NORTH MERRICE CREEK

Environmental Investigations and Remediation

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Executive Summary

CCSG Associates conducted a preliminary environmental investigation of inactive mining and exploration sites in the North Merrice Creek area (NTS map 115 I/7) during August 1999. This report is prepared for the Waste Management Program, Department of Indian and Northern Affairs Canada.

The objectives of the North Merrice Creek environmental investigation were:
1. To develop a site history and inventory of physical waste;
2. To test for specific contaminants;
3. To determine a contaminant profile; and
4. To suggest recommendations for further assessment, monitoring or remediation.

The history of mining and exploration activity in the North Merrice Creek area was determined based on literature and archival searches, as well as interviews conducted with a variety of people knowledgeable about the area. A field sampling regime tested for paste pH, conductivity and levels of copper, nitrate, nitrite and sulphate. Analysis of soil, water and vegetation samples for total metal content was conducted by Maxxam Analytical Laboratories. In conjunction with field observations of vegetation and environmental conditions, the samples were assessed to determine potential risk to human and environmental health and safety, as well as aesthetic concerns. The CCME National Classification System was used to rate one area investigated. Recommendations for further assessment, monitoring and/or remediation were made based upon toxicological interpretation of the site contaminant types, quantities and locations.

There has been mining and exploration activity in the North Merrice Creek area for over 100 years. Three main sample areas were investigated, "Merrice Creek #1" located between Merrice and Williams Creek and adjacent to the Yukon River (latitude: 62°23'17"; longitude: 136°36'08"), "Nancy Lee Creek" located at an elevation 1,400 metres above Nancy Lee Creek on south side and north of Williams Creek, and the "Merrice Creek #2" area (approximate latitude 62°21 to 62°23'; longitude 136°34 to 136°36).

Merrice Creek #1 sample area was a deforested region with corridors stemming from the central area. There were slash piles, some waste rock , surface iron staining of exposed rock and signs of heavy machinery work. There was evidence of work done to stabilize slopes using geo-textile, log and earth barriers. Revegetation is occurring sparsely in most areas, except where the soils are highly compacted.

Nancy Lee Creek sample area consisted of three small pits, and a 3-4 metre diameter and 15 metre depth mine excavation shaft . Waste rock extended from the excavations down the steep slope approximately 8 metres. Any area situated on current claims of Western Copper Holdings were not investigated. The Nancy Lee Creek site could not be

thoroughly assessed because the upper mine excavation shaft and pits originally connected to a mine portal below at creek level in an area which is currently located on a Western Copper claim.

At the Merrice Creek #2 sample area no signs of mine excavation were confirmed. Three cabins, waste cans and wire still remain from old camps at this site.

Remedial actions recommended for all three sites are of low priority because the health, safety and environmental risks, as well as aesthetic concerns associated with the North Merrice Creek area are low. The site is remote, however, the Yukon Quest dog sled trail cuts through the area and the Yukon River is used for fishing, hunting and recreational purposes.

Recommendations

Merrice Creek #1 sample area:

- Revegetation and slope stabilization could be enhanced by scarifying the highly compacted areas and planting tree seedlings near the Yukon River.

Nancy Lee Creek sample area:

- The mine portal at the level of Nancy Lee Creek (on Western Copper claims) should be investigated for health and safety, and environmental risks
- The mine excavation shafts and pits be manually backfilled with the waste rock on the slope near the openings.

Merrice Creek #2 sample area:

- The waste debris (rusted cans and wire) be removed.

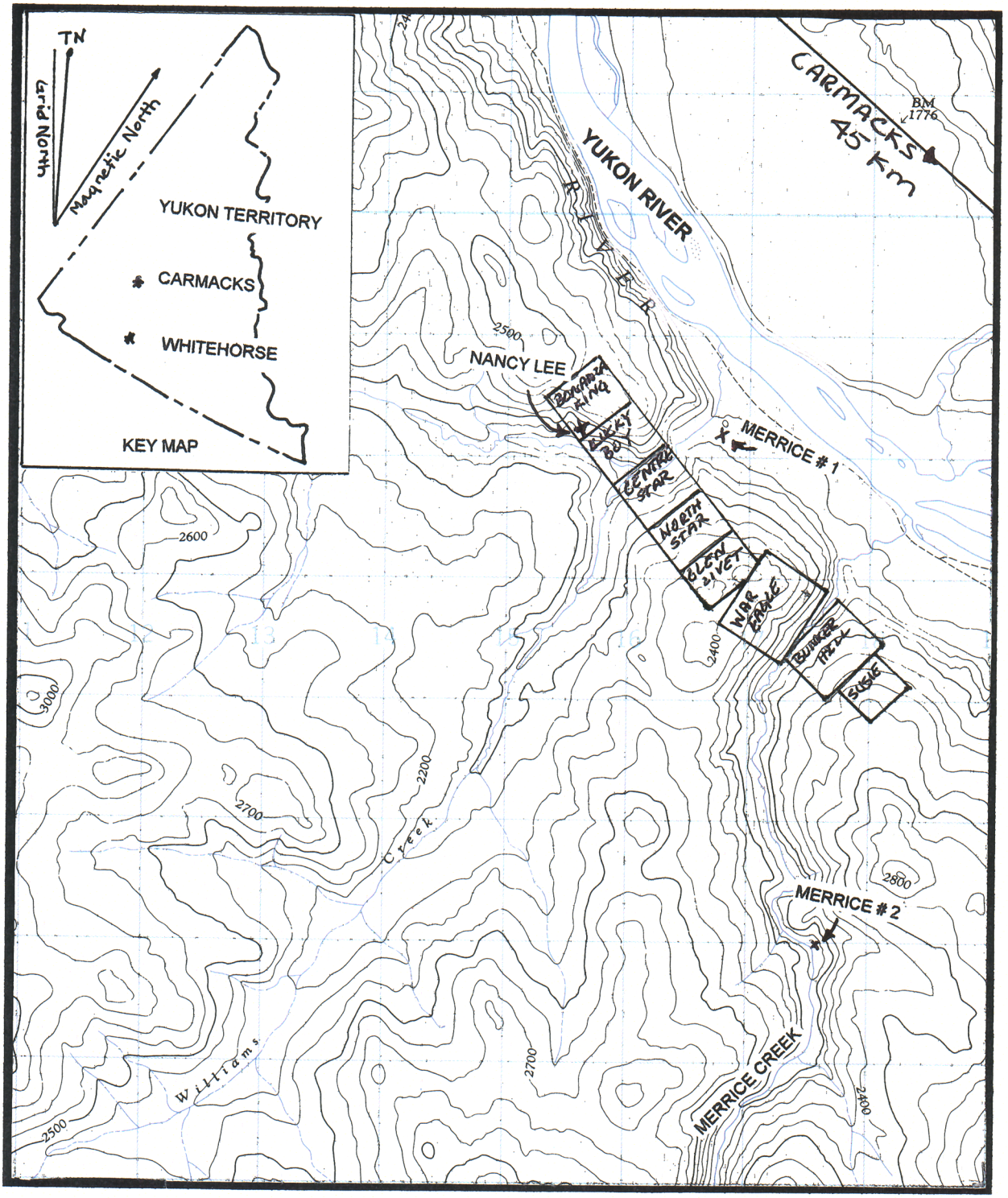

Figure 1. **Location of North Merrice Creek Site – 1:50,000, NTS –115 I/7**
[Mines and Technical Surveys Canada: 1961]

1.0 INTRODUCTION AND BACKGROUND

In 1996 the Arctic Environmental Strategy (AES), Action on Waste program of the federal department of Indian and Northern Affairs Canada initiated the preliminary environmental investigation of previously identified abandoned waste and disposal sites throughout the Yukon. These sites had been associated with exploration, mining, industrial, pipeline or military operations. Indian and Northern Affairs Canada, Waste Management Program initiated further investigations in follow up to the AES program.

CCSG Associates investigated the North Merrice Creek area, during August 1999, to determine the presence and extent of impacts related to past mining practices in the area.

1.1 Location

The area under examination for this study is located in the Dawson Range, 200 km north of Whitehorse, and approximately 38 km north of Carmacks. Refer to the map on page 1 indicating the location of the North Merrice Creek Site.

The first sample area, named "***Merrice Creek #1***" in this report, was located between Williams and Merrice Creeks, west of the Yukon River (latitude: 62°23'17"; longitude: 136°36'08"). The site was approximately 500-550 m above sea level. There were four sample sites in this area (see Photographs 1 & 2 in Appendix C and Figure 2 for site layout).

The second sample area, named "***Nancy Lee Creek***" site in this report, was located on the north side of a tributary of Wiliams Creek, known as Nancy Lee Creek. The site sampled on Nancy Lee Creek was approximately 700 m above the level of the creek, on a south-facing bluff.

The third and final sample area was on Merrice Creek (approximate latitude 62°21 to 62°23'; longitude 136°34 to 136°36) and was named "***Merrice Creek #2***" for this report. Sections of both sides of the creek were investigated to a distance of approximately 6 km from where Merrice Creek enters the Yukon River.

1.2 Overview and Site Development

There is over 100 years of mining exploration and development in the North Merrice Creek region. The following sections clarify the different names and references to locations used over time, and discusses the history of site development in the area.

1.2.1 Notes on Names

Documentation about Williams Creek can be found in reference to the Lewes River which in more recent years became known as the Yukon River.

Williams Creek was named after a prospector by that name, who was one of the first to locate on the creek in 1898.

Merrice Creek was named after Homer Merrice, who discovered placer on the creek in 1898. According to a report by H.S. Bostock, due to "a mistake, and believing it to be the original," the creek was referred to as Merritt Creek during the 1930s.[1] The creek has since reverted back to its original name.

Nancy Lee Creek is also referred to as Nancy Creek, or denoted as a tributary of Williams Creek.

1.2.2 Site Development History

This region has long been explored for copper. It has been stated that the copper occurrences in the vicinity of Williams Creek were probably the earliest base metal showings to be reported on in the Yukon or northern British Columbia.[2] The first report of copper was made in 1887, by G.M. Dawson, who told of occurrences at Hoochekoo Bluff, which is located on the Yukon River, only 12 km north of Williams Creek.[3]

Copper-bearing quartz veins in the canyons on Williams and Merrice Creeks were first staked in 1898 by placer miners enroute to the Klondike. Development

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[1] Bostock, H.S. 1957. Yukon Territory: Selected Fields Reports of the Geological Survey of Canada - 1898 to 1933. (Queens Printer, Ottawa). P. 339.

[2] Abbott, G. 1971. Geology of the Williams Creek Copper Prospect. University of British Columbia 4th-year thesis. P. 2.

[3] G.W. Dawson. 1898. "Report on an exploration in the Yukon District, NWT, and adjacent northern portions of British Columbia," Geological Survey of Canada Annual Report. Volume 3, Part 1, 1887-1888. P. 145.

work on these claims was completed by 1910, and the old workings can still be seen in many places.

Mine workings dating back to the early 1900s have been reported on the Bonanza King, Dawson, Monte Christo, Lucky Boy, Glenlivet and Homestake claims all of which are crown grants.

Bonanza King, Glenlivet, Monte Christo, Lucky Boy

Recorded in 1907, these claim were explored and developed by a number of different owners. Almost all of the claims were eventually consolidated under the ownership of Dawson City dentist by the name of J.O. Lachapelle.[4] Work ceased in March of 1920, by which time 5.9 tonnes of ore had been shipped to the Anyox Smelter.

Development in the area included 173.7 m of drifting in two adits and two 15-metre shafts on the Bonanza King claim, and an 112.8-metre adit on the adjacent Lucky Boy claim, which borders Bonanza King to the south. Immediately west of Bonanza King is the Dawson claim, which is now lapsed. Work on that claim included a 12-metre adit.[5] All of these claims are located on the north (east) side of Nancy Lee Creek

Work was conducted on two other claims, the Glenlivet, located between Williams and Merrice Creeks, and Bunker Hill, located on the south side of Merrice Creek. A 2.7-metre shaft, 4.1 m of decline and 2.7 m of drifting took place on the Glenlivet, while a 6.1-metre crosscut was driven on Bunker Hill.

Homestake

Bostock (1957, p. 341) reported that the Homestake copper grant was located on the south side of Merrice (Merritt) creek, two and a half miles from the Lewes (Yukon) river, with the main workings being situated 150 feet above the creek bottom. The widest vein on the property, which is where almost all development was expended, outcropped at the surface, and the rock in the area was reported to be green schistose and granite.

According to Minfile#115I 009, the Merrice (Homestake) claim was staked in 1902, and work at the site, all of which was done prior to 1908, included 47.2 m of drifting and surface pitting. In 1971, the claim was re-staked as the Taslar, Bob and Stella claims, and mapping and a small geochemical survey were conducted.

A second wave of interest was generated in the Merrice Creek and Williams Creek area in 1970, when copper mineralization at Williams Creek was

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[4] "Letter to the Office of the Gold Commissioner of the Yukon Territory, August 3, 1918." Cited by G. Abbott (see footnote 1).

[5] Yukon Minfile, 1992. File #115I 010.

discovered. The primary copper minerals were found to be azurite, malachite and cuprite. Extensive drilling was performed in 1991 to further define the deposits.[6]

Bill Harris, who prospected in the area during the 1970s, mentioned that Armand Arsenault cut a line down the hill between Williams and Merrice Creek, across the terrace, across one of the islands in the Yukon River, and on the other side of the river he continued until he hit the highway.[7]

1.3 Site Access

Access to the Williams and North Merrice Creek sites occurred via the Yukon River. The sites were all easily accessible by water.

An existing dirt road off of the Freegold Road provides access to Yukon Crossing, which is approximately 5 km south of Merrice Creek, on the Yukon River. The Yukon Quest Trail, which is a well-maintained path, free of trees, roughly parallels the Yukon River in this area. Thus, it is possible to hike along this trail from Yukon Crossing to Merrice and Williams Creeks. However, one would have to first traverse Crossing Creek, which is approximately 5 m wide and one metre deep near its mouth, to access the Quest Trail from Yukon Crossing.

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[6] Davidge, D. and Snider, R. 1996. Baseline study of sediments and water quality of the Williams and Merrice Creek Watersheds, Yukon. Environment Canada (Pacific and Yukon Region) Regional Report No. 96-03. P. 1.

[7] Bill Harris. Personal Communication. August 25, 1999. Carmacks, Yukon.
Bill and his wife Vivian staked in the Carmacks area in 1947, and have spent time walking the area around Williams, and less so around Merrice, creeks.

2.0 PURPOSE AND SCOPE

The purpose of this environmental investigation was to complete the four phases listed below in order to set priorities and provide direction for site remediation. Detailed task descriptions follow in the Methodology section 3.

Phase I	Determine site history and contaminant profile based on literature, archival and record search and interviews. Accomplish initial site reconnaissance.
Phase II	Determine presence of contaminants on site. Develop and carry out a sampling regime, ensuring Quality Assurance/ Quality Control in order to characterise contaminants, soil and water.
Phase III	Delineate contaminant source locations and migration pathways. Determine extent and nature of contamination.
Phase IV	Develop recommendations for further assessment, monitoring or remediation.

3.0 METHODOLOGY

The following sections describe the methods CCSG Associates used in this environmental investigation to accomplish the following objectives which were:

1. To develop a site inventory of physical wastes.
2. To test for specific contaminants.
3. To determine a contaminant profile.
4. To suggest recommendations for further assessment, monitoring or remediation.

3.1 Assumptions

CCSG Associates focused this environmental investigation on the areas of North Merrice Creek which had historical mining development. Therefore, the investigation focused on the Crown Grant claims which span between and across Williams Creek to Nancy Lee Creek, but did not cross over current claims held by Western Copper Holdings (for example, the lower mine portal on Nancy Creek was not investigated).

At Merrice Lake there was a sluicing operation, but all current accounts indicate that the equipment and machinery have all been removed. This investigation did not confirm these accounts on the ground as the sources were considered reliable.

Extensive mineral exploration trenching exists between the portion of Merrice Creek upstream of Merrice Lake and the headwaters of Williams Creek, this was viewed from the helicopter survey but not investigated because claims are currently held by Western Copper Holdings.

3.2 Approach

The assessment program of CCSG Associates included the Canadian Council of Ministers of the Environment (CCME) National Classification System for Contaminated Sites (NCS), the Yukon Government Contaminated Site Regulations, the Canadian Standards Association (CSA) guidelines for site remediation, Metal Mining Liquid Effluent Regulations (1977) and Mine Reclamation in the Northwest Territories and Yukon (INAC, 1992). The CCME guidelines for Soil Quality (1997), Sediment Quality (1995), and Water Quality (1995) were used as a tool specifically for the classification and general prioritisation of contaminated sites.

