

# **Faro Mine Tour**

**August 28<sup>th</sup>, 2006** 

# **Tour Agenda and Materials**



# Introduction – agenda for the day

7:30 am.

4:30pm

5:00pm

Take a technical tour of the Faro lead-zinc mine site; the tour involves a charter flight to the community of Faro and a short drive to the mine site.

At the site, you will be provided with an overview of current site care and maintenance activities, as well as the approach the federal and Yukon governments are taking to involve the community and local First Nations in preparing a suitable closure and remediation plan for the site.

Meet at Air North desk, Whitehorse airport

**Meet Tour Guides:** Roger Payne, Director of Faro Mine Closure Office Stephen Mead, Project Manager (Faro), Yukon Gov. **Depart Whitehorse for Faro** 8:00am 8:30am Arrive in Faro – transport by vans through the town of Faro to the mine site 9:15am Arrive at Mine site and begin tour Morning Coffee Break on site during tour 12:00pm Lunch on site 1:00pm Continue on with tour **Depart mine site for Airport** 3:30pm

Maps and layouts of the site together with the proposed route for the tour can be found in Appendix A.

**Depart Faro for Whitehorse** 

**Arrive Whitehorse** 

# **Faro Mine Complex – Summary**

The Faro mine site is an abandoned lead and zinc mine now under the care and maintenance of a court-appointed interim receiver, Deloitte and Touche. It is a significant mine with a 30 year history. Faro operated with interruptions from 1969 to 1998. It was one of the largest open-pit lead and zinc mines in the world at that time. The Faro Mine accounted for twenty-five percent of the Yukon's economy when it was operating fully.

The Faro Mine complex spans a length of approximately 20 km with a footprint of approximately 1500 hectares. It consists of three large open pits, approximately 325 million tonnes of waste rock, a mineral concentrator plant, approximately 60 million tonnes of tailings, several water and tailings retention dams, freshwater diversion channels, a 13 km haul road, water treatment facilities and other buildings.

Inadequate company resources for closure lead to federal financial responsibility of the site. Devolution resulted in Yukon government responsibility for closure with funds provided by Canada.

A senior level Oversight Committee (OSC) consisting of Canada, Yukon government, the Kaska Nation and the Selkirk First Nation, provides overall strategic direction to the closure and remediation process. A joint federal and territorial Type II Mines Office is responsible for the overall coordination of work related to the Faro Mine complex. The Faro Mine Closure Planning Office, located in Whitehorse, is responsible for the preparation of a final closure and remediation plan.

The site employs up to 50 local people during the summer months. Currently, over 50% of care and maintenance funds are spent in the territory. The care and maintenance expenditures for 2006/07 are expected to be about \$10 million, with closure planning accounting for \$3 million of those funds.

The site has potential future, long-term environmental impacts. Mitigation and control of impacts will be costly and require long-term management.

The key closure issues include:

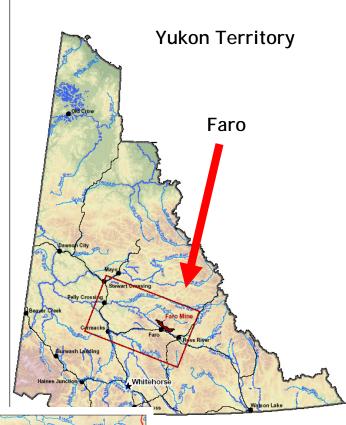
- Adequacy, robustness and stability of physical structures over the long-term, i.e. dams and containment structures, spillways, channels and ditches, waste dumps, etc.
- Surface and groundwater quality, i.e. most ore, exposed rock and waste is/will be acid generating;
- Extent of existing contamination and need for remediation i.e. air and water dispersion;
- Future land use and aesthetics

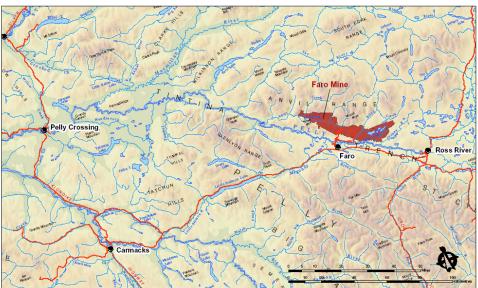
# **Faro Mine Complex - Location**

The Faro Mine Complex is located in south-central Yukon. It is 15 km north of the town of Faro and almost 200 km northeast of the City of Whitehorse.

