Deloitte & Touche

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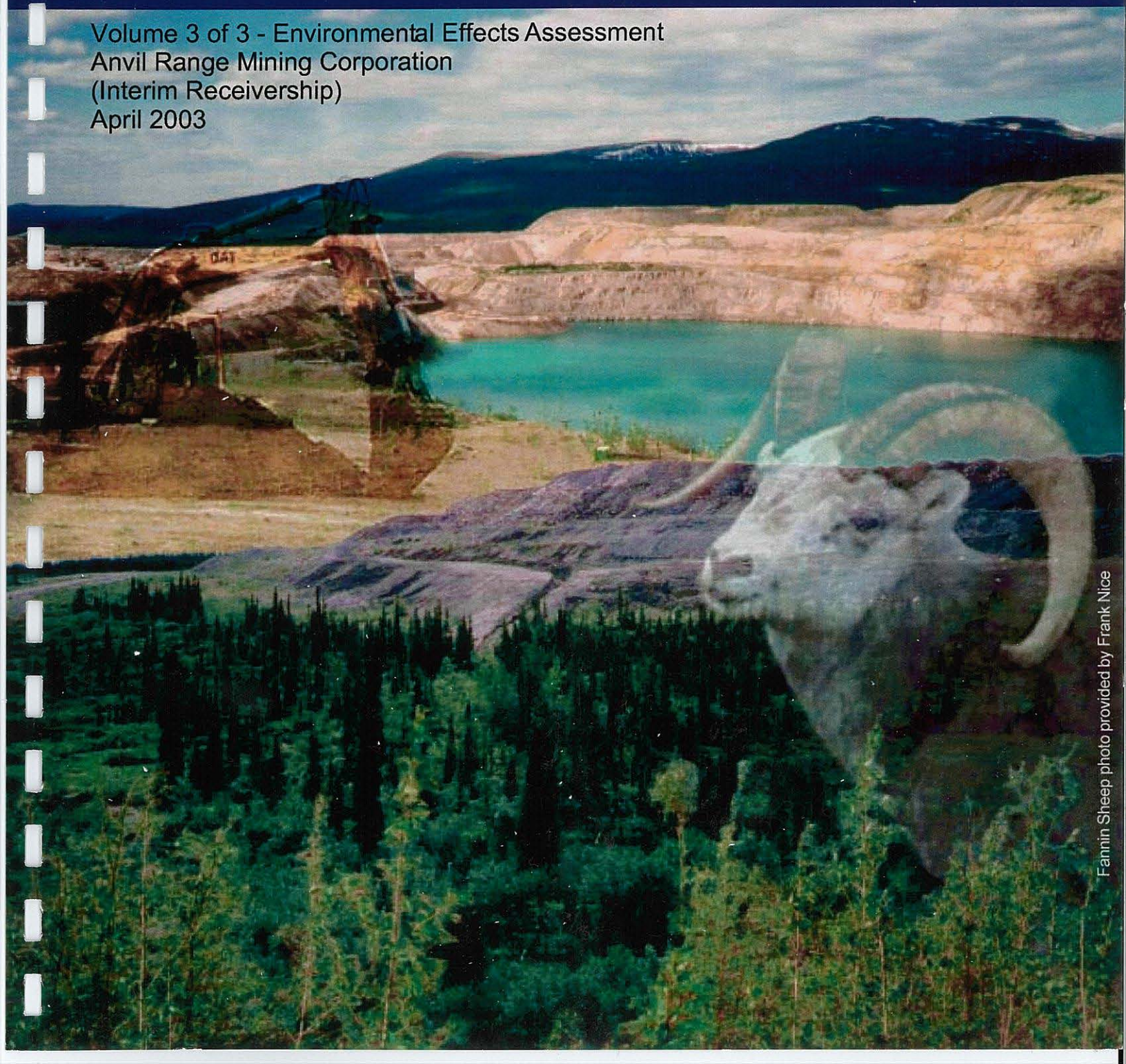
Anvil Range Mine Complex

2004 to 2008 Water Licence Renewal - Environmental Assessment Report

Volume 3 of 3 - Environmental Effects Assessment
Anvil Range Mining Corporation
(Interim Receivership)
April 2003



Fannin Sheep photo provided by Frank Nice

Volume III
Environmental Effects Assessment

Anvil Range Mining Corporation
(Interim Receivership)
2004 to 2008 Water Licence Renewal
Environmental Assessment Report

Submitted by:
Deloitte & Touche Inc.

In their capacity as Interim Receiver for:
Anvil Range Mining Corporation

in association with:
Gartner Lee Limited

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1 INTRODUCTION

1.1 INTRODUCTION TO THE THREE-VOLUME ENVIRONMENTAL ASSESSMENT REPORT

The Anvil Range Mine Complex, located in Faro, Yukon, operated from 1969 to 1998 inclusive of several temporary closures. Mining and milling operations permanently ceased in early 1998 shortly after the owner, Anvil Range Mining Corporation ("Anvil Range"), filed for creditor protection under the Companies' Creditor Arrangement Act. Deloitte & Touche Inc. was appointed Interim Receiver ("Interim Receiver") of Anvil Range pursuant to an order ("Interim Receivership Order") of the Ontario Court (General Division) ("the Court") (now the Superior Court of Justice) in April 1998.

The site is managed by the Court Appointed Interim Receiver, Deloitte & Touche Inc.

The Interim Receiver has overseen the management of the property under the terms of the water licences in addition to the Interim Receiver's mandate to receive, preserve, protect and realize upon Anvil Range's assets. The Interim Receiver has worked with the Department of Indian Affairs and Northern Development ("DIAND"), the Yukon Territorial Government ("YTG"), the Town of Faro, the Ross River Dena Council, and other stakeholders to manage environmental programs that are required to protect the receiving environment.

The mine complex is currently regulated under two water licences, which specify the terms and conditions under which the licence holder (i.e. Anvil Range) can discharge water into the natural environment. The Faro mine site operates under licence QZ95-003 (formerly IN89-001) and the Vangorda Plateau mine site operates under licence IN89-002. The water licences were granted by the Yukon Territory Water Board under the Yukon Waters Act. Both licences will expire December 31, 2003.

The Interim Receivership Order grants the Interim Receiver the authority to "apply for any permits, licences, approvals or permissions on behalf of [Anvil Range] as may be required by any government or regulatory authority". In order to ensure that regulatory licencing that allows for the continued performance of necessary environmental protection activities, remains in place, the Interim Receiver filed documents, in May 2002, to initiate the process for application to the Yukon Territory Water Board for a single integrated licence for the mine complex for the period from January 1, 2004, to December 31, 2008 (5 years).

Steps to renew a licence include CEAA and licence application

Two overall steps are involved in the renewal and integration of the water licences:

1. A review process under the Canadian Environmental Assessment Act ("CEAA") which is required, in part, due to the disbursement of federal funds for the maintenance of this property. The review is focussed on the activities described in an Environmental Assessment Report ("EAR") that is submitted by the proponent following guidelines provided by DIAND; and

2. An application to the Yukon Territory Water Board for a water licence renewal.

The CEAA process was initiated with a Project Description submitted in May 2002

To initiate the CEAA process, the Interim Receiver submitted a Project Description in May 2002 that described the proposed activities for the proposed licence period. A Project Description Supplement was submitted in September 2002 in response to questions raised regarding the Project Description. At that time, preparation of a Final Closure and Reclamation ("FCRP") Plan for the mine complex was included into the Interim Receiver's scope of work.

Guidelines for preparation of the EAR were issued by DIAND in March 2003. The final scope of the project, as described in the Guidelines focussed solely on care and maintenance activities and excluded the development of a Final Closure Plan. This change was based on the announcement by DIAND in January 2003 that the development of a FCRP would be undertaken by a government project team ("closure Project Team") that would be formed for this specific purpose.

This EAR has been prepared to comply with the Guidelines provided by DIAND and to provide the information necessary to enable a screening decision per the CEAA.

The EAR is a three volume document:

This Environmental Assessment Report (EAR) is presented in 3 volumes plus a standalone EAR summary document and a companion document being the new mechanism for development of a closure plan

1. Volume I provides a description of the existing facilities, a description of the proposed activities and a description of the adpative management program.
2. Volume II describes the current environmental conditions at the mine site.
3. Volume III describes the impacts of the proposed activities on the existing conditions at the mine site.

A general reference between the information requested in the Guidelines and location of that information in the EAR is provided in Table 1. A detailed conformity table is appended to each volume.

Table 1. Information Reference Locations

Guideline Reference	EAR Reference
2.0 Executive Summary	Volume I
2.1 Project Summary	Volume I
2.2 Project Description	Volume I
2.3 Environmental Setting	Volume II
3.0 Environmental Effect Assessment	Volume III

The three-volume EAR is summarized in a standalone summary document, which provides a summary of the information and conclusions of the EAR.

While closure planning is not a specific, integral part of the Environmental Assessment Report, a document titled Anvil Range Mine Complex: Closure Planning Project Management, designed to address the planning process for the

final closure of the site, will be submitted by the closure Project Team at a later date.

1.2 INTRODUCTION TO VOLUME III: ENVIRONMENTAL EFFECTS ASSESSMENT

In Volume III, the following are discussed:

- The scope of the project and effects assessment, as set by the DIAND guidelines;
- The First Nations and public consultation process that has taken place regarding this project;
- Methods used to predict effects;
- Effects of the project on environmental components, specific to defined Valued Ecosystem and Cultural Components (VECCs). These are discussed under the environmental component headings of air quality, water resources, aquatic resources and terrestrial resources;
- Effects of environmental change on human health, socio-economic, traditional use and heritage resource components, also specific to defined VECCs;
- Effects of the environment on the project;
- Environmental effects of possible malfunctions and accidents;
- Cumulative effects assessment (overlapping effects with other projects); and
- A summary of proposed monitoring and follow-up programs.

The environmental assessment process for this project was initiated under the authority of the Canadian Environmental Assessment Act ("CEAA"). However, the devolution of responsibilities for natural resources from the Federal to Territorial governments included the transfer of authority for environmental assessment from CEAA to the Yukon Environmental Assessment Act ("YEAA"). This transfer of authority came into effect on April 1, 2003.

Section 54-1 of YEAA describes transitional projects for which environmental assessment was initiated under CEAA but not completed by April 1, 2003. For such projects, the environmental assessment process is to be completed under YEAA and this process will apply to completion of the environmental assessment process for the project at hand.

As YEAA constitutes "mirror legislation" from CEAA to enable the devolution of responsibilities from the Federal Government to the Government of Yukon, it is reasonable that the approaches and practices identified in the *Responsible Authority's Guide* to the Canadian Environmental Assessment Act should be followed for the environmental assessment of the water licence renewal for the care and maintenance of the Anvil Range Mine Complex. Therefore, in this report, CEAA is used as the general reference for the environmental process.

2 ENVIRONMENTAL ASSESSMENT METHODOLOGY

2.1 OVERVIEW

The context that overarches both the selection of the proposed care and maintenance activities and the development of the environmental assessment (and the assessment framework) is that the Anvil Range property exists as a property resulting from former mining and milling activities. This property has recognized environmental liabilities. The proposed care and maintenance activities and the timeframe of the proposed licence were selected to allow the property to be maintained while allowing sufficient time for a FCRP to be developed. As such, the assessment framework described below was developed on the basis that the proponent of the proposed project (the Interim Receiver) is not proposing to start a new mine in the next five years, nor to close the property in the next licence term. As mentioned in the introduction to the EAR, closure planning is the responsibility of the government and is addressed in a companion volume to the EAR in a report entitled "Anvil Range Mine Complex, Closure Planning Project Management".

The premises described above drove the development of the following environmental assessment framework:

- The **spatial boundaries** of the assessment follow standard environmental assessment methodology. The effects assessment is based on two spatial scales: a local scale, the local study area; and at a regional scale, the regional study area.

- The **temporal boundary** for the project, scoped as a care and maintenance project in the March 11 2002 Guidelines from DIAND Environment Directorate, is defined as the five-year timeframe from 2004 to 2008. The effects assessment for the project is based on this timeframe and compares the project to conditions existing during the 1998 to 2002 care and maintenance timeframe. This point of comparison was chosen because a comparison to pre-mining condition would be a hypothetical one and would not reflect the reality that this site currently exists and that care and maintenance activities are on-going. The assessment of care and maintenance effects on the environment is therefore aimed at determining whether the proposed care and maintenance activities are adequate for the next five years and can maintain the property in a state comparable to that achieved over the 1998-2002 timeframe, where the site monitoring information demonstrated that regulatory limits were consistently achieved (as per the water licence).

The implication of the chosen environmental assessment framework is that effects being evaluated are relative rather than absolute in nature. As such, the

proposed care and maintenance activities should, by definition, result in a neutral impact on the environment in comparison to 1998-2002.

The information presented in Volume II of the EAR (Description of Existing Environment) is primarily intended to support the determination of environmental effects according to the framework described above. These effects are presented in Volume III (Environmental Effects Assessment).

In addition, the information presented in Volume II was designed to support additional objectives. It is the understanding of the Interim Receiver that the Responsible Authorities, as well as other interested parties, may review the information available around pre-mining, historical and existing conditions with the intent of understanding the impacts of the property itself on the environment in comparison to the pre-mining conditions. It is the understanding of the Interim Receiver that the driver behind this broadened review focus is to underscore the need for closure planning and implementation, by referencing closure planning and implementation as required additional mitigation for this project. As mentioned above, this additional mitigation (closure planning) is the responsibility of the Project Team.

As such, the information presented in Volume II was researched and presented with the following objectives in mind:

1. respect the requirements of the March 11 2003 Guidelines issued by the then DIAND Environment Directorate.
2. support the assessment of effects related to the proposed care and maintenance activities for 2004-2008 in comparison to those occurring the the 1998-2002 time frame.
3. support the additional review objectives that reviewers of this document may have (as described above).

The May 2002 Baseline report may be taken as a general reference for the information presented in this report

The information, as it is available, that may be needed to support the third objective is included in both Volume II of the EAR, as well as in Volume II of the original Project Description filed with the then DIAND Environment Directorate in May 2002. This information includes data about pre-mining, historical and existing conditions, as well as site-characterization as it is currently understood. The bulk of the information that could be required for this type of review, if undertaken by the reviewers, is found in Volume II of the original Project Description (May 2002). Volume II of the Environmental Assessment Report, as mentioned above, is primarily intended to support the assessment of effects relating to care and maintenance activities in relation to 1998-2002. However, this volume also provides additional historical or site characterization information that would have been either researched or collected in the summer of 2002 that was not included in Volume II of the original Project Description (May 2002). A "road map" to this information is described in the section 1.2.2. of Volume II of the EAR.

2.2 INTEGRATION OF TRADITIONAL KNOWLEDGE

The CEAA and the project specific Information Guidelines, which were issued by DIAND and are provide in Appendix B, require that First Nations traditional knowledge is to be integrated into the EA. The existing body of traditional knowledge related to the Faro mine complex was supplemented, for this EA report, by additional knowledge gathering interviews. This body of information consists of two sets of interviews, described below, as well as previously conducted studies described in Volume II, Section 2.9.2.1. In addition, First Nations consultation was undertaken during the environmental assessment process regarding the proposed care and maintenance activities. The consultation activities, the identified issues and their integration into the proposed project are described in Volume 3, Section 3 (First Nations and Public Consultation).

A series of interviews were conducted by anthropologist Sheila Greer with selected elders of the Ross River Dena community in December of 1999 to confirm if the findings of the Weinstein study were still considered valid and to record any additional information regarding land use (Greer 2000).

During the week of March 24, 2003, further interviews were conducted with Ross River Dena members to document current traditional use patterns in the study area, as well as traditional knowledge related to environmental concerns that might be related to the mine. These interview sessions also sought permission to use or share with a wider audience, through the EA process, earlier documented use of and traditional knowledge regarding the Faro mine area, particularly that recorded by Greer in 1999. Permission to use the 1999 information from one individual was verbally granted to Greer during a March 26th interview with this same person.

The 2003 interviews were conducted by Doris Dreyer, in her capacity as a researcher for the Ross River Dena Council ("RRDC"), and Testloa George Smith, RRDC member and researcher. Anthropologist Sheila Greer assisted with the initial three interview sessions, with Ms. Dreyer and Mr. Smith carrying out the balance of the interviews. An Information Sharing Protocol outlining the terms by which any traditional knowledge data assembled by the project would be shared was put in place in order for the interview work to proceed. As well, both Ms. Greer and Ms. Dreyer signed letters of confidentiality acknowledging that the knowledge and information they were collecting was privileged and the property of the Ross River Dena Council.

The traditional knowledge available for consideration in the present assessment includes (1) that contained in the report titled *Ross River Dena Traditional Use Study for the Faro Mine Water License Application (2004 to 2008)* prepared by Doris Dreyer and and Testloa George Smith (excluding transcripts or interview notes); (2) one of the 1999 interviews conducted by Ms. Greer, for which permission to share the knowledge released was granted on March 26th, 2003; and (3) that which Ms. Greer heard during the interviews she participated in on

March 25th & 26th. In these sessions the interview participants indicated their willingness to have the information they were providing (and had provided in the case of one of the 1999 interview) shared with a wider audience. Note that, as per the terms of the Information Sharing Protocol, the individuals who provided the information are not identified, and that in respect of the protocol, Ms. Greer did not take notes during these sessions.

2.2.1 TRADITIONAL KNOWLEDGE IN DESCRIPTION OF THE EXISTING ENVIRONMENT

Traditional knowledge has been incorporated into the Description of the Existing Environment described in Volume 2 of this report, as it became available.

The discussion of wildlife communities in the study area resulting from the 2003 interviews provided information regarding wildlife health and movements related to activities at the mine site.

Additionally, the 2002 preliminary study of effects in the terrestrial environment was motivated, in part, by issues raised by the community of Ross River regarding the potential effects of wind blown contaminants on wildlife and vegetation. The follow up studies that are proposed for 2003 to 2005 are a direct continuation of this collection of scientific data that is required to produce a mitigation plan (as proposed to be completed by the end of 2005).

2.2.2 TRADITIONAL KNOWLEDGE IN EFFECTS ASSESSMENT

The accumulated traditional knowledge was considered along with scientific data in the selection of VECC's and indicators, in the assessment of effects and significance and in the proposed follow up studies.

2.3 SCOPE OF THE PROJECT

The scope of the project relates to care and maintenance of the property

As defined in the Information guidelines, the scope of the project refers to:

"The scope of the project for this assessment includes the physical works and undertakings in relation to the care and maintenance and related activities of the Anvil Range Mining Complex during the period of the proposed five year water licence. This must include the principal undertaking and any accessory activities or physical works that are directly linked to, or interconnected with, the principal project. In this case, the physical work is the actual mine site and the principal undertaking in relation to that physical work is the care and maintenance, new activities/undertakings, adaptive management program, ongoing studies and other accessory activities."

This defined scope is consistent with the proposed activities described in Volume I of the EAR. As a summary, the Interim Receiver has overseen the management of the property under the terms of the water licences and their mandate to

receive, preserve, protect and realize upon the assets. The Interim Receiver has worked with the Department of Indian Affairs and Northern Development (DIAND) who is the funder of the project activities, the Yukon Territorial Government (YTG), the Town of Faro, the Ross River Dena Council, and other stakeholders to manage environmental protection programs that are required to protect the receiving environment.

The site will continue to be managed in complience with the water licence

The Interim Receiver plans to continue activities to manage the site in compliance with the water licence, including water collection and treatment and monitoring of water quality. These activities are consistent with:

1. The mandate of the Interim Receiver to provide maintenance and protection of the property and the environment, and to apply for a necessary licences, and;
2. Condition 48 of the Faro water licence and part b, condition 13 of the Vangorda Plateau water licence, which require the operator "to maintain all works of the property in accordance with sound engineering and environmental practices, in particular, the tailings disposal facility, the diversion canals, the freshwater supply reservoir, the waste rock dumps and all associated works."

The context that overarches both the selection of the proposed care and maintenance activities is that the Anvil Range property exists as a property resulting from former mining and milling activities. This property has recognized environmental liabilities. The proposed care and maintenance activities and the timeframe of the proposed licence were selected to allow the property to be maintained while allowing sufficient time for a FCRP to be developed. Therefore, it is important to note that the proponent of the proposed project (the Interim Receiver) is not proposing to start a new mine in the next five years, nor to close the property in the next licence term. As mentioned in the introduction to the EAR, closure planning is the responsibility of the government and will be addressed in a subsequent report entitled "Anvil Range Mine Complex: Closure Planning Project Management".

The routine on-going care and maintenance activities that are proposed to be undertaken from 2004 to 2008 will focus on achieving these specific objectives:

1. to minimize the quantity of clean water that enters or crosses the mine site and subsequently requires treatment;
2. to maximize the capture of water that requires treatment;
3. to provide storage and treatment for water that requires treatment;
4. to assess the efficiencies of the above systems on an ongoing basis and to implement upgrades and maintenance as appropriate;
5. to monitor environmental conditions on the mine site and in the receiving environment and the physical stability of earth structures on an ongoing basis;
6. to interpret and utilize monitoring information on an ongoing basis to improve the water management systems;

7. to provide for efficient management of all activities providing for worker health and safety, public health and safety, contingency and emergency preparedness planning and cost effective management of public funding; and
8. to report on care and maintenance activities on a scheduled basis per the water licences to the Yukon Territory Water Board.

Activities will focus on summer pump and treat programs and action items are the focus of the effects assessment

Project activities will centre on seasonal (summer) water pumping and treatment programs for the Faro Main Pit, the back-filled Faro Zone II Pit, the Intermediate Pond and the Vangorda Pit in addition to the maintenance of water diversions and dams. The project includes action, maintenance and monitoring components. The effects assessment is focussed on the action components as these are physical works and activities that will occur. Monitoring takes place to measure the status of the complex. Maintenance activities will occur only if monitoring indicates there is a problem that needs to be corrected.

An on-going risk assessment will enable the Interim Receiver to identify and prioritize short-term risks in any given year and to develop mitigative plans for items identified as high risk. In addition, an adaptive management program will be used to provide a staged approach to mitigation of identified environmental effects based on a pre-determined series of triggers and responses. These are described in Section 7 of Volume I, Project Description.

The Interim Receiver consults with Faro & Ross River, as well as other stakeholders

The Interim Receiver consults with its stakeholders, including the town of Faro and the Ross River community. It contacts leaders from both groups on a regular basis to discuss mine activities and future plans. A key focus is the identification of employment opportunities for members of these communities.

In addition, environmental issues are regularly discussed with other stakeholders. The Interim Receiver maintains close consultation with DIAND and YTG regarding environmental management activities at the site. From a regulatory perspective on a project-by-project basis, Environment Canada and the Department of Fisheries and Oceans ("DFO") have been and will continue to be consulted. Annual meetings of the Technical Advisory Committee ("TAC"), which includes the above-mentioned stakeholders, as well as semi-annual update memos to TAC members help ensure that stakeholders are informed on mine activities. Consultation and communication with First Nations and stakeholders is described in Section 2.1.5 of Volume I, Project Description.

2.4 SCOPE OF THE ENVIRONMENTAL EFFECTS ASSESSMENT

2.4.1 GUIDELINE REQUIREMENTS

The effects assessment requirements from the DIAND Guidelines and CEAA are addressed in this Volume III

The Information Guidelines (issued by DIAND on March 11, 2003 and provided in Appendix B) list requirements of the environmental effects assessment as described under Section 16 of CEAA. The Interim Receiver provided a response to the a draft of the Information Guidelines that stated, among other items, its understanding of the intent and scope of the Information Guidelines and this

letter is provided in Appendix C for ease of reference. Table 2 provides a cross reference between the Information Guideline requirements relating to assessment of effects and the sections of this volume.

Table 2. Information Relating to Effects Assessment Locations in Volume 3

DIAND Guideline Requirement	Volume III Section
Spatial and temporal boundaries	4.3.1
Environmental effects	5 and 6 by component and VECC
Significance	5 and 6 by component and VECC
Mitigation measures	5 and 6 by component and VECC
Cumulative effects	9
Public comment	3
Traditional knowledge	3

2.4.2 VALUED ECOSYSTEM AND CULTURAL COMPONENTS

2.4.2.1 Rationale

Definition of VECC

The detection of environmental effects from a project is complicated by the number of environmental components, vegetation and wildlife species, as well as the natural changes within locations of component study areas. CEAA recognizes that it is not possible, nor particularly useful, to measure effects on all possible receptors (at the component or species level); rather, it is advantageous to focus a limited number of locally significant and measurable receptors that will serve as surrogates for the environmental components as a whole. The same can be said for the social context.