CCSG Associates conducted the North Merrice Creek environmental investigation with an experimental protocol that is based on CCME and CSA guidelines. Using the CCME classification system, the hazard (or hazard potential) of a site can be evaluated by scoring site characteristics grouped under one of three categories:

1. *Contaminant Characteristics*: the relative hazard of contaminants present at a site.

2. *Exposure Pathways*: the route a contaminant may follow to a receptor.

3. *Receptors*: living beings or resources that may be exposed to and affected by contamination.

From this approach, a basis of understanding to recommend further assessment, monitoring or remediation was accomplished.

3.3 List of Tasks

The tasks involved in accomplishing each phase of the environmental assessment are listed in detail in this section.

3.3.1 Review of Existing Information

Phase I consisted of archival research and interviews to amass existing information about the sites. This site history information was used to predict the locations, and potential for certain types and quantities of contaminants currently remaining at the site. An initial reconnaissance of the site was conducted to determine preliminary information such as access and a general view of contamination extent.

Archival information was found in the following departments and libraries: Yukon Archives; Whitehorse Public Library; Government of Yukon Community and Transportation Services Library; INAC Library; Yukon Renewable Resources Library; Environment Canada Library; Yukon Chamber of Mines; DIAND Lands Branch; Geoscience Office; Water Survey; and Mine Recorder Office.

CCSG Associates interviewed the following local residents: Bill Harris (prospector and river expeditor); Al von Finster (Fisheries and Oceans Canada), Johnnie Sam (Little Salmon Carmacks First Nation), Pier Rinks (Carmacks Forestry Office, DIAND Field Operations), Steve Colp (Mining Inspector, DIAND), Kirby Meister (DIAND Field Operations, Faro), Grant Abbott (DIAND). As well, Tom Becker, a geologist with Archer Cathro (Vancouver) was interviewed about exploration conducted in this area.

3.3.2 Field Program

CCSG Associates conducted a field program for the Phase II investigation to confirm or refute predictions of contaminant presence identified in Phase I. Phase III delineation of contaminants was begun with a field sampling regime. Site assessment was conducted for five identified regions within the Merrice Creek #1, Nancy Lee Creek and the Merrice Creek #2 sample areas. This included a visual survey, photographic records, mapping of sample sites and regions, and an inventory of wastes, physical hazards, structures and mining related landscape features. Soil, water and vegetation samples were taken from sample locations chosen based on Phase I and survey indications. Field analysis helped to identify priority samples for more detailed analysis with Maxxam Analytical Laboratories (CAEL accredited).

3.3.2.1 Initial Reconnaissance

An initial site reconnaissance was done to establish layout and physical characterization. The following features were noted: signs of stressed vegetation, atypical or nonexistent vegetation, olfactory and staining indications; proximity to water and erosion; surface waste and existing structures.

3.3.2.2 Field Survey

The survey walk ensured that any visual anomalies were accurately described and mapped in greater detail than provided in the initial reconnaissance. Vegetation was examined for signs of stress and anomalies from expected abundance and types of plants, and described in spatial relation to other vegetation regions. Surface debris, topography and structures were noted as indicators of potential contamination and recorded as a surface area layout.

3.3.2.3 Sampling

Representative point sample sites were selected based on indications derived in the archival research, initial reconnaissance and visual survey.

Ambient conditions were recorded at the time of sampling: air temperature, precipitation, cloud cover and general weather.

Soil
Soil samples were collected using a stainless steel spade and 5mm mesh screen for size separation. At every soil sample site a number of observations were recorded; location, surface debris, vegetation, location, depth, soil type, colour, moisture and general particle size.

A paste was prepared in the field for each soil sample using 65 ml of soil with particle size smaller than 5mm and 100ml of deionized water. The paste was mixed thoroughly and allowed to settle for 10 minutes. Each paste solution was analysed for pH, conductivity, nitrate, nitrite, copper and sulfate (see below, section 2.3.2, for field analysis details).

Soil samples were stored in plastic sample bags and kept cool prior to shipping for analysis. Analysis was conducted within two weeks of the sampling date.

Water

Water samples were collected by rinsing the 500ml plastic storage bottle three times with the water source and then filling to leave 1cm headspace. Water temperature and pH were recorded at the time and place of sampling.

As with the paste solution, water samples were analysed in the field for pH, conductivity, nitrate, nitrite, copper and sulfate (see below, section 2.3.2 for field analysis details).

Water samples were intended for metal analysis and were stored with 5mL of 20% nitric acid as preservative. Water samples were kept cool prior to transport to the analytical laboratory. Analysis was conducted within two weeks of the sampling date.

Vegetation

Plants that displayed stress were sampled. A piece of the plant was removed and stored in a sample bag. Stress was defined as any indication that plant health, growth or reproduction was adversely influenced, for example stunted growth, unhealthy appearance, or insect and mold infections. Microscopic analysis was conducted within two weeks of the sampling date.

Additionally, vegetation that may have taken up contaminants and could be consumed by animals were sampled. These representative samples were sent to the analytical laboratory within two weeks of sampling.

3.3.2.4 Photographs

Photographs were taken of the site from various vantages, point sample sites, surface debris and stressed vegetation.

3.4 Laboratory Program

The laboratory program consisted of two parts: field and off-site analytical laboratory analysis.

Some soil, water and vegetation samples were sent to a commercial analytical laboratory where testing took into account a wider range of parameters and guaranteed a higher level of accuracy than field testing. CCSG Associates submitted samples to Maxxam Analytical Laboratory, of Calgary, Alberta. Maxxam is approved by the Canadian Association for Environmental Analytical Laboratories (CAEAL). Maxxam analysed all samples in compliance with the

CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites Guidelines.

Samples were chosen for laboratory analysis based on:

- required replication of field samples to ensure Quality Assurance/Quality Control
- indications of high contamination derived from field results

3.4.1 Quality Assurance/Quality Control

All sampling and testing adhered to the principals outlined in the CCME Guidance Manual on Sampling Analysis and Data Management for Contaminated Sites. CCME Data Quality Objectives were used to develop the experimental design for laboratory analysis.

The experimental design for laboratory analysis was developed and implemented according to the CCME Quality Assurance/Quality Control (QA/QC) guidelines. For quality assurance:

1. blank and spike samples were verified with each sample run;
2. ambient air temperature variation was accounted for;
3. 10% of all field tests were replicated in the field to confirm analysis.

For quality control 10% of field samples were submitted to Maxxam Labs to undergo testing for the same compounds (copper, nitrate, nitrite, sulfate, and total metals) for which they had been tested in the field.

3.4.2 Field Laboratory Analysis

Figure 2. Chart of Field Analysis Components, Method of Analysis and Range of Sensitivity

FIELD ANALYSIS COMPONENT	METHOD OF ANALYSIS	RANGE
pH	Oakton pHTestr	-1.0 to 15.0
Conductivity	Oakton TDSTestr 20	0 to 1999 uS, and 2.00 to 19.99 mS
nitrate	Aquachek water quality test strips	o mg/L to 50 mg/L
nitrite	Aquachek water quality test strips	0 mg/L to 3 mg/L
copper	EM Quant Copper (Cu^{+}/Cu^{2+}) Test	0 mg/L to 300 mg/L
sulfate	EM Quant Sulfate (SO_4^{2-}) Test	0 mg/L to over 1,600 mg/L

3.4.3 Analytical Laboratory Program

Some soil, water and vegetation samples were chosen to be sent to a commercial analytical laboratory. Testing was done for these reasons:

1. To provide more accurate quantitative analysis of parameters already tested in field;
2. To test greater specificity within parameters;
3. To confirm accuracy of field results through replicate samples;
4. To test parameters that could not be tested in the field.
5. To clarify the degree of contamination in priority vectors such as vegetation, water etc.

Soil and water samples were sent to Maxxam Labs Alberta Inc. of Calgary, Alberta were tested for some or all of the following components:

Figure 3. Chart of Laboratory Analysis Type and Method

TYPE OF TEST	METHOD OF TEST	ANALYTES				
Total Metal Content	ICP	aluminum	arsenic	barium	beryllium	boron
		cadmium	calcium	chromium	cobalt	copper
		iron	lead	lithium	magnesium	manganese
		mercury	molybdenum	nickel	phosphorus	potassium
		silicon	selenium	silver	sodium	strontium
		sulphur	titanium	uranium	vanadium	zinc

3.5 Delineation

Phase III interpreted the results of field and Maxxam laboratory testing, in conjunction with knowledge of the physical characteristics of the site, to:

1. Analyse and interpret levels of contaminants detected in Phase II.
2. Determine contaminant sources.
3. Delineate the extent and nature of contamination.
5. Predict the potential for contaminant migration.

3.6 Developing Recommendations

Phase IV developed recommendations for further assessment, monitoring or remediation.

Background levels were compared with concentrations found in the site sampling regime, concentrations above the background levels being considered a

potential pollutant. CCME Interim Assessment Criteria was used to compare to the sample analysis results to determine level of concern presented.

Interpretation of analytical results included the use of the National Classification System (CCME NCS, 1992) work sheets. This system uses a work sheet scoring system to assess the hazard to human and ecological health of a site. Site classification was based on individual characteristics and the site was placed into classes according to their priority for action. These classes are:

Class 1 - Action Required
Class 2 - Action Likely Required
Class 3 - Action May Be Required
Class N - Action Not Likely Required
Class I - Insufficient Information

Determination of these ratings assess potential hazard to human and ecological health by:
1. Establishing contaminants, receptors and pathways involved
2. Combining site specific data with literature review to assess toxicity potential
3. Delineating contaminant sources and assess potential exposure levels and pathways
4. Classifying potential hazard of site and recommend degree of action priority.

The National Classification System evaluates sites by scoring them on a scale from 0 to 100. In general, sites that exhibit observable or measured impacts on the surrounding environment or have a high potential for causing negative impacts will score high under the system. Sites with minimal observed impacts or a low potential for causing impacts will generally receive a low score. The system is not designed to provide a quantitative risk assessment, but rather is a tool to screen sites with respect to need for further action (e.g., characterization, risk assessment, remediation, etc.) to protect human and animal health and the environment.

Sites are not ranked relative to one another. Sites are classified on their individual characteristics and will be placed into classes according to their priority for action.

4.0 ENVIRONMENTAL SETTING

The following section describes components of the environmental setting for each of the three sample sites. These components include mineralization, surface hydrology, climate, vegetation, fish and wildlife resources, site topography and soils and permafrost.

4.1 Merrice Creek #1

The following sections describe the environmental setting and initial reconnaissance observations of the Merrice Creek #1 sample area (see Appendix C, Photographs 1&2 for an overview of this area).

4.1.1 Mineralization

The mineralization of the Williams Creek and Merrice Creek area is characteristic of the metamorphosed copper deposits occurring along the boundary between the Yukon Tanana and Northern Stikine terranes.[8]

4.1.2 Surface Hydrology

Drainages in the region have a rectilinear pattern, e.g., Williams Creek flows perpendicular to the Yukon River, which reflects structural features of the landscape, and suggests that the surface hydrology has been little affected by valley glaciation.[9]

Drainage from the sample area is either to the north, into Williams Creek, which flows into the Yukon River, or east, directly into the Yukon River. Drainage south towards Merrice Creek is limited by distance and topography.

4.1.3 Climate[10]

The Merrice Creek and Williams Creek adjacent watersheds are located within the "Central Yukon Basin" climatic region. Climate in the Carmacks area, as with much of the Yukon, is characterized by warm summers and cold winters. January is generally the coldest month, with a mean low temperature of -33°C, and a mean high temperature of -23°C; and July is the warmest month, with a mean low temperature of 7°C and a mean high temperature of 22°C.

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[8] Yukon Minfile, 1992. File #115I 008. Williams Creek (Carmacks Copper). September, 1994. P. 3.

[9] Abbott, G. p. 3.

[10] Kilborn Engineering Pacific Ltd. 1994. Western Copper Holdings Ltd. Carmacks Copper Project. Project #8555-15. Feasibility Study, Volume 1. P. 3-5.

Total precipitation in the region averages 25.5 cm (water equivalent). Close to 16 cm of precipitation occur in the form of rain, while 95 cm fall as snow.

4.1.4 Vegetation

The vegetation of the Merrice Creek #2 sample area was highly disturbed. There were a number of clearings, which were devoid of large vegetation (i.e., trees, shrubs). Sample Sites 1-3 were located on the largest clearing, which runs perpendicular to the Yukon River, while site 4 was on a clearing parallel to the river (see Photographs 1 and 2 for an overview of the Merrice Creek #2 sample area).

Sample Site 1: At river level, there was a consistent cover of grasses, with fireweed, rose bushes and poplar. Sample Site 1 was located on the first floodplain terrace. Here there were only sparse occurrences of spruce and poplar (5-20 cm); fireweed; and grasses. The poplar trees at site 1 did not show signs of disease, however, below this site the poplar trees appeared to be diseased (had "poplar roses").

Sample Site 2: Similar to site 1, vegetation at this site was sparse, and included 10- to 50-cm poplar trees; sporadic spruce seedlings < 2 cm high; stunted equisetum growing in circular patches, which were 2-3 cm in diameter; and patches of grass.

Sample Site 3: Alder (with signs of viral or bacterial infection) and rose bushes were growing on the slope from site 2 to site 3. Where site 3 flattened out, there were some plants, e.g., grasses, fireweed and equisetum, growing out of cracks in the soil, but otherwise vegetation was sparse.

Sample Site 4: There was a different composition here than at sites 1-3. Species included the usual grasses, fireweed and wild rose, but also included yarrow, Labrador tea and strawberry blight.

4.1.5 Fish and Wildlife Resources[11]

The Yukon River, at the confluence of Williams Creek, provides habitat for chinook, chum, lake trout, lake whitefish, broad whitefish, round whitefish, least cisco, inconnu, arctic grayling, northern pike, burbot, longnose sucker and slimy sculpin. Major side channels, which provide the highest fish capabilities on this section of the river, are located approximately 0.5 km downstream and 1.2 km upstream of Williams Creek (toward Merrice Creek).

Six species of fish have been identified in the Williams Creek watershed, including juvenile chinook salmon, arctic grayline, slimy sculpin, longnose sucker,

[11] Kilborn, pp. 11-5 and 11-6.

burbot and northern pike. The section of Williams Creek located below the confluence with Nancy Lee Creek has been identified as having the highest fish rearing capability of any of the reaches of Williams Creek. There have been no reports of spawning salmon in Williams Creek, possibly due to the fact that the creek is small, has low discharge, and has high fines content in the bed material.

The Yukon River floodplain in the area of the Williams Creek confluence has high potential for habitat for moose, snowshoe hare, red squirrel, black bear, wolves and lynx; and moderate habitat for marten, grizzly bear, beaver, ruffed grouse, small mammals and forest birds. Beaver and river otter occur along the Yukon River and lower Williams Creek. Forested slopes have low to moderate habitat potential for moose, hares, lynx, marten and black bears.

There were no sightings of large wildlife in this area, however, there were moose tracks evident at some of the sites, and bear tracks along the banks of the Yukon River.

4.1.6 Site Topography and Soils

The area between Williams and Merrice Creeks is characterized by a number of historic Yukon River floodplain terraces above the level of the Yukon River, the highest terrace being approximately 200 m above the level of the river. Beyond the terraces, the terrain slopes rapidly upward, to an elevation of 2200 m above sea level.

This region of the Yukon is located at the western margin of Pleistocene glaciation. The soils of this area have been described as being covered by a veneer of ablation and lodgment bouldery till (of glacial origin), with a sandy to silty matrix, generally less than 1 m thick.[12]

> Sample Site 1: (located on top of rise between the level of the Yukon River bank and the first terrace). There was no organic layer at this site. The surface was predominantly gravel to a depth of 20 cm, and there were salt precipitates on the gravels.
>
> Sample Site 2: (located on the first terrace). There was a 2-cm layer of ash, underlain by silty-sandy, dark brown soil, which contained orange-stained rocks < 5 mm in size. Organic matter content was low.
>
> Sample Site 3: (still located on the second terrace above the Yukon River, this area was located in a depression, approximately 2 m lower in elevation than site 2). Samples were taken at this site because the soils had a markedly different texture than those at site 2. The ash layer was, for the most part, absent. The upper soil layer was a densely-packed, extremely uniform clay-like material, approximately 10 cm thick. Quite possibly, the

[12] All information on fish and wildlife from Kilborn, p. 3-6.

clay was drilling mud. The surface showed polygonal cracking (depth of the cracks was 5-10 cm), and the polygons had diameters ranging from 50-100 cm.

