

Tantalus Butte Coal Property

Preliminary Site Assessment

Prepared for: Government of Yukon
Department of Energy, Mines and Resources

Prepared by Access Consulting Group
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1.0 Introduction

1.1 PROPERTY LOCATION AND GENERAL DESCRIPTION

The Tantalus Butte Coal Property is located in the upper southern Yukon about 5km north of the community of Carmacks on the east side of the North Klondike Highway. The Village of Carmacks is located 180 km north of Whitehorse. A general location map is presented in Figure 1.

Access to the site is by a gravel road on the east side of the highway about 6 km from the bridge over the Yukon River. The south access to the site is by a gated gravel road leading to a turn-around at the old Anvil Mining Company load-out site, just below the southern toe of the butte. A detailed site map is shown in Figure 2.

Land tenure in the study area consists of Crown Land, 1 First Nation Settlement Land parcel, a 500m wide Land Disposition for the currently proposed Yukon Energy Corporation power transmission route and 3 parcels of private property.

The study area lies on the northern, eastern and southern portions of a prominent hill on the north side of the Yukon River. Tantalus Butte reaches an elevation of approximately 782.7m ASL overlooking the Yukon River to the south. The surrounding topography is heavily glaciated and is made up of rolling hills oriented sub-parallel to the river. Small bodies of water can be found approximately 3km to the north and 5km east of the study area; there is one intermittent stream draining the property (see Figure 2).

1.2 SCOPE OF ENGAGEMENT

Access Consulting Group was retained by the Government of Yukon, Department of Energy Mines and Resources to undertake an initial site visit to Tantalus Butte site to document site conditions and present an understanding of the risks associated with the burning coal deposit.

Access Consulting Group was not engaged to provide solutions for remedying the situation as it is understood that not only would more substantive work need to be undertaken to fully understand the nature and extent of the fire, but also that the responsibility for remedying the situation has not yet been finally determined.

This document provides a preliminary assessment of the Tantalus Butte Coal Property and was formed based on information collected from Yukon Government Inspection and Natural Resource Officers, desktop research and from a site inspection conducted on June 21, 2007.

This document provides:

- a description of the current status of the site,
- the regional setting,
- local environment,
- current land use and tenure,
- identifies the risks and issues noted during the site inspection, and
- makes recommendations to address information deficiencies

The open pit mine, exposed workings and other property previously developed by the Anvil Mining Company and others are indicated on a map along with aerial imagery taken in 2003.

There is also a description of the exposed mine structures, open pit, waste rock dump, collapsed ground locations including an assessment of the environmental impacts of past and current conditions.

This document therefore provides the basis for identification of current and future public safety and environmental concerns. This report also provides a starting point for the preliminary identification of priorities for closure and development of a closure plan.

2.0 History of Development and Ownership

Coal showings were recorded as early as 1887 in the area of Tantalus Butte. The deposit was mined over a period of 58 years, generally from south from north, starting with underground mining in the south and moving to the north with open pitting starting in 1978.

The discovery seams, found by George Dawson, were used as a source of fuel for prospectors and trappers. Production slowed around 1918 to a few hundred tons per year. During this period, the mine was under the ownership of the Five Fingers Coal Company and development was primarily underground. The Fiver Fingers Coal Company mined up to 1938 and on average 454 tonnes were extracted per year (MINFILE, 1995). The mine was closed in 1938.

The mine was sold to the Yukon Coal Company Ltd. in 1948 and reopened. Production was mainly for heating plant fuel for the United Keno Hill Mines. Underground mining extracted 118,000 tonnes from 1948 through 1967. The main method of underground development was through room and pillar mining. Figure 3 presents the 1967 Yukon Coal Company Ltd. underground workings in section. MINFILE 115I 003 notes that mining took place above a 900m adit. Upon inspection, the potential portal to this adit was found to be intact but in poor condition.

The Anvil Mining Corp Ltd. acquired the mine in 1968 and mined 109,770 tonnes from the underground up to the end of 1976. The coal was used to dry concentrate and for heat at the Faro Mine and the Cyprus Anvil Mining Corp in 1975. According to MINFILE Report 115I 003 In 1973, 6 holes were dug about 294.4m north of the portal in order to explore the extents of the main seam (MINFILE, 1995). Surface production involved the main seam. The seam was mined about 520m to the north. Here an additional 27,200 tonnes were removed from 1975-76. In 1976, 10 additional exploratory holes were dug 1545m north of the portal along with bulldozer trenching (MINFILE, 1995). Rotary percussion drilling and geophysical testing took place 3476m from the portal to the north in 1977 (MINFILE, 1995).

An underground fire in 1978 forced production to move above ground and activity was focused on the surface mine. Rotary percussion drilling took place in 1978. Production was as follows: 1978 (21,410t), 1979 (22,680t), 1980 (18,140t) and 1981 (11,790t).

Currently the mine site is located on Crown Land.

A summarized history of development and ownership is provided in Table 1.

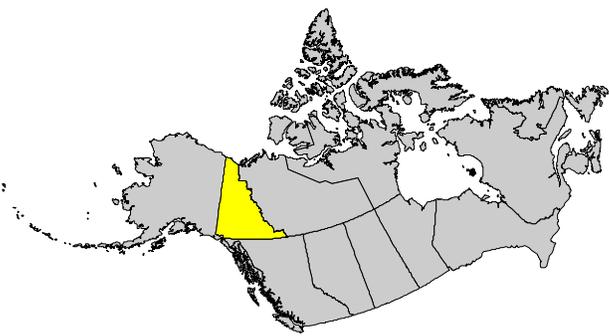


General Location Map of the Yukon Territory

Scale 1 : 6 000 000



Project Location



Site Status Assessment Report

Tantalus Butte
Yukon Territory

Drawn By: HD/RG	Figure 1
Checked By: RM	Date: July 2007

Our file: D:\Project\AllProjects\YTG\YTG-07-03\gis\mxd\Fig1_GenLoc.mxd

Lot 1094
LSC C-8B
84830 CLSR

Lot 24 REM
55634 CLSR

Lot 23
55634 CLSR

Yukon River

Lot 1101
LSC C-36B
84833 CLSR

Lot 1098
LSC C-23B
85102 CLSR

Figure 2
Tantalus Butte, Carmacks YT
Site Status Map

DRAWN BY: RG
CHECKED BY: RLM
DATE: July 11, 2007
OUR FILE: \\dawson\projects\allprojects\Ytg\YTIG-07-03\gis\mxd\Figure2_overall\site.mxd

Legend

- GPS locations
- Potential Mine workings
- Opening
- Subsidence
- Potential Bulldozer Trench
- Berm
- Waste rock pile
- General trails
- Potential Rotary percussion drill trails
- Bulldozer Trenches
- Existing access road
- Intermittent stream
- Cadastral
- First Nation Settlement Land

* Aerial photos were flown in early fall 2003. Scale: 1:8000. Altitude: 8000 feet ASL.