This process involved the selection of VECCs for each environmental and social component (such as aquatic resources and traditional use). VECCs can be defined as features of the regional environmental and social setting selected to be a focus of an environmental assessment because of their ecological, social and economic value and their potential vulnerability to effects of the project. VECCs can then be used as a focus of the environmental assessment, as is done in this Effects Assessment.

In addition, for each VECC, indicators have been identified that can be used to measure changes in that VECC. Detailed descriptions of the selected VECCs and indicators are provided below.

2.4.2.2 Use Traditional Knowledge in Definition of VECCs

Traditional knowledge is acquired by indigenous people over time through direct experience with the environment, and is considered equal to scientific knowledge in EA

As defined under CEAA, traditional knowledge is the knowledge base acquired over hundreds of years by indigenous peoples through direct experience and contact with the environment. It takes several forms:

- An intimate and detailed knowledge of the environment including plants, animals and natural phenomena;

- The development and use of appropriate technologies and methods for hunting, fishing agriculture and forestry; and
- A holistic world view that parallels the scientific discipline of ecology.

Traditional knowledge is used in the determination of VECCs and indicators and carries the same weight in environmental assessment as scientific knowledge.

For this project, the descriptions of existing information for traditional land use and heritage resources (areas where traditional knowledge is essential) both identified information gaps that limited the ability to fully describe the existing conditions. Nonetheless, the information that is available on these topic areas is sufficient to allow for the assessment of the proposed project activities because of the limited temporal and spatial scope of the activities (i.e. care and maintenance only).

The gathering and integration of traditional knowledge specific to this project is described in Section 2.2 of this volume.

2.4.2.3 VECCs and Indicators

14 VECCs and 22 indicators were developed for this effects assessment

The selected VECCs and indicators are identified in Table 3 (which is repeated from Table 54 of Volume 2 for ease of reference). The indicators were selected based on the following selection criteria:

- presence in the regional study area;
- ecological importance;
- existing monitoring where a baseline is available;
- degree of exposure to stressors produced by the project;
- sensitivity to stressors produced by the project;
- socio-economic importance;
- traditional use importance; and
- heritage importance.

VECC indicators were selected as a means of measuring change in the VECC. These were selected based on the existence of baseline data at established locations and the ability to detect measurable changes.

In total, 14 VECCs and 26 indicators were developed. These are used for this environmental effects assessment to determine where project activities will interact with the environmental and social components and to determine what effect, if any, these interactions will have on the indicator and VECC.

Table 3. Valued Ecosystem and Cultural Components Defined for the Environmental Assessment

Component	VECC	Indicator
Air Quality	air quality in the airshed	maintain air quality within territorial objectives (CCME CWS objective for particulate)
Water Resources	stream flow in the receiving environment	maintain pit elevations within desired range
	stream flow in the receiving environment	maintain site water flow patterns
	stream flow in the receiving environment	maintain water flow patterns off site
	surface water quality in the receiving environment	zinc, sulphate and pH in Rose Creek at R2/X14
	surface water quality in the receiving environment	zinc, sulphate and pH in Vangorda Creek at V8
	groundwater flow in the receiving environment	maintain pit and pond surface water elevations within desired range
	groundwater flow in the receiving environment	construction of new facilities or alterations to existing facilities that would result in changes to groundwater recharge or discharge areas
	groundwater quality in the receiving environment	subsurface zinc, sulphate and pH measured at site X16
	groundwater quality in the receiving environment	subsurface zinc, sulphate and pH measured along the North Fork of Rose Creek
	groundwater quality in the receiving environment	subsurface zinc, sulphate and pH measured below the Vangorda rock dump
	groundwater quality in the receiving environment	subsurface zinc, sulphate and pH measured below the Grum rock dump
Aquatic Resources	fish habitat	metals in sediment in Rose Creek (R2 to R5) compared to reference levels and CCME
	fish habitat	metals in sediment in Vangorda Creek (V5, V27, V8) compared to reference levels and CCME
	fish habitat	benthic invertebrate community structure (abundance and richness) in Rose Creek (R2 to R5) compared to reference communities
	fish habitat	benthic invertebrate community structure (abundance and richness) in Vangorda Creek (V5, V27, V8) compared to reference communities
	fish population health	metals in fish tissue (Arctic grayling liver and muscle, slimy sculpin whole body)
	fish population health	fish presence and abundance
Terrestrial Resources	wildlife habitat integrity	metals in vegetation
	wildlife habitat integrity	vegetation community (structure, diversity)
	wildlife population health	wildlife presence and abundance
Socio-economics	commercial, subsistence and recreational use	Continued use opportunities
Traditional Use	Aboriginal fishery	Continued fish harvesting opportunities
	wildlife harvesting	Continued wildlife harvesting opportunities
	plant harvesting	Continued plant harvesting opportunities
Heritage Resources	heritage sites	No disturbance of heritage sites

3 FIRST NATIONS AND PUBLIC CONSULTATION

This section describes the community and stakeholder consultation carried out during the environmental assessment. The consultation was carried out both directly by the Interim Receiver and in collaboration with the DIAND Environment Directorate Project Assessment Manager. In addition to what is described below, it is the understanding of the Interim Receiver that additional consultation has been carried out by the Project Assessment Manager independently of the Interim Receiver.

The consultation described below relates to care and maintenance activities described in Volume I of the EAR. The following clarifications are offered to facilitate the review of this section:

- This section below is not a description of proposed consultation to be undertaken during the next licence term for care and maintenance. The proposed consultation on care and maintenance for 2004-2008 is described in Volume I, Section 2.1.5.
- The consultation described below is not a proposed consultation for closure planning as that type of consultation is the responsibility of the closure planning Project Team. The consultation structure for closure planning is evolving and is described, as it is presently known in April 2003, in a report titled "Anvil Range Mine Complex, Closure Planning Project Management".
- While the Project Description filed in May 2002 made reference to the preparation of a FCRP, the final scope of the project, as described in the Guidelines, focused solely on care and maintenance activities and excluded the development of a FCRP. As such, the consultation results described below do not contain comments received by the Interim Receiver during the Environmental Assessment consultation process that pertain to closure planning. These comments have been communicated to the closure Project Team.

3.1 EAR CONSULTATION REQUIREMENTS AND APPROACH

The consultation approach for the Environmental Assessment relating to the renewal of the water licences for the Anvil Range property involved First Nations, stakeholders, and local communities. The purpose was to provide opportunities for interested parties to become informed and involved; as well as identified, documented and addressed issues as they arose throughout the environmental assessment process.

The consultation activities were guided by the following objectives:

- To identify affected and interested First Nations and stakeholders, along with stakeholders at the federal, territorial and municipal government levels as well as their communication and consultation needs. A list of specific interested parties for the project was established.

- To keep identified interested parties informed about its progress of the environmental assessment, its nature and scope, key events and activities and the results of the assessment.
- To provide opportunities for First Nations and identified stakeholders to provide data and information as input to the environmental assessment studies and to identify and discuss any concerns they may have.
- To document the consultation/communication process and environmental assessment consultation outcomes and responses.

3.2 STAKEHOLDER IDENTIFICATION

The primary sources for stakeholder identification were the members of the Regional Environmental Review Committee ("RERC") and the Technical Advisory Committee. The membership of both of these groups was reviewed, overlap was eliminated and identified members formed the basis of the interested parties listed below. The majority of the consultation process described below took place prior to Devolution on April 1, 2003. As such, regional offices of DIAND listed below will not be involved in the environmental assessment consultation for the remainder of the environmental assessment process. However, DIAND Headquarters (Ottawa) and the newly established Type II Mines Project Office will be involved as stakeholders for the remainder of the environmental assessment. In addition, as a result of Devolution, other new stakeholders may be identified as the consultation process continues during the remainder of the environmental assessment process.

- Canadian Wildlife Service
- CEAA Agency
- Council of Yukon First Nations
- DIAND (Environment)
- DIAND (Headquarters)
- DIAND (Mineral Resources)
- DIAND (Mining Land Use)
- DIAND (Water Resources)
- DIAND (Land Resources)
- DIAND (RMO Watson Lake)
- DIAND (RMO Ross River)
- DIAND (Indian Affairs)
- Environment Canada
- Fisheries and Oceans (Habitat and Enhancement Branch)
- Fisheries and Oceans (Navigable Waters Protection Division)
- Health Canada
- Ross River Dena Council
- Kaska First Nation
- Liard First Nation
- Kaska Tribal Council
- Natural Resources Canada

- Parks Canada Agency
- Selkirk First Nation
- Town of Faro
- Yukon Conservation Society
- Yukon Salmon Committee
- YTG (Energy Mines and Natural Resources)
- YTG (Faro MLA)
- YTG (Environment)
- YTG (Business, Tourism and Culture)
- YTG (Environmental Health)
- YTG (Workers Compensation Board)
- YTG (Infrastructure)

3.3 REGULATORY AND PUBLIC CONSULTATION

3.3.1 REGULATORY AND PUBLIC EAR CONSULTATION PROCESS

The elements of the consultation strategy were planned to include circulation of reports required under CEAA to the RERC and to the TAC, presentations to the RERC and to the TAC, meetings with First Nations and interested parties on a individual basis, and public meetings. Further details regarding the consultation process specific to First Nations is provided in under Section 3.4.1. below.

The Project Assessment Manager (DIAND Environment Directorate) made the Project Description available to members of the RERC when it was filed in May 2002. In addition, the filing was advertised in local papers by the Project Assessment Manager. The Interim Receiver sent the Project Description to all members of the TAC who were not members of the RERC.

Through the federal coordination process under CEAA, the federal departments who declared themselves as Responsible Authorities ("RAs") included DIAND Water Resources and DFO. DFO did not identify a specific trigger for involvement but cited the spirit of the revisions to CEAA to declare themselves as RAs until such time that they determine that this involvement is no longer necessary. Federal experts include Environment Canada and Natural Resources Canada. With the Devolution Transfer Agreement coming into effect on April 1 2003, YTG also became a Responsible Authority.

A presentation regarding the water licence renewal process was made at the July 2002 TAC meeting. Public meetings, jointly hosted by the proponent and DIAND Environment Directorate and advertised in the communities, were held in late August in Whitehorse and Faro. Specifically, a meeting was held on August 21 2002 in Whitehorse, with 24 people in attendance and a meeting was held in Faro on August 22 2002, with 9 people in attendance. The meetings were held in an "open house" format, with the information presented on posters and clearly identified staff available for questions.

Individual meetings were also held in late August 2002 and in March 2003 with stakeholders including Environment Canada, DFO, DIAND Water Resources, and a consultant for both the Yukon Conservation Society and the Yukon Salmon Committee.

During the January 2003 TAC meetings, the Interim Receiver presented an update on the events surrounding the submission of the water licences application. This update included a summary of the content of the Project Description, a description of the subsequent consultation meetings, a listing of the stakeholders who had sent in comments on the Project Description, an explanation of the Project Description Supplement and an update on the status of the EAR Guidelines.

Comments on the Project Description were received by the Project Assessment Manager from DFO, DIAND Water Resources, DIAND Ross River Sub District, Environment Canada, Natural Resources Canada, the Ross River Dena Council, Yukon Energy Mines and Resources, Yukon Business Tourism and Culture, and Yukon Environment. Comments from the RAs, First Nations and stakeholders were forwarded to the Interim Receiver as they became available. It is the understanding of the Interim Receiver that these comments were integrated, as appropriate, into the Guidelines for the EAR by the Project Assessment Manager. These Guidelines were circulated by the Project Assessment Manager in draft form to the RERC prior to being finalized on March 11, 2003.

Further consultation will take place following the submission of the EAR.

3.3.2 REGULATORY AND PUBLIC ISSUES IDENTIFICATION

During discussions and meetings, parties generally felt that site procedures and monitoring implemented during the 1998-2002 period had achieved results that are compliant with existing regulations. There was also an agreement with the application of a risk-based management approach. Areas of concerns identified by regulatory agencies that are relevant to care and maintenance over the 2004-2008 period included:

- additional ground disturbance relating to relocation of diversions, development of a new landfill site, and the development of new borrow sources;
- potential risk of tailings impact on wildlife (particularly moose and wildfowl);
- the need to remediate and clean-up of fuel contaminated soils, particularly in association with the lube stations;
- the need to explain the decision-making framework for deciding between short and long-term management objectives at the site. This includes identifying the decision making framework and regulatory approvals regarding water management plans, ARD management plans, sludge disposal plans and groundwater contamination contingencies;

- the need to provide ranges as well as averages in the summary of water quality database for the site in the description of the existing environment;
- the need for monitoring wells along the Rose Creek diversion channel in order to detect any potential lateral migration of tailings leachate from the impoundments directly to the channel;
- a question regarding the disposal of sediments excavated from the Cross-Valley Pond in 2002.

During public meetings held in Faro and Whitehorse, the majority of comments centred on the economic importance to the Yukon Territory of undertaking closure activities.

3.3.3 INCORPORATION OF REGULATORY AND PUBLIC ISSUES INTO PROPOSED ACTIVITIES

In the context of the proposed care and maintenance activities described in Volume I of this EAR report, issues identified above were incorporated, as they were made available. In particular,

- no additional ground disturbance will be required because it is no longer proposed to relocate diversions and to develop new borrow sources and because the new landfill is proposed to be located on previously located land (see Volume, Section 6.1);
- regarding the risk to wildlife resulting from the tailings, a terrestrial effects study is proposed under Section 10.1 of Volume I;
- it is proposed to investigate and remediate the clean-up of fuel contaminated soils as described in Section 6.2 of Volume I;
- the decision-making framework for deciding between short and long-term management objectives at the site are outlined in the introduction of the care and maintenance section (Section 5.1). Whenever proposed management choices are identified, the rationale for the proposed alternative is outlined (e.g. pond management in Section 5.2.4.1.) or a process, including consultation, for resolving an uncertainty is proposed (e.g. sludge management study in Section 10.3). With respect to ARD and groundwater contamination contingencies, these are primarily outlined under the Adaptive Management Plan in Section 7. The interlinkages of the water management plan are described in overview fashion in Figure 17 of Volume I and described in Section 5.2 and 5.3 of that volume.
- the description of surface water quality (Section 2.5.4. of Volume II) included ranges as well as averages.
- the need for monitoring wells along the Rose Creek diversion channel in order to detect any potential lateral migration of tailings leachate from the impoundments directly to the channel is deferred to the closure planning studies managed by the closure Project team; the short term effects of such possible lateral seepage that would fall within the scope of the care and maintenance activities from 2004 to 2008 would be detected by surface water

monitoring per the Water Monitoring Protocol that is described in Volume 1, Project Description.

- sediments excavated from the Cross-Valley Pond in 2002 were disposed of in the Faro Pit. It is proposed, going-forward, to dispose of these in the Intermediate Pond (Section 5.2.4.2 of Volume I) until such time as a study regarding treatment sediment management plan can be completed (Section 10.3 of Volume I).

3.4 FIRST NATIONS EAR CONSULTATION

3.4.1 FIRST NATIONS EAR CONSULTATION PROCESS

The Ross River Dena were made aware of the intended water licence renewal through a meeting with the community in May 2002, distribution of the Project Description during that same month and attendance at the TAC meeting on July 17th 2002. A technical review (using Kaska/SNC Lavalin as a technical advisor) and non-technical review of the Project Description were undertaken by the community. The intent of these reviews was to identify issues that the community would like addressed in the Guidelines for the Environmental Assessment Report ("EAR") so that they could participate in a meaningful fashion in a community meeting related to the Project Description.

A meeting with representatives of the Ross River Dena Council was held on October 10th 2002 to discuss the water licence renewal process and the associated CEAA process. Questions regarding the intent of a longer-term consultation structure were also raised and discussed. A community meeting was also scheduled on the same date but was postponed due to a sudden death in the community. This community meeting was rescheduled for October 25th 2002. At that meeting, the Interim Receiver, its environmental assessment sub-consultant, representatives of DIAND Environment Directorate, DIAND Water Resources and YTG Energy Mines and Resources were in attendance. The conversation focused on similar topics as were discussed on October 10th 2002.

On October 30th 2002, a conference call was held among Kaska/SNC Lavalin, the Interim Receiver and its environmental assessment sub-consultant. The purpose of the call was to answer any outstanding technical questions that Kaska/SNC Lavalin may have had, in its capacity as technical advisor to the Ross River Dena.

It is the understanding of the Interim Receiver that the Project Assessment Manager attended a meeting with the Ross River Dena community on February 25th 2003. The purpose of that meeting was to discuss the draft guidelines issued by the Project Assessment Manager. Members of Selkirk First Nations were also in attendance at that meeting.

A meeting and telephone conversations, between the Interim Receiver and representatives of the Ross River Dena community took place on March 12th

2003, with the primary focus of discussing a process for supplementing the existing traditional knowledge regarding the site. The identified process centred on interviews with community members to be undertaken during the week of March 24-28 2003. The need for an Information Sharing Protocol was discussed during the call and subsequently developed prior to the interviews. Further details regarding the interview process are provided in Section 2.2. of this Volume. In addition to providing Traditional Use information, these interviews allowed areas of concern to be further identified.

3.4.2 FIRST NATIONS ISSUE IDENTIFICATION

During discussions and meetings, areas of concerns identified by community members that are relevant to care and maintenance included:

- the need of training, employment and business opportunities for the community. These were noted in particular in the context of building demolition;
- a general distrust of the quality of the water and the health of the animals in the area, including moose;
- dust blowing from the tailings piles and impact of the tailings on health of the moose;
- access to the site for hunting;
- a concern about further impacts to heritage resources;
- the need for increased communication and consultation between the community and the Interim Receiver, including the sharing of information regarding the quality of drinking water and the need for notification of emergencies at the site;
- the need for monitoring including water quality downstream of the mine site, including at the Anvil Creek and Pelly River confluence and the need for biological monitoring that includes more than only "benthic invertebrate populations".

In addition to care and maintenance areas of concerns, comments were received by the Interim Receiver regarding the consultation process for closure planning. These were communicated to the closure Project Team.

3.4.3 INCORPORATION OF FIRST NATION ISSUES INTO PROPOSED ACTIVITIES

In the context of the proposed care and maintenance activities described in Volume I of this report (i.e., excluding development of the FCRP by the Closure Project Team), issues identified through consultation as well as traditional knowledge were incorporated as they were made available. Should the body of traditional knowledge increase through time, the integration of that knowledge into the project activities can also increase.

In the context of the proposed care and maintenance activities described in Volume I of this EAR report, issues identified above were incorporated, as they were made available. In particular,

- regarding employment and capacity building for First Nations, Section 2.1.4. of Volume I describes the intent of the Interim Receiver to continue to make efforts to increase opportunity for employment. An emphasis will be placed on the proposed new activities;
- the primary focus of the activities to provide treatment of contaminated water and maintain an appropriate safety freeboard within pits and ponds (described in Section 5.2 and 5.3 and complements First Nation's concerns regarding protection of water and fish;
- section 10.1 outlines a proposed study of environmental effects in the terrestrial environment that was driven in large part by First Nations' concern regarding the health of wildlife in the area and follows directly from the combination of scientific and traditional knowledge that there has been a mine-related impact;
- maintenance of the ATV crossing of the haul road provides for safe access to the land above the mine site and maintaining the existing locations of the security gates provides continued access to hunting areas (Section 5.4 of Volume I);
- the proposed locations of the demolition debris landfill and the bio-remediation cells are within disturbed areas (rock dumps), which avoids new land disturbances that increase the "footprint" of the mine (Section 6.1 and 6.2 of Volume I);
- the Water Monitoring Protocol includes sampling for water quality at the confluence of Rose and Anvil Creeks, which complements concerns regarding the downstream effects of the mine site. Section 2.1.5. of Volume I describes the proposed distribution of monitoring information, including the notification process for emergencies.

4 METHODS USED TO PREDICT EFFECTS

4.1 FRAMEWORK OVERVIEW

Environmental Assessments are used to examine potential impacts and benefits during early planning stages of a project

The purpose of an Environmental Assessment (EA) is to examine potential impacts and benefits during the early planning stages of a project. This allows for refinements in overall project design and the development of mitigation measures to manage the environmental and socioeconomic impacts.

The practice of conducting environmental assessments has evolved over the last thirty years. Practitioner guidebooks have been developed in an effort to standardize the EA process while allowing for flexibility in assessing projects of varying complexity. The *Anvil Range Mining Corporation (Interim Receiver) 2004 to 2008 Water Licence Renewal Environmental Assessment* will be assessed according to Canadian Environmental Assessment Agency guidelines (www.ceaa-acee.gc.ca/0011/0001/0008/Part2_e.htm). This assessment will be guided by the following steps:

Step 1 - Scoping and issue identification
Step 2 - Analysis of effects on existing environmental and social conditions
Step 3 - Identification of mitigation
Step 4 - Significance determination
Step 5 - Follow-up
Step 6 - Cumulative effects assessment

These steps are described further in the following subsections.

4.2 SCOPING AND ISSUE IDENTIFICATION

The scoping step identifies key issues

The scoping process is an important and necessary first step in conducting an EA – it ensures that the assessment remains focussed and the analysis remains manageable and practical. Scoping involves the identification of key issues of concern, selection of VECCs and the identification of temporal and spatial boundaries. The following outlines the steps taken in scoping the assessment and identifying issues.

Key Issues. A list of key issues or potential environmental effects was developed based on the proposed project activities described in Volume I. The focus was on action types of activities rather than maintenance and monitoring activities. Interaction matrices are a useful scoping tool for describing the potential relationship between a project activity and the environment. Preliminary issues were scoped by identifying potential interactions between the project activities and each discipline component (e.g., wildlife, hydrology, fisheries, traditional use, socio-economic, etc.). Four interaction matrices were developed, Tables 4, 5, 6, and 7.