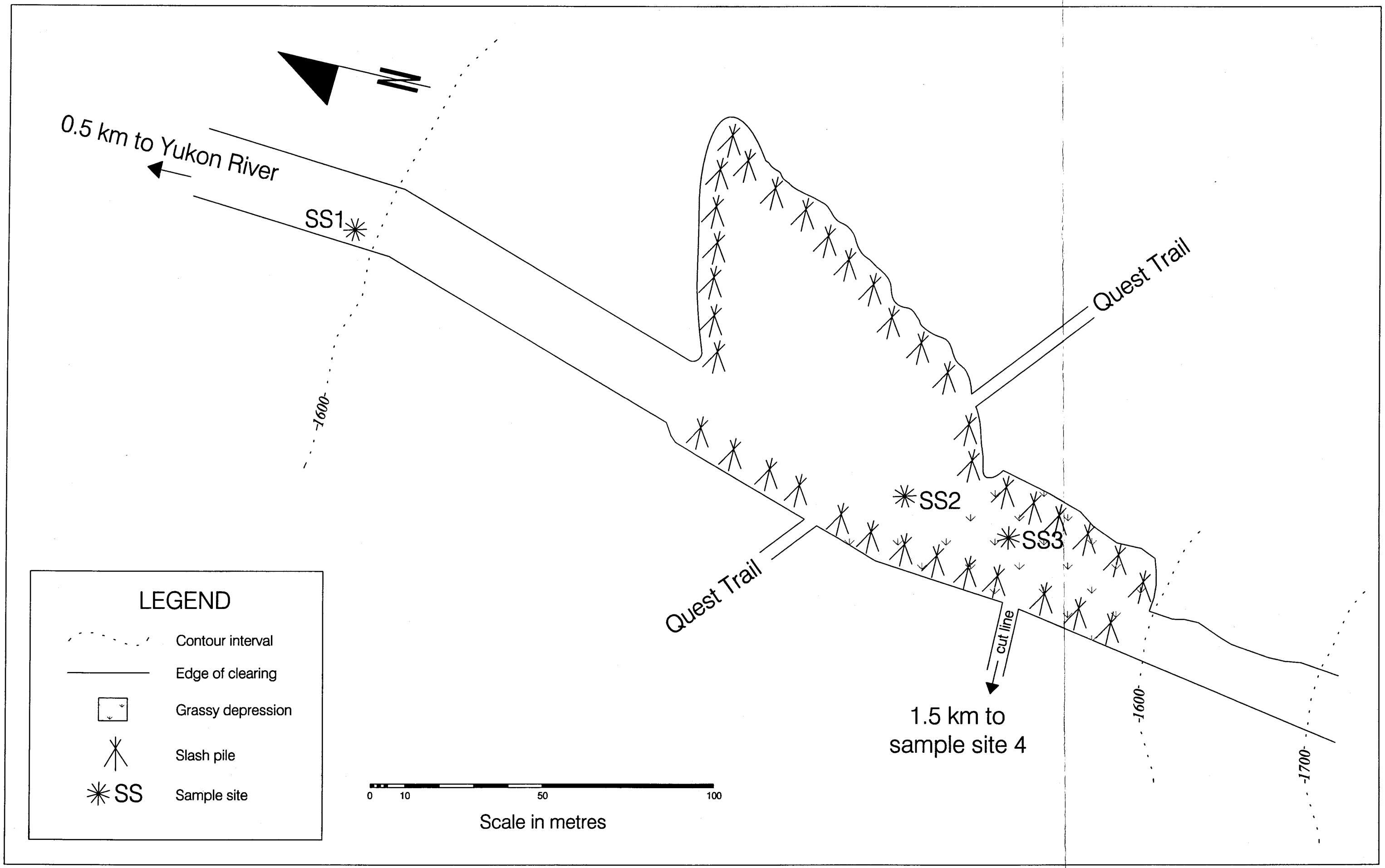
Sample Site 4: (located on a cut line, which runs perpendicular to sites 1-3, and approaches but does not reach Williams Creek. At the end of the clearing there is a 25-m hill, with a rocky outcrop). The soils on the cut line were high in organic matter, with the organic layer, at some points, > 20 cm. The rocky hill had areas of broken rock that were highly oxidized (there appeared to by copper and iron present).

Refer to the map of Merrice Creek #1 site on the following page, and Photographs 1 & 2 in Appendix C.

4.1.7 Permafrost

This region has not been mapped for permafrost type by the Geological Survey of Canada (Map of Permafrost and Ground Ice Conditions of Northwestern Canada 1691A). Abbott reported that permafrost in this region is rare and occurs only on northern slopes (Abbott, p.4). Others have reported that permafrost is present at varying depths in most north-facing slope locations (Kilborn, p.3-6).

There were no obvious signs of extensive permafrost degradation at this sample area, but there was evidence of soil creep, likely due to removal of normally stabilizing vegetation, on the hill leading up to the second terrace. Several berms covered with geo-textile material, log and earth had been built to enhance slope stabilization, erosion may have been caused by a combination of factors including surface run-off, wind and intermittent permafrost thawing.


N
0.5 km to Yukon River
SS1
-1600-
Quest Trail
SS2
SS3
Quest Trail
cut line
1.5 km to
sample site 4
-1600-
-1700-
LEGEND
Contour interval
Edge of clearing
Grassy depression
Slash pile
SS
Sample site
0
10
50
100
Scale in metres

4.2 Nancy Lee Creek

The following sections describe the environmental setting and initial reconnaissance observations of the Nancy Lee Creek sample area (see Appendix C, Photographs 5-8).

4.2.1 Mineralization

Several studies have reported that copper mineralization is non-sulphide forms[13] and that pyrite is very noticeably absent from both showings and the country rocks.

4.2.2 Surface Hydrology

The sample area was located on the north side of Nancy Lee Creek at an elevation approximately 150 metres above the creek. Nancy Lee Creek runs approximately parallel to the Yukon River and flows into Williams Creek from the east. The confluence of Nancy Lee Creek with Williams Creek is approximately 1 mile from the point where Williams Creek meets the Yukon River.

4.2.3 Climate[14]

See Section 4.1.3

4.2.4 Vegetation

Vegetation was extremely sparse on the south-facing valley hillslope, reflecting the thin soil layer present at the site and subsequent low moisture-holding capacity of the soil. The slope was almost entirely covered in grass, with sagebrush and juniper growing intermittently. There were patches of well-established poplar trees, ranging in height from <1 m to 4 m

4.2.5 Fish and Wildlife Resources

Fish rearing capabilities have been reported to be highest in the Williams Creek watershed in the area below the confluence of Nancy Lee and Williams creeks (Kilborn, 1994, p. 11-6). Other reaches of both creeks are limited in their ability to act as fish rearing habitat due to their low flows, and low occurrence of riffle habitat (Kilborn, 1994, p. 11-6).

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[13] Abbott, p.11; Journal of Geochemical Exploration, p. 102.

[14] Kilborn Engineering Pacific Ltd. 1994. Western Copper Holdings Ltd. Carmacks Copper Project. Project #8555-15. Feasibility Study, Volume 1. P. 3-5.

Steep grassy slopes, such as the area sampled above Nancy Lee Creek, provide good habitat for hares in area where shrubs and juvenile aspen are abundant. These slopes appear to have good habitat potential for moose and ground squirrels, while cliffs in the area show high potential for golden eagle nesting (Kilborn, 1994, p. 11-3).

There were no sightings of wildlife above Nancy Lee Creek. However, there were several sightings of eagles in the area.

4.2.6 Site Topography and Soils

The north side of Nancy Lee creek, where the sample area was located, is a steep, grassy slope, which rises approximately 1400 m above creek level. The south side of the creek, on the other hand, has a gentler gradient, and is forested primarily with spruce.

No soil pits were dug at this site. However, overburden in this region is generally thin. Typical soil profiles have several centimetres of moss and/or organic material overlying 4-20 cm of volcanic ash, several centimetres of organic material, and 12-36 cm of red-brown soil (Abbott, p. 4).

4.2.7 Permafrost

No obvious signs of permafrost.

4.3 Merrice Creek #2

The following sections describe the environmental setting and initial reconnaissance observations of the Merrice Creek #2 sample area (see Appendix C, Photographs 9 & 10).

4.3.1 Mineralization

The mineralization of the Merrice Creek area is characteristic of the metamorphosed copper deposits occurring along the boundary between the Yukon Tanana and Northern Stikine terranes.[15]

4.3.2 Surface Hydrology

As mentioned previously, drainage in this region along the Yukon River has a rectilinear pattern, i.e., Merrice Creek flows roughly parallel to Williams Creek and both creeks flow perpendicular to the Yukon River.

[15] Yukon Minfile, 1992. File #1151 008. Williams Creek (Carmacks Copper). September, 1994. P. 3.

A 1-km-long section of Merrice Creek, located 3 to 4 kilometres upstream from the Yukon River, was dry. Presumably, the flow here went subsurface, because there was water in the creek both above and below the dry section.

4.3.3 Climate[16]

See Section 4.1.3

4.3.4 Vegetation

There was a diversity of vegetation in the riparian zone along Merrice Creek, including a variety of mosses, equisetum, wild rose, high-bush and low-bush cranberry, willow, and spruce trees.

On the slopes above creek level, poplar, spruce and grasses predominated the landscape.

4.3.5 Fish and Wildlife Resources

The substrate in Merrice Creek was composed of large gravels, cobbles, and boulders. No significant amount of fines were present until very close to the creek mouth.

The presence of large bed material and abundant stream cover in the lower reaches of Merrice Creek should provide habitat suitable for rearing fish (Kilborn, 1994, p. 11-5). However, there were no fish observed in Merrice Creek.

There is a marshy area located on the Yukon River just south of the mouth of Merrice Creek. Moose, bear and wolf tracks were abundant in this area.

The willow/spruce dominated, wet riparian zones along Merrice Creek provide good habitat for moose and snowshoe hares and moderate habitat for black bears, red squirrels and spruce grouse (Kilborn, p. 11-3). Bear scat, containing berry-remnants, was noted at various points along Merrice creek, as were moose tracks.

Conifer-dominant uplands have low habitat potential overall, but can provide good habitat for red squirrel and spruce grouse (Kilborn, 1994, p. 11-4). A spruce grouse was spotted in the area, and there were numerous areas riddled with squirrel nests in the forested slopes above Merrice Creek.

[16] Kilborn Engineering Pacific Ltd. 1994. Western Copper Holdings Ltd. Carmacks Copper Project. Project #8555-15. Feasibility Study, Volume 1. P. 3-5.

4.3.6 Site Topography and Soils

The north side of Merrice Creek has the same topography as the Williams Creek site, i.e., two terraces before reaching a steep slope, which rises approximately 1200 m over a distance of 500 m.

Approximately 1.5 km up Merrice Creek, the hills begin to slope steeply on both sides, creating a canyon landscape in some places.

As with the Williams Creek and Nancy Lee Creek sample areas, the soils at Merrice Creek were poorly developed. The only notable difference was that the moss layer on the south side of Merrice Creek was much thicker than what was observed at any of the other sites (5-10 cm, as opposed to 2-5 cm).

4.3.7 Permafrost

It is possible that the slides and slumping observed in the gullies on the south side of Merrice Creek were related to permafrost action.

5.0 SITE DESCRIPTION AND FINDINGS

The details of the site investigation are contained in this section. This includes a discussion of physical and chemical wastes and a discussion of associated environmental exposure and impacts.

5.1 Merrice Creek #1

The deforested areas of the Merrice Creek sample site were noted during the helicopter reconnaissance flight. The cleared flat areas and adjoining steep incline corridors devoid of trees were not present on the air photographs taken in 1989 by the Department of Energy, Mines and Resources.

Four Sample Sites were investigated in the Merrice Creek #1 area, see sections 4.1.4 and 4.1.6 for a detailed description of the location and observed condition of these four sample sites. As well, Photographs 1 and 2 show an overview of this area.

It was suggested that the clearing might have been conducted by Forestry personnel, however, discussions with department representatives did not confirm this assumption.

The presence of the uniform, densely packed clay-like material could be the remnants of an exploration drilling program. No drill core or drill holes were discovered. There was a piece of a double thickness brown bag with the Mohawk label and symbol found on-site.

5.1.1 Buildings, Infrastructure, Equipment

There were no buildings or infrastructure present at this site.

There was no equipment left on site, however there were signs that heavy machinery had been working on the open flat clearing of Sample Site 1, 2 and 3. See Photograph 3 which shows grass growing in the linear depressions left by heavy machinery tracks. At Sample Site 4, geo-textile barriers had been installed for slope stabilization purposes and

5.1.2 Non-hazardous Waste Materials

No non-hazardous waste materials were found at this site.

5.1.3 Hazardous Waste Materials

The following discussion reviews field and laboratory analysis of 9 soil and vegetation samples taken from Sample Sites 1-4 to determine the degree of hazard associated with the disruption investigated at the Merrice Creek #1 area.

Field Sample Analysis

Field analysis was conducted on 6 soil samples representing the variability of the Merrice Creek #1 area. Additionally, three vegetation samples were selected and inspected on site. A summary of the location and description of each sample analysed in the field and the paste parameters determined for pH, conductivity, copper, nitrate, nitrite, and sulphate is provided (refer to the chart on the next page below).

For all soil samples analysed in the Merrice Creek #1 area, pH levels were in the range of neutral, conductivity was low and copper levels were not detected. Nitrate was detected in low levels in samples S-7 and S-9 and moderate levels in S-8. Signs of orange and red staining on soils of sample S-1, S-2, S-8 and S-9, in conjunction with high sulphate levels greater than 1600 ppm, needed further investigation to determine the potential for harmful impacts to occur as a result of metal leaching.

Figure 5. Chart of Field Sampling Analysis for Merrice Creek #1 Sample Area

Sample Site and Number	Location	Description	pH	conductivity (us)	Copper (ppm)	Nitrate (ppm)	Nitrite (ppm)	Sulphate (ppm)
Merrice Creek #1 *								
S-1	*Sample Site 1*-top of slope leading to first Yukon R. floodplain terrace	soil sample: 10 cm pit, ash layer removed, soil consisted of coarse to fine gravel and sand, light brown with orange staining on rocks	7.6	36	0	0	0	800-1600
S-2	*Sample Site 2* - on first floodplain terrace	soil sample: 15 cm pit, ash layer removed, soil consisted of fine gravel (2 mm), which was stained reddish-orange, and silty-sand; organic matter content was low	8.0	26	0	0	0.15	>1600
S-3	same location as S-2	fine grain, grey silt layer, which was approximately 2 cm thick at this site, was sampled	7.8	79	0	0	0	<200
S-4	same as S-2	vegetation sample: equisetum, which was stunted and growing in 2-3 cm round patches	NA	NA	NA	NA	NA	NA
S-5	same as S-2	vegetation sample: poplar (trembling aspen), which was 10-50 cm, at a density of 3-4 per m^2	NA	NA	NA	NA	NA	NA
S-6	same as S-2	vegetation sample: grass, which was growing in patches	NA	NA	NA	NA	NA	NA
S-7	*Sample Site 3* - in a depression approximately 2-3 metres below the elevation of the first floodplain terrace	soil sample: 10 cm pit; essentially no ash layer at this site; sampled densely packed, hard, uniform clay layer	7.6	67	0	2	0	<200
S-8	*Sample Site 4* - cut line perpendicular to Yukon River, approximately 500 m from the river; sample from area below a rocky hill slope	soil sample: soil pit 15 cm; sample consisted of highly organic, dark brown soil;	8.2	63	0	10	0	>1600
S-9	*Sample Site 4* - same cut line as S-8, but sample taken from the rocky slope	soil sample: soil pit 15 cm; no topsoil was present; site consisted of broken rock 4-15 cm in diameter, partially stained red, underlain by fine gravels intermixed with sand	7.2	37	0	2	0.15	>1600

*Maxxam analytical samples labeled "Williams Creek S-1, S-5 and S-7" refer to the sample site "Merrice Creek #1"

Laboratory Sample Analysis

Soil samples S-1 and S-7 and vegetation sample S-5 were analysed for total metal content by Maxxam Analytical laboratory.

