PWGSC

Quality in Environmental Services

PHASE II ENVIRONMENTAL ASSESSMENT OF THE CONGLOMERATE CREEK ABANDONED MINE SITE

prepared for:

Action on Waste Program
Indian and Northern Affairs Canada

prepared by:

Environmental Services
Public Works and Government Services Canada

March 1997

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Canada

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EXECUTIVE SUMMARY

A phase II environmental assessment was conducted at the Conglomerate Creek Abandoned Mine site (61° 16' 27"N and 128° 42' 36"W) in July, 1996 by Environmental Services, Public Works and Government Services Canada for the Action on Waste Program, Indian and Northern Affairs Canada. Based on the findings of the Phase I investigation performed in 1993 by DIAND Technical Services, a phase II assessment was conducted to a) identify potential environmental and human health risks associated with the present condition of the mine site, and b) provide recommendations and preliminary cost estimates for remediation of those risks.

A field investigation of the abandoned mine site was conducted to evaluate environmental and human safety concerns with respect to: mine openings and workings; buildings and infrastructure; waste disposal areas; waste rock disposal areas; surface water (including adit and waste rock seepage, and receiving waters); and hazardous and non-hazardous materials on the site.

The results of the investigation concluded that the two building structures remain on site and present a potential safety hazard to the public if left unmaintained. Since the site is very remote and practical accesses is achieved by air, the risk is considered to be low. There do not appear to be any environmental risks associated with mine waste at the site. No waste rock piles or tailings were developed, and the rock that is exposed in trenches contains few sulphides. In its present state, the property is not impacting the water quality of Conglomerate Creek. A minor environmental risk exists as a result the abandonment of petroleum hydrocarbons on site. One barrel, in poor condition, contains approximately 50 litres of a liquid organic waste. Based on laboratory analysis, the disposal of liquid waste may be locally incinerated. There is a an aesthetic concern due to the presence of buildings and waste debris scattered throughout camp sites. However, the concern is low due to the remoteness of the site. Little revegetation of the trenches has occurred naturally, possibly because of the coarse granitic material of which it is composed.

Using applicable federal and territorial criteria, background characteristics, as well as northern mine reclamation guidelines, it is recommended that all buildings be burned and ashes left on site. Waste material that is non-hazardous and combustible can be burned on site. Reclamation of the trench areas is not recommended because of the remoteness of the site. Furthermore, recontouring and reseeding of the site would disturb the revegetation that has occurred. Waste petroleum products contained in barrels can be use for burning waste debris around the site. Once empty, the barrel should be cleaned and disposed of with along with other non-hazardous waste materials. It is recommended that the miscellaneous site debris be collected and consolidated.

Summary of Conclusions and Recommendations

ASSESSMENT COMPONENT	RISK	RECOMMENDATION
1. Building, Infrastructure, Equipment		
1 Building, 1 shed , 2 collapsed sheds	Health and Safety	Burn and leave ashes
3 pieces of heavy equipment	Aesthetic/Health & safety	None
2. Non-Hazardous Waste Material		
11 empty barrels	Aesthetic	Collect and consolidate
Misc. Wood, metal, plastic debris	Aesthetic	Collect and consolidate
3. Hazardous Materials		
1 barrel with 25% product	Minor environmental concern	Use product for burning, clean barrel and leave on site
Contaminated Soil	Minor environmental concern	Leave in place to bioremediate
4. Water Quality		
Mine Seepage - none		
Site Drainage - none		
Receiving Waters - stream	Minor environmental risk	None
5. Waste Rock Disposal Areas		
none		
6. Mine Openings		
none		
7. Tailings		
none		

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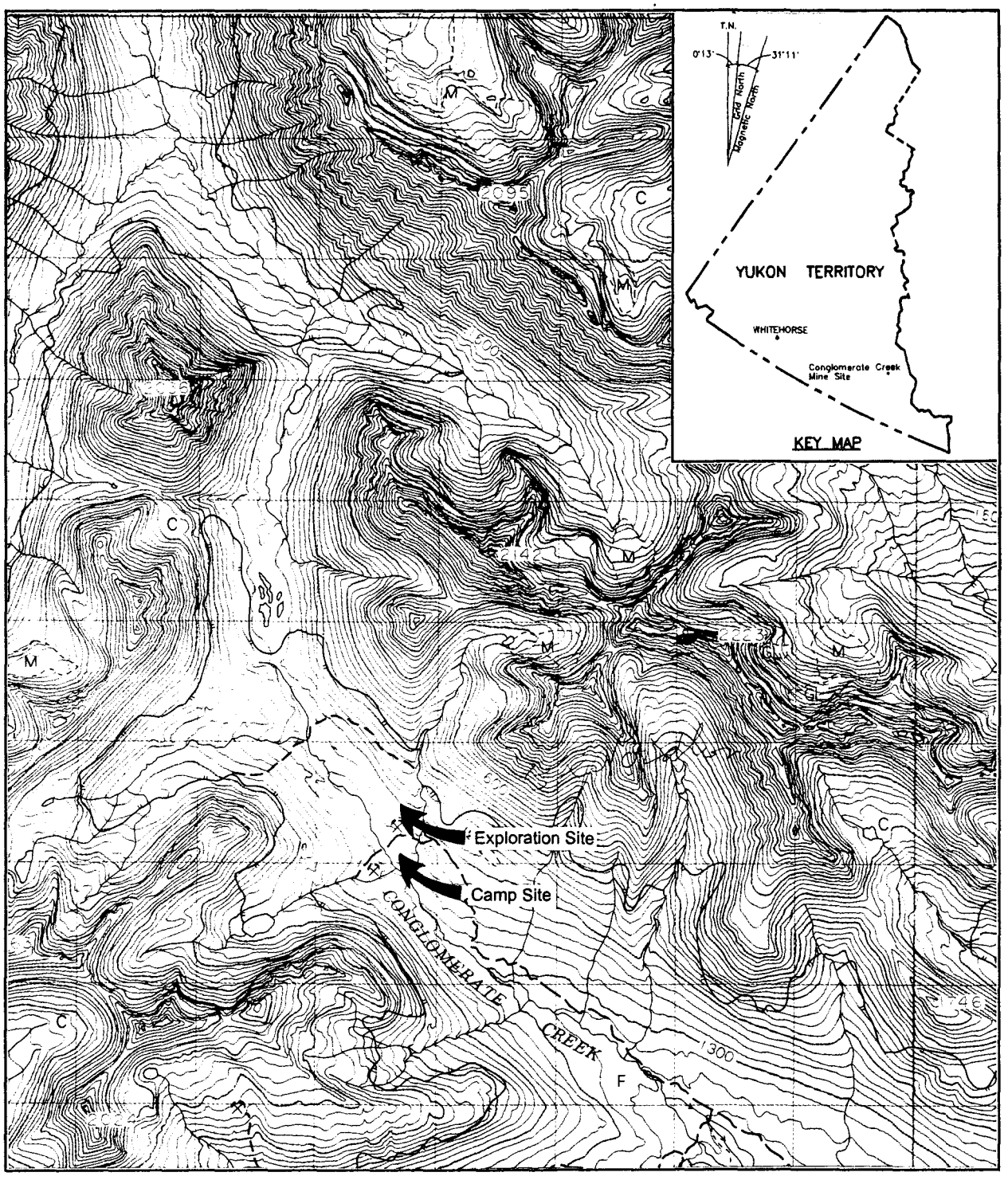

Figure 1. Location of Conglomerate Creek Mine - 1:50,000, NTS-105H/7 [Energy Mines and Resources Canada: 1985]

Creek property was first staked as the BM claims in 1964 by Yukon Pacific Pros Group which conducted mapping and hand trenching. From 1968 to 1971, the property was optioned to Silver Duke Mines Ltd. which constructed a road and drilled 91m in two holes.

In 1973, Pan Ocean carried out geochemical surveys, mapping, and dozer trenching of anomalies on the Rieta and Woo claim groups. Dozer trenching was completed in 1977 and a single crushing/grinding circuit was installed to test the "E" Zone. Canada Tungsten Mining Corporation added the Schee claims and drilled 342m in six holes in the "E" Zone. Additional dozer trenching was conducted in 1979, and approximately 700m were drilled from twelve holes from 1979 to 1980.

1.3 SITE ACCESS

The site was accessible by a trail off the Nahanni Range Road, but washouts on this trail make this trail impassable. Currently, the site may only practically be reached by helicopter.

2.0 PURPOSE AND SCOPE OF WORK

The following assessment activities were completed:

- Inspection of mine openings and workings, buildings and infrastructure, and waste disposal areas;
- Photo documentation and mapping of relevant site features;
- Sampling of waste rock disposal areas, stained soils, surface water (including adit and waste rock seepage, and receiving waters) and barrel contents;
- Identification and inventory of hazardous and non-hazardous materials on the site;
- Identification of potential or actual environmental pathways and receptors for site contaminants; and
- Assessment of human safety hazards and potential for accidental or deliberate access to hazardous areas.