Surface Mining - Anvil Mining Corp. (1975-76, 1978-1981)
Rotary percussion drill trails - Anvil Mining Corp. (1977)

Open pit

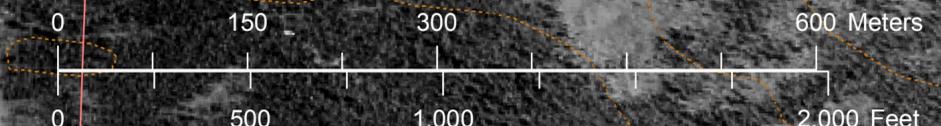
Bulldozer Trenches
(Anvil Mining Corp., 1976)

Waste Rock Pile

Approximate Region of Underground Development:
- Fiver Fingers Coal Co. (1923-38)
- Yukon Coal Co. Ltd. (1948-67)
- Anvil Mining Corp. (1969-78)

Developed by: Anvil Mining Corp.
(1969-1978)

Tipple



Site Status Inspection Locations and Descriptions			Site Status Inspection Locations and Descriptions				
Site	UTM Zone 8N (Nad 1983) Northing	UTM Zone 8N (Nad 1983) Eastings	Description	Site	UTM Zone 8N (Nad 1983) Northing	UTM Zone 8N (Nad 1983) Eastings	Description
S3	689068.01	433998.28	Location: Open pit. High wall is approx. 20m in height. Geotechnical concern on highwall side of pit. Trees growing to upper edge of highwall are blocking view of pit when approaching from above. Double berming recommended at pit edge. Evidence of faulting. Slides on hanging wall rock. Visible coal on high wall side of pit. Fire pit remains found. Volunteer revegetation occurring on low wall side of pit.	S14	6889276.52	434238.53	Location: Subsidence pit. Blurred for visibility. Subsidence actively occurring.
S4	6889873.82	434351.74	Location: Waste rock pile. Good stability. No settling occurring on edge of pile. No ponded water. Volunteer revegetation occurring. Also evidence of possible replanting. Fire pit and beer bottle remains found.	S15	6889232.79	434253.21	Location: Very deep hole. Slope on low wall is actively revealing. Highwall is heavily fractured bedrock and falling. Coal is visible at surface and goes to depth. Signage present: "DANGER Former cave in area. Approach with caution" Classes emitted from pit.
S5	6889871.68	434175.41	Location: On trail leading south from access road termination at waste rock pile. Partially revegetated beam blocking trail. Signage on berm: "DANGER Former mine site. Use caution while walking in the area." Recommend brushing around sign.	S16	6889198.04	434263.49	Location: Underground mine workings structure. Highwall is revealing. Classes emitted from pit. Recommend gas analysis. Blurred for visibility.
S6	6889761.10	434132.05	Location: Bulldozer trench leading to old shaft collar. Ladder with rotted rungs found. Visible coal at edge of pit around shaft collar. Recommend gas analysis.	S17	6889111.78	434287.38	Location: Pit. Classes emitted from pit. Recommend gas analysis. Signage present: "DANGER Former cave in area. Approach with caution" Blurred for visibility.
S7	6889702.81	434149.69	Location: Small pit. Melted sign: "DANGER Deep Dug" Sign has graffiti: "Sloan Charles 1977" Burned tree trunk found standing amongst young unburned willows.	S18	6889082.74	434290.46	Location: 2 Adjacent Pits. Pits are emitting smoke. Recommend gas analysis. Blurred on highwall is actively falling.
S8	6889668.31	434147.45	Location: Cleared grassy area with bulldozer trenches south of Stop 7. Area seeded with legume. Bulldozer trenching at this location was also seeded.	S19	6889002.44	434294.12	Location: Pit. Heat and smoke emitted from pit. Recommend gas analysis. Blurred tree growing just inside pit is dying. Coal at surface. Bedrock on highwall is falling.
S9	6889640.58	434140.65	Location: Minor subsidence aligned with strike.	S20	6888954.56	434292.67	Location: Pit. Pit is emitting smoke. Recommend gas analysis. Signage present.
S10	6889463.87	434177.24	Location: Blurred area. Re-seeded and signed. Probably not resulting from subsidence.	S21	6888884.47	434286.61	Location: Vent to underground, where slope aspect changes from eastward to southward facing. Vent is smoking heavily. Heat emitted from opening. Burn residue present on vegetation immediately surrounding opening. This location is releasing the most amount.
S11	6889467.12	434179.00	Location: Blurred opening. Seeded with legumes. Vegetation only suitable for surface soil retention and not sufficient to prevent slope failure. Crack formed parallel with strike.	S22	6888706.54	434268.54	Location: Adit above tipple. Structure remains in place. Tarp placed by former Kirk (over adit entrance is currently being drawn inward). Smoke has slowed since tarp was placed. Blurred noise can be heard and air drawn into the opening can be felt with th.
S12	6889382.34	434183.61	Location: 5 metre (approx.) linear opening on side of slope. Heat and gases emitted from fissure. Recommend gas analysis. Brown moss vegetation around rim of opening. Native vegetation is dead at rim.	Tipple	6888605.93	434292.00	Location: Blurred structure below Adit line S22. Remains are degraded heavily and debris are scattered around location. Coal sands and cobbles cover surrounding ground. An access road from the South Klondike Highway leads to this location. A turn around cut.
S13	6889323.87	434228.29	Location: Very deep pit. Coal visible at surface and going to depth. Heat and gases emitted from hole. Recommend gas analysis. Pit location is not visible.				Information taken from personal communication with Mike Nadeau (Natural Resources Officer, Department of Energy, Mines and Resources, Yukon Government).

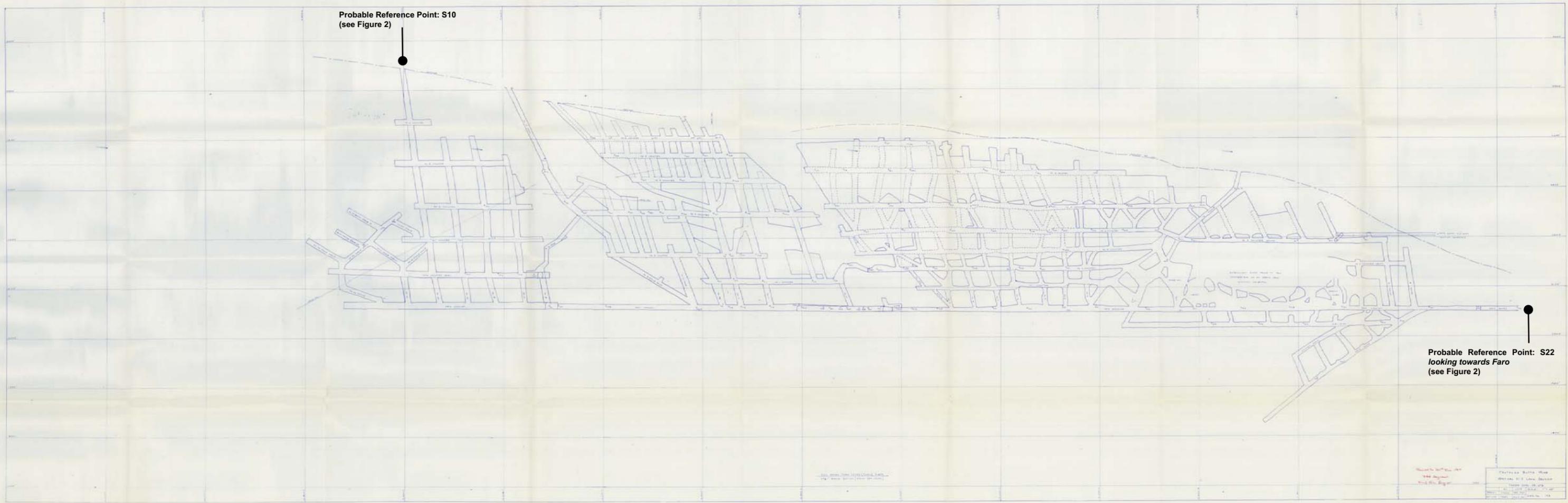


Figure 3 - vertical N-S long section (Yukon Coal Company Ltd., 1967)

Owner	Production Period	Production Tonnage	Ore Source
Five Fingers Coal Company Ltd.	1923-1938	6,810 t	Underground
Yukon Coal Company Ltd.	1948-1967	118,000	Underground
Anvil Mining Corp Ltd.	1969-1976	109,770	Underground
	1975-1976	27,200	Subcrop of the main seam
	1978	21,410	Surface Mine
	1979	22,680	Surface Mine
	1980	18,140	Surface Mine
	1981	11,790	Surface Mine
<u>Totals:</u>	58 years	218,918t	approx. 3 km strike length

Table 1 – Summarized history of Development and Ownership at the Tantalus Butte coal mine site.