Soil sample S-1 was a priority concern due to its close proximity to the Yukon River and the potential for runoff and leaching of metals to surface waters inhabited by fish. Analytical results indicated slightly elevated levels of vanadium at 41.2 mg/kg, and high aluminum levels at 9840 mg/kg, high iron levels at 14,900 mg/kg. Neither iron or aluminum are listed in the CCME Interim Assessment Criteria for soil, however, fish are sensitive to the impacts of both iron and aluminum. For the protection of Freshwater Aquatic Life, based on levels defined by CCREM (1987), aluminum levels in water should not exceed 5-100mg/L and iron 300mg/L. The high levels of aluminum and iron are common to the mineralization of the area but increased exposure resulting from the clearance of vegetation may result in slightly increased input of both iron and aluminum to the Yukon River.

Soil sample S-7 was sampled from an area where vegetation was not becoming re-established after the area was disrupted. Iron levels in soil sample S-7 were moderately high at 1,300 mg/kg. Iron is not listed the CCME Interim Criteria for soil and the potential for run-off or leaching to Merrice Creek, Williams Creek or the Yukon River would be low enough to ensure the protection of Freshwater Aquatic Life as defined by CCREM (1987) at 300mg/L. Further, the vegetation sample S-5 taken adjacent to the cleared area did not have elevated levels of iron or other metals and therefore would not be a risk for wildlife consuming the plant material.

5.1.4 Surface Water Quality

It is possible that some surface and subsurface flows enter Williams Creek from the areas that were sampled in this study. We did not sample surface water quality in Williams Creek, however, data on surface water quality for Williams creek are available from studies conducted in the early-to-mid 1990s.

Eleven surface water quality stations were set up in the Williams Creek watershed and sampled between October 1989 and October 1992 (Kilborn, 1994). It was found that levels of total aluminum, cadmium, chromium, copper, iron and zinc in Williams Creek were periodically above Canadian Council of Ministers of the Environment (CCME) guideline values for the protection of aquatic ecosystems.

In August, 1994, water quality data were collected by Environment Canada staff at three sites along Williams Creek (Davidge and Snider, 1996).[17] This study found that all nutrient and metal parameters were below maximum allowable concentrations recommended for drinking water and the protection of aquatic life.

The Davidge and Snider study reported that stream sediment metals concentrations of aluminum, cobalt, chromium, iron, strontium, titanium, vanadium and zinc were either equal to or higher than maximum values measured in 1992.[18] The authors surmised that the increased levels might be due, at least in part, to increased exploration activity along Williams Creek.

It is possible that if exploration or mining activity increases in this area, or in the upstream reaches of Williams Creek, levels in the sediments could accumulate such that they exceed the maximum levels. Since Williams Creek is on active claims Western Copper Holdings, CCSG Associates did not sample the creek water or sediment.

5.1.5 Waste Rock Disposal Areas

The only potential waste rock disposal site in this sample area was at site 4. At this site, there was a 25-metre rocky hill, and the lower half was covered in waste rock (showing copper mineralization and iron-staining).

There was vegetation growing in the organic soils below the rock pile, and also sparsely within, the waste rock pile. The species of vegetation growing at this site differed from the species present at the three other sites in this sample area (site 4 included yarrow, labrador tea, strawberry blight, in addition to the more common fireweed, wild rose and grasses found at the other sites). This is likely due to the presence of a thick organic soil layer, which would have created an environment more conducive to the growth of a diversity of vegetation.

5.1.6 Mine Openings and Excavations

Although waste rock was present at site 4, there was no evidence of mine openings. The waste rock could have resulted from minor activity involving blasting for the purpose of exploration. No references to this site have been located in geological papers about the area.

5.1.7 Tailings

There were no obvious signs of tailings in this sample area.

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[17] Davidge, D. and Snider, R. 1996. Baseline study of sediments and water quality of the Williams and Merrice Creek Watersheds, Yukon. Environment Canada (Pacific and Yukon Region) Regional Report No. 96-03. P. 8.

[18] The stream sediment data were collected for Western Copper Holdings Ltd by P.A. Harder and Associates. The Harder report was cited in Davidge and Snider, 1996.

5.2 Nancy Lee Creek

Nancy Lee Creek was investigated to determine whether there were any negative impacts from reported mining activity in the area. The investigation focused on the Bonanza King claim, which is a crown grant claim presently owned by Mrs. I. Goulter.[19]

Abbott (1971) reported that the arid climate, lack of pleistocene glaciation and relatively high permeability of the biotite-rich rocks in the vicinity of Nancy Lee creek create an environment favourable to the weathering and leaching of sulphides. He also reported, however, that most of the copper mineralization in the area is in non-sulphide forms, and pyrite is very noticeably absent from country rocks. Consequently, the amount of leaching of metals due to acid rock drainage is unlikely to be a significant problem in this area.

The Environment Canada water quality samples (Davidge and Snider, 1996) taken from the confluence of Nancy Lee and Williams creeks, as well as the downstream samples from the mouth of Williams creek, support this assumption. The samples revealed nutrient and metal parameters below maximum allowable concentrations recommended for drinking water and the protection of aquatic life.

5.2.1 Buildings, Infrastructure, Equipment

There is currently an old cabin, mine tunnel and mine car near the confluence of Nancy Lee and Williams creeks (personal communication Johnny Sam, Bill Harris, Al von Finster). Kilborn (1994, p. 11-16) also refer to a mine adit on the north side of Williams Creek, approximately 400 m west of the Yukon River. Possibly, this adit/tunnel connects with the mine shaft that was located 300 m above Nancy Lee creek. The lower mine tunnel is located on a Western Copper Holdings Ltd. claim and so was not investigated in this study.

Also, according to the publication Yukon Places and Names (Coutts), there was a town established at the mouth of Williams Creek called Boronite City, which had a population of 20. It was built in 1907 to service the influx of prospectors to the region, but the city shut down within two years, because no commercially viable bodies of ore had been discovered. Kilborn (1994, p. 11-16) mentions a partially collapsed log cabin, barn, and domestic and mining-related refuse and artifacts 1.25 km northwest of the confluence of Williams Creek and the Yukon River. It is possible that these two accounts refer to the same site.

[19] Yukon Minfile, 1992. File #115I 010.

5.2.2 Non-hazardous Waste Materials

There was a waste rock pile located on the slope immediately below the mouth of the vertical shaft. The pile was composed of broken-up, mineralized rock (pink quartz, oxide copper – malachite; iron staining; pyrite – silver grey), and was approximately 2 m wide, 25-50 cm deep, and extended 8 m down the slope.

5.2.3 Hazardous Waste Materials

The following discussion reviews field and laboratory analysis of 4 soil and vegetation samples taken from Nancy Lee Creek area to determine the degree of hazard associated with the mine excavations.

Field Sample Analysis

Field analysis was conducted on 3 soil samples of the Nancy Lee Creek site. Additionally, vegetation samples were selected and inspected on site. See the chart below which summarizes the location and description of each sample analysed in the field and the paste parameters determined for pH, conductivity, copper, nitrate, nitrite, and sulphate.

For all soil samples analysed in the Nancy Lee Creek area, pH levels were in the range of neutral and conductivity was low. Copper levels were variable in the waste rock pile ranging up to 100ppm. Nitrate was detected in low levels in all samples, and some nitrite was detected in sample S-1. Signs of orange and red staining in the waste rock was variable, as was the high sulphate levels greater than 1600 ppm. Further investigation was required to determine the potential for harmful impacts to occur as a result of metal leaching, blowing or plant uptake.

These shafts investigated above Nancy Creek are believed to be connected to a portal at the level of Nancy Creek below. This portal was not investigated because it rests on claims currently held by Western Copper. Therefore impacts to surface water below cannot be assessed in this report.

Figure 6. Chart of Field Sampling Analysis for Nancy Lee Creek Sample Area

Sample Site and Number	Location	Description	pH	conductivity (us)	Copper (ppm)	Nitrate (ppm)	Nitrite (ppm)	Sulphate (ppm)
Nancy Lee Creek								
S-1	grassy slope, approximately 300 m above Nancy Lee Creek (ask JEN);	soil sample: taken from the wall of a shallow pit; the wall was covered in broken up rock, 2-20 cm diameter; stained red	7.9	84	10	1	0.15	>1600
S-2	same as S-1	soil sample	8.2	79	0	2	0	>1600
S-3	same as S-1	soil sample:	8.1	111	100	2	0	200-400
S-4	same as S-1	vegetation sample:	NA	NA	NA	NA	NA	NA

Laboratory Sample Analysis

Soil sample S-2 taken from the waste rock pile on Nancy Lee Creek and vegetation sample S-4 were analysed for total metal content by Maxxam Analytical Laboratories. The waste rock sample had high levels of barium (346 ppm), copper (312 ppm), iron (19,200 ppm) and sulphur (684 ppm), as compared to the CCME Interim Assessment and Remediation Criteria. The location of the waste rock is exposed to wind and water erosion influences, these high metal levels could impact wildlife or the creek below. Vegetation sample S-5 taken from below the waste rock pile indicated that the plant was not taking in high metal levels, therefore direct impact to wildlife from the high metals of the waste rock is estimated to be low.

5.2.4 Surface Water Quality

No water was sampled on Nancy Lee Creek, however, as mentioned above, Davidge and Snider (1996) did not find any nutrient or metal parameters exceeding allowable concentrations for either human drinking water or aquatic life.

5.2.5 Waste Rock Disposal Areas

See section 5.2.2 above.

5.2.6 Mine Openings and Excavations

There were three areas where excavation had occurred. The three holes were side-by-side. The southern-most excavation was shallow (< 1 m), and was roughly circular, with a diameter of 5-6 m. There were remnants of wooden beams in this hole. Beside this hole was a second, deeper hole, which Refer to the chart on the next page below which was approximately 15 m deep, and 3-4 m in diameter. There were no wooden support structures within this shaft. The third area of excavation was extremely shallow (< 0.5 m), and was 2 m in diameter.

5.2.7 Tailings

There were no tailings at this site. The 5.9 tonnes of ore removed from the Bonanza King shafts were shipped to the Anyox Smelter for processing in 1917.[20]

[20] Yukon Minfile, 1992. File #115I 010.

5.3 Merrice Creek #2

On August 26, 1999, a search for the Homestake claim was conducted. The areas approximately 2.5 miles up Merrice Creek was investigated for signs of mining activity. No obvious signs of activity were found in the region where the Homestake claim was staked.

Areas around rocky outcrops were targeted, since the Bostock report identified the Homestake work as being conducted at such an outcrop. Most of the outcrop areas were located adjacent to gullies, and most of the gullies appeared to be prone to slumps and slides. Almost all of the gullies were filled with dead trees that had fallen or slid in from the banks. Consequently, it is possible that a slide could have infilled or obliterated the adit and any other traces of mining activity.

Moreover, the area was heavily overgrown with moss mats, which were approximately 10-15 cm thick. Thus, any waste rock present was likely covered over in the 90 years since activity occurred at the site. There were areas where the rock beneath the moss mats was broken, as waste rock would have been, however, it was impossible to discern whether or not the broken rock was natural or due to mining activity.

5.3.1 Buildings, Infrastructure, Equipment

A number of buildings were encountered on the north side of Merrice Creek, where it empties into the Yukon River. One of the cabins was in excellent condition, and appeared to be recently used. The door on the cabin had ".illiams Mining Co." A second, larger cabin was in disrepair, with a caved-in roof; and a number of other smaller buildings were also in poor condition.

Approximately ¾ km up Merrice Creek, just past the Quest Trail, a second cabin was located. This cabin was in excellent condition, and appeared to be in use, as the cabin was well-stocked with firewood. A fish-trap was found beside the cabin.

There have been reports of a windless being located near an old cabin (Bill Harris, Personal Communication). However, no windless was located by any of the cabins. At the Yukon River site, the first river terrace began behind the cabins. On this terrace, 8-10 m from the buildings, were two pits, which were approximately the size of a grave (2 m long, 1 m wide, 0.5 m deep). Also in the area, 20-30 m of wire was found. It is possible that this wire could have been used in a windless operation, as it was thick enough to hold a heavy load. However, it is equally likely that it had nothing to do with a windless.

On the south side of Merrice Creek a claim post was found, approximately 1 km upstream. The markings were partially obliterated, but it was possible to read that it was the Billy claim, July 4, 1971. The Yukon Minfile reports that A. Arsenault and associates registered the Billy claim in July, 1971, but did no work

on it.[21] The area around the discovered claim post was partially cleared, i.e., there was evidence of logging, but there were no buildings or other infrastructure in the vicinity.

5.3.2 Non-hazardous Waste Materials

Scattered in the woods along the east side of Merrice Creek are rusted cans. Similarly, near the cabins at the confluence of Merrice Creek with the Yukon River, are rusted cans and some wire (see Photograph #10 in Appendix C).

5.3.3 Hazardous Waste Materials

There is no obvious evidence of hazardous waste materials present at the Merrice Creek #2 sample area.

5.3.4 Surface Water Quality

In August, 1994, water quality data were collected by Environment Canada staff at two sites on Merrice Creek (Davidge and Snider, 1996).[22] One sample site was located at the mouth of the creek, and the second site was located approximately 10 km up the creek, just upstream of a seasonal exploration tote road.[23]

In situ measurements of temperature, conductivity, pH and dissolved oxygen showed that Merrice Creek, much like Williams Creek, is typical of small-to-medium size drainages found in other parts of the Yukon.

Davidge and Snider found that all metal and nutrient parameters except for nitrite were below maximum allowable concentrations recommended for drinking water and the protection of aquatic life. A nitrite concentration of 0.274 mg/L, measured at the mouth of Merrice Creek, exceeded Canadian Council of Ministers of the Environment (CCME) guidelines established for the protection of aquatic life.

The following discussion reviews field and laboratory analysis of 3 water samples taken from Merrice Creek #2 to determine the degree of hazard associated with past disruption in this area. Red staining in the creek was apparent.

Field Sample Analysis

In this study, three water samples were taken on Merrice Creek. One was located approximately 5 km upstream from the Yukon River, in the region where

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[21] Yukon Minfile, 1992. File #115I 010

[22] Davidge, D. and Snider, R. 1996. Baseline study of sediments and water quality of the Williams and Merrice Creek Watersheds, Yukon. Environment Canada (Pacific and Yukon Region) Regional Report No. 96-03. P. 8.

[23] Kilborn Engineering Pacific Ltd. 1994. Western Copper Holdings Ltd. Carmacks Copper Project. Project #8555-15. Feasibility Study, Volume 1. P. 10-2.

the Homestake claim was supposedly located. There was heavy iron-staining on the substrate in this area. A second sample was taken approximately 3.5 km upstream. The substrate in this area was also stained. The third sample was taken close to the mouth of Merrice Creek.

Field analysis was conducted on 3 water samples to determine changes in water quality at different points in the creek. See the chart on the next page below which summarizes the location and description of each sample analysed in the field and the paste parameters determined for pH, conductivity, copper, nitrate, nitrite, and sulphate.

All water samples had a pH in the neutral range 7.6-8.0, with pH increasing slightly with distance downstream. Conductivity was moderate in all samples, decreasing slightly with distance downstream 326-235us/cm. Copper, nitrate and nitrite were not detected. Sulphate levels were high in all water samples.

Figure 7. Chart of Field Sampling Analysis for Merrice Creek #2 Sample Area

Sample Site and Number	Location	Description	pH	conductivity (us)	Copper (ppm)	Nitrate (ppm)	Nitrite (ppm)	Sulphate (ppm)
Merrice Creek #2								
S-1	2.5 miles up Merrice Creek from confluence with Yukon River	water sample-gravel sand substrate, iron precipitates in creek, base of rock slide (possible subsidence of old mine workings	7.6	326	0	0	0	>1600
S-2	2.0 miles up Merrice Creek from confluence with Yukon River	water sample-gravel, cobble & sand substrate, iron precipitates in creek	7.9	240	0	0	0	>1600
S-3	1.5 miles up Merrice Creek from confluence with Yukon River	water sample-sand and small gravel substrate, iron precipitates in creek, just before creek bed goes dry for ~1 mile	8.0	235	0	0	0	>1600

Laboratory Sample Analysis

Laboratory sample analysis of the water in Merrice Creek is high in metal content at quantities which are comparable to past studies on Williams and Nancy Creeks. It is inconclusive what the source of elevated metals is, but is likely a combination of high natural levels in this mineralized region as well as increased leaching due to historical mining and exploration practices on the creek.