Upon completion of these activities, preliminary cost estimates were generated to meet the following remediation/mitigation requirements:

- Physical stabilization of waste rock disposal areas;
- Chemical stabilization of the waste rock disposal areas as appropriate to

local and background conditions, taking into account impact, on-site resources, and accessibility;
- Sealing of all mine openings;
- Consolidation and landfill of all non-hazardous, non-combustible solid wastes;
- Remediation or removal and disposal of contaminated soils as required to meet the more stringent of: Yukon Government's Contaminated Sites Regulations (1996) Schedule 1; and Canadian Council of Ministers of the Environment's Interim Canadian Environmental Quality Criteria for Contaminated Sites (1991) Commercial/Industrial criteria for soils;
- Removal and disposal of hazardous solid wastes;
- Draining, cleaning and disposal of drums or other containers containing petroleum products or other liquid hazardous wastes;
- Onsite flaring or removal and off-site disposal of petroleum products and other liquid hazardous wastes; and
- Demolition of buildings and infrastructure to foundation level and burning of combustible non-hazardous materials in approved location

3.0 SITE ASSESSMENT METHODOLOGY

3.1 ASSUMPTIONS

The assessment was limited to the area specifically developed or occupied for exploration or mining purposes, and adjacent areas and resources believed to be affected by these activities. Water samples were taken off-site to determine potential impact to surface water bodies due to mining activities. Access roadways to mine sites were not included in the assessments.

3.2 ASSESSMENT CRITERIA

3.2.1 Criteria and Guidelines

Metal Mining Liquid Effluent Regulations and Guidelines (Environmental Protection Service, Environment Canada, 1977)

The intent of the requirements defined in this document is to limit the discharge of deleterious substances from base-metal, uranium and iron ore mines. These requirements are uniformly applied national standards and intended to provide protection for fish and other aquatic life.

(I) the generic numerical water standard of Schedule 3, or
(ii) the local background concentration of that substance in the soil, surface water, or groundwater.

Below 3 metres of the surface, commercial land use criteria is applicable.

Mine Reclamation in Northwest Territories and Yukon (INAC, 1992)

This report defines factors which are to be considered in reclamation of abandoned mine sites operating in northern climates. Factors include:

- open pit and underground mines;
- special mines such as uranium, sand and gravel, and coal;
- waste rock and tailings disposal;
- acid generation and leaching; and
- estimating cleanup costs.

Barrel Clean Up Protocol (INAC, 1992)

See Appendix E for protocol on testing and cleaning of barrels and contents.

3.2.2 Application of Criteria and Guidelines

The following assessment criteria were used for the Conglomerate Creek abandoned mine site:

A. Soils:

CCME:	Remediation Criteria for Soil - Commercial/Industrial standard
YUKON RENEWABLE RESOURCES	Draft Contaminated Sites Regulations - used for hydrocarbon screening parameters

B. Water:

ENVIR. CANADA:	Metal Mining Liquid Effluent Regulations and Guidelines - are compared to seepage from mine openings, and river/stream water quality

BACKGROUND:	Downstream water quality results of rivers and streams are compared to the results of upstream (background) water quality
CCME:	Remediation Criteria for Water - Freshwater Aquatic Life guideline for river and stream water quality

[Note: In this screening assessment of water quality, analytical results are primarily compared to background values which may more accurately characterize the local environment.]

C. Mine Clean-Up and Reclamation:

INAC:	Mine Reclamation in Northwest Territories and Yukon

D. Barrel Clean Up

INAC:	Barrel Clean Up Protocol

3.3 METHODS

3.3.1 Background Information

Available background information was consolidated from the Yukon Chamber of Mines mine records, Whitehorse Public Library, Yukon Archives holdings, and records and reports from the Yukon Renewable Resources Library, Yukon Water Board, DIAND Lands Branch, DIAND Water Resources, and DIAND Library. INAC (1994) provided an overview assessment of the Conglomerate Creek abandoned mine site to that date. Other published information sources were examined for site or regional information as applicable. On the basis of available information, knowledge gaps regarding existing or potential safety and environmental risks at the site were identified and a site assessment plan was developed.

3.3.2 Site Assessment Components

A site assessment was conducted to identify existing or potential safety and environmental risks on the site. The assessment included the following components:

Waste Rock disposal areas were inspected and sampled by a professional geologist to assess acid rock drainage potential by:

- Identifying waste rock mineralization with potential to release acidic and/or metal-contaminated drainage
- Mapping and logging waste rock, tailings, pit walls and rock faces
- Collecting and field testing representative samples of mine wastes

Mine Openings were inspected and documented to identify closure requirements.

Non-Hazardous Site Debris was inventoried.

Contaminated Soil Areas were measured and sampled to determine the degree and type of contamination and estimate soil volumes for remediation.

Hazardous Materials were inventoried and sampled for analyses of contaminant constituents, as necessary.

Buildings and other Structures were inspected for hazardous materials and assessed for stability.

Borrow Sources were identified and assessed for accessibility and approximate quantity and type of granular material as applicable.

Scale site plans were prepared to identify the dimensions and locations site structures, mine workings and adits, waste rock disposal areas, on-site sampling locations, and any other pertinent information.

3.3.3 Sampling Methods and Quality Assurance

Test Pit Sampling

Test pits were excavated to a depth of about 0.3 to 1.0 m. Horizons in the test pit walls were logged, noting colour/weathering, rock composition, primary and secondary mineralization, particle size distribution, paste pH and paste conductivity, and moisture content. The test pit was photographed and its location was marked on the field map.

Approximately 2 kg of rock was collected at each sample site. For test pits showing a homogeneous wall face, a plastic sheet was placed at the bottom of the test pit and the pit wall was cut vertically down with a cleaned shovel. All rock larger than 75 mm in size was discarded. The sample was coned and quartered, discarding

opposite quarters, until a 2 kg sample was obtained.

For test pit walls showing clearly-distinguishable horizons (distinguishable by the sulphide and carbonate contents), the horizons were sampled individually.

Water Sampling

Samples were collected from surface streams upstream and downstream of mine related flows, and from representative seeps emanating from waste rock, tailings, pit walls, and/or adits.

250 ml water samples were collected by hand, facing upstream, ensuring that the sample is not contaminated by disturbed sediment, debris and other floating materials. Sample bottles were rinsed three times with water from the sample stream prior to collecting the sample.

2 ml of HNO_3 were immediately added to water samples destined for metals analyses. For analyses of non-metallic parameters, water samples were brim-filled to minimize head space, placed in a cooler, and maintained at 4° C until delivery to the laboratory.

Soil Sampling

Soil lithology was recorded from observations of the side walls of the test pit, and soil samples for both field and laboratory testing were collected. Observations were recorded for each soil sample site, including soil particle size, consistency, colour, moisture, discoloration, stratification, odour, and other observations of significance.

Samples were collected at depth intervals selected on the basis of stratigraphic observations and anticipated or apparent contamination. The lab samples were collected using disposable latex gloves and decontaminated stainless steel sampling utensils. All samples intended for organic analyses were stored in laboratory-cleaned 250 ml glass jars; samples intended for metals analyses were placed in new "Whirl-Pak" bags. All samples were placed in a cooler for shipment to the laboratory.

Barrel, Pail, and Above-Ground Storage Tank Sampling

Barrels and pails containing hydrocarbons were sampled with 1.2 m clean hollow glass rods ("drum thieves"), capable of extracting up to 25 ml of product. The rods were inserted into the drum or pail, and the uppermost open tip was sealed to

maintain the sample within the rod as it was extracted from the drum or pail. The sampled hydrocarbon was then drained into a 40-ml laboratory-cleaned vial. The extractions were repeated until at least 20-30 ml of product was obtained. The vial was then sealed and placed in a container for shipment to the laboratory. Each used drum thief rod was subsequently destroyed to prevent accidental re-use.

One Above-Ground Storage Tank (AST) was sampled with a stainless steel Bacon bomb sampler. A plunger at the tip of the sampler depressed when contact with the tank bottom was made, allowing petroleum product to enter the body of the sampler. When the sampler was raised, the plunger closed to seal the sampler and allow removal of the sample from the AST. The sampled hydrocarbon was then drained into a 40-ml laboratory-cleaned vial which was then sealed and placed in a container for shipment to the laboratory. The bomb sampler was cleaned with laboratory-grade detergent between sampling events.

Since hydrocarbon samples were collected only for analyses of Total Halides and metals, no cooling or other preservative was required.

Quality Assurance

Quality Assurance (QA) is a set of procedures for ensuring that the results of chemical analyses are, and can be shown to be, accurately representative of field conditions. A complete QA program includes both a field component and a laboratory component.

In addition to the standard sample collection methods outlined above, the field QA measures that were implemented for this assessment study include:

- chain of custody procedures and forms;
- a sample labeling and sample location identification scheme;
- laboratory preparation of all sampling containers;
- laboratory defined sample preservation and shipping procedures; and
- regular maintenance (including re-calibration) and cleaning of field equipment.

Laboratory QA measures included replicate analyses of selected soil and water samples. Replicate analytical results were submitted with each analytical report.

