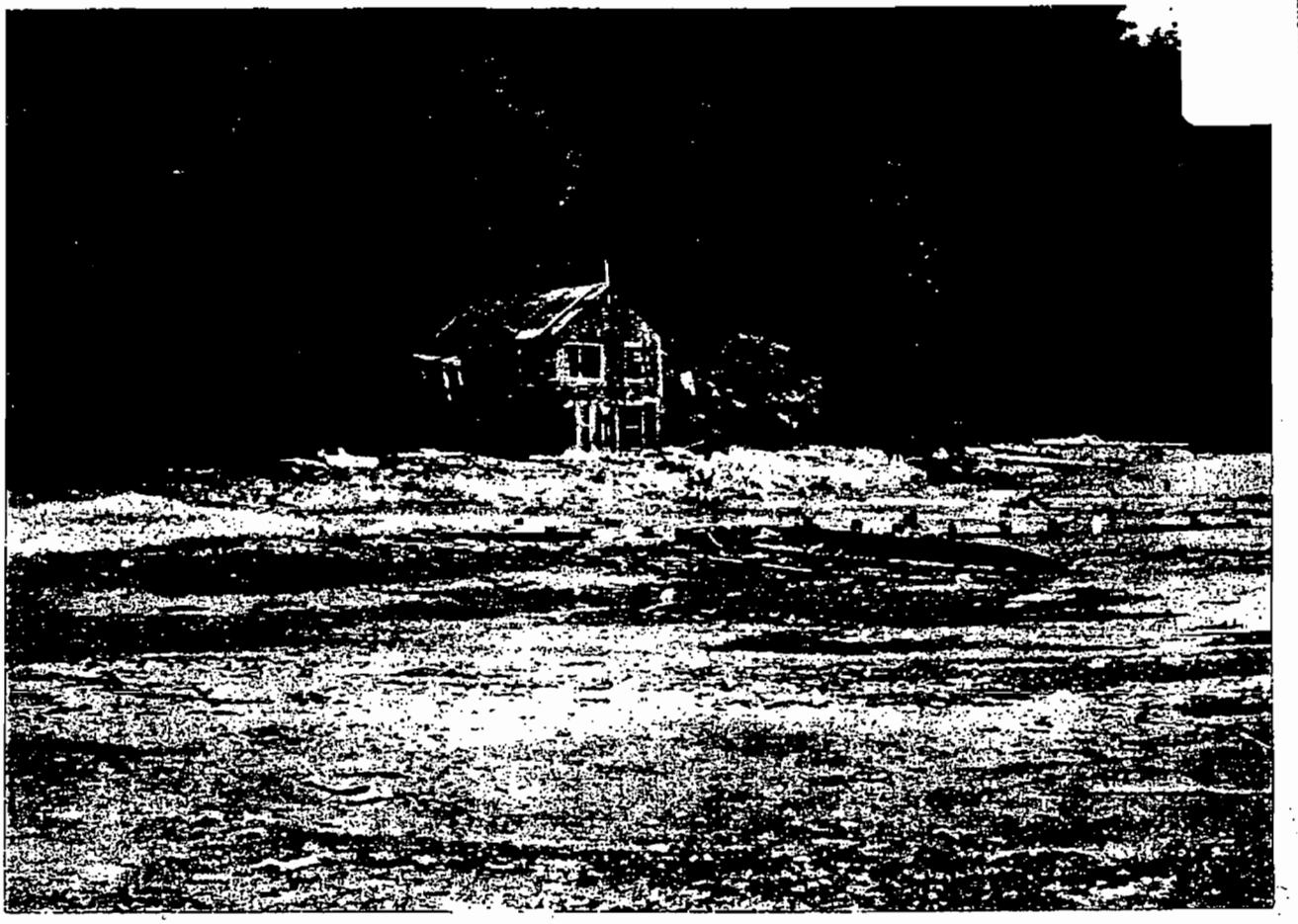
FINAL REPORT
REMOVAL PRELIMINARY ASSESSMENT

SALT CHUCK MINE

THORNE BAY RANGER DISTRICT
TONGASS NATIONAL FOREST
REGION 10 - ALASKA



Prepared by Bureau of Land Management
Juneau Field Office
Interagency Agreement No. 96IA-10-012
April, 1998

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1.0 EXECUTIVE SUMMARY

Numerous abandoned and inactive mine sites located in the Tongass National Forest were inventoried for physical and chemical hazards. Several of these sites contained significant chemical hazards that warranted additional examination to fulfill objectives outlined by the U.S. Environmental Protection Agency for conducting integrated site assessments under the Superfund Accelerated Cleanup Model (EPA, 1993). The intent was to collect data to generate a Hazard Ranking System score and determine whether a removal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is required.

The Salt Chuck Mine is located at the northwest head of Kasaan Bay, on Prince of Wales Island, southeast Alaska. The mine exploited a magnetite clinopyroxenite/gabbro host rock that contained chalcopyrite, bornite, digenite, chalcocite, and covellite with magnetite, pyrrhotite and pyrite also present. Reported production from the mine amounted to 326,000 tons of ore at an average grade of 0.95% copper, 0.063 oz/t palladium, 0.036 oz/ton gold and 0.17 oz/ton silver. A flotation mill was constructed on site. Concentrates were produced and then transported to smelters for final processing. Production ceased in 1941.

An inventory-level evaluation of physical and chemical hazards was performed at the site in 1995. Underground and surface mine workings, structures and miscellaneous equipment were evaluated for imminent hazards and ranked for future prioritization. Potentially affected surface water and soils were sampled for hazardous substances. Several physical hazards were identified at the site. Copper exceedances were detected in surface water samples. Mine tailings containing heavy metals were identified in the intertidal zone south of the mill.

Filtered water samples taken in 1997 validated the copper exceedance. Tissue and associated sediment samples taken in several locations revealed that most of the copper present in the tailings is not bioavailable. There are several hundred thousand cubic yards of tailings at Salt Chuck and the most practical removal option is to cap the tailings with coarse material and line the affected creeks with larger riprap. This will restrict migration of the tailings, while providing suitable substrate for regeneration of intertidal biota.

2.0 INTRODUCTION

Personnel from the U. S. Bureau of Land Management completed a preliminary inventory of physical and chemical hazards at 109 abandoned and inactive mine (AIM) sites throughout the Tongass National Forest. This work was completed in 1995/1996 under various agreements signed by the U.S.D.A. Forest Service, the former U. S. Bureau of Mines and the U. S. Bureau of Land Management. Several of these AIM sites contained significant chemical hazards and merited additional examination to fulfill objectives outlined by the U.S. Environmental Protection Agency for conducting integrated site assessments under the Superfund Accelerated Cleanup Model (EPA 1993). The purpose was to collect enough data to generate a Hazard Ranking System score and determine whether a removal action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is required.

The objectives of the preliminary assessment (PA) reports are to:

1) Collect and review existing information to determine if data gaps exist;
2) Collect sufficient data to determine the potential for releases of hazardous substances to the environment;
3) Evaluate the potential threat to the public or the environment from hazardous substances on site; and
4) Determine whether a removal action is warranted.

This PA work at the Salt Chuck Mine site was conducted under terms prepared for Interagency Agreement #96IA-10-012, signed and dated in April, 1997 (amended in August, 1997).

3.0 SITE DESCRIPTION

Location and Access

The Salt Chuck Mine is located at the northern extremity of Kasaan Bay, on Prince of Wales Island, about four miles south-southwest of Thorne Bay. The site takes its name from the

shallow, restricted bay called Salt Chuck which borders it to the south (figure 1). Ketchikan is located about 43 air miles southeast of the site.

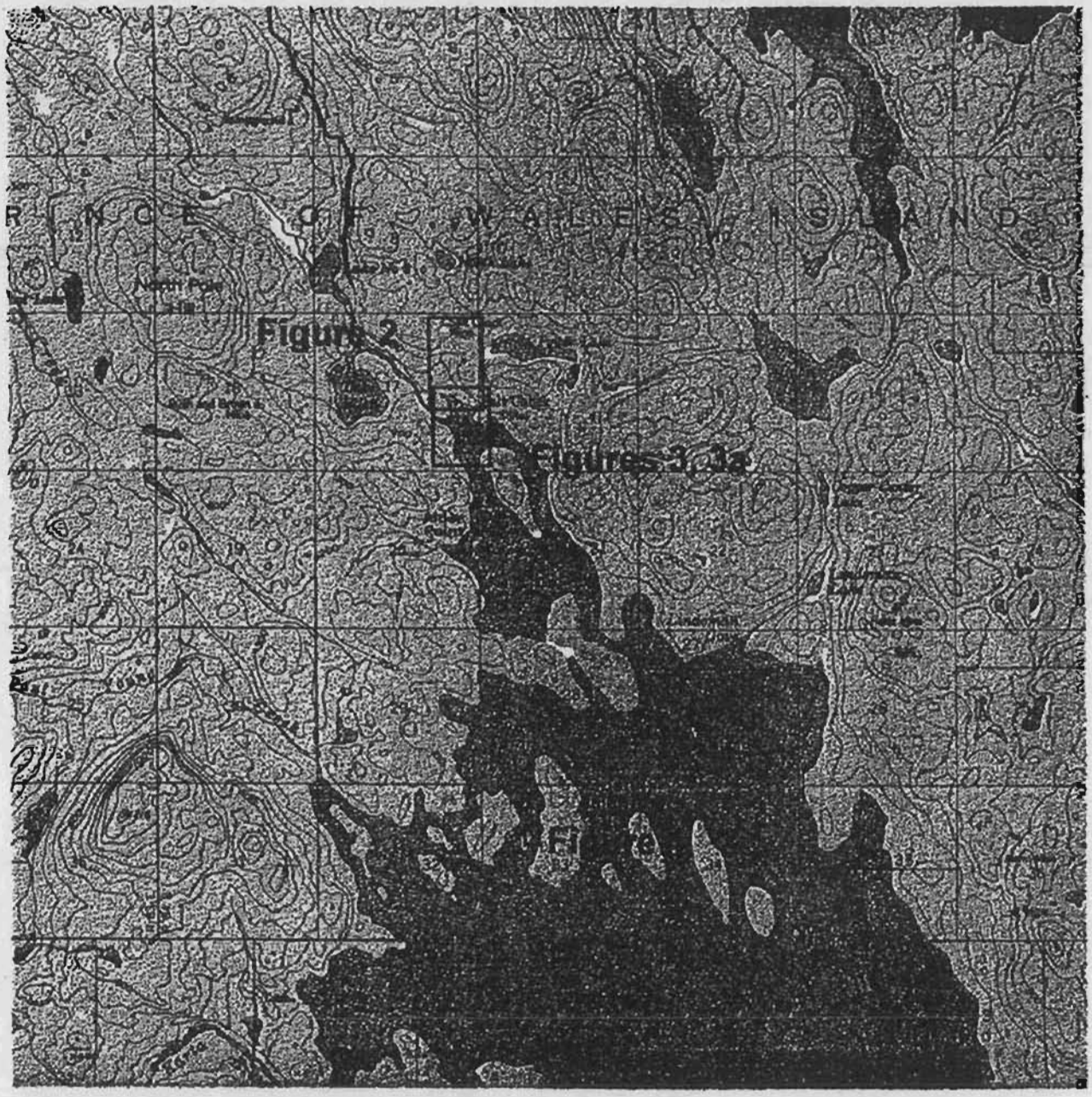
Logging road spurs from the main Prince of Wales Island road system extend past the north end of the site (near the glory hole). One of the mine waste rock dumps is visible from this road. An unimproved trail extends 0.5 miles from the glory hole to the mill facilities located near the beach. Although an extensive intertidal zone exists at the head of Kasaan Bay at low tides, the site can be easily accessed by float plane or boat during tides in excess of 13 feet. Access during low tides can result in a 0.5 mile walk to the site. The site is regularly accessible by helicopter. A Forest Service recreational cabin is present at Lake No. 3., about one mile northwest of the site. There was much evidence of visitation to the Salt Chuck site.

The mine workings are situated between 100 and 300 feet elevation and consist of a large glory hole connected to a main haulage adit, 2 shafts, and a tunnel. There are two abandoned camps at the mine. One is located on the north side of the unnamed creek, less than a hundreds yards east of the main haulage adit at elevation 100 feet. The other camp is located along the beach front near the mill. Large waste rock dumps are located near the glory hole, a few hundred feet west of the main adit portal, and behind the millsite. An extensive tailings deposit is located in the intertidal zone just south and west of the millsite. The uplands portion of the site encompasses nearly 45 acres. Figures 2 and 3 provide a plan map for the uplands and intertidal portions of the site.

The legal description for this site is Township 72 South, Range 84 East, section 18, Copper River Meridian (latitude 55° 37' 38" north and longitude 132° 33' 25" west).

Climate

The nearest climatological data station to the Salt Chuck site is located at Annette Island, south of Ketchikan. Data recorded by the National Oceanic and Atmospheric Administration (NOAA) characterizes mean precipitation rates, average annual temperatures and maximum two-year 24 hour rainfall (ASCC, 1992; NCDC, 1998).



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Source: USGS: Alaska Quadrangle Craig (C-2)

Salt Chuck Mine

FIGURE 1

General Location Map

Figure 2.- Salt Chuck uplands: mine workings, structures and sample locations.

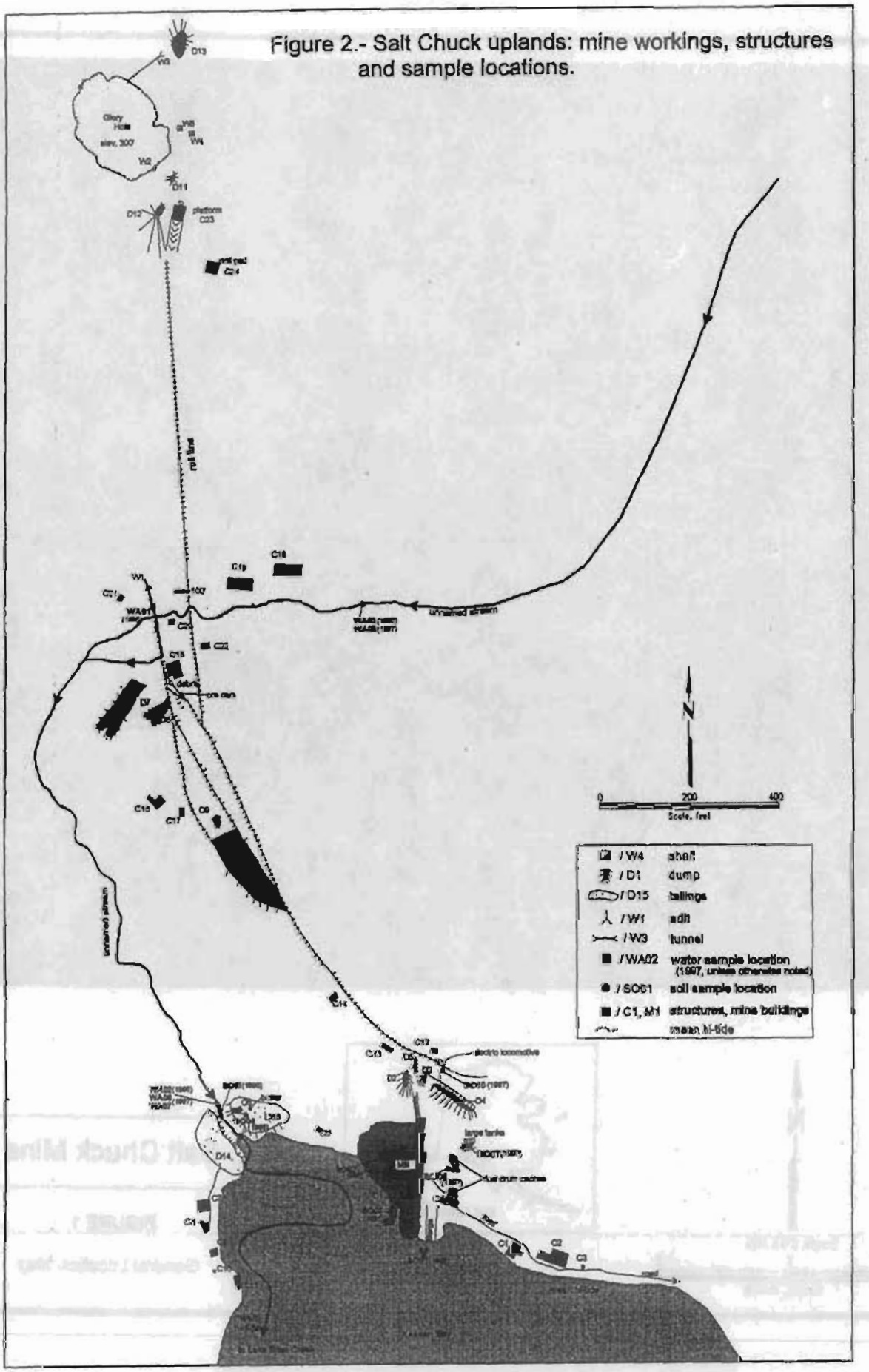


Figure 3.- Salt Chuck intertidal area: character and TCLP sample locations (1995).

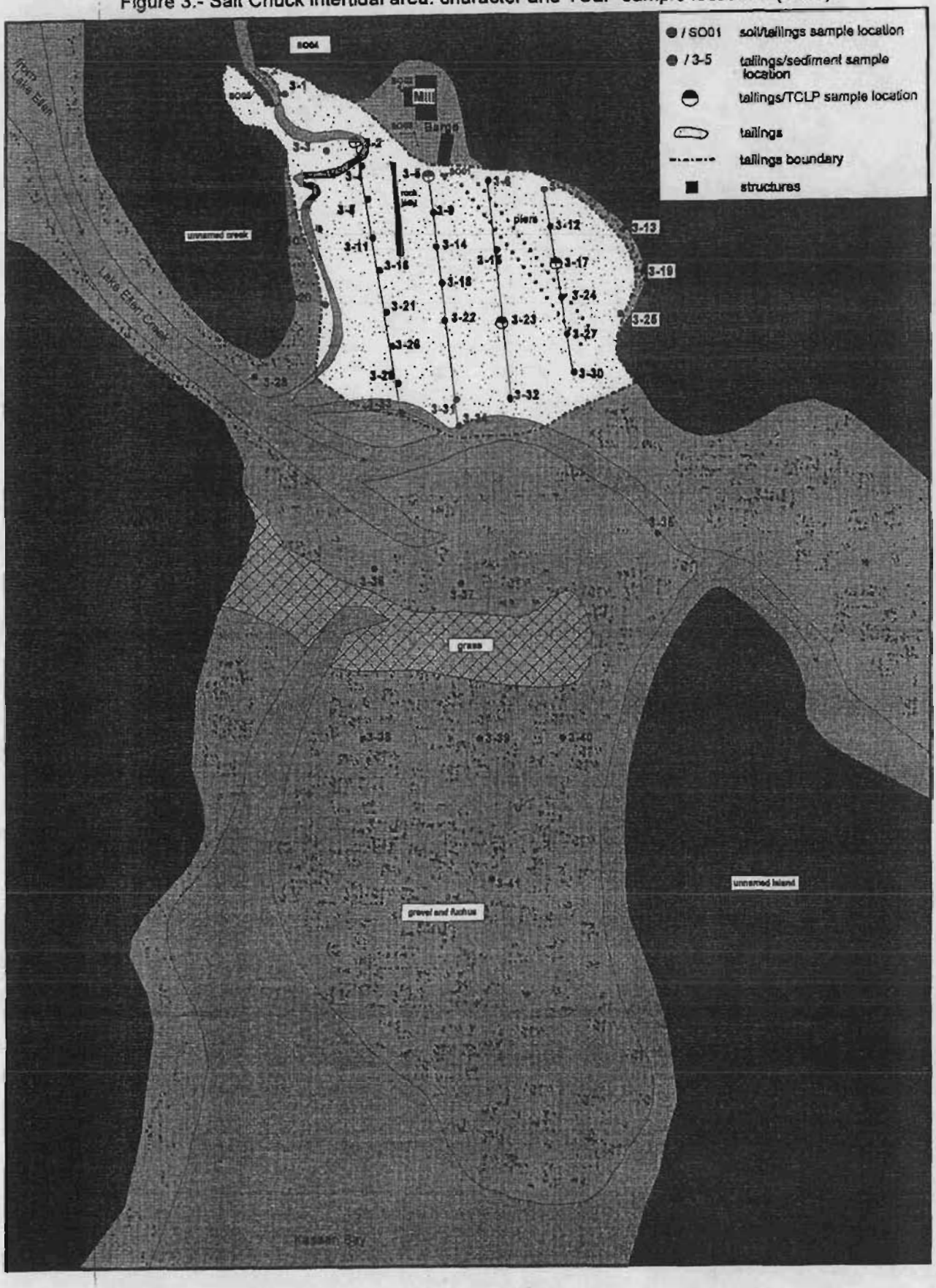
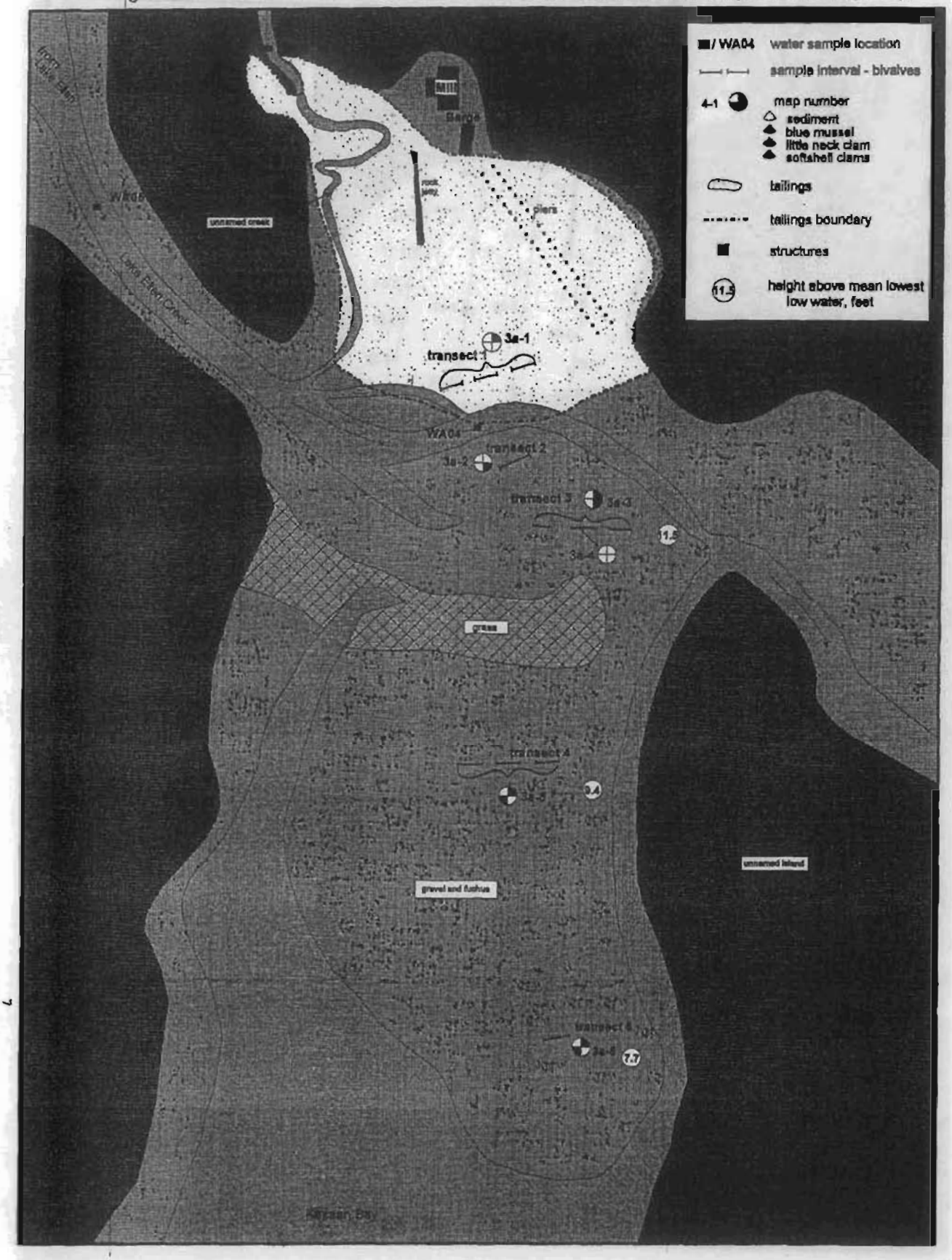


Figure 3a.- Salt Chuck intertidal area: shellfish, sediment and water sample locations (1997).



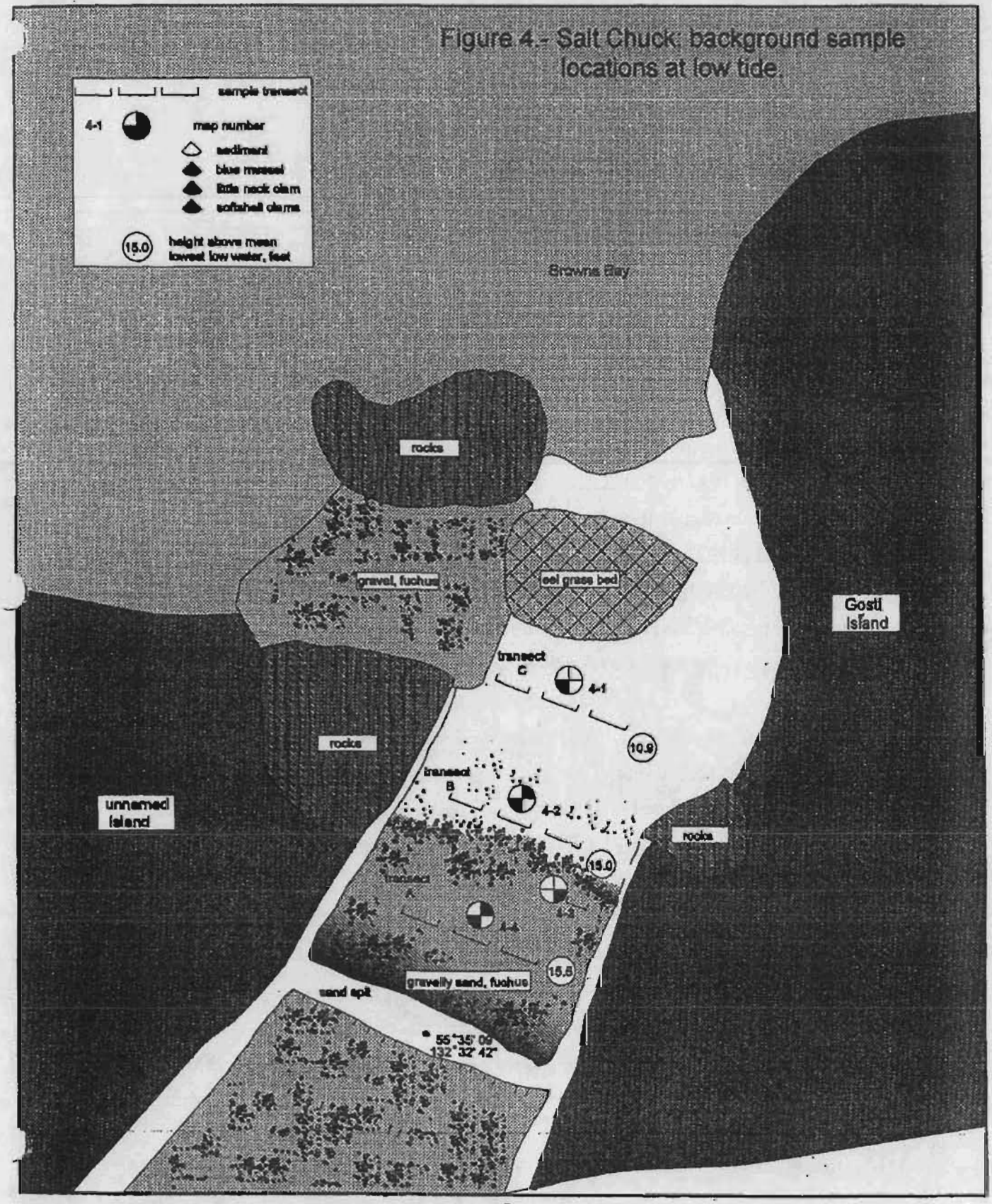


Figure 4.- Salt Chuck, background sample locations at low tide.

The mean annual precipitation rate at Annette, averaged from 1963-1992 is 111 inches, with extremes of 134 inches in 1991 and 86.4 inches measured in 1985. September through January are the wettest months, with October consistently being 33% wetter than any other month. The average annual temperature over the same time period is 46°F, with an average maximum temperature of 51°F and an average minimum of 41°F. July and August are the warmest months with average high temperatures approaching 65°F and January is typically the coldest month with average low temperatures dropping just below 30°F. The maximum two-year 24-hour rainfall was 4.59 inches, averaged from 1994 and 1996 data (NCDC, 1998).

Operational and Ownership History/Production

The Salt Chuck Mine, originally known as the Goodro Mine, was discovered in 1905 and shipments of hand-sorted ore were made until 1915 (Thorne, 1945). The Salt Chuck Mining Company was formed in 1915 by J. A. Chilberg. Discovery that the ore contained palladium/platinum led to construction of a mill with a rated capacity of 30 tons per day in 1917. The mill was enlarged in 1923 to obtain a working capacity of 300 tons per day (Thorne, 1945). Management reorganized as the Alaskan Palladium Mining Company and worked the property until 1926, at which time it closed again. John Koel purchased the property at a marshall's sale in 1929 and optioned it to the Solar Development Co., a subsidiary of Consolidated Mining and Smelting Co., Ltd. Solar explored the mine with diamond drilling and extensive sampling, but ultimately dropped the option in 1931. The Alaska Gold and Metals Company retreated 11,000 tons of tailings and mined 80,000 tons of ore from the old stopes between 1934-1941. Total production from the mine amounted to 326,000 tons of ore at an average grade of 0.95% copper, 0.063 oz/t palladium, 0.036 oz/ton gold and 0.17 oz/ton silver (Thorne, 1945).

The U.S. Bureau of Mines completed 1,550 feet of drilling at the mine from 1943-1944. The U.S.Geological Survey mapped the geology of the mine at this time (Goodall, 1989).

Utah Construction and Mining Company optioned the Salt Chuck Mine in 1958 and continued assessment work until 1963, when they dropped the option. Newmont held a claim block over the Salt Chuck from 1967 to 1972. They conducted an airborne magnetic survey and drilled

several holes looking for additional ore (Goodall, 1989).

The Bureau of Mines returned to the site in 1978. Workers took samples to complement their statewide assessment of platinum group metals as part of a critical and strategic minerals program.

The Salt Chuck site was restaked in 1979 by Fox Geological Services, Inc. Orbex Industries Ltd., had also staked claims in the area in 1979. Orbex acquired an option to the entire parcel in 1980 and held their interest through 1989. Silver Glance Resources Inc. took over Orbex at this time and continued work at the site. Fox Geological Services, Inc., maintained claims until 1996. Stealth Ventures, Inc. restaked claims at the site in December, 1996 (BLM, 1997b).

Regional and Local Geology

The geology in the Salt Chuck area is characterized by a variety of early Paleozoic igneous rocks that intruded a sequence of older Descon Formation sedimentary and volcanic rocks. The Salt Chuck Mine is hosted in a magnetite clinopyroxenite/gabbro component of these igneous rocks. Mineralization consists primarily of chalcopyrite, bornite, digenite, chalcocite, and covellite with magnetite, pyrrhotite and pyrite also present (Maas, 1995). There were three separate ore zones exploited at Salt Chuck, all plunging about 70° east-southeast along the irregular pyroxenite/gabbro contact. Sulfides composed more than 5% (by volume) of certain clinopyroxenite specimens, but the average sulfide content of the entire deposit is much lower than this. Up to 3% calcite was also present in some specimens (Watkinson, 1992).

Several other mines, prospects and mineral occurrences are located within a two-mile radius of the Salt Chuck site. These include the Rush and Brown, North Pole Hill, Kathy, Venus and Paul Young (Maas, 1995).

Soils

The soils surrounding the main mine workings at the Salt Chuck site have been predominantly

classified as McGilvery and Tolstoi soils with minor components of Kogish Peat and Maybeso Mucky Peat to the north (USDA, 1994). These soils occur within broken mountainslope topography that contains rock outcrops, deep organic-rich soils and peat. The soil profile was characterized to a 15-inch depth and consists of a one to four inch layer of peat and forest litter overlying a mixed layer containing dusky red to black peat and a sandy to gravelly loam. The soil units are moderately to well-drained and support a variety of plant species, including Western hemlock, blueberry, red cedar, devil's club and salmonberry.

The soils adjacent to the intertidal zones are classified as 'Karta - Tolstoi' very gravelly loam. The soil profile is characterized by a thin layer of forest litter and organic debris overlying a dark to grayish brown to black silt loam up to 6 inches thick. This silt loam is underlain by a yellowish-red to olive green gravelly to gravelly sandy loam up to 4 feet thick. These soils are moderately well drained and support a vegetative series dominated by Western hemlock and blueberry.

Surface Hydrology

Meteoric water enters the glory hole at elevation 300 feet and subsequently drains into the haulage level of the main adit (W1, fig. 2). This water mixes with groundwater flow entering the adit through faults, fractures and shear zones in the overlying country rock. A significant quantity of water is presently damned up behind a rock and debris plug near the adit portal. A steady trickle discharges from the portal with an estimated flow rate of < 0.1 ft^3/second (cfs). A small unnamed stream, originating northeast of the site at Power Lake, bisects the property and converges with the water discharging from the main adit portal. The stream continues its southerly course and flows into the head of Kasaan Bay, west of the millsite. Flow rate from the same location in this stream ranged from 1 to 8 cfs (samples WA03, WA08). Maximum flow observed in this drainage was up to 10 cfs. Stream flow varied directly with rainfall conditions.

At low tide, the unnamed stream traverses along the western edge of the tailings deposit and merges with Lake Ellen Creek (figure 3), a much larger stream that emanates from Lake Ellen, 0.5 miles to the west. Flow in Lake Ellen Creek was roughly 15 to 20 cfs. The water was

tannin-colored, but the gravel and boulder-lined stream bed and banks were not iron stained. Lake Ellen Creek flows along the front edge of the tailings deposit and empties into Kasaan Bay.

The tidal influence on Lake Ellen Creek and the unnamed stream is significant. Salt water completely inundates portions of these streams at high tide, and conversely, exposes these streams at low tide. Barnacles, fuchus and other saltwater biota residing in and along portions of these drainages demarcate the extent of the tidal fluctuation.

Ecological Setting

The mine workings and surface facilities at Salt Chuck are situated in an uplands environment characterized by gently rolling hills, bedrock, and abundant vegetation. There are isolated areas of palustrine, scrub-shrub, needle-leaved evergreen located north-northeast of the glory hole (USFWS, 1989). A field survey of the small creek bisecting the property and flowing past the main adit to the intertidal area indicates that wetland frontage is present along most of its length. The area adjacent to the creek draining Lake Ellen is mapped as riverine, tidal, unconsolidated bottom, permanent tidal wetland (USFWS, 1994).

Timber harvest units located north and east of the site were actively logged in 1997. These activities have no apparent direct effects to the Salt Chuck site. Lake Ellen Creek is an anadromous fish habitat, supporting pink, chum and coho salmon, steelhead and dolly varden (ADFG, 1982). Small sculpins and frogs were observed near the mouth of the small stream that bisects the site. Abundant deer tracks were observed on the intertidal sediments, and bear scat was seen within the site boundaries. Site vegetation is typical of Southeast Alaska and includes spruce, cedar, hemlock, and alder trees intermixed with abundant berry bushes, devil's club, and small scrub shrubs.

4.0 PREVIOUS ENVIRONMENTAL EXAMINATIONS

Bureau of Mines personnel conducted an inventory-level examination at the Salt Chuck Mine in 1995. A tape and compass site-survey was completed (figures 2 and 3) and physical and

chemical hazards were evaluated. An unpublished summary report was generated from this work and it included: 1) general background information, 2) main features, 3) physical and chemical hazards, 4) mitigation recommendations, and 5) recommendations for further study. A copy of this report is included in appendix B.

Overview

All accessible underground and surface mine workings, facilities and structures were evaluated for physical hazards. Unfiltered water samples were taken from affected drainages and analyzed for the 13 priority pollutant metals to determine if metals are leaching into downstream waters (figures 2, 3a). Character samples were taken from the mine tailings and analyzed to determine the presence of heavy metals (figure 3). These samples contrast with environmental samples by having less-rigorous laboratory and decontamination procedures employed than environmental samples require. Elevated metal values obtained from a character sample would instigate an environmental sampling program. Toxicity characteristic leaching procedure (TCLP) tests were conducted on selected tailings samples to determine if metals are leaching into the biologically active intertidal zone south of the millsite (figure 3).

There were 13 waste rock piles located throughout the site, and no indication that acid mine drainage was generated or metals were leaching from these features. Most waste rock piles were composed of large, boulder-sized material that was unvegetated. There was no evidence of rilling or gullying of these dumps by surface water. No paste pH tests or acid-base accounting was conducted at this site.

Mitigation and Further Study Recommendations

The Salt Chuck Mine has historical significance in that it was the only hard-rock mine producing palladium in the United States in its time. The site contains an extensive array of mine-related artifacts. The site is accessible by road, trail, and water, and there is evidence that people regularly visit the site. Obvious hazards requiring mitigation include blocking the opening to the glory hole from the end of the access tunnel; boarding up the opening to the corkscrew raise

located east of the glory hole; cleaning up the sludge and fuel spill at the millsite; erecting a fence around the millsite until a final determination of its historic value can be made; and removing the garbage and rusty equipment/debris that clearly have no historical value. The site should be evaluated by a team of archaeologists and mining historians before any restoration or mitigation is initiated.

Waters discharging from the main adit (W1) contained copper concentrations that exceeded the Alaska Freshwater Criteria for this metal. Filtered water samples analyzed for dissolved metals are needed to verify this exceedence. Mitigation of surface water contamination would be difficult as water exiting this working is constantly recharged by rainwater funneling through the glory hole, and by groundwater entering it through faults, fractures and shear zones.

Mine tailings placed in the intertidal zone contain high concentrations of copper. Nearly all of the samples contained at least 270 ppm copper, and most contained over 1,000 ppm copper. TCLP tests revealed that copper and zinc are leaching into the marine environment. No TCLP regulatory limits have been established for these metals. Bureau of Mines personnel recommended taking tissue samples from shellfish to determine if bioaccumulation of copper is taking place in this portion of Kasaan Bay. Sediment samples would have to be taken adjacent to the biota samples to provide a basis for comparison. Analytical results will be used to generate an HRS score and an ecological risk assessment. These tools will provide the basis for mitigation recommendations for these tailings.

5.0 HAZARD RANKING SYSTEM

The Hazard Ranking System (HRS) is a tool used by EPA's Superfund program to place sites on the National Priority List (NPL). The HRS assesses the relative threat to human health or the environment associated with actual or potential hazardous substance releases to the environment. The HRS generates a relative rather than absolute measure of risk as compared to those sites already listed on the NPL. Factors that affect an HRS score include the specific pathways and identified targets that may be affected by a hazardous substance. The HRS does not consider Clean Water Act substances.

Ecological Toxicity of Site Contaminants

The minimum standard to assess if a contaminant release has occurred is if analytical results are greater than three times background levels for a particular substance in the same media. If background concentrations are not detected, then any concentration observed above detection limits is considered a release (PRC, 1996).

HRS relates a contaminant source release to its potential impact on the environment. The impact, or ecological toxicity of mine-related contaminants, was further evaluated to determine if a removal action is appropriate for this site. The ecotoxicity was assessed by comparing the background and source samples' concentration to specific standards established for ambient water and sediment quality, and to public health standards for trace metals in shellfish.

Water quality was assessed by comparing analytical results to the Alaska Freshwater Criteria for the thirteen priority pollutant metals (McKerney, 1997). Arsenic concentrations were also compared to the National Toxics Rule standard which is considerably lower than the Alaska Freshwater Criteria (McKerney, 1997). A list of the 13 metals and associated standards is included in appendix table 3.

Alaska has not established sediment quality guidelines for marine sediments. Analytical results from tailings, sediments and soil samples were compared to standards established by Long and McDonald for samples taken in the marine environment. The effects range-low (ERL) and effects range-medium criteria (ERM) proposed by Long and McDonald were used to establish whether a sediment is negatively impacting organisms living in or near estuarine or marine sediments (Long and others, 1995). "Concentrations below the ERL represent a minimal-effects range; a range intended to estimate conditions in which effects would rarely be observed." "...Concentrations equivalent to and above the ERM value represent a probable-effects range within which effects would frequently occur (Long and others, 1995)."

Tissue and sediment samples were analyzed for chromium, copper, mercury, nickel, lead, silver and zinc. The selection of these metals, rather than the 13 priority pollutant metals, was based on

the analytical results from the 41 character samples and four TCLP samples taken during the inventory examination conducted in 1995 (see appendix tables 4 and 4a). Cost considerations were also factored into this decision.

There are no established guidelines for trace metal concentration in tissue samples from biota for Alaska. Human consumption guidelines have been set by the Food and Drug Administration for concentrations of cadmium, nickel, chromium, arsenic and lead, but no similar standards exist for copper and zinc. These public health standards are based on rate of consumption and age of consumer and are highly variable (O'Connor, 1995). There are several factors that influence the natural level of metals in an organism, including an individual organism's ability to achieve an equilibrium balance by shedding itself of undesirable metals. This natural or median level falls within a range and varies between species and locations. Metal concentrations in mussel samples from the Salt Chuck were compared to mean concentrations reported nationwide in NOAA's Mussel Watch program (O'Connor, 1992), and to metal concentrations in blue mussel samples from mineralized locations throughout Southeast Alaska (Rudis, 1996). There is little data available to make comparisons of metal concentrations in clam species. Copper levels in oysters were considered as an adjunct to this study, because they are commonly consumed by humans with no ill effects. The median concentration of copper in oysters is nearly 10 times greater than for mussels (Beliaeff, and others, 1998).

Background and control samples were taken for sediment and tissue samples to establish a baseline upon which to compare samples containing hazardous substances. Waste streams were quantified and average grades were determined.

Contaminant Migration Pathways

The potential threat of a hazardous substance release into the groundwater, surface water, air and soil pathways to a particular target must be determined. The surface water and soil pathways were evaluated at the Salt Chuck site. Groundwater and air migration pathways were not considered for this investigation.

The groundwater pathway was not considered because there are no drinking wells within a 15-mile target distance limit downstream from the Salt Chuck site. The nearest year-round population is located at Thorne Bay, about 4.5 miles north of the site. This is outside the four-mile target distance limit for air migration. The majority of the tailings are below mean high-tide and are covered by seawater during a flood tide. The tailings are somewhat compacted and not susceptible to wind-blown transport under most conditions. The air pathway was not evaluated for these reasons.

Targets

Human and environmental targets may be affected by hazardous substances at or leaving the Salt Chuck site. Recreational visitors frequently visit the site. The glory hole is regularly used by rock climbers for rappelling. The logging roads adjacent to the site are frequently used by hunters and casual recreational vehicle traffic. There is much evidence of human traffic throughout the site. Trails are well-worn, contemporary garbage is strewn about, and visitors were encountered by BLM personnel during the inventory examination completed in 1995. There are active mining claims covering the site and personnel working the claims are potential targets. There are no drinking water intakes downstream of the site, but these visitors may consume freshwater from the streams flowing through the site. A large intertidal zone containing several species of clams, blue mussels and other organisms is located adjacent to the main tailings deposit. Visitors or local fauna harvesting these shellfish may be affected by hazardous substances that have bioaccumulated in these organisms.

There are several potential environmental targets at or near the site. These include the assemblage of invertebrate life contained in the intertidal zone, the anadromous fisheries utilizing Lake Ellen Creek, transient and resident wildlife in the area, and the sensitive environment (wetlands) surrounding the site. There are no sensitive environmental areas designated by the Alaska Coastal Management Program near the site (ADGC, 1994). However, the Prince of Wales Area Plan designated the head of Kasaan Bay as a unique area with high habitat and recreational values (ADNR, 1988).

The Alaska Dept. of Fish and Game (ADF&G), Division of Subsistence, had no harvest data available for invertebrate species in this part of Kasaan Bay. A cursory inspection of the intertidal zone south of the millsite revealed abundant blue mussels, little neck clams, softshell clams, butter clams, juvenile dungeness crabs, barnacles, worms, nymphs, fuchus and other seaweed types. Pink salmon were observed in the drainage leading to Lake Ellen during the inventory examination, but ADF&G had no harvest or escapement data for salmon in this portion of Kasaan Bay.

Detailed salmon escapement surveys were conducted in four separate years from 1980-1993 on Paul Young Creek, located three miles south of Salt Chuck. Average pink salmon escapement in this drainage was 1,550 per year (ADFG, 1997).

Transient and resident wildlife are present in the area. However, no critical habitat has been specified for Federally designated threatened and endangered (T&E) species near the site. The only Federally designated terrestrial T&E species in the project area is the American Peregrine Falcon. This species visits during seasonal migration and there are no known nesting sites throughout all of Southeast Alaska (USFWS, 1997). There is no designated habitat used by State listed T&E species in Kasaan Bay (ADFG, 1997). There is no known habitat for Federally designated marine T&E species in the project area. The humpback whale is a transient visitor to the area, as is the Steller sea lion. There are no designated sea lion haulouts near Karta Bay (50 CFR, part 226.120, 1996). The only State designated T&E species visiting the area is the humpback whale.

HRS Data Gaps

Previous sampling at the Salt Chuck Mine ~~indicated that hazardous substances may be present in~~ the surface water and soil pathways. Filtered water samples analyzed for dissolved metals are required to delineate a copper exceedance relative to Alaska Freshwater Standards. Character samples of the tailings had been collected in 1995, but contaminant release into biota within and downstream of the tailings area had not been documented. Tissue analysis from mollusc samples taken in the intertidal zone south of Salt Chuck will provide the necessary data. Sediment

samples were taken from the same location as the shellfish samples to infer the bioavailability of the metals present. Sediment samples were taken downhill from an electric locomotive to determine if lead and antimony had been released from batteries used to power the engine. Background concentrations for each media were obtained to help determine if a release occurred.

6.0 PA/SI SAMPLING PROGRAM

BLM personnel sampled the surface water, mine tailings, and potentially contaminated soil at the Salt Chuck site and a control site from July 23-25, 1997. Weather conditions during these visits were generally overcast with slight rain, temperatures in the high 50s°F to low 60s°F, and a slight southeasterly breeze. There had been considerable rain the week prior to this investigation.

These visits were made to: 1) obtain tissue samples from resident shellfish near the millsite and at a control site three miles away; 2) obtain sediment samples from these same locations; 3) obtain filtered water samples from selected water bodies throughout the Salt Chuck site; and 4) take soil samples from an abandoned fuel cache and downhill from an electric locomotive.

Samples were collected with dedicated glassware and reusable sample retrieval equipment. Shovels, augering equipment and scoops were decontaminated between uses. Water samples were sent under chain-of-custody to Montgomery Laboratories (Juneau, AK). Tissue and sediment samples were sent under chain-of-custody to Battelle Marine Sciences Laboratories (Sequim, WA). Soil samples were sent under chain-of-custody to Analytica Environmental Laboratories (Broomfield, CO). Control samples were taken from all media to ensure a high quality of laboratory procedures. Quality assurance/quality control plans and procedures for integrated site assessments are provided under separate cover (BLM, 1997a).

Overview

Tissue samples from molluscs were taken to determine the trace metal concentrations of selected metals in these organisms. Sediment samples were taken from the same locations as the molluscs to facilitate a comparison of metal concentrations (bioavailability) in these two media.

Sample locations were randomly selected along a centerline surveyed through the biologically active zone within and downstream from the mine tailings. Transects were established perpendicular to this centerline and three 100-foot-wide zones were established along each transect, when possible (figure 3a). Individual samples were collected from 60-foot sections within the interval length. A single composite sample was made from the three individual samples taken along the transect. Separate samples for each species (blue mussels, softshell clams or little neck clams) were collected along a transect if that species was available. This methodology varied when biota was not present along an entire transect (e.g. figure 3a, transect 2). A similar sample collection methodology was used at the control site (figure 4). The only difference in methodology between the millsite and control site was related to the width of the sample area and corresponding width of the individual zones. The control site was much narrower so individual zones were only 40 feet wide, and 30-foot sections of these zones were sampled.

Additional samples were taken to validate and characterize contaminant releases from the water and soil pathways. Water sample locations were selected to determine if Lake Ellen Creek is being contaminated by metals leaving the Salt Chuck uplands and mill tailings area. Splits were taken at each water sample location. The Alaska Freshwater Standards require filtered samples analyzed for dissolved metals for five of the 13 priority pollutant metals (copper, cadmium, chromium, lead and mercury). One split was passed through a 45-micron filter and analyzed for dissolved metals to validate the copper exceedance identified during the inventory examination. The other split was unfiltered and analyzed for total metals.

Soil samples for TPH and contamination from batteries were composed of material collected from three to five holes in close proximity and then mixed to produce a composite sample. This methodology provides a larger sample volume and reduces the inherent heterogeneity (and possible 'nugget' effect) from a grab sample. Sample locations from the 1995 and 1997 site examinations are provided in figures 2, 3, 3a, and 4.

Background Samples

Background samples of tissue, sediment and surface water were taken to determine baseline concentrations of metals in the respective pathways.

Tissue and Sediments

A control site for shellfish and sediment samples was chosen in an intertidal area located immediately west of Gosti Island, about three miles south of the Salt Chuck millsite (figure 4). This was the closest location in Kasaan Bay that had similar characteristics to the affected site and was not influenced by outfall from other mining properties in the area. A raised, sandy spit divided the intertidal area. Samples of blue mussels (Mytilus Trossolus), little neck clams (Protothaca Staminea), softshell clams (Mya Arenaria) and sediments were taken from the northern half of this area. The zone measured roughly 220 feet wide by 350 feet long. The intertidal area was bounded by Gosti Island to the east and an unnamed island to the west. The texture of the intertidal sediments varied from south to north. A loosely packed, gravelly sand with abundant fuchus (seaweed) graded into a homogenous sandy silt as one moved from the sand spit north to Browns Bay. An extensive patch of eel grass commenced about 350 feet north of the spit (figure 4). No biota samples were taken from eel grass near the Salt Chuck millsite, so no biota samples were taken from the eel grass at the control site.

Samples were taken every six feet along individual zones and a single composite sample was made from each transect. Sediment samples were collected from the upper six inches of detrital material, spaced at similar intervals along the zone as the biota. Organic material was removed from the uppermost layer of sediment (0.5 to 1 inch thick) prior to sampling.

Samples from the control site consisted of four sediment samples (map Nos. 4-1, 4-2, and 4-4), three samples of little neck clams (map Nos. 4-1, 4-2 , 4-4), three samples of blue mussels (map Nos. 4-2, 4-4) and one sample of softshell clams (map No. 4-3). The little neck clams were sparse in number near the sand spit but increased significantly to the north as the matrix became sandier. Blue mussels affix themselves to fuchus and coarse gravels, and as this material graded

into a sandier matrix to the north, the concentration of mussels decreased significantly. The softshell clams were clustered in a pocket of loose, gravelly sand north of transect A (figure 4), and were not found anywhere else in this control zone. Duplicate samples of blue mussels and sediments were taken along transect A (map No. 4-4, samples SCM14 and SC54). Matrix spike samples of mussels and sediments were collected along this same transect (map No. 4-4, sample SCM13m and SC13m).

Surface Water

Sample WA08 was taken from the unnamed stream that bisects the Salt Chuck site. The sample was taken well upstream from the dilapidated structures and debris present along the north side of this drainage (figure 2). This location was nearly identical to the location used for sample WA03 taken during the inventory examination in 1995. A split from this sample was filtered and analyzed for dissolved metals during the current examination. Stream flow was estimated at 8 ft^3/second , pH was 8.3, conductivity was 30 µS and water temperature was 18°C. The water was tannin-colored, reflecting the organic debris incorporated into the high flow.