The community of Ross River is located 65km east of the mine complex and is home to the Ross River Dena, members of the Kaska Nation.

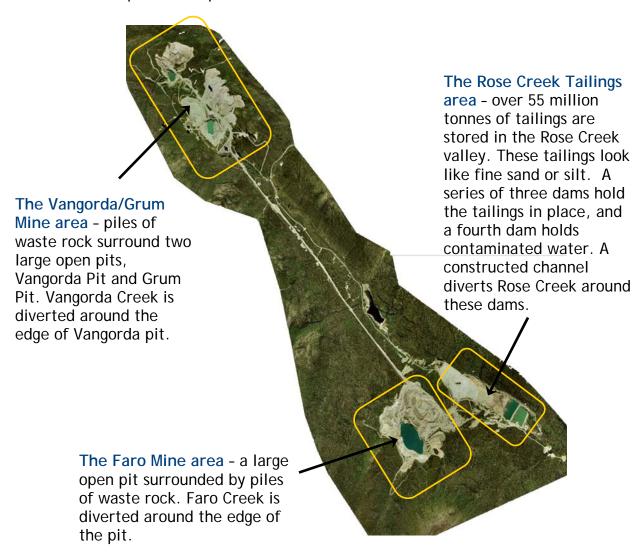
The mine complex is located in the traditional territory of the Kaska Nation and upstream from the traditional territory of the Selkirk First Nation, centered in Pelly Crossing.





# Faro Mine Complex – Site Plan

The mine complex is comprised of three main areas:



Maps and layouts of the site together with the proposed route for the tour can be found in Appendix A.

# **Site Issues and Challenges**

- 1. Large quantities of process and mining wastes, all of which are potentially acid generating (approximately 400 million tonnes in total)
- Location of the mine and wastes within a valley subject to wide variations of flood potential and with a deep aquifer underlying the valley floor
- 3. Management of clean water and treatment of contaminated water
- 4. Long-term stability of physical structures
- 5. Very long timelines for acid generation and metals release

Site issues and challenges will be one of the main focuses for your tour.

# Costs

The current administration of the site encompasses two areas of cost – the costs for the continued routine care and maintenance of the site, and the costs associated with developing a closure and remediation plan.

These costs, all borne by the federal government, are significant and over the past 5 years have been averaging \$10 to \$15m. Costs of this order will continue until reclamation of the site commences. This could still be several years away.

Cost estimates for the suite of remediation options that have been identified for the site are still in progress but indicate the eventual cost of reclamation of the whole site could be several hundred million dollars.

# **Process**

The process being followed which will result in the submission of a proposed closure and remediation plan for the site, its approval and eventual implementation can be summarized as follows:-

- 1. Technical assessment and inventory of the site
- Technical studies addressing the site issues and their possible resolution
- 3. Compilation of a suite of potential site remediation strategies

- 4. Independent technical Peer Review of the alternatives
- 5. Stakeholder consultation to solicit input on the alternatives
- Preparation of a preferred site-wide closure and remediation plan and obtaining general support for the plan from the Steering Committee and Oversight Committee
- 7. Preliminary Project Approval from the Treasury Board
- 8. Further consultation with the stakeholders to obtain their general support for the selected closure plan
- Prepare the detailed Closure Plan documentation and submit for Regulatory Review and Approval
- 10. Support the Plan through the Approvals Process
- 11. Effective Project Approval from the Treasury Board

## **Project Timeline** 2011 to 2020 2020 to 2030 Activity Technical Assessment ompleted nd Site Inventory 2005 Technical studies Completed repare Example Alternatives C and OSC support Preliminary Project Approval TB Consultation Phase II Prepare Closure Plan a submit for regulatory Regulatory Approval Effective TB Approval Carry out remediation Active operation wrt.