4.0 ENVIRONMENTAL SETTING

4.1 MINERALIZATION

The deposit appears to be a magnetite skarn deposit formed in Devonian-Mississipian carbonate rocks intruded by a Cretaceous granite batholith. Massive magnetite was seen in a few places near outcrops of the granite batholith. Approximately 5% iron oxide staining was seen on rocks and boulders exposed during the trenching. This staining appears to be primarily from weathering of biotite in the country rocks and from weathering of finely disseminated sulphides. Disseminated galena, sphalerite, and minor chalcopyrite were reported at the site (DIAND, 1994), although these minerals were not observed in the 1996 site visit.

4.2 SURFACE HYDROLOGY

Both the exploration and camp sites gently drain southwest towards Conglomerate Creek (Figure 1). The camp site is immediately northeast of the creek.

4.3 CLIMATE

The closest climatological information is from the town of Tuchitua, 60° 56' N, 129° 15' W; 724m above sea level (Environment Canada, 1980). Total annual precipitation is 590.6 mm. This consists of 243.8mm of rainfall and 337.4mm of snowfall. Highest levels of rainfall occur in July and highest levels of snowfall occur in December. Temperatures range from -26.7° C in January to 13.6°C in July. The mean annual temperature is -4.2° C.

4.4 VEGETATION

Conglomerate Creek is found within the Highland ecoregion. This ecoregion is characterized by boreal forest, consisting of open stands of black and white spruce, with an understorey of dwarf birch, Labrador tea, lichen, and moss. Drier sites have more white spruce, with some lodgepole pine, paper birch and aspen. Bog or fen vegetation is common on wet sites and includes dwarf black spruce, larch, Labrador tea, ericaceous shrubs, sedges and mosses.

4.5 FISH AND WILDLIFE RESOURCES

Typical wildlife in the region includes moose, wolf, red fox, snowshoe hare, arctic ground squirrel, beaver, lynx, weasel, snowy owls and various raptors. Typical bird species include rock and willow ptarmigan, raven and golden eagle.

4.6 SITE TOPOGRAPHY AND SOILS

The regional and site topography are mountainous, with a relief of about 1300 metres at Conglomerate Creek to 2,000 metres at some of the higher peaks. The mountains, though steep, are rounded with few cliffs and rock outcrops and can be easily traversed.

Much of the ecoregion is covered by a thin layer of eutric brunisolic soils. A blanket of recent volcanic ash 10-30cm thick covers most of the region. Turbic cryosols occur sparsely in poorly drained areas.

Topography above the mine site exhibits typical upper-alpine features such as stone nets and felsenmeer interspersed with hummocky tundra. Steep upper slopes are covered with talus or scree material contributed by freeze-thaw fracturing of sedimentary rock. The slope is uniformly covered with talus; at lower elevations, fractured shale outcrops are interspersed with hummocky flats and gentle slopes.

4.7 PERMAFROST

Conglomerate Creek is in a discontinuous permafrost zone. No attempt was made to establish the presence or absence of permafrost at this site.

5.0 SITE DESCRIPTION AND FINDINGS

5.1 BUILDING, INFRASTRUCTURE, and EQUIPMENT

Table 1 lists all site buildings and structures by size, construction, and contents. Site observation showed that there were two buildings and three processing structures at the camp site. Structures were all in poor condition and did not indicate any historical value.

5.2 NON-HAZARDOUS WASTE MATERIALS

The non-hazardous waste materials observed in and around the site are two demolished sheds and small quantities of wooden timbers, steel rails, 11 empty barrels, and assorted plastic, wood and metal debris.

5.3 HAZARDOUS MATERIALS

One 1/4 full barrel of product was located at the bunkhouse in the camp site. The

barrel contents were tested for disposal by incineration. The results are presented in Table 2 and indicate that the contents are suitable for incineration. The barrel was in satisfactory condition, however, its contents were unknown and exposed as the bung was not in place.

Table 1 Buildings, Infrastructure, and Equipment

ITEM	SIZE	MATERIALS	CONTENTS/CONDITION
Bunkhouse	5x4x3 m	wood (2x4 construct.), asphalt paper roofing	- small quantity of scrap, wood table - poor condition
Workshop (shed)	3x3x3 m	wood (2x4 construct.), Fiberglass insulation	- cores
Grizzly (large sieve)	2.5x2.5x4 m	log frame (4 x12 '), steel grate	- rock filled - fair condition
Shaker Table	2x5 m	rubber table surface, wood side rails and bed, 3 - 8"x2" steel bottom frame	- none - fair condition
Caterpillar Tractor	D-4	steel, rubber	- front end bucket - not practically repairable
Truck	5 ton	steel, rubber, plastic, glass	- not practically repairable
Roaster	1x0.5 m	bricks and steel on wood frame	- none

Table 2 Results of Barrel Sampling for Incineration

Parameter	Barrel Clean Up Criteria (ppm)	#1 (ppm)
Cadmium	2	< 1
Chromium	10	< 1
Lead	100	4.3
Total Organic Halides	1000	<5.0
PCBs	2	<0.2

Note: N/R - not required as TOX analysis is less than 2 ppm, N/A - not available

Two soil samples were collected from stained soils at the site of the former fuel and oil storage site. Samples were analyzed for the presence of lead, total extractable hydrocarbons (TEHs), and Polycylic Aromatic Hydrocarbon (PAHs).

The concentration of total extractable hydrocarbons (THE) in both samples was above Yukon remediation criteria indicating that petroleum hydrocarbon contaminated soils. Hydrocarbon distributions of both of these samples indicate that contamination is the result of heavy oils, possibly attributable to waste oil spills or leaks. Laboratory results are detailed in Table 3. Complete analytical results are provided in Appendix B. Sample locations are included on Drawing 1.

Table 3 Soil Sample Laboratory Results

Parameter	Yukon Criteria - Industrial (ppm)	CCME - Com./Indust. (ppm)	Cong-s-1 (ppm)	Cong-s-2 (ppm)
Lead	n/a	1000	32	44
PAH's	10	10	<0.5	<0.5
THE's	2000	n/a	115,000	38,000

5.4 SURFACE WATER QUALITY

There is no source of mine water (e.g. adits or seeps) at the site. However, samples were collected upstream and downstream of the exploration site on Conglomerate Creek, which runs through the site. Samples were analyzed for pH, conductivity, sulphate, acidity, alkalinity, and metals by Inductively Coupled Plasma (ICP). Complete analytical results are presented in Appendix C. Results are summarized in Table 4.

Table 4 Surface Water Samples - Significant Results

Sample ID	Sample Location	pH	Conductivity (µmhos/cm)	Metals	Other
CONGWQ/STR1/1	Upstream approx. 400m of the site	7.06 (7.53)	39.4 (30)	Low	SO_4 = 13 mg/L
CONGWQ/STR1/2	Downstream approx. 50 m from the site.	7.09 (7.44)	37.5 (30)	low	SO_4 = 13 mg/L

Note: Numbers in brackets are field values.

Water quality upstream and downstream of the mine site was nearly identical. The stream water had neutral pH and conductivity below 40 μmhos/cm. Sulphate concentrations in the two samples was 13 mg/L.

Metal concentrations were very low, with calcium concentrations less than 6 mg/L and silicon concentrations approximately 2 mg/L. These low values reflect the presence of the resistant granite batholith in the area.

5.5 WASTE ROCK DISPOSAL AREAS

There is no waste rock at the site. Trenching has exposed glacial till overlying granite bedrock. This material contained spotty iron oxide staining and few visible sulphides and, therefore, was not sampled.

5.6 MINE OPENINGS

There are no mine openings at the site.

5.7 TAILINGS

No milling of ore was conducted at the site and so tailings exist.

6.0 CONCLUSIONS

6.1 HEALTH AND SAFETY RISKS

Two building structures remain on site and present a potential safety hazard to the public if left unmaintained. Since the site is very remote and practical accesses is achieved by air, the risk is considered to be low.

6.2 ENVIRONMENTAL RISKS

There do not appear to be any environmental risks associated with mine waste at the site. No waste rock piles or tailings were developed, and the rock that is exposed in trenches contains few sulphides. In its present state, the property is not impacting the water quality of Conglomerate Creek.

A minor environmental risk exists as a result the abandonment of petroleum hydrocarbons on site. One barrel, in poor condition, contains approximately 50 litres of a liquid organic waste. Based on laboratory analysis, the disposal of liquid

waste may be locally incinerated.

6.3 AESTHETIC CONCERNS

There is a an aesthetic concern due to the presence of buildings and waste debris scattered throughout camp sites. However, the concern is low due to the remoteness of the site.

Little revegetation of the trenches has occurred naturally, possibly because of the coarse granitic material of which it is composed.

7.0 RECOMMENDATIONS

Recommended remediation and management actions are compliant with applicable federal or territorial regulations and criteria, are reliant upon available technology, and are intended to be appropriate for local conditions and sensitivities.

Recommendation 1.

It is recommended that all buildings be burned and ashes left on site. Waste material that is non-hazardous and combustible can be burned on site.

Recommendation 2.

Reclamation of the trench areas is not recommended because of the remoteness of the site. Furthermore, recontouring and reseeding of the site would disturb the revegetation that has occurred.

Recommendation 3.