Sample WA05 was taken from Lake Ellen Creek, approximately 200 feet upstream from its confluence with the unnamed stream draining the Salt Chuck site (figure 3a). This sample location is flooded at a high tide. General characteristics at this sample site included an estimated flow rate of 15-20 ft^3/second, tannin-colored water but no iron-staining of the boulder lined banks, pH of 8.1, conductivity of 1500 µS, and temperature of 19°C. There is abundant fuchus and barnacles attached to the boulders lining the creek banks. Small fry and sculpins were observed in this portion of the creek. No salmon were observed in the creek during the 1997 site visits, although numerous salmon and trout species are known to use this habitat.

Source Samples

Source samples were taken from shellfish tissue and sediments within and adjacent to the periphery of the tailings. Surface water samples were taken from the unnamed stream bisecting the site and from Lake Ellen Creek. Soil samples were taken beneath a cache of abandoned 55-

gallon drums and from the periphery of two 1000- gallon fuel tanks adjacent to the millsite. A soil sample was taken downhill from a battery-powered, electric locomotive.

Tissue and Sediments

The extent of the tailings at the Salt Chuck site was defined by 41 character samples taken during the inventory examination (figure 3). The tailings cover an area exceeding 10 acres in size (roughly 700 by 700 feet) with an average thickness approaching 5 feet and a maximum thickness exceeding 13 feet. The majority of the tailings pile was devoid of biota and flora of any kind. The surface was generally homogenous and consisted of fine, organic-rich silt and coarse sand displaying subtle color variations from dark green to brown to reddish brown. A few small tidal channels crossing the tailings were iron stained. Beach grasses, beach asparagus, barnacles, clams and mussels were commonly found outside the periphery of the tailings, near the wooded areas and towards Kasaan Bay.

Portions of the tailings north of Lake Ellen Creek are covered by a veneer of organic-rich, silty creek sediments spread around by the tidal currents. This silty layer is up to three inches thick near the creek, but gradually thins and completely disappears within 200 to 250 feet of the creek. The interface between the silty layer and the tailings is distinct. An occasional twig or rock embedded in this layer allows fuchus and/or mussels and barnacles to attach and propagate.

The first appearance of blue mussels and barnacles was about 200 feet north of Lake Ellen Creek. These populations increase closer to the creek as the substrate contained more debris for them to attach to. However, the overall density of biota was spotty when compared to the concentrations found further south from Lake Ellen Creek. The silty organic-rich layer supported healthy populations of sea worms. Worm chimneys were widespread on top of this silty layer. The worms did not penetrate into the underlying tailings.

A centerline was established stretching from the barge through the middle of the tailings pile to the opposite side of Lake Ellen Creek. Individual transects near the tailings were chosen based on population densities and opportunity. Transects located closer to Kasaan Bay proper were

selected randomly because population densities were more uniform.

Transect 1 was laid out about 100 feet north of Lake Ellen Creek (figure 3a). Biota were not concentrated equally along the transect, but an attempt was made to collect blue mussels and sediments at 15-foot intervals along each 60-foot-wide zone. The mussels averaged from 0.75 to 1 inch long. A portion of each zone sample was combined to make a single composite sample for the entire transect (map No. 3a-1, sample SCM22). There were no clam species found north of Lake Ellen Creek. A composite sediment sample was taken from spaced intervals in the same zones along this transect (SC66).

The initial occurrence of softshell clams was discovered about 90 feet south of the south bank of Lake Ellen Creek (transect 2, figure 3a). The clams were about 2 to 2.5 inches long and were discovered from 2 inches to 15 inches deep into the substrate. The species were concentrated in patches, and not equally distributed along the 100 foot sample zone. Composite samples of clams and sediments were taken (map No. 3a-2).

Transect 3 was established about 300 feet south of Lake Ellen Creek at an elevation of 11.5 feet above mean lowest low water. Three zones were set up and composite samples of blue mussels, softshell clams and sediments were collected (map No. 3a-3, samples SCM9, SCC3A, SC49). The blue mussel population was more concentrated (relative to transect 1) and individual specimens averaged one inch in length, similar to sample 3a-1. Softshell clams were widespread along this transect. Individual specimens averaged from 1.5 to 2 inches long. The clams were burrowed into a loosely compacted, dark-green to iron-stained, coarse sandy matrix. The color of the material is largely similar to the tailings found north of Lake Ellen Creek, but the loose nature, coarse texture and localized iron-stained appearance were distinct differences. A select sample of an iron-stained portion of the sediments was taken from this transect (map no. 3a-4, sample SC47).

Transect 4 was established approximately 750 feet south of the south bank of Lake Ellen Creek at an elevation of 9.4 feet above mean lowest low water (figure 3a). Concentrations of fuchus and mussels were mostly uniform across the entire transect. Average size of the mussel

specimens was 1 to 1.5 inches, clearly larger than the specimens found closer to Lake Ellen Creek. The substrate is composed of loosely packed, gravelly sand with abundant shell fragments and numerous worms. There are patches of iron-stained soil at depth along the transect, but it's presence did not alter the mussel or worm population density. A composite sample of the blue mussels and sediments was obtained from this transect (map No. 3a-5, samples SCM4, SC43). A pocket of several varieties of clams was found along a 12-foot interval in the west zone of this transect. The clams were scattered throughout a one foot depth into the substrate. A grab sample of little neck clams was obtained here (map No. 3a-5, sample SCC1). Average size was 1 inch long and the clams were very uniform in shape and color.

Transect 5 was established 800 feet south of transect 4, at an elevation of 7.7 feet above mean lowest low water. This portion of the intertidal area contained more blue mussles and little neck clams compared to other transects already mentioned. Individual mussels were larger here and ranged up to 2 inches long. The little neck clams averaged 1 inch long, similar to those found in other transects. The overall width of the transect was limited to one zone. The outgoing tide uncovered a larger area along this transect, as depicted on figure 3a. A composite sample of blue mussels, little neck clams and sediments was obtained here (map No. 3a-6, samples SCM5, SCC2, SC44).

Surface Water

Sample WA06 was taken from the small unnamed creek that bisects the site at a location just above the northwestern extent of the mill tailings (figures 2, 3a). This is the same location as sample site WA02 collected during the inventory examination, the difference being that WA06 was filtered and analyzed for dissolved metals according to protocol established by the Alaska Freshwater Standards (McKerney, 1997). Field screening at this site revealed a pH of 8.0, conductivity of 30 µS, and temperature of 18°C. Flow rate was estimated at 10 ft^3/second. The water was tannin colored, but there was no iron staining of the boulder-laden banks. Sample WA07 was a duplicate sample collected from this location.

Sample WA04 was also taken from Lake Ellen Creek, just downstream from its confluence with

the unnamed tributary stream mentioned above. The unnamed tributary had flowed past the entire length of tailings before converging with Lake Ellen Creek. Trace elements from the tailings leaching into the unnamed stream would be more concentrated at this location than further downstream in Lake Ellen Creek. Field screening results showed a pH of 8.1, conductivity of 930 µS, and a temperature of 18°C. The water was tannin colored, and a slight iron-stained discoloration was noticed along the creek banks. A second location was not chosen further downstream in Lake Ellen Creek because of suspected contamination of the fresh water sample from the salt waters of Kasaan Bay.

Batteries

An electric locomotive was abandoned above the millsite at the end of the rail line that extends from the main adit portal (figure 2). This locomotive was powered by a series of batteries that are still present in the body of the locomotive. Hazardous substances released from these batteries would collect and be channeled into a small gully present just below the engine. A composite soil sample (SO10) was taken from the soil in the gully and analyzed for lead and antimony.

Total Petroleum Hydrocarbons (TPH)

Several two and four cylinder, diesel-powered engines were used to power the mill. Fuel was stored in two large 1,000 gallon capacity tanks located just east of the millsite. One tank contains an unknown quantity of water and the other tank is empty. There are approximately 30 empty 55-gallon drums located in two caches, downhill from the larger tanks (figure 2). Two soil samples were taken from the fuel storage area to determine if petroleum products have been released into the soil pathway.

Sample SO06 was a composite sample taken from several holes dug around and downhill from the 55-gallon drum caches. The soil profile was defined by abundant humus, organic debris and rotting wood overlying a light to dark brown soil. Most drums were empty, however some of the drums contained dried TPH residue and samples were obtained directly beneath these. The soils

did not appear oil-soaked. Minor TPH odor was associated with this sample site.

Sample SO07 was taken from 4 holes excavated around the periphery of the large fuel tanks. There was no petroleum odor associated with these holes. Sample material was similar to SO06, however less forest litter and organic debris overlaid this area. Soils directly beneath the tanks were stained and emitted a TPH odor. The quantity of material present under the tanks was less than two yd^3. No samples were taken beneath the large tanks because of obvious contamination. We were more concerned with determining the extent of migration from the TPH source.

7.0 ANALYTICAL RESULTS

Analytical results from tissue and sediment samples are found in appendix tables 1 and 2, respectively. Water sample results are presented in appendix table 3; character sample results from mine tailings are depicted in appendix table 4; and results from the TCLP tests are found in appendix table 4a. Results from tissue and sediment samples were reported in µg/g which is equivalent to ppm.

Tissue and Sediments

Background concentrations of trace metals in blue mussels, softshell clams and little neck clams were comparable, and little variation was noticed across all seven samples. Metal concentrations from blue mussels were compared to geometric mean concentrations of metals from the NOAA Mussel Watch program (O'Connor, 1992). Copper values from Salt Chuck samples were lower than the mean concentrations, however other trace metals contained in sample SCM18 (map No. 4-2) and sample SCC12 (map No. 4-3) were above these mean values. Sample SCM 18 contained 0.114 µg/g mercury as compared to a geometric mean value of 0.094 µg/g mercury. Sample SCC12 contained 0.437 µg/g silver and 139 µg/g zinc as compared to a geometric mean of 0.141 µg/g silver and 130 µg/g zinc.

Sediment samples taken from the control site contained consistently low values of the seven analytes. There were no anomalous or spiked values. All values were well below the ERL

guidelines established for marine and estuary sediments (Long and others, 1995).

Analytical results from tissue samples taken near the millsite showed elevated levels of copper, zinc and mercury compared to values obtained at the control site. Blue mussel samples from transect 1 (sample SCM22) contained 48.3 µg/g copper. Samples of blue mussels from transect 3 (sample SCM9) contained 22.8 µg/g copper. Softshell clams collected across transect 2 (sample SCC13) contained 29.8 µg/g copper, 0.145 µg/g mercury and 134 µg/g zinc. Softshell clams taken across transect 3 (sample SCC3A) contained 48.0 µg/g copper, 0.140 µg/g mercury and 157 µg/g zinc.

Sediment samples from the five transects established near the millsite contained elevated values of copper, silver, mercury and chromium. These elevated values are relative to the ERL guidelines and/or the background levels obtained at the control site. Sample SC66, collected across transect 1, contained 501 ppm copper, 137 ppm chromium, 0.185 ppm mercury and 0.234 ppm silver. Sample SC71, collected across transect 2, contained 159 ppm copper and 93.8 ppm chromium. The high grade sample of iron-stained sediment taken from transect 3 (sample SC47) contained lower metal concentrations than the composite sample taken across the entire transect (sample SC49). Sample SC49 contained 154 ppm copper and 86.8 ppm chromium as compared to 43.0 ppm copper and 69.6 ppm chromium contained in SC47. Sample SC43, taken across transect 4 contained 0.303 ppm mercury. Sample SC44, collected across transect 5, contained 157 ppm copper.

Surface Water

Filtered water samples taken from the unnamed creek draining the Salt Chuck site contained elevated concentrations of copper (sample WA06). Sample WA06 contained 3.9 µg/l copper at a nardness of 12 mg/l, as measured by $CaCO_3$. The Alaska Freshwater Standard at this hardness is 1.93 µg/l copper. Samples WA04 and WA05, taken from Lake Ellen Creek, contained 2.1 µg/l copper and 3.1 µg/l copper, respectively. These concentrations are both below the Alaska Freshwater Standards for copper at their respective hardnesses (appendix table 3). No metals were detected in the background sample.

Tailings

Forty one character samples were taken from the mine tailings during the 1995 inventory examination. These samples were analyzed using less rigorous laboratory standards than the tissue and sediment samples recapped above. However, analytical results from these samples revealed a consistently high level of copper. Most of the samples contained in excess of 1,000 ppm copper. Tidal and stream activity has reworked and moved the tailings outside of the original depositional area, creating a halo of copper contamination around the tailings pile. Analytical results from samples taken along the periphery of the intertidal zone (figure 3, map Nos. 3-13, 3-19, 3-25, 3-28 and 3-35) verify this.

TCLP tests were conducted on splits from four of the character samples. Copper, zinc and barium were recovered during these tests. Copper values ranged from 0.75 mg/l (sample SC11) to 6.87 mg/l (sample SC21). Zinc values ranged from 0.46 mg/l (sample SC21) to 0.63 mg/l (sample SC24). There are no regulatory standards for copper or zinc in a TCLP test. Barium values were up to 0.16 mg/l, well below the regulatory limit of 100 mg/l.

Batteries

Lead and antimony were detected in soil sample SO10, taken downhill from the electric locomotive. Analytical results revealed 21 ppm lead and 1 ppm antimony.

Total Petroleum Hydrocarbons (TPH)

Sample SO07 contained 9,600 mg/kg total petroleum hydrocarbons (TPH). No TPH was detected in sample SO06. The contaminated soil is limited in extent and no TPH odors were detected in soils downhill from the tanks. Sample SO01 (1995 exam) identified a significant concentration of TPH within the mill structure (163,000 mg/kg), but no TPH was recovered from a sample taken in the intertidal zone (SO02).

8.0 SOURCES AND THEIR IMPACTS TO PATHWAYS AND POTENTIALLY AFFECTED TARGETS

The water and soil pathways have been contaminated by hazardous substances attributed to the Salt Chuck site. Descriptions of the affected media and targets are summarized in the following sections.

Surface Water

The unnamed stream that bisects the Salt Chuck site and flows into Kasaan Bay contained copper concentrations that exceeded the Alaska Freshwater Standards. Copper was not detected in background samples taken upstream in this drainage. Water sampling during the inventory examination revealed hazardous substances discharging from the main adit portal and entering the unnamed stream. Flow rate in this unnamed stream varied from 1 to 10 ft^3/second during individual site visits. This stream merges with Lake Ellen Creek near the southern tip of the tailings pile (figure 3a).

Numerous pink salmon were observed schooling up and entering Lake Ellen Creek during incoming tides. ADF&G does not conduct fish escapement surveys on Lake Ellen Creek, so an official fish count was not available. There were no salmonids observed in the unnamed creek, however resident life in this stream consisted of small frogs and sculpins. Bear and deer tracks were seen on the tailings near this creek and it can be assumed that deer take water from this stream. Site visitors and mining claimants may unknowingly consume water in the unnamed creek after it converges with water discharging from the main adit portal.

It is noteworthy that this unnamed stream can contribute significant water and hazardous substances to Lake Ellen Creek. However, it appears that sufficient dilution takes place to reduce the threat to salmonid populations.

Tailings

The mine tailings contain consistently high concentrations of copper. All of the character samples contained in excess of 270 ppm copper, the ERM for copper in estuary sediments (Long and others, 1995). The Washington State marine sediment management standard for copper is 390 ppm and again, the Salt Chuck tailings contain significantly higher copper levels relative to this standard. The highest values exceeded 3,800 ppm copper. Samples collected from the top six inches of the tailings material (taken in conjunction with the bivalve samples) contained 501 ppm copper. There is ample data available to quantify the copper concentrations present in the mine tailings. However, the data is less conclusive when determining whether the copper is bioavailable to the resident shellfish and biota in this portion of Kasaan Bay.

Blue mussels, softshell clams and associated sediments were sampled on or near the tailings pile. Data from transects 1, 3 and 5 revealed the following copper concentrations in mussels and sediments (figure 3a). Analytical results from transect one revealed 501 ppm copper in sediments and 48.3 ppm copper in mussel tissue. Samples from transect 3 contained 154 ppm copper in sediments and 22.8 ppm copper in blue mussels. Sample results from transect 5 revealed 157 ppm in sediments and 11.6 ppm copper in mussels. Analytical data for softshell clams from transects 2 and 3 revealed 29.8 ppm and 48.0 ppm copper in tissue, and 159 ppm and 154 ppm copper in sediments, respectively.

The TCLP tests revealed that low levels of copper (up to 6.87 mg/l) are leaching out of the tailings. However, this data shows no direct correlation between copper values in sediments and copper values in the shellfish living or feeding off the top of these sediments. The data does show a relative decrease of copper in mussel tissue related to increased distance from the tailings pile. This generalization was not consistent with the data from softshell clams. There was more copper found in softshell clam tissue obtained from transect 2 than from transect 3.

The copper concentration in mussel tissue from samples obtained along transects 1 and 3 exceeded three times the level of copper obtained from background samples (~ 4.3 μg/g copper) at the control site. These two values also exceeded copper concentrations found in blue mussel

samples from other mineralized zones in Southeast Alaska (Rudis, 1996). Mean copper concentrations in blue mussels reported in Rudis' study varied from 9.178 (+/-) 3.079 µg/g to 10.047 (+/-) 1.520 µg/g. Median concentrations of copper in various mussel species sampled for the NOAA Mussel Watch Program are between 8.1-10 µg/g (O'Connor, 1995). However, annual median concentrations of copper contained in oysters from 45 various sites is enriched by more than a factor of 10 relative to mussels or between 96-126 µg/g (Beliaeff and others, 1998).

O'Connor's work concluded that there were no important concentration differences between mytilus species (mussels) at the various sites used in the Mussel Watch Program. It is therefore valid to make comparisons between mussel species (O'Connor, 1995). The comparison of trace metal concentrations between mussels and oysters illustrates the difference in bioaccumulation of metals between species from the same location. There are no public health standards for copper in shellfish so these numbers should be used for reference and not as cleanup guidelines.

The tailings are not contained within a man-made or natural impoundment and are subject to erosion and transport by the unnamed creek, Lake Ellen Creek and tidal currents. Some of the tailings are covered by a veneer of creek and marine sediments, but the majority of tailings are exposed.

Batteries

Low levels of lead and antimony were detected in soil samples taken below the electric locomotive. The concentrations of both metals were below the threshold effects level guidelines for metals in sediments (Environment Canada, 1995). These levels indicate that negative effects to biota will occur rarely.

9.0 REMOVAL ACTION ASSESSMENT

Three objectives for conducting a removal preliminary assessment at the Salt Chuck site were:

1) to determine if the site contained CERCLA releases of hazardous substances, and

2) to determine if any reportable releases of petroleum products (TPH) had occurred, and

3) to evaluate time-critical versus non time-critical removal action.

CERCLA Releases

Releases of hazardous substances are classified as observed CERCLA releases when contaminant concentrations are: 1) at least three times background levels, or 2) detected in any concentration when none was detected in background. Character samples of mine tailings contained copper concentrations that exceeded three times the background level. Sediment samples from the tailings zone, collected in conjunction with tissue samples, also had copper values that exceeded three times background levels. Mercury and silver concentrations exceeding three times background levels were present in one of the sediment samples from the tailings pile. These concentrations comprise an observed CERCLA release of these contaminants.

Reportable Releases of Total Petroleum Hydrocarbons (TPH)

Samples taken from a petroleum sludge within the mill structure contained 16.3% TPH. The sludge is not contained, but further sampling revealed that the TPH product is not migrating into the intertidal zone. A small quantity of TPH-stained soil is present next to the mill structure. There was 0.96% TPH contained in a composite soil sample taken around the periphery of the large diesel tanks adjacent to the millsite (SO02). This material is unconfined, but samples taken downslope from these tanks did not contain TPH. Total volume of material containing TPH is estimated to be less than 10 yd^3.

Potential Threat to the Environment

The tailings pile and surface water discharging from the main adit and flowing past these tailings into Kasaan Bay present an ongoing threat to the environment. The determination of whether these releases pose a threat requiring a removal action is based on the eight factors defined by 40 CFR 300.415 (b) (2), paragraphs i-viii. The Salt Chuck site meets the following criteria:

i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants;

ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

iv) High levels of hazardous substances or pollutants or contaminants in soils largely at the surface, that may migrate;

v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

vii) The availability of other appropriate federal or state response mechanisms to respond to the release.

The Salt Chuck site is a popular destination for Prince of Wales Island residents and visitors. People have been observed rappelling in the glory hole and there is much evidence of recent visitation throughout the site. Forest Service recreational shelters are located nearby and logging roads provide access to the upper workings. A crude trail extends from the upper workings past the main adit portal and down to the beach. The site can be reached by small boat at high tide, but this mode of access is less frequently used than the roads. There is an abundance of shellfish species located in the intertidal areas surrounding the site, but no subsistence use is documented. Lake Ellen Creek supports runs of pink, coho and chum salmon, dolly varden and steelhead. Typical species of Southeast Alaska fauna use the habitat surrounding the site. These targets may directly or indirectly ingest the hazardous substances present on site and contaminate the food chain.

The Salt Chuck site is bisected by a small stream and wetland frontage is present along most of its length. The area adjacent to the creek draining Lake Ellen is mapped as riverine, tidal, unconsolidated bottom, permanent tidal wetland (USFWS, 1994). The intertidal area containing the mine tailings is a sensitive environment, designated as a unique area with high habitat and recreational values. These three areas are contaminated by hazardous substances. The tailings are near surface (mostly uncapped) and adverse weather conditions could exacerbate the migration of these contaminated tailings into Kasaan Bay.

The Salt Chuck site has been listed on the Federal Agency Hazardous Waste Compliance Docket

(Docket), published in the Federal Register on June 27, 1997. EPA will evaluate this PA report and decide if a site inspection report is necessary. Ultimately, EPA or State of Alaska Dept. Of Environmental Conservation may respond to the releases documented at the Salt Chuck site.

Further degradation to the intertidal area in this portion of Kasaan Bay is occurring at a slow rate. Reestablishment of a rich ecosystem on top of the tailings pile is occurring at an equally slow rate. The tailings were created at least 55 years ago and hazardous substance releases from the tailings have impacted the surrounding ecosystem. The principal kill zone at the site is found directly over the tailings. This may be due to a lack of sufficient substrate for seaweed, mussels and barnacles to recolonize or it could be due to the toxicity of the tailings. It could also be related to the time that this portion of the intertidal zone is uncovered during low tide. These same biota reside in larger numbers across Lake Ellen Creek from the tailings pile, where the height above mean lowest low water is much less. Salmonid and other fish species continue to use Lake Ellen Creek.

A non-time critical removal action should be considered for these tailings. Removal options include actual removal of the tailings from the site, or capping and stabilizing the tailings with crushed rock and large riprap boulders. Sources of this capping material include the numerous waste rock dumps located adjacent to the millsite and along the railbed connecting the millsite to the main adit. A small rock jetty located at the north end of the tailings pile illustrates the innocuous nature of this waste rock when exposed to continuous tidal activity. This jetty has been present for decades and the constituent rocks display no sign of oxidation and acid generation. Capping may also provide suitable habitat for further recolonization by mussels, seaweed and barnacles depending on the resultant height above mean lowest low water.

10.0 CONCLUSIONS AND RECOMMENDATIONS

The surface water and soil pathways at the Salt Chuck contain copper concentrations that exceed applicable standards for each medium. These exceedances are attributable to the site. Surface water discharge from the main adit converges with the unnamed stream bisecting the site and flows into the head of Kasaan Bay. This stream mixes with Lake Ellen Creek and significant

dilution takes place to reduce the copper exceedance. Lake Ellen Creek currently provides suitable habitat for several salmon and trout species and sculpins and small frogs are resident in the unnamed creek. Visitors may drink water from the unnamed creek downstream from the adit portal. Plugging the adit and piping the discharge to a distant location within Kasasan Bay would provide a short term solution to the water quality problem in the unnamed creek. An engineering evaluation/cost analysis or ecological risk assessment should be performed prior to mitigating the copper exceedance in the surface water pathway. Signs warning of the contamination should be placed outside the adit portal in the near term.

The affected soil pathway includes mine tailings and TPH-contaminated soil. Tailings removal is justified by the elevated copper concentrations, but tissue samples taken from blue mussels, softshell clams and little neck clams indicate that these high levels of copper are not entirely bioavailable. Physically removing the tailings would be cost prohibitive and unnecessary. An alternate approach would be to cap the tailings with at least six to eight inches of crushed rock. Larger riprap could be used to armor the banks of the unnamed stream and Lake Ellen Creek, adjacent to the tailings. This capping material would effectively contain the tailings and restrict further migration, while providing suitable habitat for seaweed, barnacles and mussels to regenerate.

The soil surrounding the large diesel tanks should be tilled and bioremediated. The quantity of soil is minimal, and the TPH concentration is not excessive. These soils could be removed if proper conditions for bioremediation are not sustainable over the duration of the process.

The Salt Chuck site contains a wide array of mining artifacts and associated physical hazards. The site is visited regularly and physical hazards at the glory hole, main adit portal and the millsite pose an imminent danger that should be addressed. Warning signs should be erected in the near term while a cultural assessment is completed.

11.0 REFERENCES/BIBLIOGRAPHY

Alaska Department of Fish and Game, Commercial Fisheries, Region 1, 1997. Detailed Salmon Escapement Data from 1980-1993, gathered from the State of Alaska Integrated Database Network by Scott Walker, Assistant Area Biologist, October 7, 1997, Ketchikan, AK.

_____, Southeast Regional Office, Habitat Protection Division, October, 1997. Anadromous Stream Catalog Maps, 1982, Douglas, AK.

Alaska Department of Natural Resources, October 1, 1997. Water rights inquiry made through Southeast Region Division of Land, Information Center, Land Administration System (LAS) Database, October 1, 1997, Juneau, AK.

_____, 1988. Prince of Wales Island Area Plan. Alaska Department of Natural Resources, Div. of Land and Water, December 1998, 460 pp.

Alaska State Climate Center, 1992. Local Climatological Data, Annual Summary with Comparative Data for Annette, Alaska. Environmental and Natural Resources Institute, Univ. AK-Anch., 9 pp.

Beliaeff, B., T.P.O'Connor, and D. Claisse, 1998. Comparison of Chemical Concentrations in Mussels and Oysters from the United States and France. Environmental Monitoring and Assessment, Vol. 49: 87-95, Kluwer Academic Publishers, pp. 87-95.

Federal Register, July 1, 1996. Code of Federal Regulations: 40 CFR, Ch. 1, Part 300, Appendix A, Section 4.1, Table 4-23: Sensitive Environments Rating Values, United States Government Printing Office, Washington D.C., p. 163.

_____, July 1, 1996. Code of Federal Regulations: 40 CFR, Ch.1, Part 300, Section 300.415 (b) (2), Removal Action Criteria, United States Government Printing Office, Washington D.C., p. 61.

_____, July 1, 1996. Code of Federal Regulations: 40 CFR, Ch. 1, Section 230.3, Part (t), Definition of Wetlands, United States Government Printing Office, Washington D.C., p. 207.

_____, July 1, 1996. Code of Federal Regulations: 50 CFR, Ch. 2, Part 226, Section 226.12, Critical Habitat for Marine Mammals, North Pacific Ocean, Steller Sea Lion (Southeast Alaska), p. 109.

Goodall, G. N., and P. E. Fox, 1989. Mapping, Prospecting, and Geochemical Report on the Salt Chuck Property, Prince of Wales Island, Alaska. Unpublished rep. for Orbex Industries, Inc., 21 pp., available from BLM, Juneau, Alaska.

Long, E. R., D. D. McDonald, S. L. Smith, and F. D. Calder, 1995. Incidence of Adverse Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environmental Management, Vol. 19, No. 1, pp. 81-97.

Maas, K. M., P. E. Bittenbender, and J. C. Still, 1995. Mineral Investigations in the Ketchikan Mining District Southeastern Alaska. BuMines OFR 11-95, 606 pp.

McKerney, Katy, 1997. Compilation of the U.S. Environmental Protection Agency's Water Quality Criteria for the Priority Toxic Pollutants. Alaska Dep. of Environmental Conservation, Juneau, Alaska, 107 pp., plus appendices.

National Climate Data Center, 1998. State of Alaska Climatological Data. National Oceanic and Atmospheric Administration, Asheville, NC, Data derived from world wide web @ http://www.ncdc.noaa.gov/.

O'Connor, T. P., and B. Beliaeff, 1995. Recent Trends in Coastal Environmental Quality: Results from the Mussel Watch Program. National Status and Trends Program, Marine Environmental Quality, NOAA, June 1995, 40 pp.

PRC Environmental Management, Inc., 1996. Final Report - Granite Mine Removal Preliminary Assessment and Site Inspection, Chugach National Forest, Alaska. Delivery Order 95-3, Prepared for USDA Forest Service, Region 10, Juneau, Alaska, 75 pp., maps and appendices.

Rudis, D. D., 1996. Metal Concentrations in Sediments and Selected Biota in Gastineau Channel, Juneau, Alaska. Technical Report SEES-TR-92-01, U.S. Fish and Wildlife Service, Juneau, Alaska, 46 pp.

Thorne, R. L., J. G. Shepard, S. P. Holt, A. W. Tolonen, and E. L. Fosse, 1945. Salt Chuck Mine, Kasaan Peninsula, Prince of Wales Island, Southeastern Alaska- Copper, Palladium. War Minerals Report 423, 11 pp.

U.S. Bureau of Land Management, 1997a. Quality Assurance Project Plan for Abandoned and Inactive Mine PA/SI in the Tongass National Forest, Southeast Alaska. CERCLA Services for Forest Service Region 10, Juneau, AK.

U.S. Bureau of Land Management, 1997b. Mining Claim Information from Alaska Land Information System Database. BLM Public Room, November, 1997.

U.S. Bureau of Mines, 1973, 1986. Alaska 1:250,000-Scale Quadrangle Map Overlays and Paper Copy Showing Mineral Deposit Locations, Principal Minerals, Number and Type of Claims, and Historical Information. BuMines OFR 20-73.

U.S.D.A. Forest Service, 1994. Classification and Correlation of the Soils of the Ketchikan Area, Alaska. Unpublished Report SSSA-644, available from Ketchikan Area Supervisors Office, Ketchikan, Alaska.

U.S. Environmental Protection Agency, August 1993. Guidance on Conducting Time Critical Removal Actions Under CERCLA. Office of Emergency and Remedial Response, Publication 9360.0-32, August, 1993, 57 pp.

_____, September, 1993. Integrating Removal and Remedial Site Assessment Investigations. Office of Solid Waste and Emergency Response, Directive No. 9345.1-16FS, September, 1993, 8 pp.

U.S. Fish and Wildlife Service, 1989. Wetland Survey Maps for 1:40,000-Scale Quadrangle Map of Craig C-2. Prepared by National Wetlands Inventory using aerial photographs taken in 1979, available from USFWS, Juneau, AK..

_____, 1997. Endangered, Threatened and Candidate Species in Alaska. 2 pp., available from USFWS, Juneau, AK.

Watkinson, D. H., and D. R. Melling, 1992. Hydrothermal Origin of Platinum-Group Mineralization in Low-Temperature Copper-Sulfide-Rich Assemblages, Salt Chuck Intrusion, Alaska. Economic Geology, v. 87, No. 1, pp. 175-184.

Appendix table 1.- Analytical results from tissue samples (results presented in µg/g unless otherwise noted).

Sample #	Map #	Species	Chromium	Copper	Mercury	Nickel	Lead	Silver	Zinc
MILLSITE									
SCM22	3a-1	Blue mussels (Mytilus Trossolus)	1.12	48.3	0.0450	0.984	0.368	0.122	123
SCC13	3a-2	Softshell clams (Mya Arenaria)	1.21	29.8	0.145	1.51	0.110	0.0591	134
SCC3A	3a-3	Softshell clams	1.95	48.0	0.140	2.78	0.442	0.0605	157
SCM9	3a-3	Blue mussels	1.37	22.8	0.101	1.48	0.404	0.0443	86.0
SCM4	3a-5	Blue mussels	0.813	10.7	0.0717	1.27	0.261	0.135	113
SCC1	3a-5	Little neck clams (Protothaca Staminea)	2.00	9.58	0.0597	6.95	0.257	0.0345	103
SCC2	3a-6	Little neck clams	0.812	13.2	0.0780	4.66	0.103	0.03	104
SCM5	3a-6	Blue mussels	0.862	11.6	0.0873	0.808	0.277	0.0598	88.9
CONTROL SITE									
SCC10	4-1	Little neck clams	0.980	5.32	0.0506	4.91	0.109	0.0842	101
SCC11	4-2	Little neck clams	1.20	5.44	0.0724	4.81	0.116	0.103	91.9
SCM18	4-2	Blue mussels	0.705	4.72	0.114	0.737	0.151	0.0733	81.9
SCC12	4-3	Softshell clams	0.897	5.31	0.0434	1.39	0.124	0.437	139
SCC6	4-4	Little neck clams	1.09	5.40	0.0482	5.24	0.115	0.127	90.6
SCM13	4-4	Blue mussels	0.821	4.08	0.0458	0.727	0.194	0.0772	80.2
SCM14	4-4	Blue mussels	0.716	4.23	0.0512	0.746	0.180	0.141	76.5
NOAA geometric mean		Blue mussels	NA	8.9	0.094	NA	1.8	NA	130

Appendix table 2.- Analytical results from sediment samples (results presented in ppm unless otherwise noted).

Sample #	Map #	Description	Chromium	Copper	Mercury	Nickel	Lead	Silver	Zinc
			MILLSITE						
SC66	3a-1	within tailings zone	137	501	0.185	30.3	3.30	0.234	87.5
SC71	3a-2	~ 125 feet from tailings	93.8	159	0.0308	28.3	3.80	0.132	71.7
SC49	3a-3	~ 350 feet from tailings	86.8	154	0.0342	27.8	3.42	0.130	80.9
SC47	3a-4	~ 350 feet from tailings	69.6	43.0	0.0354	20.1	3.42	0.0863	67.9
SC43	3a-5	~ 950 feet from tailings	66.6	121	0.303	22.5	3.62	0.134	61.3
SC44	3a-6	~ 1,750 feet from tailings	66.4	157	0.0544	19.1	3.39	0.168	64.5
			CONTROL SITE						
SC58	4-1	10.9 feet above MLLW	57.0	21.4	0.0072	14.7	2.71	0.0533	50.0
SC62	4-2	15.0 feet above MLLW	49.8	22.2	0.0181	18.5	3.01	0.0591	52.1
SC53	4-4	15.5 feet above MLLW	57.8	27.8	0.0183	13.5	2.07	0.0423	44.4
SC54	4-4	duplicate of sample SC53	47.7	23.1	0.0073	16.1	2.68	0.0910	46.4
Effects range low - ERL[1]			81	34	0.15	20.9	46.7	1.0	150
Effects range medium - ERM[1]			370	270	0.71	51.6	218	3.7	410

[1]Trace metal guidelines for sediments in marine and estuary environments (Long and others, 1995).
Bolded numbers refer to analytical values that exceed the ERM for a particular metal.

Appendix table 3.- Analytical results from 1995/1997 water samples.

Metal	WA01 (1995) main adit	WA02 (1995) downstream	WA03 (1995) background	WA04 (1997) Lake Ellen Creek; downstream	WA05 (1997) Lake Ellen Creek; upstream	WA06 (1997) same location as WA02	WA07 (1997) duplicate of WA06	WA08 (1997) same location as WA03	Alaska State Freshwater Criteria	National Toxics Rule
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	6 µg/l	14 µg/l
Arsenic	1.8 µg/l	ND	ND	ND	ND	ND	ND	ND	50 µg/l	0.18 µg/l
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	4 µg/l	
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	hardness dependent $e^{(0.7852[\ln \text{hardness}) - 3.490)}$	
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	11 µg/l	
Copper	60 µg/l	4.9 µg/l	ND	2.1 µg/l	3.1 µg/l	3.9 µg/l	4.9 µg/l	ND	hardness dependent $e^{(.8545 [\ln \text{hardness}) - 1.465)}$	
Lead	ND	ND	ND	ND	ND	ND	ND	ND	hardness dependent $e^{(1.273 [\ln \text{hardness}) - 4.705)}$	
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	0.012 µg/l	0.14 µg/l
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	hardness dependent $e^{(0.76 [\ln \text{hardness}] + 1.06)}$	
Selenium	11 µg/l	ND	ND	ND	ND	ND	ND	ND	35 µg/l	
Silver	ND	ND	ND	ND	ND	ND	ND	ND	0.12 µg/l	
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	2 µg/l	1.7 µg/l
Zinc	19 µg/l	11 µg/l	ND	ND	ND	ND	ND	ND	47 µg/l	
Hardness	91 mg/l	14 mg/l	13 mg/l	85 mg/l	95 mg/l	12 mg/l	ND	13 mg/l		

[1] bold numbers indicate exceedances relative to the standards depicted in this table.

Appendix table 4. - Analytical results from character samples of mill tailings (1995).

Sample Number	Map Number	Chromium	Copper	Mercury	Nickel	Lead	Silver	Zinc
SC28	3-1	49	979	0.050	14	< 2	0.8	44
SC11	3-2	36	1150	0.070	20	2	1.0	44
SC39	3-3	52	1485	0.060	19	4	0.6	50
SC12	3-4	27	3160	0.050	16	2	2.0	62
SC24	3-5	33	3880	0.090	16	58	2.0	66
SC33	3-6	37	1330	0.060	15	2	< 0.2	40
SC19	3-7	31	1475	0.030	16	4	0.2	40
SC13	3-8	20	3180	0.050	17	2	1.8	46
SC23	3-9	23	1255	0.070	17	< 2	0.6	60
SC37	3-10	31	2520	0.040	16	2	1.0	46
SC14	3-11	25	1135	0.030	16	< 2	< 0.2	52
SC20	3-12	54	737	0.010	14	2	0.2	36
SC32	3-13	28	637	0.040	16	2	< 0.2	50
SC9	3-14	36	1445	0.040	17	2	0.2	44
SC34	3-15	36	1085	0.080	17	2	0.2	58
SC15	3-16	34	1290	0.040	16	2	1.0	42
SC21	3-17	25	512	0.030	12	< 2	< 0.2	46
SC8	3-18	41	975	0.040	16	< 2	0.6	36
SC27	3-19	31	641	0.070	16	16	0.2	50
SC38	3-20	64	852	0.040	16	4	< 0.2	56
SC16	3-21	26	804	0.030	16	4	0.2	50
SC22	3-22	54	664	0.040	13	2	0.2	48
SC7	3-23	23	794	0.040	14	2	< 0.2	42
SC35	3-24	39	1080	0.040	15	2	0.6	56
SC31	3-25	66	677	0.060	15	8	< 0.2	50
SC17	3-26	24	751	0.090	16	2	0.4	60
SC18	3-26	17	721	0.080	16	2	0.2	56
SC26	3-27	39	769	0.050	14	2	0.2	52
SC3	3-28	31	672	0.070	12	2	< 0.2	60
SC29	3-29	29	1490	0.060	15	2	0.6	50
SC25	3-30	37	1290	0.040	15	6	0.4	56

Sample Number	Map Number	Chromium	Copper	Mercury	Nickel	Lead	Silver	Zinc
SC6	3-31	29	**653**	0.060	15	<2	0.2	54
SC36	3-32	28	**1240**	0.080	16	2	0.4	58
SC30	3-33	74	**803**	0.030	17	4	0.2	60
SC5	3-34	45	**1415**	0.020	18	<2	0.8	42
SC2	3-35	67	**452**	0.040	14	<2	<0.2	58
SC67	3-36	82	**80**	0.020	16	2	<0.2	68
SC4	3-37	70	**229**	0.050	14	2	<0.2	56
SC70	3-38	85	**53**	0.010	15	4	<0.2	70
SC68	3-39	74	**64**	0.010	14	4	<0.2	74
SC69	3-40	77	**39**	0.030	13	6	<0.2	50
SC1	3-41	83	**55**	0.020	12	2	<0.2	56
ERL guidelines		81	34	0.15	20.9	46.7	1.0	150

ERL - Effects range low guidelinesfor marine and estuary sediments, Long and others, 1995.
Bolded numbers refer to values that meet or exceed the ERL for that particular metal.

Appendix table 4a.- Analytical results from TCLP test (1995) (results given in mg/l).

Sam #	Map #	Cu	Zn	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
SC11	3-2	**0.75**	**0.48**	<0.50	0.08	<0.005	<0.01	<0.10	<0.002	<0.50	<0.01
SC24	3-5	**1.37**	**0.63**	<0.50	0.15	0.006	<0.01	<0.10	<0.002	<0.50	<0.01
SC21	3-17	**6.87**	**0.46**	<0.50	0.13	<0.005	<0.01	<0.10	<0.002	<0.50	<0.01
SC35	3-23	**1.73**	**0.54**	<0.50	0.16	<0.005	<0.01	<0.10	<0.002	<0.50	<0.01
Reg. Limit		NA	NA	5	100	1	5	5	0.2	1	5

Copper and zinc values are bolded for emphasis, but there are no regulatory limits for these metals in a TCLP test.

Appendix B.- Inventory examination summary report.

Background: The Salt Chuck Mine was discovered in 1905 and operated on a small scale (hand-sorted shipments) until 1915. A 30-ton per day mill was constructed in 1915 and an adit tunnel was driven 1,200 feet to intersect the orebody 300 feet below its surface exposure. Mill capacity was increased to 130 tons per day by 1923 and operations continued until 1926. Exploratory drilling was performed from 1929 until 1931, but production ceased during this time. In 1934 the Alaska Gold and Metals Company reopened the mine and production continued until 1941. Most of the ore mined at Salt Chuck was removed from three separate ore shoots contained within a large glory hole. Mineralized rock consists of gabbro and pyroxenite with bornite being the principal ore mineral. Chalcopyrite, pyrite, and magnetite are present in lesser quantities. Production from the mine totaled 326,000 tons of ore at an average grade of 0.95% copper, 0.063 oz/t palladium, 0.036 oz/t gold, and 0.17 oz/t silver. Copper recovery from the flotation mill averaged 85%. Several companies explored the Salt Chuck area in the 1980's and early 1990's, and established geophysical and geochemical grids to obtain targets for core-drilling operations. There are currently no active mining claims on the site. Bureau of Mines geologists evaluated the Salt Chuck for physical and chemical hazards on July 20, 21 and September 11, 14, and 15, 1995.

Main Features: Five mine workings were found during the current investigation including one adit and a tunnel (W1, W3), a large glory hole (W2) and two shafts (W4, W5). Two short adits are reportedly located 1,400 feet SW of the glory hole, but were not found during this investigation. W1 and W3 were found open and are 1,200 feet and 120 feet long, respectively. W1 is located at 100 feet elevation, about 1,200 feet from the millsite. The portal is partially caved and water is pooled to 3 feet deep, preventing a thorough examination. This working undercuts the glory hole from the SSE and was used mainly as a haulage level to bring ore to the mill. W3 intersects the glory hole from the NE at an elevation of 300 feet. This tunnel leads directly into the glory hole (and a 100-foot drop) and is located less than 200 yards from a well-traveled logging road. The glory hole measures nearly 250 feet by 175 feet at its widest points and is nearly 200 feet deep in its connection with W1 haulage adit. A trail encircles the perimeter of the glory hole. W4 and W5 are open shafts located less than 60 feet from the east edge of the glory hole. W4 has dimensions of 4 by 4 feet and is 6 to 8 feet deep. W5 is a corkscrew raise that connects with the 100-level of the mine about 200 feet below the rim of the glory hole. The opening for W5 is about 5 by 6 feet, but an overgrown pit that measures 15 by 20 feet envelops the actual working. A raise similar to W5 is found adjacent to the NW side of the glory hole, but it is very conspicuous.

Waste rock from the mine has been placed in 13 separate dumps distributed from the NE side of the glory hole to the millsite, almost 0.5 miles away. The dumps range in size from over 100 yd^3 (D9) to over 4,000 yd^3 (D12). A large amount of material was used to create the tramway bed leading from W1 to the millsite, but was not included in waste rock volume calculations. Most of the rock in the dumps is greater than cobble size (2"-6") and some dumps contain large boulders that become unstable when walked over. The dumps above the millsite (D2-D5) and

south of the glory hole (D12) are good examples of this. Hazards from unstable waste rock at D2 are compounded by the presence of a large gyratory crusher and the hollow foundation on which it is placed. There is a 2-by 3-foot-wide opening that drops into a 3 foot+ deep hole below the crusher located next to the trail leading down the dump. There are large pieces of rusty metal equipment on some of the dumps (D1, D3, D12, D13) which aggravate the physical hazard already generated by unstable footing.

There are at least 25 separate structures in various stages of disrepair at Salt Chuck (see map). The majority of these are in poor to bad shape and are lying in a heap of boards, planks, tarpaper, etc. Most of these structures are either clustered near the beach, along the tramway leading from W1 to the mill, upstream along the creek that flows past the portal of W1, or near the glory hole. Several of these structures appear to be cabin sites used to house and feed the workers (C7-C9, C11, C16-C19). There is also a large millsite (C25), a superintendent's house (C1), general office (C2), a blacksmith or machine shop (C15), and platforms used to load and transfer rock (C12, C23). Several piles of garbage were found near the cabin sites at the beach and along the creek. These contain bottles, tin cans, bed springs and frames, metal parts, electrical wire, toys, equipment, etc. A wide variety of equipment and debris is found along the tramway between the mill and the haulage adit. A complete list of the structures and possible uses is provided in the Region 1 form.

The millsite is the largest structure at Salt Chuck and is in poor to bad condition. Over one-half of the shell of the building is standing, but precariously at that. Pieces of the tin-siding flap in the breeze and parts of the building frame are likely to collapse. The east and south sides of the mill have completely collapsed, the floor has caved in and large piles of beams, boards, tin siding, heavy equipment and rusty metal pieces are present. The west side of the mill retains some structural integrity, and the floor that supported the main diesel engines is still largely intact, though holes in the wood planking are present. The upper portion of the mill framing is intact, but conveyor equipment is piled randomly amongst beams, planks and siding. The amount and size of equipment at the millsite is noteworthy and a full cultural assessment is warranted prior to any remediation effort. The area could be fenced off while a management decision is made.

Chemical hazards related to the soil and water pathways were evaluated at Salt Chuck. The Salt Chuck mill operated until 1941 and was powered by 4 separate banks of Fairbanks Morse diesel engines. These engines were placed on a concrete platform overlying a floor where fuel tanks are located. These tanks have rusted and corroded on the top, but it is not known if they are perforated on the bottom or sides. A thick, gooey sludge has accumulated on the floor beneath these tanks and a sample taken of this material (SO01) smelled strongly of petroleum. Analysis of this sample revealed high levels of diesel range organic contamination with TEPH readings approaching 16.3%. The side of the mill just west of the tanks is stained black and the soil here is similarly discolored. The sludge appeared to have migrated into the intertidal zone where a second soil sample was taken (SO02). Analysis of this sample revealed that the sludge was actually vegetative in origin and contained only 86 mg/kg TEPH. It is not known how much material has spilled. A follow up investigation would more precisely determine the quantity of

sludge material present and its extent. In addition, electrical power generated by these engines was used to operate machinery and electrify many of the structures throughout the mine complex. PCB's may have been used in power generation and distribution equipment (transformers), and a return visit to sample for PCB's is warranted.

A composite sample of mill tailings was taken directly in front of the mill (SO03). Analysis reveals high levels of copper (7.3%) and silver (43 ppm). There are two piles of mill tailings located west of the millsite, on opposite sides of the main creek that drains the site (D14, D15). Tailings were also found in the creek. Two samples were taken of this material (SO04, SO05) These tailings are virtually identical to the main tailings pile that covers an 800 by 1,000 foot area in the intertidal zone. Sample SO04 contained 1,085 ppm copper and 451 ppm vanadium. Sample SO05 contained 493 ppm copper and 219 ppm vanadium.

Tailings piled in the intertidal zone were thoroughly sampled (SC1-SC39) and leaching tests (TCLP) were also done. The TCLP tests detected copper and zinc in concentrations up to 6.87 mg/l and 0.63 mg/l, respectively. However, regulatory limits have not been established for these two metals. The tailings cover an area roughly 700 feet by 700 feet with depths ranging from 15 feet near mill and decreasing to less than one-foot thick near the main creek to the south. The majority of the tailings were devoid of life. Grasses, seaweed, mussels, and barnacles were found along the edges of the tailings, where the metal concentrations were much lower. Samples were taken to determine the extent of contamination and not the absolute depth and volume of contaminated material. Over half of the samples taken contained in excess of 1,080 ppm copper; the largest value obtained was 3,880 ppm copper. Anomalous amounts of gold and palladium were also found in the samples. A mathematical average of copper from all 39 samples was 1,184 ppm.

Water emanating from mine workings and subsequently flowing into the creek that drains the area was field screened (WFS1-WFS5) for pH, conductivity (µS), and temperature (°C). Background water quality was also tested/sampled. Field screening parameters ranged from pH 6.6 to 7.7, conductivity from 20 µS to 190 µS, and temperature from 6°C to 15.5°C. The water draining W1 had a pH of 7.7 and a conductivity of 190 µS (WFS1). This mine water mixes with water from the main creek less than 30 feet away (at the end of the open cut in front of the adit). A sample from this mixed water (WFS3) contained a pH of 7.0 and conductivity of 30 µS. The upstream water sample (WFS5) yielded the lowest pH of 6.6. Three samples were taken to determine total metals in the water (WA01-WA03). Samples were taken of water draining W1 (WA01), in addition to upstream (WA03) and downstream samples (WA02).

Analytical results from the water sampling disclose the presence of arsenic, copper, selenium, and zinc in varying quantities. The sample taken from water draining W1 contained 1.8 µg/l arsenic, 60 µg/l copper, 11 µg/l selenium, and 19 µg/l zinc at a hardness of 91 mg/l (measured as $CaCO_3$). The copper level exceeds the Alaska Freshwater standard for this metal. The arsenic concentration exceeds the National Toxics Rule standard for this metal. The selenium and zinc values are below established standards. The downstream sample (WA02) contained 4.9 µg/l

copper and 11 µg/l zinc at a hardness of 14. The copper concentration exceeds the Alaska Freshwater Criteria for this metal, and the zinc is well within established guidelines. The upstream sample (WA03) did not contain measurable quantities of any metals. The following table depicts this analytical information.

Sample Number	Sample Description	Metal	Alaska Freshwater Criteria	National Toxics Rule	Analytical results
KT3WA01	draining W1	As	50 µg/l	0.18 µg/l	1.8 µg/l
		Cu	10.9 µg/l at 91 hardness		60 µg/l at 91 hardness
		Se	35 µg/l		11 µg/l
		Zn	47 µg/l		19 µg/l
KT3WA02	downstream	Cu	2.2 µg/l at 14 hardness		4.9 µg/l at 14 hardness
		Zn	47 µg/l		11 µg/l

The mine water flowing from W1 should be diverted or buffered as it contains excessive copper that is contaminating downstream water. This stream supports minor fish populations and abundant frogs. Deer prints were seen along the banks of this creek. Salmon spawn in the larger creek located south of the mine site.

Hazards: There are many physical hazards present including dangerous mine openings, unstable waste rock dumps, over 25 structures in various stages of disrepair, and scattered metal parts, equipment, and debris. The portal of W1 is partially caved and water is pooled to 3 feet deep. W3 opens directly into the glory hole, about a 100-foot fall. W4 and W5 are open shafts located less than 60 feet from the east edge of the glory hole. W5 descends several hundred feet before it connects with the 100 level in W1. The majority of the structures are in poor to bad shape and are found lying in a heap of boards, planks, tarpaper, etc. The millsite is in especially bad condition and is the epitome of an attractive nuisance. Besides the physical hazard at the millsite, an unconfined oil-sludge spill was identified that has possibly spread into the intertidal zone. Copper concentrations up to 3,880 ppm were found in soil samples taken from tailings in the intertidal zone. TCLP tests indicated that copper and zinc are leaching from the tailings found in the intertidal zone. Downstream water samples contained copper in concentrations exceeding the Alaska Freshwater Criteria for this metal.

Mitigation Recommendations: The Salt Chuck Mine contains the widest array of mine-related artifacts found on USFS land in the Tongass. The site has historical significance in that it was the only hard-rock mine producing palladium in the U.S. in its time. The site is accessible by road, trail, and water, and there is evidence that people regularly visit the site. Obvious hazards requiring remediation include blocking the opening to the glory hole from the end of W3 tunnel

(fence); boarding up the opening to the corkscrew raise located east of the glory hole (W5); cleaning up the sludge and fuel spill at the millsite; erecting a fence around the millsite until a final determination can be made; and cleaning up the garbage and rusty equipment with no historical value. All of the other remains should be evaluated by a team of archaeologists and mining historians and the site should be restored and made into an interpretive site for the many visitors to Prince of Wales Island.