5.3.5 Waste Rock Disposal Areas

On the north side of Merrice Creek, where the hill begins to slope steeply beside the creek, the slope was covered in jagged, broken rock. It was thought that this might be the area where the windless was located, but a close inspection of the rocky slope did not reveal any openings.

It was possible that the rock was the result of a slide, and not mining activity. The rock had minor iron staining, and there was sage, moss and grass growing within the pile, and small poplar trees (< 1 m) growing around the edges of the pile.

5.3.6 Mine Openings and Excavations

As mentioned above, no mine openings or excavations were identified.

5.3.7 Tailings

No tailings were found.

6.0 CONCLUSIONS

The following sections discuss the risk assessment and conclusions for each site investigated by CCSG Associates based on health and safety, environmental and aesthetic concerns.

6.1 Merrice Creek #1

CCME National Classification System for Contaminated Sites (1992) was used to evaluate the risk associated with Merrice Creek #1 sample site. Appendix B shows the details of this classification process. CCSG Associates assigns the Merrice Creek #1 sample area a site score of 47.8 (+/- 5.5) and classify it as Class 3, medium low risk. The NCS system denotes the meaning of this classification as "Action May Be Required" . The following sections discuss Health and Safety, Environmental Risks and Aesthetic Concerns to prioritize remedial actions which may be employed.

6.1.1 Health and Safety

Merrice Creek #1 area is in remote location with access from the Yukon River and the Quest Trail. At the time of this investigation there were no apparent physical hazards associated with this site. Site disruption has exposed the naturally high metal content of the area to increased mobility due to enhanced blowing and leaching, but the impact on Yukon River water quality would be low due to dilution effects. CCSG Associates concludes that risk to human health and safety is very low.

6.1.2 Environmental Risks

Increased leaching of metals to the Yukon River will be readily diluted thereby minimizing the potential impact on freshwater aquatic life. Wildlife will not be exposed to high metal content in vegetation food sources or drinking water. Vegetation is beginning to re-establish and will reduce wind erosion and surface runoff.

Some slope stabilization may be required where exposed areas are steeper and vegetation is not becoming established naturally. Some of this work has already been accomplished with the use of geo-textile, log and earth barriers. Some areas are highly compacted and may require scarification to enable plants to grow. CCSG Associates concludes that the environmental risks associated with this site are low and not a primary concern for possible remedial actions.

6.1.3 Aesthetic Concerns

The main aesthetic concerns arise from the lack of vegetation re-growth and surface staining and seeps of exposed iron minerals. CCSG Associates concludes that the aesthetic concerns are minimal.

6.2 Nancy Lee Creek

CCME National Classification System for Contaminated Sites (1992) was not used to evaluate the risk associated with Nancy Lee Creek sample site because information was insufficient to adequately classify this site. Current claims held by Western Copper were located adjacent to the upper mine shafts, therefore the connecting lower mine portal on Nancy Lee Creek could not be investigated. Follow-up investigation in conjunction with the Western Copper should sample the Nancy Lee Creek water quality and check for physical hazard associated with the lower mine portal. The following sections discuss Health and Safety, Environmental Risks and Aesthetic Concerns to prioritize remedial actions which may be appropriately employed specifically for the upper Nancy Lee Creek area investigated by CCSG Associates, and does not consider other influences which might be associated with the creek level mine portal.

6.1.1 Health and Safety

The Nancy Lee Creek site was difficult to access, but there were signs of recent hikers (possibly geologists) in the area. The deep mine shaft and loose waste rock on the steep slope is a physical hazard. CCSG Associates concludes that the risk to human health and safety of the Nancy Lee Creek Site is low.

6.1.2 Environmental Risks

Exposure of wildlife to metals from the waste rock through vegetation food sources, blowing or leaching is low. Stability of the waste rock pile may be influenced snow build up, but is not of high concern. CCSG Associates concludes that the environmental risks associated with the Nancy Lee Creek site are low.

6.1.3 Aesthetic Concerns

The waste rock piles and 4 small open mine excavation shafts and pits are aesthetic concerns, however the sight is very remote. CCSG Associates concludes that the aesthetic concerns associated with the Nancy Lee Creek site are low.

6.3 Merrice Creek #2

No current point source of contamination was located in the Merrice Creek #2 area, consequently this site was not classified using the NCS system. The following sections discuss the minimal Health and Safety, Environmental Risks and Aesthetic Concerns associated with the Merrice Creek #2 area.

6.1.1 Health and Safety

At the mouth of Merrice Creek there are old cabin structures, a small amount of old rusty tin cans and metal wire which could present a physical hazard to

canoeists stopping from the Yukon River or dog teams with the Quest Trail. CCSG Associates considers the risk to human health and safety to be low.

6.1.2 Environmental Risks

Moderate levels of metals in water samples from Merrice Creek may be naturally high or elevated due to the influence of past mining activity in the area. Some signs of subsidence may have been caused by mining practices but now appear to have stabilized. CCSG Associates did not identify any current source of metal contamination which should be remediated.

6.1.3 Aesthetic Concerns

Some waste debris (cans, wire, fallen structures) are the aesthetic concerns at Merrice Creek #2 site. CCSG Associates considers these aesthetic concerns to be of low priority.

7.0 RECOMMENDATIONS

CCSG Associates recommends in general that the remedial options listed below are of low priority, but would assure better protection of human and environmental health and safety.

7.1 Merrice Creek #1

- Revegetation would be enhanced by scarifying the compacted flat area of this site and that tree seedlings be planted to stabilize the slopes closest to the Yukon River.

7.2 Nancy Lee Creek

- The mine excavation shaft and three pits of the upper Nancy Lee Creek site should be backfilled with the waste rock, this could be accomplished by hand.

- The mine portal at the level of Nancy Lee Creek should be investigated for physical safety and the potential of metals contamination to Nancy Lee Creek, Williams Creek and the Yukon River.

7.3 Merrice Creek #2

- The waste debris (wire and cans) should be gathered and removed from the site, this would not be an extensive endeavour.

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Appendix A

Maxxam Analytical Laboratory Data

MaXXam Analytics Inc

CCSG ASSOCIATES
BOX 3946
WHITEHORSE, YT
CANADA Y1A 5M6

Attention: SUE MOODIE

Report Date: 1999/09/22

ANALYTICAL REPORT

MAXXAM JOB #: 9906968
Received: 1999/09/02, 9:00

Sample Matrix: SOIL
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury	3	N/A	1999/09/13	C10061R5	CVAA
Elements by ICP	3	N/A	1999/09/15		ICP

Sample Matrix: TISSUE (PLANT)
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury	2	N/A	1999/09/13	C10061R5	CVAA
Elements by ICP	2	N/A	1999/09/15		ICP

Sample Matrix: WATER
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury (Dissolved)	1	N/A	1999/09/09	C1003R7	CVAA
Mercury (Total)	1	N/A	1999/09/09	C1003R7	CVAA
Elements by ICP (Dissolved)	1	N/A	1999/09/17	C1001R0	ICP
Elements by ICP (Total)	1	N/A	1999/09/16	C1001R0	ICP

MAXXAM Analytics Inc.

WAYNE RAE
M.Sc.

Approved by RON VENZI

WER/bc
encl.

Total Cover pages: 1

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : WILLIAMS CK S-1
Sample Date & Time :
Sampled By :
Sample Type : Composite
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93619
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : SOIL
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Aluminum (Al)	9840	mg/kg	ICPP	58678	1	2
Total Antimony (Sb)	<0.5	mg/kg	ICPP	58678	0.5	1
Total Arsenic (As)	1.1	mg/kg	ICPP	58678	0.4	0.8
Total Barium (Ba)	104	mg/kg	ICPP	58678	0.09	0.2
Total Beryllium (Be)	0.26	mg/kg	ICPP	58678	0.02	0.04
Total Bismuth (Bi)	<2	mg/kg	ICPP	58678	2	4
Total Boron (B)	<0.1	mg/kg	ICPP	58678	0.1	0.2
Total Cadmium (Cd)	0.18	mg/kg	ICPP	58678	0.05	0.1
Total Calcium (Ca)	4230	mg/kg	ICPP	58678	2	4
Total Chromium (Cr)	18.5	mg/kg	ICPP	58678	0.05	0.1
Total Cobalt (Co)	6.17	mg/kg	ICPP	58678	0.07	0.1
Total Copper (Cu)	17.1	mg/kg	ICPP	58678	0.3	0.6
Total Iron (Fe)	14900	mg/kg	ICPP	58678	0.4	0.8
Total Lead (Pb)	4.5	mg/kg	ICPP	58678	0.3	0.6
Total Lithium (Li)	9.06	mg/kg	ICPP	58678	0.05	0.1
Total Magnesium (Mg)	2840	mg/kg	ICPP	58678	2	4
Total Manganese (Mn)	173	mg/kg	ICPP	58678	0.04	0.08
Acid Extr. (Closed) Mercury (Hg)	<20	ug/kg	CVAA	58352	20	40
Total Molybdenum (Mo)	0.25	mg/kg	ICPP	58678	0.07	0.1
Total Nickel (Ni)	11.6	mg/kg	ICPP	58678	0.1	0.2
Total Phosphorus (P)	318	mg/kg	ICPP	58678	2	4
Total Potassium (K)	4670	mg/kg	ICPP	58678	4	8
Total Selenium (Se)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Silicon (Si)	1260	mg/kg	ICPP	58678	4	8
Total Silver (Ag)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Sodium (Na)	115	mg/kg	ICPP	58678	4	8
Total Strontium (Sr)	27.3	mg/kg	ICPP	58678	0.04	0.08
Total Sulphur (S)	<8	mg/kg	ICPP	58678	8	20
Total Thallium (Tl)	<0.2	mg/kg	ICPP	58678	0.2	0.4
Total Tin (Sn)	1.63	mg/kg	ICPP	58678	0.09	0.2
Total Titanium (Ti)	879	mg/kg	ICPP	58678	0.05	0.1
Total Tungsten (W)	<7	mg/kg	ICPP	58678	7	10
Total Uranium (U)	<1	mg/kg	ICPP	58678	1	2
Total Vanadium (V)	41.2	mg/kg	ICPP	58678	0.1	0.2
Total Zinc (Zn)	27.1	mg/kg	ICPP	58678	0.2	0.4
Total Zirconium (Zr)	3.1	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : WILLIAMS CK S-5
Sample Date & Time :
Sampled By :
Sample Type : Composite
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93621
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : TISSUE (PLANT)
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Aluminum (Al)	20.4	mg/kg	ICPP	58678	1	2
Total Antimony (Sb)	<0.5	mg/kg	ICPP	58678	0.5	1
Total Arsenic (As)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Barium (Ba)	54.5	mg/kg	ICPP	58678	0.09	0.2
Total Beryllium (Be)	<0.02	mg/kg	ICPP	58678	0.02	0.04
Total Bismuth (Bi)	<2	mg/kg	ICPP	58678	2	4
Total Boron (B)	<0.1	mg/kg	ICPP	58678	0.1	0.2
Total Cadmium (Cd)	1.41	mg/kg	ICPP	58678	0.05	0.1
Total Calcium (Ca)	13400	mg/kg	ICPP	58678	2	4
Total Chromium (Cr)	0.60	mg/kg	ICPP	58678	0.05	0.1
Total Cobalt (Co)	0.71	mg/kg	ICPP	58678	0.07	0.1
Total Copper (Cu)	6.5	mg/kg	ICPP	58678	0.3	0.6
Total Iron (Fe)	61.9	mg/kg	ICPP	58678	0.4	0.8
Total Lead (Pb)	<0.3	mg/kg	ICPP	58678	0.3	0.6
Total Lithium (Li)	<0.05	mg/kg	ICPP	58678	0.05	0.1
Total Magnesium (Mg)	1280	mg/kg	ICPP	58678	2	4
Total Manganese (Mn)	82.4	mg/kg	ICPP	58678	0.04	0.08
Acid Extr. (Closed) Mercury (Hg)	(21)	ug/kg	CVAA	58352	20	40
Total Molybdenum (Mo)	0.34	mg/kg	ICPP	58678	0.07	0.1
Total Nickel (Ni)	0.9	mg/kg	ICPP	58678	0.1	0.2
Total Phosphorus (P)	1870	mg/kg	ICPP	58678	2	4
Total Potassium (K)	13100	mg/kg	ICPP	58678	4	8
Total Selenium (Se)	(0.6)	mg/kg	ICPP	58678	0.4	0.8
Total Silicon (Si)	507	mg/kg	ICPP	58678	4	8
Total Silver (Ag)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Sodium (Na)	47.8	mg/kg	ICPP	58678	4	8
Total Strontium (Sr)	<0.04	mg/kg	ICPP	58678	0.04	0.08
Total Sulphur (S)	1190	mg/kg	ICPP	58678	8	20
Total Thallium (Tl)	<0.2	mg/kg	ICPP	58678	0.2	0.4
Total Tin (Sn)	2.79	mg/kg	ICPP	58678	0.09	0.2
Total Titanium (Ti)	0.95	mg/kg	ICPP	58678	0.05	0.1
Total Tungsten (W)	<7	mg/kg	ICPP	58678	7	10
Total Uranium (U)	<1	mg/kg	ICPP	58678	1	2
Total Vanadium (V)	0.3	mg/kg	ICPP	58678	0.1	0.2
Total Zinc (Zn)	66.4	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : WILLIAMS CK S-5
Sample Date & Time :
Sampled By :
Sample Type : Composite
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93621
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : TISSUE (PLANT)
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Zirconium (Zr)	1.4	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : WILLIAMS CK S-7
Sample Date & Time :
Sampled By :
Sample Type : Composite
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93620
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : SOIL
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Aluminum (Al)	1120	mg/kg	ICPP	58678	1	2
Total Antimony (Sb)	<0.5	mg/kg	ICPP	58678	0.5	1
Total Arsenic (As)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Barium (Ba)	14.7	mg/kg	ICPP	58678	0.09	0.2
Total Beryllium (Be)	<0.02	mg/kg	ICPP	58678	0.02	0.04
Total Bismuth (Bi)	<2	mg/kg	ICPP	58678	2	4
Total Boron (B)	<0.1	mg/kg	ICPP	58678	0.1	0.2
Total Cadmium (Cd)	0.17	mg/kg	ICPP	58678	0.05	0.1
Total Calcium (Ca)	1230	mg/kg	ICPP	58678	2	4
Total Chromium (Cr)	0.47	mg/kg	ICPP	58678	0.05	0.1
Total Cobalt (Co)	0.75	mg/kg	ICPP	58678	0.07	0.1
Total Copper (Cu)	5.5	mg/kg	ICPP	58678	0.3	0.6
Total Iron (Fe)	1300	mg/kg	ICPP	58678	0.4	0.8
Total Lead (Pb)	(0.4)	mg/kg	ICPP	58678	0.3	0.6
Total Lithium (Li)	<0.05	mg/kg	ICPP	58678	0.05	0.1
Total Magnesium (Mg)	235	mg/kg	ICPP	58678	2	4
Total Manganese (Mn)	9.27	mg/kg	ICPP	58678	0.04	0.08
Acid Extr. (Closed) Mercury (Hg)	<20	ug/kg	CVAA	58352	20	40
Total Molybdenum (Mo)	<0.07	mg/kg	ICPP	58678	0.07	0.1
Total Nickel (Ni)	0.6	mg/kg	ICPP	58678	0.1	0.2
Total Phosphorus (P)	143	mg/kg	ICPP	58678	2	4
Total Potassium (K)	5310	mg/kg	ICPP	58678	4	8
Total Selenium (Se)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Silicon (Si)	195	mg/kg	ICPP	58678	4	8
Total Silver (Ag)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Sodium (Na)	577	mg/kg	ICPP	58678	4	8
Total Strontium (Sr)	11.9	mg/kg	ICPP	58678	0.04	0.08
Total Sulphur (S)	<8	mg/kg	ICPP	58678	8	20
Total Thallium (Tl)	<0.2	mg/kg	ICPP	58678	0.2	0.4
Total Tin (Sn)	1.92	mg/kg	ICPP	58678	0.09	0.2
Total Titanium (Ti)	95.0	mg/kg	ICPP	58678	0.05	0.1
Total Tungsten (W)	<7	mg/kg	ICPP	58678	7	10
Total Uranium (U)	<1	mg/kg	ICPP	58678	1	2
Total Vanadium (V)	<0.1	mg/kg	ICPP	58678	0.1	0.2
Total Zinc (Zn)	8.0	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description	:	WILLIAMS CK S-7	Maxxam Sample Number	:	93620
Sample Date & Time	:		Maxxam Job Number	:	C9906968
Sampled By	:		Sample Access	:	
Sample Type	:	Composite	Sample Matrix	:	SOIL
Sample Received Date	:	1999/09/02	Report Date	:	1999/09/22
Sample Station Code	:				