3.0 Regional Setting

Climate

Tantalus Butte is contained in the Yukon Plateau-Central Ecoregion. The precipitation is relatively light with amounts ranging from 250-300mm. Two-thirds of the precipitation occurs during the summer months, and snow cover remains from mid-October through mid-April in lowland areas and later into the spring at higher elevations. Mean temperatures in the winter range from -30°C to -20°C, and summer mean temperatures range from +10°C to +15°C. Extremes range from -60°C to -65°C minimums to +35°C maximums in the lowest valley floors. (Smith, C.A.S. et al., 2004) Mean temperatures are greater than 0°C from mid-April to mid-October. Winds are typically light with strengths becoming moderate to strong during storm situations.

Vegetation

The vegetation in the area is composed mainly of montane boreal forest below elevations of 1,200m ASL. The forests in have been affected by forest fires in the past which can ignite due to a high incidence of thunderstorms along the north part of the Tintina Trench. (Smith, C.A.S. et al., 2004) Frequent fires in the past have resulted in a prevalence of lodgepole pines and trembling aspen in lowland areas. Aspens can be found on steep south facing slopes, and pines are found in well drained areas with coarser soils. On colder north facing slopes and alluvial flood plains white spruce are being replaced by black spruce and permafrost. On drier sites the understory is mainly lichen, kinnikinnick and grass. In more moisture rich areas sites commonly contain more shrubs such as alder, willow, lingonberry, soapberry and mosses (Smith, C.A.S. et al., 2004). Grasslands in this region are characteristic. They occur at sites found in valleys and as high as alpine zones. Sagewort, rose, juniper and kinnikinnick are typical species in grassland regions. Aspens and willows tend to grow into moisture rich grasslands usually at the base of slopes.

Wildlife

The ecoregion in which the Tantalus Butte mine lies supports a variety of mammal and bird species. The list below provides a complete list of species found in the ecoregion. Some of the species listed may occasionally frequent the Tantalus Coal Property, while others may never visit the location. Large mammals found in the area include caribou and moose. Other species include river otters, snowshoe hare, shrews, squirrels and mice. Predator species include coyote, wolf, black and grizzly bear and wolverine in lower numbers than adjacent ecoregions, and lynx. A

complete list of animal species taken from the Ecoregions of the Yukon Territory: Biophysical Properties of Yukon Landscapes Report is presented as Table 2 below.

Carnivores	Rodents
Cyote	Northern red-backed vole
Wolf	Brown lemming
Red fox	Long-tailed vole
Cougar	Tundra vole
Lynx	Meadow vole
Wolverine	Chestnut-cheeked vole
River otter	Muskrat
Marten	Heather vole
Ermine (short-tailed weasel)	Northern bog lemming
Least weasel	Beaver
Mink	Bushy-tailed woodrat
Black bear	Deer mouse
Grizzly bear	Porcupine
Ungulates	Northern flying squirrel
Moose	Hoary marmot
Elk	Woodchuck
Mule Deer	Arctic ground squirrel
Woodland caribou	Least chipmunk
Lagomorphs	Red squirrel
Snowshoe Hare	Meadow jumping mouse
Collared Pika	Insectivores
Bats	Black-backed shrew
Little Brown Myotis	Common shrew
	Pygmy shrew
	Dusky shrew
	Water shrew

Table 2 – Summary Table of Animal Species in the Central Plateau Ecoregion (Ecoregions of the Yukon Territory: Biophysical Properties of Yukon Landscapes) (Smith, C.A.S. et al., 2004)

Geology

The bedrock underlying the Tantalus Butte coal property is composed of the Upper Jurassic Tantalus Formation. A footwall of Haematitic Sandstone occurs in the floor of the open pit. The hanging wall is primarily the Laberge series conglomerate. Slickensides were noted on large cobbles in the open pit and on the west pit wall indicating the occurrence of faulting.

The coal seam is mainly found within the Laberge conglomerate in the open pit, and in holes where visible coal was noted. The seam strike is north and the dip is 055 and has been displaced by northeast striking, southeast dipping faults. MINFILE 115I/1 describes the coal as being: 2.4-6m thick, non-coking, high-volatile bituminous B coal. The reported analysis of the coal composition is 14% ash, 35% volatile and 51% fixed carbon with a gross calorific value between 11,000 and 12,700 BTU (MINFILE, 1995).

4.0 Land Use and Socioeconomic

4.1 CURRENT LAND USE AND LAND TENURE

The area containing the Tantalus Butte Coal Property is currently contained in part by 2 parcels of private, mostly vacant crown owned and some First Nation settlement land (Figure 2). A 100m land disposition (Disposition 2004-0003) for Yukon Energy Corporation also runs less than to the east of the property.

Coal exploration licences in the Yukon are grouped as 4 grants per NTS map sheet. The Tantalus Butte site is found on NTS map sheet 115I01 which currently contains 3 active coal exploration licenses (Figure 4). These licenses are granted to Archer, Cathro & Associates (1981) Ltd. The active coal exploration grant numbers are as follows:

- Grant Number: CYW0088 (southeast quadrant) – *expires 9/6/2009*
- Grant Number: CYW0089 (northeast quadrant) – *expires 9/6/2009*
- Grant Number: CYW0090 (northwest quadrant) – *expires 9/6/2009*

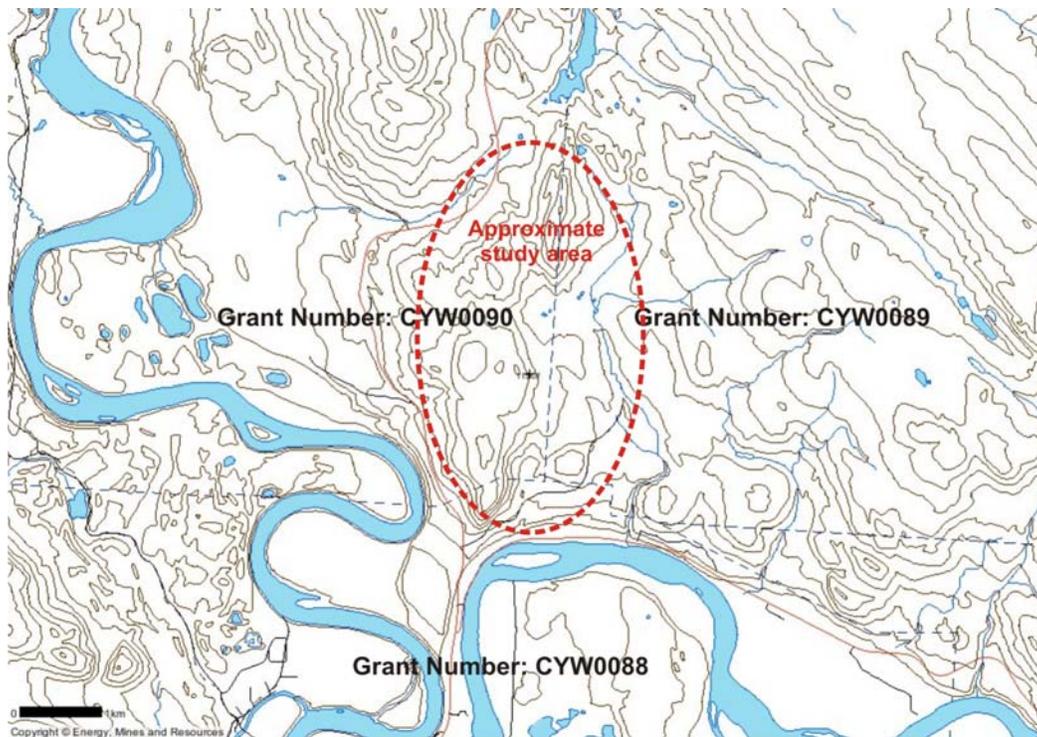


Figure 4 – Active Coal Exploration License around Tantalus Butte (Energy Mines and Resources, Yukon)