The water leaving W1 contains excessive copper and should be treated. There is little possibility of preventing water from entering this working as W2 (glory hole) collects water and funnels it into W1. The tailings are contaminated with copper and should be removed from this location.

Future Study Recommendations: Mine tailings placed in the intertidal zone contain high concentrations of copper. Leach tests revealed that copper and zinc are leaching into the marine environment, but regulatory limits have not been established for the these metals. Biological testing of benthic organisms is recommended to determine if bioaccumulation of copper is taking place in this portion of Karta Bay. Results from this study will determine if tailings removal is warranted.

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Laboratory Report

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Laboratory Report

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Sample # 951577 Sample ID KT3 WA01 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total	(EPA 200.9)	mg/l	ND				0.0005	04-oct-1995	evb	11-oct-1995	ddw
Arsenic by furnace - Total	(EPA 200.9)	mg/l	0.0018				0.0005	04-oct-1995	evb	06-oct-1995	ddw
Beryllium by furnace - Total	(EPA 200.9)	mg/l	ND				0.001	04-oct-1995	evb	09-oct-1995	ddw
Cadmium by furnace - Total	(EPA 200.9)	mg/l	ND				0.0002	04-oct-1995	evb	10-oct-1995	ddw
Chromium by flame - Total	(EPA 218.1)	mg/l	ND				0.02	04-oct-1995	evb	09-oct-1995	jrs
Copper by furnace - Total	(EPA 200.9)	mg/l	0.060			2	0.004	04-oct-1995	evb	12-oct-1995	ddw
Hardness as CaCO3, Titrimetric	(EPA 130.2)	mg/l	91				10			07-oct-1995	bnb
Mercury by CV - Total	(EPA 245.2)	ug/l	ND				0.2	26-sep-1995	chr	27-sep-1995	chr
Nickel by furnace - Total	(EPA 200.9)	mg/l	ND				0.01	04-oct-1995	evb	11-oct-1995	ddw
Lead by furnace - Total	(EPA 200.9)	mg/l	ND				0.002	04-oct-1995	evb	08-oct-1995	ddw
Antimony by furnace - Total	(EPA 200.9)	mg/l	ND				0.005	04-oct-1995	mac	09-oct-1995	ddw
Selenium by furnace - Total	(EPA 200.9)	mg/l	0.011				0.005	04-oct-1995	evb	09-oct-1995	ddw
Thallium by furnace - Total	(EPA 200.9)	mg/l	ND				0.001	04-oct-1995	evb	07-oct-1995	ddw
Zinc by flame - Total	(EPA 289.1)	mg/l	0.019				0.01	04-oct-1995	evb	09-oct-1995	jrs

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Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Mines
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 951577 Sample ID KT3 WA01 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00428	86
LCS2	Silver by furnace - Total	mg/l	0.005	0.00434	87
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00383	77
MSD	Silver by furnace - Total	mg/l	0.005	0.00410	82
LCS1	Arsenic by furnace - Total	mg/l	0.005	0.00471	94
LCS2	Arsenic by furnace - Total	mg/l	0.005	0.00489	98
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.005	0.00461	92
MSD	Arsenic by furnace - Total	mg/l	0.005	0.00504	101
LCS1	Beryllium by furnace - Total	mg/l	0.005	0.0050	100
LCS2	Beryllium by furnace - Total	mg/l	0.005	0.0048	96
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.005	0.0056	112
MSD	Beryllium by furnace - Total	mg/l	0.005	0.0058	116
LCS1	Cadmium by furnace - Total	mg/l	0.002	0.00203	102
LCS2	Cadmium by furnace - Total	mg/l	0.002	0.00189	94
MBLK	Cadmium by furnace - Total	mg/l	ND	ND	
MS	Cadmium by furnace - Total	mg/l	0.002	0.00180	90
MSD	Cadmium by furnace - Total	mg/l	0.002	0.00188	94
LCS1	Chromium by flame - Total	mg/l	0.2	0.185	92
LCS2	Chromium by flame - Total	mg/l	0.2	0.176	88
MBLK	Chromium by flame - Total	mg/l	ND	ND	
MS	Chromium by flame - Total	mg/l	0.2	0.196	98
MSD	Chromium by flame - Total	mg/l	0.2	0.199	100
LCS1	Copper by furnace - Total	mg/l	0.020	0.0227	114
LCS2	Copper by furnace - Total	mg/l	0.020	0.0210	105
MBLK	Copper by furnace - Total	mg/l	ND	ND	
MS	Copper by furnace - Total	mg/l	0.020	0.0209	104
MSD	Copper by furnace - Total	mg/l	0.020	0.0205	102
LCS1	Hardness as CaCO3, Titrimetric	mg/l	25	28.0	112

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U.S. Bureau of Mines
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 951577 Sample ID KT3 WA01 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Hardness as CaCO3, Titrimetric	mg/l	25	29.0	116
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	19.4	78
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	20.0	80
LCS1	Mercury by CV - Total	ug/l	2.0	2.31	116
LCS2	Mercury by CV - Total	ug/l	2.0	2.20	110
MBLK	Mercury by CV - Total	ug/l	ND	ND	
MS	Mercury by CV - Total	ug/l	2.0	2.19	110
MSD	Mercury by CV - Total	ug/l	2.0	2.35	118
LCS1	Nickel by furnace - Total	mg/l	0.04	0.0402	100
LCS2	Nickel by furnace - Total	mg/l	0.04	0.0388	97
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.04	0.0361	90
MSD	Nickel by furnace - Total	mg/l	0.04	0.0368	92
LCS1	Lead by furnace - Total	mg/l	0.02	0.0215	108
LCS2	Lead by furnace - Total	mg/l	0.02	0.0211	106
MBLK	Lead by furnace - Total	mg/l	ND	ND	
MS	Lead by furnace - Total	mg/l	0.02	0.0202	101
MSD	Lead by furnace - Total	mg/l	0.02	0.0209	104
LCS1	Antimony by furnace - Total	mg/l	0.05	0.0555	111
LCS2	Antimony by furnace - Total	mg/l	0.05	0.0526	105
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.05	0.0546	109
MSD	Antimony by furnace - Total	mg/l	0.05	0.0557	111
LCS1	Selenium by furnace - Total	mg/l	0.05	0.0523	105
LCS2	Selenium by furnace - Total	mg/l	0.05	0.0518	104
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.05	0.0535	107
MSD	Selenium by furnace - Total	mg/l	0.05	0.0553	111
LCS1	Thallium by furnace - Total	mg/l	0.010	0.00893	89
LCS2	Thallium by furnace - Total	mg/l	0.010	0.00891	89

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Laboratory Report

MONTGOMERY LABORATORIES
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Juneau, Alaska 99801
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U.S. Bureau of Mines
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 951577 Sample ID KT3 WA01 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Thallium by furnace - Total	mg/l	ND	ND	
MS	Thallium by furnace - Total	mg/l	0.010	0.00892	89
MSD	Thallium by furnace - Total	mg/l	0.010	0.00930	93
LCS1	Zinc by flame - Total	mg/l	0.1	0.090	90
LCS2	Zinc by flame - Total	mg/l	0.1	0.088	88
MBLK	Zinc by flame - Total	mg/l	ND	ND	
MS	Zinc by flame - Total	mg/l	0.1	0.090	90
MSD	Zinc by flame - Total	mg/l	0.1	0.090	90

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Laboratory Report

U.S. Bureau of Mines
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 951578 Sample ID KT3 WA02 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total	(EPA 200.9)	mg/l	ND				0.0005	04-oct-1995	evb	11-oct-1995	ddw
Arsenic by furnace - Total	(EPA 200.9)	mg/l	ND				0.0005	04-oct-1995	evb	06-oct-1995	ddw
Beryllium by furnace - Total	(EPA 200.9)	mg/l	ND				0.001	04-oct-1995	evb	09-oct-1995	ddw
Cadmium by furnace - Total	(EPA 200.9)	mg/l	ND				0.0002	04-oct-1995	evb	10-oct-1995	ddw
Chromium by flame - Total	(EPA 218.1)	mg/l	ND				0.02	04-oct-1995	evb	09-oct-1995	jrs
Copper by furnace - Total	(EPA 200.9)	mg/l	0.0049				0.002	04-oct-1995	evb	12-oct-1995	ddw
Hardness as CaCO3, Titrimetric	(EPA 130.2)	mg/l	14				10			07-oct-1995	bmb
Mercury by CV - Total	(EPA 245.2)	ug/l	ND				0.2	26-sep-1995	chr	27-sep-1995	chr
Nickel by furnace - Total	(EPA 200.9)	mg/l	ND				0.01	04-oct-1995	evb	11-oct-1995	ddw
Lead by furnace - Total	(EPA 200.9)	mg/l	ND				0.002	04-oct-1995	evb	08-oct-1995	ddw
Antimony by furnace - Total	(EPA 200.9)	mg/l	ND				0.005	04-oct-1995	evb	09-oct-1995	ddw
Selenium by furnace - Total	(EPA 200.9)	mg/l	ND				0.005	04-oct-1995	evb	09-oct-1995	ddw
Thallium by furnace - Total	(EPA 200.9)	mg/l	ND				0.001	04-oct-1995	evb	07-oct-1995	ddw
Zinc by flame - Total	(EPA 289.1)	mg/l	0.011				0.01	04-oct-1995	evb	09-oct-1995	jrs

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U.S. Bureau of Mines
Alaska Field Operations Center
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ATTN: Roger Baer

Sample # 951578 Sample ID KT3 WA02 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00428	86
LCS2	Silver by furnace - Total	mg/l	0.005	0.00434	87
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00383	77
MSD	Silver by furnace - Total	mg/l	0.005	0.00410	82
LCS1	Arsenic by furnace - Total	mg/l	0.005	0.00471	94
LCS2	Arsenic by furnace - Total	mg/l	0.005	0.00489	98
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.005	0.00461	92
MSD	Arsenic by furnace - Total	mg/l	0.005	0.00504	101
LCS1	Beryllium by furnace - Total	mg/l	0.005	0.0050	100
LCS2	Beryllium by furnace - Total	mg/l	0.005	0.0048	96
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.005	0.0056	112
MSD	Beryllium by furnace - Total	mg/l	0.005	0.0058	116
LCS1	Cadmium by furnace - Total	mg/l	0.002	0.00203	102
LCS2	Cadmium by furnace - Total	mg/l	0.002	0.00189	94
MBLK	Cadmium by furnace - Total	mg/l	ND	ND	
MS	Cadmium by furnace - Total	mg/l	0.002	0.00180	90
MSD	Cadmium by furnace - Total	mg/l	0.002	0.00188	94
LCS1	Chromium by flame - Total	mg/l	0.2	0.185	92
LCS2	Chromium by flame - Total	mg/l	0.2	0.176	88
MBLK	Chromium by flame - Total	mg/l	ND	ND	
MS	Chromium by flame - Total	mg/l	0.2	0.196	98
MSD	Chromium by flame - Total	mg/l	0.2	0.199	100
LCS1	Copper by furnace - Total	mg/l	0.020	0.0227	114
LCS2	Copper by furnace - Total	mg/l	0.020	0.0210	105
MBLK	Copper by furnace - Total	mg/l	ND	ND	
MS	Copper by furnace - Total	mg/l	0.020	0.0209	104
MSD	Copper by furnace - Total	mg/l	0.020	0.0205	102
LCS1	Hardness as CaCO3 Titrimetric	mg/l	25	28.0	112

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Laboratory Report

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Alaska Field Operations Center
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P.O. Box 20550
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ATTN: Roger Baer

Sample # 951578 Sample ID KT3 WA02 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Hardness as CaCO3, Titrimetric	mg/l	25	29.0	116
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	19.4	78
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	20.0	80
LCS1	Mercury by CV - Total	ug/l	2.0	2.31	116
LCS2	Mercury by CV - Total	ug/l	2.0	2.20	110
MBLK	Mercury by CV - Total	ug/l	ND	ND	
MS	Mercury by CV - Total	ug/l	2.0	2.19	110
MSD	Mercury by CV - Total	ug/l	2.0	2.35	118
LCS1	Nickel by furnace - Total	mg/l	0.04	0.0402	100
LCS2	Nickel by furnace - Total	mg/l	0.04	0.0388	97
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.04	0.0361	90
MSD	Nickel by furnace - Total	mg/l	0.04	0.0368	92
LCS1	Lead by furnace - Total	mg/l	0.02	0.0215	108
LCS2	Lead by furnace - Total	mg/l	0.02	0.0211	106
MBLK	Lead by furnace - Total	mg/l	ND	ND	
MS	Lead by furnace - Total	mg/l	0.02	0.0202	101
MSD	Lead by furnace - Total	mg/l	0.02	0.0209	104
LCS1	Antimony by furnace - Total	mg/l	0.05	0.0555	111
LCS2	Antimony by furnace - Total	mg/l	0.05	0.0526	105
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.05	0.0546	109
MSD	Antimony by furnace - Total	mg/l	0.05	0.0557	111
LCS1	Selenium by furnace - Total	mg/l	0.05	0.0523	105
LCS2	Selenium by furnace - Total	mg/l	0.05	0.0518	104
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.05	0.0535	107
MSD	Selenium by furnace - Total	mg/l	0.05	0.0553	111
LCS1	Thallium by furnace - Total	mg/l	0.010	0.00893	89
LCS2	Thallium by furnace - Total	mg/l	0.010	0.00891	89

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Laboratory Report

MONTGOMERY LABORATORIES
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U.S. Bureau of Mines
Alaska Field Operations Center
Juneau Branch
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Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 951578 Sample ID KT3 WA02 Project
Sample Type Water Sampled 14-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Thallium by furnace - Total	mg/l	ND	ND	
MS	Thallium by furnace - Total	mg/l	0.010	0.00892	89
MSD	Thallium by furnace - Total	mg/l	0.010	0.00930	93
LCS1	Zinc by flame - Total	mg/l	0.1	0.090	90
LCS2	Zinc by flame - Total	mg/l	0.1	0.088	88
MBLK	Zinc by flame - Total	mg/l	ND	ND	
MS	Zinc by flame - Total	mg/l	0.1	0.090	90
MSD	Zinc by flame - Total	mg/l	0.1	0.090	90

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MONTGOMERY LABORATORIES
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Laboratory Report

U.S. Bureau of Mines
Alaska Field Operations Center
Juneau Branch
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Juneau , AK 99802-0550
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Sample # 951579 Sample ID KT3 WA03 Project
Sample Type Water Sampled 15-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total	(EPA 200.9)	mg/l	ND				0.0005	04-oct-1995	evb	11-oct-1995	ddw
Arsenic by furnace - Total	(EPA 200.9)	mg/l	ND				0.0005	04-oct-1995	evb	06-oct-1995	ddw
Beryllium by furnace - Total	(EPA 200.9)	mg/l	ND				0.001	04-oct-1995	evb	09-oct-1995	ddw
Cadmium by furnace - Total	(EPA 200.9)	mg/l	ND				0.0002	04-oct-1995	evb	10-oct-1995	ddw
Chromium by flame - Total	(EPA 218.1)	mg/l	ND				0.02	04-oct-1995	evb	09-oct-1995	jrs
Copper by furnace - Total	(EPA 200.9)	mg/l	ND				0.002	04-oct-1995	evb	12-oct-1995	ddw
Hardness as CaCO3, Titrimetric	(EPA 130.2)	mg/l	13				10			07-oct-1995	bnb
Mercury by CV - Total	(EPA 245.2)	ug/l	ND				0.2	26-sep-1995	chr	27-sep-1995	chr
Nickel by furnace - Total	(EPA 200.9)	mg/l	ND				0.01	04-oct-1995	evb	11-oct-1995	ddw
Lead by furnace - Total	(EPA 200.9)	mg/l	ND				0.002	04-oct-1995	evb	08-oct-1995	ddw
Antimony by furnace - Total	(EPA 200.9)	mg/l	ND				0.005	04-oct-1995	evb	09-oct-1995	ddw
Selenium by furnace - Total	(EPA 200.9)	mg/l	ND				0.005	11-oct-1995	mac	10-oct-1995	ddw
Thallium by furnace - Total	(EPA 200.9)	mg/l	ND				0.001	04-oct-1995	evb	07-oct-1995	ddw
Zinc by flame - Total	(EPA 289.1)	mg/l	ND				0.01	04-oct-1995	evb	09-oct-1995	jrs

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Alaska Field Operations Center
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Sample # 951579 Sample ID KT3 WA03 Project
Sample Type Water Sampled 15-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00428	86
LCS2	Silver by furnace - Total	mg/l	0.005	0.00434	87
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00383	77
MSD	Silver by furnace - Total	mg/l	0.005	0.00410	82
LCS1	Arsenic by furnace - Total	mg/l	0.005	0.00471	94
LCS2	Arsenic by furnace - Total	mg/l	0.005	0.00489	98
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.005	0.00461	92
MSD	Arsenic by furnace - Total	mg/l	0.005	0.00504	101
LCS1	Beryllium by furnace - Total	mg/l	0.005	0.0050	100
LCS2	Beryllium by furnace - Total	mg/l	0.005	0.0048	96
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.005	0.0056	112
MSD	Beryllium by furnace - Total	mg/l	0.005	0.0058	116
LCS1	Cadmium by furnace - Total	mg/l	0.002	0.00203	102
LCS2	Cadmium by furnace - Total	mg/l	0.002	0.00189	94
MBLK	Cadmium by furnace - Total	mg/l	ND	ND	
MS	Cadmium by furnace - Total	mg/l	0.002	0.00180	90
MSD	Cadmium by furnace - Total	mg/l	0.002	0.00188	94
LCS1	Chromium by flame - Total	mg/l	0.2	0.185	92
LCS2	Chromium by flame - Total	mg/l	0.2	0.176	88
MBLK	Chromium by flame - Total	mg/l	ND	ND	
MS	Chromium by flame - Total	mg/l	0.2	0.196	98
MSD	Chromium by flame - Total	mg/l	0.2	0.199	100
LCS1	Copper by furnace - Total	mg/l	0.020	0.0227	114
LCS2	Copper by furnace - Total	mg/l	0.020	0.0210	105
MBLK	Copper by furnace - Total	mg/l	ND	ND	
MS	Copper by furnace - Total	mg/l	0.020	0.0209	104
MSD	Copper by furnace - Total	mg/l	0.020	0.0205	102
LCS1	Hardness as CaCO3, Titrimetric	mg/l	25	28.0	112

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Alaska Field Operations Center
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Sample # 951579 Sample ID KT3 WA03 Project _____
Sample Type Water Sampled 15-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Hardness as CaCO3, Titrimetric	mg/l	25	29.0	116
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	19.4	78
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	20.0	80
LCS1	Mercury by CV - Total	ug/l	2.0	2.31	116
LCS2	Mercury by CV - Total	ug/l	2.0	2.20	110
MBLK	Mercury by CV - Total	ug/l	ND	ND	
MS	Mercury by CV - Total	ug/l	2.0	2.19	110
MSD	Mercury by CV - Total	ug/l	2.0	2.35	118
LCS1	Nickel by furnace - Total	mg/l	0.04	0.0402	100
LCS2	Nickel by furnace - Total	mg/l	0.04	0.0388	97
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.04	0.0361	90
MSD	Nickel by furnace - Total	mg/l	0.04	0.0368	92
LCS1	Lead by furnace - Total	mg/l	0.02	0.0215	108
LCS2	Lead by furnace - Total	mg/l	0.02	0.0211	106
MBLK	Lead by furnace - Total	mg/l	ND	ND	
MS	Lead by furnace - Total	mg/l	0.02	0.0202	101
MSD	Lead by furnace - Total	mg/l	0.02	0.0209	104
LCS1	Antimony by furnace - Total	mg/l	0.05	0.0555	111
LCS2	Antimony by furnace - Total	mg/l	0.05	0.0526	105
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.05	0.0546	109
MSD	Antimony by furnace - Total	mg/l	0.05	0.0557	111
LCS1	Selenium by furnace - Total	mg/l	0.05	0.0523	105
LCS2	Selenium by furnace - Total	mg/l	0.05	0.0518	104
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.05	0.0535	107
MSD	Selenium by furnace - Total	mg/l	0.05	0.0553	111
LCS1	Thallium by furnace - Total	mg/l	0.010	0.00893	89
LCS2	Thallium by furnace - Total	mg/l	0.010	0.00891	89

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Laboratory Report

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Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Mines
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 951579 Sample ID KT3 WA03 Project
Sample Type Water Sampled 15-sep-1995 Received 18-sep-1995 Reported 18-oct-1995

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Thallium by furnace - Total	mg/l	ND	ND	
MS	Thallium by furnace - Total	mg/l	0.010	0.00892	89
MSD	Thallium by furnace - Total	mg/l	0.010	0.00930	93
LCS1	Zinc by flame - Total	mg/l	0.1	0.090	90
LCS2	Zinc by flame - Total	mg/l	0.1	0.088	88
MBLK	Zinc by flame - Total	mg/l	ND	ND	
MS	Zinc by flame - Total	mg/l	0.1	0.090	90
MSD	Zinc by flame - Total	mg/l	0.1	0.090	90

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Juneau, Alaska 99801
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Laboratory Report

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970870 Sample ID KT3 WA04 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total	(EPA 272.2)	mg/l	ND				0.0005	07-aug-1997	aes	11-aug-1997	saw
Arsenic by furnace - Total	(EPA 206.2)	mg/l	ND				0.0005	07-aug-1997	aes	14-aug-1997	saw
Beryllium by furnace - Total	(EPA 210.2)	mg/l	ND				0.001	07-aug-1997	aes	21-aug-1997	saw
Cadmium by furnace - Dissolved	(EPA 213.2)	mg/l	ND				0.0002			05-aug-1997	saw
Chromium by furnace-Dissolved	(EPA 218.2)	mg/l	ND				0.015			09-aug-1997	saw
Copper by furnace - Dissolved	(EPA 220.2)	mg/l	0.0021				0.002			09-aug-1997	saw
Diss.Hardness as CaCO3, Titr.	(EPA 130.2)	mg/l	85				10			01-aug-1997	saw
Hardness as CaCO3, Titrimetric	(EPA 130.2)	mg/l	86				10			01-aug-1997	saw
Mercury by CV - Dissolved	(EPA 245.1)	ug/l	ND				0.2	07-aug-1997	aes	31-jul-1997	ddw
Nickel by furnace - Total	(EPA 249.2)	mg/l	ND				0.01	07-aug-1997	aes	13-aug-1997	saw
Lead by furnace - Dissolved	(EPA 239.2)	mg/l	ND				0.002			05-aug-1997	saw
Antimony by furnace - Total	(EPA 204.2)	mg/l	ND				0.005	07-aug-1997	aes	19-aug-1997	saw
Selenium by furnace - Total	(EPA 270.2)	mg/l	ND				0.005	07-aug-1997	aes	20-aug-1997	saw
Thallium by furnace - total	(EPA 279.2)	mg/l	ND				0.001	07-aug-1997	aes	25-aug-1997	saw
Zinc by furnace - Total	(EPA 289.2)	mg/l	ND				0.007	07-aug-1997	aes	20-aug-1997	saw

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U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970872 Sample ID KT3 WA06 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00519	104
LCS2	Silver by furnace - Total	mg/l	0.005	0.00502	100
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00551	110
MSD	Silver by furnace - Total	mg/l	0.005	0.00499	100
LCS1	Arsenic by furnace - Total	mg/l	0.0250	0.0276	110
LCS2	Arsenic by furnace - Total	mg/l	0.0250	0.0266	106
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.0250	0.0255	102
MSD	Arsenic by furnace - Total	mg/l	0.0250	0.0248	99
LCS1	Beryllium by furnace - Total	mg/l	0.0025	0.00237	95
LCS2	Beryllium by furnace - Total	mg/l	0.0025	0.00249	100
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.0025	0.00239	96
MSD	Beryllium by furnace - Total	mg/l	0.0025	0.00244	98
LCS1	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00246	98
LCS2	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00265	106
MBLK	Cadmium by furnace - Dissolved	mg/l	ND	ND	
MS	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00276	110
MSD	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00231	92
LCS1	Chromium by furnace-Dissolved	mg/l	0.025	0.0262	105
LCS2	Chromium by furnace-Dissolved	mg/l	0.025	0.0269	108
MBLK	Chromium by furnace-Dissolved	mg/l	ND	ND	
MS	Chromium by furnace-Dissolved	mg/l	0.025	0.0287	115
MSD	Chromium by furnace-Dissolved	mg/l	0.025	0.0272	109
LCS1	Copper by furnace - Dissolved	mg/l	0.025	0.0243	97
LCS2	Copper by furnace - Dissolved	mg/l	0.025	0.0255	102
MBLK	Copper by furnace - Dissolved	mg/l	ND	ND	
MS	Copper by furnace - Dissolved	mg/l	0.025	0.0282	113
MSD	Copper by furnace - Dissolved	mg/l	0.025	0.0289	116
LCS1	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101

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Laboratory Report

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U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
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ATTN: Roger Baer

Sample # 970872 Sample ID KT3 WA06 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101
MBLK	Diss.Hardness as CaCO3, Titr.	mg/l	ND	ND	
MS	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.8	99
MSD	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.0	96
LCS1	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
LCS2	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	24.8	99
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	24.0	96
LCS1	Mercury by CV - Dissolved	ug/l	2.0	1.86	93
LCS2	Mercury by CV - Dissolved	ug/l	2.0	1.93	96
MBLK	Mercury by CV - Dissolved	ug/l	ND	ND	
MS	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
MSD	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
LCS1	Nickel by furnace - Total	mg/l	0.025	0.0259	104
LCS2	Nickel by furnace - Total	mg/l	0.025	0.0262	105
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.025	0.0265	106
MSD	Nickel by furnace - Total	mg/l	0.025	0.0257	103
LCS1	Lead by furnace - Dissolved	mg/l	0.025	0.0230	92
LCS2	Lead by furnace - Dissolved	mg/l	0.025	0.0247	99
MBLK	Lead by furnace - Dissolved	mg/l	ND	ND	
MS	Lead by furnace - Dissolved	mg/l	0.025	0.0241	96
MSD	Lead by furnace - Dissolved	mg/l	0.025	0.0238	95
LCS1	Antimony by furnace - Total	mg/l	0.025	0.0224	90
LCS2	Antimony by furnace - Total	mg/l	0.025	0.0232	93
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.025	0.0190	76
MSD	Antimony by furnace - Total	mg/l	0.025	0.0159	64
LCS1	Selenium by furnace - Total	mg/l	0.025	0.0276	110
LCS2	Selenium by furnace - Total	mg/l	0.025	0.0277	111

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Laboratory Report

MONTGOMERY LABORATORIES
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U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970872 Sample ID KT3 WA06 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.025	0.0302	121
MSD	Selenium by furnace - Total	mg/l	0.025	0.0290	116
LCS1	Thallium by furnace - total	mg/l	0.025	0.0245	98
LCS2	Thallium by furnace - total	mg/l	0.025	0.0245	98
MBLK	Thallium by furnace - total	mg/l	ND	ND	
MS	Thallium by furnace - total	mg/l	0.025	0.0250	100
MSD	Thallium by furnace - total	mg/l	0.025	0.0236	94
LCS1	Zinc by Furnace - Total	mg/l	0.110	0.142	129
LCS2	Zinc by Furnace - Total	mg/l	0.110	0.122	111
MBLK	Zinc by Furnace - Total	mg/l	ND	ND	
MS	Zinc by Furnace - Total	mg/l	0.010	0.0125	125
MSD	Zinc by Furnace - Total	mg/l	0.010	0.0120	120

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Laboratory Report

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970873 Sample ID KT3 WA07 Project

Sample Type Water Sampled 25-Jul-1997 Received 31-Jul-1997 Reported 28-Aug-1997

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total	(EPA 272.2)	mg/l	ND				0.0005	07-aug-1997	aes	11-aug-1997	saw
Arsenic by furnace - Total	(EPA 206.2)	mg/l	ND				0.0005	07-aug-1997	aes	14-aug-1997	saw
Beryllium by furnace - Total	(EPA 210.2)	mg/l	ND				0.001	07-aug-1997	aes	21-aug-1997	saw
Cadmium by furnace - Dissolved	(EPA 213.2)	mg/l	ND				0.0002			05-aug-1997	saw
Chromium by furnace-Dissolved	(EPA 218.2)	mg/l	ND				0.015			09-aug-1997	saw
Copper by furnace - Dissolved	(EPA 220.2)	mg/l	0.0049				0.002			09-aug-1997	saw
Diss.Hardness as CaCO3, Titr.	(EPA 130.2)	mg/l	ND				10			01-aug-1997	saw
Hardness as CaCO3, Titrimetric	(EPA 130.2)	mg/l	ND				10			01-aug-1997	saw
Mercury by CV - Dissolved	(EPA 245.1)	ug/l	ND				0.2	07-aug-1997	aes	31-jul-1997	ddw
Nickel by furnace - Total	(EPA 249.2)	mg/l	ND				0.01	07-aug-1997	aes	13-aug-1997	saw
Lead by furnace - Dissolved	(EPA 239.2)	mg/l	ND				0.002			07-aug-1997	saw
Antimony by furnace - Total	(EPA 204.2)	mg/l	ND				0.005	07-aug-1997	aes	19-aug-1997	saw
Selenium by furnace - Total	(EPA 270.2)	mg/l	ND				0.005	07-aug-1997	aes	20-aug-1997	saw
Thallium by furnace - total	(EPA 279.2)	mg/l	ND				0.001	07-aug-1997	aes	25-aug-1997	saw
Zinc by Furnace - Total	(EPA 289.2)	mg/l	ND				0.007	07-aug-1997	aes	20-aug-1997	saw

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Laboratory Report

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U.S. Bureau of Land Management
Alaska Field Operations Center
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ATTN: Roger Baer

Sample # 970873 Sample ID KT3 WA07 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00519	104
LCS2	Silver by furnace - Total	mg/l	0.005	0.00502	100
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00551	110
MSD	Silver by furnace - Total	mg/l	0.005	0.00499	100
LCS1	Arsenic by furnace - Total	mg/l	0.0250	0.0276	110
LCS2	Arsenic by furnace - Total	mg/l	0.0250	0.0264	106
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.0250	0.0255	102
MSD	Arsenic by furnace - Total	mg/l	0.0250	0.0248	99
LCS1	Beryllium by furnace - Total	mg/l	0.0025	0.00237	95
LCS2	Beryllium by furnace - Total	mg/l	0.0025	0.00249	100
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.0025	0.00239	96
MSD	Beryllium by furnace - Total	mg/l	0.0025	0.00244	98
LCS1	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00246	98
LCS2	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00265	106
MBLK	Cadmium by furnace - Dissolved	mg/l	ND	ND	
MS	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00276	110
MSD	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00231	92
LCS1	Chromium by furnace-Dissolved	mg/l	0.025	0.0262	105
LCS2	Chromium by furnace-Dissolved	mg/l	0.025	0.0269	108
MBLK	Chromium by furnace-Dissolved	mg/l	ND	ND	
MS	Chromium by furnace-Dissolved	mg/l	0.025	0.0287	115
MSD	Chromium by furnace-Dissolved	mg/l	0.025	0.0272	109
LCS1	Copper by furnace - Dissolved	mg/l	0.025	0.0243	97
LCS2	Copper by furnace - Dissolved	mg/l	0.025	0.0255	102
MBLK	Copper by furnace - Dissolved	mg/l	ND	ND	
MS	Copper by furnace - Dissolved	mg/l	0.025	0.0282	113
MSD	Copper by furnace - Dissolved	mg/l	0.025	0.0289	116
LCS1	Dis.Hardness as CaCO3, Titr.	mg/l	50	50.4	101

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Laboratory Report

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U.S. Bureau of Land Management
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Sample # 970873 Sample ID KT3 WA07 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101
MBLK	Diss.Hardness as CaCO3, Titr.	mg/l	ND	ND	
MS	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.8	99
MSD	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.0	96
LCS1	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
LCS2	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	24.8	99
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	24.0	96
LCS1	Mercury by CV - Dissolved	ug/l	2.0	1.86	93
LCS2	Mercury by CV - Dissolved	ug/l	2.0	1.93	96
MBLK	Mercury by CV - Dissolved	ug/l	ND	ND	
MS	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
MSD	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
LCS1	Nickel by furnace - Total	mg/l	0.025	0.0259	104
LCS2	Nickel by furnace - Total	mg/l	0.025	0.0262	105
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.025	0.0265	106
MSD	Nickel by furnace - Total	mg/l	0.025	0.0257	103
LCS1	Lead by furnace - Dissolved	mg/l	0.025	0.0265	106
LCS2	Lead by furnace - Dissolved	mg/l	0.025	0.0263	105
MBLK	Lead by furnace - Dissolved	mg/l	ND	ND	
MS	Lead by furnace - Dissolved	mg/l	0.025	0.0253	101
MSD	Lead by furnace - Dissolved	mg/l	0.025	0.0247	99
LCS1	Antimony by furnace - Total	mg/l	0.025	0.0224	90
LCS2	Antimony by furnace - Total	mg/l	0.025	0.0232	93
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.025	0.0190	76
MSD	Antimony by furnace - Total	mg/l	0.025	0.0159	64
LCS1	Selenium by furnace - Total	mg/l	0.025	0.0276	110
LCS2	Selenium by furnace - Total	mg/l	0.025	0.0277	111

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Laboratory Report

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Sample # 970873 Sample ID KT3 WA07 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.025	0.0302	121
MSD	Selenium by furnace - Total	mg/l	0.025	0.0290	116
LCS1	Thallium by furnace - total	mg/l	0.025	0.0245	98
LCS2	Thallium by furnace - total	mg/l	0.025	0.0245	98
MBLK	Thallium by furnace - total	mg/l	ND	ND	
MS	Thallium by furnace - total	mg/l	0.025	0.0250	100
MSD	Thallium by furnace - total	mg/l	0.025	0.0236	94
LCS1	Zinc by Furnace - Total	mg/l	0.110	0.142	129
LCS2	Zinc by Furnace - Total	mg/l	0.110	0.122	111
MBLK	Zinc by Furnace - Total	mg/l	ND	ND	
MS	Zinc by Furnace - Total	mg/l	0.010	0.0125	125
MSD	Zinc by Furnace - Total	mg/l	0.010	0.0120	120

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Laboratory Report

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Alaska Field Operations Center
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ATTN: Roger Baer

Sample # 970874 Sample ID KT3 WA08 Project
Sample Type Water Sampled 25-Jul-1997 Received 31-Jul-1997 Reported 28-Aug-1997

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total	(EPA 272.2)	mg/l	ND				0.0005	07-aug-1997	aes	11-aug-1997	saw
Arsenic by furnace - Total	(EPA 206.2)	mg/l	ND				0.0005	07-aug-1997	aes	14-aug-1997	saw
Beryllium by furnace - Total	(EPA 210.2)	mg/l	ND				0.001	07-aug-1997	aes	21-aug-1997	saw
Cadmium by furnace - Dissolved	(EPA 213.2)	mg/l	ND				0.0002			05-aug-1997	saw
Chromium by furnace-Dissolved	(EPA 218.2)	mg/l	ND				0.015			09-aug-1997	saw
Copper by furnace - Dissolved	(EPA 220.2)	mg/l	ND				0.002			09-aug-1997	saw
Diss.Hardness as CaCO3, Titr.	(EPA 130.2)	mg/l	ND				10			01-aug-1997	saw
Hardness as CaCO3, Titrimetric	(EPA 130.2)	mg/l	ND				10			01-aug-1997	saw
Mercury by CV - Dissolved	(EPA 245.1)	ug/l	ND				0.2	07-aug-1997	aes	31-jul-1997	ddw
Nickel by furnace - Total	(EPA 249.2)	mg/l	ND				0.01	07-aug-1997	aes	13-aug-1997	saw
Lead by furnace - Dissolved	(EPA 239.2)	mg/l	ND				0.002			07-aug-1997	saw
Antimony by furnace - Total	(EPA 204.2)	mg/l	ND				0.005	07-aug-1997	aes	19-aug-1997	saw
Selenium by furnace - Total	(EPA 270.2)	mg/l	ND				0.005	07-aug-1997	aes	20-aug-1997	saw
Thallium by furnace - total	(EPA 279.2)	mg/l	ND				0.001	07-aug-1997	aes	25-aug-1997	saw
Zinc by Furnace - Total	(EPA 289.2)	mg/l	ND				0.007	07-aug-1997	aes	20-aug-1997	saw

Report #: 35885

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Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970874 Sample ID KT3 WA08 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00519	104
LCS2	Silver by furnace - Total	mg/l	0.005	0.00502	100
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00551	110
MSD	Silver by furnace - Total	mg/l	0.005	0.00499	100
LCS1	Arsenic by furnace - Total	mg/l	0.0250	0.0276	110
LCS2	Arsenic by furnace - Total	mg/l	0.0250	0.0266	106
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.0250	0.0255	102
MSD	Arsenic by furnace - Total	mg/l	0.0250	0.0248	99
LCS1	Beryllium by furnace - Total	mg/l	0.0025	0.00237	95
LCS2	Beryllium by furnace - Total	mg/l	0.0025	0.00249	100
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.0025	0.00239	96
MSD	Beryllium by furnace - Total	mg/l	0.0025	0.00244	98
LCS1	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00246	98
LCS2	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00265	106
MBLK	Cadmium by furnace - Dissolved	mg/l	ND	ND	
MS	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00276	110
MSD	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00231	92
LCS1	Chromium by furnace-Dissolved	mg/l	0.025	0.0262	105
LCS2	Chromium by furnace-Dissolved	mg/l	0.025	0.0269	108
MBLK	Chromium by furnace-Dissolved	mg/l	ND	ND	
MS	Chromium by furnace-Dissolved	mg/l	0.025	0.0287	115
MSD	Chromium by furnace-Dissolved	mg/l	0.025	0.0272	109
LCS1	Copper by furnace - Dissolved	mg/l	0.025	0.0243	97
LCS2	Copper by furnace - Dissolved	mg/l	0.025	0.0255	102
MBLK	Copper by furnace - Dissolved	mg/l	ND	ND	
MS	Copper by furnace - Dissolved	mg/l	0.025	0.0282	113
MSD	Copper by furnace - Dissolved	mg/l	0.025	0.0289	116
LCS1	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101

Report #: 35885

Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970874 Sample ID KT3 WA08 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101
MBLK	Diss.Hardness as CaCO3, Titr.	mg/l	ND	ND	
MS	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.8	99
MSD	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.0	96
LCS1	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
LCS2	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	24.8	99
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	24.0	96
LCS1	Mercury by CV - Dissolved	ug/l	2.0	1.86	93
LCS2	Mercury by CV - Dissolved	ug/l	2.0	1.93	96
MBLK	Mercury by CV - Dissolved	ug/l	ND	ND	
MS	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
MSD	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
LCS1	Nickel by furnace - Total	mg/l	0.025	0.0259	104
LCS2	Nickel by furnace - Total	mg/l	0.025	0.0262	105
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.025	0.0265	106
MSD	Nickel by furnace - Total	mg/l	0.025	0.0257	103
LCS1	Lead by furnace - Dissolved	mg/l	0.025	0.0265	106
LCS2	Lead by furnace - Dissolved	mg/l	0.025	0.0263	105
MBLK	Lead by furnace - Dissolved	mg/l	ND	ND	
MS	Lead by furnace - Dissolved	mg/l	0.025	0.0253	101
MSD	Lead by furnace - Dissolved	mg/l	0.025	0.0247	99
LCS1	Antimony by furnace - Total	mg/l	0.025	0.0224	90
LCS2	Antimony by furnace - Total	mg/l	0.025	0.0232	93
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.025	0.0190	76
MSD	Antimony by furnace - Total	mg/l	0.025	0.0159	64
LCS1	Selenium by furnace - Total	mg/l	0.025	0.0276	110
LCS2	Selenium by furnace - Total	mg/l	0.025	0.0277	111

Report #: 35885

Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970874 Sample ID KT3 WA08 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.025	0.0302	121
MSD	Selenium by furnace - Total	mg/l	0.025	0.0290	116
LCS1	Thallium by furnace - total	mg/l	0.025	0.0245	98
LCS2	Thallium by furnace - total	mg/l	0.025	0.0245	98
MBLK	Thallium by furnace - total	mg/l	ND	ND	
MS	Thallium by furnace - total	mg/l	0.025	0.0250	100
MSD	Thallium by furnace - total	mg/l	0.025	0.0236	94
LCS1	Zinc by Furnace - Total	mg/l	0.110	0.142	129
LCS2	Zinc by Furnace - Total	mg/l	0.110	0.122	111
MBLK	Zinc by Furnace - Total	mg/l	ND	ND	
MS	Zinc by Furnace - Total	mg/l	0.010	0.0125	125
MSD	Zinc by Furnace - Total	mg/l	0.010	0.0120	120

Report #: 35885

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

Laboratory Report

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970875 Sample ID KT3 WA09 Project
Sample Type Water Sampled 23-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Parameter		Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total	(EPA 272.2)	mg/l	ND				0.0005	07-aug-1997	aes	11-aug-1997	saw
Arsenic by furnace - Total	(EPA 206.2)	mg/l	ND				0.0005	07-aug-1997	aes	14-aug-1997	saw
Beryllium by furnace - Total	(EPA 210.2)	mg/l	ND				0.001	07-aug-1997	aes	21-aug-1997	saw
Cadmium by furnace - Total	(EPA 213.2)	mg/l	ND				0.0002	07-aug-1997	aes	18-aug-1997	saw
Chromium by furnace - Total	(EPA 218.2)	mg/l	ND				0.015	07-aug-1997	aes	09-aug-1997	saw
Copper by furnace - Total	(EPA 220.2)	mg/l	ND				0.002	07-aug-1997	aes	09-aug-1997	saw
Hardness as CaCO3, Titrimetric	(EPA 130.2)	mg/l	ND				10			01-aug-1997	saw
Mercury by CV - Total	(EPA 245.1)	ug/l	ND				0.2	07-aug-1997	aes	31-jul-1997	ddw
Nickel by furnace - Total	(EPA 249.2)	mg/l	ND				0.01	07-aug-1997	aes	13-aug-1997	saw
Lead by furnace - Total	(EPA 239.2)	mg/l	ND				0.002	07-aug-1997	aes	21-aug-1997	saw
Antimony by furnace - Total	(EPA 204.2)	mg/l	ND				0.005	07-aug-1997	aes	19-aug-1997	saw
Selenium by furnace - Total	(EPA 270.2)	mg/l	ND				0.005	07-aug-1997	aes	20-aug-1997	saw
Thallium by furnace - Total	(EPA 279.2)	mg/l	ND				0.001	07-aug-1997	aes	25-aug-1997	saw
Zinc by Furnace - Total	(EPA 289.2)	mg/l	ND				0.007	07-aug-1997	aes	20-aug-1997	saw

Report #: 35885

Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
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907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970875 Sample ID KT3 WA09 Project
Sample Type Water Sampled 23-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00519	104
LCS2	Silver by furnace - Total	mg/l	0.005	0.00502	100
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00551	110
MSD	Silver by furnace - Total	mg/l	0.005	0.00499	100
LCS1	Arsenic by furnace - Total	mg/l	0.0250	0.0276	110
LCS2	Arsenic by furnace - Total	mg/l	0.0250	0.0266	106
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.0250	0.0255	102
MSD	Arsenic by furnace - Total	mg/l	0.0250	0.0248	99
LCS1	Beryllium by furnace - Total	mg/l	0.0025	0.00237	95
LCS2	Beryllium by furnace - Total	mg/l	0.0025	0.00249	100
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.0025	0.00239	96
MSD	Beryllium by furnace - Total	mg/l	0.0025	0.00244	98
LCS1	Cadmium by furnace - Total	mg/l	0.0025	0.00264	106
LCS2	Cadmium by furnace - Total	mg/l	0.0025	0.00272	109
MBLK	Cadmium by furnace - Total	mg/l	ND	ND	
MS	Cadmium by furnace - Total	mg/l	0.0025	0.00267	107
MSD	Cadmium by furnace - Total	mg/l	0.0025	0.00287	115
LCS1	Chromium by furnace - Total	mg/l	0.025	0.0267	107
LCS2	Chromium by furnace - Total	mg/l	0.025	0.0265	106
MBLK	Chromium by furnace - Total	mg/l	ND	ND	
MS	Chromium by furnace - Total	mg/l	0.025	0.0266	106
MSD	Chromium by furnace - Total	mg/l	0.025	0.0269	108
LCS1	Copper by furnace - Total	mg/l	0.025	0.0253	101
LCS2	Copper by furnace - Total	mg/l	0.025	0.0248	99
MBLK	Copper by furnace - Total	mg/l	ND	ND	
MS	Copper by furnace - Total	mg/l	0.025	0.0235	94
MSD	Copper by furnace - Total	mg/l	0.025	0.0243	97
LCS1	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101

Report #: 35885

Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970875 Sample ID KT3 WA09 Project
Sample Type Water Sampled 23-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	24.8	99
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	24.0	96
LCS1	Mercury by CV - Total	ug/l	2.0	1.86	93
LCS2	Mercury by CV - Total	ug/l	2.0	1.93	96
MBLK	Mercury by CV - Total	ug/l	ND	ND	
MS	Mercury by CV - Total	ug/l	2.0	2.24	112
MSD	Mercury by CV - Total	ug/l	2.0	2.24	112
LCS1	Nickel by furnace - Total	mg/l	0.025	0.0259	104
LCS2	Nickel by furnace - Total	mg/l	0.025	0.0262	105
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.025	0.0265	106
MSD	Nickel by furnace - Total	mg/l	0.025	0.0257	103
LCS1	Lead by furnace - Total	mg/l	0.025	0.0270	108
LCS2	Lead by furnace - Total	mg/l	0.025	0.0274	110
MBLK	Lead by furnace - Total	mg/l	ND	ND	
MS	Lead by furnace - Total	mg/l	0.025	0.0273	109
MSD	Lead by furnace - Total	mg/l	0.025	0.0255	102
LCS1	Antimony by furnace - Total	mg/l	0.025	0.0224	90
LCS2	Antimony by furnace - Total	mg/l	0.025	0.0232	93
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.025	0.0190	276
MSD	Antimony by furnace - Total	mg/l	0.025	0.0159	64
LCS1	Selenium by furnace - Total	mg/l	0.025	0.0276	110
LCS2	Selenium by furnace - Total	mg/l	0.025	0.0277	111
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.025	0.0302	121
MSD	Selenium by furnace - Total	mg/l	0.025	0.0290	116
LCS1	Thallium by furnace - total	mg/l	0.025	0.0245	98
LCS2	Thallium by furnace - total	mg/l	0.025	0.0245	98

Report #: 35885

Laboratory Report

MONTGOMERY LABORATORIES
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907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970875 Sample ID KT3 WA09 Project
Sample Type Water Sampled 23-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Thallium by furnace - total	mg/l	ND	ND	
MS	Thallium by furnace - total	mg/l	0.025	0.0250	100
MSD	Thallium by furnace - total	mg/l	0.025	0.0236	94
LCS1	Zinc by Furnace - Total	mg/l	0.110	0.142	129
LCS2	Zinc by Furnace - Total	mg/l	0.110	0.122	111
MBLK	Zinc by Furnace - Total	mg/l	ND	ND	
MS	Zinc by Furnace - Total	mg/l	0.010	0.0125	125
MSD	Zinc by Furnace - Total	mg/l	0.010	0.0120	120

Report #: 35885

Print Date 12/19/97

BATTELLE MARINE SCIENCES LABORATORY
1529 West Sequim Bay Road
Sequim, WA 98382-9099
360/681-3604

BUREAU OF LAND MANAGEMENT - JUNEAU, ALASKA
METALS IN TISSUE
(Samples Received 11/5/97)

(concentrations in µg/g - blank corrected)

MSL Code	Sponsor ID	Percent Dry Wt	Cr ICP-MS	Cu ICP-MS	Hg CVAF	Ni ICP-MS	Pb ICP-MS	Ag ICP-MS	Zn ICP-MS
1152-12	SCM4	10.6	0.813	10.7	0.0717	1.27	0.261	0.135	113
1152-13	SCM5	10.0	0.862	11.6	0.0873	0.808	0.277	0.0598	88.9
1152-14	SCM9	10.5	1.37	22.8	0.101	1.48	0.404	0.0443	86.0
1152-15	SCM13	9.58	0.821	4.08	0.0458	0.727	0.194	0.0772	80.2
1152-16r1	SCM13M	10.9	0.631	4.38	0.0438	0.758	0.153	0.0867	82.7
1152-16r2	SCM13M	10.9	0.717	4.54	0.0417	0.789	0.217	0.0932	79.5
1152-17	SCM14	9.26	0.716	4.23	0.0512	0.746	0.180	0.141	76.5
1152-18	SCM18	10.3	0.705	4.72	0.114	0.737	0.151	0.0733	81.9
1152-19	SCM22	6.38	1.12	48.3	0.0450	0.984	0.368	0.122	123
1152-20	SCC1	10.6	2.00	9.58	0.0597	6.95	0.257	0.0345	103
1152-21	SCC2	9.85	0.812	13.2	0.0780	4.66	0.103	0.03 U	104
1152-22	SCC6	10.4	1.09	5.40	0.0482	5.24	0.115	0.127	90.6
1152-23	SCC10	11.3	0.980	5.32	0.0506	4.91	0.109	0.0842	101
1152-24	SCC11	10.2	1.20	5.44	0.0724	4.81	0.116	0.103	91.9
1152-25	SCC3A	9.53	1.95	48.0	0.140	2.78	0.442	0.0605	157
1152-26	SCC12	7.41	0.897	5.31	0.0434	1.39	0.124	0.437	139
1152-27	SCC13	8.56	1.21	29.8	0.145	1.51	0.110	0.0591	134
Blank			0.490	0.05 U	0.001 U	0.03 U	0.0121 J	0.0287 J	0.3 U
DETECTION LIMIT			0.06	0.05	0.001	0.03	0.05	0.03	0.3

Approvals:

Project Manager — Date

QA/QC Officer — Date 12/19/97

Tissue

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BATTELLE MARINE SCIENCES LABORATORY
1529 West Sequim Bay Road
Sequim. WA 98382-9099
360/681-3604

BUREAU OF LAND MANAGEMENT - JUNEAU, ALASKA
METALS IN TISSUE
(Samples Received 11/5/97)

(concentrations in µg/g - blank corrected)

MSL Code	Sponsor ID	Percent Dry Wt	Cr ICP-MS	Cu ICP-MS	Hg CVAF	Ni ICP-MS	Pb ICP-MS	Ag ICP-MS	Zn ICP-MS
STANDARD REFERENCE MATERIAL									
1566a			1.43	57.8	0.0603	1.47	0.494	1.61	706
		certified value	1.43	66.3	0.0642	2.25	0.371	1.68	830
		range	±0.46	±4.3	±0.0067	±0.44	±0.014	±0.15	±57
		percent difference	**0%**	**13%**	**6%**	**35% #**	**33% #**	**4%**	**15%**
MATRIX SPIKE RESULTS									
Amount Spiked			5.00	5.00	5.00	5.00	5.00	5.00	5.00
1152-16	SCM13M	10.9	0.674	4.46	0.0428	0.774	0.185	0.0900	81.1
1152-16 MS			5.80	8.61	4.72	5.19	4.63	4.50	118
Amount Recovered			5.13	4.15	4.68	4.42	4.45	4.41	36.9
Percent Recovery			103%	83%	94%	88%	89%	88%	738% SL
REPLICATE ANALYSIS									
1152-16r1	SCM13M	10.9	0.631	4.38	0.0438	0.758	0.153	0.0867	82.7
1152-16r2	SCM13M	10.9	0.717	4.54	0.0417	0.789	0.217	0.0932	79.5
		RPD	**13%**	**4%**	**5%**	**4%**	**35% #**	**7%**	**4%**

J Reported below DL shown
U Not detected at or above DL shown
SL Inappropriate spike level
RPD Relative percent difference
Outside QC limits of ±25%

BATTELLE MARINE SCIENCES LABORATORY
1529 West Sequim Bay Road
Sequim, WA 98382-9099
360/681-3604

BUREAU OF LAND MANAGEMENT - JUNEAU, ALASKA
METALS IN SEDIMENT
(Samples Received 11/4/97)

MSL Code	Sponsor ID	Percent Dry Wt	Cr XRF (concentrations in µg/g - blank corrected)	Cu XRF	Hg CVAA	Ni XRF	Pb ICP-MS	Ag ICP-MS	Zn XRF
1152-1	SC43	70.1	66.6	121	0.303	22.5	3.62	0.134	61.3
1152-2	SC44	76.3	66.4	157	0.0544	19.1	3.39	0.168	64.5
1152-3	SC47	78.4	69.6	43.0	0.0354	20.1	3.42	0.0863	67.9
1152-4	SC49	84.2	86.8	154	0.0342	27.8	3.42	0.130	80.9
1152-5	SC53	68.7	57.8	27.8	0.0183	13.5	2.07	0.0423	44.4
1152-6r1	SC53M	63.2	41.5	27.3	0.0168	13.2	2.27	0.0465	47.0
1152-6r2	SC53M	63.2	42.4	24.9	0.0189	12.2	2.15	0.0351	42.1
1152-7	SC54	67.7	47.7	23.1	0.0073	16.1	2.68	0.0910	46.4
1152-8	SC58	80.7	57.0	21.4	0.0072	14.7	2.71	0.0533	50.0
1152-9	SC62	76.8	49.8	22.2	0.0181	18.5	3.01	0.0591	52.1
1152-10	SC66	63.8	137	501	0.185	30.3	3.30	0.234	87.5
1152-11	SC71	77.1	93.8	159	0.0308	28.3	3.80	0.132	71.7
Blank			NA	NA	0.0016 U	NA	0.03 U	0.02 U	NA
MDL			5	4	0.0016	2	0.03	0.02	2
STANDARD REFERENCE MATERIAL									
MESS 2			114	38.6	0.0996	47.5	19.7	0.232	171
	certified value		106	39.3	0.092	49.3	21.9	0.18	172
	range		±8.0	±2.0	±0.009	±1.8	±1.2	±0.02	±16
	percent difference		**8%**	**2%**	**8%**	**4%**	**10%**	**29%**	**1%**

Approvals:

Ed Kiesling — Project Manager — Date

R. Gill — QA/QC Officer — Date 12/19/97

Sediment

BATTELLE MARINE SCIENCES LABORATORY
1529 West Sequim Bay Road
Sequim, WA 98382-9099
360/681-3604

BUREAU OF LAND MANAGEMENT - JUNEAU, ALASKA
METALS IN SEDIMENT
(Samples Received 11/4/97)

(concentrations in µg/g - blank corrected)

MSL Code	Sponsor ID	Percent Dry Wt	Cr XRF	Cu XRF	Hg CVAA	Ni XRF	Pb ICP-MS	Ag ICP-MS	Zn XRF
MATRIX SPIKE RESULTS									
Amount Spiked			NA	NA	5.00	NA	5.00	5.00	NA
1156-6	SC53M	63.2	NA	NA	0.0179	NA	2.21	0.0408	NA
1152-6 MS			NA	NA	5.16	NA	7.28	4.61	NA
Amount Recovered			NA	NA	5.14	NA	5.07	4.57	NA
Percent Recovery			NA	NA	103%	NA	101%	91%	NA
REPLICATE ANALYSIS									
1152-6r1	SC53M	63.2	41.5	27.3	0.0168	13.2	2.27	0.0465	47.0
1152-6r2	SC53M	63.2	42.4	24.9	0.0189	12.2	2.15	0.0351	42.1
	RPD		**2%**	**9%**	**12%**	**8%**	**5%**	**28%**	**11%**

U Not detected at or above DL shown
NA Not applicable/available
RPD Relative percent difference

ANALYTICA ALASKA INC
811 W. 8th Avenue, Anchorage, AK 99501 • (907) 258-2155 • FAX (907) 258-6634

MONTGOMERY LABORATORIES
712 W 12TH STREET
JUNEAU, AK 99801

Attn: MS. DEBORAH BOYLEN

Order #: A5-09-107
Date: 10/24/95 11:16
Work ID: U.S. BUREAU OF MINES
Date Received: 09/28/95
Date Completed: 10/24/95

SAMPLE IDENTIFICATION

Sample Number	Client Description
01	KT3 S001
02	KT3 S002

Enclosed are the analytical results for the submitted samples. All analyses met quality assurance objectives, except where noted in the case narratives. If you have any questions regarding the analyses, please feel free to call.