Table 4. Interactions Matrix - Faro Mine Site

		Atmospheric Environment	Water Resources								Aquatic Resources				Terrestrial Resources			Socio-economics	Traditional Use			Heritage Resources
	VECC's:	air quality in the airshed	stream flow in the receiving enviroment			surface water quality in the receiving environment	groundwater flow in the receiving environment		groundwater quality in the receiving environment		fish habitat integrity		fish population health		wildlife habitat integrity		wildlife population health	commercial, subsistence and recreational use	Aboriginal fishery	wildlife harvesting	plant harvesting	heritage sites
Location	Physical Works or Activity	maintain air quality within territorial objectives (CCME CWS objective for particulate)	maintain pit elevations within desired range	maintain site water flow patterns	maintain water flow patterns off site	zinc, sulphate and pH in Rose Creek at R2/X14	maintain pit and pond surface water elevations within desired range	construction of new facilities or alterations to existing facilities that would result in changes to groundwater recharge or discharge areas	subsurface zinc, sulphate and pH measured at site X16	subsurface zinc, sulphate and pH measured along the North Fork of Rose Creek	metals in sediment in Rose Creek (R2 to R5) compared to reference levels and CCME	benthic invertebrate community structure in Rose Creek (R2 to R5) compared to reference communities	metals in fish tissue (Arctic grayling and slimy sculpin)	fish presence and abundance	metals in vegetation	vegetation community (structure, diversity)	wildlife presence and abundance	Continued use opportunities	Continued fish harvesting opportunities	Continued wildlife harvesting opportunities	Continued plant harvesting opportunities	No disturbance of heritage sites
Zone 2 Pit	Dewatering into Faro Main Pit		X				X			X												
Main Pit	Dewatering to Mill Water Treatment Plant		X				X															
Mill Water Treatment System	Treat water pumped from Faro Main Pit and discharge to Rose Creek, Cross-Valley Pond or Intermediate Pond		X	X	X	X					X	X	X	X			X		X	X		
Mill Water Treatment System	Sludge disposal into Intermediate Pond																					
Intermediate and Cross Valley Ponds seepage	Lime treatment of water from the Intermediate Pond and discharge to Cross Valley Pond			X			X		X								X					
Intermediate and Cross Valley Ponds seepage	Release of water from Cross Valley Pond to Rose Creek			X	X	X	X		X		X	X	X	X			X		X	X		
Intermediate and Cross Valley Ponds seepage	Sludge disposal into Intermediate Pond																					

Table 5. Interactions Matrix - Vangorda Plateau Mine Site

Component:		Atmospheric Environement	Water Resources								Aquatic Resources				Terrestrial Resources			Socio-economics	Traditional use			Heritage Resources
VECC's:		Air quality in the airshed	Stream flow in the receiving enviroment			suface water quality in the receiving environment	groundwater flow in the receiving environment		groundwater quality in the receiving environment		fish habitat integrity		fish population health		wildlife habitat integrity		wildlife population health	commercial, subsistence and recreational use	Aboriginal fishery	wildlife harvesting	plant harvesting	heritage sites
Location	Physical Works or Activity	maintain air quality within territorial objectives (CCME CWS objective for particulate)	maintain pit elevations within desired range	maintain site water flow patterns	maintain water flow patterns off site	zinc, sulphate and pH in Vangorda Creek at V8	maintain pit and pond surface water elevations within desired range	construction of new facilities or alterations to existing facilities that would result in changes to groundwater recharge or discharge areas	subsurface zinc, sulphate and pH measured below the Vangorda Rock Dump	subsurface zinc, sulphate and pH measured below the Grum Rock Dump	metals in sediment in Vangorda Creek (V5, V27, V8) compared to reference levels and CCME	benthic invertebrate community structure in Vangorda Creek (V5, V27, V8) compared to reference communities	metals in fish tissue (Arctic grayling and slimy sculpin)	fish presence and abundance	metals in vegetation	vegetation community (structure, diversity)	wildlife presence and abundance	Continued use opportunities	Continued fish harvesting opportunities	Continued wildlife harvesting opportunities	Continued plant harvesting opportunities	No disturbance of heritage sites
Vangorda Pit	Dewatering to Grum/Vangorda Water Treatment Plant		X	X			X															
Water treatment system	Treat water pumped from Vangorda Pit and discharge to Grum Interceptor Ditch			X	X	X					X	X	X	X					X	X		
Water treatment system	Sludge disposal into Vangorda Pit																					
Little Creek Dam	Dewatering to Vangorda Pit		X	X																		

Table 6. Interactions Matrix - General Site Security

		Atmospheric Environement	Water Resources								Aquatic Resources						Terrestrial Resources			Socio-economics	Traditional Use			Heritage resources
VECC's:		Air quality in the airshed	Stream flow in the receiving enviroment			surface water quality in the receiving environment		groundwater flow in the receiving environment		groundwater quality in the receiving environment		fish habitat integrity				fish population health		wildlife habitat integrity		wildlife population health	commercial, subsistence and recreational use	Aboriginal fishery	wildlife harvesting	plant harvesting	heritage sites
Location	Physical Works or Activity	maintain air quality within territorial objectives (CCME CWS objective for particulate)	maintain pit elevations within desired range	maintain site water flow patterns	maintain water flow patterns off site	zinc, sulphate and pH in Rose Creek at R2/X14	zinc, sulphate and pH in Vangorda Creek at V5	maintain pit and pond surface water elevations within desired range	construction of new facilities or alterations to existing facilities that would result in changes to groundwater recharge or discharge areas	subsurface zinc, sulphate and pH measured at site X16	subsurface zinc, sulphate and pH measured below the Grum Rock Dump	metals in sediment in Rose Creek (R2 to R5) compared to reference levels and CCME	metals in sediment in Vangorda Creek (V5, V27, V8) compared to reference levels and CCME	benthic invertebrate community structure in Rose Creek (R2 to R5) compared to reference communities	benthic invertebrate community structure in Vangorda Creek (V5, V27, V8) compared to reference communities	metals in fish tissue (Arctic grayling and slimy sculpin)	fish presence and abundance	metals in vegetation	vegetation community (structure, diversity)	wildlife presence and abundance	Continued use opportunities	Continued fish harvesting opportunities	Continued wildlife harvesting opportunities	Continued plant harvesting opportunities	No disturbance of heritage sites
Mine access points	restrict public access to potentially unsafe areas																								
Mine Sites	Provide safe transportation and storage for materials					X	X			X	X			X	X		X		X	X	X	X			
Mine Sites	Securing and safely storing highly contaminated soils					X	X			X				X	X		X		X	X		X	X	X	
Mine Sites	Removal of buildings that represent a health or safety hazard and placement in existing landfill		same as new building demo																						
Mine Sites	Materials salvage																								
Mine Access Road	maintenance					X	X																		
Haul Road	maintenance					X	X												X		X	X	X	X	
Haul Road	Maintain ATV access ramp																				X		X	X	

Table 7. Interactions Matrix - Proposed New Activities

	Component	Atmospheric Environement	Water Resources										Aquatic Resources						Terrestrial Resources			Socio-economics	Traditional Use			Heritage resources
	VECCs:	Air quality in the airshed	Stream flow in the receiving enviroment			surface water quality in the receiving environment		groundwater flow in the receiving environment		groundwater quality in the receiving environment			fish habitat integrity				fish population health		wildlife habitat integrity		wildlife population health	commercial, subsistence and recreational use	Aboriginal fishery	wildlife harvesting	plant harvesting	heritage sites
Faro/Vangorda Plateau	Physical Works or Activity	maintain air quality within territorial objectives (CCME CWS objective for particulate)	maintain pit elevations within desired range	maintain site water flow patterns	maintain water flow patterns off site	zinc, sulphate and pH in Rose Creek at R2/X14	zinc, sulphate and pH in Vangorda Creek at V5	maintain pit and pond surface water elevations within desired range	construction of new facilities or alterations to existing facilities that would result in changes to groundwater recharge or discharge areas	subsurface zinc, sulphate and pH measured at site X16	subsurface zinc, sulphate and pH measured below the Vangorda Rock Dump	subsurface zinc, sulphate and pH measured below the Grum Rock Dump	metals in sediment in Rose Creek (R2 to R5) compared to reference levels and CCME	metals in sediment in Vangorda Creek (V5, V27, V8) compared to reference levels and CCME	benthic invertebrate community structure in Rose Creek (R2 to R5) compared to reference communities	benthic invertebrate community structure in Vangorda Creek (V5, V27, V8) compared to reference communities	metals in fish tissue (Arctic grayling and slimy sculpin)	fish presence and abundance	metals in vegetation	vegetation community (structure, diversity)	wildlife presence and abundance	Continued use opportunities	Continued fish harvesting opportunities	Continued wildlife harvesting opportunities	Continued plant harvesting opportunities	No disturbance of heritage sites
Faro/Vangorda Plateau	Tear down / demolition of buildings	X																	X						X	
Demolition Waste Landfill	Site establishment - excavate surface water control ditches			X																	X					
Demolition Waste Landfill	Site operations - closure related activity																				X					
Bioremediation Cell	Site establishment - berm and liner																				X					
Bioremediation Cell	Site operations - place soil and operate	X					X					X				X	X	X			X					
Oxidized fines near the Crusher Stockpile	Consolidate and cover with compacted silt or clay	X								X									X		X				X	
Oxidized fines near the Vangorda Rock Dump	Cover with compacted silt or clay	X									X								X		X				X	

Tables 4 through 7 contain the potential interactions with environmental and socio-economic components from continued care and maintenance activities at the Faro Mine Site, the Vangorda Mine Site, general site security and new activities, respectively.

It is important to note that under CEAA, effects on human health, socio-economics, traditional use and heritage resource are assessed on the basis of how project related to changes to the environment affect those components. Therefore, it is important to consider project-environment interactions when determining the indirect project interactions with these components.

Select VECCs. A list of VECCs was generated for each discipline component, as discussed in Section 2.2.

4.3 DATA COLLECTION AND ANALYSIS OF EFFECTS

4.3.1 DATA COLLECTION AND BOUNDARIES

Data were collected for each discipline component in accordance with the Terms of Reference (EA guidelines).
The effects assessment is based on two spatial scales: a local scale, the **local study area;** and at a regional scale, the **regional study area.** Both of these areas are described below and in Volume 2. The description of the existing environment in Volume 2 was also based on these spatial scales. Figure 1 shows the project location map.

The local study area extends from the background water quality sites upstream of each mine to the first monitoring point downstream of where the effluent stream enters receiving waters

The **local study area** (LSA) was defined based on the physical and hydrologic footprint of both mine sites, including the Haul Road (Figure 2). This is the area of immediate influence on the environment as a result of the care and maintenance activities and the area of interest from the Water Licences. The LSA extends from the site-specific background water quality sites upstream of each mine to the first monitoring point downstream of where the effluent stream specified in the existing Water Licence enters receiving waters.

The LSA includes Faro Creek and the North and South Forks of Rose Creek, and extends downstream to the effluent mixing zone in Rose Creek downstream of the Rose Creek Tailings Facility. The LSA extends from the background water quality site on Vangorda Creek upstream of the Vangorda mine site, to the Main Stem of Vangorda Creek downstream of the mine, just upstream of the confluence with the West Fork and the West Fork. This LSA applies to all discipline components.

Regional study areas have been defined for the environmental and social components where an impact assessment is completed

A **regional study area** (RSA) was defined to incorporate data outside of the project footprint that may be important to the determination of direct effects on an environmental component and to allow for examination of potential cumulative effects where project effects extend beyond the study area boundary. The boundaries of the RSA were established based on geographic or social

boundaries as well as the "zone of influence" beyond which the effects of a care and maintenance activity have diminished to an acceptable or trivial level. As the geographic or social boundary and the zone of influence will vary depending on the environmental component (e.g. wildlife, fish, water quality), RSAs have been defined for the environmental and social components where an impact assessment is completed, as outlined in Table 8. Each RSA is discussed in more detail in the component section of Volume 2.

Table 8. Component Regional Study Areas

Component	Regional Study Area	Figure
Air quality	Bounded by the height of land surrounding the Rose and Vangorda watersheds (to capture both watersheds) plus water sampling sites in Anvil Creek at the mouth of Rose Creek	3
Water resources (hydrology, hydrogeology and water quality)	Bounded by the height of land surrounding the Rose and Vangorda watersheds (to capture both watersheds) plus water sampling sites in Anvil Creek at the mouth of Rose Creek	3
Aquatic resources (sediment quality, benthic invertebrates and fish	Bounded by the height of land surrounding the Rose and Vangorda watersheds (to capture both watersheds) plus water sampling sites in Anvil Creek at the mouth of Rose Creek	3
Terrestrial resources (soil, vegetation, wildlife)	Bounded by the Pelly River to the south, Rose Mountain to the west, Mount Aho to the north and Mount Mye and Sheep Mountain to the east	4
Socio-economics, traditional use and heritage resources	Bounded by the Pelly River to the south, Anvil Creek to the west and the height of land defining the Rose Creek watershed to the north and Blind Creek to the east	5

The project temporal boundary is 2003 to 2008

The **temporal boundary** for the care and maintenance project is defined as the five-year timeframe from 2003 to 2008. This effects assessment is based on this timeframe and compares the project to the existing 1998 to 2002 care and maintenance timeframe conditions discussed in Volume 2.

4.3.2 ANALYSIS OF EFFECTS

This step focussed on assessing the effects of the project activities on selected VECCs. The potential cause-effect relationships (or linkages) between project activities and the VECCs were clearly identified for each discipline component. The predicted changes to VECCs over the term of the water license (2004-2008) were then considered and analyzed. The local and regional study areas were considered in determining potential project interactions.

Interactions matrices were completed o identify potential project impacts by VECC

The project interactions matrices (Tables 4 through 7) were compiled to identify the potential impacts on each discipline component (e.g., hydrology, wildlife) VECC from the proposed project activities. Developing these matrices was the first step in scoping out the main issues for the project. The project activities were classified as either action, maintenance or monitoring (noted in Volume I). Only the action activities are included in the matrices as these are the focus of the EA scope (as noted in section 2.1 above). An "X" denotes a potential positive, negative or neutral impact, and these potential impacts are described further in

Sections 5 and 6 of this volume. Details on the project activities are described in Volume I of the EAR.

The assessment considered the existing environment and predicted impacts

Potential impacts from each interaction were assessed by qualified practitioners expert in each of the environmental and socio-economic components. The assessment considered the existing environment (Volume II) and the predicted outcomes of each project activity based on changes from the previous care and maintenance activity period (1998 to 2002), using technical data and professional judgement.

4.3.3 IDENTIFICATION OF MITIGATION

Mitigation is an activity to reduce or eliminate adverse environmental and socio-economic effects

Where an adverse effect is identified, the environmental assessment process requires that mitigation measures be identified. Mitigation is an activity to reduce or eliminate adverse environmental and socio-economic effects. Mitigation measures are recommended for any identified adverse environmental effects in sections 5 and 6.

Residual effects are those effects remaining after mitigation measures have been considered, and are identified for each component VECC where appropriate.

The care and maintenance project is an environmental mitigation

It is important to note that the care and maintenance program is of itself an environmental mitigation that minimizes or prevents adverse effects on the environment that would otherwise occur within the RSA.

In addition, closure planning will take place (as described in the companion document entitled "Anvil Range Mine Complex, Closure Planning Project Management") during the proposed licence term. The implementation of closure activities following the closure planning processwill result in further mitigation beyond the 2004-2008 timeframe of the care and maintenance project.

4.4 SIGNIFICANCE DETERMINATION OF RESIDUAL EFFECTS

Deciding whether a project is likely to cause significant adverse environmental effects is central to the concept and practice of environmental assessment. The CEAA Reference Guide, *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* (www.ceaa-acee.gc.ca/0011/0001/0008/guide 3_e.htm) is summarized below as the procedure that was followed for this EA.

Significance of a residual effect requires determining if the effect is adverse, significant and likely

A residual effect is an effect that remains following mitigation. The purpose of this step is to determine whether any identified residual effects are likely to cause significant adverse environmental impacts. There are three general steps in determining whether environmental effects are adverse, significant, and likely within the context of CEAA:

Step 1 - Decide whether the environmental effects are adverse;
Step 2 - Decide whether the adverse environmental effects are significant; and
Step 3 - Decide whether the significant adverse environmental effects are likely.

Step 1, deciding whether environmental effects are adverse, involves comparing the quality of the existing environment with the predicted quality of the environment once the project is in place.

Step 2, deciding whether the adverse environmental effects are significant is accomplished by considering the following criteria: magnitude, geographic extent, duration and frequency, reversibility, and ecological context. For the purposes of this assessment definitions for each criterion are provided below. The definitions for the classifications within each criterion are provided in Table 9.

Magnitude, geographic extent, duration, frequency, reversibility and ecological context are considered in determining significance

Magnitude refers to the severity of the adverse environmental effects. The extent to which the project could trigger or contribute to any cumulative environmental effects is considered in defining the level of magnitude. Magnitude is classified into four levels: negligible, low, moderate and high.

Geographic Extent refers to the spatial extent of the predicted effect. Some adverse effects may be localized while others may affect a much larger area and have more significance. The assessment will describe the spatial extent of the effects at a local and regional scale.

Duration is the period of time that an effect on a VECC may exist or remain detectable (i.e., the amount of time an effect lasts before recovery returns conditions to pre-project levels). Short-term, medium-term, or long-term effects will be considered.

Frequency refers to how often an effect will occur and is expressed as low, medium or high. Effects that occur with high frequency may be significant.

Reversibility is an indicator of the potential for recovery from an impact, and is classified as reversible in short-term, reversible in long-term or irreversible (i.e., permanent).

Ecological Context refers to the condition of the environment, or the ability of the environment to accept changes. Environmental effects may be significant in areas considered ecologically fragile or sensitive with little resilience to imposed stresses. The most common method of determining whether the adverse environmental effects of a project are significant is to use environmental standards, guidelines or objectives. If the level of an adverse environmental effect is less than the standard, guideline or objective, it may be insignificant, and if it exceeds the standard, guideline or objective, it may be significant. Professional judgement (using the above criteria) is used in situations where standards, guidelines or objectives do not exist.

Table 9. Significance Classification Definitions

Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context (Sensitivity)
Positive: positive impact on environment **Neutral:** no change on environment **Negative:** adverse impact on environment	Discipline specific definitions provided for *negligible, low, moderate* and *high* magnitude classifications in Sections 4 to 8.	**Local:** effect is restricted to the LSA **Regional:** effects extend beyond the LSA into RSA	**Short-term:** less than 6 months **Medium-term:** up to 5 years (i.e., duration of license) **Long-term:** greater than 5 years	**Low:** occurs once **Medium:** occurs off and on **High:** occurs continuously	*Reversible **Short-term:** effects reversible in less than 5 years **Reversible Long-term:** effects reversible in greater than 5 years* **Irreversible:** effects cannot be reversed	*Low: resilience to stress is high **Medium:** some tolerance to stress **High:** minimal to no resilience to stress Note: also take into consideration cumulative effects on environment*

Probability of occurrence and scientific uncertainty are used to decide if a significant adverse effect is likely

Step 3, deciding whether significant adverse effects are likely, involves the consideration of two criteria: probability of occurrence and scientific uncertainty.

Probability of Occurrence is the likelihood that the identified significant adverse environmental effect will occur. If there is a high probability, the effect may be considered likely to occur, while if the probability is low, the effect may be considered unlikely to occur. High, moderate and low classifications of probability are used. The level of classification applied to a significant adverse environmental effect is based on professional judgement.

Scientific Uncertainty is related to the level of confidence in the impact prediction. Classifications of high, moderate and low certainty are used. The classification used will be based on professional judgement. The level of classification applied to a significant adverse environmental effect is based on professional judgement.

For each environmental and socio-economic component effects assessment in Sections 5 and 6, significance is determined where there is a residual effect, following the above described steps.

4.5 FOLLOW-UP

A follow-up program is recommended where further data collection will help measure effects and mitigation

Follow-up programs are included for some component effects assessment, where the collection of data is recommended to determine unknown existing environment conditions to measure the predicted environmental assessment outcome, including the project effects and the effectiveness of recommended

mitigative measures. The recommended follow-up programs are included by component in Sections 5 and 6 and are summarized in Section 10.

4.6 CUMULATIVE EFFECTS ASSESSMENT

Cumulative effects are changes to the environment that are caused by an action in combination with the past, present and future actions

Cumulative effects are changes to the environment that are caused by an action in combination with possible past, present and future actions. In other words, cumulative effects are the combined residual effects of the project effects and "other project" residual effects where they overlap in space and time. Cumulative effects may occur in a number of ways including additive, magnification, synergistic and masking. The objective of cumulative effects assessment (CEA) is to assess whether these combined effects are enhanced by residual project effects resulting in an overall effect of concern to the environmental components under study.

CEA requires the consideration of the temporal and geographic boundaries of the assessment; and the interactions among the environmental effects of the project, and past and future projects and activities. The cumulative effects assessment will examine the local project effects, as well as regional effects.

A full explanation of assumptions and limitations are provided where necessary.

CEA also involves scoping, effects analysis, mitigation, significance and follow-up

The approach taken for this assessment essentially follows that outlined in the *Cumulative Effects Assessment Practitioner's Guide* (Cumulative Effects Assessment Working Group and AXYS Environmental Consulting Ltd. 1999), which generally follows the basic concepts underlying project specific effects analysis. The evaluation included:

Scoping

- Through the broader environmental assessment process, the spatial and temporal effects of the project after mitigation were identified (i.e. residual effects). This was based on the selected VECCs.
- The other projects and activities whose residual effects fall within the spatial and temporal boundaries of this project were identified. These effects were then described.

Effects Analysis of Cumulative Impacts

- The cumulative effects resulting from project effects and the effects of other projects and activities were identified and analyzed. These effects were described according to magnitude, frequency, duration, reversibility, geographic extent, and ecological context. Probability of occurrence and scientific uncertainty were also considered.

Mitigation

- Mitigation measures were proposed for each of the identified cumulative effects.

Significance Determination

- Significance of the effect is determined in accordance with standard practices. The method used follows that described under Section 1.3.5, above.

Follow-up

- If required, recommendations on monitoring or other follow-up activities are made.

5 EFFECTS ON ENVIRONMENTAL COMPONENTS

5.1 AIR QUALITY

5.1.1 POTENTIAL EFFECTS

The proposed activities will not create dust. The only source of emissions will be equipment use.

The main issue regarding air quality on the Faro and Vangorda mine sites related to the performance of care and maintenance activities is the potential for wind-borne dust to contribute to contaminant levels in the surrounding environment. The main potential dust sources include the Rose Creek Tailings Impoundment and any residual ore concentrate that may be present at the mill site. Continued use of vehicles and equipment are the only sources of emissions. It should be noted that under all proposed care and maintenance activities, there is no potential to negatively impact air as compared to the 1998 to 2002 existing environmental conditions.

Air quality has been defined as a **VECC** for this assessment and the **indicator** has been defined as a change in ambient air particulate levels.

The current National Ambient Air Quality objective is expressed in terms of Total Suspended Particulates (TSP)

The National Ambient Air Quality Objectives are outdoor air quality goals that are considered protective of public health, the environment or aesthetic properties of the environment. They are developed cooperatively by federal and provincial governments and provide a basis for development of air quality management strategies. The current objective for particulate matter is expressed in terms of Total Suspended Particulates (TSP) with the maximum acceptable level of 120 $\mu g/m^3$ averaged over a 24-hour period. This objective was developed in the mid-1970s and is currently under review. More recently, new criteria for particulate matter (PM) are being recommended under the Canada Wide Standards (CWS) process headed by the Canadian Council of Ministers of the Environment (CCME). The numerical target for PM under the CWS is 30 $\mu g/m^3$ (24-hour averaging time), based on the 98th percentile ambient measurement annually, averaged over three consecutive years. In addition, PM10 and PM2.5 (particulate matter less than 10 and 2.5 microns, respectively) have been designated as priority, candidate substances for the development of CWSs. Particulate matter in these size fractions are respirable and pose a risk to human health.

Atmospheric transport is the likely source of high levels of lead and zinc in soil and vegetation

Levels of lead and zinc have been observed in the RSA in soil samples at concentrations exceeding accepted Yukon *Contaminated Sites Regulations* levels (C.E Jones, 2003). The source of these metals is not known with certainty, however it is surmised from their distribution in the environment that they are likely the result of atmospheric transport. The original source may have been ore crushing and concentrate drying operations that were terminated in 1998. In the absence of any monitoring data however, the potential for ongoing contribution to environmental levels from existing sources, such as dust-blown tailings cannot be ruled out.

The concern with particulate matter from The Rose Creek Tailings Facility is transport of contaminants to soil and vegetation

The primary sources of particulate matter of concern in the LSA is the Rose Creek Tailings Impoundment. The tailings consist of fine material that remains following recovery of economic minerals. In this case, the tailings contain lower, but substantial levels of lead and zinc in comparison to the ore material. Although there may be potential human and animal health effects associated with these materials, the primary element of interest is transport of lead and zinc contamination from the mine site to environmental receptors including soils and vegetation.

Project activities have the potential to exacerbate emissions during dry, windy conditions. This situation existed during the baseline period and the potential for impact remains unchanged during future care and maintenance operations.

Project activities likely to affect air quality

A number of the new activities planned involve demolition or construction activities:

- Tear down and demolition of buildings at the Faro and Vangorda Plateau Mine sites.
- Soil excavation and placement in bioremediation cells.
- Consolidate and cover oxidized fines near the crusher stockpile with compacted silt or clay.
- Cover oxidized fines near the Vangorda Rock Dump with compacted silt or clay.

No long term impact on air quality is expected from new activities. In most cases those activities will reduce further emissions

In general, these activities have the potential to increase particulate emissions through operation of heavy equipment and disturbance of soils. Impacts associated with these activities are considered low in magnitude and transitory in nature and are not expected to have any long-term impact on air quality, as noted in the summary below. In most cases, these activities (i.e. consolidating and permanently covering fines) will actually reduce potential future particulate emissions from the site and should be viewed as positive measures.

The effects assessment is summarized in Table 10 by project activity.

Table 10. Effects Assessment – Air Quality

Project Activity	VECC affected	Predicted change to VECC indicator	Overall Consequence	Positive or Adverse Effect
Tear down and demolition of buildings	Air quality	Temporary increase in ambient air particulate levels. Not known if, where or to what extent this may result in not meeting the National Ambient Air Quality Objectives and Canada Wide Standards.	Potential minor, temporary increase	Minor adverse
Soil excavation and placement in bioremediation cells	Air quality	Temporary increase in ambient air particulate levels. Reduction in long-term potential for contaminated particulates in air.	Potential minor, temporary increase	Minor adverse

Project Activity	VECC affected	Predicted change to VECC indicator	Overall Consequence	Positive or Adverse Effect
Consolidate and cover oxidized fines near the crusher stockpile with compacted silt or clay	Air quality	Temporary increase in ambient air particulate levels. Reduction in long-term potential for contaminated particulates in air.	Potential minor, temporary increase	Minor adverse
Cover oxidized fines near the Vangorda Rock Dump with compacted silt or clay	Air quality	Temporary increase in ambient air particulate levels. Reduction in long-term potential for contaminated particulates in air.	Potential minor, temporary increase	Minor adverse

5.1.1.1 Proposed Mitigation

The project activities will reduce the potential for future airborne particulates

The project activities noted above will reduce the potential for future airborne particulates from the LSA and are viewed as positive measures. These activities are mitigation for potential long-term air quality impacts. Although the projects will result in a short term and minor adverse impact to air quality, the comparison to the National Ambient Air Quality Objectives and Canada Wide Standards are not known.