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Zirconium (Zr)	2.0	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : NANCY CK S-2
Sample Date & Time :
Sampled By :
Sample Type : Composite
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93623
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : SOIL
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Aluminum (Al)	9450	mg/kg	ICPP	58678	1	2
Total Antimony (Sb)	<0.5	mg/kg	ICPP	58678	0.5	1
Total Arsenic (As)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Barium (Ba)	346	mg/kg	ICPP	58678	0.09	0.2
Total Beryllium (Be)	0.40	mg/kg	ICPP	58678	0.02	0.04
Total Bismuth (Bi)	<2	mg/kg	ICPP	58678	2	4
Total Boron (B)	<0.1	mg/kg	ICPP	58678	0.1	0.2
Total Cadmium (Cd)	<0.05	mg/kg	ICPP	58678	0.05	0.1
Total Calcium (Ca)	<2	mg/kg	ICPP	58678	2	4
Total Chromium (Cr)	3.70	mg/kg	ICPP	58678	0.05	0.1
Total Cobalt (Co)	7.55	mg/kg	ICPP	58678	0.07	0.1
Total Copper (Cu)	312	mg/kg	ICPP	58678	0.3	0.6
Total Iron (Fe)	19200	mg/kg	ICPP	58678	0.4	0.8
Total Lead (Pb)	1.3	mg/kg	ICPP	58678	0.3	0.6
Total Lithium (Li)	14.3	mg/kg	ICPP	58678	0.05	0.1
Total Magnesium (Mg)	7690	mg/kg	ICPP	58678	2	4
Total Manganese (Mn)	646	mg/kg	ICPP	58678	0.04	0.08
Acid Extr. (Closed) Mercury (Hg)	(28)	ug/kg	CVAA	58352	20	40
Total Molybdenum (Mo)	0.16	mg/kg	ICPP	58678	0.07	0.1
Total Nickel (Ni)	2.9	mg/kg	ICPP	58678	0.1	0.2
Total Phosphorus (P)	1310	mg/kg	ICPP	58678	2	4
Total Potassium (K)	3600	mg/kg	ICPP	58678	4	8
Total Selenium (Se)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Silicon (Si)	1070	mg/kg	ICPP	58678	4	8
Total Silver (Ag)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Sodium (Na)	70.2	mg/kg	ICPP	58678	4	8
Total Strontium (Sr)	<0.04	mg/kg	ICPP	58678	0.04	0.08
Total Sulphur (S)	684	mg/kg	ICPP	58678	8	20
Total Thallium (Tl)	<0.2	mg/kg	ICPP	58678	0.2	0.4
Total Tin (Sn)	1.28	mg/kg	ICPP	58678	0.09	0.2
Total Titanium (Ti)	97.6	mg/kg	ICPP	58678	0.05	0.1
Total Tungsten (W)	<7	mg/kg	ICPP	58678	7	10
Total Uranium (U)	<1	mg/kg	ICPP	58678	1	2
Total Vanadium (V)	35.4	mg/kg	ICPP	58678	0.1	0.2
Total Zinc (Zn)	41.9	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description	:	NANCY CK S-2	Maxxam Sample Number	:	93623
Sample Date & Time	:		Maxxam Job Number	:	C9906968
Sampled By	:		Sample Access	:	
Sample Type	:	Composite	Sample Matrix	:	SOIL
Sample Received Date	:	1999/09/02	Report Date	:	1999/09/22
Sample Station Code	:				

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Zirconium (Zr)	2.0	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : NANCY CK S-4
Sample Date & Time :
Sampled By :
Sample Type : Composite
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93624
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : TISSUE (PLANT)
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Aluminum (Al)	33.0	mg/kg	ICPP	58678	1	2
Total Antimony (Sb)	<0.5	mg/kg	ICPP	58678	0.5	1
Total Arsenic (As)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Barium (Ba)	67.8	mg/kg	ICPP	58678	0.09	0.2
Total Beryllium (Be)	<0.02	mg/kg	ICPP	58678	0.02	0.04
Total Bismuth (Bi)	<2	mg/kg	ICPP	58678	2	4
Total Boron (B)	<0.1	mg/kg	ICPP	58678	0.1	0.2
Total Cadmium (Cd)	0.89	mg/kg	ICPP	58678	0.05	0.1
Total Calcium (Ca)	3420	mg/kg	ICPP	58678	2	4
Total Chromium (Cr)	5.00	mg/kg	ICPP	58678	0.05	0.1
Total Cobalt (Co)	0.37	mg/kg	ICPP	58678	0.07	0.1
Total Copper (Cu)	32.3	mg/kg	ICPP	58678	0.3	0.6
Total Iron (Fe)	91.1	mg/kg	ICPP	58678	0.4	0.8
Total Lead (Pb)	(0.5)	mg/kg	ICPP	58678	0.3	0.6
Total Lithium (Li)	<0.05	mg/kg	ICPP	58678	0.05	0.1
Total Magnesium (Mg)	826	mg/kg	ICPP	58678	2	4
Total Manganese (Mn)	80.9	mg/kg	ICPP	58678	0.04	0.08
Acid Extr. (Closed) Mercury (Hg)	(31)	ug/kg	CVAA	58352	20	40
Total Molybdenum (Mo)	4.62	mg/kg	ICPP	58678	0.07	0.1
Total Nickel (Ni)	2.5	mg/kg	ICPP	58678	0.1	0.2
Total Phosphorus (P)	995	mg/kg	ICPP	58678	2	4
Total Potassium (K)	13600	mg/kg	ICPP	58678	4	8
Total Selenium (Se)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Silicon (Si)	2050	mg/kg	ICPP	58678	4	8
Total Silver (Ag)	<0.4	mg/kg	ICPP	58678	0.4	0.8
Total Sodium (Na)	16.7	mg/kg	ICPP	58678	4	8
Total Strontium (Sr)	12.1	mg/kg	ICPP	58678	0.04	0.08
Total Sulphur (S)	352	mg/kg	ICPP	58678	8	20
Total Thallium (Tl)	<0.2	mg/kg	ICPP	58678	0.2	0.4
Total Tin (Sn)	2.94	mg/kg	ICPP	58678	0.09	0.2
Total Titanium (Ti)	2.94	mg/kg	ICPP	58678	0.05	0.1
Total Tungsten (W)	<7	mg/kg	ICPP	58678	7	10
Total Uranium (U)	<1	mg/kg	ICPP	58678	1	2
Total Vanadium (V)	0.4	mg/kg	ICPP	58678	0.1	0.2
Total Zinc (Zn)	17.0	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description	:	NANCY CK S-4	Maxxam Sample Number	:	93624
Sample Date & Time	:		Maxxam Job Number	:	C9906968
Sampled By	:		Sample Access	:	
Sample Type	:	Composite	Sample Matrix	:	TISSUE (PLANT)
Sample Received Date	:	1999/09/02	Report Date	:	1999/09/22
Sample Station Code	:				

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total Zirconium (Zr)	1.6	mg/kg	ICPP	58678	0.2	0.4

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : MERRICE CK
Sample Date & Time :
Sampled By :
Sample Type : Grab
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93625
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : WATER
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Dissolved Aluminum (Al)	0.03	mg/L	ICPP	58998	0.01	0.02
Total Aluminum (Al)	0.05	mg/L	ICPP	58465	0.01	0.02
Dissolved Antimony (Sb)	<0.005	mg/L	ICPP	58998	0.005	0.01
Total Antimony (Sb)	(0.006)	mg/L	ICPP	58465	0.005	0.01
Dissolved Arsenic (As)	<0.004	mg/L	ICPP	58998	0.004	0.008
Total Arsenic (As)	<0.004	mg/L	ICPP	58465	0.004	0.008
Dissolved Barium (Ba)	0.0948	mg/L	ICPP	58998	0.0009	0.002
Total Barium (Ba)	0.0948	mg/L	ICPP	58465	0.0009	0.002
Dissolved Beryllium (Be)	<0.0002	mg/L	ICPP	58998	0.0002	0.0004
Total Beryllium (Be)	0.0014	mg/L	ICPP	58465	0.0002	0.0004
Dissolved Bismuth (Bi)	<0.02	mg/L	ICPP	58998	0.02	0.04
Total Bismuth (Bi)	<0.02	mg/L	ICPP	58465	0.02	0.04
Dissolved Boron (B)	0.034	mg/L	ICPP	58998	0.001	0.002
Total Boron (B)	0.040	mg/L	ICPP	58465	0.001	0.002
Dissolved Cadmium (Cd)	0.0010	mg/L	ICPP	58998	0.0005	0.001
Total Cadmium (Cd)	0.0016	mg/L	ICPP	58465	0.0005	0.001
Dissolved Calcium (Ca)	31.3	mg/L	ICPP	58998	0.02	0.04
Total Calcium (Ca)	31.3	mg/L	ICPP	58465	0.02	0.04
Dissolved Chromium (Cr)	<0.0005	mg/L	ICPP	58998	0.0005	0.001
Total Chromium (Cr)	0.0021	mg/L	ICPP	58465	0.0005	0.001
Dissolved Cobalt (Co)	<0.0007	mg/L	ICPP	58998	0.0007	0.001
Total Cobalt (Co)	0.0027	mg/L	ICPP	58465	0.0007	0.001
Dissolved Copper (Cu)	0.026	mg/L	ICPP	58998	0.003	0.006
Total Copper (Cu)	0.026	mg/L	ICPP	58465	0.003	0.006
Dissolved Iron (Fe)	0.029	mg/L	ICPP	58998	0.004	0.008
Total Iron (Fe)	0.132	mg/L	ICPP	58465	0.004	0.008
Dissolved Lead (Pb)	0.032	mg/L	ICPP	58998	0.003	0.006
Total Lead (Pb)	0.035	mg/L	ICPP	58465	0.003	0.006
Dissolved Lithium (Li)	<0.005	mg/L	ICPP	58998	0.005	0.01
Total Lithium (Li)	0.0086	mg/L	ICPP	58465	0.0005	0.001
Dissolved Magnesium (Mg)	6.54	mg/L	ICPP	58998	0.02	0.04
Total Magnesium (Mg)	6.62	mg/L	ICPP	58465	0.02	0.04
Dissolved Manganese (Mn)	0.0105	mg/L	ICPP	58998	0.0004	0.0008
Total Manganese (Mn)	0.0218	mg/L	ICPP	58465	0.0004	0.0008
Dissolved Mercury (Hg)	<0.05	ug/L	CVAA	58321	0.05	0.1

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description	: MERRICE CK		Maxxam Sample Number	:	93625
Sample Date & Time	:		Maxxam Job Number	:	C9906968
Sampled By	:		Sample Access	:	
Sample Type	: Grab		Sample Matrix	:	WATER
Sample Received Date	: 1999/09/02		Report Date	:	1999/09/22
Sample Station Code	:				

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Total (Closed) Mercury (Hg)	<0.05	ug/L	CVAA	58324	0.05	0.1
Dissolved Molybdenum (Mo)	0.0073	mg/L	ICPP	58998	0.0007	0.001
Total Molybdenum (Mo)	0.0073	mg/L	ICPP	58465	0.0007	0.001
Dissolved Nickel (Ni)	<0.001	mg/L	ICPP	58998	0.001	0.002
Total Nickel (Ni)	0.003	mg/L	ICPP	58465	0.001	0.002
Dissolved Phosphorus (P)	0.69	mg/L	ICPP	58998	0.02	0.04
Total Phosphorus (P)	0.69	mg/L	ICPP	58465	0.02	0.04
Dissolved Potassium (K)	7.12	mg/L	ICPP	58998	0.04	0.08
Total Potassium (K)	7.12	mg/L	ICPP	58465	0.04	0.08
Dissolved Selenium (Se)	<0.004	mg/L	ICPP	58998	0.004	0.008
Total Selenium (Se)	(0.005)	mg/L	ICPP	58465	0.004	0.008
Dissolved Silicon (Si)	5.18	mg/L	ICPP	58998	0.04	0.08
Total Silicon (Si)	5.40	mg/L	ICPP	58465	0.04	0.08
Dissolved Silver (Ag)	<0.004	mg/L	ICPP	58998	0.004	0.008
Total Silver (Ag)	<0.004	mg/L	ICPP	58465	0.004	0.008
Dissolved Sodium (Na)	5.32	mg/L	ICPP	58998	0.04	0.08
Total Sodium (Na)	6.98	mg/L	ICPP	58465	0.04	0.08
Dissolved Strontium (Sr)	0.283	mg/L	ICPP	58998	0.0004	0.0008
Total Strontium (Sr)	0.283	mg/L	ICPP	58465	0.0004	0.0008
Dissolved Sulphur (S)	1.88	mg/L	ICPP	58998	0.08	0.2
Total Sulphur (S)	2.20	mg/L	ICPP	58465	0.08	0.2
Dissolved Thallium (Tl)	(0.002)	mg/L	ICPP	58998	0.002	0.004
Total Thallium (Tl)	(0.002)	mg/L	ICPP	58465	0.002	0.004
Dissolved Tin (Sn)	0.0031	mg/L	ICPP	58998	0.0009	0.002
Total Tin (Sn)	0.0032	mg/L	ICPP	58465	0.0009	0.002
Dissolved Titanium (Ti)	<0.0005	mg/L	ICPP	58998	0.0005	0.001
Total Titanium (Ti)	0.0024	mg/L	ICPP	58465	0.0005	0.001
Dissolved Tungsten (W)	<0.07	mg/L	ICPP	58998	0.07	0.1
Total Tungsten (W)	<0.07	mg/L	ICPP	58465	0.07	0.1
Dissolved Uranium (U)	<0.01	mg/L	ICPP	58998	0.01	0.02
Total Uranium (U)	<0.01	mg/L	ICPP	58465	0.01	0.02
Dissolved Vanadium (V)	(0.001)	mg/L	ICPP	58998	0.001	0.002
Total Vanadium (V)	0.003	mg/L	ICPP	58465	0.001	0.002
Dissolved Zinc (Zn)	0.015	mg/L	ICPP	58998	0.002	0.004
Total Zinc (Zn)	0.015	mg/L	ICPP	58465	0.002	0.004

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Sample Description : MERRICE CK
Sample Date & Time :
Sampled By :
Sample Type : Grab
Sample Received Date: 1999/09/02
Sample Station Code :

Maxxam Sample Number : 93625
Maxxam Job Number : C9906968
Sample Access :
Sample Matrix : WATER
Report Date : 1999/09/22

PARAMETER DESCRIPTION	RESULTS	Units	INST.	QA/QC Batch	MDL	RDL
Elements						
Dissolved Zirconium (Zr)	0.006	mg/L	ICPP	58998	0.002	0.004
Total Zirconium (Zr)	0.016	mg/L	ICPP	58465	0.002	0.004

MDL = Method Detection Limit - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.
RDL = Reliable Detection Limit (2 x MDL)
() = Result < RDL and is subject to reduced levels of confidence
Results are not corrected for surrogate or moisture values unless otherwise stated.