Earl L. Crapps
Laboratory Supervisor

The EPH samples were extracted on 09/28/95. Due to the matrix and contamination level of sample KT3 S001, approximately 1 gram was used for the EPH extraction rather than the normal 40 grams per Analytica Alaska's SOP.

Sample KT3 S001 exhibits high levels of diesel range organic (C10-C28) contamination arising from a chromatographic pattern extending into the residual range and indicative of a heavier lubrication oil or grease type contaminant. Sample KT3 S002 shows a chromatographic pattern more indicative of vegetative organic type contamination.

The EPH surrogate recovery reported as not calculated (NC) is due to the contamination level of the sample and the required extract dilution, resulting in a surrogate concentration below the calibration range of the instrument.

All results are reported on a dry weight basis. The EPA recommended analytical and extraction holding times are met for all samples. The quality control (QC) data is from another sample set of similar matrix prepared and analyzed concurrently with your samples. The QC data are indicative of acceptable method and instrument performance, except as noted above. The method blank is within acceptable limits. The samples were received properly packed at 6° C and were refrigerated upon receipt.

Sample: 01A KT3 S001 Collected: 09/15/95 Matrix: SOIL

Test Description	Method	Result	Limit	Units	Analyzed
DRO\EPH in soil by AK102.	3550\AK102				
EPH	3550\AK102	163000	12000	mg/Kg	10/20/95
Surrogates, % Recovery					
o-Terphenyl		NC	Min: 50	Max: 150	

Sample: 02A KT3 S002 Collected: 09/15/95 Matrix: SOIL

Test Description	Method	Result	Limit	Units	Analyzed
DRO\EPH in soil by AK102.	3550\AK102				
EPH	3550\AK102	86	8.3	mg/Kg	10/20/95
Surrogates, % Recovery					
o-Terphenyl		79	Min: 50	Max: 150	

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers
994 Glendale Ave., Unit 3. Sparks
Nevada. U.S.A. 89431
PHONE: 702-356-5395 FAX: 702-355-0179

T _ J.S. BUREAU OF MINES **
ALASKA FIELD OPERATIONS CENTER
P.O. BOX 20550
JUNEAU, ALASKA
99802-0550

Project : CHATHAM AIM
Comments: ATTN: PETER BITTENBENDER**

Page Nur _ :1-A
Total Pag. :1
Certificate Date: 25-OCT-95
Invoice No. :19531113
P.O. Number :B4650067
Account :JOW

**PLEASE NOTE

CERTIFICATE OF ANALYSIS A9531113

SAMPLE	PREP CODE	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppb	K %	La ppm	Mg %	Mn ppm	Mo ppm
KT3S003	205 226	43.0	1.42	4	30	< 0.5	Intf*	1.27	1.0	25	21	>10000	9.56	< 10	130	0.07	< 10	1.18	440	2
KT3S004	205 226	0.6	1.74	2	20	< 0.5	< 2	1.61	< 0.5	26	50	1085	8.23	< 10	80	0.10	< 10	1.30	505	< 1
KT3S005	205 226	0.2	2.48	6	30	< 0.5	2	1.44	< 0.5	24	40	493	4.37	< 10	440	0.10	< 10	1.62	825	< 1

Chemex Labs, Inc.

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U.S. BUREAU OF MINES
ALASKA FIELD OPERATIONS CENTER
P.O. BOX 20550
JUNEAU, ALASKA
99802-0550

Project : CHATHAM AIM
Comments: ATTN: PETER BITTENBENDER

Page Number : 1-B
Total Pages : 1
Certificate Date: 25-OCT-95
Invoice No. : 19531113
P.O. Number : B4650067
Account : JOW

**PLEASE NOTE

CERTIFICATE OF ANALYSIS A9531113

SAMPLE	PREP CODE	Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
KT3S003	205 226	0.02	21	150	98	8	4	107	0.16	< 10	< 10	401	10	230
KT3S004	205 226	0.03	17	250	2	2	6	164	0.18	< 10	< 10	451	< 10	64
KT3S005	205 226	0.08	15	730	12	< 2	7	139	0.17	< 10	< 10	219	< 10	92
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

88

ANALYTICA
ENVIRONMENTAL
LABORATORIES
Analytica Group company

325 Interlocken Parkway
Suite 200
Broomfield, CO 80021
(303) 469-8868
(800) 873-8707
FAX: (303) 469-5254

Bureau of Land Management
Juneau Field Office
P.O. Box 20550
Juneau, AK 99802
Attn: Ken Maas

Order #: 97-08-061
Date: 08/28/97 13:24
Work ID: KETCHIKAN AIM
Date Received: 08/08/97
Date Completed: 08/27/97

SAMPLE IDENTIFICATION

Sample Number	Client Description	Sample Number	Client Description
01	KT8 SO02	05	KT8 SO06
02	KT8 SO03	06	KT8 SO07
03	KT8 SO04	07	KT8 SO08
04	KT8 SO05	08	KT3 SO10

Enclosed are the analytical results for the submitted sample(s). Please review the CASE NARRATIVE for a discussion of any data and/or quality control issues. A listing of data qualifiers and analytical codes is located on the TEST METHODOLOGIES page at the end of the report.

If you have any questions regarding the analyses, please feel free to call.

Sincerely,

Claire K. Toon

Claire K. Toon
Project Manager

Analytica Alaska, Inc.
811 W. 8th Ave. Anchorage, AK 99501 Phone-(907)258-2155 FAX-(907)258-663

tabular sample report - TRPH

AAI Project ID: **A708022**

Client: **MONTGOMERY LABORATORIES**

19-Aug-97

Project Name: **KETCHIKAN BLM**

Sample ID	Client Sample ID	Matrix	Total Recoverable Petroleum Hydrocarbons	Units
A708022-01	KT3SO06	SOIL	U (2600)	mg/Kg
A708022-02	KT3SO07	SOIL	9100 (3600)	mg/Kg
A708022-03	KT8SO09	SOIL	U (440)	mg/Kg

06

The number in parentheses is the reporting limit. "U" indicates analyte was not detected. "()" indicates analyte was not analyzed for. "J" indicates value is estimated.

Sample: 08A KT3 SO10 Collected: 07/25/97 Matrix: SOIL

Test Description	Method	Result	Q	Limit	Units	Analyzed
Antimony, Total	SW 7041	1.0		0.50	mg/Kg	08/26/97
Lead, Total	SW 7421	21	D	1.0	mg/Kg	08/20/97

THE FOLLOWING CODES APPLY TO THE ANALYTICAL REPORT

RESULT field...
ND = not detected at the reported limit
NA = analyte not applicable (see case narrative/methods for discussion)

Q (qualifier) field...
GENERAL:
* = Recovery or %RPD outside method specifications
H = value is estimated due to analysis run outside EPA holding times
E = reported concentration is above the instrument calibration range
D = analyte was diluted to bring within instrument calibration range or to remove matrix interferences

ORGANIC ANALYSIS DATA QUALIFIERS:
B = analyte was detected in the laboratory method blank
J = analyte was detected above the instrument detection limit (IDL) but below the analytical reporting limit (CRDL)

INORGANIC ANALYSIS DATA QUALIFIERS:
B = analyte was detected above the instrument detection limit (IDL) but below the analytical reporting limit (CRDL)
A = post digestion spike did not meet criteria (70-130%), therefore the reporting limit was raised by a factor of two to reflect spike failure
S = reported value determined by the Method of Standard Additions

HG_CTS:	MERCURY, Total (CVAA) prepared and analyzed according to EPA 245.5 and/or SW-846.	METHOD:245.5/7471
3050_G:	Acid Digestion of Sediments, Sludges, and Soils for GFAA Metals	METHOD: 3050A
3050_I:	Acid Digestion of Sediments, Sludges, and Soils for ICP Metals	METHOD: 3050A
AG_GTS:	SILVER, Total (GFAA)	METHOD: 3050/7761
AS_GTS:	ARSENIC, Total (GFAA)	METHOD: 7060
CD_GTS:	CADMIUM, Total (GFAA)	METHOD: 7131
PB_GTS:	LEAD, Total (GFAA)	METHOD: 7421
SB_GTS:	ANTIMONY, Total (GFAA)	METHOD: 7041
SE_GTS:	SELENIUM, Total (GFAA)	METHOD: 7740
TL_GTS:	THALLIUM, Total (GFAA)	METHOD: 7841
ICP_TS:	METALS, Total (ICP)	METHOD: 6010

MONTGOMERY LABORATORIES

5438 Shaune Dr.
Juneau, Alaska 99801
(907) 780-6668

SC

Laboratory Report

for

U.S. Bureau of Mines
P.O. Box 20550

Juneau, Alaska 99802

Attn: Roger Baer

MONTGOMERY WATSON
Analytical Testing Services

University Research Park
One Science Court
Madison, Wisconsin 53711
Tel: 608 231 4747 • Fax: 608 231 4777

METHOD REFERENCES

	Soil/Groundwater				Wastewater			
Analytes	ICP	Flame	Furnace	CV	ICP	Flame	Furnace	CV
Aluminium	6010	7020	-	-	200.7	202.1	-	-
Antimony	6010	7040	7041	-	200.7	-	204.2	-
Arsenic	6010	-	7060	-	200.7	-	206.2	-
Barium	6010	7080	7081	-	200.7	208.1	208.2	-
Beryllium	6010	7090	7091	-	200.7	210.1	210.2	-
Boron	6010	-	-	-	200.7	-	-	-
Cadmium	6010	7130	7131	-	200.7	213.1	213.2	-
Calcium	6010	7140		-	200.7	215.1	-	-
Chromium, Total	6010	7190	7191	-	200.7	218.1	218.2	-
Cobalt	6010	7200	-	-	200.7	219.1	-	-
Copper	6010	7210	-	-	200.7	220.1	-	-
Iron	6010	7380	-	-	200.7	236.1	-	-
Lead	6010	7420	7421	-	200.7	239.1	239.2	-
Magnesium	6010	7450	-	-	200.7	242.1	-	-
Manganese	6010	7460	-	-	200.7	243.1	-	-
Mercury	-	-	-	7470/7471				245.1
Molybdenum	6010	7480	-	-	200.7	246.1	-	-
Nickel	6010	7520	-	-	200.7	249.1	-	-
Potassium	-	SM3500D	-	-	-	SM3500D	-	-
Selenium	6010	-	7740	-	200.7	-	270.2	-
Silver	6010	7760	7761	-	200.7	272.1	272.2	-
Sodium	6010	SM3500D	-	-	200.7	SM3500D	-	-
Strontium	6010	-	-	-	200.7	-	-	-
Thallium	6010	7840	7841	-	200.7	279.1	279.2	-
Tin	6010	-	-	-	200.7	-	-	-
Titanium	6010	-	-	-	200.7	-	-	-
Vanadium	6010	7910	7911	-	200.7	286.1	286.2	-
Zinc	6010	7950	-	-	200.7	289.1	-	-

SW846, "Test Methods for Evaluating Solid Waste", 3rd Ed., December 1987.

EPA-600, "Methods for Chemical Analysis of Water and Wastes", March 1984.

Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.

MONTGOMERY WATSON
Analytical Testing Services

[illegible] Research Park
One Science Court
Madison, Wisconsin 53711
Tel: 608 231 4747 • Fax: 608 231 4777

TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11531-003
Description : #SC 11
Sample Date : 23-AUG-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Arsenic	5	< 0.50	0.50	98.0	11-SEP-95	
Barium	100	0.08	0.01	88.0	08-SEP-95	
Cadmium	1	< 0.005	0.005	94.0	08-SEP-95	
[illegible]romium, Total	5	< 0.01	0.01	96.0	08-SEP-95	
Lead	5	< 0.10	0.10	96.0	08-SEP-95	
Mercury	0.2	< 0.002	0.002	91.2	13-SEP-95	
Selenium	1	< 0.50	0.50	100.0	08-SEP-95	
Silver	5	< 0.01	0.01	79.0	08-SEP-95	

Chk'd: [illegible] App'd: CAW
Date App'd: 9/28/95

SOURCE CHARACTERIZATION FORM

STAINED SOILS

Number of areas:

Size*(s) 1) 75 C x 75 C - 10 12 areas

Size*(s) 2) 100 x 30

Size*(s) 3) 50 x 20 (minor NH) - no real staining

Size*(s) 4)

Size*(s) 5)

*Size = Estimate area or give dimensions

Method of measurement (pacing, metal tape measure, or reference):

tape / compass

Is the stained soil in a drainage ditch (pathway) leading off site? (explain):

minor iron-staining in unnamed stream. Most drainages on tailings pile

Source of contamination for each stained area (indicate by number):

tailings

Sample data:

Copper up to 3580 ppm

Accessibility (fenced):

no fencing present

Residents, school, daycare, or workers within 200 feet? (explain): NO

Comments:

biota samples reveal minimal bioavailability

capping may be most practical remediation technique

Photodocument and sketch areas of stained soils on site sketch.

MONTGOMERY WATSON LABORATORIES

Madison Division
1 Science Court
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Fax: 608 231 4777

TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11944-003
Description : SC 11
Sample Date : 23-JUL-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Copper	-	0.75	0.01	102.0	02-NOV-95	
Zinc	-	0.48	0.01	108.0	02-NOV-95	

Chk'd: [illegible] App'd: BAB
Date App'd: 11/8/95

Lab Certification ID#: 113138300

MONTGOMERY WATSON
Analytical Testing Services

University Research Park
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TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11531-004
Description : #SC 21
Sample Date : 23-AUG-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Arsenic	5	< 0.50	0.50	98.0	11-SEP-95	
Barium	100	0.13	0.01	88.0	08-SEP-95	
Cadmium	1	< 0.005	0.005	94.0	08-SEP-95	
Chromium, Total	5	< 0.01	0.01	96.0	08-SEP-95	
Lead	5	< 0.10	0.10	96.0	08-SEP-95	
Mercury	0.2	< 0.002	0.002	91.2	13-SEP-95	
Selenium	1	< 0.50	0.50	100.0	08-SEP-95	
Silver	5	< 0.01	0.01	79.0	08-SEP-95	

Chk'd: [illegible] App'd: CAW
Date App'd: 9/28/95
reissue

WI Lab Certification ID#: 113138300

TCLP - 4

MONTGOMERY WATSON LABORATORIES

Madison Division
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TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11944-004
Description : SC 21
Sample Date : 23-JUL-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Copper	-	6.87	0.01	102.0	02-NOV-95	
Zinc	-	0.46	0.01	108.0	02-NOV-95	

Chk'd: PD App'd: BAS
Date App'd: 11/8/95

AI Lab Certification ID#: 113138300

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TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11531-001
Description : #SC 24
Sample Date : 23-AUG-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Arsenic	5	< 0.50	0.50	98.0	11-SEP-95	
Barium	100	0.15	0.01	88.0	08-SEP-95	
[illegible]nium	1	0.006	0.005	94.0	08-SEP-95	
[illegible]romium, Total	5	< 0.01	0.01	96.0	08-SEP-95	
Lead	5	< 0.10	0.10	96.0	08-SEP-95	
Mercury	0.2	< 0.002	0.002	91.2	13-SEP-95	
Selenium	1	< 0.50	0.50	100.0	08-SEP-95	
Silver	5	< 0.01	0.01	79.0	08-SEP-95	

Chk'd: KK App'd: CAW
Date App'd: 9/25/95
reissued

WI Lab Certification ID#: 113138300

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TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11944-001
Description : SC 24
Sample Date : 23-JUL-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Copper	-	1.37	0.01	102.0	02-NOV-95	
	-	0.63	0.01	108.0	02-NOV-95	

Chk'd: [illegible] App'd: GAB
Date App'd: 11/8/95

// Lab Certification ID#: 113138300

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Analytical Testing Services

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TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11531-005
Description : #SC 35
Sample Date : 23-AUG-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Arsenic	5	< 0.50	0.50	98.0	11-SEP-95	
Barium	100	0.16	0.01	88.0	08-SEP-95	
Cadmium	1	< 0.005	0.005	94.0	08-SEP-95	
Chromium, Total	5	< 0.01	0.01	96.0	08-SEP-95	
Lead	5	< 0.10	0.10	96.0	08-SEP-95	
Mercury	0.2	< 0.002	0.002	91.2	13-SEP-95	
Selenium	1	< 0.50	0.50	100.0	08-SEP-95	
Silver	5	< 0.01	0.01	79.0	08-SEP-95	

Chk'd: Kate App'd: CAW
Date App'd: 9/28/95

WI Lab Certification ID#: 113138300

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1 Science Court
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TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)
METHOD 1311
INORGANIC REPORT

MONTGOMERY LABORATORIES-ALASKA

Project Number: 2229.0313

Lab Sample # : L11944-005
Description : SC 35
Sample Date : 23-JUL-95

Test	Regulatory Limit (mg/L)	Analytical Result (mg/L)	Reporting Limit (mg/L)	Matrix Spike Recovery (%)	Analysis Date	Footnote
Copper	-	1.73	0.01	102.0	02-NOV-95	
Zinc	-	0.54	0.01	108.0	02-NOV-95	

Chk'd: [illegible] App'd: BAB
Date App'd: 11/8/95

Chemex Labs, Inc.

Analytical Chemists * Geochemists * Registered Assayers
994 Glendale Ave., Unit 3, Sparks
Nevada, U.S.A. 89431
PHONE: 702-356-5395 FAX: 702-355-0179

To: U.S. BUREAU OF MINES
ALASKA FIELD OPERATIONS CENTER
P.O. BOX 20550
JUNEAU, ALASKA
99802-0550

Project : CHATHAM AIM
Comments: ATTN: PETER BITTENBENDER

Page number :1-A
Total pages :2
Certificate Date: 14-SEP-95
Invoice No. :19527122
P.O. Number :B4650067
Account :JOW

CERTIFICATE OF ANALYSIS A9527122

SAMPLE	PREP CODE		Au ppb AFS	Pt ppb AFS	Pd ppb AFS	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppb	K %	La ppm
SC-01	205	226	-----	-----	-----	< 0.2	2.08	8	40	< 0.5	< 2	4.93	< 0.5	8	83	55	2.92	< 10	20	0.17	< 10
SC-02	205	226	-----	-----	-----	< 0.2	1.85	6	30	< 0.5	2	1.97	< 0.5	19	67	452	5.10	< 10	40	0.14	< 10
SC-03	205	226	-----	-----	-----	< 0.2	1.70	6	20	< 0.5	2	6.76	< 0.5	19	31	672	4.29	< 10	70	0.08	< 10
SC-04	205	226	-----	-----	-----	< 0.2	1.91	8	20	< 0.5	< 2	1.24	< 0.5	13	70	>229	3.70	< 10	50	0.12	< 10
SC-05	205	226	-----	-----	-----	0.8	1.49	2	20	< 0.5	2	1.52	< 0.5	27	45	1415	10.80	< 10	20	0.12	< 10
SC-06	205	226	144	25	516	0.2	1.64	< 2	20	< 0.5	2	1.61	< 0.5	24	29	653	5.91	< 10	60	0.10	< 10
SC-07	205	226	172	35	654	< 0.2	1.28	4	10	< 0.5	< 2	1.38	< 0.5	24	23	794	6.82	< 10	40	0.08	< 10
SC-08	205	226	256	35	1030	0.6	1.48	2	20	< 0.5	< 2	1.88	< 0.5	24	41	975	9.46	< 10	40	0.11	< 10
SC-09	205	226	420	35	900	0.2	1.79	2	20	< 0.5	< 2	2.08	< 0.5	27	36	1445	9.43	< 10	40	0.13	< 10
SC-10	205	226	1390	60	1830	0.4	1.83	2	30	< 0.5	2	1.86	< 0.5	29	35	1880	9.68	< 10	40	0.15	< 10
SC-11	205	226	800	40	1520	1.0	1.49	2	20	< 0.5	< 2	1.52	< 0.5	31	36	1155	12.90	< 10	70	0.12	< 10
SC-12	205	226	546	35	800	2.0	2.29	< 2	30	< 0.5	< 2	2.52	< 0.5	27	27	3160	7.10	< 10	50	0.16	< 10
SC-13	205	226	364	40	888	1.8	1.67	< 2	20	< 0.5	< 2	2.19	< 0.5	26	20	3180	8.02	< 10	50	0.10	< 10
SC-14	205	226	182	30	580	< 0.2	1.91	2	20	< 0.5	< 2	2.42	< 0.5	26	25	1135	6.96	< 10	30	0.10	< 10
SC-15	205	226	230	40	1010	1.0	1.74	< 2	30	< 0.5	< 2	2.33	< 0.5	25	34	1290	8.95	< 10	40	0.15	< 10
SC-16	205	226	198	30	632	0.2	1.82	4	20	< 0.5	< 2	2.05	< 0.5	27	26	804	7.21	< 10	30	0.12	< 10
SC-17	205	226	144	25	496	0.4	2.17	2	30	< 0.5	< 2	2.42	< 0.5	29	24	751	6.73	< 10	90	0.14	< 10
SC-18	205	226	-----	-----	-----	0.2	1.96	8	20	< 0.5	< 2	2.52	< 0.5	28	17	721	6.99	< 10	80	0.13	< 10

CERTIFICATION: Laurent Blain

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ALASKA FIELD OPERATIONS CENTER
P.O. BOX 20550
JUNEAU, ALASKA
99802-0550

Project : CHATHAM AIM
Comments: ATTN: PETER BITTENBENDER

Page Number :1-B
Total Pages :2
Certificate Date: 14-SEP 9
Invoice No. :19527122
P.O. Number :B465006
Account :JOW

CERTIFICATE OF ANALYSIS A9527122

SAMPLE	PREP CODE		Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
SC-01	205	226	1.17	510	< 1	0.19	12	1300	2	< 2	6	357	0.13	< 10	< 10	112	< 10	56
SC-02	205	226	1.41	410	< 1	0.13	14	590	< 2	2	7	136	0.16	< 10	< 10	276	< 10	58
SC-03	205	226	1.38	510	< 1	0.15	12	660	2	< 2	5	489	0.14	< 10	< 10	223	< 10	60
SC-04	205	226	1.38	415	2	0.11	14	780	2	< 2	6	90	0.14	< 10	< 10	164	< 10	56
SC-05	205	226	1.21	410	< 1	0.06	18	290	< 2	< 2	7	125	0.18	< 10	< 10	635	< 10	42
SC-06	205	226	1.42	415	< 1	0.06	15	440	< 2	< 2	6	97	0.17	< 10	< 10	335	< 10	54
SC-07	205	226	1.10	360	< 1	0.04	14	250	2	< 2	5	94	0.15	< 10	< 10	397	< 10	42
SC-08	205	226	1.09	400	< 1	0.07	16	180	< 2	< 2	8	171	0.16	< 10	< 10	558	< 10	36
SC-09	205	226	1.33	455	< 1	0.05	17	240	2	< 2	9	204	0.18	< 10	< 10	551	< 10	44
SC-10	205	226	1.33	445	< 1	0.04	15	250	4	< 2	8	199	0.20	< 10	< 10	590	< 10	46
SC-11	205	226	1.17	440	< 1	0.04	20	210	2	< 2	7	144	0.20	< 10	< 10	601	< 10	44
SC-12	205	226	1.55	495	< 1	0.05	16	250	2	< 2	9	203	0.18	< 10	< 10	407	< 10	62
SC-13	205	226	1.31	425	< 1	0.04	17	210	2	< 2	7	105	0.16	< 10	< 10	464	< 10	46
SC-14	205	226	1.52	450	< 1	0.04	16	300	< 2	< 2	7	153	0.18	< 10	< 10	400	< 10	52
SC-15	205	226	1.39	450	< 1	0.07	16	220	2	< 2	10	178	0.18	< 10	< 10	540	< 10	42
SC-16	205	226	1.41	450	< 1	0.04	16	280	4	< 2	7	153	0.18	< 10	< 10	423	< 10	50
SC-17	205	226	1.70	520	< 1	0.05	16	330	2	< 2	9	186	0.21	< 10	< 10	399	< 10	60
SC-18	205	226	1.58	510	< 1	0.04	16	320	2	< 2	8	168	0.19	< 10	< 10	391	< 10	56

CERTIFICATION: Jurgen Bain

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Project : CHATHAM AIM
Comments: ATTN: PETER BITTENBENDER

Page Number :2-A
Total Pages :2
Certificate Date: 14-SEP-95
Invoice No. :19527122
P.O. Number :B465006
Account :JOW

CERTIFICATE OF ANALYSIS A9527122

SAMPLE	PREP CODE		Au ppb AFS	Pt ppb AFS	Pd ppb AFS	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppb	K %	La ppm
SC-19	205	226	380	30	1120	0.2	1.69	2	30	< 0.5	2	1.81	< 0.5	26	31	1475	8.83	< 10	30	0.15	< 10
SC-20	205	226	-----	-----	-----	0.2	1.68	4	30	< 0.5	< 2	1.85	< 0.5	23	54	737	7.21	< 10	10	0.13	< 10
SC-21	205	226	-----	-----	-----	< 0.2	1.84	2	40	< 0.5	2	2.13	< 0.5	25	25	512	5.66	< 10	30	0.18	< 10
SC-22	205	226	-----	-----	-----	0.2	1.83	8	30	< 0.5	< 2	1.89	< 0.5	24	54	664	6.01	< 10	40	0.15	< 10
SC-23	205	226	-----	-----	-----	0.6	1.92	4	30	< 0.5	< 2	2.14	< 0.5	30	23	1255	7.05	< 10	70	0.14	< 10
SC-24	205	226	858	55	1230	2.0	1.85	4	30	< 0.5	< 2	1.70	< 0.5	29	33	3880	7.34	< 10	90	0.12	< 10
SC-25	205	226	-----	-----	-----	0.4	1.81	4	20	< 0.5	< 2	1.74	< 0.5	26	37	1290	7.08	< 10	40	0.12	< 10
SC-26	205	226	256	35	816	0.2	1.72	2	20	< 0.5	< 2	1.60	< 0.5	25	39	769	6.67	< 10	50	0.11	< 10
SC-27	205	226	214	20	514	0.2	1.55	2	20	< 0.5	2	1.37	< 0.5	26	31	641	6.81	< 10	70	0.09	< 10
SC-28	205	226	788	45	1900	0.8	1.96	6	40	< 0.5	< 2	2.06	< 0.5	25	49	979	6.98	< 10	50	0.18	< 10
SC-29	205	226	208	40	782	0.6	1.75	< 2	20	< 0.5	2	1.87	< 0.5	26	29	1490	6.26	< 10	60	0.10	< 10
SC-30	205	226	-----	-----	-----	0.2	2.73	6	50	< 0.5	< 2	2.16	< 0.5	20	74	803	6.23	< 10	30	0.22	< 10
SC-31	205	226	-----	-----	-----	< 0.2	1.94	2	30	< 0.5	2	2.16	< 0.5	24	66	677	6.84	< 10	60	0.16	< 10
SC-32	205	226	-----	-----	-----	< 0.2	1.48	2	20	< 0.5	2	1.28	< 0.5	25	28	637	7.37	< 10	40	0.09	< 10
SC-33	205	226	394	45	1310	< 0.2	1.64	2	30	< 0.5	2	1.76	< 0.5	25	37	1330	8.16	< 10	60	0.13	< 10
SC-34	205	226	186	35	716	0.2	1.78	2	20	< 0.5	< 2	1.80	< 0.5	30	36	1085	7.31	< 10	80	0.11	< 10
SC-35	205	226	148	20	628	0.6	2.00	4	30	< 0.5	< 2	2.24	< 0.5	28	39	1080	6.43	< 10	40	0.17	< 10
SC-36	205	226	188	30	576	0.4	1.76	4	20	< 0.5	< 2	1.88	< 0.5	30	28	1240	6.44	< 10	80	0.11	< 10
SC-37	205	226	712	40	1350	1.0	2.02	6	30	< 0.5	< 2	2.38	< 0.5	28	31	2520	8.55	< 10	40	0.17	< 10
SC-38	205	226	-----	-----	-----	< 0.2	2.18	6	30	< 0.5	< 2	2.04	< 0.5	27	64	852	7.25	< 10	40	0.17	< 10
SC-39	205	226	3560	35	1880	0.6	1.94	< 2	40	< 0.5	2	2.19	< 0.5	31	52	1485	10.60	< 10	60	0.17	< 10

CERTIFICATION: Laurent Bilodeau

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Project : CHATHAM AIM
Comments: ATTN: PETER BITTENBENDER

Page Number :2-B
Total Pages :2
Certificate Date: 14-SEP-95
Invoice No. :I9527122
P.O. Number :B4650067
Account :JOW

CERTIFICATE OF ANALYSIS A9527122

SAMPLE	PREP CODE		Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
SC-19	205	226	1.20	400	< 1	0.04	16	210	4	< 2	8	190	0.16	< 10	< 10	562	< 10	40
SC-20	205	226	1.16	365	< 1	0.04	14	220	2	< 2	8	150	0.15	< 10	< 10	456	< 10	36
SC-21	205	226	1.43	405	< 1	0.06	12	240	< 2	< 2	9	173	0.16	< 10	< 10	372	< 10	46
SC-22	205	226	1.47	400	< 1	0.08	13	280	2	< 2	9	166	0.17	< 10	< 10	391	< 10	48
SC-23	205	226	1.71	480	< 1	0.06	17	320	< 2	< 2	9	121	0.20	< 10	< 10	458	< 10	60
SC-24	205	226	1.59	440	< 1	0.06	16	410	58	< 2	7	114	0.19	< 10	< 10	465	< 10	66
SC-25	205	226	1.50	410	1	0.10	15	350	6	< 2	8	141	0.19	< 10	< 10	446	< 10	56
SC-26	205	226	1.41	400	< 1	0.07	14	310	2	< 2	7	140	0.18	< 10	< 10	419	< 10	52
SC-27	205	226	1.32	370	1	0.04	16	300	16	< 2	6	113	0.17	< 10	< 10	430	< 10	50
SC-28	205	226	1.53	435	< 1	0.06	14	310	< 2	< 2	11	215	0.18	< 10	< 10	439	< 10	44
SC-29	205	226	1.40	400	< 1	0.07	15	290	2	< 2	7	134	0.17	< 10	< 10	392	< 10	50
SC-30	205	226	1.66	495	< 1	0.13	17	660	4	< 2	11	243	0.18	< 10	< 10	368	< 10	60
SC-31	205	226	1.48	420	< 1	0.08	15	260	8	< 2	10	208	0.17	< 10	< 10	438	< 10	50
SC-32	205	226	1.27	365	1	0.07	16	310	2	< 2	6	101	0.17	< 10	< 10	467	< 10	50
SC-33	205	226	1.19	385	< 1	0.06	15	190	2	< 2	8	194	0.16	< 10	< 10	516	< 10	40
SC-34	205	226	1.59	445	< 1	0.06	17	360	2	< 2	8	118	0.20	< 10	< 10	469	< 10	58
SC-35	205	226	1.67	455	< 1	0.08	15	310	2	< 2	10	166	0.19	< 10	< 10	413	< 10	56
SC-36	205	226	1.59	430	< 1	0.04	16	310	2	< 2	7	117	0.19	< 10	< 10	408	< 10	58
SC-37	205	226	1.49	460	< 1	0.06	16	250	2	< 2	10	213	0.18	< 10	< 10	543	< 10	46
SC-38	205	226	1.66	465	< 1	0.13	16	530	4	< 2	11	190	0.19	< 10	< 10	448	< 10	56
SC-39	205	226	1.55	490	< 1	0.08	19	270	4	< 2	11	205	0.21	< 10	< 10	684	< 10	50

CERTIFICATION: Laurent Bilodeau

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Project :
Comments: ATTN: KEN MAAS

Page Number :1-B
Total Pages :1
Certificate Date: 05-OCT-97
Invoice No. :19744722
P.O. Number :
Account :JOW

CERTIFICATE OF ANALYSIS A9744722

SAMPLE	PREP CODE	Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
SC 67	214 229	0.27	16	1250	2	< 2	6	98	0.16	< 10	< 10	163	< 10	68
SC 68	214 229	0.27	14	930	4	< 2	6	88	0.16	< 10	< 10	161	< 10	74
SC 69	214 229	0.30	13	740	6	2	4	65	0.12	< 10	< 10	95	< 10	50
SC 70	214 229	0.27	15	1460	4	< 2	6	95	0.15	< 10	< 10	132	< 10	70

CERTIFICATION: Stuart Buchler

109

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Account :JOW

CERTIFICATE OF ANALYSIS A9744722

SAMPLE	PREP CODE	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppb	K %	La ppm	Mg %	Mn ppm	Mo ppm
SC 67	214 229	< 0.2	2.57	12	30	< 0.5	< 2	1.21	0.5	15	82	80	4.01	< 10	20	0.12	< 10	1.61	870	3
SC 68	214 229	< 0.2	2.55	6	30	< 0.5	< 2	1.57	0.5	15	74	64	3.89	< 10	10	0.12	< 10	1.72	590	< 1
SC 69	214 229	< 0.2	1.83	2	20	< 0.5	< 2	1.07	0.5	9	77	39	2.59	< 10	30	0.11	< 10	1.21	430	1
SC 70	214 229	< 0.2	2.48	6	30	< 0.5	< 2	1.28	0.5	15	85	53	3.89	< 10	10	0.14	< 10	1.70	690	< 1

CERTIFICATION: Stewart Bichlmaier

Appendix C

Appendix C. - Field Notes and Original Analytical Data.

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907-780-6668

CHAIN OF CUSTODY/TRANSMITTAL RECORD

PAGE 1 OF 1

CUSTODY SEAL? YES NO

PROJECT NAME: Ketchikan MM

SAMPLER(S): Ken Maas

PHONE#: 364-1559

ADDRESS: PO Box 20550 Juneau, AK 99802

ANALYSIS REQUIRED

GROUP # 35885 (lab use only)

TIME	DATE	SITE DESCRIPTION/IDENTIFIER	MATRIX	NUMBER OF CONTAINERS	TPH	Cu, Cd, Cr, Pb, Hg	Sb, Be, Ni, As, Se, Ag, Tl, Zn	hardness	13 priority pollutant plus Lab duplicates + tracks	LAB #	COMMENTS
825	7/25/97	KT3 S006	soil	1	X						
900	7/25/97	KT3 S007	soil	1	X						
1410	7/25/97	KT3 WA04(F)	water	1		X		X		970870	HNO3 added
1415	"	KT3 WA04	water	1			X	X		970870	
1445	7/25/97	KT3 WA05(F)	water	1		X		X		970871	
1450	7/25/97	KT3 WA05	water	1			X	X		970871	
1510	7/25/97	KT3 WA06(F)	water	1		X		X		970872	
1515	7/25/97	KT3 WA06	water	1			X	X		970872	
1530	7/25/97	KT3 WA07(F)	water	1		X		X		970873	
1535	7/25/97	KT3 WA07	water	1			X	X		970873	
1600	7/25/97	KT3 WA08(F)	water	1		X		X		970874	take matrix spike from this
1605	7/25/97	KT3 WA08	water	1			X	X		970874	take matrix spike from this
1510	7/23/97	KT3 WA09	water	1					X	970875	↓

RELINQUISHED BY: (signature)	DATE	TIME	RECEIVED BY: (signature)	DATE	TIME	CUSTODY SEAL INTACT?	COMMENTS
[signature]	7/31/97	13:30	Michelle Bonnet	7/31/97	1338	YES NO	Hand-delivered
RELINQUISHED BY: (signature)			RECEIVED BY: (signature)			CUSTODY SEAL INTACT? YES NO	
RELINQUISHED BY: (signature)			RECEIVED BY: (signature)			CUSTODY SEAL INTACT? YES NO	
RELINQUISHED BY: (signature)			RECEIVED BY: (signature)			CUSTODY SEAL INTACT? YES NO	
RELINQUISHED BY: (signature)			RECEIVED BY: (signature)			CUSTODY SEAL INTACT? YES NO	

*COMMENTS should include condition of samples or kit upon receipt, temperature, shipping method, etc.

Kenai Alaska Salt Chuck KT 3 7/23/97

KM/DC/SJ 1/43

Sun w/ photo 6C

water sample WA66

bio samples SCBC 1 (butter clam)

bio samples SCM 1 (mussels)

intertidal sed sample SCS040

replinds TH SC06

weather: low clouds, rain, slight breeze from SE temp in 60's

been raining for several days

7:10 leave Tenakee for Kasta Bay

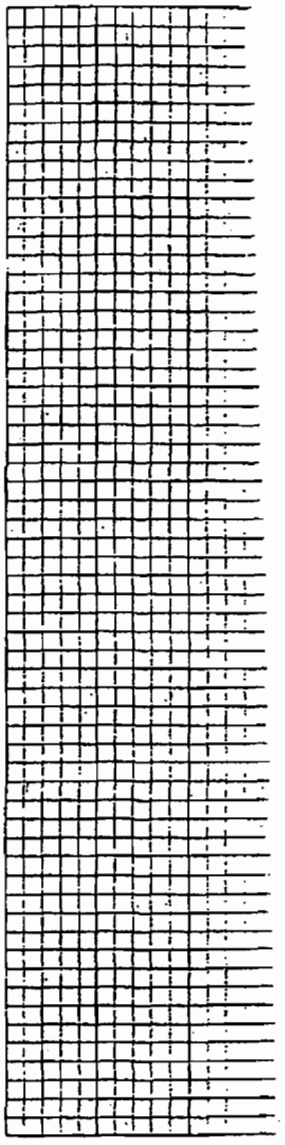
7:30 arrive Kasta Bay

looked at local area for possible background zones

8:00 mobilize gear under mild rain and take a recon walk to survey pt A where we re-established a base for shellfish sampling

8:10 walked out toward SC1 pt to view density of critters and possible sample pts

- lots of mussels, barnacles, few clams



Kendrick Kinlock 7/13/97 2/43

830 survey from rock on grassy spit out toward low-tide mark

bearing 120° for 750'
planting stakes at 250' intervals

at 150' went 16.5' cylindrical off line
at 500' off line

flags are for sediment samples

randomly selected at along 750' line to set up quads for shellfish sampling

45' from survey pt @

go 30 m, 100' eql direction off of this pt to create a line transect for shellfish, sediment sampling

from each pt we use first 6' of line for sampling

145

Kendrick Kinlock 7/23/97 2/43

Sketch (actual to main map)

1" = 200'

survey pt

(C) 5C43 5CMH

(A) 5C40 5C41

(B) 5C41 5C42

Composite (D) 5C43 5CMH

1450' mussel line

9.4' above MLLW

Kenai Peninsula KM/DK/LT 7/17/92 3/43

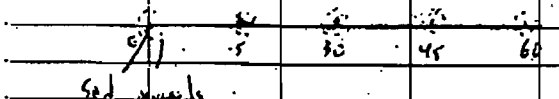
9:40 SC40 - grab/composite of soil, each 15'
SCM1 - grab/composite of mussels, each 15'
taken from zone A

SC40: soil taken from 1-4" down
scrape barnacles, seaweed, mussels
from surface
small pebbles, dk. organic, some peat
in soil sample

photo 60 all 9 #1: close up of soil taken from
hole closest to center line
Peat - fibrous in texture, mainly
green brown peat

SCM1 = mussels taken around each
sediment hole
approx 10-15 taken, average size 1-1.5"
no broken shells, no gaping between
shells, try to ensure taking only
live critters

photo 61-63: looking 95° at sampling along
the SCM1 line



Kreutzfeldt KM/DK/SS 7/23/97 4/43

1000 SC41 taken from zone B along
SC42 same 450' mussel line

SC41: numerous worms, Fest
soil, gets more C3 toward E.
patches of more consistent soil,
less barnacles, mussels on top but
equal C3 of shell fragments present

photo 64: looking NE at mix of
sampling material for SC41

SC42: more Fuchus here than
in zone A, C3 of this
? as we move east along line
less mussels associated w/ this
fuchus, otherwise pretty
consistent C3 in remainder of line

photo 65: looking W93 at fuchus
and mussel sampling in zone
B

Kenneth Allen KM/DC/SJ 7/23/97 5:43

1015 SC#2 taken from zone "C" along
SC#3 450' mussel line

SC#2: soil was more fine here than in other 2 zones along this transect. no FeS noticed

less pebbles & shell fragments

photo 66: typical habitat along zone C

SC#3: pretty regular transect except for lack of mussels at 15'; this caused sampler to move 5 a total 20' to get back into the mussels. abundant pebbles from ~ 20-40' along line

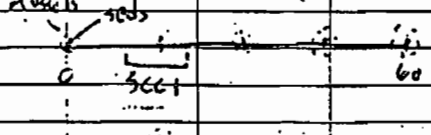


photo 67: looking 125 at sample SC#3 near the head of zone C

Dewatto Bay KM/DC/SJ 7/23/97 6/°C

1030 SC43 Composite from zones
SC44 A-C along 45ft' mussel line

photo 68: looking 089 along transect line

1040 SCC1 taken from zone "C" along 450' mussel line from 7-18' along zone
Area was devoid of mussels, fucus and had abundant clam shells on top -
dug down ~ 1' to uncover wide variety of clams including butter, little neck, cockles, bent nose

This sample will be the only one taken on this transect for clams

photo: 73 looking 270 at SCC1 zone
Broken shells, dirt pile, pool

1055 took advantage of lo-tide and went another 50' from end of 1st center line 75' from survey pt Q
went 500' @ 165°

went ~60' east from this pt &
sampled along this line (zone D)
This pt is 7.7' above mean lower low water

Kenoyer KM/DC/ST 3/23/97 7/43

1105 SC44 taken each 15' along this
SCM5 60' line

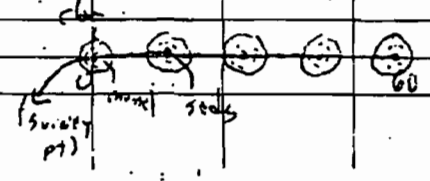
general notes: more mussels here than
in previous years,
rockweed is dense

SC44 soil looks a bit darker,
shell fragments present, pebbles
present
dark grey below light brown

photo 69: looking NE at soil
sampling along SC44 line

SCM5: mussels thicker here -
some larger than further up
toward pt Q.
easy picking

photo 71: looking ENE at sample
SCM5 w/ abundant fucus &
mussels



Kenai Mtn Kn/sc/sj 7/23/97 3/43

1110 SCC 2 c/sm sample taken along zone "D" transect. This was taken at 15' intervals similarly to subs 2 mussels predominantly little rocks here, one bent nose c, 1 b-fore clam, but these were discarded.

little rocks are roughly 1" diam.

photos 71.72 looking 267 along transect at clam sorting activities

1130 decon all equip used so far return to survey pt Q to attack intermediate zone

1145 survey from pt Q back to coordinates. steer @ 353° at 120' along line transition zone staked walked out 340' along this line and placed a stake to construct transect 1 to

Kenai Mtn Kn/sc/sj 7/23/97 4/43

intermediate zone

composite SCM9 SC49

Q²

340'

SCC3 SC45 SCM6

SCC4 SC46 SCM7

SCC5 SC48 SCM8

zone 5 zone 4 zone 3 zone 2 zone 1

11.5' above MLLW

Survey pt Q

Kewaffee KM/DC/SJ 7/23/97 7/W3

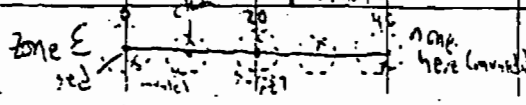
1205 turns out that there is a shortage of mussels in this part of the intermediate zone

we decided to search out a reasonable concentration of mussels and sample there. The transect will be abandoned and we will sample where we can

1215 planted stake at 127° – 175' from Q² and set up for sample SCM6 along zone E
SC45
40' transect line in mid of this pt where a band of mussels was found

SC45: less material in scrape sample trying to get more fine below mussel bed etc,

SCM6: mussels sparse, generally smaller ~ 1" max - substrate is fine sand & silt; unburied EB is common
Samples taken every 8' ft when possible



Kewitt Mc KM/DC/SJ 7/23/87 10/40

photo 74: looking 090 at zone E and sample SCM6, SC45

1230 SC43 taken from several holes along zone E
"Macoma" species
very different from clams found in other zones
maybe best case "macoma nasuta"
these were 1½-2" deep
very concentrated
~ burrowed into very Fe-stained soil
photo 75: clam holes & Fe-st soil

1240 survey 91° for 100' from zone E stake to get to zone F

1250 SC46 taken along 60' line in zone F
SC47

SC46 taken from holes spaced 15' apart
dark brown, pebbly material
average shell frags - no worms
abundant small minor crabs,

Kenai Hills KMDC/SJ 7/23/97 11/43

SC#7 lots of juvenile dungeness crab in fucus
mussels (3) in fucus
loose fucus patch on beach
no problem w/ quantity of
mussels

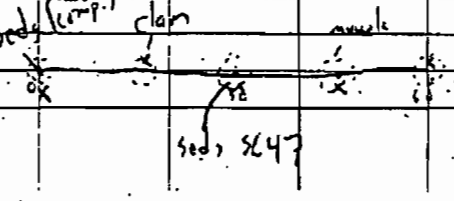
photo 76 looking down zone F toward
east at SC#7, SC#6
scales

1300 SC#4 taken at bentwise
clams from zone F

removed approx 1/2' into
beds which contain material
that looks a lot like tailings
Fast/olive green, sandy material

SC#7 taken from this material
hi-grade

1305 SC#7 - soil from zone F
Fast/olive green



Kennett/Mc KM/DC/SJ 7/23/97 12/43

1320 survey from stake on zone "F" 100' due East to begin new transect on zone "G"

1325 SC48 taken at 15' intervals
SCM8 along transect 60' long - zone "G"

ground: abundant fucus, barnacles,

SC48: scrape away fucus lots of fines, few pebbles few shell frags, lots of worms, dk brown-olive

SCM8: fairly thick fucus bed abundant juvenile crabs under seaweed mat mussel #3 is good - no problem obtaining sample

photo #7 - mixing SC48 from zone "G"
photo 78 - picking thru fucus for mussels at SCM8

Kennett/Mc KM/DC/SJ 7/25/97 12.1/43

SC48 ↘
SCM9 ↗ composite samples taken from transect following zones E, F, G

Kennett Mtn KM/DC/SJ 7/23/97 13/43

1335 SCC5 taken from zone 6" dug into sandy material N of line, outside of fracture, boundaries - not as many clams as in zones E & F

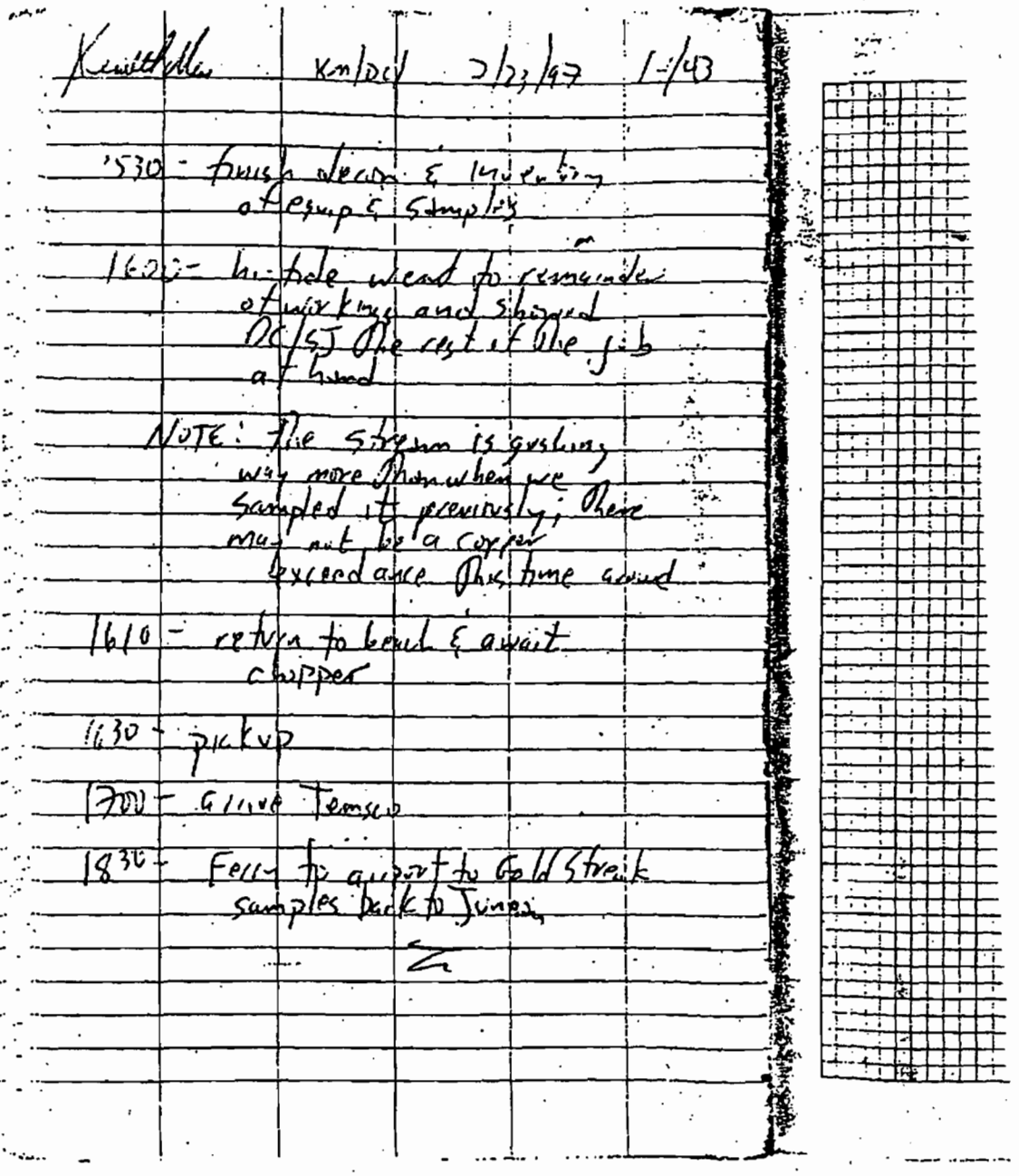
1345 - raced tide back across creek and remobilized on mill site