Waste petroleum products contained in barrels can be use for burning waste debris around the site. Once empty, the barrel should be cleaned and disposed of with along with other non-hazardous waste materials.

Recommendation 4.

It is recommended that the miscellaneous site debris be collected and consolidated.

8.0 COST ESTIMATES TO IMPLEMENT RECOMMENDATIONS

A cost estimate of expected site remediation costs to an accuracy of 25% is provided under a separate cover. The cost estimate includes contractor and project management costs and contingency.

REFERENCES

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Yukon Government, Minfile record 105O 057

APPENDIX A

Site Photographs

CONGLOMERATE CREEK

Photographic Record

July 26, 1996

Photos	Description
C.C. # 1	Aerial View of Camp Site
C.C. # 2	Aerial View of Trenching
C.C. # 3	Stream adjacent to Camp Site
C.C. # 4	Camp and Trench Site
C.C. # 5	Site Debris and Barrels
C.C. # 6	Site Debris
C.C. # 7	Site Debris and Shed
C.C. # 8	Abandoned Equipment
C.C. # 9	Site of Hazardous Materials Storage Shed
C.C. # 10	Debris on Opposite Side of Stream
C.C. # 11	Upstream Water Sample
C.C. # 12	Downstream Water Sample

Photo# 1: Aerial View of Camp Site

Photo# 2: Aerial View of Trenching

Photo# 3: Stream Adjacent to Camp Site

Photo# 4: Camp and Trench Site

Photo# 5: Site Debris and Barrels

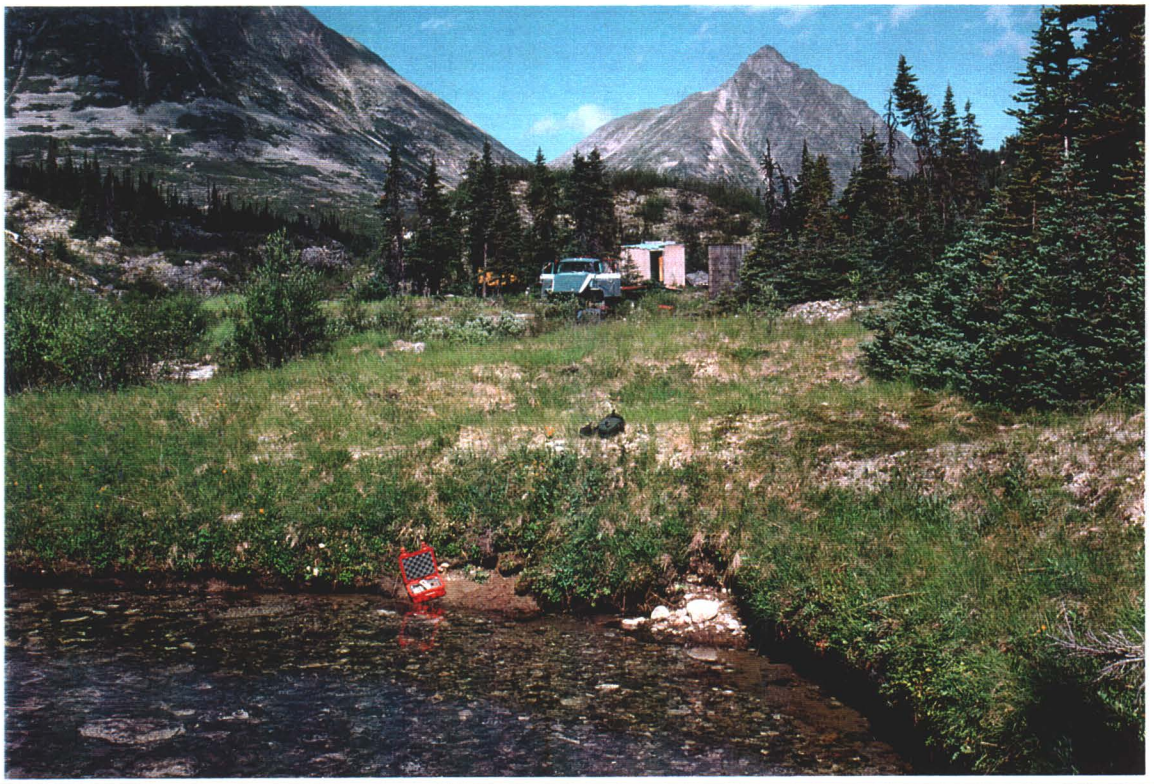
Photo# 6: Site Debris

Photo# 7:Site Debris and Shed

Photo# 8: Abandoned Equipment

Photo# 9: Site of Hazardous Materials Storage Shed

Photo# 10: Debris on Opposite Side of Stream



Photo# 11: Upstream Water Sample

Photo# 12: Down Stream Water Sample

APPENDIX B

Analytical Results

REMARKS

File No. G3604

The detection limits for the polycyclic aromatic hydrocarbons have been increased for the samples identified as "Cong-S 1-1" and "Cong-S 1-2". These samples contain hydrocarbon material that interferes with the quantification of these compounds.

RESULTS OF ANALYSIS - Water[1]

File No. G3604

			Cong-WQ-STR1-1 96 07 29	Cong-WQ-STR1-2 96 07 29
Physical Tests				
Conductivity (umhos/cm)			39.4	37.8
pH			7.06	7.09
Dissolved Anions				
Acidity		CaCO3	2.1	2.1
Alkalinity Total		CaCO3	13.4	13.4
Sulphate	SO4		3.9	4.2
Total Metals				
Aluminum	T Al		<0.2	<0.2
Antimony	T-Sb		<0.2	<0.2
Arsenic	T As		<0.2	<0.2
Barium	T-Ba		<0.01	<0.01
Beryllium	T-Be		<0.005	<0.005
Bismuth	T-Bi		<0.1	<0.1
Boron	T-B		<0.1	<0.1
Cadmium	T Cd		<0.01	<0.01
Calcium	T-Ca		5.58	5.44
Chromium	T-Cr		<0.01	<0.01
Cobalt	T-Co		<0.01	<0.01
Copper	T-Cu		<0.01	<0.01
Iron	T-Fe		<0.03	<0.03
Lead	T-Pb		<0.05	<0.05
Lithium	T-Li		<0.01	<0.01
Magnesium	T-Mg		0.16	0.18
Manganese	T-Mn		<0.005	<0.005
Molybdenum	T-Mo		<0.03	<0.03
Nickel	T-Ni		<0.02	<0.02
Phosphorus	T-P		<0.3	<0.3
Potassium	T-K		<2	<2
Selenium	T-Se		<0.2	<0.2
Silicon	T-Si		2.14	2.10
Silver	T-Ag		<0.01	<0.01
Sodium	T-Na		<2	<2
Strontium	T-Sr		0.024	0.023
Thallium	T-Tl		<0.1	<0.1
Tin	T-Sn		<0.03	<0.03
Titanium	T Ti		<0.01	<0.01
Vanadium	T-V		<0.03	<0.03

Remarks regarding the analyses appear at the beginning of this report.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre except for pH and Conductivity (umhos/cm).

RESULTS OF ANALYSIS - Water[1]

File No. G3604

		Cong-WQ-STR1-1 96 07 29	Cong-WQ-STR1-2 96 07 29
Total Metals			
Zinc	T-Zn	<0.005	<0.005

Remarks regarding the analyses appear at the beginning of this report.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre except for pH and Conductivity (umhos/cm).

RESULTS OF ANALYSIS - Sediment/Soil[1]

File No. G3604

		Cong-S 1-1	Cong-S 1-2
		96 07 29	96 07 29
Physical Tests			
Moisture	%	13.8	11.4
Total Metals			
Lead	T-Pb	32	44

Remarks regarding the analyses appear at the beginning of this report.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

RESULTS OF ANALYSIS - Sediment/Soil[1]

File No. G3604

	Cong-S 1-1 96 07 29	Cong-S 1-2 96 07 29
Polycyclic Aromatic Hydrocarbons		
Acenaphthene	<0.5	<0.5
Acenaphthylene	<0.5	<0.5
Anthracene	<0.5	<0.5
Benzo(a)anthracene	<0.5	<0.5
Benzo(a)pyrene	<0.5	<0.5
Benzo(b)fluoranthene	<0.5	<0.5
Benzo(g,h,i)perylene	<0.5	<0.5
Benzo(k)fluoranthene	<0.5	<0.5
Chrysene	<0.5	<0.5
Dibenz(a,h)anthracene	<0.5	<0.5
Fluoranthene	<0.5	<0.5
Fluorene	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	<0.5	<0.5
Naphthalene	<0.5	<0.5
Phenanthrene	<0.5	<0.5
Pyrene	<0.5	<0.5
Extractables		
Total Extr Hydrocarbons (C10-30)	115000	38000

Remarks regarding the analyses appear at the beginning of this report.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

Appendix 1 - QUALITY CONTROL - Replicates

File No. G3604

Sediment/Soil[1]		Cong-S 1-2	Cong-S 1-2
		96 07 29	QC # 69053
Physical Tests			
Moisture	%	11.4	9.8
Total Metals			
Lead	T-Pb	44	47
Polycyclic Aromatic Hydrocarbons			
Acenaphthene		<0.5	<0.5
Acenaphthylene		<0.5	<0.5
Anthracene		<0.5	<0.5
Benzo(a)anthracene		<0.5	<0.5
Benzo(a)pyrene		<0.5	<0.5
Benzo(b)fluoranthene		<0.5	<0.5
Benzo(g,h,i)perylene		<0.5	<0.5
Benzo(k)fluoranthene		<0.5	<0.5
Chrysene		<0.5	<0.5
Dibenz(a,h)anthracene		<0.5	<0.5
Fluoranthene		<0.5	<0.5
Fluorene		<0.5	<0.5
Indeno(1,2,3-c,d)pyrene		<0.5	<0.5
Naphthalene		<0.5	<0.5
Phenanthrene		<0.5	<0.5
Pyrene		<0.5	<0.5
Extractables			
Total Extr Hydrocarbons (C10-30)		38000	37900

Remarks regarding the analyses appear at the beginning of this report.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

Appendix 2 - METHODOLOGY File No. G3604

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.