As can be seen, there are many steps in the development and approvals process for a closure and remediation plan, the duration of which is difficult to estimate. As a result, the above chart indicates the key steps and how they interrelate only over the next 5 years or so.

# **Project Administration**

In January 2003, the federal and territorial governments acknowledged that the Faro Mine Complex would not reopen. The two governments then entered into a joint agreement with the Ross River Dena Council (on behalf of the Kaska Nation) and Selkirk First Nation to work together on the development of a closure and remediation plan for the Faro Mine Complex.

Given the complexity of the Faro property, special processes have been established to manage and oversee the planning project.

A Faro Mine Oversight Committee (OSC), consisting of representatives of the federal and territorial governments as well as the Ross River Dena Council (on behalf of the Kaska Nation) and the Selkirk First Nation, provides senior level leadership and direction to the planning process.

A DIAND/GY Joint Steering Committee (SC) provides direction and approval of budget and work plans. These specific undertakings are managed under a joint office, known as the Type II Mines Joint Office, with representatives of INAC and the Assessment and Abandoned Mines branch of GY.

Responsibility for developing a closure plan has been given to an arm's length office – The Faro Mine Closure Office staffed with non-government personnel.

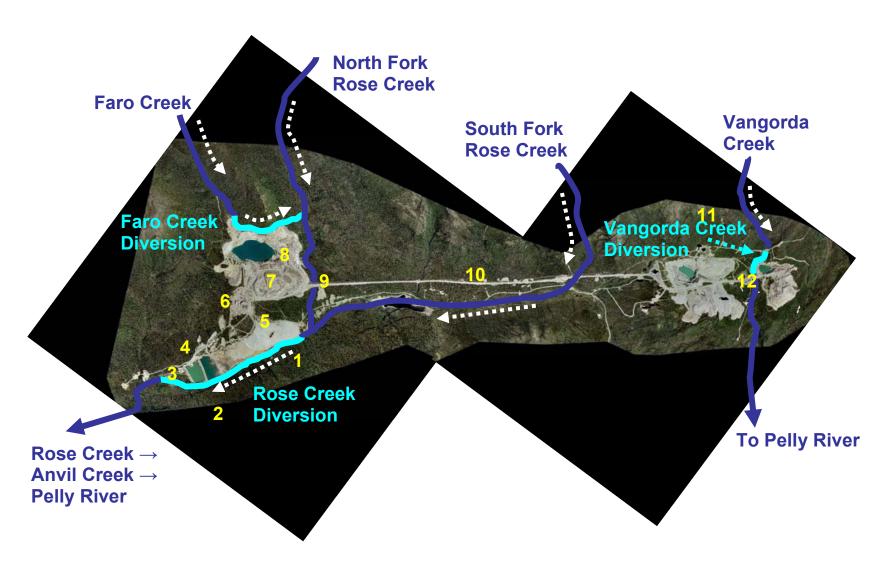
More details are provided in Appendix B.

# **Project history and mine operations details**

See Appendix C.

# **Site Reference Photos**

See Appendix D.



Yellow Numbers Indicate proposed stops on tour – see following description for details of each stop

# **Details of Stops on Tour**

## Stop #1. Tailings Area (location of second dam)

Discuss-tailings issues-acid generation, dusting; contact, aquifer, groundwater.dam stability; Tailings options-manage in place, relocate some or all.

## Stop #2. Rose Creek at Intermediate dam.

Discuss-diversion(s) issues-capacity, stability; spillway challenges Options:-design to PMP; relocate

## Stop #3. Toe of Cross Valley Dam

Discuss aquifer, groundwater collection; environmental impacts and timeframe to impacts.

## Stop #4. Intermediate treatment site.

Discuss need for treatment -whole site

## Stop #5. North side of tailings-overlooking whole TMA.

If necessary, further discussion on tailings relocation and challenges.

## Stop #6. Mill Site.

Discuss demolition and site remediation.

#### Stop #7. Faro Waste Rock Piles.

Discuss issues-quantity; quality and variability; acid generation; groundwater, infiltration;

Waste Rock Options-relocation; covers-range of options.