1400 - well-deserved lunch

1435 - set up decon station & clean all the stainless steel sampling equip

1510 - rinsate sample WA069 - all metals #Nos dup taken off a stainless shovel used to dig clams in SCC5 location

photo 79 - decon procedures near mill, looking N



Kenneth Allen KmDC 7/23/97 1-143

0530 - finish decon & inventory of equip & samples

1600 - hi-hole wand to remainder of working and shipped DC/SJ the rest of the job at hand

NOTE: The stream is gushing way more than when we sampled it previously; there may not be a copper exceedance this time around

1610 - return to beach & await chopper

1630 - pickup

1700 - Glove Tenseo

1830 - Fell to airport to Gold Streak samples back to Juneau

Kenneth Mc Kinlay 7/24/97 15:40

Salt Chuck Control site

weather: overcast, rainy, slight breeze
very similar to 7:13 weather

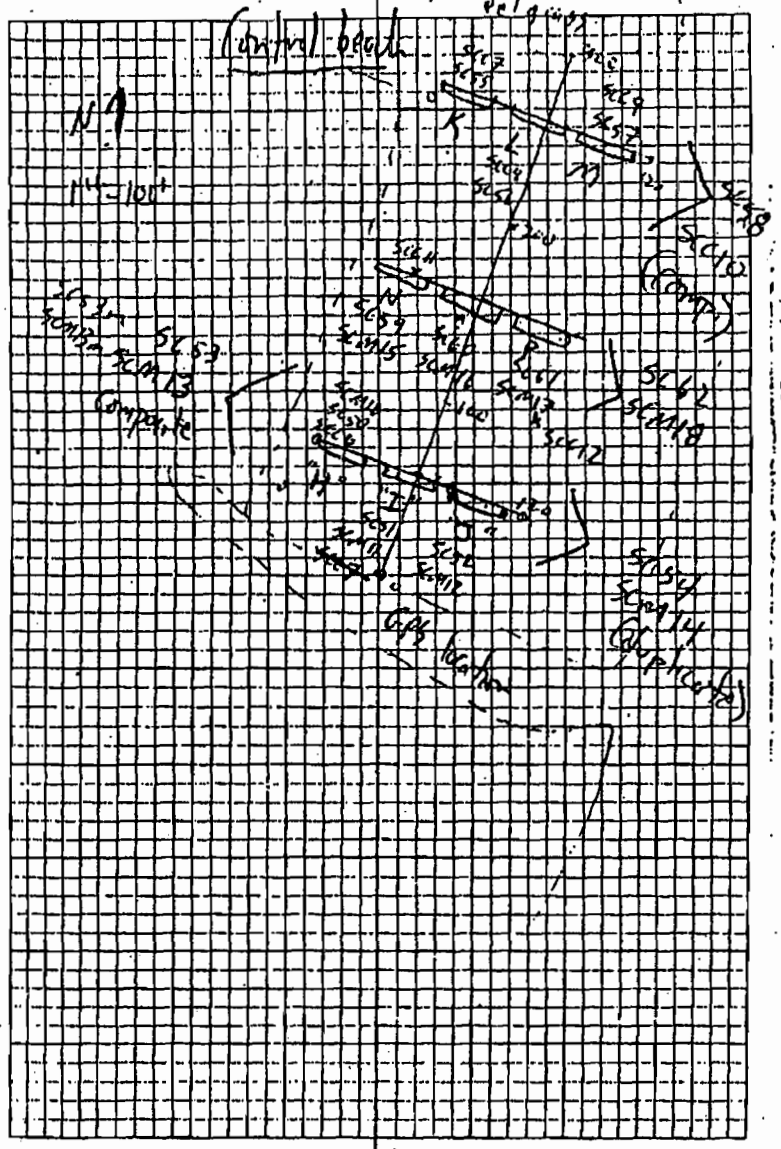
730: leave Temsco for Kah Bay
up stream at site to use for
background sampling

GPS lat 55° 35' 09
long 132 32' 42'

site located between 2 islands
up shaft Salt Chuck area
relatively safe as we are far
enough north of any influence
from Paul Young Creek

840 mobilized pilot our gear from
mainsite to the location -
walked around site & set up
survey center line

85? went 200' from GPS point
and set up stakes at 100'
interval at 020 bearing



Kennebec Knolls Inc 7/24/97 16/40

900 set up first transect at 60' along the line. ran a line 120' evenly split along center line, because of narrow nature of beach that we are working on

we set up zones that are 30' wide w/ a 10' buffer between them i labelled them H, I, & J

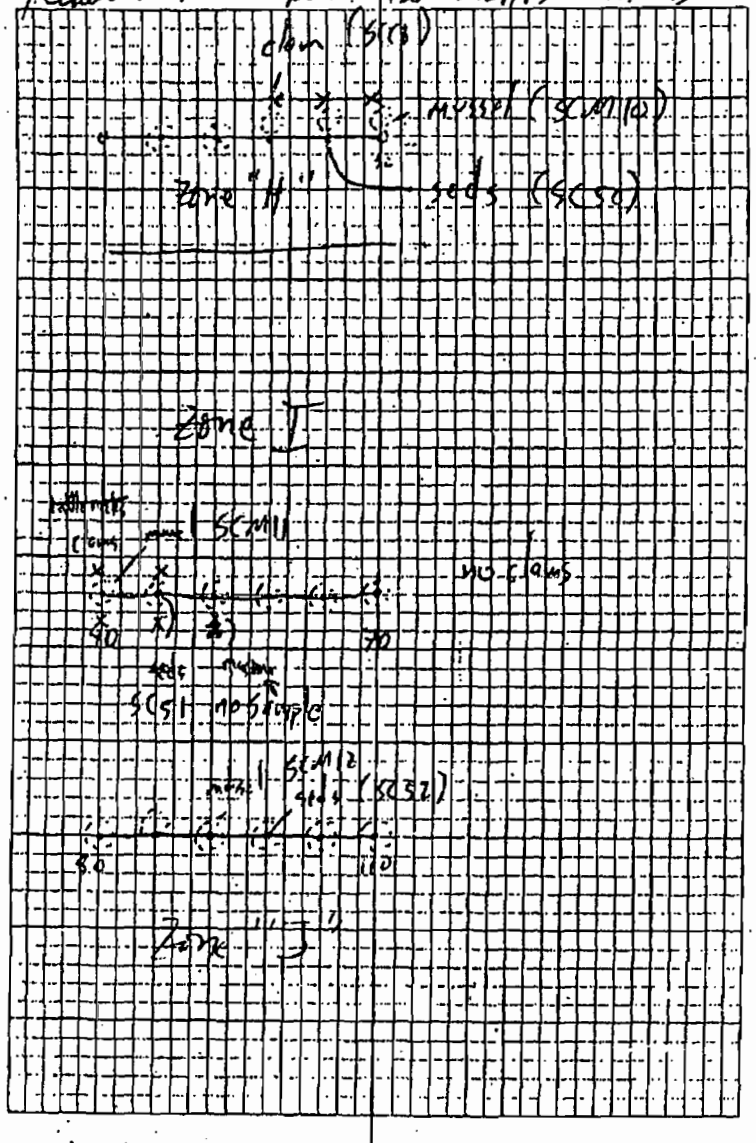
910 began sampling along "H" zone

will take normal sample

SCM10 taken at 6'
SC4950 intervals along zone "H"

SC50: abundant shell fragments, few pebbles, sandy, medium grey

SCM10: mid fucius bed, numerous juvenile oysters (?) in fucius, numerous clam shells, both L+R valves, mud dense mussels: selection size ~ 1½"



Kimball Bldg KM/OC/ST 7/24/97 17/43

plots 80-82 locking 295 at zone H
sampling
showing sediment/soil collection
spotty nature of finds

930 SCC6 clam sample taken from zone H
clams most abundant from 18'-30' along line
but littlenecks most abundant species here, used for sample
1½-2"
butter clams also present, but no geoduck or cockles here

940 move on to zone "I" from 42'-70' along this line

SC51
SCM11
SCC7 taken from 6' intervals along this zone

Kiawah Island | KM/DC/SJ | 7/24/97 | 18/42

SC51 - very similar to SC50
shell frags, gray sand, few pebbles
H2S smell
no barnacles, little sea oping
sample 1 arm about 2"

SCM11 - Same situation as in SCM10, except Root Above is more consistent mat of fucus along this zone
1½-2" size range
juvenile dungeness (?) present

photo 83 - looking at mussel gathering in thick fucus along zone "I"

photo 84 - clam & mussel gathering along zone I - looking 245°

SC57 - sponge
Abundant clams near start of zone (pools of standing water here)
ES tapers off near end of zone
little rocks are found in isolated areas near start of zone, covered but they are too small
mainly clam shells, periwinkles

Kennitt Ellis Km/OC/SJ 7/24/97 19/43

1010	SC52 SCM12	taken from 30' zone J in 6' intervals
	SC52:	shell frags, fg dk sed, minor pebbles, H_2S odor - decaying organics
	photo 85 -	looking 170 at sampling along SC52 - moving fr bus out of way - for presentation photo
	SCM12 -	very similar to SCM11 hi (3) of fr bus, abundant 1½-2" mussels, abundant juvenile drugs (?)
	photo 86 -	looking 240 at mussel sampling on zone "J"
1020	SC53	composite from along Qbis line, includes zone H, I, J
(1045)	SC54	duplicate for SC53
1045	SC53M	matrix spike

Kenefick KM/MC/SS 7/29/97 20/93

1030 SCM13 composite sample from zones H, I, J

SCM13m matrix spike from this sample

1045 SCM14 duplicate from SCM13

1050 decon spoons & shovels from 1st line

1110 Set up transect further down beach toward lo-tide area

- As tide went out eel grass came into beach picture at 300' we certainly want to be above zone of eel grass as this is a completely different
- turns out that eel grass starts just below 300' survey pt along center line

- next transect will start at 260' from GPS location on spit

Lewisville Kmlocl55 7/24/97 21/43

photo 87 looking 020 from GCS location down to 0-tide mark on beach

This transect will include zones "K, L & M" (turned out 10.9' above MLLW)

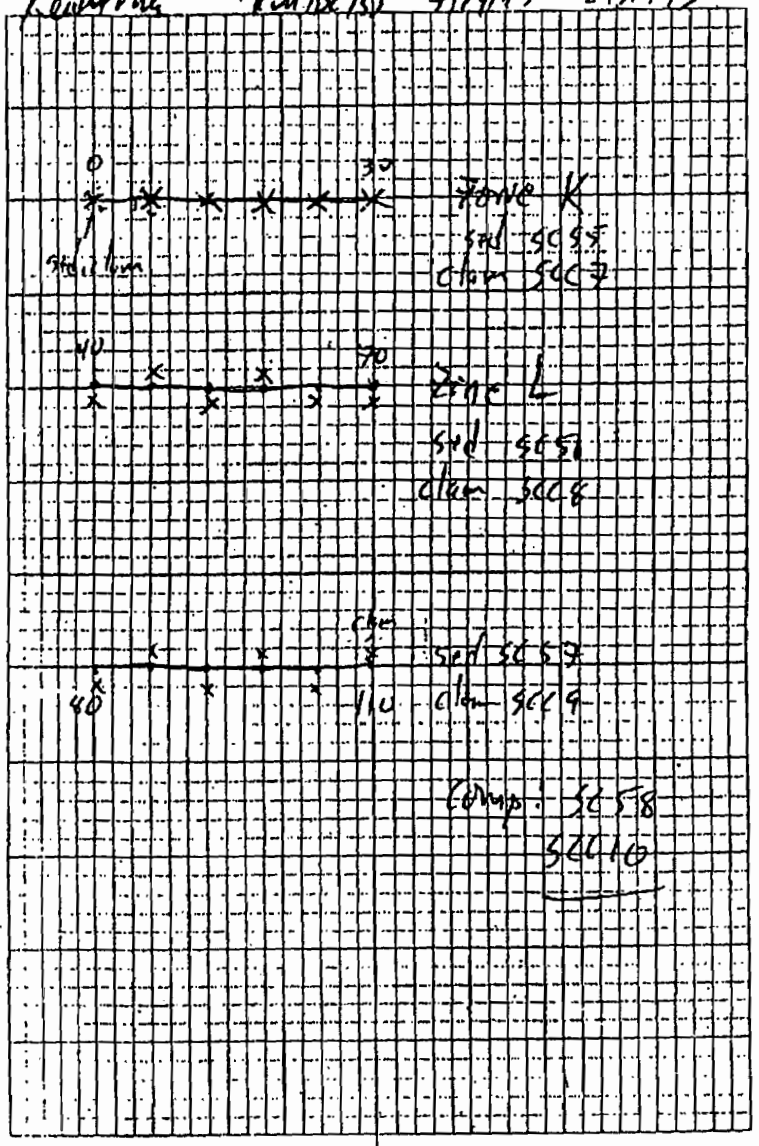
Samples will cover clams & sands, there are no mussels here

1115 SC55, SCC7 taken from 0-30' along transect in zone K at 6' intervals

SC55: gravelly grey sand-silt less shell frags on top layer

photo 88, 89 looking 290 at zone K sed & clam sampling, nice beach, no fucus, scattered seaweed, but mainly shells, pebble, boulders to 8" diam.

SCC7: mainly little nicks 1-2" variety, minor butter clams found from 2-6" down, prime environment for those guys



Kenai Alla KM/RC/SJ 7/24/97 22/43

1135 SC56 taken from zone "L"
SCC8 along transect at 6' intervals

SC56 same general character of seds = gravelly sand, minor shell frags on top layer

SCC8 abund. of little necks, minor butter clams

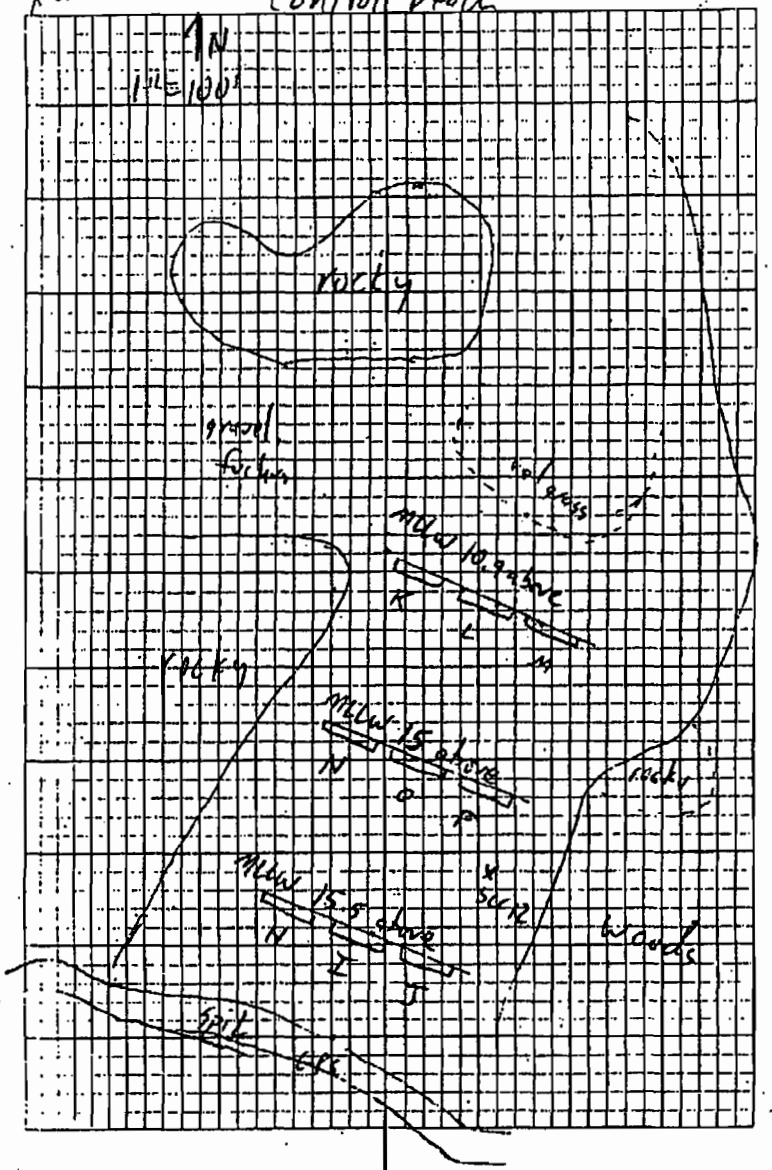
1150 SC57 taken from zone "M"
SCC9 along transect at 6' intervals

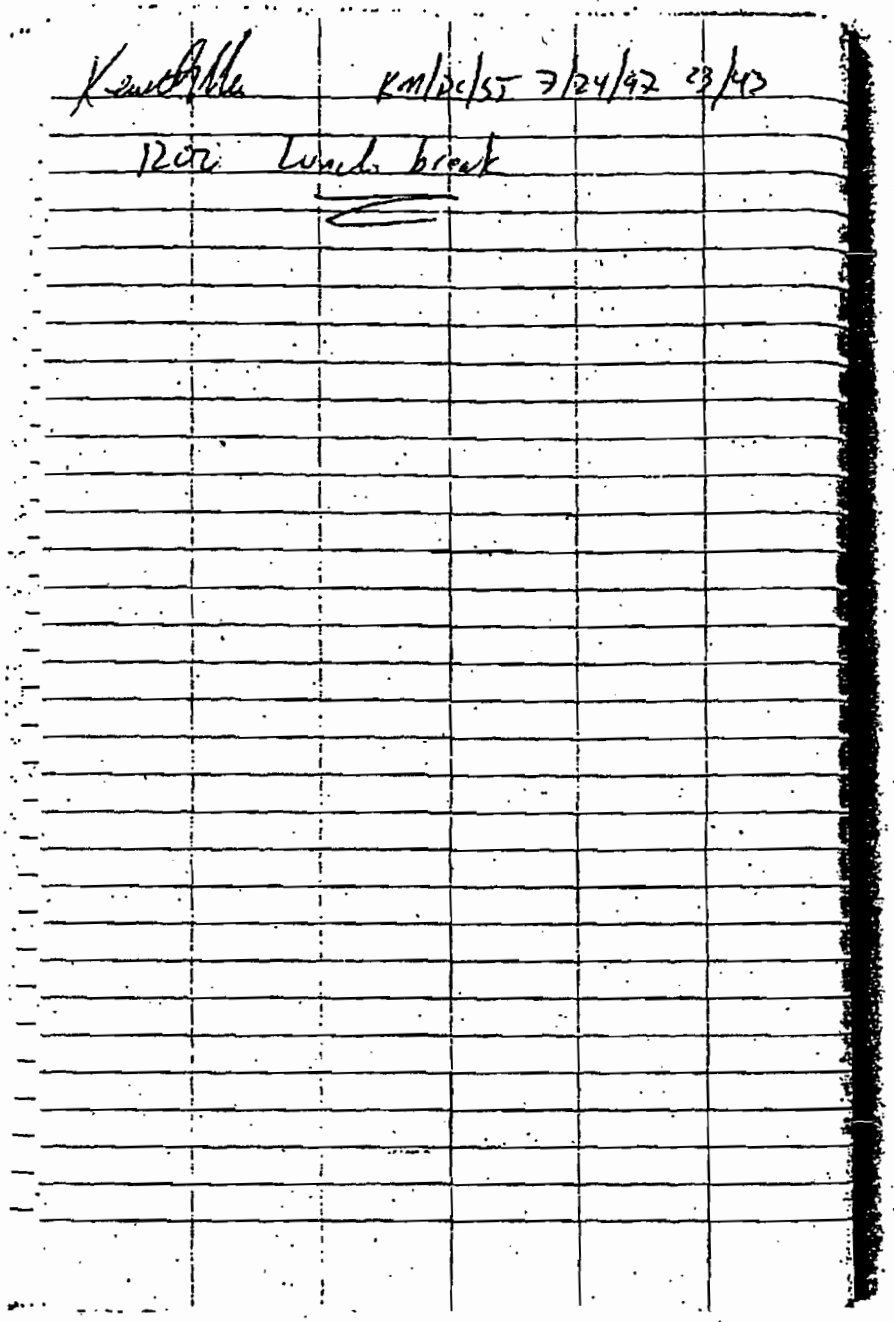
photos 90 - taken along entire transect line looking 110 no cover, broken shells, sand

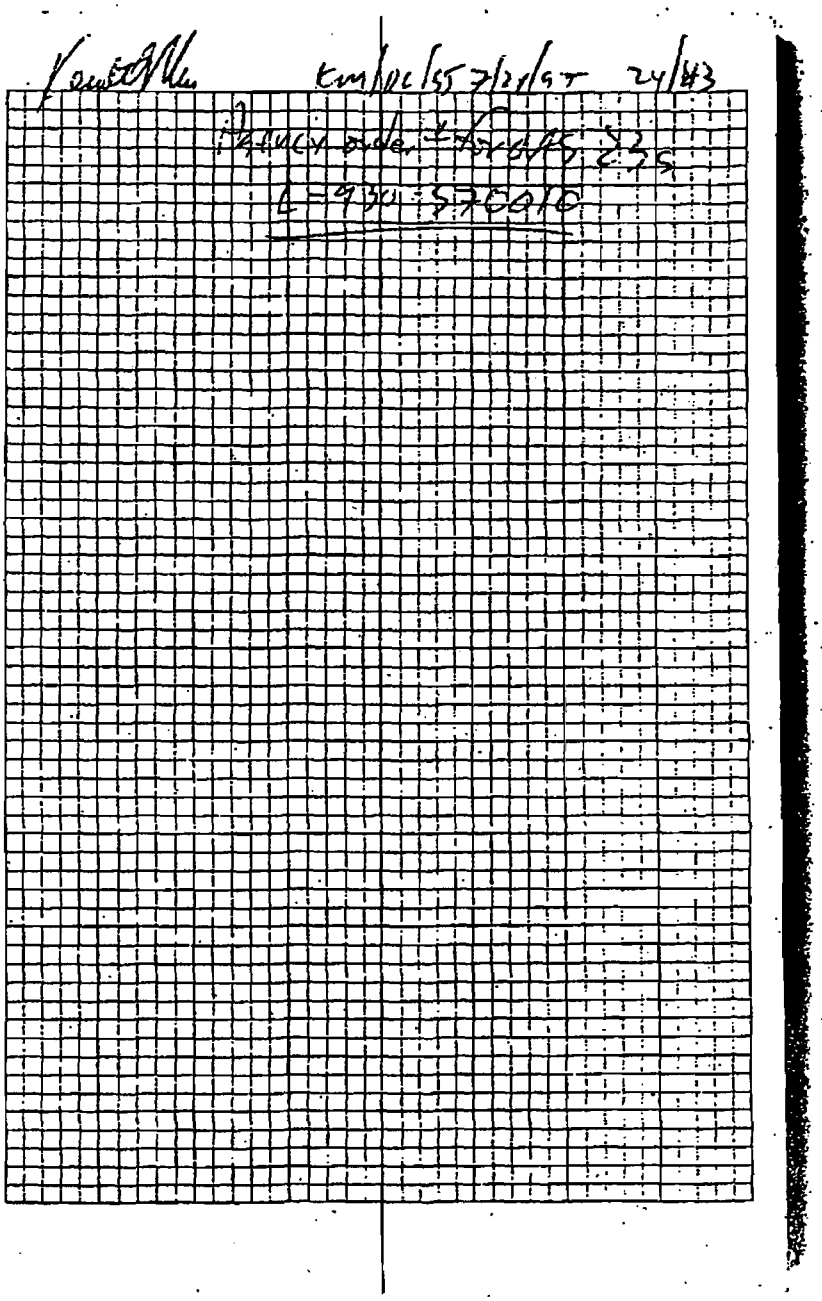
SC57 same character seds as SC56, SC55 . shell frags, less gravel (only because density of clams has to do with seds

SCC9 - abundant little neck clams ½-1½" variety - few butter clams

Kenai Alla Control Beach 7/24/97 22A/43




Kenneth Ables KM/DC/ST 7/24/92 23/43
120i Lunch break



Kenai Fjords KNI/DC/SS 7/24/97 25/43

1220 Begin 1st transect along center line

transect at 160° from GPS point extending 60' on both sides of center line

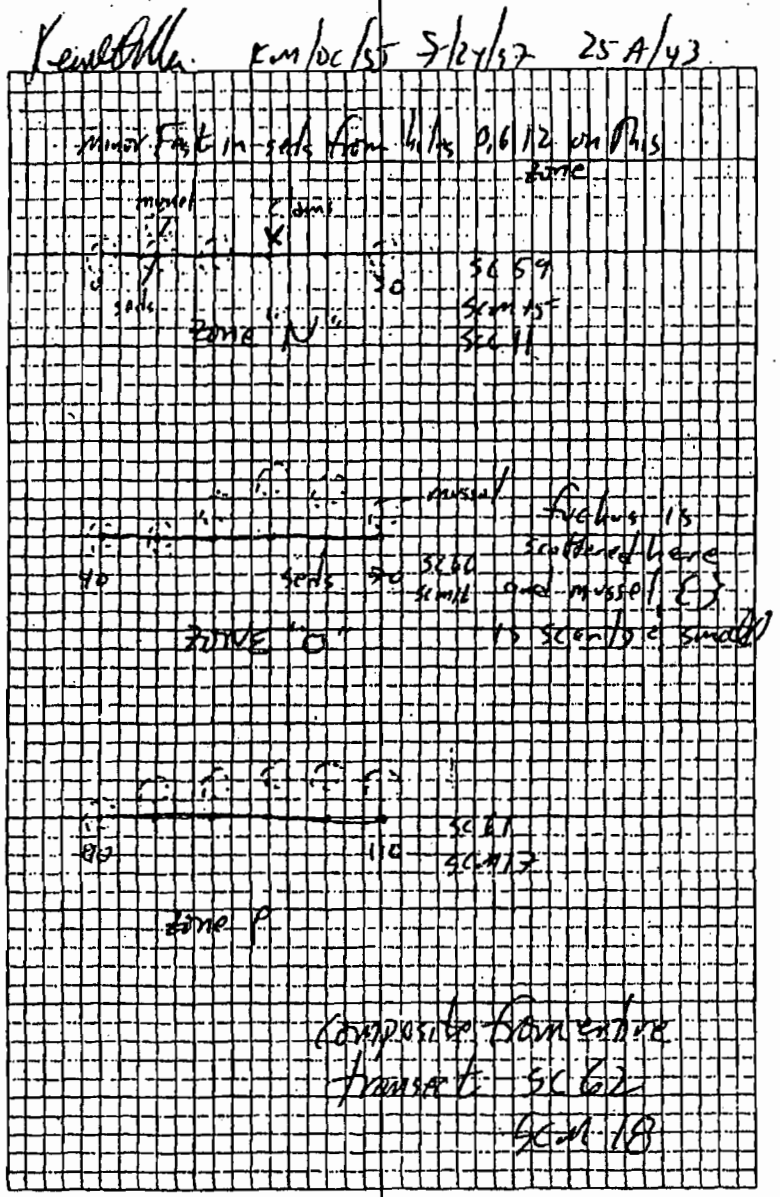
1225 SC59 taken from zone N along
SCM15 intermediate transect line at 6' intervals

SC59 abundant shell frags, coarse grey sand w/ few pebbles some clams in top layer

photo 91 looking 250 ed sample sites SC59 & SCM15

n=11 10

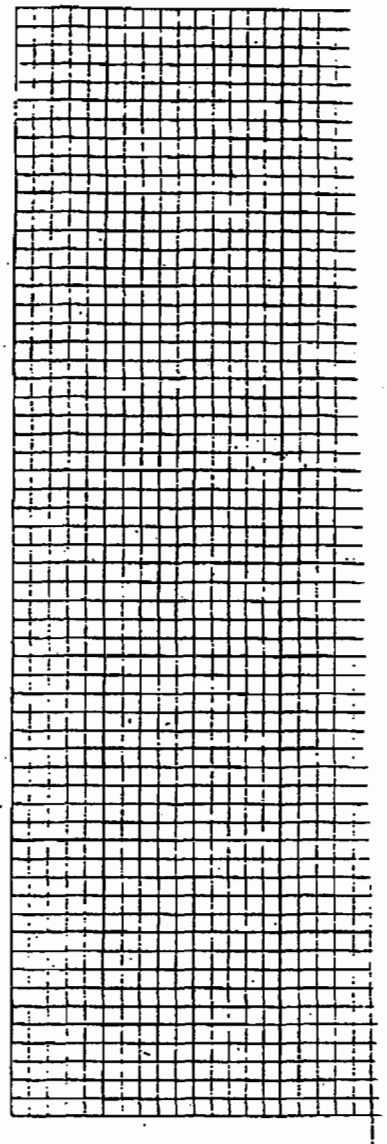
SCM15 abundant fuchus & juvenile crabs mussels smaller than normal in first few holes ? move off zone line to obtain sample



Kenneth Lee KM/DC/SJ 7/24/97 26/43

photo 92: looking across entire transect line at zones N, O, & P view 290

1215	SC60 SCM16	taken from zone "O" along transect at 5' intervals
	SC60	very similar to SC59 shell frags, sandy, coarse grey few pebbles
	SCM16	mussel [3] is less along this zone; smaller size as well 1" or less
1310	SC61 SCM17	taken from zone "P" along intermed transect
	SC61	brown color set mixed in w/ grey coarse sandy material shell frags, but no clams (white)



Kewaunee KM/DC/SJ 7/24/97 27/43

SCM17 - Straying up to 5' from transect line in an attempt to collect enough mussels for this sample.

SC62 / SCM18 > composite off intermed. line

tide is coming up & we are hurrying to complete this sample

1315 attempting to collect a sample of little necks along this transect

one composite would be great, but the clams are very sparse

photo 93: attempting to collect clams along intermed. transect

1330 SCC11 grab sample of little necks at 24' along zone "N".
good density here of 3¼-1½"
clams
none along rest of line

Kenai Fjords KF/DC/KS 7/24/18 28/43

1400 clean up transect area, remove rebar & set up decon station

1420 started digging in the control zone to accumulate enough macoma valves/clams for a single composite to represent the entire site.

As macoma enjoy a muddy, organic, muddy environment, we found a bunch in one area just below the upper zone (1st transect)

SCC12: grabbed about 1 dozen 2-3" macoma valves from this site
- abundant fucus covering this zone; no other clams living here

1430 completed work at the control zone

tide is nearly up to the spit where we set up shop

Kendall Kn/a/ks 7/14/97 29/43-44/Kn

~~Hec~~ Kn

1500 take equip over to LZ and await arrival of chopper

1630 Chopper arrived, hi-tide almost caught us by surprise as it came within 2' of totally submerging our LZ

1715 return to Temsco

1930 Take ferry to airport to ship samples back/stock to JNU

Kenai Fjords Icy Bay 7/25/97 30/43

weather: partial clearing, calm, temp in 50's
best of three days so far

730 plan: TPH samples
PCBs bromide
water samples: up-leaving-down
hot zone shellfish
sed samples: 700' rock Q-S
200-300' each side
Q-R (1600') 300' from rock Q-S
centerline & 200' outside
300' from rock Q-N
2 samples - centerline

730 leave Tenakee w/ Arthur
800 arrive Salt Chuck mollusks

calibrate equipment
pH 7.0-7.0, 7.0, 7.0
mS 100 µS, 100 µS, 100 µS

815 walk over to fuel barrel caches for
sampling of possible TPH
dig 3 holes in front of each empty barrel cache
825 SOIL: a composite from these 6
holes in front of C-1 & C-2

Arnett AFB km/dc/ss 7/15/97 31/43

photo 94 looking 220 at G1 fuel barrels & sample site SO#6 (very dark for photo)

roll 1 #1

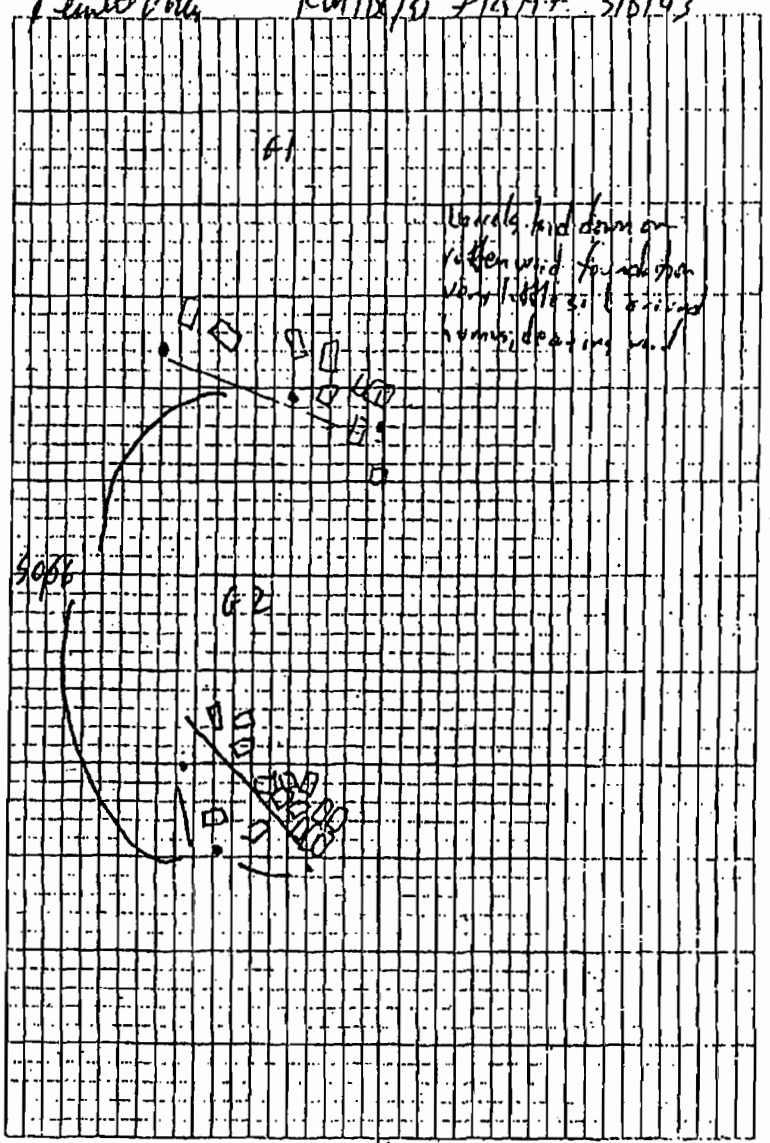
- holes in front of G1 were dug through weed fiber mat of cache about 6" into brown rotten peat & soil. 1 of the holes did give off an odor of possible TPH ; otherwise only brown humus roots, topsoil

- holes dug by G2 did not give off odor ; some of barrels are coated w/ dried petroleum muck that gives off an odor when scraped

- soils did not look very oil-soaked odor was very minimal - could be minor contamination but nothing to rule out contam

photo 95 looking 290 at sampling in G2 cache for SO#6

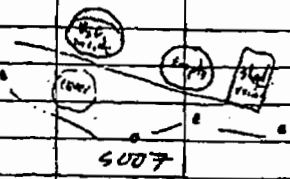
850 going up to new tanks to get for similar sample



Kendall Ave vm/dc/sT 7/25/97 3/9/98

These tanks are standing on a wooden platform

Lease Tanks



dug several holes to determine extent of contaminated soil - not extensive or concentrated

note: no kill zone, no strong odors

This sample is merely taken, to discover if there is a larger area of spill than just under the tanks themselves

* dug some test holes directly under tanks and the soil was stained, but the odor was not strong; although visible this in sample as material present is in small quantity

900 Sample S007
taken from 4 holes around tanks

photo 96 Sampling at S007

Kendrick KM/DK/SS 7/15/97 32/43

910 arrive at electric locomotive at end of trucks, above millsite

locomotive contains batteries that still have fluids in them

what has contaminated the soils?

we will sample here, a grab ~~taken, until 5 gals composite around~~ from the locomotive cab itself

sample enough for 2 jars

analyze for pcbs, acids & metals

925 S004 - taken ~~from cab~~ of this locomotive, actually there is a ~~small~~ gully formed that could channel materials, ~~leaving~~ the cab itself & it heads for the mill

analyze this for PCBs

930 S009 - same spot, analyze for acid,
935 S010 - metals.

photo 97 looking, ESE at sample site: S008-S010 (used Zeiss)
also ~~taken~~ w/ flash

Kwadwo Kondolf KM/AC/SJ 7/15/97 33/43

Seal from 5008-5010 was lt-dk brown sandy muds w/ burrows, rubber bands, etc

950 set up decon station & wash down shovels & spoons used for previous samples

1000 survey center line hot-zone 500' @ 162° from middle of jetty

we want to take a transect between 300'-500' along this center line, but really the C3 of mussels will determine where we sample

* transect will be at "400" along this line

walked 100' @ 252° from center line and set up first zone "Q"

1035 SC63 SCM19 taken along a 60' interval at 15' increments along "Q"

Kenai Fjords | KM/SJ/DC | 7/25/97 | 34/43

SC63 — seds are mainly olive brown tailings scraped from top 1". seds underneath mussel patch are a bit darker (more organic), than the ordinary tailings

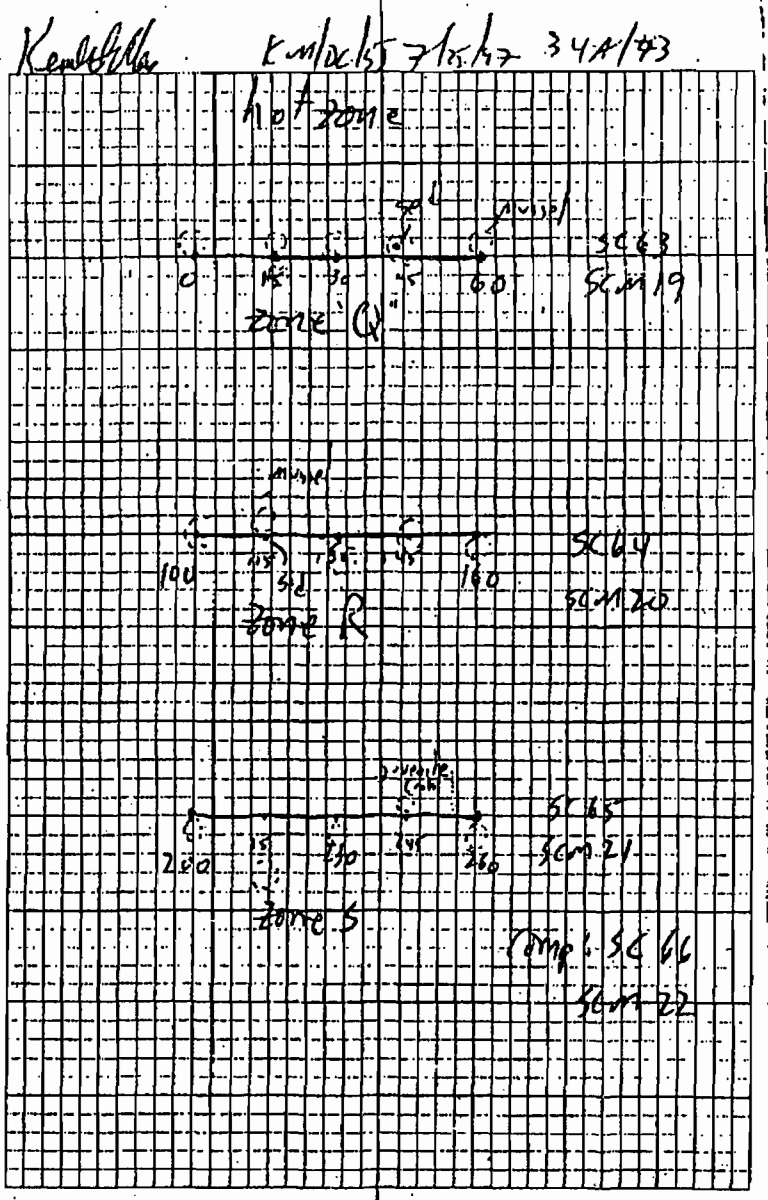
SCM19 — mussels are spotty, pebbles exist where fuchus reg somehow stuck to the substrate. size is 1½-2" max, they are not really much smaller than in intermediate zone

photo 98 - looking 230 at sample site SC63 & SCM19

attempted to dig clams along this zone & there weren't any

abundant chimneys are related to worms

1100 — dug clams on other side of meadow creek, stream about 10' from stream edge, macoma variety no Protothaca



KM/DC/SJ 7/25/97 35/43

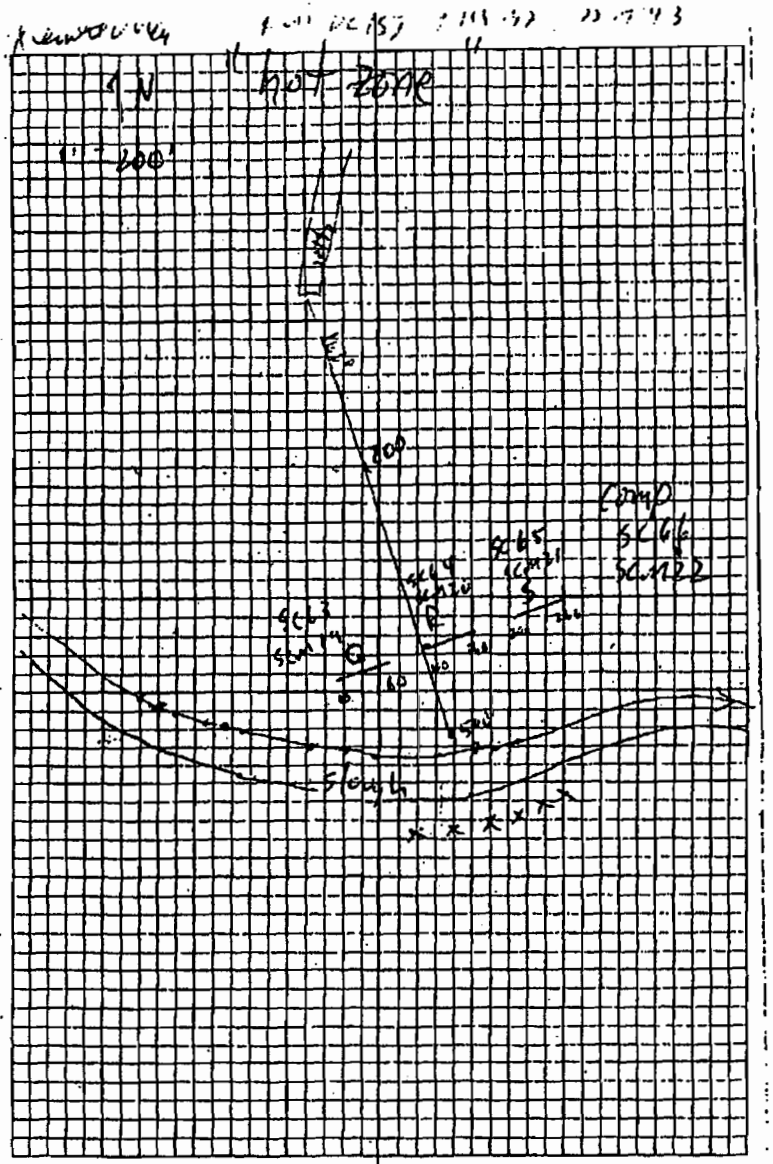
1105 SC64 Taken at 15 intervals
SCM20 along zone "R"

photo 99 looking NW at sample site SC64 & SCM20 slough in background

SC64 Some tailings material 1" of it covers green goo over top of olive gray/black tailings top layer of goo contains seds covered evenly by tidal flux The mussels are living in this green layer and not down into the tails themselves, this is the distinction

SCM20 mussels attached to loose fucus or twigs/branches that have somehow reacted into the goo clearly in clusters size is still 1-2" variety

The tailings zone below the 200' marker from the jetty contain a consistent goo layer that allows more footing for fucus twigs - above this zone the ground is softer & the mussel/worm { } is ↓ significantly



Kenneth Mc KM/OC/SJ 7/25/97 36/43

1120 set up for zone S at 200-260 along transect line

1130 SC65 taken at 15' intervals
SCM21 along zone S in hot zone

photo 100 looking 250 at zone S and SC65 sampling

SC65 some general character as previous samples, except that last 30' of zone had a thinner goo - zone worm channels were consistent throughout entire transect

SCM21 consistent w/ other 2 zones along transect
Spotty finhris / twigs that have rotted and allowed mussels to grow here
at 215' had to go 10' off line to get sample, otherwise ground good

1145 SC44 - sed comp from zones Q, R, & S
SCM22 - mussel comp from "

Lewis Ck kn/ax/sj 7/24/97 37/43

1155 went across slough to intermediate and quiet zones to complete sampling grid begun in 1995

SC67 taken 268' from Q @ 300°
Sample consisted sandy, pebbly material w/ abundant Fest does not appear same consistency as tailings, although Fest is somewhat cuciform; hole down 17"

photo 101 closeup of SC67 material

1205 SC68 taken 300' from pt Q along survey line to SC1
dug about 1 ft down & hit water table
material is gravelly, some clay, no Fest

photo 102 closeup of SC68

1215 SC69 taken 200' L to survey line toward E

Kenai Hills KM/DC/SS 7/22/97 39/43

SC 69 Sample dug into very fine sands, sandy, few pebbles, silt, minor black layers in this profile as well
hole down ~ 18"
Sample taken across profile

photo 103 - closeup of sample SC 69

1230 SC 70 taken 300 W of centerline
material looks alot like tailings ~ no pebbles, some shell frags
consistent texture, dk brown-olive color
hole down 15" - hit water table
Black fuchsia bed all around this sample location;

photo 104 closeup of SC 70

1235 - return to millsite for lunch

Permit # 44 KM/LK/BJ 7/25/97 39/43

1215 1245 collected 3 samples of macoma from opposite side of slough from hot zone (absolute left closest location to tailings that clams were found) worms found on other side of slough

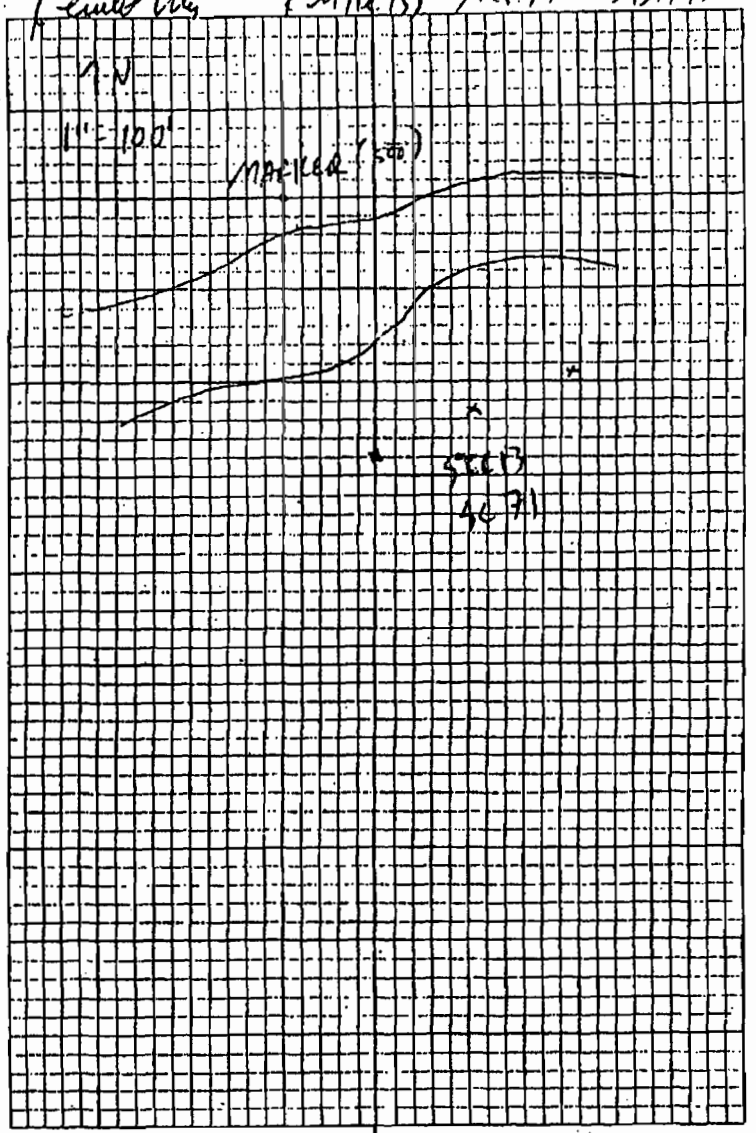
SCC13
SCC14
SCC15
> these were composited into one sample SCC#13
clams ~ 2-2½" in size

took sed samples as well

Survey from 500' marker used in hot zone to SCC13
144° @ 161°

1255 SC71 sed sample comp from 3 areas where clams were dug: Coarse, gravelly sand Epst w/ some black pebbles fucus present

photo 105 looking @ 70 at sampling zone for SCC13 & SC71



Kenneth Mc	Knoloc/SJ	7/25/97	40/43

1310 remobilized gear from slough back up to mill site

1315 Lunch break

1340 decon equip used for earlier activities

1400 water sampling using filtered samples

1410 KTBWA04(F) collected in
1415 WA04 slough downstream from confluence w/ exceedance creek (see map)

pH 8.1
mS 930 mS
T° 18°C

water is tannen color
slight discoloration along banks
slight-mod sedimentation

Flow: (65 x 0.9 x 4/6) = 20 cfs

photo 106: looking 285 upstream at sample site WA04

Kendall Mine KM/DC/ST 7/25/97 41/43

1445 WAQS(F)
1450 WAQS

moved upstream in this slough above confluence about 200', but still in salt H2O influence