The privately owned lots within the immediate area are owned by the following individuals starting with the southern most lot:

- Lot 23, 55634 CLSR
Bonnie Kirk-Sundin
Box 112, Carmacks YT
Y10B 1C0
- Lot 24, 55634 CLSR
Jean Paul Goulet
General Delivery, Carmacks YT
Y10B 1C0

The single parcel of First Nation Settlement Land to the south-east of the property is identified as:

- Lot 1098
LSC C-23B
85102 CLSR

A map indicating the land tenure in and around Tantalus Butte follows as Figure 5.

4.2 FIRST NATIONS HISTORY IN THE AREA

Originally the area around Carmacks was part of the fishing and hunting territory for the Northern Tutchone peoples. The town of Carmacks was an important trading stop on route to the Coastal Tlingit and the Northern and Interior Athapaskan.

Public legends describing the area indicate a long history of human activity in the area. Tantalus Butte was once known as *Gün Tthi* (Worm Hill). Legends reportedly describe the glowing eyes of the worm which were said to be lit by pieces of the sun. If travellers on the Yukon River were too loud when passing Gün Tthi the worm would call up a wind to blow them from the river. Although far from proof, the existence of this legend suggests that the Tantalus Butte coal seam has been burning for many years.

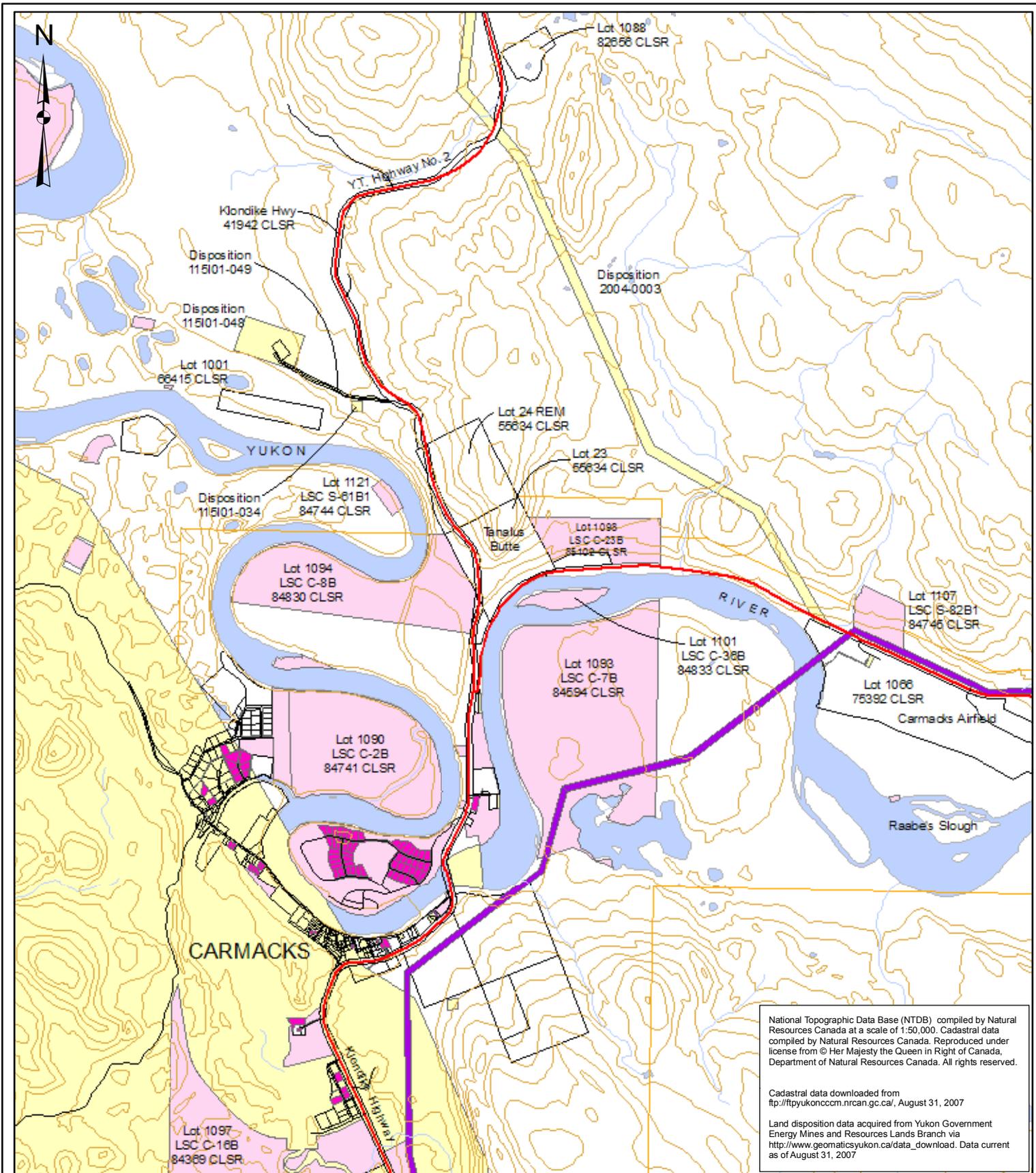
The community of Carmacks is the home of the Little Salmon Carmacks First Nation (LSCFN). The majority of the residents live on the south side of the river.

5.0 Site Description

5.1 SITE INSPECTION

A site inspection of the Tantalus Butte coal property was conducted on June 21, 2007. The property was walked by Access Consulting Group's Robert McIntyre (R.E.T), and Ryan Gould (Geologist) as well as Steve Colp (Natural Resources Offices, YG Energy Mines and Resources). A representative from the Little Salmon Carmacks First Nation was not available for the June 21 visit.

The Tantalus Butte coal property was initially inspected remotely from a view point south of the hill, on the air port road leading east from the Yukon River Bridge. No smoke or structures were visible from this location. The property was accessed first from the south entrance where structures originating from 1967 activity were observed. A pedestrian transect was conducted by entering the site with a truck from the north entrance by way of an access road. Using the road, the open pit and waste dump were accessed and inspected. The remaining inspections were conducted on foot using a trail. Site inspection locations are indicated on figure 2 and a detailed table describing those sites is presented as Table 3.



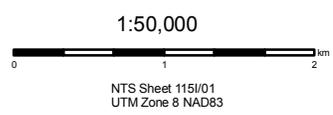
National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.