#### Stop #8. Faro Pit.

Discuss issues-pit wall stability; acid generation; water management; water treatment; diversions

## Stop #9. North Fork Rock Drain.

Discuss diversions; flood attenuation of structure; stability; fish habitat

## Stop #10.Along the haul road.

Discuss issues –wildlife barrier; dusting; need during reclamation program; huge quantity. Perhaps general discussion on current monitoring programs and environmental performance.

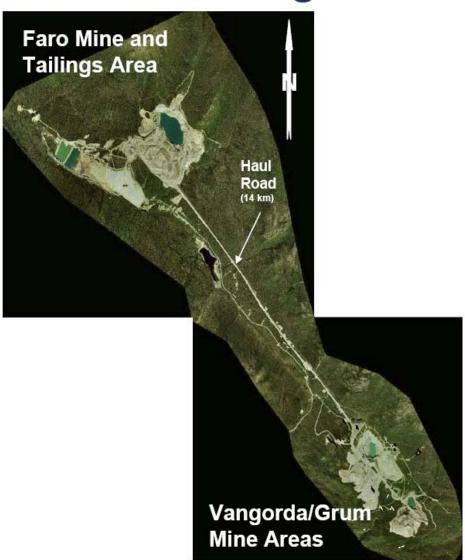
## Stop #11. Vangorda Water Treatment Plant.

Discuss treatment options and particularly possibility of biological treatment of Grum pit water on a seasonal basis.

## Stop #12. Vangorda Pit.

Discuss issues of waste quality and diversion challenges. Possible option to relocate waste back to pit and re-divert creek over backfilled pit.

# Faro and Vangorda/Grum



# Vangorda/Grum Mine Areas



# **Faro Mine and Tailings Areas**



#### **ADMINISTRATION & MANAGEMENT**

(courtesy of Deloitte & Touche Inc.)

The most recent owner of the Faro Mine complex, Anvil Range Mining Corporation (Anvil Range) was placed into Interim Receivership in April 1998. The mine site has been under the management of Deloitte & Touche Inc., acting as the court-appointed Interim Receiver, since that time. Mining and ore processing activities have never been restarted and the mine is considered to be permanently closed. Care and maintenance activities at the Faro and Vangorda Plateau mine sites are regulated under a water licence issued in March 2003 and it runs to February 2009. The water licence, in general, allows for the continuation of care and maintenance activities and the development of final closure and reclamation plan (FCRP).

Since Deloitte's appointment in 1998, the Interim Receiver has successfully maintained compliance with the terms of the water licence by implementing a broad scope of tasks related to environmental protection and environmental monitoring. A Comprehensive Risk Assessment program was established and is continually evaluated each year. A framework was developed to identify, assess and mitigate risk associated with the management of the Anvil Range mine site. It allows the Interim Receiver to maintain discipline around a very complicated, multi-dimensional process of organization, analysis and decision-making and to communicate priorities to DIAND. In fact, the risk management framework developed by Deloitte for Anvil Range served as the basis of DIAND's corporate risk management framework.

DIAND and YG have the responsibility for preparing a FCRP and established the Faro Mine Closure Planning Office (FMCPO) in 2005 to oversee this process. During the past three years, more than 75 investigative studies have been carried out. It is generally viewed that sufficient technical work has been completed to develop and design a FCRP. While the FCRP is being developed, further studies will be carried out which will provide additional support for selected options and further advance the process.

The FMCPO reports to an Oversight Committee which includes representation from the two governments, Canada and Yukon, and from the two First Nations, Ross River Dena Council and Selkirk First Nation. There is an understanding and expectation that preparation of the closure plan will be accomplished taking into consideration the results of a continuous consultation program with all stakeholders.

#### **ORE BODY**

(Ore Body, History, Historical Production courtesy of Yukon Mineral Property Update 2004. S. Traynor (compiler), 2005. Yukon Geological Survey, 81 p.)

The Faro area lead-zinc deposits are located in the Anvil Mountain Range within the Selwyn Basin, immediately northeast and adjacent to the Tintina Trench. The age of the stratigraphic sequence in the Anvil district ranges from late Precambrian to Permian. The sulphide deposits are located in a 150-m-thick stratigraphic interval straddling the Mt. Mye formation and the Vangorda formation contact. Sulphide minerals occur both as massive and disseminated with quartz. The Cretaceous granodiorite-quartz monzonite Anvil batholith intruded and uplifted the sedimentary package.