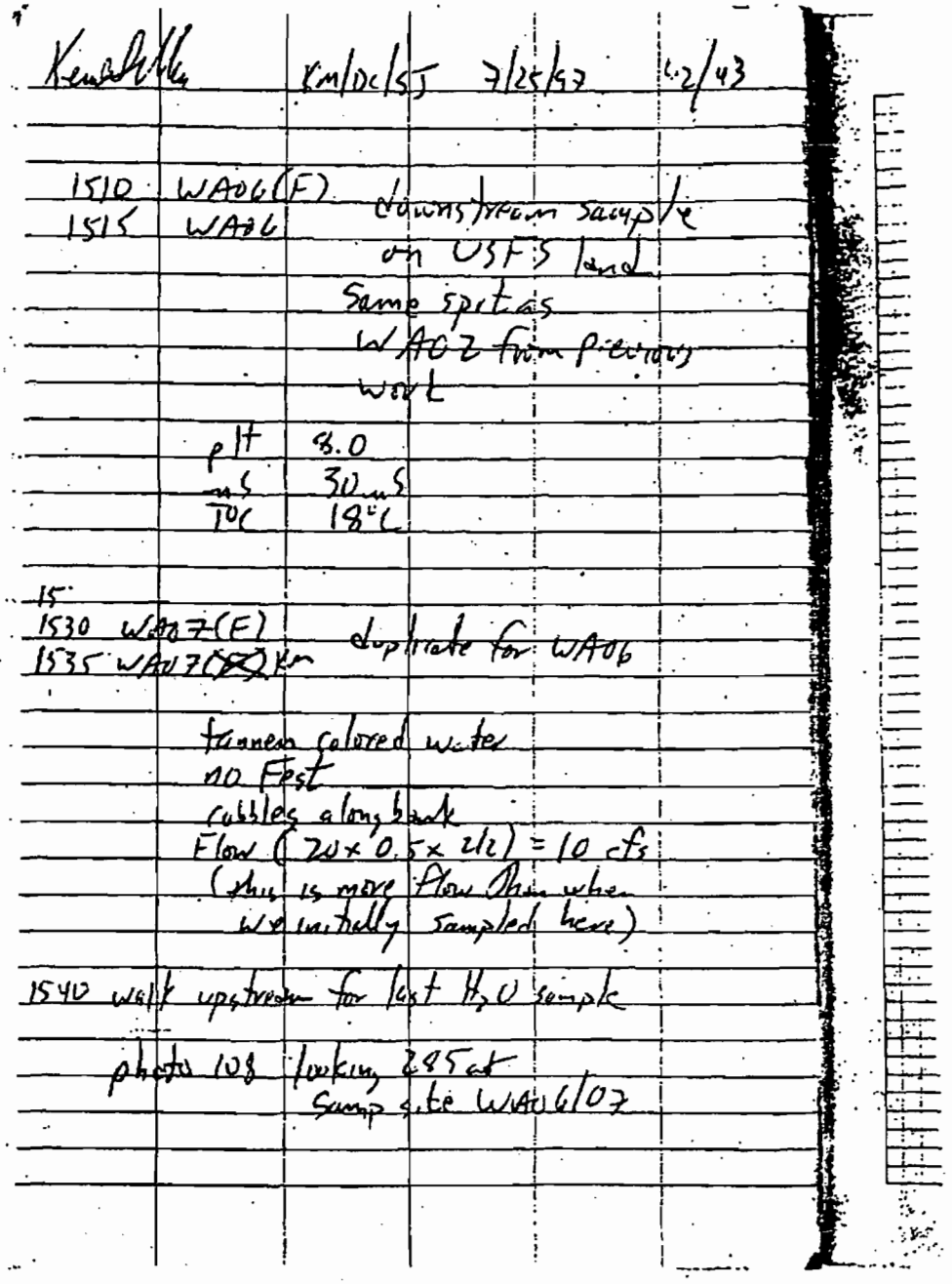
Sampled creek water that is very tannen colored (coming from lake?)

pH 8.1
µS 1500 µS
TOC 190C

no frost
boulder lined banks, one mid-bar
fuchus along shore / barnacles also
this area is clearly upstream from influence from Salt Chuck Mine

Flow: est 15-20 cfs

photo 107 looking upstream at samp site WAQS view is 312°



Kenai Mtns km/DC/SJ 7/25/97 4.2/43

1510 WA06(F) downstream sample
1515 WA06 on USFS land
Same spot as WA02 from previous work

pH 8.0
mS 30 mS
Toc 18°C

1530 WA07(F) duplicate for WA06
1535 WA07(F) km

Tannin colored water
no Frost
cobbles along bank
Flow (20 × 0.5 × 1.2) = 10 cfs
(this is more flow than when we initially sampled here)

1540 walk upstream for last H2O sample

photo 108 looking 285 at Sample site WA06/07

Leadville KM/DC/SS · 7/25/97 1/43

1600 WA04(F)
1605 WA04 upstream sample
Same location as WA03
pH 8.3
µS 30mS
T°C 18°C

rapid flow - tannum colored
actually overflowing banks
boulder-lined bed
no Fest
est flow 8 cfs

photo 109 looking upstream
at WA04

1615 return to mill site &
clean up - prepare for
pickup

Kenai folder — KM/PB — 9/16/95

Salt Cluck — KT3 — 1/6

- surface features survey

Leave Tenakee @ 10:35
Arrive site @ 11:00

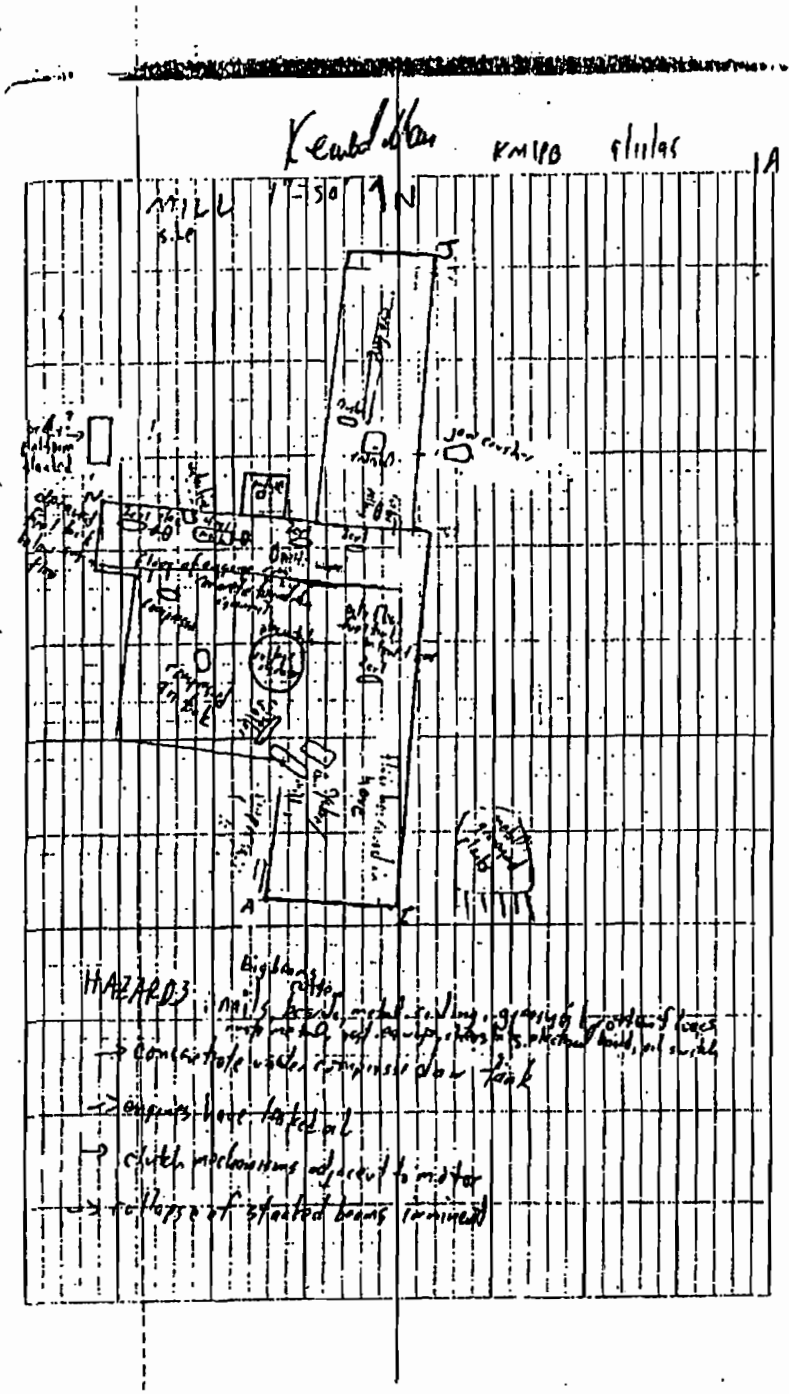
weather: cloudy, low ceiling in KTN (Congress Narrows improved markedly at Wrangell Narrows), patchy blue at Keith Bay — rained overnight, temp in 50s, low 40s

Begin survey at edge of mill

From	To	Distance	bearing	ΔH & ΔV	Comments
A	B	110'	S10E	-5' vert	edge of mill to edge of barge (shingle)
	(?)	ed 65' to end of rec. dump fill			
B	C	200'	S84E	0	edge of barge to w/super's house (C1)
		super's house is on back fringe which runs to upper end of barge			(see fig. for D)
D	E	45'	S50E	0	D is waypoint
E	F	~~52'~~ 52'	N87E	0	corner of C2
F	G	44'	S88E	0	C2 → C3 corner
G	H	210'	parallel w/		all road, new trail, ends at remains of store
			high tide line		trail goes onto tideflat
			10-25' in		some remains of corduroy rd & pile for mill H2O

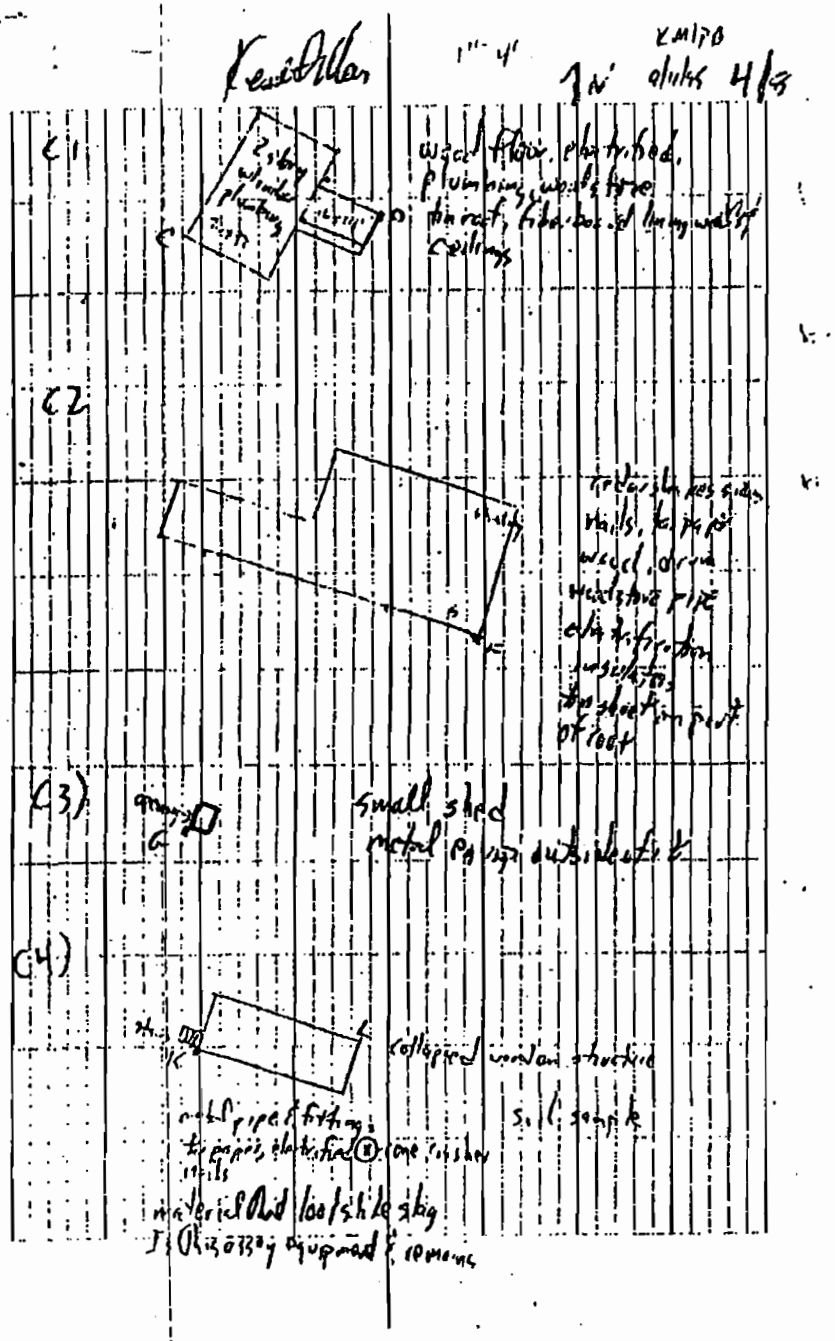
Kenai folder — Km/MB — 9/11/95 — 2/6

From	To	Bearing	Distance ΔV	Comments
A	~~B~~	S85E	35	
I	J	N5E	120+60'	corner to bldg drive
		at 120' - jaw crusher on E side		
		mill building upper level begins		
		at 120' building is 25' across (N88E)		
		mill sections may not all align		
		at 140' the other L goes off		
		12x72' on pilings, stepping 10' from end of 100'		
		(see figure)		- entire mill surrounded by wooden walkway
I	K	S89E	48'	edge of mill to end of wooden walkway; covered structure across walkway (C4)
L	M	N2E	128'	from NE corner of mill to main land tanks (W side)
		at 48' (cut off log) pile		
		73½' (2nd grouping)		
		0-22' 1st covered platform (30' wide)		
N	O	N79W	54'	remains of mill to road system on mud flat
O	P	W	77'	
		at 48'	about 1' of rip rap is steel pipe	
P	Q	N30W	28'	→ to 6x7' structure C5
P	R	N56W	125'	35' to mid-grade (see C5 sketch)
		at 100' begin tailings (11-11½')		
		line is still along rd		
R	S	N66W	77'	rd to C6
		boiler on pedestal along this line (1) at 55' (2' diam)		6.5x3' pedestal (N42E)



Kendall Atlas — KMLPD Gillilan 3/13

From	To	Distance	bearing	℄	comments
S	old "L"	49'	S		from corner of CG to old corner marker in side of L
L	T	99'	S34W		old L to telephone pole corner of to corner of C7
T	U	60'	S16W		to corner of C8
U	V	65'	S		
V	W	44'	S15E		to corner of C9 near the corner of CC8 (Coltman)
X	Y	26'	S4E		
Z	A1	54'	S35E		to SW corner of C11



C1) 20' x 32' (size) wood frame

pile of house rubble fallen on E. side of house
nicest cabin left on property

C2) 65' x 24' w/ fireplace visible -
sketched, E side is standing, rest is in ruins

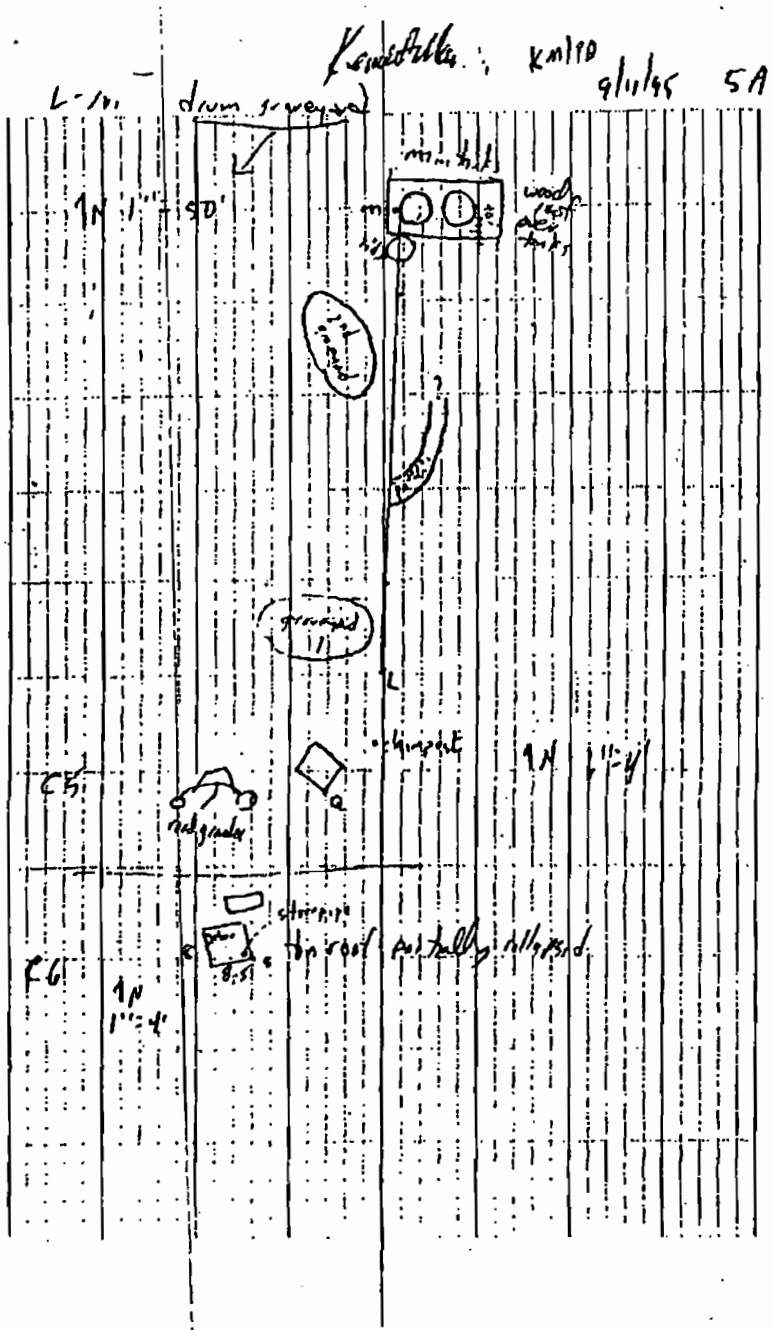
C3) outhouse size standing bldg (?) (storage shed(?) pantry)
(size) 8' x 4'
metal equip outside

C4) 13' x 31' (size) wood bldgs, shake shingles, tar paper
metal drum rocks N of structure

road went in front of this house & behind
super's & matched up w/ road to total area
F --> H

slag-like material found below house
Is this assay house(?) - take soil sample

cone crusher lies another side of rd.



Kawerak KMRB 9/11/95 - 6/6

Drum Graveyard (7 AK residue on ends) 2nd graveyard

1) "Cora products refining CO."

2) 2 graveyards 1 w/ 17+
1 w/ 30+
drums mostly rusted out, perforated - no liquids inside

3) 2 large tanks at top of graveyard
8' diameter x 10.5' tall
rusty { W tank lid on (H_2O inside) bottom lid $3.V^{11}$ N_2O
E tank lid off (empty) no slosh

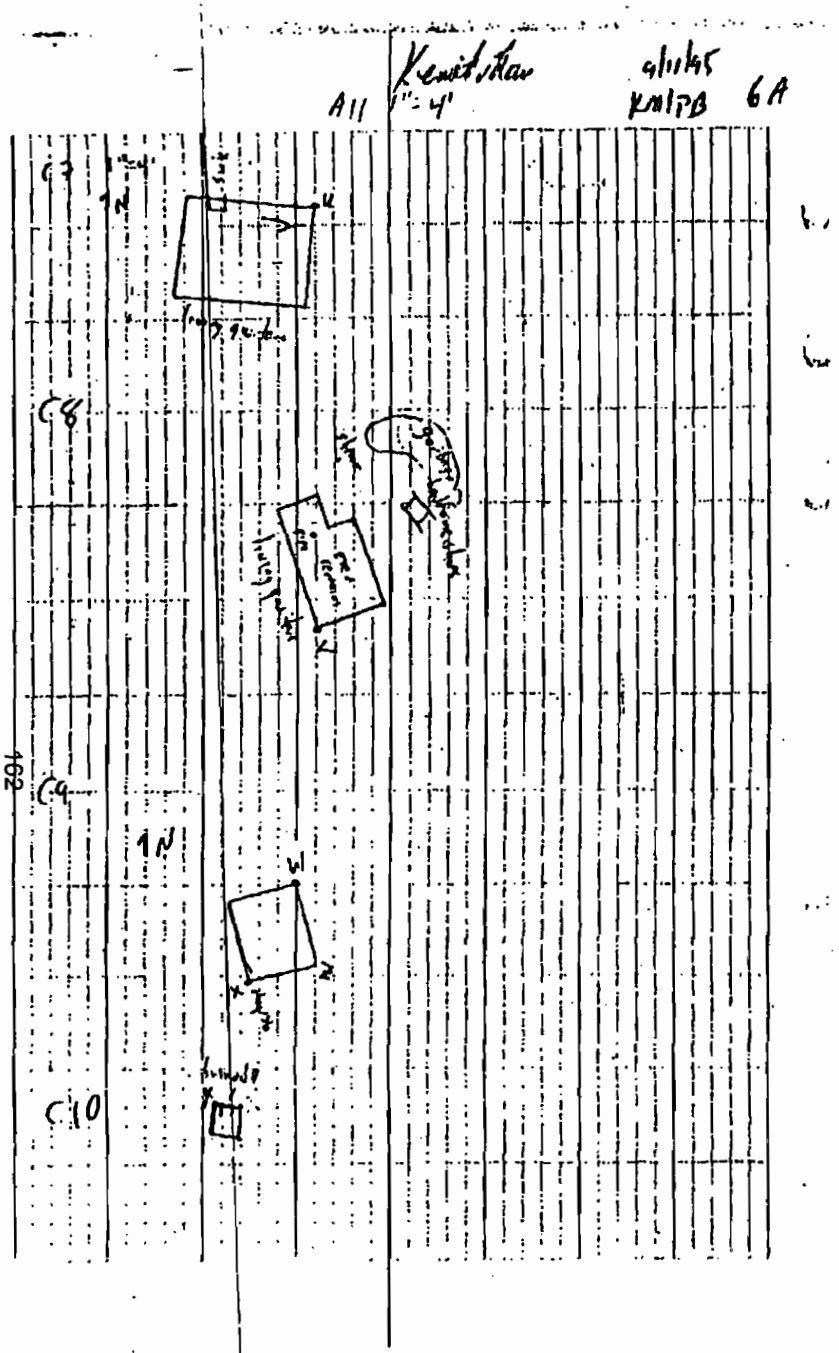
no stressed vegetation or kill zones

(5) 6x7' structure w/ screened window & tar paper (NESW) collapsed structure

old pipe & compressor tank & boiler located 25' upslope of boiler 3'-7" tall 2m

C6 photo 1 roll 17.#31 looking NE6W at C6 8'x8.5' (sloping roof) small wooden cupboard behind 4x8 wood stove standing boards for walls structure visqueen on walls or nails & paper inside

both structures built on tailings near creek



Kenai Star — KNLPB — 9/11/95 — 7/6

C7 — structure on W side of ck
plumbed sink, piping, tarp, plastic bird
77 x 22' (SESW) — cabin is in ruins
white trim, nails, spikes,
cedar shake siding

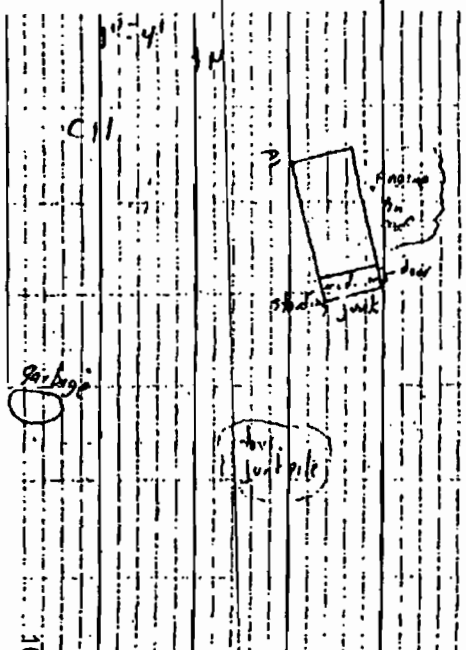
C8 — 572 W
15' x 26' w/ 8x8 square — totally collapsed wooden
structure w/ tarpaper,
cedar, plumbing, nails
strange unknown equipment (refrig?)
glass, copper plate, bedframe
some garbage, furnace,
"7 the electric motor" will work...!
Comp. 110 volts
radiator pipe: possibly, bullet, shard
fuge 200

C9 — 18' x 14' 579 W — partially collapsed
roof has fallen onto floor, but
roof trusses are intact
tarpaper on roof, plumbing
cedar shake siding over tarpaper
- single story w/ a loft
gas engine/pump
glass jars, tin pie plates
cutting NW wooden
cabin

C10 — 5.5 x 6' (SSW) — tin roof, cedar shake sides
bldg is in good shape
1 hole copper still in outhouse
house sitting on log foundation

Kenetech KCM1B
9/11/95 7A

C11



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Kenetech KCM1B
9/11/95 7

C11

plumbing
electrical, bedsprings, tar paper on sides
standing wall (new shyroom)
interior siding gone, all the roof
woodstove, nails, drawers
13' x 30' (SIZE)
roofing fallen to ground
rusted blazo fuel can

large junk pile ~ 30' away both
historic & modern garbage

several CMT cedar all over the place
stripped bark prevails

Kennecott — Salt Creek — Kmlsb — 9/14/95

1/9

weather: mostly cloudy, patches of blue, mild breeze, drizzle to increase - high in low 60s

Leave Tenaya: 7:30
Arrive Salt Creek base @ 7:51

8:00 Calibration pH 7 — 6.9, 7.0, 7.0
pH 4 — 4.0, 4.0, 4.0
conductivity — 150, 150, 150 uS

8:10 continue survey starting w/ dumps around millsite

GPS: Lat 55° 37.57 — HDOP 4.4
Long 132° 33.32 — 4 satellites

From	To	bearing	distance	elv (UR)	comments
F	B1	N25W	64		from corner of this concrete pier-crusher (1 of 7)
		conveyer from crusher to top of mill about 2 wide			
B1(1)	B2	N30W	48'	(D2)	at □ glass to top of dump
B1(2)	B1	N44E	31		
B2	B1	N72E	11	(D3)	to very top (1)
B1	B5	S56E	124		to end of dump (2)
			at 78' (start dump)		
B5	B1	S30W	15'		on top of dump to big tree (3) (D4)

Kennecott — Kmlsb photos 2/9

From	To	Bearing	Distance	elv (UR)	comments
B4	B7	N57E	414'		(photo 1 roll 19, #35)

electric engine at B7 - rail-line to mill WI
rail-line pieces between trucks & dumps

train engine: 45 battery cells found (ACB's)
2 large battery blocks
control panel found as well
Cutler-Hammer Mfg Co (Milwaukee, WI)

photo 2: looking at train engine & battery cells (view S30E)
roll 19, #36

photo 3: view S75E of control panel, linkage & cells
roll 19, #37 undercarriage of engine
(engine sits atop pit

B7 — B8 — B6gW — 94' — which may have anchored wooden bulkhead across rail
at 31' goes to bottom/underbrush
73' goes to DS (to be cmd)

sheet metal, boxes, rail-line, lunch box pipe along rail line

B6	B9	N40W	145'	along rail line
		30 to 71' (L13) about 20' left line		along rail line
B9	B10	N36W	166'	rail bed is about 20' wide
		at 75' remnant 35' to water line		water line
		water line runs S75E		

all kinds of pipe, tanks, bedsteads, flue, battery cells on trail, sheet metal, boxes, all rusty drum/tanks

From	To	Distance	Bearing	Comments
B10	B11	~~[illegible]~~ 165'	~~[illegible]~~ N22W	Compass bearing line goes under tracks at 105'
		2nd rail-line	3 from B11	
B11	B12	~~[illegible]~~ 165'	N23W	along rail-line
		2nd rail line	46-62' (3rd from) core bags stored on rail-line >40 1 from B12	
B12	B13	165'	N25W at 65' ⊥ to flag line, split at 2nd line w/a 3rd line	
B13	B14	100'	N33W 3 ore cars at 100' (80) -> 119' (ea)	to edge of fore car
photo 6 roll 20, #3		looking N 35W at ore car string		
B14	B15	86'	N43W	
		44-66	ore car pieces, creek, fill in w/ rip rap	
B15	B16	165'	N11W at 33' stream crosses trail at 141' stream crosses trail then E, runs w/ water exiting WI and under rail-line, also flag down track ⊥ 47'	to exposure outside WI
B16	B17	76'	same	to portal

water testing site (WT1)

WFS 1 pH 7.7
µS 190 µS
T°C 6°C

11:00 WA01:

photo 8 roll 20, #5 — looking N10W at ~~portal of WI~~ sample site WA01 (stream exiting WI)

photo 9 roll 20, #6 — looking N10W at portal of WI

11:15 WFS 2 pH 7.1 µS 30 µS T°C 15.5°C — from upstream on creek flowing into WI water

11:20 WFS 3 pH 7.0 µS 30 µS T°C 15.5 — after water from stream has mixed w/ WI effluent

B15	B18	86'	S11W at 33' trail exits off L line and connects w/ N/W at 45 dump join here to face
B18	B19	53'	S64W
B19	B20	60'	S ~~[illegible]~~ to DB
B20	B21	44'	W from 1'7-1'6
B21	B22	60'	S57W from DB to old dump

40 across dump
17' along it

Kentucky Alum — KmlPB 6/9 — 6/14/95

B16	B23	135'	S26E	line split to B16, other line stays at SITE trail
B23	B24	60'	S29E	line switched B24
B24	B25	72'	S6E	one railline just goes till it goes 3' from mill and joins to dump above level of railline

follows split rail-line from mill line

mid ore car at 22'

dumpcars from 48-72'

wide rail-yard at end of dump. from Bisrail

photo 10, roll 20, #7 — view from C9 (B26) to rails, water or generator, engine parts, water pipe, cable. S50E

photo 11, roll 20, #4 — view N50E of NW corner of C4

photo 12, roll 20, #9 — view NNW of lower stash of drums in graveyard

photo 13, roll 20, #10 — view NNW of 2 large fuel tanks at top of graveyard

photo 14 — view N of end front of C1

photo 15 — view N of E portion of C2

photo 16: view NE SW of E side of mill, lower

photo 17: view NE SW of " " " upper

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Kentucky Alum — KmlPB 6/7 — 6/14/95

Structures

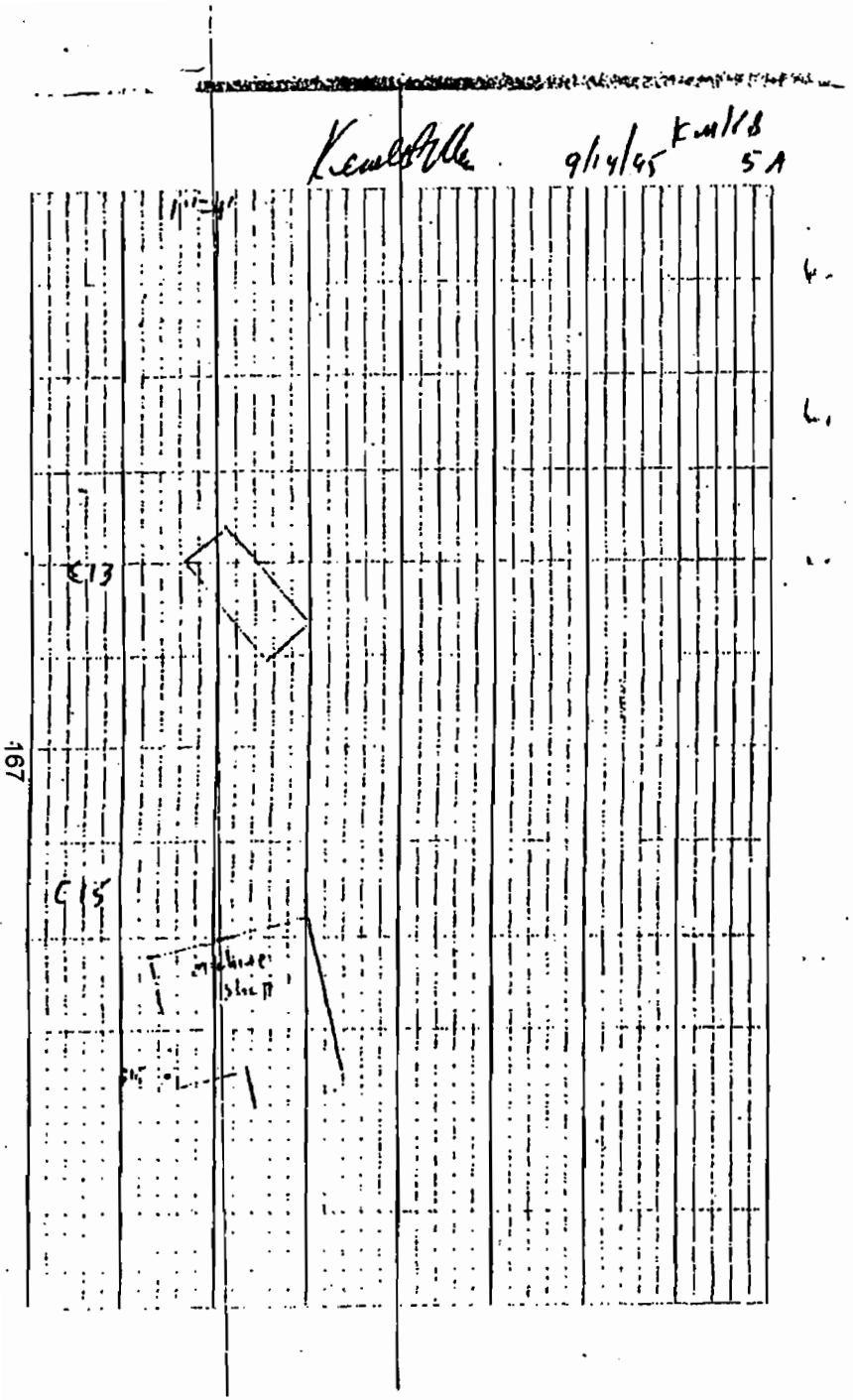
C12	75' x 45' (E) (N)	wall with station above track at B7+31', discuss assoc w/ rock movement - pull rail cars to ore feed & dump picks

photo 4, roll 20, #1: looking at front of C12, winch mechanism, view N 40W

C13	27' x 18'	squared timbers, legs & front structure ruined, bolts, boards, metal plate
photo 5, roll 20, #2	jumble of iron on top	
C14	15' x 20' (SIZE)	totally ruined roof, cabin, porcelain toilet, stove base, stovepipe, electrified wire insulators
C15	20' x 35' NTS	(machine shop) ruined interior, portal of W1 engine, belt drives, timbers, belts, parts, rubber hose, drills, pulleys, drill steel, tools, twisted, mangled pipe, oil torque Denver Equip Co. Oil torque Denver Rock Drill Mfg Co. WAGNER Model 8 generator (alg elec)

c'1 to c7'n line Bisline

photo 7, roll 20, #1: looking at WAGNER Model 8, view is N 75 E



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Kewaunee plate 5 KM/PB 7/9

photo 18 — view NNE of large angle compressor, main drive wheels, valve gallery

photo 19 — view NNE of 4 cyl & 2 cyl Fbks Morse engines inside mill on platform, cement

photo 20 — view NNW inside of mill under platform having engines showing oil sheave & sludge

photo 21 — view NNE of upper portion of mill where conveyors & crushers operators belt wheels

photo 22 — view of 4 cyl Fbks Morse diesel engine - N50E

1:45

photo 23 — looking SSE at electrical control center on E side of mill (2 control panels)

photo 24 — view W of clutch mechanism, 4 cyl, 2 cyl engines

photo 25 — view NNW of gyratory crusher & waste rock dump (B2)

photo 26 roll no. #23 — view NNE of rock grade packed in woods (Austin Mfg. Co. Chicago, Ill)

Kenetteau 9/11/95 8/9 KMPB

Tailing view W. creek (vegetation change)
L-T line nil/sparse → modgrowth
113' @ S.S.E crossing L-T @ 35'
32' from L-T line S - adjacent to both banks of creek

14:15 WTS 4 / WA02 — downstream water sample from Ck on W side property - Test on interbed portion of tl w/ mine tailings

frogs living in Ohio gulch fishin interbed-tailings H2O

pH 6.7
mS 30
T°C 15°C

photo 27 looking N 20 W. upstream at sample site WA02

photo 28 View N60W of tarpaper, sink, pipe, boards at C7 (NW corner of bldg)

photo 29 View N70E of C9 - dilapidated cabin, garbage, tarpaper, boards, tin roof

photo 30 closeup of garbage pile near C11 bottles, cans, boards, metal, etc

photo 31, 32 view S&E of recent garbage pile S of C11 plastic, rope, wire, etc

photo 33 roll 20, #30 looking SE out C11 platform and standing structure

Kenetteau -1

3:05 arrived back at adit / creek confluence
walked up creek from mouth -

3:10 walk up to Glory hole

photo 34 roll 20, #31 closeup of yellow drill station above creek near portal S70E

photo 35 roll 20, #32 looking at adit portal w/ Glory hole N75E
tailings, Cu-stain visible

photo 36, 37 aerial of Glory Hole

photo 38, 39 roll 20 #36 aerial of mill site facilities

Ken Fuller Knights 8/15/05 1/7

Salt Chuck

Leave Tenakee 7:35
Arrive Salt Chuck 7:57

Weather mostly clear, winds from N-NW, 40 sea for 4 days, temp in hi 50s - 60s

4:05 calibration pH 7 7.0, 7.0, 7.0
pH 4 4.1, 4.1, 4.0
conductivity 150, 150, 152

take 2 soil samples for oil - one in mill area
one in trees/bushes below mill

8:25 KJS S001 - taken from intertidal area in front of barge opposite from 4 lots
soil is yuck, organic, sewer like smell
photo 40 looking W at sample site S001
roll 21, # 1 Spoon in muck

8:30 KJS S002 taken from W corner of mill below pilings, tarry substance, stringy wood, not really smelly, water boils up on this side of
photo 41 looking NW at this location of S002 shows fuel tanks & black stain on wood & ground

Ken Fuller 8/15/05 2/7

S002 from this engine room floor is tarry substance, very strong petroleum smell 25'x4' by 6" but it oozes very slowly
the entire length of the mill and it has leached out into the intertidal zone

" SCOOP OF THE GOOP "

C16 - living qtrs near mill line 25x36 w/ L-shape

B24 B26 S80W 110' SE to corner of C16

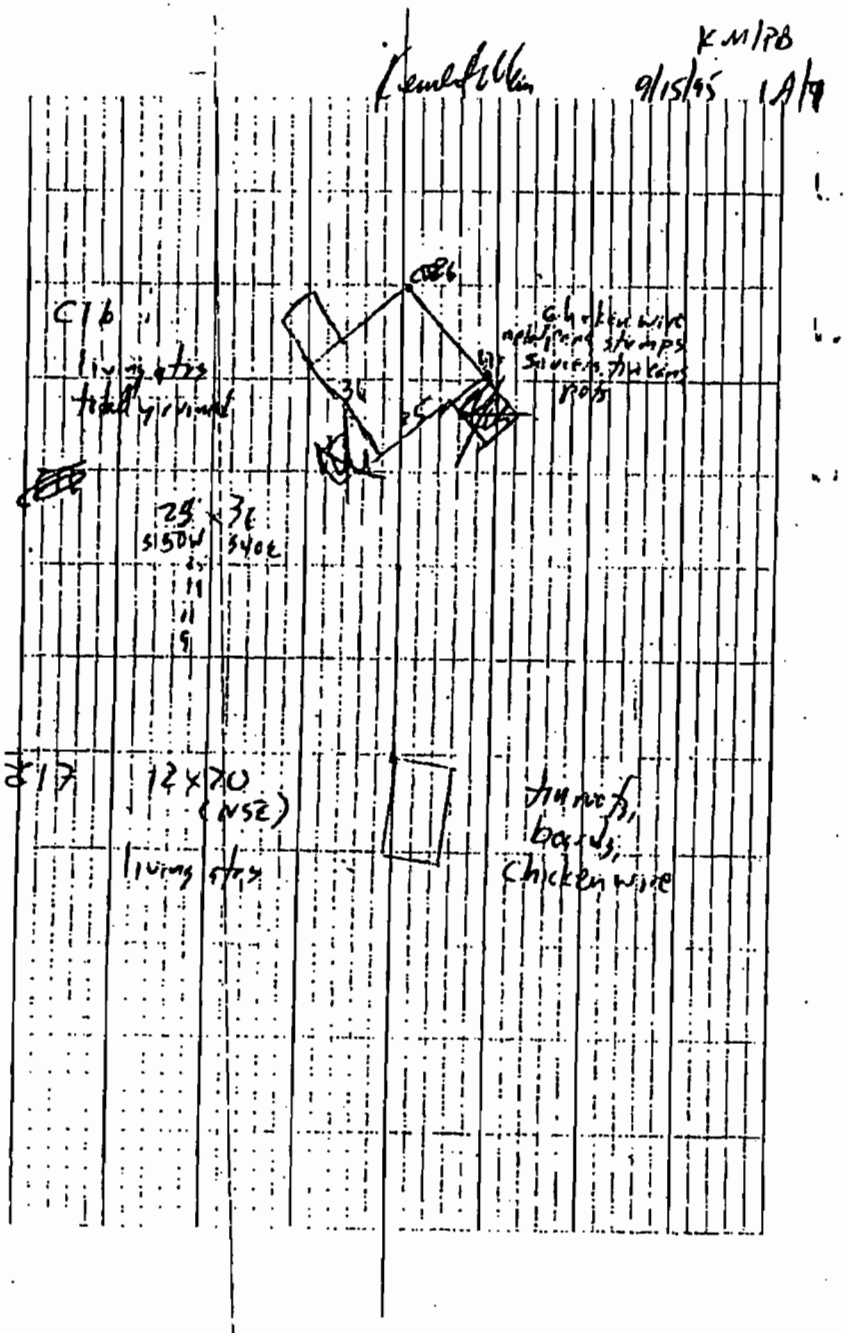
photo 42 looking N4 W at C16 showing
roll 21, #3 foundation trees, pilings, garbage

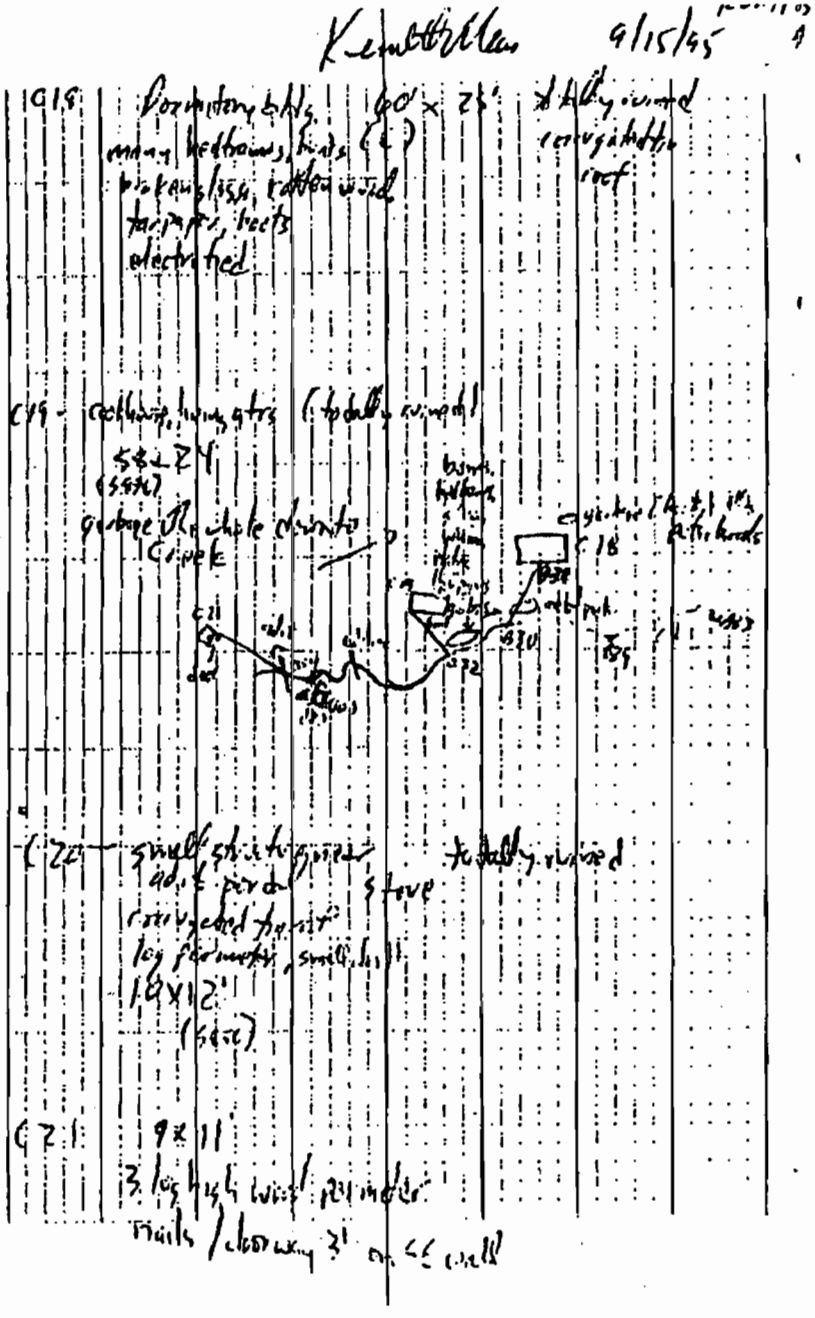
B26 B27 S74E 37' to NW corner of C17

C17 - living qtrs near C16
pilings, chicken wire, tin roof, boards
to all 7 in ruins

9:20 upstream water sample taken beyond living qtrs toward edge of travelling away from mill (W1)

WTS 1 pH 6.6
WTS 2 ms 20
psc 15%


KM/PB
Kemble Bldg 9/15/95
C16
living qtrs
totally gutted
chicken wire
supporting stumps
Stumps, timbers
roots
29 x 36
1500 sq ft
540 sq
C17
12 x 70
(840 sq)
living qtrs
timbers,
boards,
chicken wire


Kemble Bldg 9/15/95
C15
Dormitory bldg 60' x 25'
totally ruined
corrugated tin roof
many bedframes, beds
broken glass, rotten wood
tarpaper, roofs
electrified
C19
cookhouse, living qtrs (totally ruined)
588 sq ft
(588)
garbage
C18
C21
C22
stove
totally ruined
C23
9 x 11
3 log high walls
(99 sq ft)

Kenaitze KMFB 11/15/95 3/7

photo 43: Looking N85E upstream at sample site WA03

survey from WA03 back to adit along ck including living qtrs

B28	B29	85'	S80W	
		small ck to N35E crosses at 75'		
B29	B30	100'	N80W	
B30	B31	64'	N22E	creek uphill to C18

photo 44 Looking N70W at bedframes on E. side of C18 roll 21, #6

B30	B32	85'	S77W	
		trash ck along this survey (metal parts, pieces)		
B32	B33	51'	N30W	to corner of C19
B32	B34	150	S82W	
B34	B35	10'	S20E	to flat corner
B34	B36	25'	N85W	

overhead wires seen along rail line
past open cut (2 wires)

Northeast stream	B37	84'	N60W	to SE corner of C21

10:15 stroll on up to Cleary Hill

Kenaitze KMFB alaska 4/7

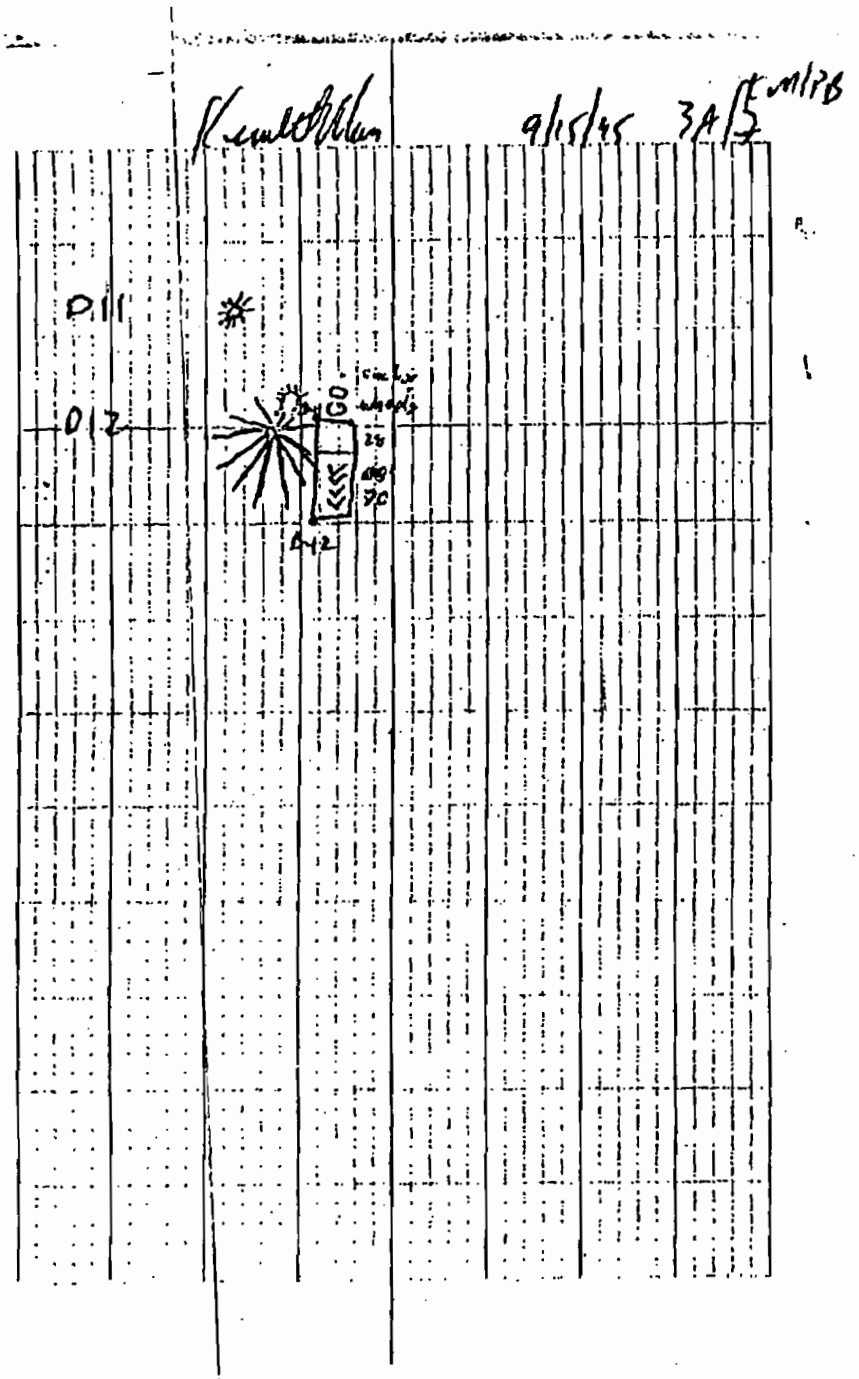
portal entrance to Cleary Hill	side of Cleary Hill	S20E		
highest on pit	side of Cleary Hill	S40E	(elongate climbing E-W)	
B38	B39	S68E	45'	side of Cleary Hill trench D11
			to top of dump w/ chute, pointed on top elongated slightly SE-W	
B39	B40	S22W	93'	D11-D12 top to top
			dump slants at 60' (fair) dump is at least 75' high steepest slope longest to S20E 100'	
B40	B41	N48E	30'	trench D12 to SW corner of structure and top of dump

platform structure is 25' across S80E
B41-B42 → 28' wide ? 70' (??)
this structure has huge braced-posts behind it
(braces look inclined to W, appear to be affected (slumping) 15' down)

photo 45 roll 21, #7 looking N10E at structure timbers, rails, sheet metal

photo 46 roll 21, #8 looking N10E up at D12 from near bottom of fan - stressed ridge behind

photo 47 looking S20W up at elongated lateral bottom of fan of D12



Kenneth Klein KMIB 9/15/45 c/7

B42 B43 S-75E 941 bottom of exploration to date

drill platform of casing in front

photo 48 – looking SSE down on drill platform - recent exploration shaft roll 24, #10 wood only of metal casing plywood is busted up, log base is

11:15 – found 2 shafts behind Glory Hole on SE side

– 1 is very large - probably connects w/ 100 level within Glory hole.

This needs to be covered.

photo 49 – looking SSOE into WH shaft behind Glory hole.

survey from adit in Glory Hole to S edge.

