



ARCTIC ALPINE RECLAMATION GROUP

MT NANSEN MINE RECLAMATION REPORT

OCTOBER 2006



Mt. Nansen Mine Site

PREPARED FOR

GOVERNMENT OF YUKON
ENERGY, MINES AND RESOURCES
Assessment and Abandoned Mines Branch

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MINE LOCATION AND SITE DETAIL



SITE LOCATION

The project site is located in the Mt Nansen Valley, Yukon. The Mt. Nansen gold and silver mine site is located approximately 70 kilometers southwest of the community of Carmacks.

The site is in the traditional territory of the Little Salmon Carmacks First Nation.

PHYSICAL DESCRIPTION

The site is within the watershed of Victoria Creek, a tributary stream to the Nisling River, in the Donjek / White River drainage basin.

This area was part of a glacial refuge that did not undergo the force of the last ice age. The area sustains a diversity of wildlife: woodland caribou / moose / wood bison / grizzly bear / black bear and small furbearers.

The latitude is (62 degrees N) and the elevation of the site is (approx. 1,200 m). There is only partial weather data available from the site. The wind direction data recorded at the site indicate that winds are most prominent from the west, southwest, and east.

The Little Salmon Carmacks First Nation has traditional access to the Mt. Nansen area for the harvesting of animals and plants. The area continues to be an important part of the traditional use and subsistence on the land for the members of the Little Salmon Carmacks First Nation.

The mine site is located primarily in a central Yukon sub alpine boreal forest, in a valley of deciduous and coniferous plant communities.

A gravel road supplies year round access to the site.

The mine site and property include (9) areas of disturbance caused by the mine development, operation and shut down:

1. Huestis adit portal area
2. Brown-McDade open pit
3. Brown-McDade waste rock dumps
4. Tailings containment system area & tailings pond dam area
 - Creek diversion area
5. Mill Site Buildings
 - Mill Site waste rock dump
 - Mill site industrial waste and settling pond
6. Pony Adit portal area and core shack
7. Camp / Office building (lower bench) & Kitchen Building area and former camp buildings area
8. Multiple access roads and borrows
9. Old equipment and materials storage sites

INTRODUCTION

This site is a Type II abandoned mine located in the Little Salmon Carmacks First Nation traditional territory.

There are areas at the mine site that require reclamation and revegetation to minimize erosion and to assist in site stabilization. There are also areas that will require remediation and rehabilitation due to the nature of the materials involved and the type of disturbance. It includes the areas adjacent to the service and access roads of the site as well as the areas at the mine camp buildings, mill complex, Huestis portal, waste rock dumps, tailings pond containment area, Brown McDade Pit and exploration trenches.

Project Activities:

- Site Analysis Report and Recommendations
 - Recommendations and Guidelines for preparation of areas to be reclaimed or revegetated
 - Recommendations and Guidelines for reclamation that would maximize the potential for hiring and training of local first nation forces.

The initial site evaluation of selected areas of the mine property was conducted in June, 2006.

The first area to be considered for a pilot project was the Huestis portal area. A scope of work was developed in conjunction with Government of Yukon, Energy, Mines and Resources, Assessment and Abandoned Mines Branch, Carmacks Development Corporation Ltd and Arctic Alpine Reclamation Group.

SCOPE OF WORK – Huestis Portal Area Pilot Project

- Removal and storage in a designated area of debris (rail, timbers, metal and other waste) in front of the Huestis portal;
- Sealing of Huestis portal with coarse waste rock, to prevent access but allow free draining of any water from the adit;
- Contouring of Huestis waste rock dump;
- Seeding of portal apron, waste rock, and access trails at the Huestis adit with an indigenous seed mix designed to site requirements.
- Planting of indigenous plant material (locally collected) to aid in the stabilization of the site

PROJECT BENEFITS

The project design and implementation was to focus on developing opportunities and methods to maximize local employment and training as well as providing recommendations for the development and completion of the Mt. Nansen Mine Reclamation and Closure Plan.

PROJECT MANAGEMENT & RESPONSIBILITIES

The project management team was primarily responsible for ensuring that the reclamation pilot project was completely implemented to the Owner's satisfaction including management and training of local labor forces and expediting of materials and equipment including:

- Management of the terms of the scope of work

- designation of all areas to be reclaimed and revegetated
- reclamation recommendations – best practices and methodologies to achieve the expected outcomes of the scope of work and the guidelines of the project benefits
 - recommend seed mixtures and plant material that conformed to land claims agreements and current Canadian environmental standards for the prevention of the introduction of a foreign seed or plant species.
 - recommend seeding rates and methods that are suitable for the variety of areas to be revegetated and stabilized.
 - recommend & supervise riparian zone rehabilitation: plant harvesting, planting methods & techniques.
 - ensured that grass seed as well as all plant material is indigenous to the site and surrounding areas
 - ensuring no fertilizer use on site
- monitoring and reporting on the pilot project activities and outcomes

The **Carmacks Development Corporation Ltd.** was the General Contractor and provided a reclamation crew; the local first nation crewmembers received training as Reclamation Technicians.