Maxxam Analytics Inc

CCSG ASSOCIATES
Attention: SUE MOODIE
Client Project #:
P.O. #:
Site Reference:

Quality Assurance Report (Continued)

Maxxam Job Number: C9906968

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
58465 ST	Calibration Check	Total Lead (Pb)	1999/09/16		99	%	92 - 107
		Total Lithium (Li)	1999/09/16		103	%	83 - 107
		Total Magnesium (Mg)	1999/09/16		!! 96.2147	%	97 - 109
		Total Manganese (Mn)	1999/09/16		102	%	89 - 107
		Total Molybdenum (Mo)	1999/09/16		96	%	91 - 110
		Total Nickel (Ni)	1999/09/16		102	%	90 - 108
		Total Phosphorus (P)	1999/09/16		103	%	85 - 106
		Total Potassium (K)	1999/09/16		99	%	N/A
		Total Selenium (Se)	1999/09/16		101	%	86 - 115
		Total Silicon (Si)	1999/09/16		96	%	61 - 147
		Total Silver (Ag)	1999/09/16		99	%	93 - 104
		Total Sodium (Na)	1999/09/16		96	%	93 - 111
		Total Strontium (Sr)	1999/09/16		103	%	94 - 107
		Total Sulphur (S)	1999/09/16		0.00000	%	N/A
		Total Thallium (Tl)	1999/09/16		94	%	84 - 114
		Total Tin (Sn)	1999/09/16		0.00000	%	N/A
		Total Titanium (Ti)	1999/09/16		104	%	94 - 111
		Total Tungsten (W)	1999/09/16		0.00000	%	N/A
		Total Uranium (U)	1999/09/16		96	%	77 - 120
		Total Vanadium (V)	1999/09/16		105	%	93 - 109
		Total Zinc (Zn)	1999/09/16		101	%	89 - 110
		Total Zirconium (Zr)	1999/09/16		98	%	89 - 114
	BLANK	Total Aluminum (Al)	1999/09/16	<0.01		mg/L	
		Total Antimony (Sb)	1999/09/16	<0.005		mg/L	
		Total Arsenic (As)	1999/09/16	<0.004		mg/L	
		Total Barium (Ba)	1999/09/16	<0.0009		mg/L	
		Total Beryllium (Be)	1999/09/16	<0.0002		mg/L	
		Total Bismuth (Bi)	1999/09/16	<0.02		mg/L	
		Total Boron (B)	1999/09/16	<0.001		mg/L	
		Total Cadmium (Cd)	1999/09/16	<0.0005		mg/L	
		Total Calcium (Ca)	1999/09/16	<0.02		mg/L	
		Total Chromium (Cr)	1999/09/16	<0.0005		mg/L	
		Total Cobalt (Co)	1999/09/16	<0.0007		mg/L	
		Total Copper (Cu)	1999/09/16	<0.003		mg/L	
		Total Iron (Fe)	1999/09/16	<0.004		mg/L	
		Total Lead (Pb)	1999/09/16	<0.003		mg/L	
		Total Lithium (Li)	1999/09/16	<0.0005		mg/L	
		Total Magnesium (Mg)	1999/09/16	<0.02		mg/L	
		Total Manganese (Mn)	1999/09/16	<0.0004		mg/L	
		Total Molybdenum (Mo)	1999/09/16	<0.0007		mg/L	
		Total Nickel (Ni)	1999/09/16	<0.001		mg/L	
		Total Phosphorus (P)	1999/09/16	<0.02		mg/L	
		Total Potassium (K)	1999/09/16	<0.04		mg/L	
		Total Selenium (Se)	1999/09/16	<0.004		mg/L	
		Total Silicon (Si)	1999/09/16	<0.04		mg/L	
		Total Silver (Ag)	1999/09/16	<0.004		mg/L	
		Total Sodium (Na)	1999/09/16	<0.04		mg/L	
		Total Strontium (Sr)	1999/09/16	<0.0004		mg/L	
		Total Sulphur (S)	1999/09/16	<0.08		mg/L	
		Total Thallium (Tl)	1999/09/16	<0.002		mg/L	
		Total Tin (Sn)	1999/09/16	<0.0009		mg/L	
		Total Titanium (Ti)	1999/09/16	<0.0005		mg/L	
		Total Tungsten (W)	1999/09/16	<0.07		mg/L	
		Total Uranium (U)	1999/09/16	<0.01		mg/L	
		Total Vanadium (V)	1999/09/16	<0.001		mg/L	
		Total Zinc (Zn)	1999/09/16	<0.002		mg/L	
		Total Zirconium (Zr)	1999/09/16	<0.002		mg/L	
58678 ST	Calibration Check	Total Aluminum (Al)	1999/09/15		102	%	94 - 112
		Total Antimony (Sb)	1999/09/15		102	%	85 - 134

Maxxam Analytics Inc

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QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
58321 RS	RPD	Dissolved Mercury (Hg)	1999/09/09	NC		%	N/A
	Calibration Check	Dissolved Mercury (Hg)	1999/09/09		75	%	69 - 132
	MATRIX SPIKE	Dissolved Mercury (Hg)	1999/09/09		80	%	66 - 133
	BLANK	Dissolved Mercury (Hg)	1999/09/09	<0.05		ug/L	
58324 RS	RPD	Total (Closed) Mercury (Hg)	1999/09/09	NC		%	N/A
	Calibration Check	Total (Closed) Mercury (Hg)	1999/09/09		75	%	69 - 132
	MATRIX SPIKE	Total (Closed) Mercury (Hg)	1999/09/09		80	%	66 - 133
	BLANK	Total (Closed) Mercury (Hg)	1999/09/09	<0.05		ug/L	
58352 RS	RPD	Acid Extr. (Closed) Mercury (Hg)	1999/09/13	NC		%	N/A
	QC STANDARD	Acid Extr. (Closed) Mercury (Hg)	1999/09/13		101	%	N/A
	BLANK	Acid Extr. (Closed) Mercury (Hg)	1999/09/13	<20		ug/kg	
58465 ST	RPD	Total Aluminum (Al)	1999/09/16	5.1		%	N/A
		Total Antimony (Sb)	1999/09/16	NC		%	N/A
		Total Arsenic (As)	1999/09/16	NC		%	N/A
		Total Barium (Ba)	1999/09/16	1.6		%	N/A
		Total Beryllium (Be)	1999/09/16	NC		%	N/A
		Total Bismuth (Bi)	1999/09/16	NC		%	N/A
		Total Boron (B)	1999/09/16	8.9		%	N/A
		Total Cadmium (Cd)	1999/09/16	NC		%	N/A
		Total Calcium (Ca)	1999/09/16	5.9		%	N/A
		Total Chromium (Cr)	1999/09/16	NC		%	N/A
		Total Cobalt (Co)	1999/09/16	NC		%	N/A
		Total Copper (Cu)	1999/09/16	14.2		%	N/A
		Total Iron (Fe)	1999/09/16	67.7		%	N/A
		Total Lead (Pb)	1999/09/16	NC		%	N/A
		Total Lithium (Li)	1999/09/16	20.4		%	N/A
		Total Magnesium (Mg)	1999/09/16	3.9		%	N/A
		Total Manganese (Mn)	1999/09/16	9.4		%	N/A
		Total Molybdenum (Mo)	1999/09/16	1.9		%	N/A
		Total Nickel (Ni)	1999/09/16	NC		%	N/A
		Total Phosphorus (P)	1999/09/16	15.4		%	N/A
		Total Potassium (K)	1999/09/16	0.2		%	N/A
		Total Selenium (Se)	1999/09/16	NC		%	N/A
		Total Silicon (Si)	1999/09/16	5.6		%	N/A
		Total Silver (Ag)	1999/09/16	NC		%	N/A
		Total Sodium (Na)	1999/09/16	1.1		%	N/A
		Total Strontium (Sr)	1999/09/16	5.9		%	N/A
		Total Sulphur (S)	1999/09/16	6.4		%	N/A
		Total Thallium (Tl)	1999/09/16	NC		%	N/A
		Total Tin (Sn)	1999/09/16	NC		%	N/A
		Total Titanium (Ti)	1999/09/16	NC		%	N/A
		Total Tungsten (W)	1999/09/16	NC		%	N/A
		Total Uranium (U)	1999/09/16	NC		%	N/A
		Total Vanadium (V)	1999/09/16	NC		%	N/A
		Total Zinc (Zn)	1999/09/16	NC		%	N/A
		Total Zirconium (Zr)	1999/09/16	NC		%	N/A
	Calibration Check	Total Aluminum (Al)	1999/09/16		102	%	94 - 112
		Total Antimony (Sb)	1999/09/16		102	%	85 - 134
		Total Arsenic (As)	1999/09/16		98	%	82 - 113
		Total Barium (Ba)	1999/09/16		101	%	94 - 106
		Total Beryllium (Be)	1999/09/16		103	%	89 - 111
		Total Bismuth (Bi)	1999/09/16		0.00000	%	N/A
		Total Boron (B)	1999/09/16		106	%	91 - 111
		Total Cadmium (Cd)	1999/09/16		97	%	87 - 113
		Total Calcium (Ca)	1999/09/16		99	%	92 - 117
		Total Chromium (Cr)	1999/09/16		106	%	90 - 110
		Total Cobalt (Co)	1999/09/16		100	%	88 - 108
		Total Copper (Cu)	1999/09/16		93	%	91 - 105
		Total Iron (Fe)	1999/09/16		103	%	92 - 112

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QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
58678 ST	Calibration Check	Total Arsenic (As)	1999/09/15		101	%	82 - 113
		Total Barium (Ba)	1999/09/15		101	%	94 - 106
		Total Beryllium (Be)	1999/09/15		103	%	89 - 111
		Total Bismuth (Bi)	1999/09/15		0.00000	%	N/A
		Total Boron (B)	1999/09/15		106	%	91 - 111
		Total Cadmium (Cd)	1999/09/15		97	%	87 - 113
		Total Calcium (Ca)	1999/09/15		99	%	92 - 117
		Total Chromium (Cr)	1999/09/15		106	%	90 - 110
		Total Cobalt (Co)	1999/09/15		100	%	88 - 108
		Total Copper (Cu)	1999/09/15		93	%	91 - 105
		Total Iron (Fe)	1999/09/15		103	%	92 - 112
		Total Lead (Pb)	1999/09/15		99	%	92 - 107
		Total Lithium (Li)	1999/09/15		104	%	83 - 107
		Total Magnesium (Mg)	1999/09/15		102	%	97 - 109
		Total Manganese (Mn)	1999/09/15		102	%	89 - 107
		Total Molybdenum (Mo)	1999/09/15		97	%	91 - 110
		Total Nickel (Ni)	1999/09/15		102	%	90 - 108
		Total Phosphorus (P)	1999/09/15		102	%	85 - 106
		Total Potassium (K)	1999/09/15		99	%	N/A
		Total Selenium (Se)	1999/09/15		101	%	86 - 115
		Total Silicon (Si)	1999/09/15		96	%	61 - 147
		Total Silver (Ag)	1999/09/15		99	%	93 - 104
		Total Sodium (Na)	1999/09/15		96	%	93 - 111
		Total Strontium (Sr)	1999/09/15		103	%	94 - 107
		Total Sulphur (S)	1999/09/15		0.00000	%	N/A
		Total Thallium (Tl)	1999/09/15		94	%	84 - 114
		Total Tin (Sn)	1999/09/15		0.00000	%	N/A
		Total Titanium (Ti)	1999/09/15		104	%	94 - 111
		Total Tungsten (W)	1999/09/15		0.00000	%	N/A
		Total Uranium (U)	1999/09/15		96	%	77 - 120
		Total Vanadium (V)	1999/09/15		105	%	93 - 109
		Total Zinc (Zn)	1999/09/15		101	%	89 - 110
		Total Zirconium (Zr)	1999/09/15		98	%	89 - 114
	BLANK	Total Aluminum (Al)	1999/09/15	<1		mg/kg	
		Total Antimony (Sb)	1999/09/15	<0.5		mg/kg	
		Total Arsenic (As)	1999/09/15	<0.4		mg/kg	
		Total Barium (Ba)	1999/09/15	<0.09		mg/kg	
		Total Beryllium (Be)	1999/09/15	<0.02		mg/kg	
		Total Bismuth (Bi)	1999/09/15	<2		mg/kg	
		Total Boron (B)	1999/09/15	<0.1		mg/kg	
		Total Cadmium (Cd)	1999/09/15	<0.05		mg/kg	
		Total Calcium (Ca)	1999/09/15	<2		mg/kg	
		Total Chromium (Cr)	1999/09/15	<0.05		mg/kg	
		Total Cobalt (Co)	1999/09/15	<0.07		mg/kg	
		Total Copper (Cu)	1999/09/15	<0.3		mg/kg	
		Total Iron (Fe)	1999/09/15	<0.4		mg/kg	
		Total Lead (Pb)	1999/09/15	<0.3		mg/kg	
		Total Lithium (Li)	1999/09/15	<0.05		mg/kg	
		Total Magnesium (Mg)	1999/09/15	<2		mg/kg	
		Total Manganese (Mn)	1999/09/15	<0.04		mg/kg	
		Total Molybdenum (Mo)	1999/09/15	<0.07		mg/kg	
		Total Nickel (Ni)	1999/09/15	<0.1		mg/kg	
		Total Phosphorus (P)	1999/09/15	<2		mg/kg	
		Total Potassium (K)	1999/09/15	<4		mg/kg	
		Total Selenium (Se)	1999/09/15	<0.4		mg/kg	
		Total Silicon (Si)	1999/09/15	<4		mg/kg	
		Total Silver (Ag)	1999/09/15	<0.4		mg/kg	
		Total Sodium (Na)	1999/09/15	<4		mg/kg	
		Total Strontium (Sr)	1999/09/15	<0.04		mg/kg	

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QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
58678 ST	BLANK	Total Sulphur (S)	1999/09/15	<8		mg/kg	
		Total Thallium (Tl)	1999/09/15	<0.2		mg/kg	
		Total Tin (Sn)	1999/09/15	<0.09		mg/kg	
		Total Titanium (Ti)	1999/09/15	<0.05		mg/kg	
		Total Tungsten (W)	1999/09/15	<7		mg/kg	
		Total Uranium (U)	1999/09/15	<1		mg/kg	
		Total Vanadium (V)	1999/09/15	<0.1		mg/kg	
		Total Zinc (Zn)	1999/09/15	<0.2		mg/kg	
		Total Zirconium (Zr)	1999/09/15	<0.2		mg/kg	
58998 ST	RPD	Dissolved Aluminum (Al)	1999/09/17	0.3		%	N/A
		Dissolved Antimony (Sb)	1999/09/17	2.7		%	N/A
		Dissolved Arsenic (As)	1999/09/17	3.5		%	N/A
		Dissolved Barium (Ba)	1999/09/17	0.09		%	N/A
		Dissolved Beryllium (Be)	1999/09/17	1.3		%	N/A
		Dissolved Bismuth (Bi)	1999/09/17	NC		%	N/A
		Dissolved Boron (B)	1999/09/17	7.4		%	N/A
		Dissolved Cadmium (Cd)	1999/09/17	1.4		%	N/A
		Dissolved Calcium (Ca)	1999/09/17	NC		%	N/A
		Dissolved Chromium (Cr)	1999/09/17	0.8		%	N/A
		Dissolved Cobalt (Co)	1999/09/17	3.6		%	N/A
		Dissolved Copper (Cu)	1999/09/17	4.5		%	N/A
		Dissolved Iron (Fe)	1999/09/17	0.03		%	N/A
		Dissolved Lead (Pb)	1999/09/17	4.6		%	N/A
		Dissolved Lithium (Li)	1999/09/17	NC		%	N/A
		Dissolved Magnesium (Mg)	1999/09/17	NC		%	N/A
		Dissolved Manganese (Mn)	1999/09/17	1.0		%	N/A
		Dissolved Molybdenum (Mo)	1999/09/17	2.2		%	N/A
		Dissolved Nickel (Ni)	1999/09/17	2.1		%	N/A
		Dissolved Phosphorus (P)	1999/09/17	NC		%	N/A
		Dissolved Potassium (K)	1999/09/17	NC		%	N/A
		Dissolved Selenium (Se)	1999/09/17	3.4		%	N/A
		Dissolved Silicon (Si)	1999/09/17	NC		%	N/A
		Dissolved Silver (Ag)	1999/09/17	4.2		%	N/A
		Dissolved Sodium (Na)	1999/09/17	5.0		%	N/A
		Dissolved Strontium (Sr)	1999/09/17	1.9		%	N/A
		Dissolved Sulphur (S)	1999/09/17	NC		%	N/A
		Dissolved Thallium (Tl)	1999/09/17	2.1		%	N/A
		Dissolved Tin (Sn)	1999/09/17	NC		%	N/A
		Dissolved Titanium (Ti)	1999/09/17	NC		%	N/A
		Dissolved Tungsten (W)	1999/09/17	NC		%	N/A
		Dissolved Uranium (U)	1999/09/17	NC		%	N/A
		Dissolved Vanadium (V)	1999/09/17	1.6		%	N/A
		Dissolved Zinc (Zn)	1999/09/17	1.2		%	N/A
		Dissolved Zirconium (Zr)	1999/09/17	NC		%	N/A
	Calibration Check	Dissolved Aluminum (Al)	1999/09/17		99	%	94 - 112
		Dissolved Antimony (Sb)	1999/09/17		102	%	85 - 134
		Dissolved Arsenic (As)	1999/09/17		102	%	82 - 113
		Dissolved Barium (Ba)	1999/09/17		102	%	94 - 106
		Dissolved Beryllium (Be)	1999/09/17		110	%	89 - 111
		Dissolved Bismuth (Bi)	1999/09/17		0.00000	%	N/A
		Dissolved Boron (B)	1999/09/17		108	%	91 - 111
		Dissolved Cadmium (Cd)	1999/09/17		98	%	87 - 113
		Dissolved Calcium (Ca)	1999/09/17		98	%	92 - 117
		Dissolved Chromium (Cr)	1999/09/17		110	%	90 - 110
		Dissolved Cobalt (Co)	1999/09/17		103	%	88 - 108
		Dissolved Copper (Cu)	1999/09/17		95	%	91 - 105
		Dissolved Iron (Fe)	1999/09/17		99	%	92 - 112
		Dissolved Lead (Pb)	1999/09/17		99	%	92 - 107
		Dissolved Lithium (Li)	1999/09/17		105	%	83 - 107