Cadastral data downloaded from <ftp://ftp.yukonccm.nrcan.gc.ca/>, August 31, 2007

Land disposition data acquired from Yukon Government Energy Mines and Resources Lands Branch via http://www.geomatics.yukon.ca/data_download. Data current as of August 31, 2007

Legend

- Main Road
- Secondary Road
- Water Course
- Contour
- Cadastral Parcel
- First Nation Settlement Land
- Parcels within First Nation Settlement Land
- Land Disposition
- Community Boundary
- Easement
- Water Body



Tantalus Butte Area

Land Use

Drawn By: HD	FIGURE 5
Checked By: RM/RG	Date: Sept. 2007



Our File: D:\Project\AllProjects\YTYG\07-03\gis\mxd\LandUse_TantalusButteArea_1151_1.mxd

The following describes observations made during the June 21, 2007 site inspection. Photographs of the locations described can be found in Appendix 1.

South Entrance

The Tantalus Butte site is accessible from both the north and south ends. The southern access road, leading to the base of the steep, south facing slope is blocked with a chain gate (Figure 2). The road appears to be in regular use and is easily passable with a full size pick-up truck. The road edges are completely grown in with willow and alder. The road terminates in a cul-de-sac shape surrounded by stands of mature aspen and black spruce indicating no recent clearing activity.

Standing on the road the surface facilities, possibly dating back to 1923, are between 10m and 20m up the slope to the north. These include a tibble and shoot (Appendix 1, Plate 1). The structures are constructed of heavy timber and are thoroughly degraded. A large piece of sheet metal remains inside the shoot and coal and minor structural debris are scattered in the immediate area. This location is described in Table 3.

The lower adit entrance is located about 10m upslope from the tibble. A blue tarpaulin has been attached around the adit mouth. The edges of the tarpaulin are well buried in the earth surrounding the exposed structure to form a partial temporary seal over the entrance. The tarp is being tautly drawn into the adit mouth and a loud sucking sound is being emitted from around the tarp as air is drawn inward. According to Mike Nadeau (Natural Resources Officer - Yukon Government - Energy, Mines and Resources Department) the tarp was erected by local land owner Bonnie Kirk-Sundin. Smoke from the underground, which had been exhausting from a vent raise opening higher up the slope slowed with the installation of the tarp (Nadeau, pers. comm. 2007).

Inspection By Pedestrian Transect

The locations inspected during a pedestrian transect of the site were mainly on the east slope of the hill. These sites were accessed from a game trail which led from the bermed end of the access road (Figure 2, Site S5). The trail runs parallel to the hill. Sites accessed on foot are indicated in figure 2 as locations S5 through S22.

Locations immediately south of the open pit showed evidence of bulldozer trenches. Most of the trenches were seeded with grasses and volunteer revegetation was occurring (Appendix 1, Plate 2). The remains of a shaft collar and notched ladder were found at site S6 (Appendix 1, Plate 3, and Plate 4).

Signage was erected at most locations and gave warnings such as: **“Danger Former Minesite. Use Caution While Walking in the Area”**, **“Keep Out Former Underground Mine Entrance”** and **“DANGER Former Cave in Area. Approach with Caution”**. Appendix 1, Plate 5 is a typical example the signage found on site. A sign found on the ground near site S7 had been melted (Photo 1).



Photo 1 – Heat impacted warning sign. Site S7 (June 21, 2007)

Between sites S7 and S12 are several locations of minor subsidence. These areas did not show evidence of tension cracking and have been reseeded with grasses and signed. Site features in this area are aligned sub-parallel to strike.

A fist sized hole of undetermined depth was located at site S 11 (Appendix 1, Plate 6). Cracks forming around this hole are aligned parallel to strike. Vegetation within 30cm of the rim was burned, and heat was actively emitting from the hole at the time of inspection. A fissure opening about 5m in length was located at site S12 (Appendix 1, Plate 7). This opening was also actively emitting heat and showed evidence of burned vegetation around its rim. Unidentified mosses within 20cm of the rim were brown in colour and dry to the touch. Based on the position of this fissure it could be anticipated that slope movement may occur in the future. The potential for landslides in the Tantalus Butte area was described by Archer Cathro in a report produced in the early 1970's.

Open holes were located further to the south. These holes are indicated on Figure 2 as sites S13 through S20. Detailed descriptions of individual sites are provided in Table 2. All the holes were brushed back from the edge of the hole for visibility and signed as described above (Appendix 1, Plate 8). The width of individual pits varied slightly, but typically was estimated at 10m. Hole depth estimates range from 3m to 4m. All pit walls were visually inspected and showed evidence of numerous failure events. The high-wall, on the west side of each opening, was heavily brecciated and was actively ravelling at the time of inspection (Appendix 1, Plate 9).

Openings at sites S13, S15, S16, S17, S18, S19 and S20 were actively emitting varying degrees of heat, smoke and other gases. Exhaust point locations within the holes could not be determined due to collapsed wall material. Vegetation still growing on large pieces of collapsed material at the bottom of the pits was dying. The rims of many openings at these locations were unstable and often undermined with only roots and grasses holding them in place.

A potential vent to the underground was located at site S21 (Appendix 1, Plate 10). At the time of inspection a significant amount of grey smoke and heat was emitting from the opening. The wooden structure here was blackened from the smoke, intact and in fair condition. The opening was sealed with timbers and partially covered with a sheet of plywood. An unreadable sign was attached to the timbers at the top of opening mouth. It was concluded by the size and shape of the sign that it was placed at the same time as those found to the north. Vegetation within 2m of the vent was coated in soot and dying.

North Entrance

Open Pit

The open pit area was accessed from the northern entrance. The access road forks before the pit with the west, or right, branch ending abruptly at the pit edge. No warning signs are present at this location and the drop-off point is not apparent upon approach. From this location the pit can be viewed from the west side (Appendix 1, Plate 11).

Throughout the pit, the west pit wall is mainly vertical, brecciated and can reach heights of over 22m. Several rock slides were noted below the west wall. The rim of the pit has grown in with willow, poplar and spruce and is no longer apparent when approaching. To the east the wall is also heavily brecciated. The east wall is about 10m in height at the north end and reduces to ground level to the south. Revegetation is occurring on east wall locations with less exposed bedrock (Photo 2).



Photo 2 - Revegetation at foot of open pit wall, east side of pit. Site S3. (June 21, 2007)