Short-term mitigation measures should include dust control measures, such as avoiding work that would create dust on windy days and wetting the working surface during disturbance, if necessary to reduce the likelihood of generating airborne particulates.

5.1.1.2 Residual Effects / Significance Determination

There will be no residual air quality effects

The mitigation outweighs the project effects on air quality. Over the project life (2004 to 2008), the potential for airborne particulates will be reduced as a result of care and maintenance activities. The implementation of short-term mitigation measures to reduce the likelihood of generating airborne particulates should result in no short-term residual impacts.

5.1.1.3 Proposed Follow-up

It is important however, to characterize the potential for airborne particulates to contribute to contaminant (lead and zinc) levels within the local and regional air quality study areas (Figure 3). It is proposed that a particulate monitoring program be incorporated into the proposed study of terrestrial effects, as described in Volume 1, Project Description, to monitor TSP levels and characterize the metals composition of airborne particulate.

Hi-volume air samplers should be established at four locations as part of a TSP monitoring program at both the Faro and Vangorda Mine sites

The program should follow standard best management practices for air quality monitoring and include establishment of high-volume air samplers at a minimum of four locations including the following:

- One background site, to act as a reference or control;

- Two sites at the Faro Mine Site including one located downwind of the tailings impoundment and one downwind of the mill; and
- one site downwind of the Vangorda Pit.

These samplers should be set up to operate for a 24-hour period every six days in accordance with the National Air Pollution monitoring system. It is also recommended that representative particulate samples be analyzed for metals and the significance of lead and zinc transport via particulate matter assessed. This monitoring program would be used to assess the need to take interim steps to minimize potential offsite transport of metals of concern. Data collected at the existing meteorological tower on the Grum Rock Dump should be incorporated into the program (i.e. wind speed and wind direction).

5.2 WATER RESOURCES

5.2.1 POTENTIAL EFFECTS

Indicators of the VECCs, stream flow in the receiving environment and surface water quality in the receiving environment, have been defined

Key water resource considerations for this project include changes to: streamflow characteristics (i.e. surface water quantity); water quality in the receiving environment; groundwater flow in the receiving environment; and, groundwater quality in the receiving environment, where these changes may be related to the proposed project activities. The inherent importance of water quantity and quality are reinforced by the potential linkages to fish habitat and fish presence in Rose and Vangorda Creeks, use of the water by wildlife, recreational human use of the water and traditional subsistence human use of the water. The following VECCs and indicators have been defined for this component:

Indicators for Stream flow in the receiving environment VECC:
- Maintain pit surface water elevations within desired range
- Maintain site water flow patterns
- Maintain water flow patterns off site

Indicators for Surface water quality in the receiving environment VECC:
- zinc, sulphate and pH in Rose Creek measured at site R2/X14
- zinc, sulphate and pH in Vangorda Creek measured at site V8

Indicators for Groundwater flow in the receiving environment VECC:
- Maintain pit and pond surface water elevations within desired range
- Construction of new facilities or alterations to existing facilities that would result in changes to groundwater recharge or discharge areas

No new discharge or activities that would alter water quality or stream flow are proposed for the 2004-2008 water licence

Indicators for Groundwater quality in the receiving environment VECC:
- subsurface zinc, sulphate and pH measured at site X16
- subsurface zinc, sulphate and pH measured along the North Fork of Rose Creek
- subsurface zinc, sulphate and pH measured below the Vangorda rock dump

- subsurface zinc, sulphate and pH measured below the Grum rock dump

Each indicator was compared against the existing (1998 to 2002) information described in Volume II, description of the existing environment. The condition underlying this water resources effects analysis is the existing baseline in which water quality and stream flow characteristics were already altered by previous mining activities. The activities proposed for the term of the 2004-2008 water licence are care and maintenance activities with the intent to maintain existing water quality and stream flow characteristics while the FCRP is developed and approved. No new discharges or activities which would alter water quality or stream flow are proposed.

The specific activities likely to affect **stream flow in the receiving environment** are identified in Table 11 and include:

Project activities likely to affect stream flow in the receiving environment

- Dewatering the Zone II Pit into the Main Pit
- Dewatering the Main Pit to the mill water treatment system
- Operation of the mill water treatment plant and release of effluent
- Lime treatment at the Intermediate Pond
- Release of water from the Cross Valley Pond to Rose Creek
- Dewatering of the Vangorda pit to the Grum/Vangorda Water Treatment Plant
- Operation of the Grum/Vangorda Water Treatment Plant and release of water to Grum Interceptor Ditch
- Dewatering Little Creek Dam to Vangorda Pit
- Excavation of surface water control ditches for the new demolition debris landfill

The potential effect on stream flow in the receiving environment is assessed in terms of maintaining pit and pond water levels within desired ranges, maintaining site water flow patterns and maintaining water patterns off site (the indicators).

Monitoring and maintaining pit and pond water levels within the desired ranges that have been in place through the baseline period (1998 to 2002) are key aspects of the proposed care and maintenance activities. Specifically, the water levels in the Main Pit, Zone II Pit, Vangorda Pit and Little Creek Pond are proposed to be maintained below the overflow elevations, which provides a variety of benefits for streamflow:

The benefits of maintaining the water level in the Main Pit, Zone II pit, Vangorda pit and Little Creek Dam below overflow elevations

- The pits are prevented from filling and overflowing, which prevents negative impacts on streamflow such as uncontrolled releases of non-compliant water that could potentially erode mine wastes, damage infrastructure and disrupt water treatment operations.
- A large portion of each pit's storage capacity, from the pits' water surface to the lip, is kept empty and is reserved for an emergency condition such as a large storm event or breaching and inflow of a water diversion. This reserved storage space would minimizes the risk of an uncontrolled release of

water from the pit and would provide time for water pumping to be activated or for the breach to be repaired, as describe in the Adaptive Management Plan.

The mill water treatment system has increased the capacity of the mine's water management system

The implementation of the mill water treatment system in 2001 has provided an additional benefit by effectively increasing the capacity of the mine's water management system to prevent the release of contaminated drainage to the receiving environment. Prior to 2001, all of the dewatering of the Main and Zone II Pits reported to the Intermediate Pond for treatment. Thus, the storage behind the Intermediate Dam had to deal with inflows from these two pits, as well as the drainage from much of the main rock dumps, the mill facilities and the tailings facility. With the exclusion of the pit dewatering flows (which are now passed as compliant water around the Intermediate Dam), the limited storage behind the Intermediate Dam has become more effective in regulating the inflows that remain (i.e., the storage capacity has increased relative to the size of the inflow stream).

On and off water flow patterns will not be altered by proposed activities

There are no proposed activities that would substantially alter on-site or off-site water flow patterns as compared to the existing conditions (1998 to 2002). The release of licence-compliant effluent to Rose and Vangorda Creeks has the potential to alter streamflow but it is proposed to follow the patterns that have been established during the baseline period and, therefore, no change is anticipated. The construction of surface diversion ditches for the establishment of the proposed new demolition debris landfill represents a minor alteration of site flow. The landfill is proposed to be located within the area of the Faro Rock Dumps and the diversion of surface flows would be completely within the area of the rock dumps such that no environmental impacts are anticipated.

In conclusion, the predicted changes to the three indicators of stream flow in the receiving environment are neutral and, therefore, there will be no additional impact as a result of the proposed care and maintenance program.

The specific activities likely to affect **surface water quality in the receiving environment** identified in Table 11 include:

The activities likely to affect surface water quality in the receiving environment

- Release of compliant water from the Mill Water Treatment Plant to Rose Creek
- Release of compliant water from the Cross Valley Pond to Rose Creek
- Release of compliant water from the Grum/Vangorda Water Treatment Plant to Grum Interceptor Ditch
- Provision of safe storage and transportation of materials
- Securing and safely storing contaminated soils

No environmental effects are predicted for the terms of the proposed water licence renewal as compared to existing conditions

The potential effect on surface water quality in the receiving environment will be assessed in terms of zinc, sulphate and pH in Rose (site R2/X14) and Vangorda (site V8) Creeks (the indicators).

The only activities with a direct linkage to surface water quality are the controlled discharge of treated compliant water to Rose Creek from either the Mill Water Treatment Plant or the Cross Valley pond and to Vangorda Creek (via the Grum Interceptor Ditch) from the Grum/Vangorda Water Treatment Plant. Other linkages were identified but are only anticipated to have an effect in cases of Accidents or Malfunctions (see Section 8). There are no environmental effects to surface water predicted for the terms of the proposed Water Licence renewal when compared to the baseline information (1998 to 2002). Maintaining reduced water levels in the pits will minimize seepage through the pit walls and containment dykes, and reduce potential impacts to water quality in the receiving environment.

The specific activities likely to affect **groundwater flow in the receiving environment** identified in Table 11 include:

The activities likely to affect surface water quality in the receiving environment

- Dewatering of Zone 2 pit into Main pit
- Dewatering of the Main pit to the mill water treatment system
- Dewatering of the Vangorda pit to the Grum/Vangorda water treatment plant
- Lime treatment of water from the Intermediate Pond and discharge to Cross Valley Pond
- Release of water from Cross Valley Pond to Rose Creek

The potential effect on groundwater flow in the receiving environment will be assessed in terms of maintaining pit and pond surface water elevations within desired ranges and construction of new facilities or alterations to existing facilities that would result in changes to groundwater recharge or discharge areas.

Changes to groundwater quality and quantity are anticipated to evolve relatively slowly

An important consideration when assessing groundwater flow is temporal scale. Evolution and flow of groundwater are orders of magnitude slower rates than that observed in surface water. Therefore, in the context of the licence renewal timeframe (2004 to 2008), changes in groundwater flow are anticipated to evolve very slowly relative to other environmental components.

There is no anticipated change of net flow of groundwater in and out of the Main, Zone II and Vangorda pits

Dewatering of the Main, Zone 2 and Vangorda Pits is anticipated to maintain the pit water levels within the ranges established since 1998. There is, therefore, no change anticipated to the net flow of groundwater in and out of these pits. The operation of the Intermediate and Cross Valley Ponds of the Rose Creek Tailings Facility by the use of syphons to maintain a variable water level is also an established practice that is not anticipated to result in a change to the flow of groundwater in and out of these ponds as compared to the baseline conditions (1998 to 2002). Further, there are no new construction activities that would intercept or divert groundwater flow (i.e. no new dams, ditches or diversions or changes to existing structures).

The specific activities likely to affect **groundwater quality in the receiving environment** identified in Table 11 include:

The activities likely to affect surface water quality in the receiving environment

- Dewatering of Zone 2 pit into Main pit
- Lime treatment of water from the Intermediate Pond and discharge to Cross Valley Pond
- Release of water from the Cross Valley Pond to Rose Creek
- Provide safe storage and transportation of materials
- Securing and safely storing highly contaminated soils
- Operation of biocells
- Consolidate and cover oxidized fines

The potential effect on groundwater quality in the receiving environment will be assessed in terms of subsurface zinc, sulphate and pH in the Rose Creek Valley aquifer (site X16), along the North Fork of Rose Creek, below the Vangorda rock dump and below the Grum rock dump (the indicators).

Changes to groundwater quality and quantity are anticipated to evolve relatively slowly

An important consideration when assessing groundwater quality is temporal scale. Evolution and flow of groundwater are orders of magnitude slower than that observed in surface water. Therefore, in the context of the licence renewal timeframe (2004 to 2008), changes in groundwater quality are anticipated to evolve very slowly relative to other environmental components.

Groundwater quality is not expected to change significantly from 2004-2008

No environmental effects are predicted for the terms of the proposed water licence renewal as compared to existing conditions

Groundwater quality is not anticipated to change to a significant degree in the timeframe of the proposed licence renewal (2004 to 2008). The baseline conditions described in Volume II, Description of the Existing Environment document that groundwater quality is already impacted in several locations as a result of previous mining activities. The baseline information and the characterization studies do not provide an indication that groundwater quality at these locations would be expected to degrade within the proposed timeframe of the licence renewal to the degree where an adverse effect on the surface receiving environment VECCs would be expected. Nonetheless, the Adaptive Management Plan described in Volume I, Project Description considers this as a possibility and describes monitoring, triggers and responses to degraded groundwater quality.

The effects assessment is summarized in Table 11 by project activity.

Table 11. Effects Assessment – Water Resources

Project Activity	VECC affected	Predicted changes to VECC indicator	Overall Consequence of the Impact on the VECC	Positive, Neutral or Adverse Effect
Dewatering the Zone 2 pit into the Main pit	Streamflow in the receiving environment	No anticipated change to pit water level patterns or on-site streamflow patterns	None	Neutral
	Groundwater flow in the receiving environment	No anticipated change to net groundwater inflow and outflow	None	Neutral

Project Activity	VECC affected	Predicted changes to VECC indicator	Overall Consequence of the Impact on the VECC	Positive, Neutral or Adverse Effect
	Groundwater quality in the receiving environment	No anticipated change to groundwater quality along the North Fork of Rose Creek	None	Neutral
Dewatering the Main pit to the mill water treatment system	Streamflow in the receiving environment	No anticipated change to pit water level patterns or on-site streamflow patterns	None	Neutral
	Groundwater flow in the receiving environment	No anticipated change to net groundwater inflow and outflow	None	Neutral
Operation of the mill water treatment plant and release of effluent	Streamflow in the receiving environment	No anticipated change to on-site or off-site streamflow patterns	None	Neutral
	Surface water quality in the receiving environment	No anticipated change in surface water quality at site X14/R2	None	Neutral
Lime treatment at the Intermediate pond	Streamflow in the receiving environment	No anticipated change to pond level patterns or on-site streamflow patterns	None	Neutral
	Groundwater flow in the receiving environment	No anticipated change to net groundwater inflow and outflow	None	Neutral
	Groundwater quality in the receiving environment	No anticipated change to groundwater quality at location X16	None	Neutral
Release of water from the Cross Valley Pond to Rose Creek	Streamflow in the receiving environment	No anticipated change to pond level patterns or off-site streamflow patterns	None	Neutral
	Surface water quality in the receiving environment	No anticipated change in surface water quality at site X14/R2	None	Neutral
	Groundwater flow in the receiving environment	No anticipated change to net groundwater inflow and outflow	None	Neutral
	Groundwater quality in the receiving environment	No anticipated change to groundwater quality at location X16	None	Neutral
Dewatering of the Vangorda pit to the Grum/Vangorda water treatment plant	Streamflow in the receiving environment	No anticipated change to pit water level patterns or on-site streamflow patterns	None	Neutral
	Groundwater flow in the receiving environment	No anticipated change to net groundwater inflow and outflow	None	Neutral
Operation of the Grum/Vangorda water treatment plant and release of water to Grum Interceptor Ditch	Streamflow in the receiving environment	No anticipated change to on-site or off-site streamflow patterns	None	Neutral
	Surface water quality in the receiving environment	No anticipated change in surface water quality at site V8	None	Neutral
Dewatering Little Creek	Streamflow in the	No anticipated change to pond level	None	Neutral

Project Activity	VECC affected	Predicted changes to VECC indicator	Overall Consequence of the Impact on the VECC	Positive, Neutral or Adverse Effect
Dam to Vangorda pit	receiving environment	patterns or on-site streamflow patterns		
Excavation of surface water control ditches for the new demolition debris landfill	Streamflow in the receiving environment	Minor anticipated change to on-site streamflow patterns	None	Neutral
Provide safe storage and transportation of materials	Surface water quality in the receiving environment	No anticipated change in surface water quality at site X14/R2 or site V8 except in an accident/ malfunction circumstance	None	Neutral
	Groundwater quality in the receiving environment	No anticipated change to groundwater quality except in an accident/ malfunction circumstance	None	Neutral
Securing and safely storing highly contaminated soils	Surface water quality in the receiving environment	No anticipated change in surface water quality at site X14/R2 or site V8 except in an accident/ malfunction circumstance	None	Neutral
	Groundwater quality in the receiving environment	No anticipated change to groundwater quality except in an accident/ malfunction circumstance	None	Neutral
Operate biocells	Groundwater quality in the receiving environment	No anticipated change to groundwater quality except in an accident/ malfunction circumstance	None	Neutral
Consolidate and Cover Oxidized Fines	Groundwater quality in the receiving environment	Slight improvement in groundwater quality	Slight	Positive

5.2.2 PROPOSED MITIGATION

No adverse effects have been identified for the water resource VECCs, therefore, no mitigation measures are required or recommended.

5.2.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

There are no residual effects on water resources VECCs from the proposed care and maintenance activities.

5.2.4 PROPOSED FOLLOW-UP

No follow-up studies are required to address specific aspects of water resources during the 2004-2008 period. Follow up studies are warranted if monitoring of surface water quality, groundwater quality or the aquatic community shows unexpected degradation. The Adaptive Management Plan that is described in Volume 1, Project Description provides a response framework for unforseen events and should be followed.

The following recommendations are made regarding environmental effects monitoring for **streamflow in the receiving environment**:

Recommendations given for environmental effects monitoring for streamflow

- Streamflow dataloggers should continue to be operated and monitored at locations R7, X14 and V8 through the proposed licence period;
- Surface flows should be monitored according to the proposed site water monitoring protocol as described in Volume I, Project Description;
- The site water balance should be updated and evaluated annually as a means of verifying that there have not been substantial alterations to the off-site streamflow patterns; and
- An on-site climate station should be established and operated to collect climate data relevant to compiling an accurate streamflow balance.

The following recommendations are made regarding monitoring for **surface water quality in the receiving environment**:

Recommendations made for environmental effects monitoring for surface water quality

- Water quality measurements should continue at the current sites noted in Table 12 (which is repeated from Table 14 of Volume 2 for ease of reference) to provide continuity with the surface water data for the Faro Mine Site / Rose Creek watershed;
- The water quality program should include the parameters listed in Table 13 to provide information on basic water quality characteristics, toxicity modifying factors (i.e., Dissolved Organic Carbon, pH, hardness), indicators of waste water discharge from the site (Zn, SO4, Mn, Fe, NH3) and trace metals which are also associated with the waste water discharge;
- Water quality should be sampled at least monthly after ice out, prior to waste water discharge and monthly during periods of discharge;
- Detection limits available by ICP-MS (Induction Coupled Plasma, Mass Spectrometry) are adequate for the required program and should not be changed over the five-year term of the water license;
- The surface water quality monitoring program should not supplant required compliance monitoring or the internal monitoring needed to guide on-site waste and treatment streams;
- The surface water quality monitoring program should continue to be coordinated with the biological and sediment monitoring sites and schedules.

Table 12. Surface Water Quality Stations Selected for Proposed Follow-up Program

Station Function	Station I.D.	Station Description
Faro Site		
Reference - Local Study Area	FDU	Faro Creek - Upstream of Diversion
	W10	Upper Guardhouse Creek
	R7	North Fork Rose Creek - upstream of Mine
Mine Impact	X5	Cross Valley Pond Outflow
	X13	Cross Valley Dam Seepage
Receiver - Local Study Area	X14 / R2	Rose Creek - downstream of diversion channel
	R3	Rose Creek - mid way to Anvil Creek
	R4	Rose Creek at Anvil Creek
Reference - Regional Study Area	R6	Anvil Creek - upstream of confluence with Rose Creek
Receiver - Regional Study Area	R5	Anvil Creek - downstream of confluence with Rose Creek
Vangorda Plateau Site		
Reference - Local and Regional Study Area	V1	Vangorda Creek above mine
	V4	Shrimp Creek
Mine Impact	V25BSP	Vangorda Creek - below Sheep Pad Pond
	V2	Grum Creek
	V6A	AEX Creek
	V27	Vangorda Creek, Main Stem, downstream of mine
Receiver - Local Study Area	VGMain	Vangorda Creek, above confluence with West Stem
	V5	West Stem Vangorda Creek
Receiver - Regional Study Area	V8	Vangorda Creek at Faro

Table 13. Surface Water Quality Parameters Selected for Proposed Follow-up Program

Trace Metals	Ag, Al, As, Cd, Co, Cr, Cu, Fe, Hg, Mn, NI, Pb, V, Zn
Other Parameters	Alkalinity, Conductivity, Hardness, Ca, ammonia nitrog pH, sulphate, total suspended solids

Recommendations made for environmental effects monitoring for surface water quality

The following recommendations are made regarding monitoring for **groundwater flow and quality in the receiving environment**:

- Groundwater quality measurements should continue at the sites listed in the proposed Water Monitoring Protocol on a twice per year basis (spring and fall) to provide continuity with the existing database;
- Chemical analyses should be conducted for the parameters listed in the Water Monitoring Protocol and should exclude analysis for total metals;
- The results of the groundwater quality monitoring program should be evaluated according to the triggers defined in the Adaptive Management Plan subsequent to each sampling event;
- Detection limits available by ICP-MS (Induction Coupled Plasma, Mass Spectrometry) are adequate for the required program and should not be changed over the five-year term of the water license.

5.3 AQUATIC RESOURCES

5.3.1 POTENTIAL EFFECTS

Specific key fisheries considerations for this project include alterations of fish habitat, changes to fish presence and the health of fish as measured by metals in fish tissue. Fisheries and Oceans Canada's guiding principle of "no net loss of fish habitat" and the *Fisheries Act* enforce the importance of all aspects of fish habitat, including hydrology, water quality, sources of food, physical habitat and the presence of migration barriers. The following VECCs and indicators have been defined for this study:

Two VECCs related to fish habitat and fish health have been selected

Indicators for Fish habitat VECC:

- metals in sediment in Rose Creek (R2 to R5) compared to reference levels and CCME
- metals in sediment in Vangorda Creek (V5, V27, V8) compared to reference levels and CCME
- benthic invertebrate community structure (abundance and richness) in Rose Creek (R2 to R5) compared to reference communities
- benthic invertebrate community structure (abundance and richness) in Vangorda Creek (V5, V27, V8) compared to reference communities

Indicators for Fish population health VECC:

- metals in fish tissue (Arctic grayling muscle and liver and slimy sculpin whole body)
- fish presence and abundance

These indicators have been selected to measure changes to these VECCs within the regional study area, based on existing monitoring programs and data available, as well as potential issues associated with the project. Other VECC's described earlier that have a direct relationship to fish habitat are water quality and quantity. The assessment of the care and maintenance program on water quality concluded there would be no change from the current water quality.

Potential project activities that can affect fish habitat or fish populations

The specific activities likely to affect fish habitat or fish population VECCs identified in Table 14 and include:

- Operation of the Mill Water Treatment Plant and release of effluent to Rose Creek
- Intermediate and Cross Valley Dam seepages
- Operation of the Grum/Vangorda Water Treatment Plant and release of water to Grum Interceptor Ditch
- Provide safe storage and transportation of materials
- Securing and safely storing contaminated soils

5.3.1.1 Fish Habitat

The potential effects on fish habitat are assessed in terms of changes to sediment quality that would result from the release of contaminants such as copper, lead and zinc into the receiving environment causing degradation of sediment quality. Habitat impacts are also assessed in terms of changes to the benthic community as indicated by reduced variability and the levels of metals in the tissue. Finally the impact of changing the conditions of the water licence will also be considered from the fish habitat perspective.

There are no anticipated negative effects on sediment quality since the proposed care and maintenance program is a continuation of the existing program

Rose and Vangorda Creek sediment quality have been studied in terms of metal content in and around the project area. Volume II summarizes condition of sediment in the receiving environment with a focus on copper, lead and zinc. Rose Creek data indicates that metal levels are highest immediately below the mine and progressively decreases proceeding downstream with the lowest values in the Anvil Creek reference site (R6). However, focusing on the more complete data set collected in 1999 collected by Environment Canada indicates that there is no statistical difference between the reference tributary sites flowing into Rose Creek and the sediment from the mainstem of Rose Creek immediately below the mine site. While the data suggests that the mine has had an effect on sediment quality in Rose Creek, a comparison of metal levels before and after 1998 suggests that since the care and maintenance program was established the sediment quality has improved. Since the proposed care and maintenance program will be a continuation of the existing program there are no anticipated negative effects on sediment quality from 2004 to 2008.