SSIE

60' @ SSOE S. edge to WH 11.5 : 1.2

36' @ NSIE S edge to WS 4.4

photo 50' – view SSIW of WS opening

Kenneth Mac 6/7

from portal of adit to W3 opening 25'
N44E to edge of dump 62'

S10E 50' crossing line at 30'

photo 51 looking NNW along dump from W3 showing rails, pipe, rocks

photo 52 SW into portal of W3 looking into glory hole

photo 53 close up of insulator along rail-line looking from glory hole to main adit

double electric wire strung in trees

spikes sticking out of log supports along entire length of rail-line (NSW)

6" line drawing in rail-line from glory hole past structure C22 (ruins) 12x20' (ssw) about 25' from ct

this rail-line w/ main line at 3 creek = 50'

Kenneth Mac 7/7

17:30 S063 : from around main mill

13:40 S064 - dry tailings taken around Cb area

12:56 S065 - tailings w/in stream and below W. tailings pile, near WFS4 & WA02

all composite samples

1:10 pickup at Su Hi Chuck

"Ken News / Peter Kitzenberger

Intertidal work

1/3

Thursday. July 20, 1995

Hard slog to salt chuck
Took quick look around
will survey high tide line in
both directions from mill.

Tailings: commonly f-g, greenish
sands. Not much growth/lives
on tails. Windy today; tails
are being picked up by wind

Quite a bit of evidence of
faunal presence on no-growth zones
- deer, bear, bird tracks
- insects & birds catching insects
-

The difference between grn.
& brn sediments can be misleading
- commonly, the brn areas are formed
by a <1/8" layer of brn mud on grn
sediment.
- brn mud smells v. organic, like normal
f-g intertidal zone

SC9 → 500' from A, toward B, 300' mark by Kenn
- mainly grn sands, thin (<1/4") layer of
blk mud & peat layer on top.
15" deep hole
~12" down is a 2"-4" zone of lenses of lt gray clay
- no evid of life in hole

2/3

FROM	TO	Bearing	Dist	Remarks
A	B	S80E	400'	End of Tailings; B: edge of grass
B	C	S43E	138'	C: rim, color Δ
C	D	S07E	117'	D: tree
D	E	S15W	207'	E: point
E	F	S34E	185'	F: point
F	G	S63E	105'	G: point
E	H	N86W	61'	H: end of tailings
H	I	N37W	565'	I: corner in tailings
I	J	N90W	181'	J: corner of bldg
I	K	N40W	168'	K: near corner of mill, dump
K	L	N68W	298'	L: big elm, in bldg
L	M	S5E	655'	M: point
M	N	S34W	127'	N: point
N	O	S19W	242'	O: high tide line - off scale to W

Sc A (cont'd) → more bearh aggregate than Sc B. Some barnacles on rx near hole

A → B 180' hs

280' hs in woods

H → I along crk of dble piling

I ~ on A B line

I → A → also along line of piling.

I → A → 86' to 80 ⊕

L → M 72' crk

97' crk corner

121' end crk corner

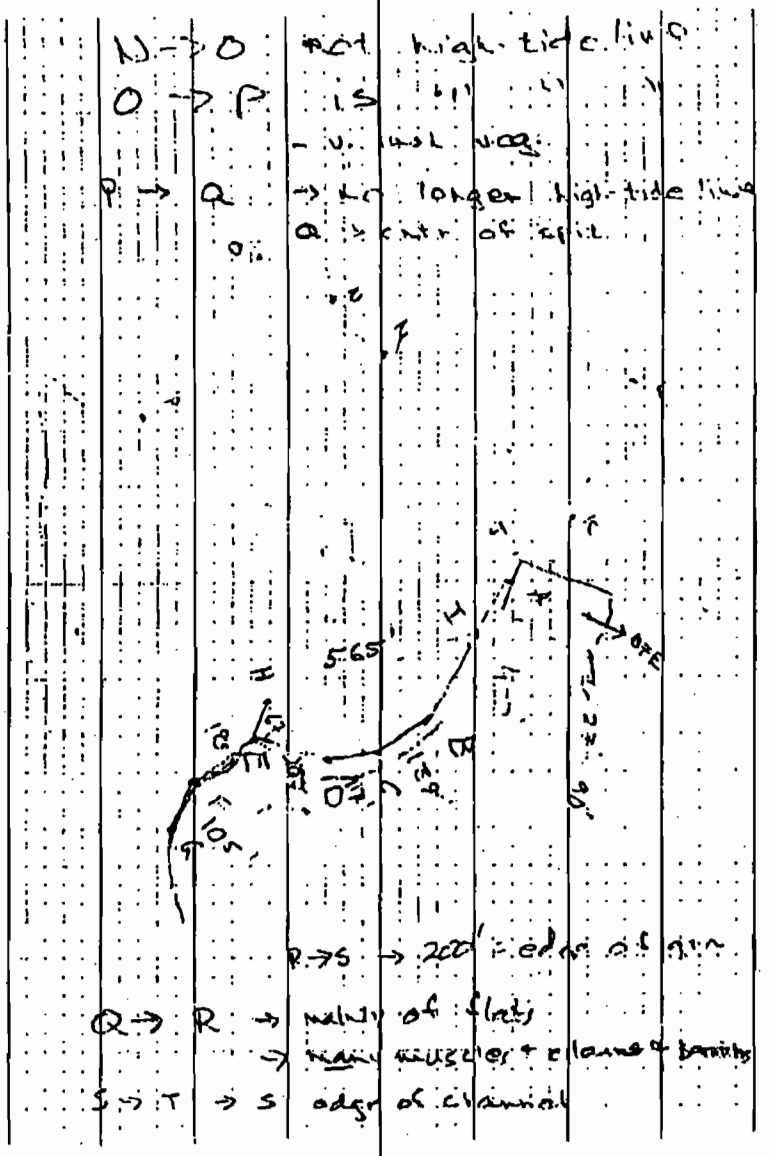
147' top of crk bank

182' → projected line of pilings that crk thing could

N → O 60' end grass, bdg. sands

98' beg channel

190' end "



From	To	Brng	Dist	Remarks
O	P	S36E	1162'	P: point
P	Q	S70E	390'	Q: pk on "ridge"
Q	R	S11E	700'	R: edge of upper flats out on flats
Q	S	N62E	535'	S: edge of channel off the pt.
S	Ga	N0°		for closure
S	T	N52W	335'	T: edge of channel
T	U	N75W	258'	U: 1" edge of channel
U	A	N10W	742'	
J	V	N87W	61'	V: W. edge of pilings
V	W	N27W	47'	W: E end of tail pile
W	X	S58W	67'	X: ~edge of top of tail pile
X	Y	S21W	100'	Y: ~edge of tail pile
J-V +6'	Z	S8E	259'	Z: S end of pk pile

Fri, July 21st, 1995

Have flown to Salt Chuck w/ Ed from MV in 19L. Will finish up today mainly sampling.

Next sample line will be X-75' toward W // to U-Alive

SC 13 100' S10E of X-75'
- 17" deep hole, sampled across 17"
- 2' from top = ~1" peat layer
- No growth in area at all
- picture #28 of hole
- just down (W) from log tails pile that is above high tide line

SC 14 200' S10E of X-75'
- sampled across 17" hole
- ~ 1/4" clay layers 6" & 8' from top
- bottom of hole = sev. clay layers
- No growth at all in area
- @ > 10" down = peat sands some, but not in distinct layers

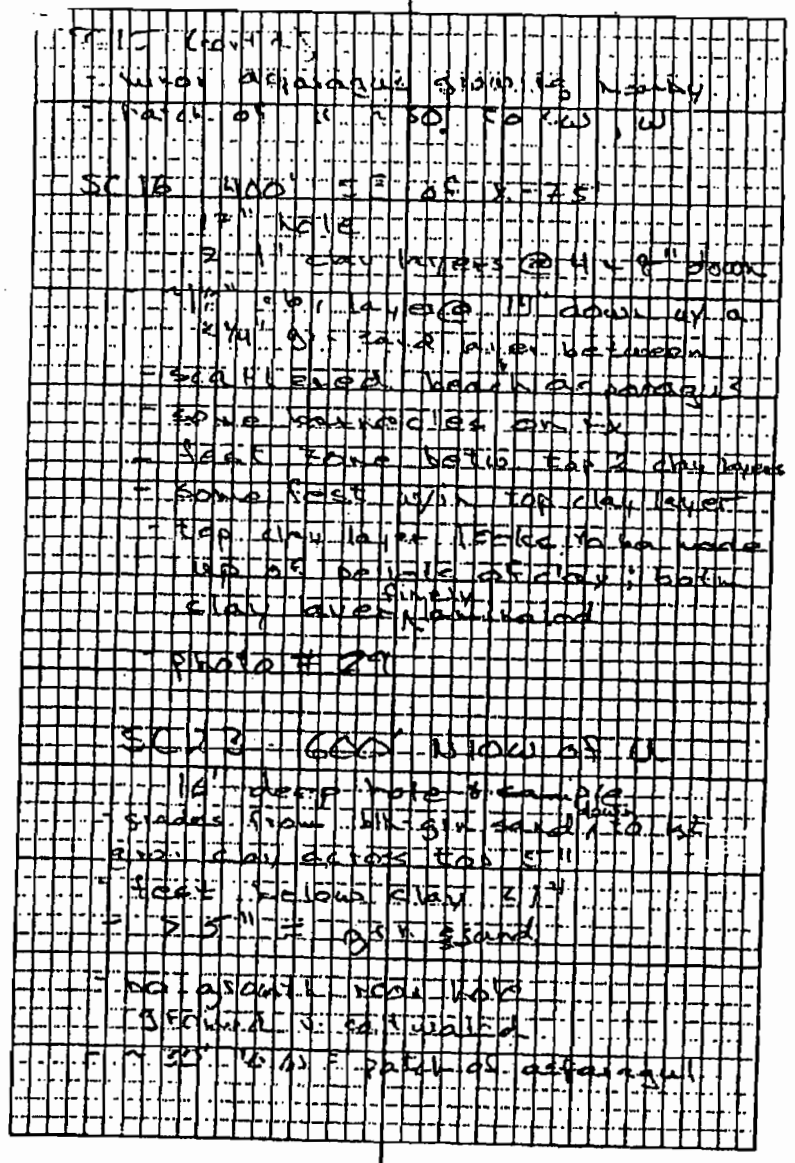
SC 15 300' S10E of X-75'
- sampled across 16' hole
- ~1" clay + wood peat in top 2"
- 1 1/2 - 2" clay layer, 11" down
- minor lines of silt and @ bottom of hole

(Friday is not today)

T → Q

160' edge of channel

198' middle of channel (low flow)



SC24 700' N low of H
(sample taken 10' W of 700' spot because N swampy grnd, standing water)
- 15" hole sampled
- all black, v. organic-rich sands
- piece of wood @ bottm of hole
- some twigs, grass, ? included in sample
- seaweed growing 10' E of sample hole (@ 700' marker) & along drainage to SE

SC25: 500' SSE of B-100
17" hole sampled
- (taken 0' E of 500' stake due to standing water at 500' mark)
- dk gray, organic-rich sand
- ~1/8" olive grn mud on top
- ~1/4" layer of v. blk mud below grn top layer
- 4" to water table (water seeped into hole after sampling)
- seaweed, clam burrows, barnacles present

SC26: 400' SSE of B-100'
16" hole sampled
- 1/4 olive grn mud on top
- blk (dk gray) sand to bottm
- twigs & sticks in hole
- earthworms, barnacles, clam burrows & shell frags present
- water table ~ 6" @ 16" dn

600' from
SC36: At +160' (toward B)
- 5" hole sampled
- ~1/8" olive grn mud, then 2' grn sand, then 3" gray sand, then ~6" of blk & gray banded sands, then ~4" of med gray sand grading into med gray clay. Below clay at bottm of hole is sand & gravel
- barnacles, mussels, seaweed in area, also clam burrows 1"-2" stalks w/in ~100'

SC35: 400 SE of At 160'
15" hole sampled
- top is 1½" of olive grn mud
- then ~3" drk gray sand, then ~4" of banded blk sand, gray sand & lgt gray clay
- bottm of hole is grn sand, below water table
- minor barnacles, mussels, seaweed in area (generally sparse growth)

SC37: 52E, 37' from stn Y
17" hole sampled
top 3" = olive grn
next 1" = " " peat
" 1" = blk sand, peat
" 2" = clay & gray sand, patchy ch.
" 3" = olive grn mixed blk sand
" 1" = clay

Top is wood, possibly planted along
shoreline. Sits as high as pilings

SC 22' @ SE, D

- Exposed top 11" of hole
- Top 3"-1" of hole sand w/
  ¼" of olive grn sand on top
- Below hole sand is 2"-3" layer
  of high org. clay
- Below clay is coarse sediment
  of sand, gravel, cobbles
- Sample shows roughly 5' of
  grade change, shoreline high-
  tide line.
- Beach ridge/berm? Flat, grades
  6% in 10' to U. Sand, pebbles
  close by. Mino-beaulieu?

C 32' @ C-10' (toward D)

- Sampled top 12" of 11" hole
- Olive grn layer (1/8") on top
- Grades downward from blk to
  dk olive grn to dk grn sand w
  trace to lot of gravel clay
- 11"-21" layer of clay @
  15" depth
- Below clay is sand, gravel, cobbles
- Within 3' of shoreline, grass
  roots/rhizomes, shredded, clay, cobbles
- 5' to test scrape (5' toward C)

1" of blk coarse olive grn sand
Bottom 5" of olive grn sand
- Lot of each organics along
  entire length, @ 10 to 05
- Hollow grass stems on top of
  sand. Tall pile

SC 39.96' W 33.50 of str. X

16" hole sampled

Top is ¼" grn mud/sand, over
then 2½" of mixed grn, blk &
red (clay) sand
then 3" blk sand
then 1" coarse sand over pebble
1" - 3" coarse grn sand
Bottom of hole in lgt grey clay
& coarse gravel
- In place, top 4" is blk sand
  over fine-medium grade shower of
  gravels

Salt Chuck 2/20/7/21

- arrived ~ 7:40 am - took quick tour of mill and trucks loading to lower ad.t
- This site will make an incredibly complex AHM site
- took brief walking tour of beach to determine hi tide zone and create a sketch of the intertidal area.

→ on initial walkaround note areas w/ veg, no veg, soil color change, sea critters, sheen, Fe-stn, -
→ several fixed objects/items will establish positions for next survey

from	To	Bearing	Distance	remarks
Base	Tree	hi-tide		just to left of line
Tree	Tree			w/ spal splotch blaze observing
Tree	Tree	on hi-tide mark		creek just to rt of line
Tree	point			

SC1: taken at survey spot. R ground - abundant mussels/barnacles/seaweed on surface
- Sample: material taken from 4-14" down. material is dark brown soil w/ Fe-stained patches & abundant shell frags
- tide flats go out 250-300' from this point tapering to the south

SC2 - taken at survey point 9
- mud material taken from fe-rich layer 2-5" down 15" hole (sandy)
- bottom of hole contains black mucky material (silt-clay size
- top 1-3" contains abundant shell frags - live clam spit water also observed from 5" down
- top material is sparsely covered w/ mussels/barnacles/seaweed - not as much as at SC1
- site is next to stream which cuts thru nose of tailings fan

SC3 - 75' from N fork and creek - about 10' from creek itself
- hole is 16" deep - top 3" is riverine mud - black organic rich muck w/ thin grey-brown interbeds - bottom 1+ is Leguma type broken shelly sand.
- sample represents all
- surface contains sparse clumps of beach asparagus & seaweed w/ barnacle-clad rocks - dark patches are broken (dried mud cracks)
- deer prints present
- sample is probably background

SC4 125' N16W from Q to sample site

- sample taken from oozy muck adjacent to slough from main creek
- sample hole is 13" - top 2" is organic rich black muck - bottom of hole is dark brown gravelly sand -
- no shells in hole
- worm found burrowed in sand/gravel layer
- abundant flies on surface/
- patches of seaweed and clam tellsare also present nearby - not as many as seen at SC2

SC5 - taken along creek bank at survey pt. U
- black sands & brown grey sands w/ organic muck -
- minor amts of algal plant life in vicinity - mussels are nearby barnacles also present
- hole at this location filled w/ water (water table right here)
- 10 feet away on line w/ survey from U → V, the tailings fan ends as this creek has eroded it away forming a gentle bank

SC6 - taken 100' from survey pt V along traverse to mill
- generally barren area w/ small, scattered patches of barnacles/seaweed even sparser than SC4
- 15" hole - first inch was brown clayey material, next 11" were varved clay - mostly black, minor white intervals (mm scale) bottom 3" composed of gravelly sand which is brown in color -
- nearby the fan top is lighter brown than this, but actually this brown is a very thin veneer which contained some black clays below w/ no gravelly layer

SC7 - taken 340' from survey pt U
- few cabins taking up residence here - a few lonely floaters have been deposited near here (barnacle clusters, 2 mussel shells, seaweed mat, etc)
- hole was 16" deep
- thin veneer of organic humus over the mainly greenish brown sand/silts
- a ¼-½" Fe-stain band occurs 3-4" down hole -
- a ½" black sand layer occurs 1' down
- some thin laminae of varved clays w/in greenish silt

SC 9 - taken 400' from surveyed pt 4
- hole went down 16" - all olive green/brown sand - no stratification to speak of - wisps of black sand here & there some perhaps, but discontinuous
- top 1" layer of rust/brown organic muck -
- no mussel beards/seaweed clusters present - less even than SC 8
- very easy digging here - no clay constituent - appears to be mainly sand

SC 9 - Peter took this at 500' in

7/21 75' from X (E) is start of second sample line

SC 10 - taken 100' NNW from station pt for this sample line - on opposite side of small creek which is extremely fe-stained - no life w/in 15' of hole, but at this pt hardy sedge grasses have taken hold - hole is 18" deep

- top 4" is olive green/brown sand
- next 1" is magnetite rich black sands
- next 7" is olive green/grey sand (less H_2O)
- next 1" is mag-rich black sand
- bottom 5" is olive green sands

- This material dug easily - all fe-stained

SC 11 - 50' from new pt on same line w/ SC 10

photo 30 - material w/in meander bend of small creek
- ocean margin/water entry (very thin - ¼")
- hole went down 16" - hit H_2O table at 12"

Sampled
- 1st 1" is black sand
- next 2" is olive green brown sand
- next 3" is black sand
- next 3" is olive green/brown sand

not sampled
- next 3" is grey clays
- bottom 4" is also grey clay (submerged)

- patches of grasses & beach asparagus on this meander bend -
- patches of fe-stain also seen
- no shell life

SC 16 – taken at new survey pt on top of mill tailings pile
– mill tailings pile is approx 10' tall near the creek which flows below it
– sample hole is 18" deep
– homogenous olive green / grey sands in hole
– top layer is very dry – sand blown and appears silty – same material as below however just drier, less compacted
– small, stunted spruce tree rooted on the tailings pile – otherwise devoid of life but for a very tiny clump of grass
– driftwood piled on top of this pile
– definitely marks storm hi-tide mark

SC 17 – 500' from new survey pt
hole is 16" deep till hit water table
– top 2" is dark brown / grey / patchy black sand (harder to dig hole – muscles, barnacles + seaweed packing)
– next 2" is olive green / brown w/ Fe-stain
– next 2.5" is varved clays grey / olive
– next 2" is olive green / brown w/ more Fe stain
– next 5" is olive green w/ abundant pockets of Fe stain, oxidized pyrite layer (curious weathering)
– 2.5" of laminated clays (curious layer)

SC 18 – hi-grade of curious layer – Fe pockets from hole SC 17
New line 100' from survey pt B

SC 19 – at 0' on line
– dry grey / brown w/ black sand in upper 3" (dk)
– hole is 19" deep – homogeneous throughout except for presence of black sands mentioned above (easy digging)
– no life on this portion of beach
– about 15' from highest tide mark where grasses / lichen begin

SC 20 – 100' from SC 19 on same line
– no beach life to speak of
– sample hole is 20" deep
– alternating olive green / black sand layers on a 1/2 – 1" scale throughout hole (hard digging)
– one thin clayey (tan) / pink 5" down – does not form a separate layer
– appears to be all tailings in hole

SC21 - taken 200' along line
3 - scattered patches of beach asparagus
? but mainly devoid of veg / life forms
2½ - hole is 20" deep
6 top 2": black sand w/ olive green sand
next 4": olive green sand w/ wisps of black sand
next 2": cross bedded clays & olive green sand
next 8": olive green sands, minor black sand pebbles
next 2": lt grey/brown clay
bottom 3": olive green sands

minor Fe-stain on surface around hole but more within hole

SC22 - 300' S10E of B-100' (near pilings line)
- v. black, organic-rich sand
- some twigs, branches in hole
- 18" hole sampled
- shell fragments 11" from top
- top ½" = grn sand
- seaweed & barnacle growth in area. Clam burrows also present

19-30

SC 28 75' @ S34E from L (survey pt)
- hole is 18" deep
- organic debris (sticks, bark, grasses) contained throughout layers exposed in hole
- top 9" - olive green/dk brown sand
- 4" of black sands w/ minor olive/brown component
- 3" Feet sandy layer
- 2" black sand & olive green/brown layer

sample taken on opp side of tk from small pilings pole on NW corner of burrows
- grasses are growing all around the burrows & where was sampled
- sample taken at extreme hi-tide zone

SC29 - 600' along line from first survey pt created 7/24
- hole is 18" deep (H2O table)
top 4" - olive gr/brown/dk/black sand/first layer
next 3" - varved clays lt grey/black (org-rich)
11" - olive grn/dk brown sands
- sparse water
- scattered rocks w/ barnacles, fish, weed / mussels

184

1. 30 700' along new survey line
- 15' beyond face of tailings fan adjacent to stream
- hole is 10" deep, then bottom
- top 1-1.5" is black-olive green tailings sands
- next 8" is sandy gravelly stream bottom material
- sparse → moderate quantities of barnacles, mussels, seaweed on rocks - tiny fry in stream
- birds w/ sharp beaks pecking beach

SC 31 120' @ S23E from survey pt D
- hole is 12" deep, then hit major twigs, roots, shells
- top 1" is olive gr/blackish org. sands
- next 11" is all org-rich black sandy material - no smell
- sparse clumps of grass & seaweed near sample hole
- 20' away is above hi-tide line and mod-heavy [illegible] of grasses, trees
- clam bills are near dry stream about 30' to the west

SC 33 new survey line on w. side of supers house
- near highest tide mark - sparse clumps of dying grass only
- 18" hole
top 16" - homogenous olive green/VK brown sand (tails)
bottom 2" - veined ltgrey/dkgrey clay

SC 34 225 from SC 33 along same line
- adjacent to small ck which has created an oasis in this area of death
- flies abound because of the org-rich muck which is present as is shad grass
- clam bills are abundant
- major seaweed on limbs, rocks
- hole is 14" deep
- black → grey → ltgrey clayey material
- top 1-2" is bottom / olive green sand silt muck
- materials completely saturated by creek / associated water table
- water table in bottom of hole

SC 37 136' @ N37W from 200' hole on line off tailings pile (1st / highest)

Peter Pos notes

SC 38 : In line w/ survey pt Y & SC 37 = across creek on W. bank ~ 200' away
- fishes in Creek / Fest banks
- hole dug w/in floodplain of ck w/ abundant beach asparagus and grasses
- no mollusks in neighborhood
- hole is 13" deep where it hit stream gravels
- top 8" is black org. rich, olive green & Fe-stain layer
- next 3 is olive green/dk brown sand
- next 1" is Fest olive gr/dk brown sand
- bottom of hole is stream sands/gravels

Photos - Salt Creek

Photo roll 11.#	To	Bearing	Distance	Remarks
10 #1	Looking	N20W	across ck at tailings & mill	taken between T & Y
11 #2	looking	S	from Q toward R out to ocean bay; intertidal zone containing abundant mussels, barnacles, clam bills, small fish in pools, etc	
12 #3	Looking	N 15W	from Q toward mill	
13 #4	Looking	SE	into hole/sample site SC 2	
14 #5	looking	N20E	into sample hole SC 2	
15 #6	looking	N30W	at millsite & intertidal zone from site S	
16 #7	From top of barge looking	S50E	out toward survey pt D viewing tide	
17 #8	From top of barge out along pilings			
18 #9	From top of barge out rock jetty			
19 #10	From top of barge out W to Fe-stain creek and mill debris/tailings survey pt L			
20 #11	From X To X	looking at	layered tails piled up and adjacent to creek	
21 #12	On tailings dump (middle)	looking	S80E at color change on far post major pilings	

photo	
22 #13	taken of sample hole SC3 showing strat: section
23 #14	taken of sample SC4 - muck & gravelly soil
24 #15	Looking N from SC4 to mill / tailings
25 #16	Looking NE of SC 6 - dark black clay layers
26 #17	taken at sample site SC7 - note Fe-rich layer about 3-4" down otherwise mostly dark green / brown
27 #18	taken of SC9 - showing Fe-rich layer
28-29 #19-20	Peter
30 #21	taken of SC11 showing 9" of tails on top of grey clay layer which is clearly marking the tailings interface of base level

Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970870 Sample ID KT3 WA04 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00519	104
LCS2	Silver by furnace - Total	mg/l	0.005	0.00502	100
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00551	110
MSD	Silver by furnace - Total	mg/l	0.005	0.00499	100
LCS1	Arsenic by furnace - Total	mg/l	0.0250	0.0276	110
LCS2	Arsenic by furnace - Total	mg/l	0.0250	0.0266	106
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.0250	0.0255	102
MSD	Arsenic by furnace - Total	mg/l	0.0250	0.0248	99
LCS1	Beryllium by furnace - Total	mg/l	0.0025	0.00237	95
LCS2	Beryllium by furnace - Total	mg/l	0.0025	0.00249	100
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.0025	0.00239	96
MSD	Beryllium by furnace - Total	mg/l	0.0025	0.00244	98
LCS1	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00246	98
LCS2	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00265	106
MBLK	Cadmium by furnace - Dissolved	mg/l	ND	ND	
MS	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00276	110
MSD	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00231	92
LCS1	Chromium by furnace-Dissolved	mg/l	0.025	0.0262	105
LCS2	Chromium by furnace-Dissolved	mg/l	0.025	0.0269	108
MBLK	Chromium by furnace-Dissolved	mg/l	ND	ND	
MS	Chromium by furnace-Dissolved	mg/l	0.025	0.0287	115
MSD	Chromium by furnace-Dissolved	mg/l	0.025	0.0272	109
LCS1	Copper by furnace - Dissolved	mg/l	0.025	0.0243	97
LCS2	Copper by furnace - Dissolved	mg/l	0.025	0.0255	102
MBLK	Copper by furnace - Dissolved	mg/l	ND	ND	
MS	Copper by furnace - Dissolved	mg/l	0.025	0.0282	113
MSD	Copper by furnace - Dissolved	mg/l	0.025	0.0289	116
LCS1	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101

Report #: 35885

Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970870 Sample ID KT3 WA04 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101
MBLK	Diss.Hardness as CaCO3, Titr.	mg/l	ND	ND	
MS	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.8	99
MSD	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.0	96
LCS1	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
LCS2	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	24.8	99
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	24.0	96
LCS1	Mercury by CV - Dissolved	ug/l	2.0	1.86	93
LCS2	Mercury by CV - Dissolved	ug/l	2.0	1.93	96
MBLK	Mercury by CV - Dissolved	ug/l	ND	ND	
MS	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
MSD	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
LCS1	Nickel by furnace - Total	mg/l	0.025	0.0259	104
LCS2	Nickel by furnace - Total	mg/l	0.025	0.0262	105
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.025	0.0265	106
MSD	Nickel by furnace - Total	mg/l	0.025	0.0257	103
LCS1	Lead by furnace - Dissolved	mg/l	0.025	0.0230	92
LCS2	Lead by furnace - Dissolved	mg/l	0.025	0.0247	99
MBLK	Lead by furnace - Dissolved	mg/l	ND	ND	
MS	Lead by furnace - Dissolved	mg/l	0.025	0.0241	96
MSD	Lead by furnace - Dissolved	mg/l	0.025	0.0238	95
LCS1	Antimony by furnace - Total	mg/l	0.025	0.0224	90
LCS2	Antimony by furnace - Total	mg/l	0.025	0.0232	93
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.025	0.0190	76
MSD	Antimony by furnace - Total	mg/l	0.025	0.0159	64
LCS1	Selenium by furnace - Total	mg/l	0.025	0.0276	110
LCS2	Selenium by furnace - Total	mg/l	0.025	0.0277	111

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Laboratory Report

MONTGOMERY LABORATORIES
5438 Shaune Drive
Juneau, Alaska 99801
907 780 6668

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970870 Sample ID KT3 WA04 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
MBLK	Selenium by furnace - Total	mg/l	ND	ND	
MS	Selenium by furnace - Total	mg/l	0.025	0.0302	121
MSD	Selenium by furnace - Total	mg/l	0.025	0.0290	116
LCS1	Thallium by furnace - total	mg/l	0.025	0.0245	98
LCS2	Thallium by furnace - total	mg/l	0.025	0.0245	98
MBLK	Thallium by furnace - total	mg/l	ND	ND	
MS	Thallium by furnace - total	mg/l	0.025	0.0250	100
MSD	Thallium by furnace - total	mg/l	0.025	0.0236	94
LCS1	Zinc by Furnace - Total	mg/l	0.110	0.142	129
LCS2	Zinc by Furnace - Total	mg/l	0.110	0.122	111
MBLK	Zinc by Furnace - Total	mg/l	ND	ND	
MS	Zinc by Furnace - Total	mg/l	0.010	0.0125	125
MSD	Zinc by Furnace - Total	mg/l	0.010	0.0120	120

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Laboratory Report

U.S. Bureau of Land Management
Alaska Field Operations Center
Juneau Branch
P.O. Box 20550
Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970871 Sample ID KT3 WA05 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Parameter	Units	Result	Conc.	%Rec	Dilution	Det.Limit	Prepared	By	Analyzed	By
Silver by furnace - Total (EPA 272.2)	mg/l	ND				0.0005	07-aug-1997	aes	11-aug-1997	saw
Arsenic by furnace - Total (EPA 206.2)	mg/l	ND				0.0005	07-aug-1997	aes	14-aug-1997	saw
Beryllium by furnace - Total (EPA 210.2)	mg/l	ND				0.001	07-aug-1997	aes	21-aug-1997	saw
Cadmium by furnace - Dissolved(EPA 213.2)	mg/l	ND				0.0002			05-aug-1997	saw
Chromium by furnace-Dissolved (EPA 218.2)	mg/l	ND				0.015			09-aug-1997	saw
Copper by furnace - Dissolved (EPA 220.2)	mg/l	0.0031				0.002			09-aug-1997	saw
Diss. Hardness as CaCO3, Titr. (EPA 130.2)	mg/l	95				10			01-aug-1997	saw
Hardness as CaCO3, Titrimetric(EPA 130.2)	mg/l	100				10			01-aug-1997	saw
Mercury by CV - Dissolved (EPA 245.1)	ug/l	ND				0.2	07-aug-1997	aes	31-jul-1997	ddw
Nickel by furnace - Total (EPA 249.2)	mg/l	ND				0.01	07-aug-1997	aes	13-aug-1997	saw
Lead by furnace - Dissolved (EPA 239.2)	mg/l	ND				0.002			05-aug-1997	saw
Antimony by furnace - Total (EPA 204.2)	mg/l	ND				0.005	07-aug-1997	aes	19-aug-1997	saw
Selenium by furnace - Total (EPA 270.2)	mg/l	ND				0.005	07-aug-1997	aes	20-aug-1997	saw
Thallium by furnace - total (EPA 279.2)	mg/l	ND				0.001	07-aug-1997	aes	25-aug-1997	saw
Zinc by Furnace - Total (EPA 289.2)	mg/l	ND				0.007	07-aug-1997	aes	20-aug-1997	saw

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ATTN: Roger Baer

Sample # 970871 Sample ID KT3 WA05 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS1	Silver by furnace - Total	mg/l	0.005	0.00519	104
LCS2	Silver by furnace - Total	mg/l	0.005	0.00502	100
MBLK	Silver by furnace - Total	mg/l	ND	ND	
MS	Silver by furnace - Total	mg/l	0.005	0.00551	110
MSD	Silver by furnace - Total	mg/l	0.005	0.00499	100
LCS1	Arsenic by furnace - Total	mg/l	0.0250	0.0276	110
LCS2	Arsenic by furnace - Total	mg/l	0.0250	0.0266	106
MBLK	Arsenic by furnace - Total	mg/l	ND	ND	
MS	Arsenic by furnace - Total	mg/l	0.0250	0.0255	102
MSD	Arsenic by furnace - Total	mg/l	0.0250	0.0248	99
LCS1	Beryllium by furnace - Total	mg/l	0.0025	0.00237	95
LCS2	Beryllium by furnace - Total	mg/l	0.0025	0.00249	100
MBLK	Beryllium by furnace - Total	mg/l	ND	ND	
MS	Beryllium by furnace - Total	mg/l	0.0025	0.00239	96
MSD	Beryllium by furnace - Total	mg/l	0.0025	0.00244	98
LCS1	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00246	98
LCS2	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00265	106
MBLK	Cadmium by furnace - Dissolved	mg/l	ND	ND	
MS	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00276	110
MSD	Cadmium by furnace - Dissolved	mg/l	0.0025	0.00231	92
LCS1	Chromium by furnace-Dissolved	mg/l	0.025	0.0262	105
LCS2	Chromium by furnace-Dissolved	mg/l	0.025	0.0269	108
MBLK	Chromium by furnace-Dissolved	mg/l	ND	ND	
MS	Chromium by furnace-Dissolved	mg/l	0.025	0.0287	115
MSD	Chromium by furnace-Dissolved	mg/l	0.025	0.0272	109
LCS1	Copper by furnace - Dissolved	mg/l	0.025	0.0243	97
LCS2	Copper by furnace - Dissolved	mg/l	0.025	0.0255	102
MBLK	Copper by furnace - Dissolved	mg/l	ND	ND	
MS	Copper by furnace - Dissolved	mg/l	0.025	0.0282	113
MSD	Copper by furnace - Dissolved	mg/l	0.025	0.0289	116
LCS1	Diss.Hardness as CaCO3 - Titr.	mg/l	50	50.4	101

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Juneau , AK 99802-0550
ATTN: Roger Baer

Sample # 970871 Sample ID KT3 WA05 Project
Sample Type Water Sampled 25-jul-1997 Received 31-jul-1997 Reported 28-aug-1997

Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
LCS2	Diss.Hardness as CaCO3, Titr.	mg/l	50	50.4	101
MBLK	Diss.Hardness as CaCO3, Titr.	mg/l	ND	ND	
MS	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.8	99
MSD	Diss.Hardness as CaCO3, Titr.	mg/l	25	24.0	96
LCS1	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
LCS2	Hardness as CaCO3, Titrimetric	mg/l	50	50.4	101
MBLK	Hardness as CaCO3, Titrimetric	mg/l	ND	ND	
MS	Hardness as CaCO3, Titrimetric	mg/l	25	24.8	99
MSD	Hardness as CaCO3, Titrimetric	mg/l	25	24.0	96
LCS1	Mercury by CV - Dissolved	ug/l	2.0	1.86	93
LCS2	Mercury by CV - Dissolved	ug/l	2.0	1.93	96
MBLK	Mercury by CV - Dissolved	ug/l	ND	ND	
MS	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
MSD	Mercury by CV - Dissolved	ug/l	2.0	2.24	112
LCS1	Nickel by furnace - Total	mg/l	0.025	0.0259	104
LCS2	Nickel by furnace - Total	mg/l	0.025	0.0262	105
MBLK	Nickel by furnace - Total	mg/l	ND	ND	
MS	Nickel by furnace - Total	mg/l	0.025	0.0265	106
MSD	Nickel by furnace - Total	mg/l	0.025	0.0257	103
LCS1	Lead by furnace - Dissolved	mg/l	0.025	0.0230	92
LCS2	Lead by furnace - Dissolved	mg/l	0.025	0.0247	99
MBLK	Lead by furnace - Dissolved	mg/l	ND	ND	
MS	Lead by furnace - Dissolved	mg/l	0.025	0.0241	96
MSD	Lead by furnace - Dissolved	mg/l	0.025	0.0238	95
LCS1	Antimony by furnace - Total	mg/l	0.025	0.0224	90
LCS2	Antimony by furnace - Total	mg/l	0.025	0.0232	93
MBLK	Antimony by furnace - Total	mg/l	ND	ND	
MS	Antimony by furnace - Total	mg/l	0.025	0.0190	76
MSD	Antimony by furnace - Total	mg/l	0.025	0.0159	64
LCS1	Selenium by furnace - Total	mg/l	0.025	0.0276	110
LCS2	Selenium by furnace - Total	mg/l	0.025	0.0277	111

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Single Determination Analytes
Quality Control

Control	Parameter	Units	Actual	Found	%Recv
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MS	Selenium by furnace - Total	mg/l	0.025	0.0302	121
MSD	Selenium by furnace - Total	mg/l	0.025	0.0290	116
LCS1	Thallium by furnace - total	mg/l	0.025	0.0245	98
LCS2	Thallium by furnace - total	mg/l	0.025	0.0245	98
MBLK	Thallium by furnace - total	mg/l	ND	ND	
MS	Thallium by furnace - total	mg/l	0.025	0.0250	100
MSD	Thallium by furnace - total	mg/l	0.025	0.0236	94
LCS1	Zinc by Furnace - Total	mg/l	0.110	0.142	129
LCS2	Zinc by Furnace - Total	mg/l	0.110	0.122	111
MBLK	Zinc by Furnace - Total	mg/l	ND	ND	
MS	Zinc by Furnace - Total	mg/l	0.010	0.0125	125
MSD	Zinc by Furnace - Total	mg/l	0.010	0.0120	120

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Appendix D. - Integrated Assessment Checklist.

INTEGRATED ASSESSMENT CHECKLIST
PART I - SITE LOCATION AND ASSESSMENT INFORMATION

CERCLIS #

State: Alaska

Site Name and Address: Salt Chuck Mine; Kasaan Bay, Prince of Wales Island

Nearest City	State	Zip	County	County Code	Cong Dist
Thorne Bay	AK	99919	—	—	—

Physical Location (directions to site): N end head of Kasaan Bay, POW I

Latitude 55°37'36"N Longitude 132°33'25"W

Source (topo, GPS)

Quadrangle Name: Craig C-2

Point on the site at which it was calculated (geographical center of entry gate): mill site

Datum: NAD '27

Section	Township	Range
17	72S	84E

Type of Ownership

☐ Municipal ☐ Private ☒ Federal ☐ Indian Nation ☐ State ☐ County ☐ Other_____

Assessment Information Ref. #(s):

Date: 7/23-7/25 1997
7/22, 7/21, 9/11, 9/14, 9/15-1995

Site Status: ☒ Active ☐ Inactive ☐ Not Specified
active Fed mining claims

Years of Operation: production ☐ Unknown Begin 1905 End 1941

Agency Performing Inspections BCM / BLM Ref. #(s):

Primary Inspectors	Title	Organization	Telephone
Ken Mees 1995/1997	Geologist	BLM-JMIC	907-364-1559
Doug Crimo 1997	Environmental Engineer	BLM-JMIC	907-364-1567
Peter Hatherden 1995	Geologist	BLM-JMIC	907-364-1556
Other Inspectors Scott Johnson	Biologist	NMFS-Juneau	907-789-6063

Site Representatives Interviewed/Contacted: NONE

—			

Access Gained By: ☒ Verbal Consent ☒ Written Consent ☐ Warrant

Time 0800-1630

Weather overcast, 50s-60s occasional showers

Site Identified	CERCLIS Identification Date	EPA Contact
☒ Federal ☐ State/Local ☐ Citizen Complaint ☐ Other		

PART II - SITE BACKGROUND AND REGULATORY STATUS

Owner/Operator History Historic Production 1905-1941 / Exploration 1943-present Ref.#(s): PA report

Current Stealth Ventures, Inc.

Previous Goldclick Mng Co. → AK Palladium Mng Co → Solar Res. Co → AK Gold & Metals Co

Site Regulatory History None Ref.#(s):

Permits NA

☐ NPDES ☐ State Permits ☐ UIC ☐ RCRA Part A ☐ RCRA Part B ☐ Local Permits ☐ Air

☐ TACB ☐ SPCC Plan ☐ Other

Dates and Description of Previous Investigations

Inventory Exam & extensive Sampling in intertidal zone during 1995 - Describe/document physical & chemical hazards - survey & sample 7/20, 7/21 & 9/11, 9/14-9/15 1995 inventory summary report completed; file prepared for USFS/Ketchikan

Dates and Description of Previous Removal Actions

NA

Dates and Description of Previous State of RCRA Corrective Actions

NA

PART III - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

Potential Threat of Fire and/or Explosion

None

i.e., unstable hazardous materials stored on-site, reactive materials disposed of together, former military site with unexploded ordnance?

Potential Threat of Direct Contact With Hazardous Substances

Copper concentrations in tailings are > ERM standards
Copper exceedance in surface water; Arsenic detected, may not exceed new EPA guidelines
- Tailings are not capped - susceptible to migration - impractical to fence; fencing needed around mills. Be proper

i.e., unrestricted public access to exposed hazardous substances, runoff carries hazardous substances to surface water bodies, hazardous substances have migrated onto residential properties, population or workers exposed or injured (date, #)?

If fencing needed, estimate dimension required: 150 x 200 x 2

Potential Threat of a Continuous Release of Hazardous Substances

- water discharging from main adit contains copper; constant trickle present mixing w/ unnamed stream & discharging into Kasaan Bay
- tailings migration from tidal flux: Some copper/zinc released into environment (TCLP tests)

i.e., sources are poorly contained possibly threatening groundwater, surface impoundments with inadequate diking near a surface water body, contamination of sewers or storm drains, lack of cover to prevent air release?

Potential Threat of Drinking Water Contamination

Not established supply in area; transient visitors may drink from unnamed stream discharging from main adit

i.e., threatened water intakes, suspected release to groundwater where private residences rely on shallow groundwater for drinking, underground storage tasks near public supply wells, private well users have reported foul-smelling and or tasting water?

Removal Considerations

- remove/remediate TPH soil near fuel tanks adjacent to millsite
- bioremediate TPH stained soil near mill; remove fuel tanks from w/in millsite
- cap tailings on intertidal zone; armor unnamed stream & Lake Ellen Creek along banks adjacent to tailings

i.e., containerize leaking drums, fences, security, capping, stabilizing waste, physical removal, pumping lagoons, air monitoring, field screening, and preliminary sampling.

PART IV - SAMPLES/FIELD SCREENING INFORMATION

Field Screening

☐ OVA	☐ Monitox	**Specify**
☐ HNu	☐ Air Monitoring	pH, conductivity, temp
☐ XRF	☐ Field Test Kit	
☐ AIM	☐ Draeger Tube (type & tube id#)	
☐ Hazcat	☒ Other	

Summary of Field Screening Results

pH: 6.6 - 8.3
uS: 20 - 1500 uS
T°C: 6° - 19°C

Samples Collected: Water - soil - character (tailings) - tissue & sediment

Sample Type	Number of Samples Taken	Samples Sent To	Estimated Date Results Available
Groundwater			
Surface Water	6	Montgomery Labs	Currently available
Waste			
Air			
Runoff			
Spill			
Soil/sediment	76	~~Sad~~ Chemex Analytica Inc; Battelle Marine Labs	; Currently available
Vegetation			
Other (tissue)	15	Battelle	currently available

PART V - A. CERCLA ELIGIBILITY

Did the facility cease operations prior to November 19, 1980? *If yes, stop, site is CERCLA eligible. If no, proceed to Part B.*

Yes

B. RCRA ELIGIBILITY Ref. #(s):

Did the facility file a RCRA Part A application? If yes: NO

1. Does the facility currently have interim status?
2. Did the facility withdraw its Part A application?
3. Is the facility a known or possible protective filer?
4. Type of facility: Generator ☐ Transporter ☐ Recycler ☐ Treatment/Storage/Disposal (TSD) ☐

Does the facility have a RCRA operating or post closure permit?

Is the facility a late (after 11/19/90) of non-filer that has been identified by the EPA of State?

If all answers to questions in Part B are NO, stop, the facility is CERCLA eligible. If answers to 2 or 3 are YES, stop, the facility is CERCLA eligible. If answers to 2 and 3 and NO, and any other answer is YES, site is RCRA, continue to Part C.

C. RCRA SITES ELIGIBLE FOR NPL Ref. #(s):

Has the facility owner filed for bankruptcy under federal or state laws? NO

Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?

Is the facility a TSD that converted to a generator, transporter or recycler after November 19, 1980?

D. EXEMPTED SUBSTANCES Ref. #(s):

Does the release involve hazardous substances other than petroleum including crude oil or any fraction thereof? If yes, site is CERCLA eligible. YES

PART VI - SITE ASSESSMENT RECONNAISSANCE

a. General Site Characteristics Ref. #(s):

Predominant Land Uses Within 1 Mile

__Industrial __Agriculture __DOI
__Commercial __Mining __Other Federal Facility
__Residential __DOD _____
X Forest/Fields __DOE __Other

Types of Site Operations (check all that apply)

__Manufacturing (must check subcategory)
- __Lumber and Wood Products
- __Inorganic Chemicals
- __Plastic and/or Rubber Products
- __Paints, Varnishes
- __Industrial Organic Chemicals
- __Agricultural Chemicals (e.g., pesticides, fertilizers)
- __Miscellaneous Chemicals Products (e.g., adhesives, explosives, ink)
- __Primary Metals
- __Metal Coating, Plating, Engraving
- __Metal Forging, Stamping
- __Fabricated Structural Metal Products
- __Electronic Equipment
- __Other Manufacturing

X Mining historic; currently staked for exploration only
- X Metals
- __Coal
- __Oil and Gas
- __Non-Metallic Minerals

__Retail
__Recycling
__Junk/Salvage Yard
__Municipal Landfill
__Other Landfill
__DOD
__DOE
__DOI
__Other Federal Facility
__RCRA
__Treatment, Storage, or Disposal
__Large Quantity Generator
__Small Quantity Generator
__Subtitle D
__Municipal
__Industrial
__Converter
__Protective Filer
__Non- or Late-filer
__Not Specified
__Other (specify)

Operational history, background, processes, and waste disposal.
discovered 1905 - hand-sorted ore produced until 1915
mill constructed in 1917; expanded to 300 tons/day by 1923; mill shut down in 1926
mine reopened in 1934 - company retreated tailings & mill previously broken ore left in stopes; operations ceased by 1941

b. Source Characterization
Indicate type(s) and quantity of sources on-site. Complete and attach a source characterization form (SCF) for each source and summarize the SCF on the following table (photodocument source and mark appropriate location on site sketch).

1. Physical States *(Enter all that apply by number in Column B)*
1. Solid
2. Powder, fines
3. Sludge
4. Slurry
5. Liquid
6. Gas
7. Other (specify)

2. Waste Characteristics *(Enter all that apply by number in Column C)*
1. Toxic
2. Corrosive
4. Persistent
5. Soluble
6. Infectious
7. Flammable
8. Ignitable
9. Highly Volatile
10. Explosive
11. Reactive
12. Incompatible
13. Not applicable

3. Treatment, if known *(Enter all that apply by number in Column D)*
1. Incineration
2. Underground Injection
3. Chemical/Physical
4. Biological
5. Waste Oil Processing
6. Solvent Recovery
7. Other Recycling Recovery
8. Other: remov.

A Source Type	B Enter #(s) from Box 1	C Enter #(s) from Box 2	D Enter #(s) from Box 3	E Active/ Inactive	F Estimated Quantity, Area, or Volume (include units of measure)	G Description or Use Comments
Landfill						
Drums	3	1,4,7		inactive	localized-indiv. drums	remove from site
Surface impoundments						
Soil	7	4	4	inactive	small area; 50x20	bioremediate
Tanks/non-drum containers	1, 3	1,4,7,8	7,4,5	inactive	mill structure	remove & recycle
Land treatment/landfarm						
Piles	1,2	1,4,5	8	active migration	7ea x 700+ 1ea x 30	cap/stabilize
Fire/burn pits						
Other/additional						

Overall containment of wastes (check one)
☐ Adequate (Secure) ☐ Moderate ☒ Inadequate (Poor) ☐ Insecure (Unsound, Dangerous)

Estimate the percentage of the site's surface that is
☒ Exposed soil, 20% ☒ Covered by buildings, 5% ☒ Covered by pavement, ☒ Covered by vegetation, 70-75%
☒ Covered by water, 20% (tidal-1 stream) ☒ waste rock piles 1-2%

List the presence (or absence) and type of plants observed on-site. If known, estimate percentages of different vegetative types *(i.e., tree canopy, shrubs, grass, ground cover, or weeds).*
typical SE Alaska flora: forests are thinned; brush is minimal

Describe any evidence or observation of animal species while on site.

fish seen in Lake Ellen Creek, stickpins/frogs in unnamed stream
deer tracks common; bear scat present

Describe any known or observed recreational uses or human presences on the site *(e.g., fishing, biking, footprints, tire tracks, or vandalism)* and photodocument.

- rock climbers rappel in glory hole; visitors seen on site during Rose examinations
- contemporary garbage onsite; decent trail from road to beach

General Types of Waste (check all that apply)

- [x] Metals
- [x] Organics
- [ ] Inorganics
- [ ] Solvents
- [ ] Paints/Pigments
- [ ] Laboratory/Hospital Waste
- [ ] Radioactive Waste
- [ ] Construction/Demolition Waste
- [ ] Pesticides/Herbicides
- [ ] Acids/Bases
- [x] Oily Waste
- [ ] Municipal Waste
- [x] Mining Waste
- [ ] Explosives
- [ ] Other _____

Specify substances below, if known (active facilities provide manifests, analytical data available)

HAZARDOUS SUBSTANCES

Category	Substance Name	Storage/Disposal Method	Maximum Concentration (include units of measure)
tailings/mining waste	copper	uncontained	up to 3880 ppm Copper
Oily waste	TPH	uncontained	samples contain to 16.3% TPH

PART VII - SITE SKETCH (attached; include north arrow, topography, distances, buildings, drainages, sources, stained soils, and features)
see figures 2-4

PART VIII - PHOTODOCUMENTATION (labeled photos attached; include panoramas, targets, sources, recreation, stressed vegetation, and sampling locations)
see slide log

PART IX - TARGETS

a. Groundwater Pathway Ref. #(s): NA	Target Distance Limit (TDL) = 4 miles
During the site visit, did you field verify all ground water targets within a 0.5 mile? Yes	Distance to nearest drinking water well NA
Is groundwater used for drinking water within 4 miles? No	Depth to shallowest aquifer on site? NA

Karst terrain present?	Nearest designated wellhead protection area
NO	☐ Underlies site
Is there a high likelihood of release to groundwater?	☐ >0 - 4 miles
NO	☒ None within 4 miles

Have likely contaminated drinking water wells been identified? If yes, enter potentially affected population.

NO

Population served by drinking water wells within the designated target distances. Note if the water supplies within that target distance radius are Private (P), Community (C or Both (B). NA

Distance (miles)	Population	Type of Supply (P, C or B)
On-site		
0 to 0.25		
0.25 to 0.5		
0.5 to 1		
1 to 2		
2 to 3		
3 to 4		

Description of wells (including usage, blending of water system, depth, age and location).

NA

Is groundwater from any target well within the TDL, for the aquifer evaluated or overlying aquifers, used for the following resources: irrigation (5 acre minimum) of commercial food crops of forage crops, watering of commercial livestock, ingredient in commercial food preparation, supply for commercial aquaculture, supply for a major or designated water recreation area?

NA

b. Surface Water Pathway Ref. #(s):	TDL =
Unnamed creek, Lake Ellen Creek	15 miles
Did you verify all surface water targets within 1 stream mile during the site visit? yes	Shortest overland distance from any source to surface water for each watershed: 50 ft

Is there a likelihood of a release to surface water? If yes, explain *(e.g., water color, fish kills, stressed vegetation)*	Site is located in	Did you observe any fishing or evidence of fishing in surface water bodies on or near the site? If yes, photodocument, specify the name of the water body and its distance from the site.
yes, water samples show copper, arsenic exceedance no sign of fish kill or stressed veg	☒ No floodplain ☐ Annual - 10 yr floodplain ☐ >10 yr - 100 yr floodplain ☐ >100 yr - 500 yr floodplain ☐ >500 yr floodplain	fish jumping in Lake Ellen Creek

Annual Precipitation	Two Year, 24-Hour Rainfall	Type of surface water draining site and 15 miles downstream (check all that apply)
111 inches	4.5 inches	☒ Stream ☐ River ☐ Pond ☐ Lake ☒ Bay ☒ Ocean ☐ Other

Identify the surface water bodies and flow rates (cubic feet per second, cfs) along a 15 stream mile pathway for each watershed. Identify the uses of each surface water body as:

DW = Drinking water
F = Fishery
FP = Ingredient in commercial food preparation
I = Irrigation of commercial food crops or commercial forage crops
L = Watering of commercial livestock
N = None of the above, specify
R = Major or designated recreation area

Surface Water Body	Begin to End Distance	Stream Flow in cfs	Use(s)
Unnamed creek	>1 mile	from 1-10 cfs	F, R (implied)
Lake Ellen creek	0.5 miles	15-20 cfs	F, R (implied)

Any drinking water intakes located along 15 mile TDL? NO
If Yes, identify the population served by surface water intakes along the 15 stream mile pathway in the table below.