Site	UTM Zone 8N (Nad 1983)		Description	Site	UTM Zone 8N (Nad 1983)		Description
	Northing	Easting			Northing	Easting	
S3	6890683.01	433998.28	Location: Open pit. High wall is approx. 20m in height. Geotechnical concern on highwall side of pit. Trees growing to upper edge of highwall are blocking view of pit when approaching from above. Double berming recommended at pit edge. Evidence of faulting. Slicken-slides on hanging wall rock. Visible coal on high wall side of pit. Fire pit remains found. Volunteer revegetation occurring on low wall side of pit.	S14	6889276.52	434238.93	Location: Subsidence pit. Brushed for visibility. Subsidence actively occurring.
S4	6889873.82	434351.74	Location: Waste rock pile. Good stability. No ravelling occurring on edge of pile. No ponded water. Volunteer revegetation occurring. Also evidence of possible replanting. Fire pit and beer bottle remains found.	S15	6889232.79	434253.21	Location: Very deep hole. Slope on low wall is actively ravelling. Highwall is heavily fractured bedrock and failing. Coal is visible at surface and goes to depth. Signage present: "DANGER Former cave in area. Approach with caution" Gasses emitted from pit. Recommend gas analysis.
S5	6889871.68	434175.41	Location: On trail leading south from access road termination at waste rock pile. Partially revegetated berm blocking trail. Signage on berm: "DANGER Former minesite. Use caution while walking in the area." Recommend brushing around sign.	S16	6889198.04	434263.49	Location: Underground mine workings structure. Highwall is ravelling. Gasses emitting from pit. Recommend gas analysis. Brushed for visibility.
S6	6889761.10	434132.05	Location: Bulldozer trench leading to old shaft collar. Ladder with notched rungs found. Visible coal at edge of pit around shaft collar. Recommend gas analysis.	S17	6889111.78	434287.38	Location: Pit Gasses emitted from pit. Recommend gas analysis. Signage present: "DANGER Former cave in area. Approach with caution" Brushed for visibility.
S7	6889702.81	434149.69	Location: Small pit. Melted sign: "DANGER Keep Out." Sign has graffiti: "Stein Charlie 1977" Burned tree trunk found standing amongst young unburned willows.	S18	6889082.74	434290.46	Location: 2 Adjacent Pits Pits are emitting smoke. Recommend gas analysis. Bedrock on highwall is actively failing.
S8	6889668.31	434147.45	Location: Cleared grassy area with bulldozer trenches south of Stop 7. Area seeded with legume. Bulldozer trenching at this location was also seeded.	S19	6889002.44	434294.12	Location: Pit Heat and smoke emitted from pit. Recommend gas analysis. Spruce tree growing just inside pit is dying. Coal at surface. Bedrock on highwall is failing.
S9	6889640.58	434140.65	Location: Minor subsidence aligned with strike.	S20	6888954.56	434292.67	Location: Pit Pit is emitting smoke. Recommend gas analysis. Signage present. Coal visible on highwall and going to depth.
S10	6889483.87	434177.24	Location: Slumped area Reseeded and signed. Probably not resulting from subsidence.	S21	6888884.47	434286.61	Location: Vent to underground, where slope aspect changes from eastward to southward facing. Vent is smoking heavily. Heat emitted from opening. Burn residue present on vegetation immediately surrounding opening. This location is releasing the most amount of smoke. Recommend gas analysis. Structural supports intact, but degraded. Signage posted above opening is burned and unreadable.
S11	6889467.12	434179.00	Location: Burned opening. Seeded with legumes. Vegetation only suitable for surface soil retention and not sufficient to prevent slope failure. Crack formed parallel with strike.	S22	6888706.54	434268.54	Location: Adit above tipple. Structure remains in place. Tarp placed by Bonnie Kirk ¹ over adit entrance is currently being drawn inward. Smoke has slowed since tarp was placed. ¹ Sucking noise can be heard and air drawn into the opening can be felt with the hand.
S12	6889382.34	434183.61	Location: 5 metre (approx.) linear opening on side of slope. Heat and gasses emitted from fissure. Recommend gas analysis. Brown moss vegetation around rim of opening. Native vegetation is dead at rim.	Tipple	6888655.93	434292.60	Location: Beamed structure below Adit (see S22). Beams are degraded heavily and debris are scattered around location. Coal sands and cobbles cover surrounding ground. An access road from the South Klondike Highway leads to this location. A turn around suitable for large trucks forms a loop below the structure.
S13	6889323.57	434226.29	Location: Very deep pit. Coal visible at surface and going to depth. Heat and gasses emitted from hole. Recommend gas analysis. Pit bottom is not visible.				Information taken from personal communication with Mike Nadeau (Natural Resources Officer, Department of Energy, Mines and Resources, Yukon Government).

Table 3 – Site inspection location descriptions

The east, or left, branch travels around the north end of the pit and continues south down the east side. An access road to the pit bottom is approximately 465m down the east side. From the pit floor at location S3 it was noted that volunteer revegetation is occurring to on the east side of the pit floor and up shallowly slope sections of the wall. A circular 6 inch diameter hole about 10m south of the access road mouth was found supporting a young poplar tree. This hole is likely the result of 1977 percussion drilling. A fire ring and several empty beer bottles were also found at the mouth of the access road (Photo 3).



Photo 3 – Remains of fire pit, open pit. Site S3. (June 21, 2007)

Waste Rock Dump

The waste rock dump is located on the east facing slope approximately 400m from the southern extent of the open pit. Upon inspection, the dump appeared to be stable with no tension cracks discovered. The sloped face of the dump is below the angle of repose and mass movement is not expected to occur at this location. Voluntary revegetation is occurring at this site with no apparent reseeding present (Photo 4). Several beer bottles were found at this location indicating human presence further into the site (Appendix 1, Plate 13).

A stream bed, dry at the time of this inspection, appears to cross the access road to the west and travel down the hill below the toe of the dump.



Photo 4 – Waste rock dump slope and volunteer revegetation. Site S4. (June 21, 2007)

Stockpile and Loadout Area

The stockpile and loadout area are shown in Figure 6. This location is found approximately 100m from the mouth of the northern entrance on the north side of the access road. The area consists of 2 main piles of coal. Photo 5 shows the piles of coal which are approximately 20m long x 15m wide x 5m high (approx. 1500m³ per pile). The remains of wooden structures most likely used to support dumping equipment were located along the access road which travels around the south side of the load out area.

There were no indications of environmental contamination present at this location.



Photo 5 – Coal stock pile in loadout area. (June 21, 2007)



Figure 6 - Aerial photograph of the northern load out area (early fall, 2003)

6.0 Environmental and Physical Hazards

6.1 ENVIRONMENTAL HAZARDS

Environmental hazards existing on the site include the contamination of ground water, airborne toxic and oxygen consuming gasses, and the destruction of habitat.

Contamination of the local water source could occur from the exposure of ground to either burned or unburned mine workings and material. This could occur during events of high ground water during spring months.

Airborne toxins could potentially originate from openings connected to burning underground material. Coal can potentially emit, among other chemicals and heavy metals, quantities of Carbon Dioxide (CO₂), Sulphur Dioxide (SO₂) and Nitrogen Oxides (NO_x). Gasses heavier than air can travel down slopes and settle in low areas once emitted. Though these gasses may not alone be deadly, however many can consume or “drive-off” oxygen from air producing an oxygen depleted environment. Areas of depleted oxygen can potentially be deadly both humans and animals.

On July 20, 2007 flames were reported by YG (Pelletier, pers. com., 2007) and LSCFN (Charlie, pers. com., 2007) to be visible emerging from the upper vent opening (Figure 2, Site S21). Occurrences of flare-up have the strong potential to ignite the dry grasses covering much of the east slope as well as other vegetation.

6.2 PHYSICAL HAZARDS

Both underground and surface mines can exhibit physical hazards after closure or abandonment. There are risks existing on the Tantalus Butte coal property for persons travelling by foot and recreational vehicle. Most locations also exhibited potential risks to wildlife.

Most notable on the property was the risk of injury or death due to falling. The vegetation adjacent to the open pit has grown in up to the edge and is currently obstructing its view (Appendix 1, Plate 12). Also noted was the lack of signage warning of the pit presence when approaching by way of the access road west branch. Those persons operating recreational vehicles on the property and those on foot could mistakenly travel close to the rim and fall from the open pit wall.

Falling injuries could also occur at several open-hole locations. Many holes have been signed and brushed, however an intrigue risk exists for those who choose to approach the rims where pit walls are unravelling. Combined risks are also present at holes connected to the underground workings.

Gasses emitted by smouldering underground workings at pit locations could cause an observer to be overcome and fall into the pit. There is a high possibility that this hazard exists at any location potentially connected to underground workings. This is due to the high potential for smoke to be emitted through the fractured surface material underlying much of the site.

Injuries on the site could also be inflicted by falling material. A significant amount of debris was noted scattered at varying distances from the foot of both pit walls in the open pit. Also large cobbles were noted in the bottom of most holes on the east slope. Freezer thaw action, common in the north, will continuously loosen wall rock each season presenting a significant overhead danger to those exploring below.