There are no anticipated adverse effects on benthic community structure

Benthic studies have provided fairly constant results in terms of community diversity over the last five years indicating that the care and maintenance program is not degrading the aquatic habitat. Therefore, it is anticipated that the care and maintenance program proposed for the next 5 years is unlikely to have an adverse effects on the benthic community.

5.3.1.2 Fish Population

The possible impacts to **fish populations** are assessed in terms of increased metals levels in fish and changes in distribution of fish within and immediately downstream of the mine site.

Possible impacts to fish populations are assessed in terms of tissue metal levels in fish, and changes in distribution of fish

Information on fish abundance is not adequate to assess changes in fish populations in and around the study area, therefore only distribution or changes in presence of fish can be used but abundance will be considered. However, the only fish distribution data collected during the current care and maintenance program was in 2002 therefore it is not possible to determine if there are any trends in fish distribution that may be related to the care and maintenance activities.

Metals in fish tissue data were collected in 2002. However, no other data were collected during the existing 1998-2002 care and maintenance period. The data collected in 2002 showed no particular trend between fish sampled within the project study area, downstream of the project or from the reference sites in the north forks of Rose Creek and Blind Creek.

Changes to fish habitat or fish population health VECC indicators are not expected as a result of transportation and storage of materials or effects of contaminated sites on the receiving environment. Spill contingency plans and monitoring that could trigger the adaptive management program will ensure that these activities do not have an effect on this VECC.

In summary, the predicted changes to the two indicators of fish habitat productivity are neutral and, therefore, there will be no additional impact to fish habitat as a result of the proposed care and maintenance program. The data on fish populations shows no particular trend that could be attributed to the current care and maintenance program. Since there are no proposed changes to the program that would result in the increase of pollutants into Rose or Vangorda Creeks, it is unlikely that the proposed 2004–2008 care and maintenance program will result in increased metal levels in fish tissue or be responsible for a change in fish distribution. Therefore, the fish populations in Rose and Vangorda Creeks should be unaffected by the proposed program.

The project activities effect on fish habitat and fish health VECCs are outlined in Table 14.

Table 14. Effects Analysis – Aquatic Resources

Project Activity	VECC affected	Predicted changes to VECC indicator	Overall Consequence of the Impact on the VECC	Positive or Adverse Effect
Operation of the mill water treatment plant and release of effluent to Rose Creek	Fish Habitat – Rose Creek	Sediment quality and benthic community not expected to be affected as the current effectiveness of the water treatment plant will remain the same	None	Neutral
	Fish Population – Rose Creek	No anticipated changes in population status or levels of metals in fish tissue	None	Neutral
Intermediate and Cross Valley Ponds seepage	Fish Habitat – Rose Creek	Sediment quality and benthic community (at R2) not expected to be affected as discharges from these facilities will remain the same	None	Neutral
	Fish Populations – Rose Creek	No anticipated changes in population status or levels of metals in fish tissue	None	Neutral

Project Activity	VECC affected	Predicted changes to VECC indicator	Overall Consequence of the Impact on the VECC	Positive or Adverse Effect
Vangorda Water Treatment System operation and release to Grum Interceptor Ditch	Fish Habitat – Vangorda Creek	Sediment quality and benthic community (at V8) not expected to be affected as the current effectiveness of the water treatment plant will remain the same	None	Neutral
	Fish Population – Vangorda Creek	No anticipated changes in population status or levels of metals in fish tissue	None	Neutral
Provide safe storage and transportation of materials / Securing and safely storing highly contaminated soils	Fish Habitat – Rose and Vangorda creeks	No anticipated changes in sediment quality and benthic community except in an accident/ malfunction circumstance	None	Neutral
	Fish Population – Rose and Vangorda creek	No anticipated changes in population status or levels of metals in fish tissue except in an accident/ malfunction circumstance	None	Neutral

5.3.2 PROPOSED MITIGATION

No mitigation is required as there were no adverse effects identified as a result of this project.

5.3.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects were identified as a result of this project.

5.3.4 PROPOSED FOLLOW-UP

No follow up studies are proposed. The follow up program for the removal of the Freshwater Supply Dam ("FWSD") will address fish and fish habitat issues affected by dam removal in the context of the pre-dam environment.

5.4 TERRESTRIAL RESOURCES

5.4.1 POTENTIAL EFFECTS

Terrestrial resource VECCs are wildlife habitat integrity and wildlife population health

The following VECCs and indicators have been selected:

- Wildlife habitat integrity VECC – metals in vegetation and vegetation community (structure and diversity) indicators
- Wildlife population health – wildlife presence and absence indicator

Investigation of potential effects to wildlife will be assessed through professional judgement

Wildlife population studies conducted within the RSA have monitored wildlife at the population level. Therefore, the potential effects of a number of localized activities cannot be easily separated. Furthermore, there are insufficient empirical data available to determine the effects of current (since 1998) care and maintenance activities on the majority of wildlife species within the RSA. Therefore, in order to capture the breadth of potential effects of project activities on wildlife populations, investigation of potential effects will not be restricted to the available data but will also be assessed based on professional judgement. A more generalized indicator of population health will therefore be employed rather than indicators of population status and characteristics of particular species.

A number of factors can effect wildlife population health

In the process of establishing whether a project activity will have a potential effect on wildlife population health, the positive or negative changes in the following parameters were considered:

- Potential loss or alteration of wildlife habitat;
- Potential displacement of wildlife from valued habitat;
- Potential uptake of metals through terrestrial or aquatic food webs; and
- Potential disruption of terrestrial or aquatic food webs.

Population level impacts can be caused by severe alteration or displacement of habitat, and reduced fitness or mortality

Potential impacts on wildlife habitat, through alteration or displacement, can impact individuals and populations. Individual fitness may be reduced temporarily or permanently through forced expansion or displacement from a home range. A population level impact could occur through a decrease in carrying capacity of the environment. This in turn results in a decrease in the maximum population density the environment can sustain. Potential uptake of metals may impact individuals through reduced fitness or mortality. Potential disruption of terrestrial or aquatic food webs can impact individuals and populations. Individual fitness may be reduced temporarily or permanently through reduction in prey abundance. If severe, this could result in a population level impact.

The following project activities have the potential to interact with the terrestrial resource VECCs as listed in Table 15:

Activities with the potential to interact with terrestrial resource VECCs

- Treat water pumped from Faro Main pit and discharge to Rose Creek, Cross-Valley Pond or Intermediate Pond
- Release of water from Cross Valley Pond to Rose Creek
- Secure and safely store highly contaminated soils
- Establish and operate Bioremediation Cells
- Consolidate and cover oxidized fines

The discharge of treated water into Rose Creek could have the potential to impact the terrestrial VECCs through the aquatic environment. The assessment of water resources provided in Section 5.3 concludes there will be no adverse effects on water resources. These activities are therefore not considered further in this section.

The activity from the bioremediation cell at the Vangorda site will not affect Fannin sheep presence

The establishment and operation of the bioremediation cells and the demolition waste landfill, to be situated on the Faro Rock Dumps, will not result in a habitat loss as this area is already disturbed and does not support vegetation. However, Fannin stone sheep (*Ovis dalli stonei*) are documented to migrate near the area sited for the bioremediation cell at the Vangorda site (McLeod 1981). The potential exists that increased human activity will increase displacement of sheep from these areas and influence migration routes. However, migration routes have been maintained throughout mine operation and care and maintenance activities and there are no documented population level effects of current care and maintenance activities. In addition, the use of the cell will remediate hydrocarbon contaminated soils and result in positive effects on wildlife habitat and health.

The storage of contaminated soils and covering of oxidized fines could result in a long-term positive effect for wildlife habitat and health

Securing and safely storing highly contaminated soils, and consolidating and covering oxidized fines with compacted silt or clay, could temporarily affect metals in vegetation or wildlife through the release of airborne pollutants. However, this activity will permanently remove a contaminant source and will result in a long-term positive effect.

Table 15. Effects Analysis – Terrestrial Resources

Project Activity	VECC affected	Predicted changes to VECC indicator	Overall Consequence of the Impact on the VECC	Positive or Adverse Effect
Treat water pumped from Faro Main pit and discharge to Rose Creek, Cross-Valley Pond or Intermediate Pond	Wildlife Population Health	Potential for effects on predators to occur through contamination of food webs resulting in a reduction in prey abundance – this is unlikely to change from existing conditions	None	Neutral
Release of water from Cross Valley Pond to Rose Creek	Wildlife Population Health	Potential for effects on predators to occur through contamination of food webs resulting in a reduction in prey abundance – this is unlikely to change from existing conditions	None	Neutral
Securing and safely storing highly contaminated soils	Wildlife habitat integrity	Potential for airborne dust to increase potential for metals in vegetation temporarily but long-term benefit from removal of exposed contaminant source	Long-term improvement to wildlife habitat	Minor - Positive
	Wildlife Population Health	Potential for airborne dust to increase potential for impact on wildlife presence and abundance temporarily but long-term benefit from removal of exposed contaminant source	Long-term improvement to wildlife health	Minor - Positive

Project Activity	VECC affected	Predicted changes to VECC indicator	Overall Consequence of the Impact on the VECC	Positive or Adverse Effect
Tear down/demolition of buildings	Wildlife habitat integrity	Temporary source or airborne dust that could carry metals to vegetation temporary and potential source of metal contamination removed. Therefore an overall potential decrease in contaminants (via dusting) that can reach vegetation	Net long-term improvement to wildlife habitat	Minor - Positive
Bioremediation Cells site establishment and operation	Wildlife habitat integrity	Potential for airborne dust to increase potential for metals in vegetation temporarily but long-term benefit from removal of exposed contaminant source	Long-term improvement to wildlife habitat	Minor - Positive
	Wildlife Population Health	Potential for bioremediation cell establishment and operations to increase displacement of stone sheep at Vangorda – unlikely but long-term benefit from removal of exposed contaminant source	Long-term improvement to wildlife health	Minor - Positive
Oxidized fines near the Crusher Stockpile - Consolidate and cover with compacted silt or clay	Wildlife habitat integrity	Potential source of metal contamination on vegetation, due to air borne pollutants during work but long term source removed	Long-term improvement to wildlife habitat	Minor - Positive
	Wildlife Population Health	Potential for the consolidation and covering of oxidized fines to increase current levels of contamination from air borne pollutants on site temporarily but removes long term exposure of contaminants to wildlife	Long-term improvement to wildlife health	Minor - Positive
Oxidized fines near the Vangorda Rock Dump - Cover with compacted silt or clay	Wildlife habitat integrity	Potential source of metal contamination on vegetation, due to air borne pollutants during work but long term source removed	Long-term improvement to wildlife habitat	Minor - Positive
	Wildlife Population Health	Potential for the consolidation and covering of oxidized fines to increase current levels of contamination from air borne pollutants on site temporarily but removes long term exposure of contaminants to wildlife	Long-term improvement to wildlife health	Minor - Positive

5.4.2 PROPOSED MITIGATION

Due to the potential net gain in wildlife habitat and improved health, no further mitigation is recommended.

5.4.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects of proposed care and maintenance activities on wildlife population health were identified.

5.4.4 PROPOSED FOLLOW-UP

The current impact of elevated metal concentrations within the terrestrial food web on wildlife population health is unknown

It is suggested that monitoring the terrestrial food webs for contaminant levels be incorporated into the proposed study of terrestrial effects that is described in Volume I of this report with the following considerations for the study design:

- The diversity of terrestrial plant and animal species sampled be increased.
- Data on wildlife species is limited e.g., *Ursus arctos* (n = 0), *Ursus americanus* (n = 0), *Ovis dalli stonei* (n = 0), *Rangifer tarandus caribou* (n = 0) and *Alces alces* (n = 4).
- Bears have the potential to be particularly vulnerable to bioaccumulation due to their hyperphagic feeding habits during summer and fall however data on forage species is also limited e.g., *Vaccinium spp.* (n = 2), *Empetrum nigrum* (n = 1), *Arctostaphylus spp.*, *Shepherdia Canadensis* (n = 0).

6 EFFECTS OF ENVIRONMENTAL CHANGES

6.1 HUMAN HEALTH

6.1.1 POTENTIAL EFFECTS

The human health effects to be considered for this project relate to:

- the health of workers at the mine site;
- the health of people who access the mine property for recreational and harvesting purposes; and,
- the health of the general population downstream of any environmental impacts that might occur (e.g., airshed, watershed).

Human health effects can be direct, for example by direct exposure to contaminants, and indirect through exposure to VECCs that have been contaminated. Potential direct and indirect effects to human health are related to the potential effects to VECCs described and analyzed elsewhere in this document (sections 5, 6, 7, 8 and 9). Potential adverse effects to VECCs are summarized for their potential effects to human health in Table 16.

Table 16. Effects Analysis – Human Health

Potential Effect	VECC Affected	Predicted Change to VECC	Overall Consequence	Positive or Adverse Effect & Magnitude	Potential Effects on Human Health
Various care and maintenance activities that may generate short term contaminated dust dispersion (tear down and demolition of buildings, soil excavation and placement in bioremediation cells, consolidation and covering of oxidized fines)	Air quality	Temporary increase in ambient air particulate levels. Reduction in long-term potential for contaminated particulates in air.	Potential minor, temporary increase	Minor adverse	Potential direct effect from air borne contaminated particulate matter
Pipeline break releasing non-compliant water to Vangorda Creek	Surface water quality	Reduced water quality in immediate area of non-compliant water spill and downstream	Potential minor, temporary increase	Minor, adverse	Potential indirect effect
Pipeline break releasing non-compliant water to Vangorda Creek	Fish habitat integrity	Compromised due to increased metal loading over short term	Potential minor, temporary increase	Minor, adverse	Potential indirect effect
Pipeline break releasing non-compliant water to Vangorda Creek	Fish population health	Reduced over short term due to increased metal loading	Potential minor, temporary increase	Minor, adverse	Potential indirect effect

Potential Effect	VECC Affected	Predicted Change to VECC	Overall Consequence	Positive or Adverse Effect & Magnitude	Potential Effects on Human Health
Gasoline and diesel fuel spills	Surface water quality	Reduced water quality in immediate area of spill	Potential minor, temporary increase	Minor, adverse	Potential indirect effect
Gasoline and diesel fuel spills	Fish habitat integrity	Short term disruption of habitat integrity in immediate area of spill	Potential minor, temporary increase	Minor, adverse	Potential indirect effect
Gasoline and diesel fuel spills	Fish population health	Reduced health over short term for exposed individuals	Potential minor, temporary increase	Minor, adverse	Potential indirect effect

There is one possible direct effects to human health noted above, from airborne contaminated particulate matter. The remaining potentially adversely affected VECCs pose only an indirect effect to human health and potentially result from a malfunction or accident, or that could be caused by a catastrophic environmental event affecting the project. These indirect events have been determined to have a very low likelihood of occurring.

The direct impacts to human health can be avoided through mitigation.

6.1.2 PROPOSED MITIGATION

Section 5.1 of this report discusses potential impacts to air quality related to the performance of care and maintenance activities and outlines mitigation measures to be applied to reduce and avoid impacts. Proper respiratory protection should be worn by onsite workers when there is a chance of coming into contact with contaminated airborne particulate matter.

6.1.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects have been identified.

6.1.4 PROPOSED FOLLOW-UP

Another potential source of environmental and human health impact that was identified during this EA, but is noted as being outside of the scope of the EA as it is related to past mining activities, is public exposure to the Rose Creek Tailings Facility. The potential effect relates to uncontrolled public access to the tailings that are acidic in nature and enriched in heavy metals.

Since the Rose Creek Tailings Facility is already proposed to undergo investigation as part of the investigation of potential terrestrial effects (as described in Volume 1, Project Description), any mitigation measures directed at public access would be developed under that plan. The proposed investigation (as described in Volume 1) is a multi-year study that is to provide annual

information updates and result in a recommended short term mitigation plan by the end of 2005.

6.2 SOCIO-ECONOMIC CONDITIONS

6.2.1 POTENTIAL EFFECTS

One socio-econimic VECC and one indicator have been identified

Potential socio-economic impacts caused by the project are assessed when they arise from a change in the environment caused by the project. This indirect consideration of socio-economic impacts does not, however, preclude the consideration of potential direct socio-economic impacts of the project. Commercial, subsistence and recreational use has been defined as the socio-economic VECC with continued use opportunities being the indicator.

During care and maintenance (1998-2002), commercial, subsistence and recreational users have had access to the area

The existing socio-economic conditions have developed since the mine became operational, resulting from a long association of the mine with local residents and other users. When the mine was operational, this resulted in direct employment benefits. However, since the mine shut down in 1998 and the property went into care and maintenance, an increasing number of commercial, subsistence and recreational users have had access to the land and water resources of the area.

The Town of Faro, suffered a significant population decline when the mine shutdown in 1998. Since then, Faro has diversified its economic base by offering recreational, tourism and retirement opportunities, and continues to grow and develop these sectors to support itself as a viable community. Continued access to the mine site for recreational transportation and use of the natural resources of the area, including fishing, hunting and wildlife viewing, play an important role in sustaining the socio-economic conditions and viability of the Town of Faro and the community of Ross River. The tear down/demolition of buildings will create further employment opportunities from those that currently exist. Economic (commercial) opportunities from this and other activities will be of potential benefit to contractors, suppliers, service providers and individuals in the Yukon region as a whole in addition to the Town of Faro and the community of Ross River.

The water licence renewal is to continue the ongoing care and maintenance of the Anvil Range Mine Complex, requiring the provision of the current level of manpower and supplier support.

The Interim Receiver will continue to maximize contracting with the Town of Faro and RRDC and surrounding area businesses, and pursue local hire where possible.

No adverse socio-economic effects are anticipated from this project

Based on the environmental effects assessment in section 5, there are no residual environmental changes that would affect continued commercial, subsistence or recreational use of the regional area (Figure 5). In addition, potential adverse direct effects are not anticipated to occur with this project since the Interim

Receiver will continue to maintain the present level of access to and use of the mine site for recreational transportation, providing for continued quality fishing, hunting and wildlife viewing opportunities, as long as health and safety permits.

6.2.2 PROPOSED MITIGATION MEASURES

No potential adverse socio-economic effects from the project have been identified and the project may result in increased commercial opportunities through jobs. Therefore, no mitigation measures are required or recommended.

6.2.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

There are no residual effects on socio-economic conditions resulting from the proposed care and maintenance project activities.

6.2.4 PROPOSED FOLLOW-UP

No follow-up studies are required or recommended to address socio-economic conditions during the 2004 to 2008 term of the care and maintenance project.

6.3 TRADITIONAL USE

6.3.1 INTRODUCTION

Traditional use is considered when reviewing the potential socio-economic impacts of proposed developments under the CEAA. Traditional use refers to First Nations activities such as hunting, trapping, fishing and gathering of plant resources. Social activities such as gatherings, teaching of skills and cultural values are also part of traditional use activities.

Disruption in traditional use of the local, as well as the regional study areas that occurred with mine development and operation caused considerable hardship for the members of the Ross River Dena community (Weinstein 1992). Even the discovery of the ore bodies has been credited to outsiders, rather than to those members of the Ross River Kaska community who first pointed out their existence (Greer 2000). These changes to traditional use and community health are substantial and significant and relate directly to the development of the mine in the late 1960's and the operation of the mine to 1998. Nonetheless, these issues affect the current assessment of effects related to the proposed care and maintenance activities (i.e. from a temporal baseline of 1998 to 2002) through the willingness of the Ross River community to engage in traditional knowledge studies and to share their knowledge of the land. The Ross River Dena Council, as well as individual Ross River Dena members, chose to participate in the present assessment of impacts to traditional use activities and it is believed that their primary motivation for doing so was to ensure that their concerns about the environment were documented and will be incorporated in the current water

renewal project, and thereby be available for inclusion into future mine closure planning.

A second issue that affects the traditional use assessment is a lack of geographically precise location data on where traditional land use activities are taking place within the study area. While considerably more data on traditional use was assembled during the 2003 interview sessions, much of it is very general in nature.

6.3.2 POTENTIAL EFFECTS

The range of traditional use activities that are presently taking place in the LSA is reduced from what it was prior to the establishment of the mine. Nonetheless, it is noted that the frequency of traditional use activities has increased from what it was during the years of mine operation. Moreover, it is expected that traditional use activities in the local study area will increase with time. Therefore, in reflection of the traditional use activities that are currently taking place in the LSA, the Traditional Use VECCs that have been identified include:

- Aboriginal fishery
- Aboriginal wildlife harvesting
- Aboriginal plant resource harvesting.

The indicators selected to measure the health of these VECCs are respectively, the existence of continued opportunities for fish, wildlife and plant harvesting in the regional study area (illustrated on Figure 5).

Numerous proposed project activities could impact traditional use activities, including machinery and equipment operation, security gate control, maintenance of ditches and diversions, demolition and disposal of buildings and establishment of a new demolition debris landfill. Any project activity that might negatively affect wildlife in the study area could consequently affect traditional use activities.

As discussed in 5.4.2.1, wildlife habitat is expected to improve with project activities. Possible wildlife concerns include displacement of wildlife from the study area, potential contamination of terrestrial or aquatic food webs, and potential disruption of terrestrial or aquatic food sources.

The predominant current traditional land use activity in the study area is moose hunting. Moose will be affected by increased human presence in the area, and by heavy equipment operation (also temporary or short-lived). Moose may also be affected by the possibility of contaminated food sources.

There is insufficient information to establish specifically if, and how fur trapping might be impacted.

While impact to sheep is possible, no sheep hunting is presently taking place in the study area. Sheep hunting as a traditional use activity will therefore not be impacted.

Based on the environmental effects, there should be no change in opportunities for traditional use

Based on the environmental effects assessments in section 5, no adverse effects on traditional use are expected, in the context of the assessment reference timeframe of 1998 to 2002. However, more geographically precise data on the location of traditional use practices is required in order to establish which specific project activities may affect which practices, and how.

6.3.3 PROPOSED MITIGATION

No mitigation measures are recommended.

6.3.4 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects have been identified.

6.3.5 PROPOSED FOLLOW UP

It is recommended that an information exchange program be implemented whereby site personnel, and specifically security personnel, are made aware of the timing and nature of First Nations hunting or other land use activities taking place in the general mine area (say loosely defined as the LSA), as a means of ensuring safety and awareness. This proposed information exchange program would capture the anticipated progressive increase in use of the land by First Nations and allow for this to be considered in relation to the on-going scheduled care and maintenance activities.

Traditional Knowledge and First Nations involvement should be included in the design and execution of the proposed study of terrestrial effects (described in Volume I of this report), as is proposed for that study.

6.4 HERITAGE RESOURCES

6.4.1 POTENTIAL EFFECTS

Specific heritage resources considerations for this project include unintentional destruction or damage to land-based heritage resources (i.e., heritage sites) with land altering activities, and pilfering of moveable heritage resources (artifacts) from heritage sites through illegal collecting.

Heritage sites have been identified as a VECC for this assessment and the indicator for effects has been defined as no disturbance of heritage sites.

The first issue directing the approach for assessing impacts to heritage resources in the project area is the lack of data on heritage resources in the regional study

area. No heritage site inventory work has ever been completed in this area and consequently the resource being managed is essentially unknown. As stated in Volume 2, available data has indicated that the study area has the potential for heritage resources.

The second issue directing the assessment is the nature of the LSA (mine site), which features extensive ground surface disturbance from the many years of mining activity. Heritage sites are typically located in surface or shallowly-buried context (unconsolidated sediments) and are highly vulnerable to disturbance with any ground altering activities. Construction of facilities in areas of undisturbed land may impact heritage sites that are situated in such settings.

At this time, none of the project activities proposed involve alteration of intact or undisturbed land surfaces. The two proposed project activities which involve new construction work, the development of a new landfill site and the establishment of the bioremediation cell, will be established on the rock dumps. That is, they will be situated on land surfaces that have already been disturbed.

Indirect impact to heritage sites, through illegal artifact collecting during the course of the project in either the LSA or RSA is also a possibility. Indirect impacts such as artifact pilfering and structure vandalism are more typical with a larger development projects in pristine or undisturbed contexts. Moreover, the size of the mine workforce and of the local resident population during the life of the project is small, especially when compared to that which was present during the years the mine was under development and operation. A larger population using the area would mean a greater chance of indirect impacts. Given the scale of human presence in the local and regional study areas since the mine was first developed, it is highly likely that any indirect impacts that might occur, have already taken place.