Metals in Water

This analysis is carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 19th Edition 1995 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005), followed by instrumental analysis by atomic absorption spectrophotometry (EPA Method 7000), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Moisture

This analysis is carried out gravimetrically by drying the sample to constant weight at 103 C.

Metals in Sediment/Soil

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 Method 3050 or Method 3051, published by the United States Environmental Protection Agency (EPA). The procedures involve a digestion using a 1:1 ratio of nitric acid and hydrochloric acid, along with hotplate or microwave heating. Instrumental analysis is by atomic absorption spectrophotometry (EPA Method 7000) and/or inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010).

Method Limitation: The stated acid digestion will provide excellent results for total recoverable metals; however, it is only partially effective on mineralized or non-environmentally available metals.

Appendix 2 - METHODOLOGY (cont'd) File No. G3604

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

This analysis is carried out using a procedure adapted by ASL from U.S. EPA Methods 3500, 3630, and 8270 (Publ. #SW-846 3rd ed., Washington, DC 20460). The procedure involves a microwave assisted extraction with dichloromethane followed by a clean-up using silica gel column chromatography. This clean-up procedure has been found to effectively remove aliphatic and heterocyclic hydrocarbons which could potentially interfere with the analysis. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection.

Total Extractable Hydrocarbons in Sediment/Soil

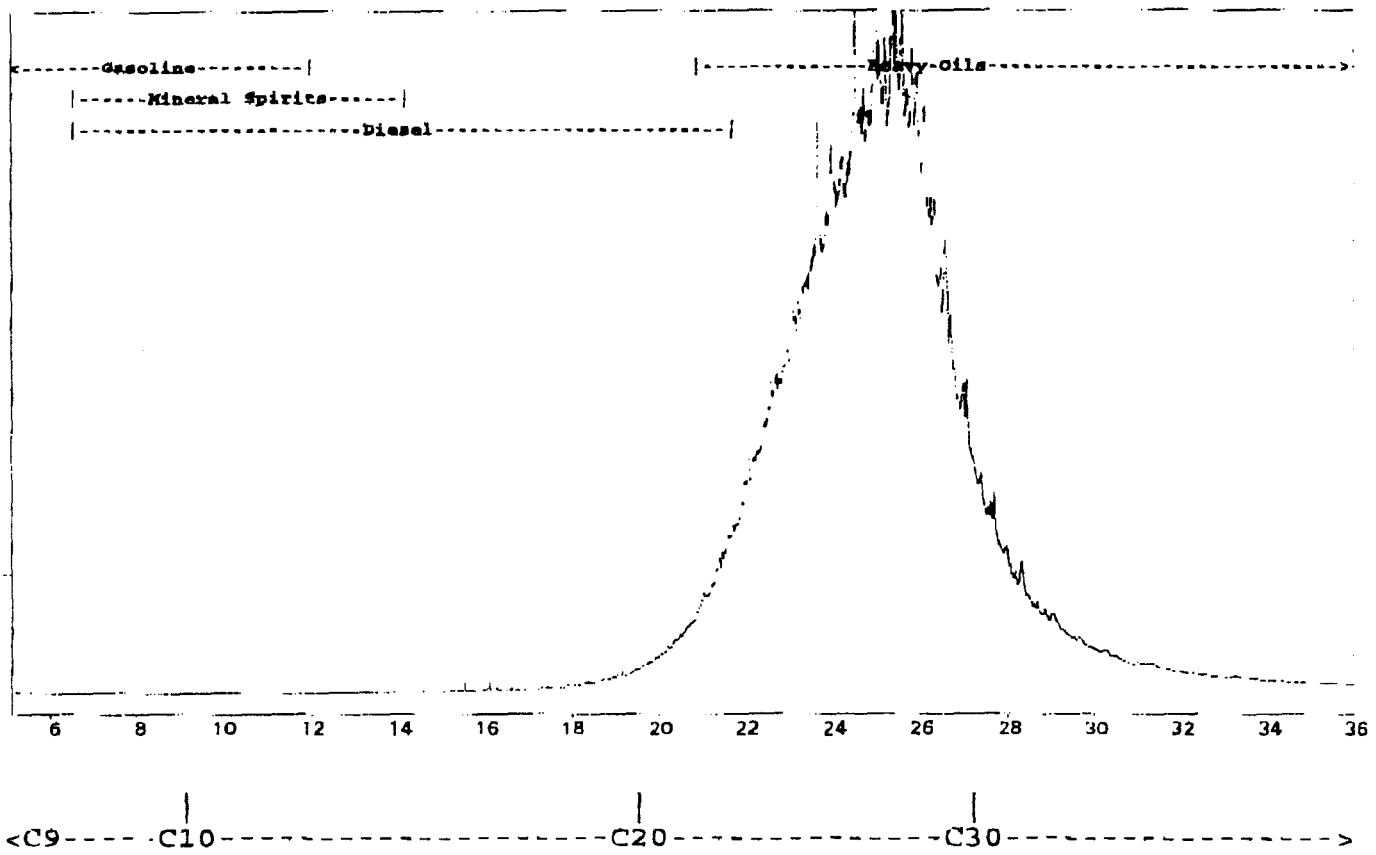
This analysis is carried out in accordance with U.S. EPA Method 3500/8015 (Publ. # SW-846 3rd ed., Washington, DC 20460). This procedure involves hexane/acetone extraction followed by analysis of the extract by capillary column gas chromatography with flame ionization detection.

End of Report

HYDROCARBON DISTRIBUTION REPORT

SAMPLE NAME: G3604 4 Cong-S 1-1 96 07 29

Sample acquired: AUG 13, 1996 11:42:19
File Name: c:\TEH\TEH12AUG.32R , Sample Name: G3604 4#Rx5
Sequence File: TEH12AUG



ASL Sample ID: G3604 4#Rx5* 5 X Dilution

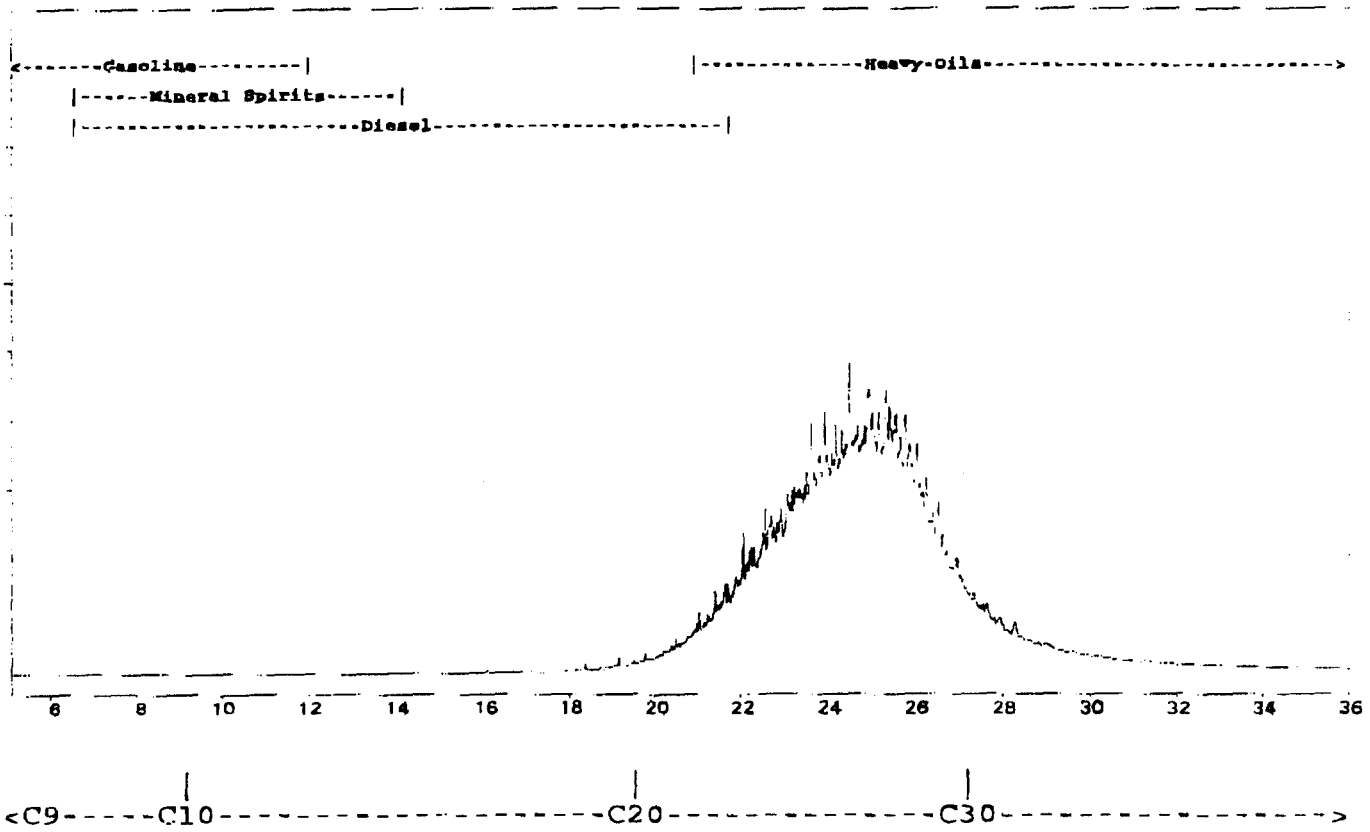
HYDROCARBON RANGE (C#)		RELATIVE AMOUNT (%)
Less than Carbon 10	(<C10)	0.0
Carbon 10 to Carbon 20	(C10-C20)	2.1
Carbon 20 to Carbon 30	(C20-C30)	74.4
Greater than Carbon 30	(>C30)	23.5