As mentioned in Section 6.1, a risk of forest ignition exists when burning underground material makes contact with the surface. Three parcels of private land along with First Nation Settlement Land exist within 1km of the site. Should a forest fire ignite on the property, it would be very probable that these locations would be placed in danger.

6.3 CONTINUED BURN OF COAL AT OTHER LOCATIONS

The Tantalus Butte formation, which has the coal seam, extends some 5km north and approximately 11.25km south of the Tantalus Butte mine site. A small portion of the formation also can be found approximately 4.5km southwest of the Minto mine on the west side of the Yukon River.

It is very possible that extensions of this seam occur in other extents of the formation. In fact smoke or steam has been observed emanating from areas above the community of Carmacks on the south side of the Yukon River, in the area of the old Tantalus Mine (McIntyre pers comm., 2007).

6.4 RISK REGISTER

Several types of risks were identified during the inspection on June 21, 2007. A summary of the risks determined to be present on the Tantalus Butte Coal property is follows as Table 4.

The organization of Table 4 is as follows. The first column, Hazard Category, groups associated risks into families and presents a common hazard to humans, wildlife, infrastructure or the local environment. Any possible subsets for each hazard category are also presented.

Column 2, **Description**, goes into greater detail on the risks noted around the site for each hazard category. This column gives examples of locations expected to be most highly affected by each hazard and presents the conditions noted during the June 2007 inspection.

Each hazard is ranked from 1 to 5 under **Severity**. The scores assigned in this column are broken down as follows:

- 1: (Minor Injury / Minor Damage to Equipment or Buildings),
- 2: (Injury – no time lost / Damage or repair costs are low),
- 3: (Injury – lost time / High damage or repair costs),
- 4: (Major reportable injury / Very high damage or repair costs), and
- 5: (Fatality / Major damage or repair costs)

Column 4, **Likelihood**, gives a value based on the likelihood of each item occurring. The values for Column 4 range from 1 to 5, with 1 being the lowest likelihood (20% approximate probability) that the item of concern will occur, and 5 (100% probability of occurrence).

Column 5, **Summary Risk Ranking**, is a calculated risk value for the each item of concern resulting from the product of Severity and Likelihood. A low value in this column indicates a low risk to the public, or rescue personnel. Risk rankings are grouped as follows:

- High Risk:** Risk Ranking of 15 to 25
- Medium Risk:** Risk Ranking of 8 to 12
- Low Risk:** Risk Ranking of 1 to 6

Hazard Category	Description	Severity Ranking 1 (Minor injury / Minor Damage to Equipment or Buildings), 2 (Injury – no time lost / Damage or repair costs are low), 3 (Injury – lost time / High damage or repair costs), 4 (Major reportable injury / Very high damage or repair costs), and 5 (Fatality / Major damage or repair costs)	Likelihood of Occurrence 1=20%,...5=100%	Summary Risk Ranking Low = 1-6 Med = 8-12 High = 15-25	
Ground subsidence and complete failure	Future or potential subsidence due to removal of underground material. Locations where underground workings are close to surface are potential locations of subsidence or failure. Cracking of surface could trigger mass movement of slope material.	4	4	16	H
Falling objects	Highwall: large failure events Ravelling due to fractured condition of regional bedrock Geotechnically unstable conditions throughout the entire site.	4	3	12	M
Forest Fires	Ignition of woody material surrounding openings emitting flames or heat. Ignition of dry grasses on east and south slopes.	3	4	12	M
Encounters with hidden dangers	Sudden drop-offs Open holes, Buried or hidden underground workings Site is used for recreational purposes (ATV trails, fire rings, liquor bottles and foot paths identified during site survey). Open pit edge is hidden by vegetation from view when approaching. West branch of Northern Access Road leading to pit rim is not signed. Insufficient warning signage and overgrown vegetation around open holes.	3	4	12	M
Loss of Habitat	Forest Grass Lands Riparian Heat and flames emitted from burning underground could ignite vegetation near openings. Potentially resulting wildfires could severely damage, or destroy habitats. Burning vegetation, foul odor and sink holes all cause animals to avoid the area. Fire activity would magnify the habitat area affected.	4	3	12	M
Inhalation of Toxic Gasses	Human NOx (nitrous oxides), SO2 (sulfur dioxide), CO (carbon monoxide), deficient Oxygen levels, CH4 (methane). Gasses of unknown composition were actively emitting from a significant number of holes surveyed and present a hazard when approached. Gasses heavier than air can settle in areas topographically lower than the source. Unsuspecting individuals could come into contact with these gasses while traveling below the site.	5	2	10	M
	Wildlife Gasses heavier than air can settle in areas topographically lower than the source and affect air quality in riparian and other low lying habitats	5	2	10	M
Damage to adjacent infrastructure	North Klondike Highway The North Klondike Highway runs immediately to the west of Tantalus Butte. Wildfires ignited by the underground fire could overtake the road and cause damage.	3	2	6	L
	Faro Road The Faro Road runs immediately to the south of Tantalus Butte. Wildfires ignited by the underground fire could overtake the road and cause damage.	3	2	6	L
	Local residential and related structures Houses and outbuildings were noted along the Faro Road, to the southeast of Tantalus Butte. Wildfires ignited by the underground fire could overtake these and cause damage to, or destroy the structures.	3	2	6	L
	Yukon River bridge The bridge crossing the Yukon River is located approximately 2km south the south of Tantalus Butte. Wildfires ignited by the underground fire could overtake the road and cause damage to the bridge and possibly hindering travel on the North Klondike Highway.	3	2	6	L
	YEC power transmission line YEC power transmission lines run adjacent to the North Klondike Highway. Wildfires ignited by the underground fire could cause damage or destroy the lines and poles.	3	2	6	L
Continued coal burn at other locations	Formations containing coal and in potential contact with the material burning underground material could carry the fire underground beyond the property assessed in this report. Geological maps of the region indicate the coal bearing Tantalus Butte Formation occurring at locations beyond the northern extents of the property, and across the river to the south at the Tantalus Mine location. Outcrops Tantalus Formation were also noted to the north, on the west side of the Yukon River, approximately 5km southwest of Minto. Coal is also noted in the hanging wall Leberge Series conglomerates. The Leberge Series occurs to the north and east of the site.	4	1	4	L

Table 4 – Site Risk Registry

7.0 Conclusions and Recommendations

7.1 CONCLUSIONS

The Tantalus Butte coal property site presents physical hazards mainly in the form of existing open holes and potential new subsidence areas. These holes are actively collapsing and present a risk if approached. The high wall of the open pit is currently unfenced and vegetation is growing up to the pit rim interfering with the view of the pit.

Heat and gasses were noted emerging from several locations on the east slope. The rate of output and composition of the gasses is unknown at the time of this report. Vegetation surrounding smoke and heat emitting openings were dry, burned and/or coated in tars from the smoke. Therefore it can be concluded that openings displaying these characteristics are possible risks for forest fire ignition points.

The site is heavily used by the public as a recreational area. Fire rings and beer bottles were discovered at several locations, and personal communication with local individuals indicated public use of the area. Also local individuals indicated that the lower adit is a well used “hang-out” known as Lover’s Lane. However this area is found on privately owned land.

It can be concluded that there is a high risk of public interaction with site hazards.

Short term developments on the site are difficult to predict without knowledge of the current underground conditions. It can be concluded confidently, however, that the actively collapsing openings will continue to widen with each freeze/thaw event. Also the risk of surface fire ignition will be ever present as long as the underground continues to burn.