The RRD community gravesites that are located in the RSA are located near Blind Creek and the Pelly River. These highly sensitive sites are situated well out of the LSA, and therefore are not considered as being at risk for indirect impact as a result of the proposed care and maintenance activities.

Therefore, since there will be no alteration of undisturbed land surfaces there can be no direct impact to heritage sites in the study area. The possibility of indirect impacts to heritage sites in the study area is considered to be low.

6.4.2 PROPOSED MITIGATION

No mitigation is required as there is no potential for disturbance of known heritage sites predicted as a result of this project.

6.4.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

There are no predicted residual effects on heritage sites as a result of this project.

6.4.4 PROPOSED FOLLOW-UP

No follow-up programs are proposed as there is no potential for disturbance of known heritage sites predicted as a result of this project.

7 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

7.1 INTRODUCTION

The approach taken for considering effects of the environment on the project has been to:

1. Identify environmental occurrences that could interact with project VECCs;
2. Assess the possible consequences of the interactions; and
3. Assess the proposed mitigation measures for appropriateness and suggest additional mitigation where required.

The Adaptive Management Plan ("AMP") described in Volume 1, Project Description describes a response framework for some unforeseen environmental effects for some project components and is a reference for this assessment.

7.2 POTENTIAL EFFECTS

This section describes the potential environmental effects that could have a significant impact on the project VECCs, and the likelihood of these events occurring. The environmental effects that could impact the project VECCs have been identified in Table 17.

Global warming has not been considered in this assessment since the duration of the proposed project is only five years (to 2008) and potential effects on project VECCs that might result from climate change over such a short timeframe are considered to be negligible.

Table 17. Effects of the Environment on the Project

Potential Environment Effect / VECC	*Wind Storm Event*	*Freshet*	*Flood Event*	*Earthquake*
Air Quality	X			
Stream Flow		X	X	X
Surface Water Quality	X	X	X	X
Groundwater Quality				X
Fish Habitat Integrity			X	X
Fish Population Health	X	X	X	
Wildlife Habitat Integrity			X	X

Potential Environment Effect / VECC	*Wind Storm Event*	*Freshet*	*Flood Event*	*Earthquake*
Wildlife Population Health	X			
Commercial Subsistence Recreational Use	X		X	X
Aboriginal Fishery			X	X
Wildlife Harvesting			X	X
Plant Harvesting	X	X	X	X
Heritage Sites			X	X

Wind Storm Event

The most likely wind storm event related environment effect of consequence would be wind dispersion of tailings resulting in increasing adverse effects on terrestrial and aquatic environments. This event has been identified in the AMP, and is addressed in section 7.6 of Volume I for effects to terrestrial environments.

Effects caused by wind dispersion of contaminated tailings would be short term, for the duration of the wind storm event. The resulting impact of this on the affected VECCs (indicated in Table 17 with an **X**) would be potential minor, temporary increase, with the potential for a minor adverse effect.

Freshet

A freshet is a natural springtime event resulting from melting snow and possibly augmented by a precipitation event. It results in raised water levels in watercourses and lakes. This is a natural occurrence that happens every spring, the intensity of which is generally determined by how much snow pack there is, how suddenly the weather warms in the spring, and whether or not it is accompanied by precipitation (e.g., rain). In severe freshet events, flooding could occur. This event has been identified in the AMP and is addressed in section 7.9 of Volume I.

Effects caused by a freshet event are considered neutral and short-term reversible, providing the appropriate AMP response is initiated as required.

Flood Event

A flood event for the purposes of this exercise is considered to be an event significantly larger than a freshet event (described above). An example of a flood event would be a 1:500 year or greater flood. It could result in widespread flooding of lands in the study area, and affect specific infrastructure components

that are at risk. This event has been identified in the AMP and is addressed in section 7.9 of Volume I.

Effects caused by a 1:500 year or greater flood event would depend on the magnitude and duration of the flood event and the resulting damage, if any, it may cause to identified infrastructure components. Many of the identified infrastructure components have been engineered for a certain level of impact. Providing the integrity of these components has been maintained, then (up to) a certain level of impact should not cause an adverse effect. The AMP outlines monitoring and response scenario's for certain environmental risks. Providing the AMP is followed, the risk of environmental impact is reduced.

A flood event of catastrophic proportion cannot be predicted or prevented. Contingency planning is the only way to be prepared for this type of event. The AMP provides a satisfactory contingency plan for a flood event.

Earthquake
An earthquake in this area could happen, though infrastructure components would have a certain level of engineering design built in to prevent serious damage from earthquakes up to a certain magnitude. An earthquake event could cause weakening or failure of infrastructure, depending on magnitude and duration. The AMP indirectly addresses impacts caused by earthquakes by identifying loss of integrity or failure events of identified infrastructure components. The AMP outlines monitoring and response scenario's for certain environmental risks, thus reducing the risk of environmental impact associated with an earthquake.

An earthquake of catastrophic proportion cannot be predicted or prevented. Contingency planning is the only way to be prepared for this type of event. The AMP provides a satisfactory contingency plan for an earthquake.

7.3 PROPOSED MITIGATION

A ***wind storm event*** is considered the only environment effect that may cause a project effect that could impact the environment; in this case wind borne contaminated dust. This document (Volume III – Environmental Effects Assessment) addresses the issue of wind blown contaminated dust in section 5.1 Air Quality and describes the proposed mitigation measures.

There are no appropriate mitigation responses to catastrophic events that may result. Implementing and following the AMP is a measure that improves the ability of the operator to respond to unforeseen events, including catastrophic events.

7.4 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects have been identified.

7.5 PROPOSED FOLLOW-UP

Follow-up monitoring would be required only if an event that causes an impact to the project and results in environmental impacts occurs. Monitoring would be conducted to determine the extent of any contamination.

8 EFFECTS OF POSSIBLE ACCIDENTS OR MALFUNCTIONS

8.1 OVERVIEW

Accidents and malfunctions, in this report, refer to the breakdown of systems that are necessary components of the project activities and that have the potential to have an adverse environmental effect. These potential breakdowns have been identified, Volume I Project Description, as follows:

1. Pipeline breaks within the mine water collection systems.
2. Pipeline breaks releasing water to the environment.
3. General loss of electrical power.
4. Pump failure at a major pumping station.
5. Gasoline and diesel fuel spills.
6. Loss of Road Access.
7. Loss of Communication.

This section assesses the potential for these breakdowns to occur and to cause impacts to VECCs.

8.2 PIPELINE BREAKS WITHIN THE MINE WATER COLLECTION SYSTEM

8.2.1 POTENTIAL EFFECTS

Some of the water pipelines that will be utilized for the proposed project activities lie entirely within the mine water collection systems and, therefore, do not pose an environmental risk if a break occurs. There will be an operational disruption if these pipelines break. However, repairs can be made by on site personnel and operational disruptions would be anticipated to be relatively minor.

The pipelines that would fall into this category are:

1. Pipeline from the Zone 2 Pit wellhead to the Main Pit.
2. Pipeline from the Main Pit to the mill water treatment system.
3. Tailings pipeline from the Mill to the Main Pit.
4. Effluent pipeline from the Mill Water Treatment system to the Intermediate Pond/Cross Valley Pond.
5. Pipeline from Little Creek Dam to Vangorda Pit.
6. Syphon pipeline from Intermediate Dam to Cross Valley Pond.

These pipelines fall within the mine water collection system and do not pose an environmental risk if a break were to occur. Therefore, no assessment of potential environmental effects is required.

8.2.2 PROPOSED MITIGATION

The contingency plan that is in place for these pipeline breaks is to have repair materials on hand or readily available from an off site source as well as any specialized repair equipment that may be required. A break in any of these pipelines would be quickly noted and repaired by the operating personnel, as part of normal operating procedures.

8.2.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects have been identified.

8.2.4 PROPOSED FOLLOW UP

No follow-up is required.

8.3 PIPELINE BREAKS RELEASING WATER TO THE ENVIRONMENT

8.3.1 POTENTIAL EFFECTS

The water pipeline from the Vangorda pit to the Grum/Vangorda water treatment plant lies partially outside of the mine water collection systems and, therefore, poses an environmental risk if a break occurs. This pipeline contains non-compliant water and, in the event of a break, this water could enter Vangorda Creek. There would also be an operational disruption if this pipeline were to break.

This pipeline was installed in 2001 with contingency planning in mind. The route was selected and extra ditching was excavated to maximize the portion of the pipeline that would pass water back into the Vangorda pit. If a loss of pipeline integrity were to occur, pressure sensors would shut the pump down and quickly shut down the flow.

The potential impacts on VECCs is summarized in Table 18.

Table 18. Effects Assessment - Pipeline Break

Potential Effect	VECC Affected	Predicted changes to VECC	Overall consequences of the impact on the VECC	Positive neutral or adverse effect
Pipeline break releasing non-compliant water to Vangorda Creek	Surface water quality	Reduced water quality in immediate area of spill and downstream	Potential minor, temporary increase	Minor, adverse

Potential Effect	VECC Affected	Predicted changes to VECC	Overall consequences of the impact on the VECC	Positive neutral or adverse effect
	Fish habitat integrity	Compromised due to increased metal loading over short term	Potential minor, temporary increase	Minor, adverse
	Fish population health	Reduced over short term due to increased metal loading	Potential minor, temporary increase	Minor, adverse

If a pipeline break were to occur, the Vangorda Creek would be impacted for the duration of the non-compliant water flow, which would only be for a short period of time. A loss of flow in the pipeline would be detected and proper shut down, containment and repair procedures would be implemented in accordance with existing contingency plans and built in safety features.

8.3.2 PROPOSED MITIGATION

A contingency plan is in place in the event this pipeline breaks, and is to have repair materials on hand or readily available from an off site source as well as any specialized repair equipment that may be required. Regular inspections are conducted, as a minimum weekly and during freshet daily, to ensure integrity of the pipeline and to remove any potential hazards that may arise. Pressure sensors are installed in this pipeline that would automatically shut off water flow in the event of a break and, therefore, a break in this pipeline would be quickly noted and repaired by the operating personnel as part of the normal operating procedures.

The pipeline was installed new in 2001 and should maintain its integrity for the life of the project (2003 – 2008).

8.3.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects have been identified.

8.3.4 PROPOSED FOLLOW UP

In the event of a pipeline break and non-compliant water flow into Vangorda Creek, a water quality effects monitoring program at downstream monitoring stations is recommended to determine the extent and duration of contamination.

8.4 GENERAL LOSS OF ELECTRICAL POWER

8.4.1 POTENTIAL EFFECTS

A general loss of electrical power could occur as a result of a local or regional disruption or accident to the Whitehorse-Aishihik-Faro hydroelectric power grid. A loss of power would necessitate a shut down of all site operations except those that are powered by a portable on site generator, such as the Intermediate Pond lime treatment system and the Little Creek Dam pump.

The operational and environmental implications of a general loss of power are dependent on the duration of the event. Experience since 1998 has demonstrated that the regional power supplier has restored power quickly in these events and the contingency plan provides for two alternate power sources in the event of an imminent environmental emergency.

The major project equipment that would be shut down in a general power loss event is:

1. Main Pit pumping.
2. Zone 2 pit pumping.
3. Vangorda pit pumping.
4. Mill water treatment system.
5. Grum/Vangorda water treatment plant.

In the event of a general loss of power, no impacts to VECCs are anticipated.

8.4.2 PROPOSED MITIGATION

A contingency plan is in place in the event of a general loss of power. This plan is to:

1. Conduct an operational check of equipment status such that equipment is configured appropriately for restart.
2. Contact the regional power supplier to confirm status and ascertain restart timeframe.
3. Arrange with the regional power supplier for power to be re-instated to the mine from the Town of Faro diesel generator if an environmental emergency was imminent.
4. Undertake maintenance of the on site EMD emergency generator such that it can be utilized in an environmental emergency situation.

8.4.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects have been identified.

8.4.4 PROPOSED FOLLOW UP

No follow-up is required.

8.5 PUMP FAILURE AT A MAJOR PUMPING STATION

8.5.1 POTENTIAL EFFECTS

Pump failure at a major pumping station such as the Main pit, the Zone 2 pit or the Vangorda pit could be caused by mechanical failure or loss of power locally or regionally. The pump failure would cause an operational disruption and the implications of the disruption would be dependent on the duration.

In the event of pump failure, no impacts to VECCs are anticipated.

8.5.2 PROPOSED MITIGATION

If the cause of the failure was loss of power from the regional grid, then the contingencies described for "General loss of electrical power" would apply.

If the cause of the failure was loss of power locally (i.e., at the mine site), then the contingency plan that is in place is to have a qualified electrician employed at the site or readily available from off site to identify and resolve the problem. Standard electrical replacement gear is either on hand or at an off site source and has been identified.

If the cause of the failure was mechanical failure, then the contingency plan that is in place is perform routine maintenance on the pumps, to have an experienced mechanic employed at the site or readily available from off site to identify and resolve the problem. Standard mechanical replacement parts are either on hand or at an off site source and has been identified.

In the extreme event where repairs could not be made in a timely manner and an environmental emergency was imminent, then a substitute pump would be expedited from an off site source and installed on an emergency rush basis. The timeframe for implementing this action would depend on the circumstances surrounding the pit water levels and would be at the discretion of the site manager.

8.5.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects are identified.

8.5.4 PROPOSED FOLLOW UP

No follow-up is required.

8.6 GASOLINE AND DIESEL FUEL SPILLS

8.6.1 POTENTIAL EFFECTS

Spills of gasoline and diesel fuel can occur due to operator error, malfunctioning dispensing equipment, overfilling of storage tanks, leaking/damaged storage tanks or leaking/damaged mobile and heavy equipment. Even relatively small spills can have an environmental implication if they occur near a stream or other environmental receptor.

The potential impacts on VECCs is summarized in Table 19.

Table 19. Effects Analysis – Gasoline and diesel fuel spills

Potential Effect	VECC Affected	Predicted changes to VECC	Overall consequences of the impact on the VECC	Positive neutral or adverse effect
Gasoline and diesel fuel spills	Surface water quality	Reduced water quality in immediate area of spill	Potential minor, temporary increase	Minor, adverse
	Groundwater quality	Potential reduction in groundwater quality	Potential minor, temporary increase	Minor, adverse
	Fish habitat integrity	Short term disruption of habitat integrity in immediate area of spill	Potential minor, temporary increase	Minor, adverse
	Fish population health	Reduced health over short term for exposed individuals	Potential minor, temporary increase	Minor, adverse

If a fuel spill were to occur and impact a watercourse, the severity of impact would correspond to the amount and duration of the spill. A fuel spill would be detected and proper containment and clean-up procedures would be implemented in accordance with existing contingency plans. The likelihood of a spill occurring that would significantly impact the VECCs is very low, therefore no impacts to VECCs are predicted.

8.6.2 PROPOSED MITIGATION

The contingency plan that is in place is:

1. Only one storage tank for gasoline and one for diesel fuel are to be utilized.
2. The active storage tanks are located within containment berms with capacity to contain the full tank volume.

3. The secondary containment berms are visually monitored and clean water is removed periodically to maintain storage capacity.
4. The storage tanks are registered with DIAND Lands Department.
5. Operating procedures are in place that provide for monitoring of storage tank levels and for security control on dispensing.
6. Operator awareness training is provided regarding the environmental implications of spills.
7. A spill response kit is maintained at the mine site that includes dry absorbent and floating absorbent booms and pads.
8. A spill response plan is in place that provides for notification to site management as well as to the Yukon 24-hour spill reporting office.

8.6.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects are identified.

8.6.4 PROPOSED FOLLOW UP

In the event of a fuel spill that impacts identified VECCs, a water quality effects monitoring program at downstream monitoring stations is recommended to determine the extent and duration of contamination. The need for a groundwater monitoring program should be evaluated and a groundwater investigation completed, if appropriate.

8.7 LOSS OF ROAD ACCESS

8.7.1 POTENTIAL EFFECTS

Loss of road access to the mine site could be caused by a flood that erodes the roadway, a washout due to culvert failure or exceedance of culvert capacity, or by heavy snowfall. The implications of loss of road access could be substantial depending on the timing and duration of the occurrence. For example, if the road was lost due to a flood event, then even a brief inability to inspect and repair damage to mine facilities, particularly dams and ditches, could result in an environmental impact. Regardless of the cause of the loss of road access, it would be important to restore access quickly.

In the event of long term loss of road access, other arrangements would have to be made to maintain the mine site and operating equipment. With the contingency plans in place, no impacts to VECCs are predicted.

8.7.2 PROPOSED MITIGATION

The contingency plan that is in place for loss of road access includes the following:

1. Park a grader or plow truck in the Town of Faro during winter periods when the road is not being cleared regularly.
2. Maintain a grader, plow truck, front end loader and gravel truck on site or maintain contact with off site contractors for emergency provision of road repair services.
3. Aggressively steam ice from culverts and clear ice from roadside ditches through the winter and spring as required to maintain flow and prevent road washout.
4. Maintain contact with the Yukon Territorial Government highways maintenance department as regards joint monitoring, maintenance and repairs to the access road.

8.7.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects are identified.

8.7.4 PROPOSED FOLLOW UP

No follow-up is required.

8.8 LOSS OF COMMUNICATION

8.8.1 POTENTIAL EFFECTS

Loss of communication to the mine site could be caused by the loss of telephone lines from the Town of Faro to the minesite. The implications of loss of communication could be substantial if contingency measures were not in place due to the time delay that would be introduced into communicating and arranging responses to emergency events.

In the event of long term loss of communication, other arrangements would have to be made to maintain communications to the mine site. With the contingency plans in place, no impacts to VECCs are predicted.

8.8.2 PROPOSED MITIGATION

The contingency plan that is in place for loss of communication includes the following:

1. Portable satellite phones are carried by senior site managers and would be use din a general loss of communications.
2. A state-of-the-art telephone system will be installed at the mine site in 2003.

3. The "Guest House" in the Town of Faro is equipped with an operable fax machine and telephone.

8.8.3 RESIDUAL EFFECTS / SIGNIFICANCE DETERMINATION

No residual effects are identified.

8.8.4 PROPOSED FOLLOW UP

No follow-up is required.

9 CUMULATIVE EFFECTS ANALYSIS

9.1 RESIDUAL EFFECTS

The environmental assessment of potential project effects was conducted using a VECC approach, in accordance with the approved *Environmental Assessment Report Information Guidelines* issued by the Environment Directorate, DIAND (the Regulatory Authority for the project). The Information Guidelines are provided in Appendix B for ease of reference. As discussed in sections 5 and 6 of this report, the environmental assessment of the VECC's concluded that any residual effects were neutral or minor either positive or negative.

9.2 METHODS/CRITERIA

A cumulative effects assessment (CEA) of the project - Care and Maintenance of the Anvil Range Mine Complex from 2004 to 2008 - is a requirement under the *Canadian Environmental Assessment Act* (CEAA). Not all of the potential environmental effects need to be addressed in a CEA, only those with residual effects after mitigation that are likely to result from the project were considered. For this project the CEA would include all existing and all reasonably foreseeable projects. Reasonably foreseeable projects included those that have entered the assessment process under CEAA, those where a right has been issued with respect to use of land or water resources, and those where binding commitments have been made by governments. Cumulative effects analysis was done where there was potential for residual effects from the project and where they overlap, spatially and temporally with the residual effects of other projects.

9.3 CUMULATIVE EFFECTS ANALYSIS

9.3.1 OTHER REASONABLY FORESEEABLE PROJECTS OR ACTIVITIES

Other reasonably foreseeable projects or activities that are licenced, are proposed projects in the CEAA process or will be carried out in the regional study area have been identified, and are summarized in Table 21. These projects and activities were identified by:

- conducting a search for and identifying existing land use permits and water licences active in the regional study area;
- identifying any potential projects that are currently being reviewed (i.e., in the CEAA process) that could potentially affect the regional study area; and,
- identifying human activities occurring in the RSA.

Table 20. Reasonably Foreseeable Projects and Activities and Potential Residual Effects

Reasonably Foreseeable Projects and Activities	Potential Environmental Effects	Likelihood of Environmental Effects	Residual effects
Breaching of the Fresh Water Supply Dam at the Faro Mine Site (scheduled to be complete by March 2004)	Reduced water flow in the Rose Creek Diversion Canal during winter months could cause freezing to the bottom in Rose Creek, affecting over wintering fish habitat.	Likelihood of environmental effect occurring if natural low-flow conditions occur.	none
	Reduced water flow in the Rose Creek Diversion Canal during winter months could affect overall productivity of Rose Creek.	Likelihood of environmental effects occurring if natural low-flow conditions occur.	none
	Breaching of the dam could remove flood attenuation that previously provided some protection to downstream structures	Very low / negligible based on engineering studies that demonstrate very low attenuation capacity existed historically	none
	Breaching of the dam reduces the risk to downstream structures by eliminating the risk of a "sunny day failure"	It is certain that the risk of a "sunny day failure" is eliminated and that this reduces risk to downstream structures	none
	A large flood (i.e., 1:500 year) event or large volumes of spring freshet runoff flows overtop of ice in the Rose Creek Diversion Canal could affect downstream structures.	Very low / negligible likelihood of flooding and contamination if Adaptive Management Plan is followed.	none
Town of Faro Water Licence (for water use and waste disposal)	Contamination of groundwater from wetland sewage treatment area, potential downstream effects on Pelly River.	Very low / negligible likelihood of contamination.	negligible; localized to wetland sewage treatment area

Reasonably Foreseeable Projects and Activities	Potential Environmental Effects	Likelihood of Environmental Effects	Residual effects
	Potential contamination of drinking water through: long term corrosion of water pipes and the release of zinc and copper; and sewage contamination through holes in water and sewage pipes causing cross contamination if system depressurized.	Very low / negligible likelihood of contamination from either source.	Negligible; localized to locations of any sewage line breaks
Community of Ross River Water Licence (for water use and waste disposal)	No documentation received. Assume similar conditions as Town of Faro regarding waste discharge and contamination potential.	Very low / negligible likelihood of contamination.	Negligible; localized to locations of any sewage line breaks
Ketza River Mine Water Licence* (there is no current water licence for this mine)	Mine site has resulted in disturbance to land that may be utilized by traditional harvesters.	Long term disturbance to land used by traditional harvesters.	High; localized to Ketza River Mine site
Cabins, residential lots and subdivisions associated with the Town of Faro, the Community of Ross River, and along the Pelly River (LUP).	Disturbance of land for cabin/house, disturbance caused by access to and from sites.	Long term, low level disturbance caused by residential developments and associated activities, localized.	Low; localized to building and subdivision footprint.

* The Ketza Mine is upstream in the Pelly and Ketza Rivers from the community of Ross River. Previous work by Gartner Lee (GLL 2002) indicated that any environmental impacts from this mine appear not to extend into the Pelly River. No effects associated with the Ketza Mine on the Pelly River at Vangorda or Anvil Creeks will be detectable.

The potential environmental effects and any resulting residual effects associated with these projects and activities were identified based on the type of undertaking and associated activities of the projects and the activities associated with the identified human use activities. Given that regulated projects would implement appropriate mitigation measures for the types of undertakings and activities to be carried out, the likely environmental effects were identified based on a review of any supporting documentation about these projects. The likely environmental effects associated with unregulated human activities were determined based on an evaluation of the activities and professional judgement about how such activities would be carried out in an environmentally sustainable manner. Regulated human activities, such as (non-traditional) hunting and fishing were assumed to be regulated and carried out within appropriate fish and wildlife

management parameters, and therefore no likely environmental effects were identified. Traditional harvesting activities within the regional study area were also considered to be carried out in a sustainable manner, and therefore no likely environmental effects were identified.

9.3.2 TEMPORAL AND GEOGRAPHIC BOUNDARIES

The temporal scope of this CEA will be up to the end of 2008, as described in Volume 2. This time period has been chosen because the FCRP is scheduled to be completed by that time.

The geographic area includes the regional study areas as defined in Volume 2 and identified in Figures 3 to 5. The CEA will focus on any interacting project effects within the regional study areas and any likely environmental effects associated with reasonably foreseeable projects.