Probable Point of Entry (PPE) located and noted on site sketch? (PPE is the point where runoff from the site most likely enters surface water)

Surface Water Body	Distance to Intake from PPE	Population Served
NO		

If drinking water system blended? If possible, make a not of percentages of contribution to system per intake (list all fisheries).

Water Body/Fishery Name	Flow (cfs)	On-Site or Distance from PPE	Pounds Fish/Year
Lake Ellen Creek	15-20 cfs	0.5 miles	not documented

Estimated pounds of fish and shellfish collected from each fishery and enter the correct range in the above table.

0 lbs
> 0 to 100
100 to 1,000
1,000 to 10,000
10,000 to 100,000
100,000 to 1,000,000
>1,000,000 Specify _____

fish observed on flood tide near mouth of Lake Ellen Creek

Wetlands (as defined in 40 CFR Section 230.3) located along the surface water migration path? If yes list wetlands.

Water Body	Flow (cfs)	Frontage Miles
unnamed creek	1-10 cfs	0.5 miles
Lake Ellen Creek	15-20 cfs	0.2 miles
Kaczan Bay	tidal currents	0.75 miles

Other sensitive environments (see 40 CFR) Part 300, Section 4.1, Table 4-23) located along the surface water migration path? If yes, list below.

Sensitive Environments Type	Water Body Type	Distance From PPE/On-Site?
(Spawning area for Lake Ellen Creek & Lake Ella	(creek & lake (upstream)	(0.5 miles)

Is surface water used for one or more of the following resources within the TDL: irrigation of commercial food or forage crops (≥ 5 acres), watering commercial livestock, ingredient in commercial food preparation, supply for a major or designated water recreation area?

NO

c. Soil Exposure Pathway Ref. #(s): TDL =

During the site visit, were targets within 500 feet field verified?

Yes

Number of residents who reside within 200 feet of known or suspected contamination.

0

School or Daycare located within 200 feet of known or suspected contamination? If yes, enrollment. NO

Number of workers on-site
- ☒ None
- ☐ 1 - 100
- ☐ 101 - 1,000
- ☐ > 1,000

Are one of the following present in an area of observed contamination at the site: commercial agriculture, silviculture, livestock production or livestock grazing?

NO

Have terrestrial sensitive environments been identified on or within 200 feet of known or suspected contamination? If yes, list each terrestrial sensitive environment (see 40 CFR Part 300, Section 5.1, Table 5-5).

State land designated as unique habitat for and high recreational values

Air Pathway Ref. #(s): TDL = 4 miles

During the site visit, were air targets within 0.5 miles of field verified?

Yes

Distance to nearest regularly occupied building or individual (worker/resident)?

Evidence of blowing dust during site visit?

NO

Enter Total Population on or within

Odors detected while on site?

Minor TFH

_____ On-site

_____ 0 - 0.25 Mile

Observed or suspected release to air? If observed, photodocument.

NO

_____ > 0.25 - 0.5 Mile

_____ > 0.5 - 1 Mile

Predominant wind direction:

SE

_____ > 1 - 2 Miles

Are there schools within the 1 mile radius? If yes,
Enrollment =
Employees = NO

_____ >2 - 3 Miles

_____ > 3 - 4 Miles

Wetlands located within 4 miles of site?

YES

0 Total Within 4 Miles

Estimate the total wetlands area (acres)	List all sensitive environments within 0.5 mile of the site.		Are one of the following resources present within a half mile of a source on-site: commercial agriculture, silviculture, a major or designated recreation area (including a park)?
☐ <1 ☑ 1 - 50 ☐ 50 - 100 ☐ 150 - 200 ☐ 200 - 300 ☐ 300 - 400 ☐ 400 - 500 ☐ >500c acres	Intertidal - Kasaan Bay, creeks		
	Distance	Sensitive Environment Type	
	On-Site	unnamed creek, Lake Ellen Lk	
	0 - 0.25 Mile	intertidal zone	
	>0.25 - 0.5 Mile	Kasaan Bay	
			NO

PART X - SOURCES OF INFORMATION

Cite specific information references by number (i.e., state files; sample analysis, ROCs, and reports). At the beginning of each part of this checklist, there is a space to enter the numbers of each reference used in that part section.

SOURCE CHARACTERIZATION FORM

DRUMS

Number of drums: ~30

On Pallets (Y/N) # NO

Leaking (Y/N) # N - any leaking has already occurred

Stained Soil (Y/N) Y

Empty/Full/Both # ea. Empty

Explosion Hazard (Y/N) N

Condition of drums: poor

Containment (describe): uncontained

Maintenance (explain): NO

Labels (Y/N) (describe): NO

Accessibility (fenced): easily accessible

Residents, schools, daycare, or workers within 200 feet? (explain and indicate distances): NO

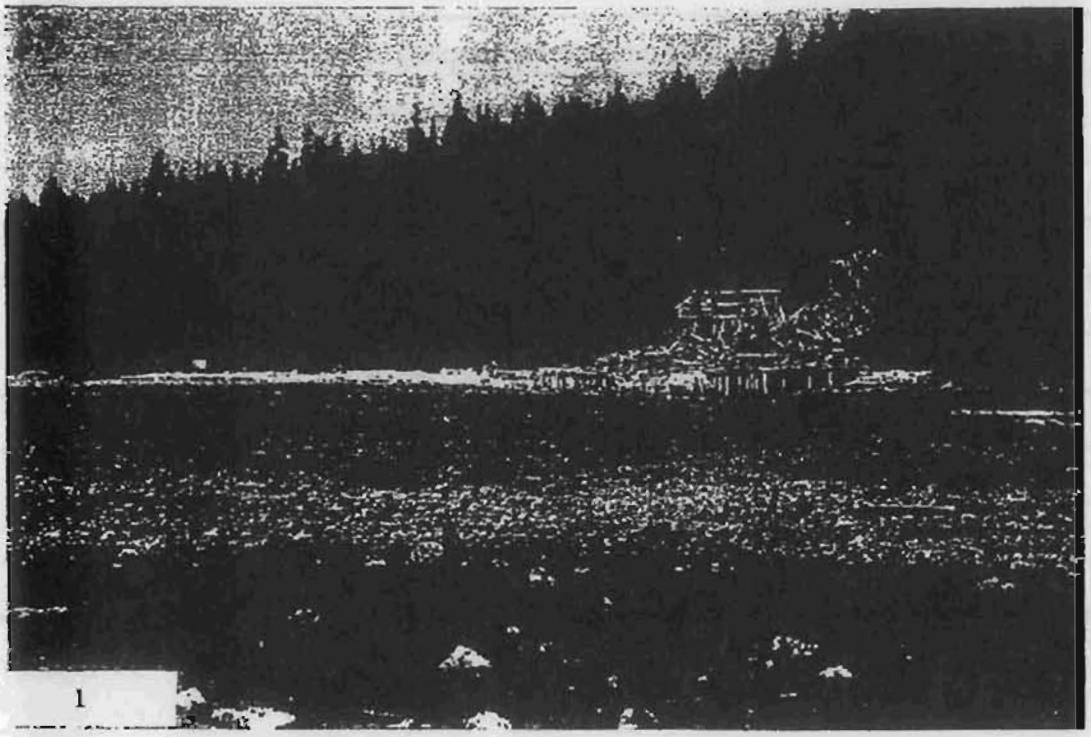
Comments:
- some of drums have thick goopy sludge adhering to inside
- these drums need to be removed from site

Photodocument and note locations on site sketch.

Appendix E. - Slides and Log.

SITE NAME		Salt Chuck	
SITE DESIGNATOR		KT03	
PHOTOGRAPHER		K Maas	
PHOTO	DATE	VIEW	DESCRIPTION
1	7/20/95	350	View across creek at tailings and mill
2	7/20/95	270	Iron-stained creek and mill debris/tailings near station L; taken from top of barge
3	7/20/95		SC6 sample site; dark/black clay layers
4	9/15/95	350	View of portal of W1
5	9/15/95		View from D9 to rails, motor/generator, misc. parts, water pipe, cable
6	9/15/95	north	Looking at front of C1
7	9/15/95	335	View of gyratory crusher and waste rock dump
8	9/15/95	160	View of contemporary garbage, piled and strewn about south of C11
9	9/15/95	140	Looking at C11 platform and standing structure
10	9/15/95	north	Aerial view of Glory Hole
11	9/15/95	220	View into portal of W3
12	9/15/95	045	Mill site at beach
13	7/23/97		Closeup of soil sampled in zone A, near center line
14	7/23/97	095	View at sampling along transect 4
15	7/23/97		Typical hole along transect 4
16	7/23/97	125	Sample site SCM3 near tidal pool at end of transect 4
17	7/23/97	267	Transect line showing clam sorting, transect 5
18	7/23/97	267	Transect along sample line 3a-6
19	7/23/97	270	Sample site 3a-5, broken shells, dirt pile, pools
20	7/23/97		Iron stained soil in transect 3
21	7/23/97	245	Mixing composite sample SC48 from transect 3
22	7/24/97	295	Background location, transect A: seds, mussels, fuchus

23	7/24/97	245	Clam and mussel sampling along transect A, background
24	7/24/97	290	Background, transect C; sediment and clam sampling; unvegetated beach
25	7/24/97	010	Eel grass at background sampling site
26	7/24/97	110	View of transect C at low-tide mark at background beach
27	7/25/97	220	View of barrels at G1 cache and sample site SO06
28	7/25/97	110	Sampling soil at SO07 site; below large tanks
29	7/25/97	250	Sample site SO08; below electric locomotive
30	7/25/97	230	Sample sites SC63 and SCM19
31	7/25/97	285	View upstream at sample site WA04
32	7/25/97	285	Sample site WA06/WA07 (duplicate)



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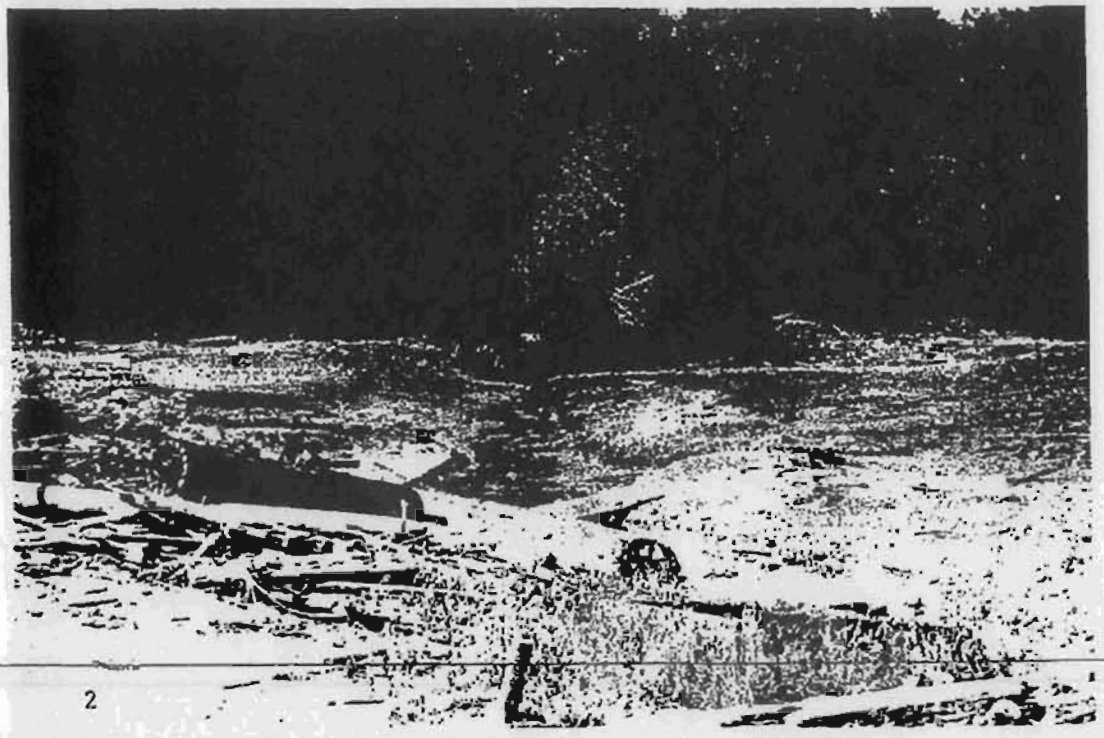

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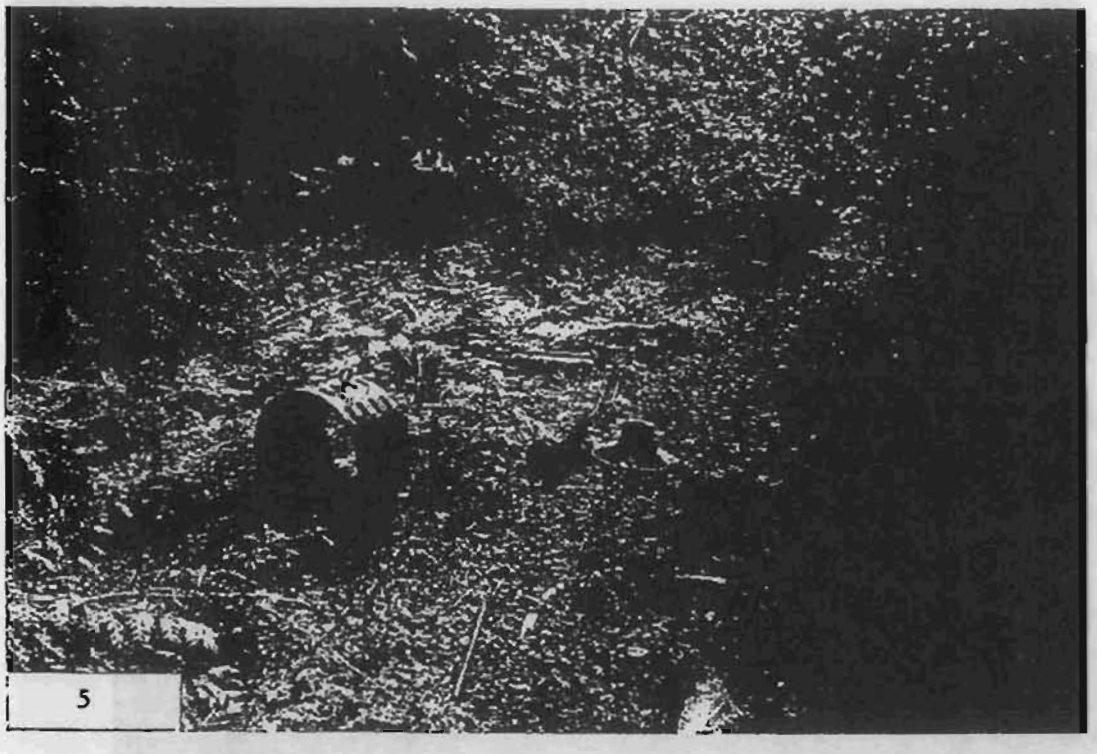

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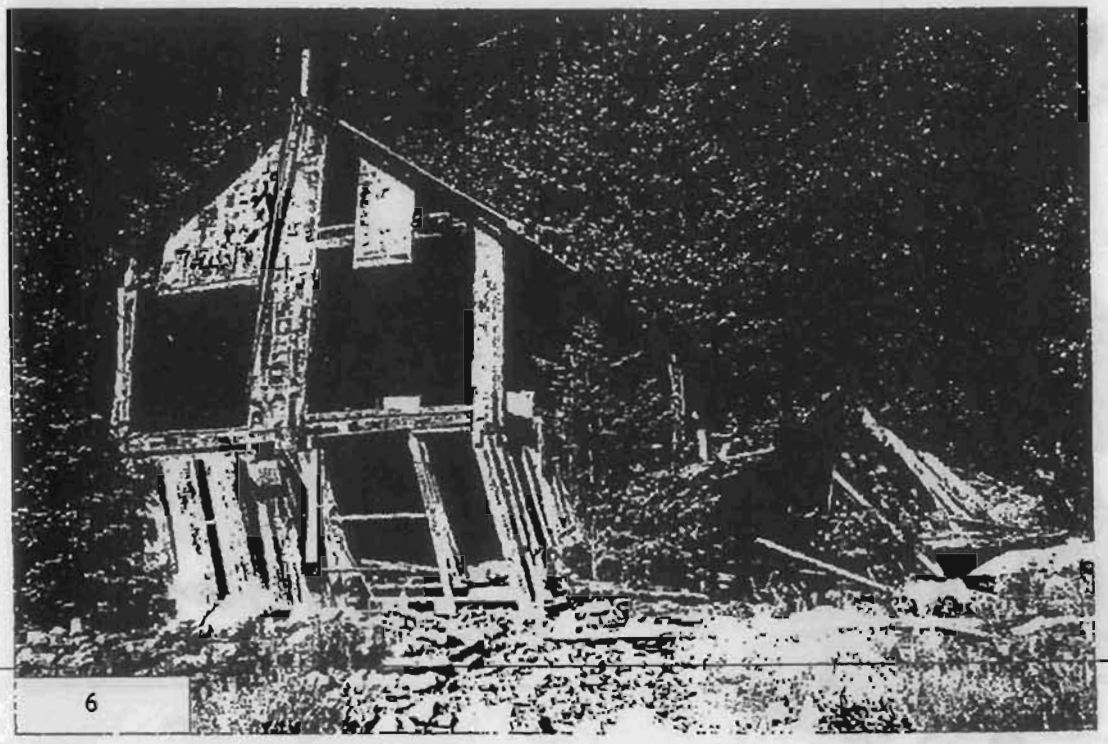

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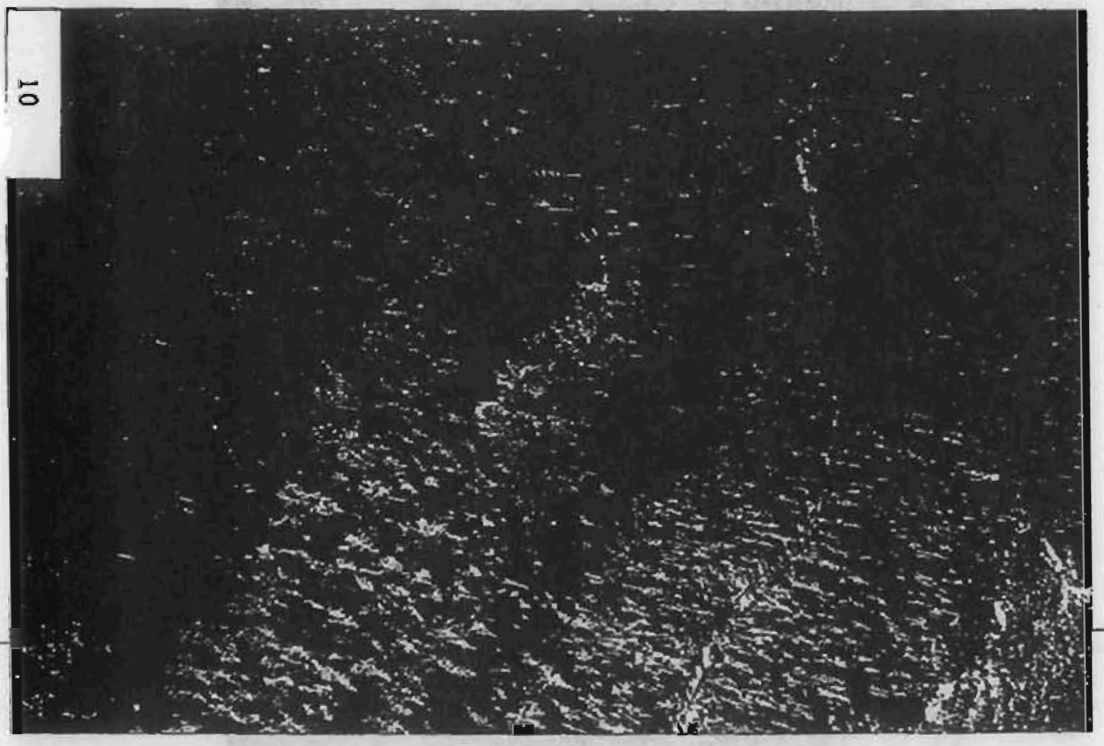
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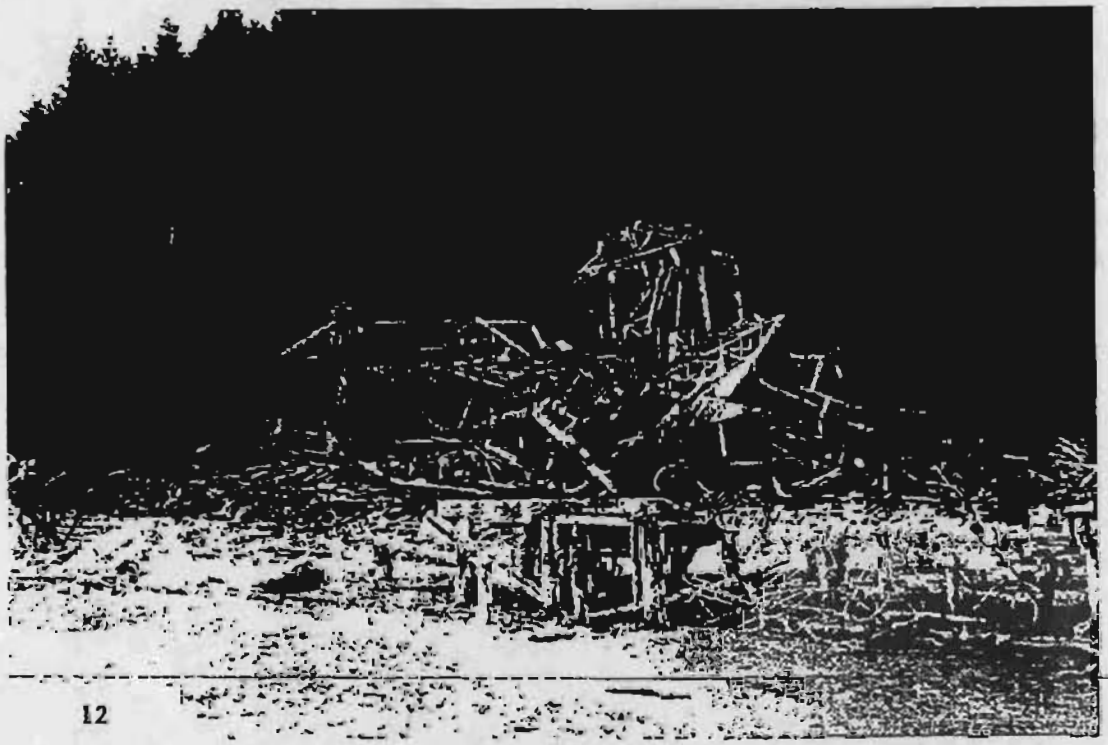

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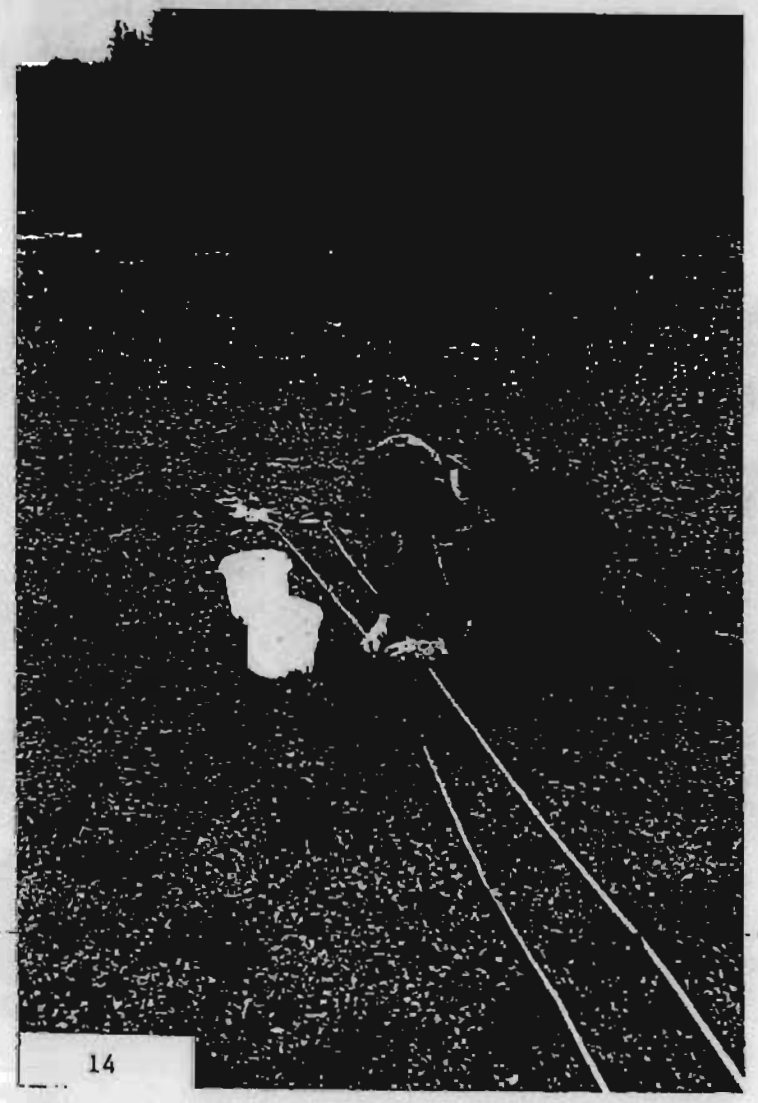

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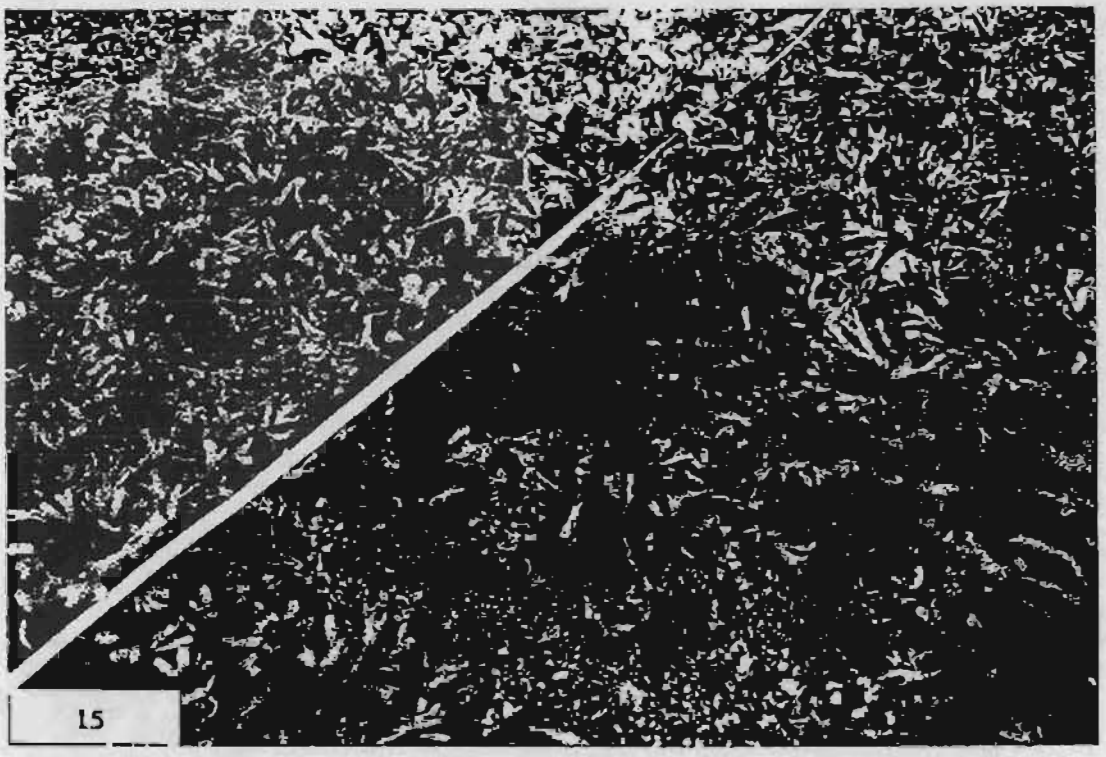

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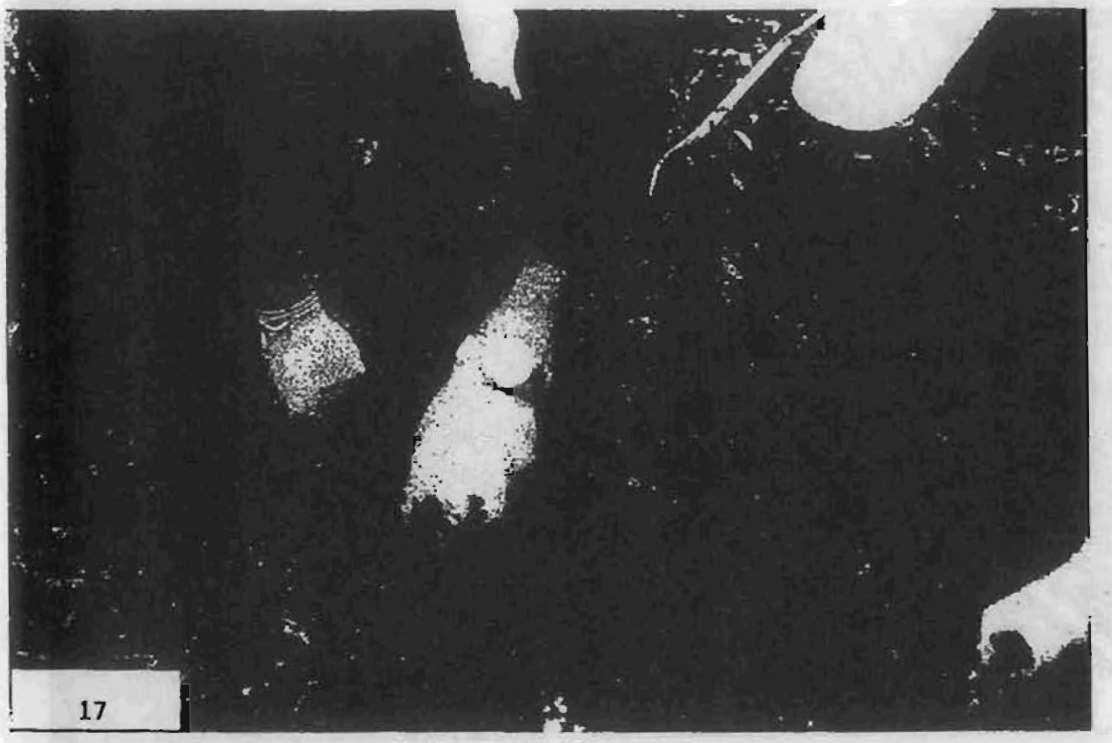

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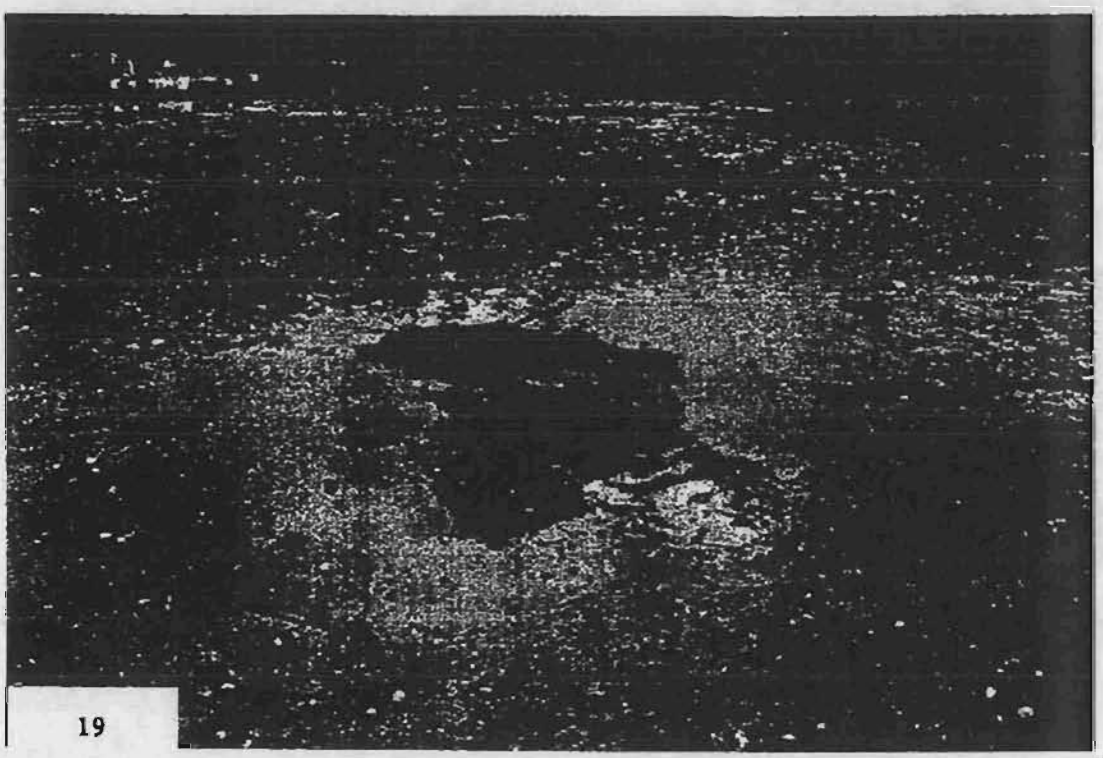

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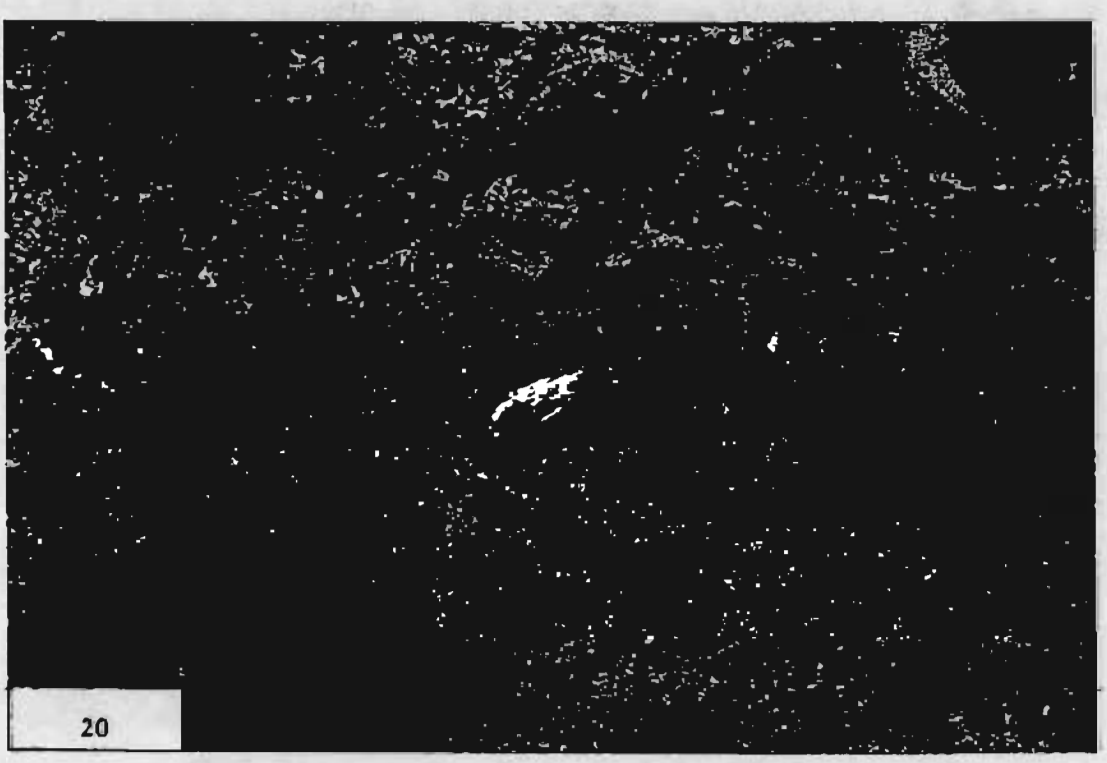

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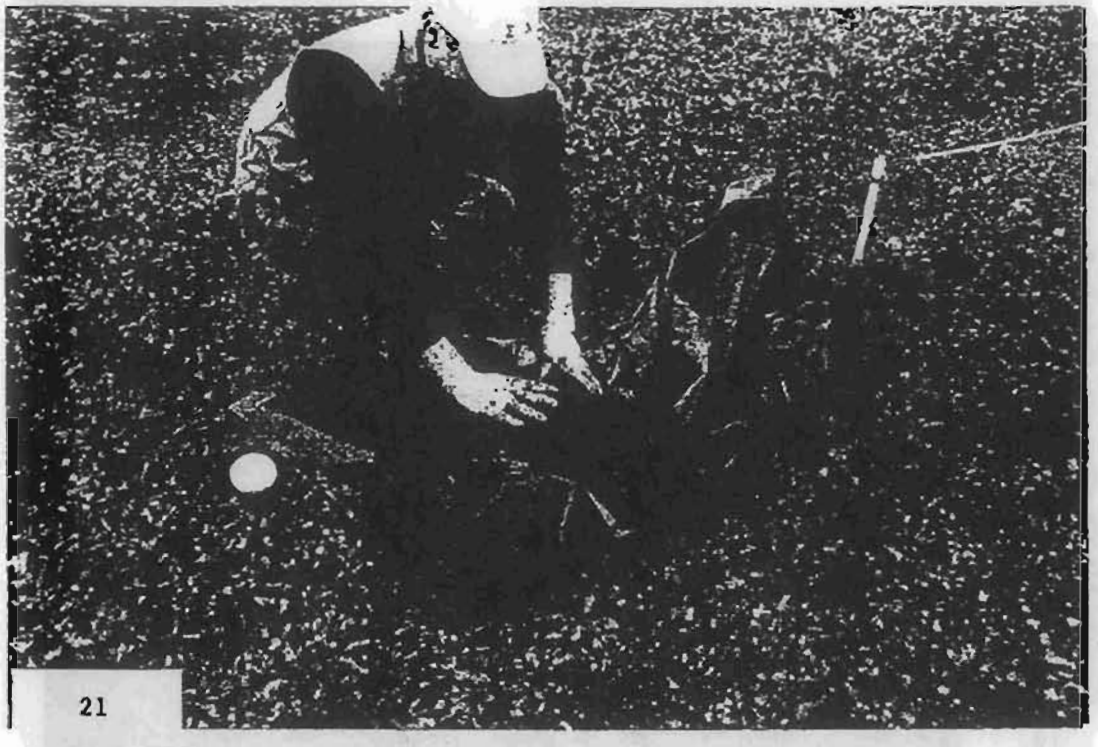

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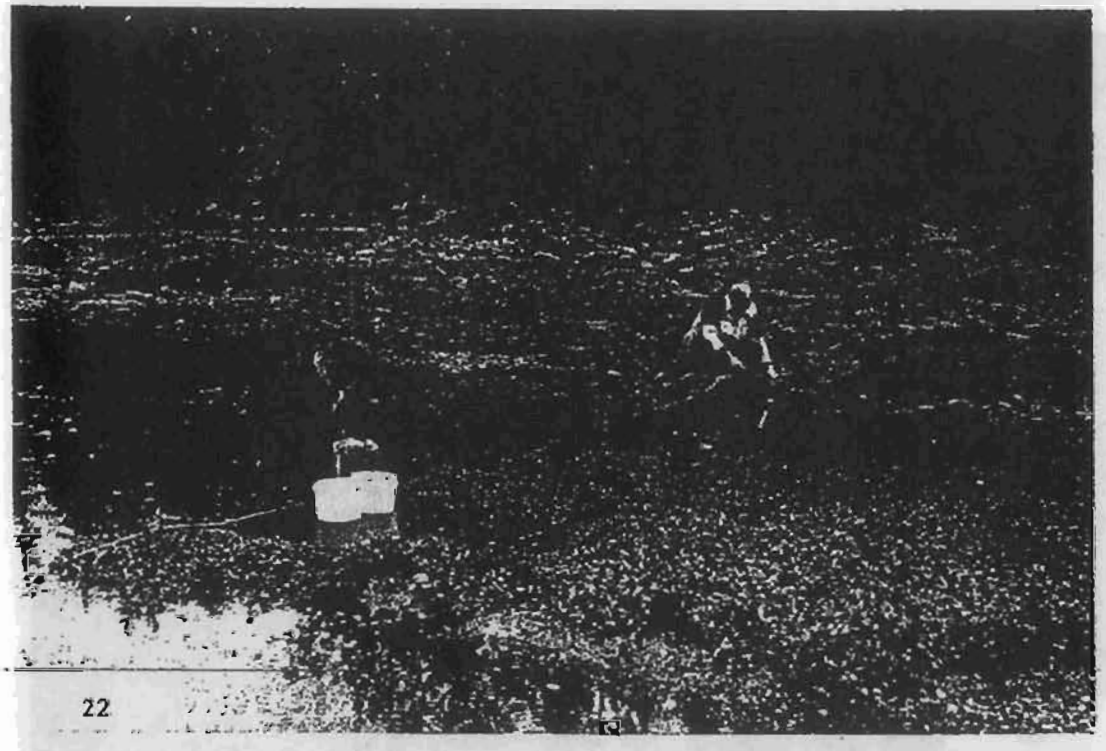

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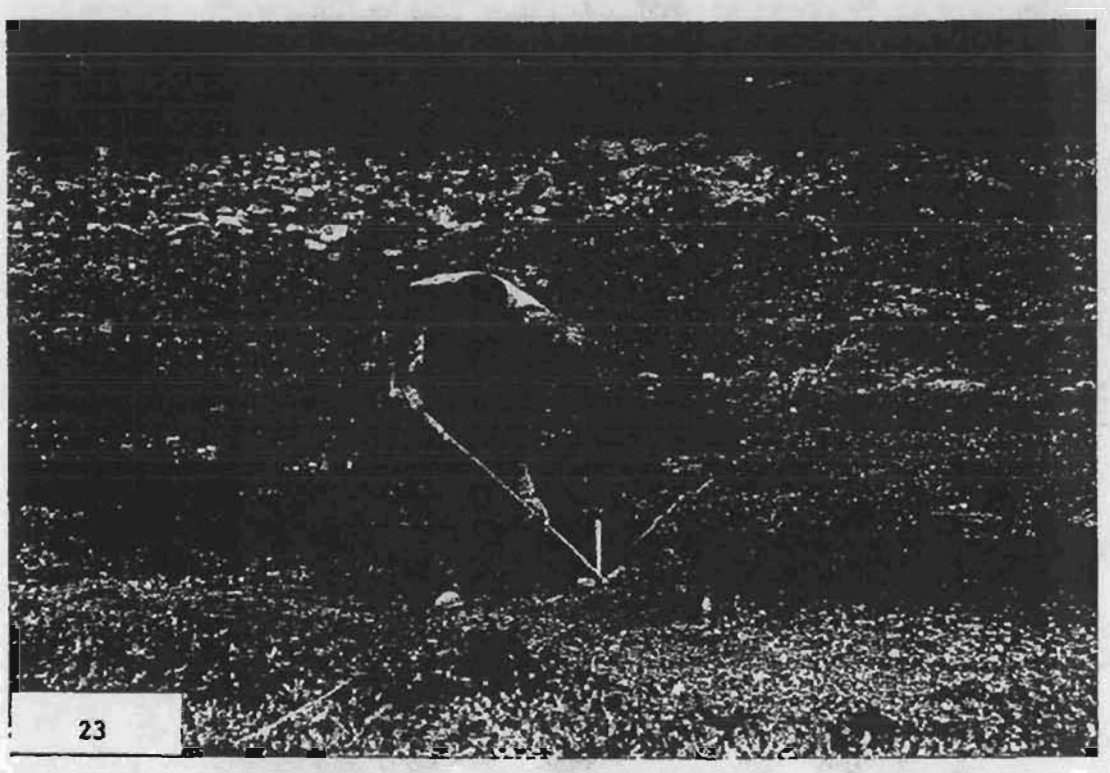

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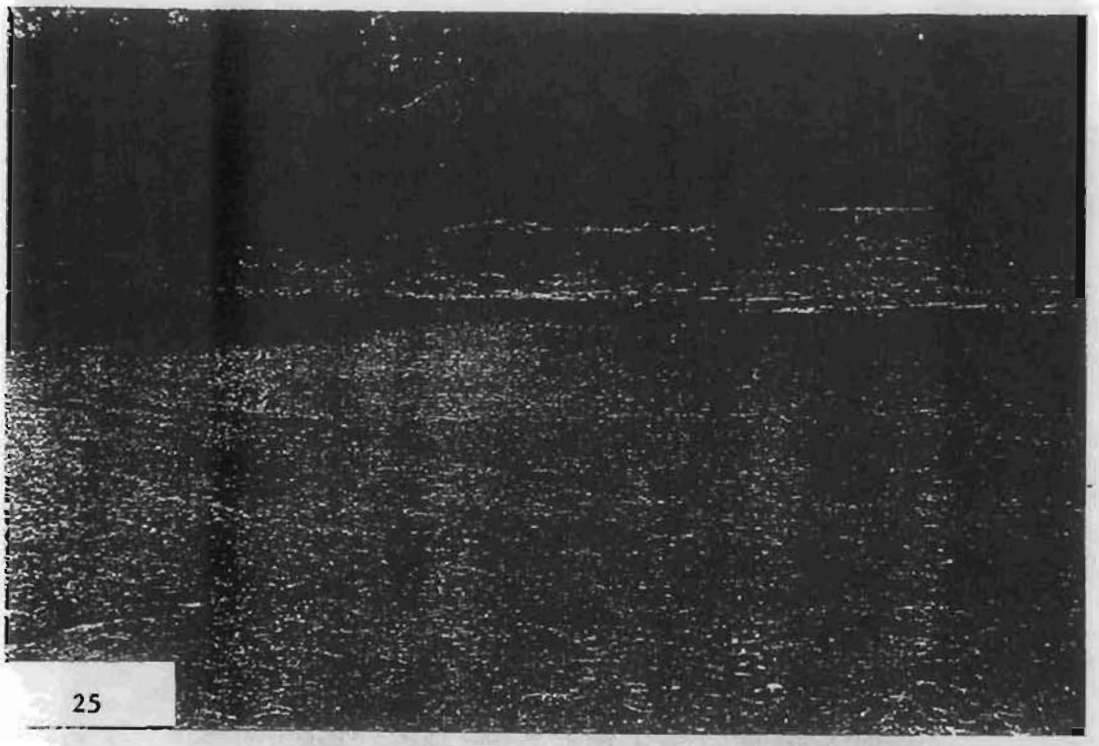

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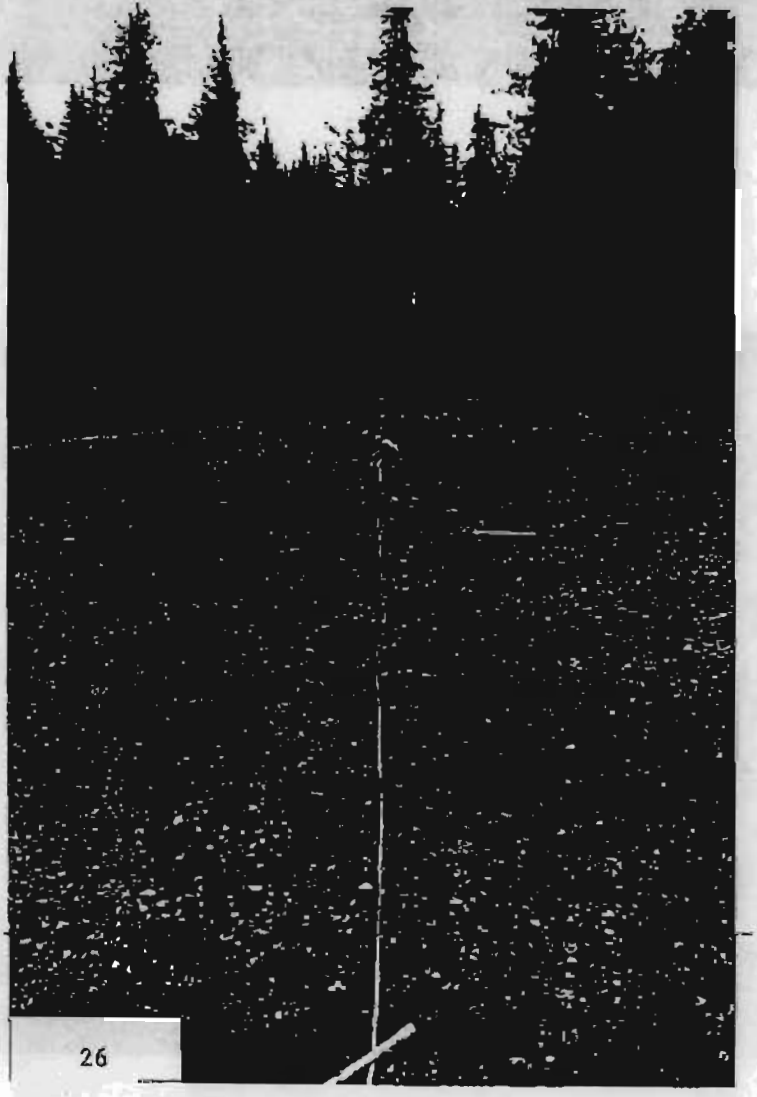

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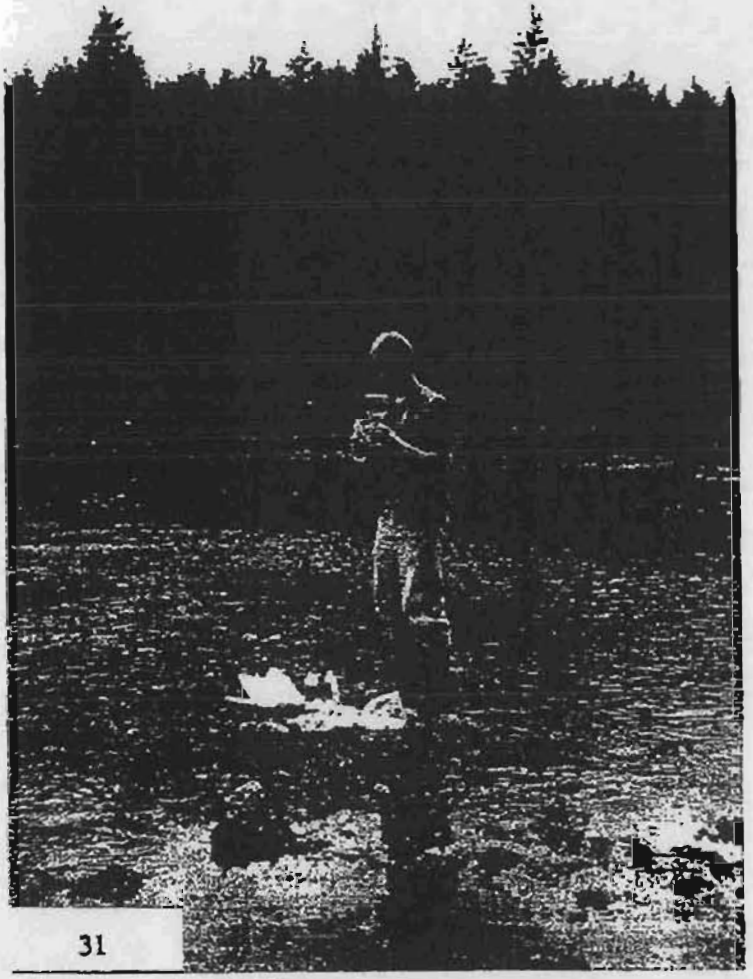

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