There are five major lead-zinc deposits in the Vangorda plateau area. From northwest to southeast, they are Faro, Grum, Vangorda, Grizzly (formerly called the Dy deposit) and Swim. The status of each deposit is as follows:

| Vangorda | mined out                                     |
|----------|---|
| Faro     | mined out                                     |
| Grum     | open-pit mine, 4-5 years of reserves left     |
| Grizzly  | advanced exploration stage, would be mined by |
|          | underground methods                           |
| Swim     | undeveloped                                   |

## **HISTORY**

Prospector Al Kulan discovered and staked the Vangorda lead-zinc deposit in 1953. The property was optioned to Prospector Airways, and diamond drilling was carried out between 1953 and 1955. Kerr-Addison Mines Limited eventually acquired Prospector Airways, but interest in the property waned for a number of years because of depressed metal prices, declining metal markets and the remoteness of the area.

In 1962, Kerr-Addison resumed exploration in the Vangorda plateau area, and the Swim lead-zinc deposit, 8 km southeast of Vangorda, was discovered in 1963. At the same time, Dynasty Explorations, under the direction of Dr. Aaro Aho, commenced a detailed exploration program on several claim groups in the Faro area in 1964 and discovered the Faro lead-zinc deposit in 1965. Cyprus Anvil, a joint venture between Cyprus Mines (60%) and Dynasty (40%), was formed in December, 1965 to develop the Faro deposit.

Anvil Mining Corporation (later Cyprus Anvil Mining Corporation) commenced open-pit mining operations on the Faro lead-zinc deposit in late 1969, at rates of up to 10 000 tonnes/day. The mine was officially opened on January 28, 1970 and stayed open until 1982.

In 1973, the Grum lead-zinc deposit was discovered by a joint venture between AEX Minerals and Kerr Addison while testing a gravity anomaly. Cyprus Anvil Mining Corporation purchased the Grum property in 1979.

Concentrate production from the Faro deposit was halted in 1982 because of falling metal prices, low productivity, high operating costs and the added burden of the debt load brought about by expansion. Between June, 1983 and October, 1984, some open-pit waste stripping operations were carried out, but production ceased completely by the end of 1984.

The Anvil Range mineral assets of Cyprus Anvil, including the Grum and Grizzly deposits, were acquired in November, 1985 by a predecessor partnership of Curragh Inc. Curragh resumed operations at the Faro mine in the spring of 1986 and made its first shipment of concentrates in June, 1986. In 1989, development of the Vangorda Plateau was begun with stripping of the Grum and Vangorda deposits. Ore removal commenced at the Vangorda pit and supplemented the mill feed. Ore removal from the Grum pit continued, but was not significant.

Curragh carried out an extensive program of surface drilling on the Grum deposit to delineate reserves and obtain samples for metallurgical testing in preparation for production. Preparation of the Grum deposit for mining commenced in 1989.

In early 1990, an underground operation was initiated just southwest of the Faro pit from a portal in the pit. This operation closed in October, 1992 after mining 1.8 million tonnes of ore.

In 1991, Curragh began stripping the Grum deposit. As of October, 1991, the total waste requiring stripping from Grum was 193.2 million tonnes for a stripping ratio of 6.70:1. The ore reserves in the Faro pit were exhausted in August of 1992 and remnant ore was salvaged by early 1993.

In late 1992, sufficient stripping in the Grum open-pit had been done to expose the top of the Grum deposit and to extract some 15 000 tonnes of mineralization for testing in the Faro concentrator. After removing 21.4 million tonnes, Grum stripping was suspended in December, 1992.

All mining operations ceased in April, 1993 due to low metal prices. Curragh was forced into receivership by its creditors.