9.3.3 ANALYSIS

9.3.3.1 Breaching of the FWSD

The scheduled breaching of the Fresh Water Supply Dam (FWSD) at the Faro Mine Site necessitates removing the current water licence requirement to maintain a minimum flow of 0.075 m^3/s in the Rose Creek Diversion Channel. Removal of this licence clause is necessary because breaching of the dam will eliminate the mine operators' ability to exercise control on flows in the Rose Creek Diversion Channel and Rose Creek. Removing the mine operators' ability to exercise control on water flows in the Rose Creek Diversion Channel and Rose Creek could, in turn, result in an effect on fish habitat during a natural low flow winter condition. The design report for the breaching of the FWSD (SRK 2003) estimates that the average flow into the reservoir from December 1 to March 31 is 0.115 m^3/s, with an estimated peak daily flow of 0.2 m^3/s (estimates for a normal year flow with a return period of every 2 years). It is possible that a natural low flow winter condition could result in a flow less than 0.075 m^3/s in the Rose Creek Diversion Channel, even with flow contributions from the North Fork of Rose Creek. Extremely low flows (i.e., less than 0.075 m^3/s) in the Rose Creek Diversion Channel could lead to an icing condition in the Rose Creek Diversion Channel (i.e., freezing to bottom), and a reduction in over-wintering habitat and the overall productivity of the habitat in Rose Creek.

There is, then, a potential adverse impact to fish habitat from the elimination of the requirement to maintain a minimum flow of water in the Rose Creek Diversion Channel and the effect this may have on the over-wintering value of the habitat below the FWSD. However, the Department of Fisheries and Oceans ("DFO") has indicated, via the FWSD Breach Project, that the removal of the reservoir and the means to control flows from the reservoir are acceptable consequences of removing the dam and creating a stable environment that provides for reduced risk to downstream fish and fish habitat. Therefore, no mitigation is proposed for this potential adverse effect to fish habitat since federal

regulators have previously concluded that the FWSD poses an unacceptable risk to downstream resources.

A natural low flow condition leading to freezing to the bottom in the Rose Creek Diversion Channel could cause a large flood event or large volume spring freshet flow to flood downstream and potentially impact downstream structures. This event scenario has been anticipated in the Adaptive Management Plan (see Volume I), and appropriate adaptive management responses have been determined that would prevent downstream flooding and potential impacts to downstream structures.

Engineering analyses in progress by SRK Engineering indicate that the FWSD does not provide significant flood attenuation and, therefore, does not provide any appreciable protection to downstream structures (pers. comm.). Therefore, the scheduled breaching of the FWSD does not increase the risk to downstream structures (such as the Intermediate Dam) and this is not considered further in this assessment.

One of the risks represented by the FWSD was the risk of a "sunny day failure", which represents the event of dam failure for reasons other than a specific storm, flood or seismic event. Engineering analyses in progress by SRK Engineering indicate that a sunny day failure of the FWSD would be likely to result in a failure of the Intermediate Dam (pers. comm.). Therefore, the scheduled breaching of the FWSD reduces the risk to downstream structures by eliminating the risk of a sunny day failure and this is not considered further in this assessment.

9.3.3.2 Town of Faro Water Licence

The identified location for residual effects caused by contamination of the groundwater from the wetland sewage treatment area are localized to the wetland sewage treatment area and downstream to the Pelly River. Any sewage line breaks and corroding water lines would be localized to the location of the break. None of the identified residual effects from this (Care and Maintenance) project overlap with the residual effects identified for the Faro Water Licence. No cumulative effects would result.

9.3.3.3 Community of Ross River Water Licence

The Community of Ross River is not within the regional study area for this (Care and Maintenance) project. Any residual effects identified for the Ross River Water Licence would be localized to the community and would not overlap with any of the identified residual effects with this project. No cumulative effects would result.

9.3.3.4 Ketza River Mine Water Licence

The Ketza River Mine Site is not within the regional study area for this (Care and Maintenance) project. The residual disturbance to the land caused by the Ketza River Mine would be localized to the Ketza River Mine site and would not overlap with any of the residual effects identified for this project. No cumulative effects would result.

9.3.3.5 Cabins, Residential Lots and Subdivisions

Disturbance to land caused by cabins, residential lots and subdivisions are localized to the footprint of these developments. Some of these developments occur within the study area for this (Care and Maintenance) project, the rest are outside. The residual disturbance caused by cabins, residential lots and subdivisions do not overlap with any of the residual effects identified for this project. No cumulative effects would result.

9.3.3.6 Summary

The environmental assessment of the VECCs did not identify any likely residual effects that would result from the proposed care and maintenance project. In order for a Cumulative Effects Assessment to be completed, the cumulative effects must result at least in part from the project being proposed, and only those environmental effects of the project which interact with effects from other projects or activities will be included as potential cumulative effects. As a result, there is no need to complete a cumulative effects assessment for this project.

9.3.4 PROPOSED MITIGATION

No mitigation was identified as being required as no cumulative effects were identified.

9.3.5 PROPOSED FOLLOW-UP

No follow-up required.

10 MONITORING AND FOLLOW-UP PROGRAM

A follow-up program is recommended where further data collection will help measure effects and mitigation

Follow-up programs are included for some component effects assessment, where the collection of data is recommended to determine unknown existing environment conditions to measure the predicted environmental assessment outcome, including the project effects and the effectiveness of recommended mitigation measures. The recommended follow-up programs are described by component in appropriate preceding sections in this volume and are summarized in Table 22.

Table 21. Summary of Proposed Follow Up Programs

Component	Topic	Proposed Follow-Up
Air Quality	General	Particulate monitoring program, incorporated into the proposed study of terrestrial effects (Volume 1) to monitor TSP levels and characterize the metals composition of airborne particulate
Water Resources	General	Follow up studies are warranted if monitoring of surface water quality, groundwater quality or the aquatic community shows unexpected degradation. The Adaptive Management Plan (Volume 1) should be followed
Water Resources	Streamflow in the receiving environment	• Streamflow dataloggers should continue to be operated • Surface flows should be monitored according to the proposed site water monitoring protocol (Volume 1) • The site water balance should be updated and evaluated annually • An on-site climate station should be established and operated
Water Resources	Surface water quality in the receiving environment	• Water quality measurements should continue at the current sites • The water quality program should include parameters (suggested) to provide information on basic water quality characteristics, toxicity modifying factors, indicators of waste water discharge from the site and trace metals • Water quality should be sampled at least monthly after ice out, prior to waste water discharge and monthly during periods of discharge • Detection limits available by ICP-MS are adequate and should not be changed • The surface water quality monitoring program should not supplant required compliance monitoring or internal monitoring • The surface water quality monitoring program should continue to be coordinated with the biological and sediment monitoring sites and schedules
Water Resources	Groundwater flow and quality in the receiving environment	• Groundwater quality measurements should continue at the sites listed in the proposed Water Monitoring Protocol (Volume 1) on a twice per year basis • Chemical analyses should be conducted for the parameters listed in the Water Monitoring Protocol (Volume 1) • The results of the groundwater quality monitoring program should be evaluated according to the triggers defined in the Adaptive Management Plan subsequent to each sampling event

Component	Topic	Proposed Follow-Up
		• Detection limits available by ICP-MS are adequate and should not be changed
Aquatic Resources	General	No follow up studies are proposed; the follow up program for the removal of the Freshwater Supply Dam will address fish and fish habitat issues affected by dam removal in the context of the pre-dam environment
Terrestrial Resources	General	Monitoring the terrestrial food webs for contaminant levels is proposed to be incorporated into the proposed study of terrestrial effects (Volume I)
Human Health	Rose Creek Tailings Facility	Human health issues related to public access to the tailings facility are considered to be incorporated into the proposed investigation of terrestrial effects (Volume 1) and the resulting recommendation for a short term mitigation plan by 1995
Socio-economic Conditions	General	No follow up studies are proposed
Traditional Use	General	an information exchange program is proposed whereby site personnel are made aware of the timing and nature of First Nations hunting or other land use activities taking place in the general mine area
Traditional Use	Investigation of Terrestrial Effects	Traditional Knowledge and First Nations involvement should be included in the design and execution of the proposed study of terrestrial effects (Volume I), as is proposed for that study
Heritage Resources	General	No follow up studies are proposed
Effects of the Environment on the Project	General	Follow-up monitoring would be required only if an event that causes an impact to the project and results in environmental impacts; monitoring would be conducted to determine the extent of any contamination
Accidents and Malfunctions	Pipeline breaks releasing water to the environment	In the event of a pipeline break and non-compliant water flow into Vangorda Creek, a water quality effects monitoring program at downstream monitoring stations is recommended to determine the extent and duration of contamination
Accidents and Malfunctions	Gasoline and diesel fuel spills	In the event of a fuel spill that impacts identified VECCs, a water quality effects monitoring program at downstream monitoring stations is recommended to determine the extent and duration of contamination; the need for a groundwater monitoring program should be evaluated and a groundwater investigation completed, if appropriate
Cumulative Effects	General	Monitor the follow-up programs of the VECCs to determine whether or not residual effects result; if they do, then this cumulative effects assessment should be re-assessed

11 SUMMARY OF THE ASSESSMENT OF ENVIRONMENTAL EFFECTS

The assessment of environmental effects for the proposed project activities was carried out according to the requirements of CEAA and the Information Guidelines (Appendix B). The VECC approach was used as per the Information Guidelines.

The assessment was bounded by the temporal boundaries (i.e. 1998 to 2002 as the "existing environment") and spatial/geographical boundaries (the single LSA and three RSA's) that were defined for the project. Per the scope of the Information Guidelines, the assessment considered the effects that were directly related to the proposed project activities and considered effects related to past (i.e. pre-1998) mining activities to be outside of the scope of the assessment.

The conclusions of the assessment of effects are summarized as follows:

1. Most effects on the environment were determined to be "neutral" and several were determined to be "minor, adverse" related to the short term (five-year) timeframe of the proposed activities as follows:
   - Air Quality: *tear down and demolition of buildings, soil excavation and placement in bioremediation cells, consolidation and covering of oxidized fines*
   - Human Health: *various care and maintenance activities that may generate short term contaminated dust dispersion (tear down and demolition of buildings, soil excavation and placement in bioremediation cells, consolidation and covering of oxidized fines), pipeline break releasing non-compliant water to Vangorda Creek, gasoline and diesel fuel spills*
   - Effects of the environment on the project: *wind storm event*
   - Accidents and Malfunctions: *pipeline break releasing non-compliant water to Vangorda Creek, gasoline and diesel fuel spills*
2. For all effects that were identified as being "minor, adverse", adequate mitigation measures are incorporated into the proposed project description (Volume 1).
3. A number of follow-up programs are proposed (Table 22) to monitor for environmental effects and the effectiveness of mitigation measures.
4. Cumulative Effects were considered by identifying and evaluating related and reasonably foreseeable or licenced activities, as per the Information Guidelines.
5. The environmental assessment of the VECCs did not identify any likely residual effects that would result from the proposed care and maintenance project.

The results of the environmental assessment support the stated objectives of the proposed care and maintenance activities (Volume 1) to maintain the property in a safe manner and to provide short term mitigation of effects for a five-year period while an FCRP is developed by the government closure Project Team.

12 REFERENCES

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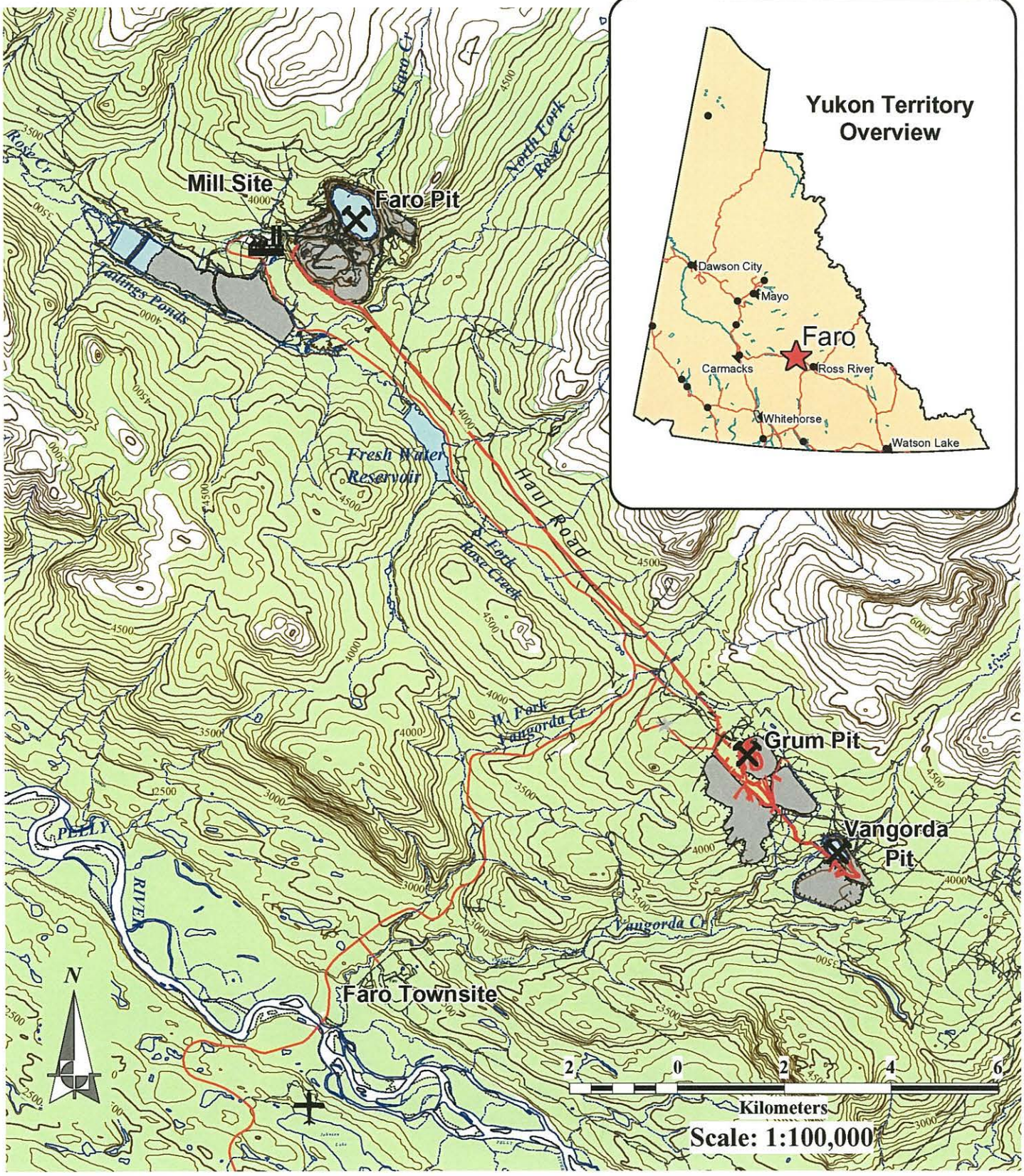
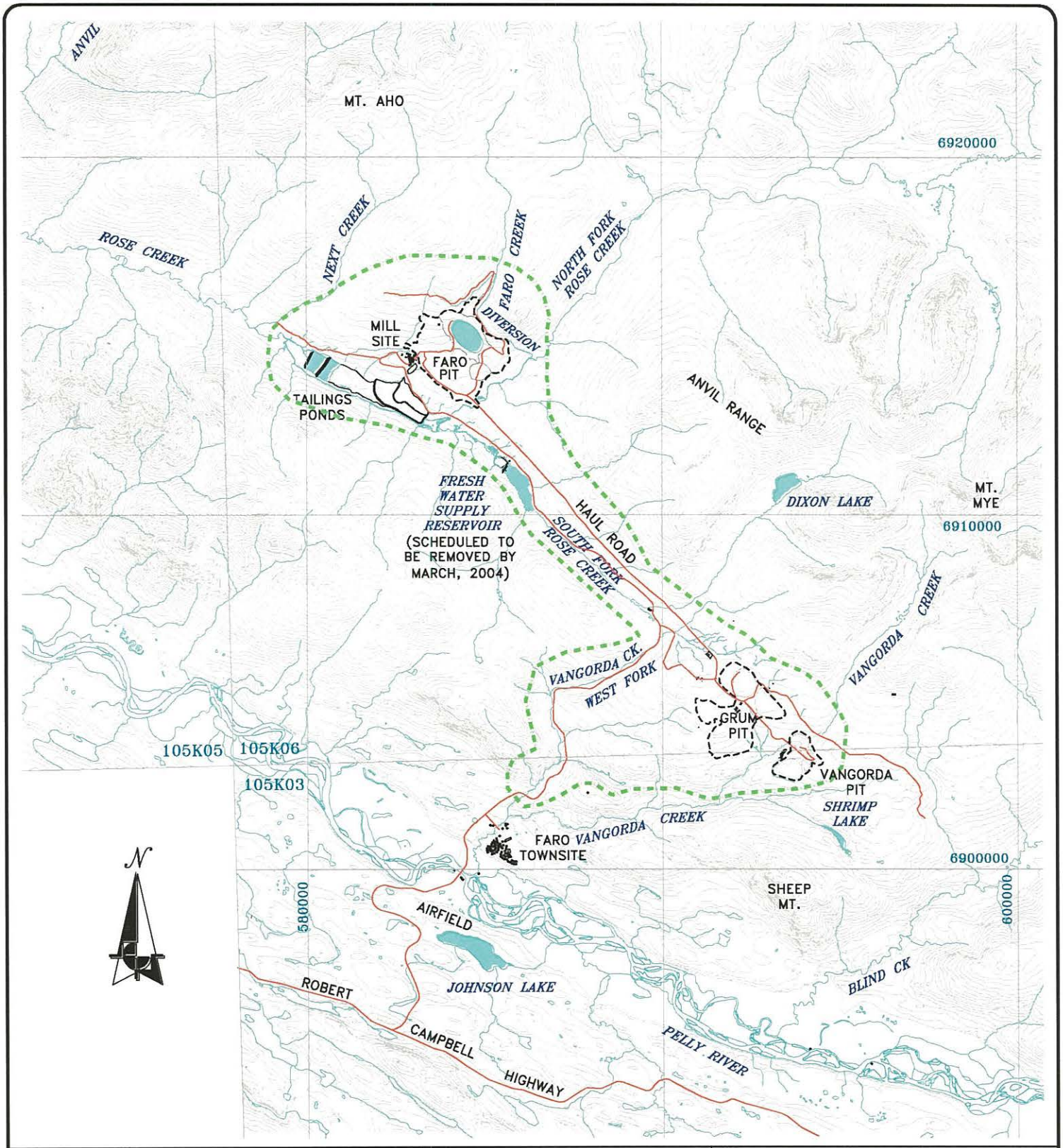
Figures



Site Name: FARO File : 22307-D6-V3-FIG1.PDF Gartner Lee Limited Scale: 1: 100,000	DELOITTE & TOUCHE INC. **Project Location Map**	Project No: 22-307 Date Issued: Apr. 2003 Figure 1



LEGEND:

- MAIN ROAD
- SURFACE DRAINAGE
- FOOTPRINT OF OPEN PITS AND ROCK DUMPS
- LOCAL STUDY AREA

0 1.5 3.0 4.5 6.0 7.5 Km

SCALE 1:150,000

COORDINATES ARE UTM NAD83 ZONE 8
CONTOUR INTERVAL 100 FT.

DRAWING INFORMATION:	
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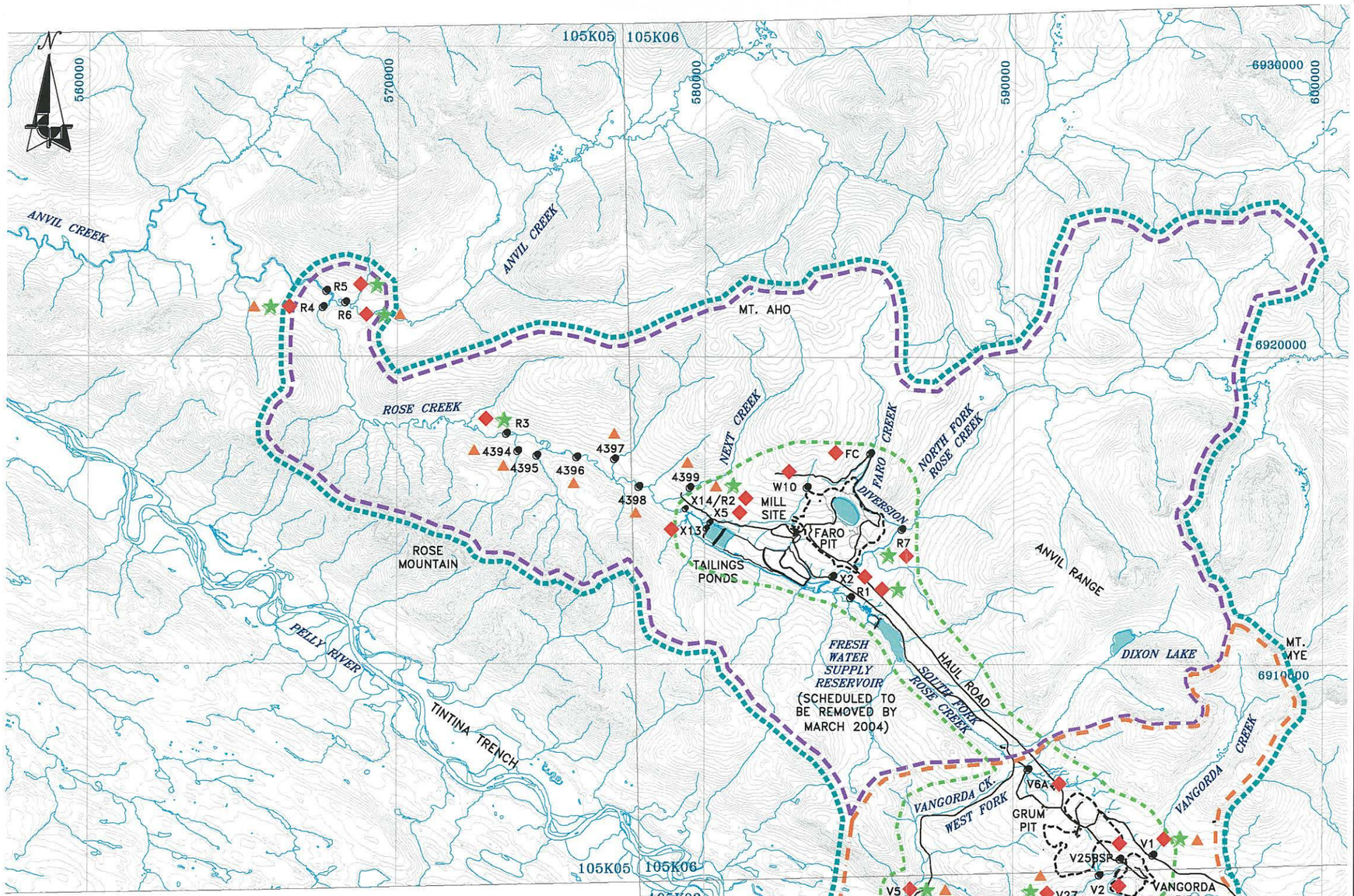
ANVIL RANGE MINING CORPORTATION
(INTERIM RECEIVER)
2004 TO 2008 WATER LICENCE RENEWAL
ENVIRONMENTAL ASSESSMENT REPORT

LOCAL STUDY AREA

Gartner Lee | Deloitte & Touche | VOLUME 3 FIGURE NO. 2

SUMMARY TABLE OF SAMPLING SITES

SITE	WATER ◆	SEDIMENT ▲	BENTHIC INVERTEBRATES ★
R1	√		√
R2/X14	√	√	√
R3	√		√
R4	√	√	√
R5	√		√
R6	√	√	√
R7	√		√
V1	√	√	√
V2	√		
V4	√		
V5	√	√	√
V6A	√		
V8	√	√	√
V27	√	√	√
V25BSP	√		
VGMAIN	√		
W10	√		
FC	√		
X2	√		
X5	√		
X13	√		
4394		√	
4395		√	
4396		√	
4397		√	
4398		√	
4399		√	



LEGEND:

- MAIN ROAD
- SURFACE DRAINAGE
- FOOTPRINT OF OPEN PITS AND ROCK DUMPS
- ROSE CREEK WATERSHED
- VANGORDA WATERSHED
- LOCAL STUDY AREA
- AIR QUALITY, WATER AND AQUATIC RESOURCES REGIONAL STUDY AREA

V1 ● SAMPLING SITE LOCATION AND IDENTIFICATION

TYPE OF SAMPLING CONDUCTED AT SAMPLING SITE:

- ◆ WATER QUALITY MONITORING SITE (1998–2002)
- ★ BENTHIC INVERTEBRATE SAMPLING SITE (1998–2002)
- ▲ SEDIMENT SAMPLING SITE (1998–2002)

COORDINATES ARE UTM NAD83 ZONE 8
CONTOUR INTERVAL 100 FT.