The Hydrocarbon Distribution Report is intended to assist you in characterizing the hydrocarbon product present in a given sample. The scale at the top of the chromatographic trace represents the hydrocarbon range of common petroleum products. Comparison of this report with those of reference standards may also assist you in the identification of the hydrocarbon product detected in your sample. The second part of the report is a table that expresses the relative amount of hydrocarbon product present in the ranges specified.

HYDROCARBON DISTRIBUTION REPORT

SAMPLE NAME: G3604 5 Cong-S 1-2 96 07 29

Sample acquired: AUG 13, 1996 12:30:33
File Name: c:\TEH\TEH12AUG.33R , Sample Name: G3604 5#Rx10
Sequence file: TEH12AUG



ASL Sample ID: G3604 5#Rx10* 10 X Dilution

HYDROCARBON RANGE (C#)		RELATIVE AMOUNT (%)
Less than Carbon 10	(<C10)	0.0
Carbon 10 to Carbon 20	(C10-C20)	1.9
Carbon 20 to Carbon 30	(C20-C30)	79.0
Greater than Carbon 30	(>C30)	19.1

The Hydrocarbon Distribution Report is intended to assist you in characterizing the hydrocarbon product present in a given sample. The scale at the top of the chromatographic trace represents the hydrocarbon range of common petroleum products. Comparison of this report with those of reference standards may also assist you in the identification of the hydrocarbon product detected in your sample. The second part of the report is a table that expresses the relative amount of hydrocarbon product present in the ranges specified.

CHEMEX Labs Alberta Inc.

Calgary : 2021 - 41st Avenue N.E., T2E 6P2. Telephone (403) 291-3077, FAX (403) 291-9468
Edmonton : 9331 - 48th Street, T6B 2R4, Telephone (403) 465-9877, FAX (403) 466-3332

PUBLIC WORKS CANADA
ATTENTION : MICHAEL NAHIR

Sample Description : CONG-BRI-1
Sample Date & Time : 29-07-96
Sampled By :
Sample Type : GRAB
Sample Received Date: October 18, 1996
Sample Station Code :

TOX SAMPLES
Chemex Worksheet Number : 96-07805-12
Chemex Project Number : PUBI010-0502
Sample Access :
Sample Matrix : LIQUID
Report Date : November 15, 1996
Analysis Date : November 5, 1996

PARAMETER DESCRIPTION	NAQUADAT CODE	UNITS	R E S U L T S	DETECTION LIMIT
Total Organic Halogens (TOX)		ug/g	5.0	2.

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PUBLIC WORKS CANADA
ATTENTION : MICHAEL NAHIR

TOX SAMPLES

Sample Description : CONG-BRI-1
Sample Date & Time : 29-07-96
Sampled By :
Sample Type : GRAB
Sample Station Code :

Chemex Worksheet Number : 96-07805-12
Chemex Project Number : PUBI010-0502
Sample Access :
Sample Matrix : LIQUID
Report Date : November 15, 1996

BATCH SPECIFIC QUALITY ASSURANCE REPORT

PARAMETER	DATE ANALYZED (DD-MM-YY)	QA/QC BATCH NUM ANAL	MATRIX SPIKES DUP Rr	MATRIX SPIKES RECOV %	MATRIX SPIKES CONTROL LIMITS LOWER	MATRIX SPIKES CONTROL LIMITS UPPER	CALIBRATION CHECK RECOV %	CALIBRATION CHECK CONTROL LIMITS LOWER	CALIBRATION CHECK CONTROL LIMITS UPPER
Total Organic Halogens (TOX)	05-11-96	2 RAV	N.A.	NOT APPLICABLE			99.5	80.0	120.0

CHEMEX Labs Alberta Inc.

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PUBLIC WORKS CANADA
ATTENTION : MICHAEL NAHIR

TOX SAMPLES

Sample Description : CONG-BRI-1
Sample Date & Time : 29-07-96
Sampled By :
Sample Type : GRAB
Sample Received Date: October 18. 1996
Sample Station Code :

Chemex Worksheet Number : 96-07805-12
Chemex Project Number : PUBI010-0502
Sample Access :
Sample Matrix : LIQUID
Report Date : November 15. 1996
Analysis Date : November 11. 1996

AROCLORS (PCBS) BY MODIFIED EPA METHOD 8081

COMPONENT	CONCENTRATION	UNIT	MDL
Aroclor 1016	< 0.2	mg/Kg	0.2
Aroclor 1221	< 0.2	mg/Kg	0.2
Aroclor 1232	< 0.2	mg/Kg	0.2
Aroclor 1242	< 0.2	mg/Kg	0.2
Aroclor 1248	< 0.2	mg/Kg	0.2
Aroclor 1254	< 0.2	mg/Kg	0.2
Aroclor 1260	< 0.2	mg/Kg	0.2
Aroclor 1262	< 0.2	mg/Kg	0.2
Aroclor 1268	< 0.2	mg/Kg	0.2

NOTES :

Results are reported in accordance with CCME guidelines, "Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites, Volume I". All results are corrected for blank levels.

MDL - Method detection level. - Calculated on the basis of the instrument detection level, the dilution used, and the weight of the sample.

( ) - Bracketed results are values below the reliable detection level, and are subject to reduced levels of confidence. The reliable detection level is twice the method detection level.

QA/QC SUMMARY

All samples were spiked with a component whose recovery was monitored to maintain analysis accuracy. Guidelines from SW846 for suggested surrogate recoveries for each matrix are shown below.

Surrogate Recovery : 80% LIQUID surrogate limits : 63% - 134%.

CHEMEX Labs Alberta Inc.

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Edmonton : 9331 - 48th Street, T6B 2R4, Telephone (403) 465-9877, FAX (403) 466-3332

PUBLIC WORKS CANADA
ATTENTION : MICHAEL NAHIR

TOX SAMPLES

Sample Description : CONG-BRI-1
Sample Date & Time : 29-07-96
Sampled By :
Sample Type : GRAB
Sample Received Date: October 18, 1996
Sample Station Code :

Chemex Worksheet Number : 96-07805-12
Chemex Project Number : PUBI010-0502
Sample Access :
Sample Matrix : LIQUID
Report Date : November 15, 1996
Analysis Date : November 11, 1996

BATCH SPECIFIC QUALITY ASSURANCE REPORT

BATCH : 11	BLANK	DUPLICATE			MATRIX SPIKE			CALIBRATION CHECK		
DATE : November 11, 1996	CONC.	CONC.1	CONC.2	RPD	RECOV	CONTROL LIMITS		RECOV	CONTROL LIMITS	
ANALYST:AAM	mg/Kg	mg/Kg	mg/Kg	%	%	LOWER	UPPER	%	LOWER	UPPER
Aroclor 1016	< 0.2	< 0.3	< 0.3	0						
Aroclor 1221	< 0.2	< 0.3	< 0.3	0						
Aroclor 1232	< 0.2	< 0.3	< 0.3	0						
Aroclor 1242	< 0.2	< 0.3	< 0.3	0						
Aroclor 1248	< 0.2	< 0.3	< 0.3	0						
Aroclor 1254	< 0.2	< 0.3	< 0.3	0	100	64.	130.	94	80.	130.
Aroclor 1260	< 0.2	< 0.3	< 0.3	0				70	61.	120.
Aroclor 1262	< 0.2	< 0.3	< 0.3	0						
Aroclor 1268	< 0.2	< 0.3	< 0.3	0						