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QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
58998 ST	Calibration Check	Dissolved Magnesium (Mg)	1999/09/17		99	%	97 - 109
		Dissolved Manganese (Mn)	1999/09/17		108	%	89 - 107
		Dissolved Molybdenum (Mo)	1999/09/17		99	%	91 - 110
		Dissolved Nickel (Ni)	1999/09/17		99	%	90 - 108
		Dissolved Phosphorus (P)	1999/09/17		104	%	85 - 106
		Dissolved Potassium (K)	1999/09/17		103	%	N/A
		Dissolved Selenium (Se)	1999/09/17		109	%	86 - 115
		Dissolved Silicon (Si)	1999/09/17		102	%	61 - 147
		Dissolved Silver (Ag)	1999/09/17		105	%	93 - 104
		Dissolved Sodium (Na)	1999/09/17		99	%	93 - 111
		Dissolved Strontium (Sr)	1999/09/17		104	%	94 - 107
		Dissolved Sulphur (S)	1999/09/17		0.00000	%	N/A
		Dissolved Thallium (Tl)	1999/09/17		99	%	84 - 114
		Dissolved Tin (Sn)	1999/09/17		0.00000	%	N/A
		Dissolved Titanium (Ti)	1999/09/17		106	%	94 - 111
		Dissolved Tungsten (W)	1999/09/17		0.00000	%	N/A
		Dissolved Uranium (U)	1999/09/17		112	%	77 - 120
		Dissolved Vanadium (V)	1999/09/17		102	%	93 - 109
		Dissolved Zinc (Zn)	1999/09/17		109	%	89 - 110
		Dissolved Zirconium (Zr)	1999/09/17		103	%	89 - 114
	BLANK	Dissolved Aluminum (Al)	1999/09/17	<0.01		mg/L	
		Dissolved Antimony (Sb)	1999/09/17	<0.005		mg/L	
		Dissolved Arsenic (As)	1999/09/17	<0.004		mg/L	
		Dissolved Barium (Ba)	1999/09/17	<0.0009		mg/L	
		Dissolved Beryllium (Be)	1999/09/17	<0.0002		mg/L	
		Dissolved Bismuth (Bi)	1999/09/17	<0.02		mg/L	
		Dissolved Boron (B)	1999/09/17	<0.001		mg/L	
		Dissolved Cadmium (Cd)	1999/09/17	<0.0005		mg/L	
		Dissolved Calcium (Ca)	1999/09/17	<0.02		mg/L	
		Dissolved Chromium (Cr)	1999/09/17	<0.0005		mg/L	
		Dissolved Cobalt (Co)	1999/09/17	<0.0007		mg/L	
		Dissolved Copper (Cu)	1999/09/17	<0.003		mg/L	
		Dissolved Iron (Fe)	1999/09/17	<0.004		mg/L	
		Dissolved Lead (Pb)	1999/09/17	<0.003		mg/L	
		Dissolved Lithium (Li)	1999/09/17	<0.005		mg/L	
		Dissolved Magnesium (Mg)	1999/09/17	<0.02		mg/L	
		Dissolved Manganese (Mn)	1999/09/17	<0.0004		mg/L	
		Dissolved Molybdenum (Mo)	1999/09/17	0.0009		mg/L	
		Dissolved Nickel (Ni)	1999/09/17	<0.001		mg/L	
		Dissolved Phosphorus (P)	1999/09/17	<0.02		mg/L	
		Dissolved Potassium (K)	1999/09/17	<0.04		mg/L	
		Dissolved Selenium (Se)	1999/09/17	<0.004		mg/L	
		Dissolved Silicon (Si)	1999/09/17	<0.04		mg/L	
		Dissolved Silver (Ag)	1999/09/17	<0.004		mg/L	
		Dissolved Sodium (Na)	1999/09/17	<0.04		mg/L	
		Dissolved Strontium (Sr)	1999/09/17	<0.0004		mg/L	
		Dissolved Sulphur (S)	1999/09/17	<0.08		mg/L	
		Dissolved Thallium (Tl)	1999/09/17	<0.002		mg/L	
		Dissolved Tin (Sn)	1999/09/17	<0.0009		mg/L	
		Dissolved Titanium (Ti)	1999/09/17	<0.0005		mg/L	
		Dissolved Tungsten (W)	1999/09/17	<0.07		mg/L	
		Dissolved Uranium (U)	1999/09/17	<0.01		mg/L	
		Dissolved Vanadium (V)	1999/09/17	<0.001		mg/L	
		Dissolved Zinc (Zn)	1999/09/17	<0.002		mg/L	
		Dissolved Zirconium (Zr)	1999/09/17	<0.002		mg/L	

N/A = Not Applicable
NC = Non-calculable

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RPD = Relative Percent Difference
!! = Please note that the recovery of some compounds are outside control limits however the overall quality control for this analysis meets our acceptability criteria.

Appendix B

National Classification System Worksheet

FACILITY SITE DESCRIPTION

Site No:**115I-07-3**
Site Name: **North Merrice Creek**
Province/Territory: **Yukon Territory**
Custodian Dept.:
Facility Name:
Site Operator/Manager
Type of Site: **Mining Exploration Site**
Site Owner:
Zone:
UTM Coordiantes: 41 ??? Easting
Latitude: **62** deg. 23 min.
sec.
69??? Northing
Longitude: **136** deg. **36** min.
Location:**40km North-west of Carmacks**
Legal Land Description: **Crown Grants**
Address:
Provincial Parcel No.:
Brief Description of Site: **North end of Merrice Creek near confluence with Yukon River**
Site Land Use: Mining Exploration
Current:
Proposed: **Unknown**

Comments:

Summary of Site Classification Information:
Completed Evaluation Form: Detailed: ✓ Short
Site Score: Total 47.8± 5.5 Estimated Score
Class: 3
Risk: Medium **Low**

Contact Name: **Sue Moodie, CCSG Associates** Verdict: Action may be required
Position: Project Coordinator
Address: **Box 3946**
City: **Whitehorse** Prov./Terr.: **Yukon**
Phone No.: **(403) 633-4203** Postal Code: **Y1A 5M6**
Site Classified by above ✓

Degree of familiarity with Site: Very familiar ✓ Moderately Familiar Indirectly Familiar Unfamiliar
Visited Site: ✓ Yes No

I CONTAMINANTS CHARACTERISTICS

A	**Degree of hazards**	**List possible contaminants and Estimated Concentrations**	**Info. Source**	**Score**
	Medium concern contaminants	- low concentration -mining residues, metals, low pH	site visit, field samples	5 ✓
B	**Contaminant Quantity**	**Estimated or measured area/ Volume of contaminated zone**		
		<2ha or 100 cubic metres	site visit	2 ✓
C	**Physical State of Contaminants**	**Does the site contain primarily liquids/gases, sludges or solids?**		
		-solid	field investigation	3 ✓

		Total ✓	**Total ?**	**Total ✓ + ?**
SITE SCORE FOR CONTAMINANT CHARACTERISTICS	**Section I- A, B,C**	10	0	10

II EXPOSURE PATHWAYS

A Groundwater

2 Potential for Groundwater Contamination

a) Engineered subsurface containment	**Document engineered systems protecting groundwater**	**Info. Source**	**Score**
	No containment	Site visit	4 ✓
b) Thickness of confining layer over aquifer	**Document local geological conditions/Identify water-bearing zones used for water supply**		
	3m or less	Site visit	0.75 ?
c) Hydraulic conductivity of the confining layer	**Estimate hydraulic conductivity**		
	10E-4 to 10E-6 cm/sec	Site visit	0.75 ?
d) Annual Rainfall	**Document Rainfall Data**		
	200 mm- 400mm	Yukon Weather Centre	0.4 ✓
e) Hydraulic conductivity of aquifer(s) of concern	**Estimate hydraulic conductivity of relevant aquifer(s)**		
10E-2 to 10E-4 cm/sec	Refer to "Range of Values of Hydraulic Conductivity and Permability"	CCME guidelines	1.0?

		Total ✓	**Total ?**	**Total ✓ ?**
SITE SCORE FOR GROUNDWATER	Section II-A (2)	7.4	3.0	6.9± 2.5

B Surface Water

2 Potential for Surface Water Contamination

a) Surface containment	**Document engineered systems protecting surface water** No containment	**Info. Source** Site visit	**Score** 5 ✓
b) Distance to perennial surface water	**o to <100**	Site visit	3 ✓
c) Topography	**Document terrain conditions contaminants above ground,** slope is flat	Site visit	0.5 ✓
d) Run-off potential 0.2✓	**Document geological & rainfall data** <500mm rainfall	Yukon Weather Centre	
e) Flood potential	**Estimate flood frequency 1 in 50 years**	estimation	0.1✓

		Total ✓	**Total ?**	**Total ✓ + ?**
SITE SCORE FOR SURFACE WATER	Section II-B (2)	8.9	0	8.9

C **Direct Contact**

2 Potential for Direct Human and/or Animal Contact

a)Airborne Emissions	**Document reports of off-site contamination due to contact contaminated soil, dust, air etc.**	**Info. Source**	**Score**
	Airborne emissions restricted to site	Site investigation	3 ✓
b)Accessibility of Site	**Review and document avenues of site access by humans and animals**		
	Remote location, contaminants are moderately covered	Site visit	1 ✓
c)Hazardous soil gas migration	**Review potential for hazardous soil gas production and migration from site**		
	contaminants at the site	Site visit	0 ✓

		Total ✓	**Total ?**	**Total ✓ + ?**
SITE SCORE FOR DIRECT CONTACT	Section II-C (2a, b, c)	4	0	4

III RECEPTORS

A Human and Animal Users

2 Potential for Impact on Humans or Animals

a) ii) Potential Impact on Drinking Water Supply	**Distance**	**Info. Source**	**Score**
Proximity to drinking water supply	-0-100m to wildlife drinking water	site visit	2 ✓
Availability of alternate drinking source	-alternate supply available		0.5 ✓
b) ii) Potential impact on water resources	**Record information on water resource**		
Proximity to water resources	**wildlife exposure**	site visit	1.5 ✓
Use of water resources	**occasional wildlife exposure**	site visit	0.5 ✓
c) ii)Potential humanexposure through land use	**Record land use type**		
	occaisional recreational, mining exploration, Yukon Quest Trail		0.5 ✓

		Total ✓	**Total ?**	**Total ✓ + ?**
SITE SCORE HUMAN AND ANIMAL RECEPTORS	Section III A (2 a(ii), b(ii), c (ii))	5	0	5

B Environmental Receptors

2 <u>Potential for Impact on Sensitive Environements</u>

a)Distance from the site to the nearest sensitive environment	**Document location, distance, type and details of any nearby sensitive environments or habitats** -fish present in Williams Creek and Yukon River	Info. Source DFO reports	Score 10 ✓
b)Groundwater	**Measure distance to major recharge or discharge area** -unknown		3?

		Total ✓	**Total ?**	**Total ✓ +?**
SITE SCORE FOR ENVIRONMENTAL RECEPTORS	Section III-B (2a, b)	13	3	13± 3

SITE SCORE SUMMARY

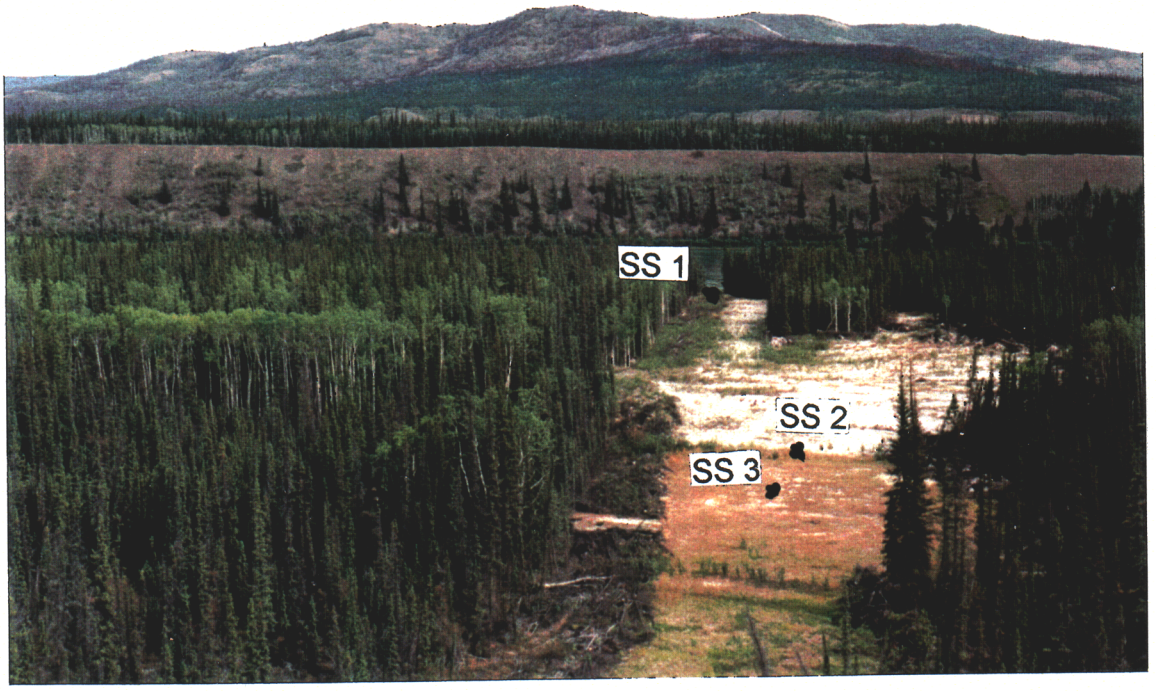
			Category Score -CS (✓ + ?)	Estimated Score -ES (? Only)	Total Category Score (CS)	Total Estimate Score (ES)
I	**CONTAMINANT CHARACTERISTICS (33)**		10	0	10.0	± 0
II	**EXPOSURE PATHWAYS(33)**					
	A	Groundwater (11)	6.9	2.5	6.9	± 2.5
	B	Surface Water (11)	8.9	0	8.9	± 0
	C	Direct Contact (11)	4	0	4.0	± 0
III	**RECEPTORS (34)**					
	A	Human and Animal (18)	5	0	5.0	± 0
	B	Environment (16)	13	3	3.0	± 3
Total					**47.8**	± **5.5**

Classification: **Class 3, medium low risk**

Verdict: Action may be required.

Appendix C

Photographic Record



Photograph 1: Merrice Creek Sample Area #1.
Overview facing north.

Photograph 2: Merrice Creek Sample Area #1.
Overview facing east.

Photograph 3: Merrice Creek Sample Area #1. Linear depressions indicating heavy machinery work on flat area. Grass growing in track depressions.

Photograph 4: Merrice Creek Sample Area #1. Geo- textile barriers on hill sloping south of site.

Photograph 5: Nancy Lee Creek Sample Area. East facing view of waste rock debris from mine shaft excavation.

Photograph 6: Nancy Lee Creek Sample Area. West facing view of Pit 4 and waste rock.

Photograph 7: Nancy Lee Creek Sample Area. West facing view of Pit 1 with wood debris and waste rock.

Photograph 8: Nancy Lee Sample Area. View of Pit 2 facing south. Pit is three is metres deep.

Photograph 9: Merrice Creek Sample Area #2. Cabin at confluence of Merrice Creek at the Yukon River.

Photograph 10: Merrice Creek Sample Area #2. Wire and can debris near cabin north of Merrice Creek.