PHASE I

- Removal and storage in a designated area of debris (rail, timbers, metal and other waste) in front of the Huestis portal
- Storage was designated in areas adjacent to the mill complex along with other materials already on site



Huestis Portal Area



Portal Area – Rail Removal

- Removal of Debris: old structures were dismantled
 - Salvageable materials (rails and ore cars) were stored in a designated area at the mill site
 - Other materials were hauled to the waste disposal site and burned by the mine maintenance manager



Removal of Debris and Salvage Materials

Phase II

- Sealing of Huestis portal with coarse waste rock, to prevent access but allow free draining of any water from the adit;



Sealing Huestis Portal and Contouring



- Contouring of Huestis portal and waste rock dump;

Huestis Portal area before contouring



Huestis Portal after contouring

Phase III

- Seeding of portal apron, waste rock, and access trails at the Huestis adit with an indigenous

Seeding of portal apron



- Planting of indigenous plant material (locally collected) to aid in the stabilization of the site

Planting



Planting



Planted



PRINCIPLES OF PROJECT DESIGN AND IMPLEMENTATION

Seed Specifications for the project:

Were based on the most prominent indigenous grass and legume species identified during site evaluation:

- Recommended rate of seeding – 25 kg /hectare
- Seeding rate was based on site / soils examination and the proposed methodology for installation
 - Seed was to be manually broadcast
 - Project areas were to be harrowed to incorporate the seed into the local soil materials

The following grass species were identified on site and recommended for use in the site seeding mix:

- *Puccinellia nuttalliana* – Alkali grass
- *Agropyron violaceum* – Violet Wheatgrass
- *Deschampsia caespitosa* – Tufted Hair Grass
- *Festuca saximontana* – Northern Fescue
- *Agrostis scabra* – Tickle Grass

Plant Specifications for the project:

- Plant materials were to be locally harvested from the closes source on the mine site
- Plant materials were to be harvested to provide a random and representative sample of the local plant materials
- Plant materials were to be harvested with hand shears and .5 meters from the soil surface of the plant was to be maintained to provide for future growth. (the harvesting technique maintains the same height variance as that caused by wildlife browsing)
- Harvesting was only to occur after a major frost and the plant had reached a stage of winter dormancy

Five (5) different woody plant species were harvested and planted as an overall test of the various plant materials available on the mine site.

Planting Method 1: Plant bundles (1 to 3 stems) of locally harvested plant material approximately 75 cm in length were planted horizontally in manually dug trenches to a depth of 15 cm.

Planting Method 2: Plant cuttings (stakes) of locally harvested plant material approximately 50 cm to 1.5 meters in length were planted vertically to a depth of 50 cm to 1 meter with a weighted metal probe due to the soil structure and porosity.

Planting Method 3: Plant bundles (3 to 4 stems) of locally harvested plant material approximately 50 cm in length were bundled together and planted horizontally in trenches to a depth of 15 to 30 cm. due to the soil structure and porosity.

All disturbed areas within the designated boundaries of the project were seeded and harrowed or raked. No fertilizer was used on the mine site.

PILOT PROJECT SUMMARY AND SITE RECOMMENDATIONS:

SUMMARY OF PILOT PROJECT

The Carmacks Development Corporation Ltd acting as the General Contractor provided the project requirements and completed the Scope of Work in an efficient, timely and economical manner.

The Pilot Project was completed on budget and within the time parameters provide and requested in the General Terms of the contract.

This project provided opportunities and methods that maximized the local employment and training as well as providing recommendations for the development and completion of the Mt. Nansen Mine Reclamation and Closure Plan.

SITE RECOMMENDATIONS FOR RECLAMATION OF THE MT. NANSEN MINE

The mine site and property include (9) areas of disturbance:

1. Huestis adit portal area
2. Brown-McDade open pit
3. Brown-McDade waste rock dumps
4. Tailings containment system area & tailings pond dam area
 - a. Creek diversion area
5. Mill Site
 - a. Mill Site waste rock dump
 - b. Mill site industrial waste and settling pond
6. Pony Adit portal area and core shack
7. Camp / Office building (lower bench) & Kitchen Building area, former camp buildings area
8. Access roads and borrows
9. Old equipment and materials storage sites