Results of Analysis
Powertech Labs Ref: 96171
ASL Ref: G3601

ASL Ref	Powertech Ref	Organic Halogen mg/L	Arsenic mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L
Tin-Brl- 1	96171-1	<300	<4	<1	<1	297
Tin-Brl- 3	96171-3	<300	<4	<1	<1	14.1
Tin-Brl- 4	96171-4	<300	<4	<1	<1	510
Tin-Brl- 5	96171-5	<300	<4	<1	<1	43.1
Stump-BR 1-1	96172-1	<300	<4	<1	<1	51.7
HOEY-Br 1-1	96173-1	<300	<4	<1	<1	7.8
Cong-Brl -1	96174-1	<300	<4	<1	<1	4.3
DLB-2	96175-1	<300	<4	<1	<1	23.9
S7BL-3	96175-6	<300	<4	<1	<1	<1
S7BL-4	96175-7	<300	<4	<1	<1	<1

APPENDIX C

Sampling Records

WATER SAMPLING

PROJECT NAME: Conglomerate Creek NAME OF SAMPLER: Michael Nahm

Location: _____ Date: 7/29/96

SAMPLE#: Cong-WQ-STR1-1 (TM/IMM) pH: 7.53 Eh: 30μs

Location description: Upstream of Site (125m)

Analysis: metals water chem Eh total sulphur

SAMPLE#: Cong-WQ-STR1-2 (TM/IMM) pH: 7.44 Eh: 30μs

Location description: Downstream of Site (50 m)

Analysis: metals water chem Eh total sulphur

SAMPLE#: _____ pH: _____

Location description: _____

Analysis: metals water chem Eh total sulphur

SAMPLE#: _____ pH: _____

Location description: _____

Analysis: metals water chem Eh total sulphur

SAMPLE#: _____ pH: _____

Location description: _____

Analysis: metals water chem Eh total sulphur

Comments: _____

Sample # Format site name-Wnumber
eg. Tintina-W1

BL=barrel S=soil
W=water WR=waste rock

Soil Sampling

Location Conglomerate Creek

Date: 7/29/96

Name of Sampler M. NAHIR

Sample #	Time	Depth (m)	Type of Soil (%) Clay	Silt	Sand	Confining Layer	Distance to surfaceH2O	oil stainin (Y/N)	grab/ composite	Analysis required	Comments
Cong-S1-1	12:30	0	Humock				30cm	Y	g	Tehb, GG, PAH	below POL storage shed.
Cong-S1-2	12:35	0.5		50	50		"	N	g	"	"

Comments:

Sample # format site name-Snumber

eg. Tintina-S1

BARREL SAMPLING

PROJECT NAME: Conglomerate Creek **SAMPLE #:** Cong-Brl-1

Location: Main Camp Site *Date:* 7/29/96

Name of sampler: Michael Nahm

Physical Observation

Condition of barrel: poor fair (good)

Size (L): (205L) other *Labels* _____

Soil staining: Y (N)

Barrel Contents

Quantity of liquid: (1/4) 1/2 3/4 full

Colour of liquid: (light) dark multiphase other

Suspected type of liquid: gasoline jet fuel waste oil glycol oil other diesel

Sludge observed: Y (N) Quantity _____

Analysis (if required)

Type of sample taken: composite (grab)

Analysis required: (metals) PCBs (chlorine) other _____

Comments: - Blue Barrel, bung open
- Amb. diesel

Sample # Format site name - BL number
eg. Tintina-BL1

BL =barrel
W=water
S=soil
WR=waste rock

APPENDIX D

Barrel Clean Up Protocol

BARREL CLEAN UP PROTOCOL

A flow diagram of the methodology for the processing, cleanup and disposal of barrels is attached.

A. Inspection

1. *The area around the barrels should be tested with a VOC metre to ensure safe working conditions. If the VOC levels exceed 20% of the Lower Explosive Limit (LEL), then all work shall be conducted in accordance with appropriate sections of the NIOSH Guidelines, the National Fire Code of Canada and the TDGA for flammable and combustible materials.*

2. *All barrels are to be inspected to address the following items which shall be recorded and used as a guide when opening barrels (section B.3):*

    1. *Symbols, words, or other marks on the barrel that identify its contents, and/or that its contents are hazardous: e.g. radioactive, explosive, corrosive, toxic, flammable.*
    2. *Symbols, works, or other marks on the barrel that indicate that it contains discarded laboratory chemicals, reagents, or other potentially dangerous materials in small-volume containers.*
    3. *Signs of deterioration or damage such as corrosion, rust, or leaks at seams, rims, and V grooves.*
    4. *Spillage or discolouration on the top and sides of the barrel.*
    5. *Signs that the barrel is under pressure such as bulging and swelling.*

B. Opening and Sampling

1. *Pressurized barrels are extremely hazardous and shall be opened with extreme caution. Only non-sparking equipment shall be used to open barrels. All personnel responsible for opening barrels shall be provided with appropriate safety equipment and clothing. Procedures outlined in NIOSH USEPA 1988 Safety and Health Compliance for Managers (165.8) USEPA-29-CFR, 1910-1920, shall be followed.*

2. *If the bungs can readily be moved; then the barrels shall be opened slowing allowing time for any pressure in the barrel to be released before the bung is fully removed.*

3. *If the bungs are not readily moved, or inspection suggests that opening of the barrel presents a special hazard, then the barrels shall be vented remotely to relieve any internal pressure that may be present prior to opening. Remote venting shall be conducted using a suitable device such as a sharp spear weighted and dropped from an appropriate height or released from a tube housing a spring to penetrate the barrel. The remote venting operation shall be conducted from a safe distance from other site operations and from behind suitable walls or barricades. After sampling, the spear opening shall be plugged.*

4. *Samples of the contents of all barrels shall be extracted using a drum thief. All barrels shall be clearly numbered using spray paint or other suitable marker.*

5. *Barrels shall not be transported until it has been determined that they are not under pressure, do not leak and are sufficiently sound for transport.*

6. *Barrels containing less than 50 mm of liquid may be combined with compatible material prior to sampling; samples inferred to contain only water on a visual examination shall be tested prior to this consolidation. Barrel contents which consist of black oil shall not be consolidated.*

7. *Consolidation of barrel contents shall take place in a secure barrel processing area. At many DEW Line sites several caches of barrels are present and, therefore, it may be desirable to establish several secure sorting areas; barrels scattered on the tundra may be vented, then closed, and then transported to a barrel sorting area for sampling and possible consolidation.*

C. Testing

1. *Liquid samples shall be inspected and classified as either containing water or organic materials. Samples thought to contain water shall be analysed on-site to confirm that they are indeed water and contain less than 2% glycols or alcohols by Fourier transform infrared spectroscopy (FTIR).*

2. *The contents of barrels containing organic materials, including aqueous samples which contain more than 2% glycols or alcohols, shall be tested for PCBs, Total chlorine, cadmium, chromium and lead, in addition to identification of the major components e.g. fuel oil, lubricating oil. Samples containing greater than 1000 ppm chlorine shall be further tested to identify the chlorinated compounds present.*

3. *Contents of barrels which contain two or more phrases shall have all phrases analysed; the organic phases as described above and the aqueous phases to ascertain whether it contains less than 2% organics. In addition, the aqueous phases shall be tested for any components found in the organic phases above the criteria described below.*

D. Disposal of Barrel Contents

1. *Barrels containing only rust and sediment shall be treated as empty barrels.*

2. *Barrel contents comprising water only (less than 2% glycols or alcohols) shall be transferred to an open vessel such as a utility tub or half-barrel and any organic material removal by agitation with a pillow or segment of oil absorbent material. The water may then be discarded on to the ground that is a minimum of 30 metres distance from natural drainage courses. Used oil absorbent material shall be treated as described in Section D.5.*

3. *Barrel contents which are composed of water with glycols and/or alcohols or*

organics phases, and which contain less than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium and 100 ppm lead, may be disposed of by incineration. Alternatively these contents may be disposed of off-site at a licensed disposal facility. The solid residual material resulting from incineration shall be subjected to a leachate extraction test. Material found to be not leachate toxic material shall be treated as hazardous waste, packaged in accordance with TDGA and/or IATA regulations as required, and disposed of off-site at a licensed disposal facility.