Anvil Range Mining formed in 1994 to acquire the Faro properties from the receiver for a purchase price of \$27 million. A nine-month pre-stripping and mill refurbishment program was carried out. Anvil Range Mining began concentrate production from the Grum open pit in August, 1995 and resumed production from the Vangorda open pit in September, 1995. The first concentrates were shipped from Skagway to Asia and Europe in September, 1995. The mining operation achieved commercial production on November 1, 1995.

By the end of 1996, the Vangorda pit was mined out, and mining operations were suspended because of low metal prices and other factors, including lower head grades, mechanical problems in the mill and lower metal recoveries which contributed to less than planned production. The mill continued to process low-grade stockpiles at 50% capacity until March 31, 1997.

In February, 1997, Anvil Range Mining Corp. announced the closing of a private placement of 4.1 million common shares for a total of \$9.4 million with Cominco. ARM also secured a \$15 million loan at 8.5% interest from its principal shareholder, Cominco, in July, 1997. The loan was advanced to ARM in two tranches.

Stripping of the Grum pit started in August, 1997. The mine reopened at full production in November, 1997 and operated until January 16, 1998, when Anvil Range announced that it planned to file for court protection from creditors. On April 21, 1998, an interim receiver was appointed to handle the company's assets and maintain the mine site.

The federal government is currently covering the costs for the interim care and maintenance of the Faro site. The total cost of maintaining the Faro site, as authorized by the court and paid by Indian and Northern Affairs Canada (DIAND) in Ottawa, has averaged approximately \$10 million over the last five years, of which 50-55% was spent on Yukon supplies and services.

#### **HISTORICAL PRODUCTION**

When operating in 1989, the Faro operations supplied 3% of the western world's zinc and 5% of its lead concentrates, making Curragh Resources, the operator at that time, the sixth largest zinc producer in the world.

## Anvil Range Mining Corporation

Production for the 14 months ending on December 31, 1996 was 345 700 tonnes Zn concentrate and 186 000 tonnes Pb concentrate. From September, 1995 to December 31, 1996, ARM loaded 25 ships for a total of 383 000 dry metric tonnes Zn concentrates and 181 000 dry metric tonnes Pb concentrates. The concentrate tonnage equates to 566.9 million lb. (257.7 million kg) of payable metal. To produce this amount of concentrate, 28.8 million tonnes of waste and 4.5 million tonnes of ore were moved. The mill processed 4.8 million tonnes of ore, at an average head-grade of 5.14% for zinc and 3.04% for lead. Recoveries in the mill averaged 71.3% for zinc and 76.7 % for lead.

Concentrates were dried to approximately 7% moisture before being loaded into specially designed shipping containers for trucking to the port of Skagway, Alaska. The lead and zinc concentrates were loaded separately into pots which had a capacity of 11-12 tonnes of concentrate. Four pots could be carried on a tractor-trailer unit. Concentrates were transferred to a storage building prior to loading onto vessels for shipment to smelters in Europe and Japan.

Power for the Grum project, 22MW, was provided from the Whitehorse-Aishihik-Faro grid.

At its peak production, the Anvil Range mine site produced approximately 15% of the world's zinc and lead output and accounted for 20% of the Yukon's economy.



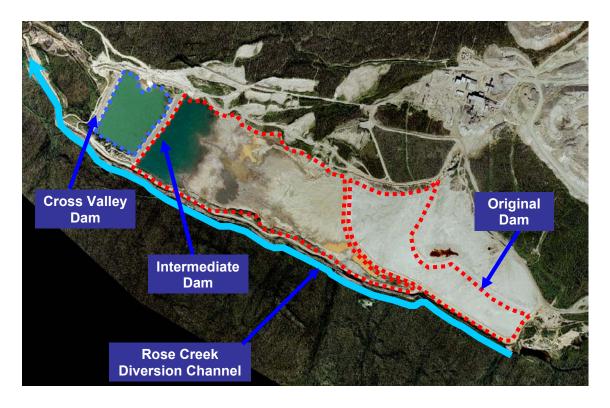
Faro Mill with the tailings impoundment in the background



Part of the 250 million tonnes of waste rock surrounding Faro Pit



The Tailings Area in Rose Creek Valley



Plan View of the Tailings Area



Grum Pit



Vangorda Pit