The following were reviewed and discussed for a priority rating

1. Huestis adit portal area – Pilot Project Fall 2006

- a. The pilot project has successfully reclaimed the immediate area around the Huestis adit portal area
- b. Annual local monitoring and reporting are recommended in order to document results and provide information that will assist in the further development of the reclamation / closure plan for this site and will additionally provide valuable information for reclamation of other mine sites
- c. There are additional areas surrounding the portal (not within the scope of work of this project) that do require reclamation.
- d. Areas of exploration disturbance that preceded the activities at the portal
 - i. There is some debris that should be removed to an authorized storage site
 - ii. The remaining area should be contoured, seeded and planted

2. Tailings containment system area & tailings pond dam area – Pilot Project 2006

- a. This is an area of immediate concern due to the nature of the materials in the tailings pond and tailings containment area. The tailings materials have the potential to affect the surrounding areas with airborne and water contaminants
- b. In June 2006 – a Tailings Vegetation Test Site was established to test indigenous grass and legume varieties. A 24 meter by 5 meter plot with 2 meters for each variety, an additional area – 10 meters by 10 meters was established as a willow bundle and willow stake test site.
- c. In September 2006 – an additional area of approximately .5 hectares of the tailings impound area was seeded with an indigenous seed mix
- d. A separate pilot project was proposed for this area
 - i. A new tailings cover pilot project proposal was prepared and submitted by Carmacks Development Corporation Ltd in October 2006
- e. Annual local monitoring and reporting are recommended in order to document results and provide information that will assist in the further development of the

reclamation / closure plan for this site and will additionally provide valuable information for reclamation of other mine sites

3. Access roads and old equipment and materials storage sites

- a. This is an area of concern to Little Salmon Carmacks First Nation and could be dealt with relatively easily by collecting and sorting the materials and storing them in one authorized location for future disposal off site or buried on site

4. Mill Site

- a. Mill Site waste rock dump
 - i. This is an area immediate concern due to the nature of the materials in the waste rock dump that have the potential to affect the surrounding areas with airborne and water contaminants
 - ii. A mill site waste rock dump cover pilot project proposal was prepared and submitted by Carmacks Development Corporation Ltd in October
- b. Mill Site General
 - i. The area around the mill site is of concern to Little Salmon Carmacks First Nation and could be dealt with relatively easily by the removal of all debris
 - 1. The debris is mostly old metal parts and pieces of machinery that could be dealt with as metal salvage and other materials could be short buried as waste in areas immediate adjacent to the mill site. (already disturbed areas)
 - a. If required these materials could be easily excavated and removed later if required or requested in the final Reclamation and Closure Plan

5. Pony Adit portal area and core shack – A Pony Adit Closure Contract was issued this year.

- a. The portal area and core shack
 - i. Removal of debris by collecting and sorting the materials and storing them in one authorized location for future disposal off site or buried on site

6. Camp & Kitchen Area –

- a. Some cleanup of debris is required
 - i. removal of debris by collecting and sorting the materials and storing them in one authorized location for future disposal off site or buried on site

7. Brown-McDade Open Pit

- a. This area is currently under review and discussion
- b. There are new and emerging reclamation technologies that could be tested on this site as pilot projects in order to document results and provide information that will assist in the further development of the reclamation / closure plan for this site and will additionally provide valuable information for reclamation of other mine sites

8. Brown-McDade Waste Rock Dumps

- a. This is an area concern due to the nature of the materials in the waste rock dump that have the potential to affect the surrounding areas with airborne and water contaminants
 - i. A demonstration project should be considered for this area that would develop positive drainage of the top elevations and direct the drainage away from the open pit area.
- b. Additionally a portion of the demonstration project could test the effectiveness of harvesting local soils and plant material and placing a vegetative cap on the top elevations with positive drainage
- c. A Bio Engineering Demonstration Project (Live Plant Palisade Tier Planting) could be developed for 2007 in order to test the success of Live Plant Palisade Tier Planting. Some areas will require contouring and shaping to reduce the severity of the toe of the slopes and allow for safe access to the area
- d. Annual Local Monitoring and reporting of this area is recommended in order to document results and provide information that will assist in the further development of the reclamation / closure plan for this site and will additionally provide valuable information for reclamation of other mine sites

Additional Areas requiring Reclamation and Revegetation at the Mt Nansen Mine Site

- e. It is recommended that a reclamation site analysis and evaluation for best practices methodologies and budget information be conducted on the following areas
 - i. Closed and abandoned borrow pits
 - ii. Closing of redundant and unnecessary access roads to prevent further access and deterioration of the general surrounding area of Mt Nansen and maintain the culture integrity of the traditional hunting and gathering areas of the Little Salmon Carmacks First Nation

This reclamation site analysis and evaluation for best practices methodologies and budget information could be conducted in the winter / spring of 2007 in order to provide information for the closure planning process.

This report and evaluation could also address the future public safety concerns of the site.