4. *Barrel contents which contain greater than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium or 1000 ppm lead shall be disposed of off-site at a licensed disposal facility. Contents may be combined with compatible materials for shipping purposes (note section E.1). Flash point may be required to be determined if they cannot be inferred from the product identification.*

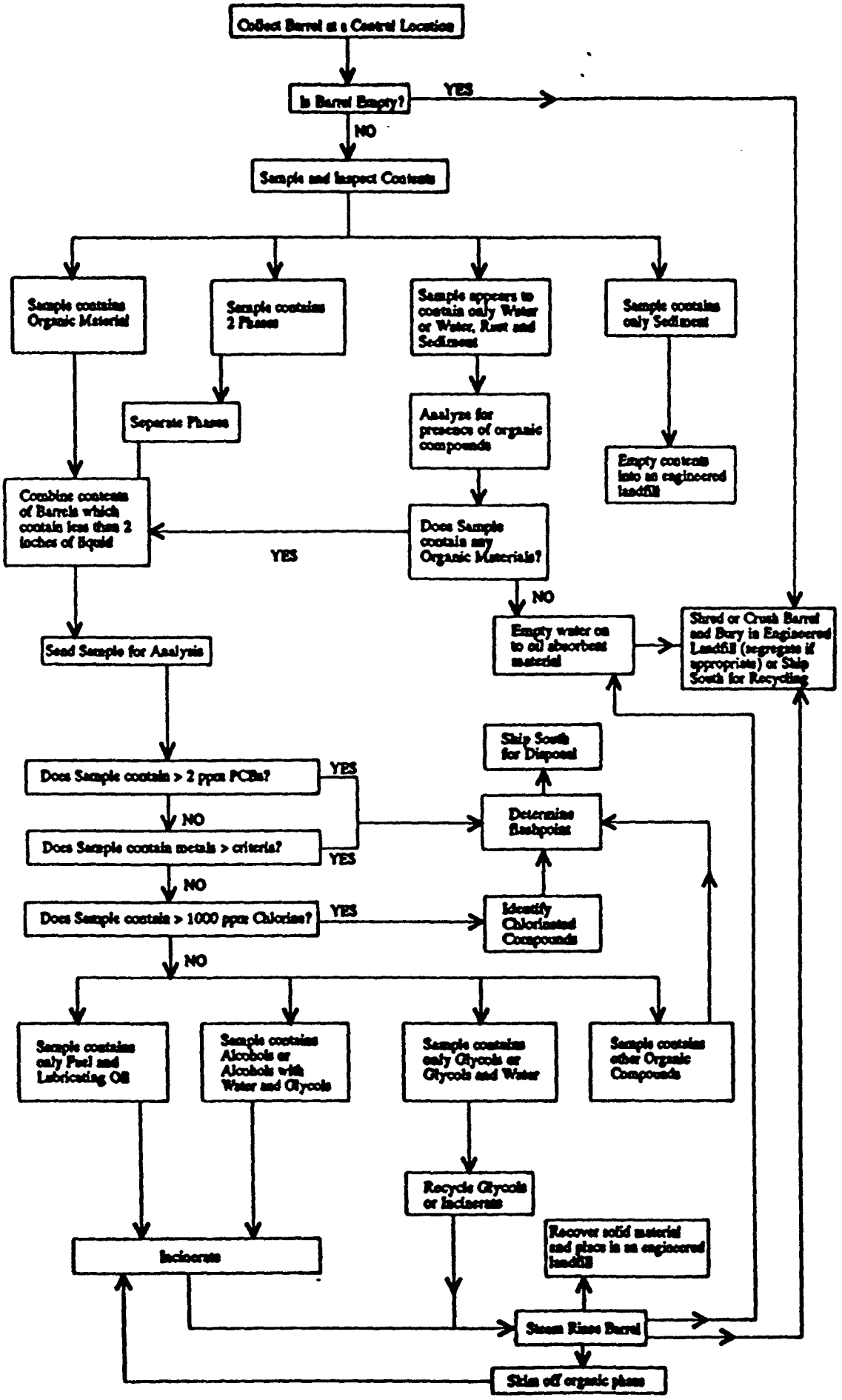
5. *Used oil absorbent material should be treated as hazardous waste and disposed of off-site at a licensed disposal facility unless, it is shown to be uncontaminated with PCBs (<2 ppm), chlorine (<1000 ppm) cadmium (<2 ppm), chromium (<10 ppm) and lead (<100 ppm) in which case it may be incinerated on site.*

E. Cleaning and Disposing of Barrels

1. *Empty barrels resulting from consolidation of contaminated material (Section D.4) shall be triple rinsed with solvent (varsol, diesel, etc.) Prior to steam cleaning; solvent washings shall be added to the bulked contaminated products unless analysed separately and shown to be suitable for incineration. Alternatively, the empty barrels may be shipped off-site and labelled appropriately (TDGA).*

2. *Only empty barrels resulting from consolidation of small volumes (section B.6), from incineration (section D.3) and from solvent washing (section E.1) require steam cleaning; after cleaning they shall be treated as described in E.3. Recycling of rinsate is permitted. The resulting wash water shall have any organic material removed by agitation with a pillow or segment of oil absorbent material. The water shall then be analysed for cadmium, chromium and lead. If these metals are present at less than 0.01, 0.10 and 0.10 ppm respectively, then the water may be discarded on land that is a minimum of 30 metres from natural drainage courses, but if not then it shall be disposed of off-site at a licensed disposal facility. Alternatively, the wash water may be shipped off site without testing for disposal at a licensed disposal facility. Used absorbent material shall be disposed of as described in section D.5.*

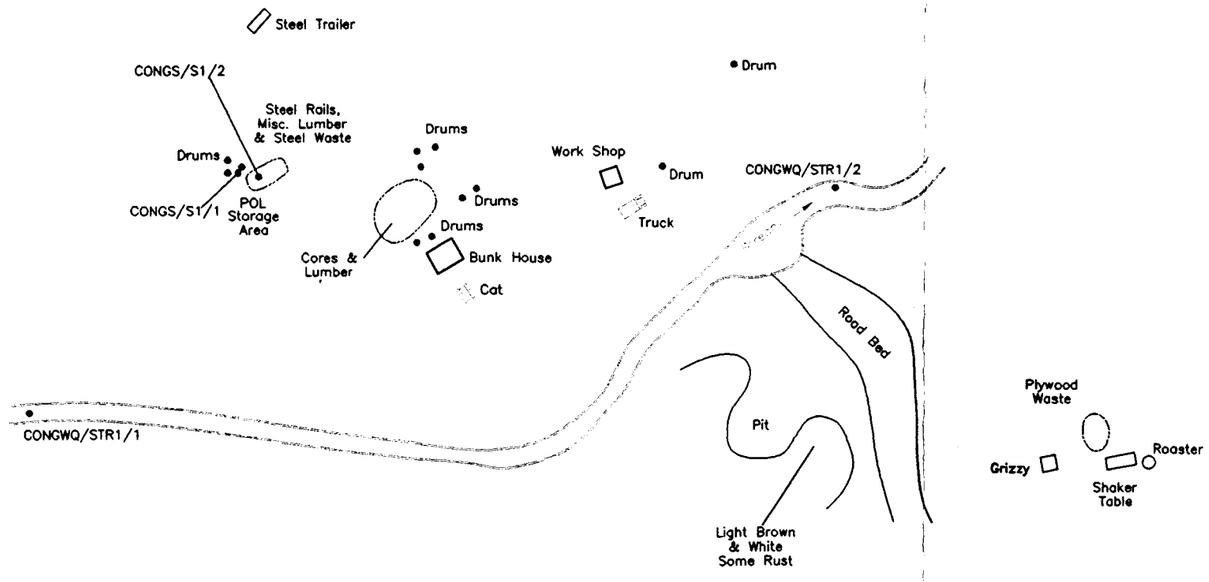
3. *Empty barrels may be crushed or shredded and be landfilled on-site as non-hazardous wastes. The barrels shall be crushed in such a manner so as to reduce their volume by a minimum of 75%. Shredded barrels may be disposed of off-site as recycled metals.*


Collect Barrel at a Central Location
Is Barrel Empty?
YES
NO
Sample and Inspect Contents
Sample contains Organic Material
Sample contains 2 Phases
Sample appears to contain only Water or Water, Rust and Sediment
Sample contains only Sediment
Separate Phases
Analyze for presence of organic compounds
Empty contents into an engineered landfill
Combine contents of Barrels which contain less than 2 inches of liquid
Does Sample contain any Organic Materials?
YES
NO
Empty water on to oil absorbent material
Shred or Crush Barrel and Bury in Engineered Landfill (segregate if appropriate) or Ship South for Recycling
Send Sample for Analysis
Ship South for Disposal
Does Sample contain > 2 ppm PCBs?
YES
NO
Determine flashpoint
Does Sample contain metals > criteria?
YES
NO
Does Sample contain > 1000 ppm Chlorine?
YES
Identify Chlorinated Compounds
NO
Sample contains only Fuel and Lubricating Oil
Sample contains Alcohols or Alcohols with Water and Glycols
Sample contains only Glycols or Glycols and Water
Sample contains other Organic Compounds
Recycle Glycols or Incinerate
Recover solid material and place in an engineered landfill
Incinerate
Steam Rinse Barrel
Skim off organic phase

DRAWINGS

Legend

- Road
- Extent Of Waste Rock
- CONGWQ/A3/1 — Water Quality Sample (site designation)
- CONGS/1 — Soil Sample (site designation)
- Buildings
- Extent of Debris, Timber, Cable, Pipe, etc.



Approx. Scale: 1:1000

PLOT: 1=1
CAD FILE: INVEN-96\CONGLOM\CONGLO-1

Public Works And Government Services Canada / Travaux publics et Services gouvernementaux Canada
Architectural & Engineering Services
Western Region

designed by / dessine par:
drawn by / dessine par:
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Conglomerate Mine Site Investigation

Yukon Territory

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