In the long term, without efforts to extinguish the fire, the underground could continue to burn for several 10’s to 100’s of years. This is, however, only a broad estimate based on the local geography and historical geological reports. A more accurate estimate can be calculated using 3 dimensional modeling of the underground workings combined with a known ore body size. Currently the size of the ore body is unknown.

Continued burning can result in additional removal of material. This could continue to weaken the underground supporting the surface and enlarge existing holes, or produce new subsidence events at other locations on the property.

7.2 RECOMMENDATIONS FOR FURTHER ASSESSMENT

There are a number of locations on the Tantalus Butte coal property that present potential risks to members of the public using the area for recreation and to those living near its location. The following are recommendations to further assess the site, the progression of site conditions and the presence of any hidden dangers not indicated in the preliminary site assessment.

7.3 UNDERTAKE GROUND GEOPHYSICAL SURVEY

Many of the surface features identified during pedestrian transects of the site are likely related to underground structures and the presence of voids. These features are often invisible and potentially present both immediate and future hazards to humans, wildlife and the environment.

There are a number of geophysical methods that could be used for delineation of the underground voids in sedimentary rock formations. Some types of geophysical instruments rely on the magnetic or electrical potential of the underground materials and would not be useful when

analysing non-metallic bodies such as coal. For the underground conditions at the Tantalus Butte Site, technologies detecting material density changes are thought to be most applicable. Methods which are proved useful for detecting the above anomalies include:

- ground penetrating radar;
- Seismic reflection and refraction; and
- Gravity anomaly surveys;
- Heat Imaging Remote Sensing

Geophysical data is typically remotely sensed and therefore the majority of these methods do not require the removal of surface material for an effective analysis, and can often be operated by one or two technicians.

Based on direct experience in the field, it is recommended that **ground penetrating radar** (GPR) be used for delineating subsurface conditions in and around the Tantalus Butte site. GPR has been applied in placer mining operations to determine depth to bedrock, in detecting voids contained in concrete structures, in assessing structural damage incurred during an earthquake and in many other applications where precise images of underground structures are sought.

The process relies on the reflection of electromagnetic radiation (UHF/VHF) pulses directed into the ground. This reflection occurs where there are changes in density and therefore could not only provide images and extents of any subsurface voids, but also provide a clearer understanding of the extents of the coal seam and help to eliminate any gaps in the information available for the site.

7.4 COLLECT LOCAL TRADITIONAL KNOWLEDGE

Traditional knowledge and information gathering sessions are an important component in public involvement and gaining public support for solutions. The existence of the Gün Tthi legend is one indicator of the long established and historical presence of the LSCFN in the region. During these sessions information could be collected from First Nation elders and other members of the LSCFN to possibly form a timeline of events occurring prior to and after any development on the property.

Any information gathering sessions should also involve the Carmacks Renewable Resource Council and the Carmacks Land Application Review Council.

7.5 CONDUCT FURTHER DETAILED MAPPING

There have been a number of site inspections conducted to date. These focused on the north, east and south sides of Tantalus Butte. The inspections were mainly aimed at previously known and recently discovered features occurring on strike with known portions of the coal seam. It is possible that underground development was conducted at locations lateral to the main seam. Therefore it is recommended that a tightly spaced, GPS assisted “grid-search” style survey using pedestrian transects be conducted. This search should cover the entire property in order to establish a complete inventory of all surface features possibly related to the abandoned mine or underground fire. When mapped these features could help predict future hazard areas.

7.6 CONTACT CURRENT COAL EXPLORATION LICENSE HOLDERS

There have been several mining companies involved in development over the life span of the property. These companies conducted geological mapping on the property at varying levels of detail depending of the technology available at the time and the current methods in use.

It is possible that these companies could still have in their possession maps and positional information on geological formations and underground workings. Using modern day GIS, and 3D CAD technology, these diagrams and plans could be processed and used to build a more complete understanding of the property, its underground structures and the extents of any geological formations.

7.7 DEVELOP AN INVENTORY OF CURRENT LAND TENURE

It is recommended that an inventory of the current land tenure in an around the Tantalus Butte Property be formed. This is an excellent starting point to identify those parties who would be most immediately impacted should any affects related to the property migrate to surrounding areas.

This inventory could help to form an emergency contact list in the event of a fire, and would potentially begin to form an understanding of any possible liability risks to the government or local citizens in the future.

Engage expert consultants regarding further predictive techniques for examination for

7.8 CONSULT DEPARTMENTAL STAFF

In order to benefit from the potentially significant quantity of corporate knowledge about the site, the Tantalus Butte Mine has an extensive history of development. During the lifespan of the property several stages of governmental evolution have been present. Over these periods the mine has been regulated under both the Federal and Territorial governments. The Yukon Northern Affairs Program Devolution Transfer Agreement was concluded on October 29, 2001 when land and resource management was transferred to the Yukon Territorial Government.

It is recommended that retired and active departmental staff working for the Territorial and Federal government in the Yukon since development on the property began be consulted about any geological, corporate and environmental knowledge.

8.0 Report Certification and Limitations

This report was prepared for the exclusive use of the Government of Yukon and is based on data and observations developed during a site investigation that was guided by Yukon Government, and supplemented by review of publicly available data.

Access Consulting Group has followed standard professional procedures in conducting the site assessment and in preparing the contents of this report. The material in this report reflects Access Consulting Group's best judgment in light of the information available at the time of the preparation of this report. Any use that a third party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of the third parties. Access Consulting Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. Access Consulting Group believes that the contents of this report are substantively correct.

The information and data contained in this report are based solely on the conditions observed at the time of the field assessment and have been developed or obtained through the exercise of Access Consulting Group's professional judgment and are set to the best of Access Consulting Group's knowledge, information, and belief. Although every effort has been made to confirm that all such information and data is factual, complete and accurate, Access Consulting Group offers no guarantees or warranties, either expressed or implied, with respect to such information or data.

Access Consulting Group shall not by the act of issuing this report be deemed to have represented that any sampling and analyses conducted by it have been exhaustive nor have all risks presented by the Tantalus Butte site been necessarily identified, and persons relying on the results thereof do so at their own risk.

Should you have any questions regarding this report, or require further information, please contact the undersigned at Access Consulting Group in Whitehorse, Yukon.

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Appendix A

Plates



Plate 1 – Tipple and shoot structure, Site S22, Figure 2. (June 21, 2007)



Plate 2 – Bulldozer trench with active revegetation seeded grasses. Site S8, Figure 2 (June 21, 2007)



Plate 3 – Remains of shaft collar. Site S6, Figure 2 (June 21, 2007)



Plate 4 – Underground ladder near shaft collar. Site S6, Figure 2 (June 21, 2007)



Plate 5 – Example of signage present around the site (June 21, 2007)



Plate 6 – Fist sized hole emitting heat and gasses. Site S11, Figure 2 (June 21, 2007)



Plate 7 – Opening actively emitting heat and unknown gasses. Site S12, Figure 2 (June 21, 2007)



Plate 8 – Evidence of brushing around pit rim, looking west. Site S18, Figure 2 (June 21, 2007)



Plate 9 – Opening highwall and pit bottom, looking west. Site S18, Figure 2 (June 21, 2007)



Plate 10 – Smoking vent to underground and remains of warning sign. Site S21, Figure 2. (June 21, 2007)



Plate 11 – Open Pit as viewed from the north access road, west branch. , Figure 2. (June 21, 2007)



Plate 12 – Open Pit as viewed from the pit floor. Site S3, Figure 2. (June 21, 2007)



Plate 13 – Voluntary revegetation of waste rock dump and evidence of recreational use of area.
Site S4, Figure 2. (June 21, 2007)