SOURCES OF INFORMATION:

1. DIGITAL COPY OF 1:50,000 TOPOGRAPHIC MAP SUPPLIED BY SRK CONSULTING.
2. FARO MINE DETAILS ADAPTED FROM DRAWINGS BY ROBERTSON GEOCONSULTANTS INC.
3. VANGORDA MINE DETAILS PROVIDED BY ANVIL RANGE MINING CORPORATION

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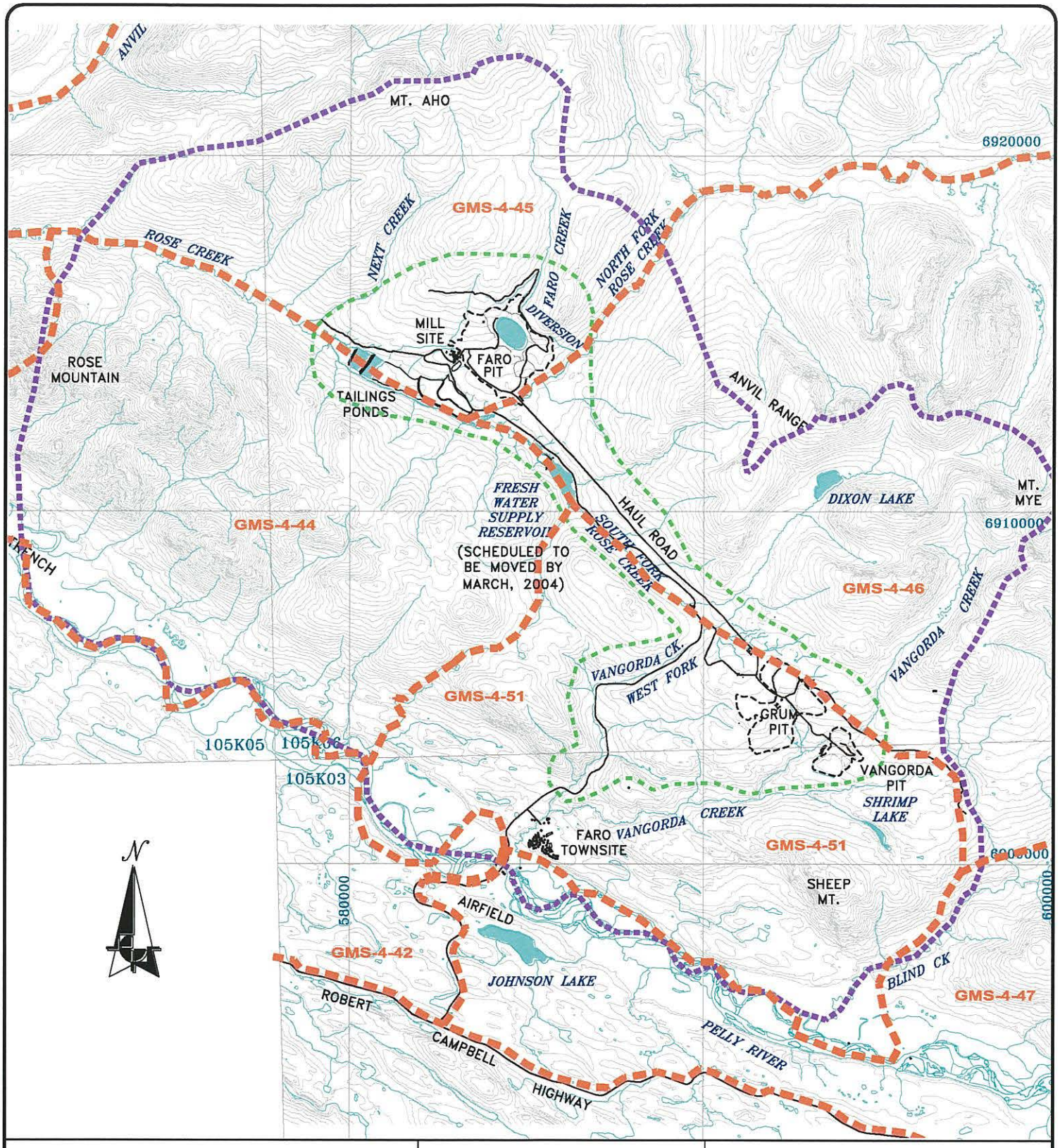
ENVIRONMENTAL ASSESSMENT REPORT

AIR QUALITY, WATER AND AQUATIC RESOURCES REGIONAL STUDY AREA

Gartner Lee | Deloitte & Touche | VOLUME 3 FIGURE NO. 3



LEGEND:

- MAIN ROAD
- SURFACE DRAINAGE
- FOOTPRINT OF OPEN PITS AND ROCK DUMPS
- LOCAL STUDY AREA
- APPROXIMATE TERRESTRIAL REGIONAL STUDY AREA
- GAME MANAGEMENT SUB-ZONE

0 1.5 3.0 4.5 6.0 7.5 Km

SCALE 1:150,000

COORDINATES ARE UTM NAD83 ZONE 8
CONTOUR INTERVAL 100 FT.

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ANVIL RANGE MINING CORPORTATION
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ENVIRONMENTAL ASSESSMENT REPORT

TERRESTRIAL RESOURCES REGIONAL STUDY AREA

Gartner Lee | Deloitte & Touche | VOLUME 3 FIGURE NO. 4

Néghā Tsí

Dzet Jedē'

K'ésk'ale Hés

Elēs Tué'

Tsē Zūl

Tū Desdés Tue'

Bédé Lúge Tue'

105L08

105K05 105K06

105K05 105K06

105K03

105L08

62°30'

62°15'

134°

6930000

6920000

6910000

550000

560000

570000

580000

590000

600000

GMS-4-41

GMS-4-42

GMS-4-43

GMS-4-44

GMS-4-45

GMS-4-46

GMS-4-47

GMS-4-51

ANVIL CREEK

PELLY RIVER

GLENLYON LAKE

GLENLYON RIVER

ROSE CREEK

ROSE MOUNTAIN

TINTINA TRENCH

MT. AHO

NEXT CREEK

FARO CREEK

DIVERSION

NORTH FORK ROSE CREEK

MILL SITE

FARO PIT

TAILINGS PONDS

ANVIL RANGE

DIXON LAKE

MT. MYE

FRESH WATER SUPPLY RESERVOIR (SCHEDULED TO BE REMOVED BY MARCH 2004)

SOUTH FORK ROSE CREEK

HAUL ROAD

VANGORDA CK. WEST FORK

VANGORDA CREEK

GRUM PIT

VANGORDA PIT

FARO TOWNSITE

SHRIMP LAKE

SHEEP MT.

AIRFIELD

JOHNSON LAKE

BLIND CK

CAMPBELL HIGHWAY

GENERAL LOCATION OF REGISTERED HERITAGE (HISTORIC) SITES 105K/03/001 THROUGH 006

LEGEND:

- MAIN ROAD
- SURFACE DRAINAGE
- FOOTPRINT OF OPEN PITS AND ROCK DUMPS
- LOCAL STUDY AREA
- SOCIO-ECONOMIC, TRADITIONAL USE AND HERITAGE REGIONAL STUDY AREA
- GAME MANAGEMENT SUB-ZONE
- TRADITIONAL USE CABIN PRE-MINE DEVELOPMENT (NOT KNOWN IF STILL EXIST OR STILL USED)
- (G) GRAVE SITE

COORDINATES ARE UTM NAD83 ZONE 8
CONTOUR INTERVAL 100 FT.

0 1.5 3.0 4.5 6.0 7.5 Km

SCALE 1:150,000

SOURCES OF INFORMATION:

1. DIGITAL COPY OF 1:50,000 TOPOGRAPHIC MAP SUPPLIED BY SRK CONSULTING.
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3. VANGORDA MINE DETAILS PROVIDED BY ANVIL RANGE MINING CORPORATION

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ANVIL RANGE MINING CORPORATION
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2004 TO 2008 WATER LICENCE RENEWAL
ENVIRONMENTAL ASSESSMENT REPORT

TRADITIONAL USE, SOCIO-ECONOMIC AND HERITAGE REGIONAL STUDY AREA

Gartner Lee | Deloitte & Touche | VOLUME 3 FIGURE NO. 5

Appendices

Appendix A

Conformity with the March 10, 2003 Information Guidelines

Appendix A. Environmental Assessment Report Conformity with the DIAND March 10, 2003 Information Guidelines

DIAND Information Guidelines		Environmental Assessment Report		
Section	Topic to Address	Volume	Section	Heading
1.2	Scope of the Project	1 / 2 / 3	1.1	Introduction to the Environmental Assessment Report
1.3	Traditional Knowledge	2	2.11	Valued Ecosystem and Cultural Components
		3	6.3	Traditional Use
2.1.1	Project Overview	1	2.1.1	Project Overview
2.1.2	Project Purpose and Need	1	2.1.2	Project Purpose and Need
2.1.3	Timing Considerations	1	2.1.3	Timing Considerations
2.1.4	Project Proponent	1	2.1.4	Project Management
2.1.5	Regulatory History	1	2.1.6	Regulatory History
2.2.1.1	Project Background	1	2.1	Project Summary
2.2.1.2	Project Location	1	3 / 4	Description of Facilities - Faro and Vangorda Mine Sites
2.2.1.3	Overall Project Facilities	1	3 / 4	Description of Facilities - Faro and Vangorda Mine Sites
2.2.2.1	Care and Maintenance Plan	1	5	Description of Care and Maintenance Activities
2.2.2.2	Proposed new construction/activities	1	6	Proposed New Activities
2.2.2.3	Adaptive Management Program	1	7	Adaptive Management Plan
2.2.2.4	Proposed Water Licence Amendments	1	9	Proposed Amendments to the Water Licence
2.2.2.5	Proposed Studies	1	10	Proposed Studies
2.2.3	Accidents and Malfunctions	1	8	Accidents and Malfunctions
2.2.4	Project Schedule	1	11	Project Schedule
2.2.5	Environmental Monitoring and Protection Plans	1	12	Environmental Monitoring and Protection
2.3	Environmental Setting	2	2	Existing Environment
2.3.1.1	Climate	2	2.1	Meteorology
2.3.1.2	Terrain	2	2.2	Terrain
2.3.1.3	Regional Geology/Geochemistry	2	2.3	Geology
2.3.1.4	Geological Hazards and Seismicity	2	2.4	Geological Hazards and Seismicity
2.3.1.5	Water Resources	2	2.5	Water Resources
2.3.1.5.1	Hydrology	2	2.5.2	Hydrology
2.3.1.5.2	Water Quality	2	2.5.4 / 2.5.5	Surface Water Quality / Groundwater Quality
2.3.1.5.3	Hydrogeology	2	2.5.3	Hydrogeology
2.3.1.6	Aquatic Resources	2	2.6	Aquatic Resources
2.3.1.6.1	Fish Resources	2	2.6.4	Fish
2.3.1.6.2	Benthic Invertebrates	2	2.6.3	Benthic Invertebrates
2.3.1.6.3	Stream Sediments	2	2.6.2	Creek Sediment Quality
2.3.1.7	Terrestrial Resources	2	2.7	Terrestrial Resources
2.3.1.7.1	Soils	2	2.7.2	Soils / Terrain
2.3.1.7.2	Vegetation	2	2.7.3	Vegetation
2.3.1.7.3	Wildlife	2	2.7.4	Wildlife
2.3.1.8	Socio-economic and Cultural Conditions	2	2.8	Socio-economic Conditions
2.3.1.9	Heritage Resources/Traditional Land Use	2	2.9 / 2.10	Traditional Use / Heritage Resources
2.3.1.10	Valued Ecosystem and Cultural Components (VECC's)	2	2.11	Valued Ecosystem and Cultural Components
2.3.2	Mine Site Characterization	2	3	Site Characterization
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Appendix B

Information Guidelines for the Preparation of an Environmental Assessment Report for Anvil Rage Mining Corporation – Interim Receivership Water Licence Renewal

Environment Directorate DIAND and the Responsible Authorities

March 10, 2003

INFORMATION GUIDELINES

for the preparation of an

ENVIRONMENTAL ASSESSMENT REPORT

for

Anvil Range Mining Corporation - Interim Receivership
Water Licence Renewal

Prepared by

Environment Directorate, DIAND and the Responsible Authorities (RA's)
with assistance of the Regional Environmental Review Committee (RERC)

March 10, 2003

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Your file - Votre référence

Our file - Notre référence
5510-5-0021

March 11, 2003

Shannon Glenn
Deloitte and Touche LLP
Suite 1900
79 Wellington Street West
PO Box 29 TD Centre
Toronto Ontario
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Re: Final Information Guidelines for the preparation of the Environmental Assessment Report for the Anvil Range Mining Corporation - Interim Receivership - Water Licence Renewal Project

Attached please find the final version of the "Information Guidelines for the preparation of the Environmental Assessment Report for the Anvil Range Mining Corporation - Interim Receivership - Water Licence Renewal" prepared by the Responsible Authorities (RA's) with assistance of the Regional Environmental Review Committee (RERC). These final information guidelines are to guide you in the preparation of the Environmental Assessment Report for the proposed Water Licence Renewal to meet the requirements of a screening assessment pursuant to the *Canadian Environmental Assessment Act (CEAA)* and the mirror legislation *Yukon Environmental Assessment Act (YEAA)*.

Comments received during the review of both the Project Description and the draft guidelines have been incorporated where appropriate. We look forward to receiving your Environmental Assessment Report. Please call me at 867-667-3865 if you have any questions.

Sincerely,

Leslie Gomm
Manager, Project Assessment

cc: Deloitte& Touche - Shannon Glenn

Canada

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PART I - OVERVIEW

1.0 INTRODUCTION

On May 31, 2002, Deloitte and Touche Inc. submitted their Anvil Range Mining Corporation - Interim Receivership Project Description to the Department of Indian and Northern Affairs Canada (DIAND). The Anvil Range project triggered an environmental assessment pursuant to the *Canadian Environmental Assessment Act* (CEAA). The Project is designed to continue care and maintenance for 2004-2008 involving the application to amalgamate two existing water licences into one. The project is, as such, required to undergo a Screening under CEAA. Upon receipt of the Project Description Report, DIAND undertook a review as laid out in the Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements as required under CEAA, to determine which federal departments were Responsible Authorities (RA's). DIAND and DFO identified themselves as RA's. The Project Description Report also underwent a First Nations, public, governmental review with comments from this review forwarded to the proponent, Deloitte and Touche Inc. Since the submission and review of the Project Description, the scope of the project was reduced to only care and maintenance related activities. These Guidelines reflect this change in scope.

The following Environmental Assessment Report Guidelines have been developed by the RA's. Where appropriate, information requests stemming from the comments received during the review of the Project Description have been incorporated into the applicable sections of the guidelines. Additional comments are outlined in Appendix A. Stakeholders have been given an opportunity to comment on these guidelines and their comments have been considered and incorporated as appropriate.

1.1 PURPOSE OF THE GUIDELINES

These guidelines provide Deloitte and Touche with guidance and direction for the preparation of the proponent's Environmental Assessment Report (EAR) that must be completed to enable the RA's to complete the Screening Report. While these guidelines provide the basis for conducting the environmental assessment and preparing the report, it is the responsibility of the proponent to provide sufficient information and analyses to allow the evaluation of the potential adverse environmental effects of the proposed project. It is up to the proponent to demonstrate that it has identified the issues relevant to the assessment of the project, that it has an understanding of and a respect for the physical, biological and socio-economic environments into which the project will be introduced, and that it understands the ways in which the project will affect these environments. The EAR should also demonstrate that the proponent has assessed the significance of the effects likely to be caused by the project, has identified measures to mitigate adverse effects and has identified a program to monitor effects and to refine mitigation over the life of the project, if required.

Following the issuance of these guidelines, the proponent will, based on existing and available

information, prepare and submit an Environmental Assessment Report that addresses the requirements of the guidelines. The findings of the EAR and subsequent consultations will assist in the preparation of the Screening Report required by the RA's in order to fulfill their obligations under CEAA.

1.2 SCOPE OF THE PROJECT

Proper scoping of the project and its assessment is critical to the EA process. It ensures that both the proponent and the RA's have a clear and common understanding of the project components and activities, boundaries (both spatial and temporal), key VECCs, and level of detail required for the EA. Scoping is the responsibility of the RA's. The scope of the project and the scope of the assessment define the components of a proposed project and the environmental effects that should be included in an EA under CEAA.

According to the Responsible Authorities Guide for the CEAA (FEARO, 1994), the scope of the project refers to those components of the proposed project that should be considered part of the project for the EA. In determining scope of the project for this EA, the RA's must consider which physical works and undertakings in relation to those physical works fall within the scope of the project.

The scope of the project for this assessment includes the physical works and undertakings in relation to the care and maintenance and related activities of the Anvil Range Mining Complex. This must include the principal undertaking and any accessory activities or physical works that are directly linked to, or interconnected with, the principal project. In this case the physical work is the actual mine site and the principal undertaking in relation to that physical work is the care and maintenance of the site which includes new activities/undertakings, adaptive management program, ongoing studies and other accessory activities.

Abandonment and reclamation of the Anvil Range Mine Complex is not included in the scope of this project, although the requirement for future abandonment and reclamation of the site will be a mitigation put forward in the Screening Report. DIAND and YTG have decided to remove the responsibility for the abandonment and reclamation of the site from the Interim Receiver and have made it a direct government responsibility. The proposed five year relicencing period is required to enable the preparation, review, and approval of the abandonment and reclamation plan for the site.

The Fresh Water Storage Dam (FWSD) is not included in the scope of this project. The Interim Receiver is planning to breach the FWSD prior to the 2004 spring freshette. In response to a directive from DFO, preliminary plans for this breach were submitted in February 2003. This breach is undergoing a separate environmental assessment under CEAA with DFO as the lead RA.

1.3 TRADITIONAL KNOWLEDGE

Deloitte and Touche Inc. shall make all reasonable efforts to incorporate traditional knowledge into the Environmental Assessment Report where applicable. First Nations peoples living on the land and harvesting its resources have developed, over thousands of years and through observation, oral history and instruction from their elders, an in-depth understanding and knowledge base of their local and regional land base. This knowledge includes an understanding of the functioning of ecosystems (resources abundance, distribution and cycles); land and resources management; social, economic and cultural conditions, and the relationships between these factors.

Traditional knowledge is, therefore, also a valuable source of information for project assessment, as it can be used in combination with scientific information to confirm evidence or provide more detailed information than is otherwise available. The proponent is therefore required to consider available and applicable traditional knowledge in various stages of the environmental assessment of the proposed care and maintenance project, including: scoping of valued ecosystem and cultural components (VECCs); the description of existing environmental conditions; prediction of environmental effects; development of mitigation measures; evaluation of significance; and monitoring and follow-up as required.

In recognition of intellectual property rights of traditional knowledge holders, the environmental assessment report may not include all of the original traditional knowledge that has been collected. However, information must be sufficient to allow reviewers to derive conclusions about the rationale for decisions made in the report that are based upon traditional knowledge that has been collected.

1.4 PRESENTATION OF THE ENVIRONMENTAL ASSESSMENT REPORT

1.4.1 Conformity

The Proponent is expected to observe the intent of the guidelines and to identify and describe environmental and socio-economic effects that are likely to arise from the Project including those not explicitly identified in the guidelines. Information provided should be substantiated through data, design, experiences or other information that verifies, confirms or supports the assertion advanced. It is possible that these guidelines include matters which, in the judgement of the Proponent, are not relevant or significant to the Project. It is recommended that the Proponent discuss these matters with the RA's prior to making a decision to omit them from the EAR. If such matters are omitted from the EAR, they should be clearly indicated so that the reviewers, public, First Nations, and other interested parties have an opportunity to comment on this judgement. Where the RA's disagrees with the Proponent's statements in this regard, the RA's may require the Proponent to provide additional information.

1.4.2 Format and Presentation

The format of the EAR is largely left to the discretion of the proponent although reviewers must be able to clearly identify where specific issues have been addressed and directions followed. If

sections overlap in content, then information should be cross-referenced rather than repeated.

The proponent should identify in a list of references all sources of information used in the preparation of the EAR. Supporting documentation should be provided in separate volumes or appendices and should be referred in the main EAR text.

The proponent should present the EAR in a clear and concise manner. Where the use of technical language cannot be avoided, a glossary defining words and acronyms should be included. The EAR shall make optimal use of maps, charts, diagrams and photographs wherever useful to clarify the text. Maps and diagrams should be presented at a common scale, appropriate to represent the levels of details considered, and where possible allow direct overlay for ease of reference.

Electronic as well as hard copies (in sufficient numbers) of the EAR must be provided to the Environment Directorate.

PART II ENVIRONMENTAL ASSESSMENT REPORT GUIDELINES

2.0 EXECUTIVE SUMMARY

- Provide a concise non-technical description of key aspects of the proponent, project, and environmental setting.
- Outline key environmental effects and proposed mitigation strategies and measures.
- Submit a summary of project information submitted and consultation efforts with stakeholders and First Nations.
- Describe any uncertainties and public concerns.

2.1 PROJECT SUMMARY

2.1.1 Project Overview

- Provide a brief introduction to the project, the location and the proponent(s).
- Briefly describe the project components, associated activities and scheduling details.
- Review any important context for the assessment.

2.1.2 Project Purpose and Need

- Describe the specific project objectives.
- Indicate the rationale for the project (e.g. environmental effects management).

2.1.3 Timing Considerations

- Describe how timing considerations affect need for the project.

2.1.4 Project Proponent

The RA's are aware that the long term management structure for this site is under development byDIAND and YTG in accordance with the DTA. Information will be provided by DIAND/YTG in a separate document once that management structure is finalized. In relation to the environmental assessment of the proposed care and maintenance project, the proponent should:

- Introduce the proponent and the corporate and project management structure. Outline the present management under the Interim Receiver and its relationship with DIAND/YTG.
- Provide important contact information for key personnel involved.
- Indicate any project rights and interests.
- Outline the corporate environmental policy.
- Briefly summarize working relationship with First Nations.
- Outline how reports and information pertaining to the care and maintenance of the site will

be made available to the communities including Ross River, Pelly Crossing and Faro.

2.1.5 Regulatory History

- Outline the regulatory history of the project including Land Tenure and Water Licences.

2.2 PROJECT DESCRIPTION

2.2.1 Definition of the Project

2.2.1.1 Project Background

- Provide an overview project development and ownership history.
- Provide an overview of the current and projected status including updates on changes to the mine site since the cessation of mining and milling operations for both the Faro and Vangorda sites.

2.2.1.2 Project Location

- Provide location description. Present the size, general site layout and legal land descriptions. Indicate where possible land tenure. Provide appropriate maps and geographical coordinates.
- Provide description and map of mine site and lease boundaries.
- Indicate distance to nearest community by road and/or air.
- Summarize project area in relation to drainage basins and eco-regions.
- Present project area topographic maps at appropriate scale.

2.2.1.3 Overall Project Facilities

- Provide a detailed description of the existing mine site facilities and structures at the Faro mine site and Vangorda Plateau including: open pits, waste rock dumps, tailings impoundments, dams and diversions, buildings and infrastructure, fuel storage, water treatment facilities, and other infrastructure. Identify the locations on suitable scale maps and/or drawings.
- Included in this should be a history of the development and operation of the various mine components.

2.2.2 Description of Proposed Project Activities

It should be recognized that the level of detail required for the various project components and activities will vary. For new projects and activities, sufficient design and/or modelling detail must be submitted, along with supporting data, to allow for a detailed technical review of the proposed project component to confirm that it is practical, feasible and will perform as expected.

The proponent shall provide a detailed description of the proposed project activities as outlined in the following section. This section should present information of the key technologies and processes associated with the proposed project. The description of new components should include maps and drawings as necessary . These drawings should be clearly labelled. Applicable design criteria, standards or parameters must be outlined along with the results of any investigations to establish site parameters.

2.2.2.1 Care and Maintenance Plan

- Provide a comprehensive plan for site management that includes the care and maintenance plans for each major component of the mine site and associated infrastructure and activities. This plan should outline the management objectives and actions required to meet them. As well, it will outline the criteria that will be used for making care and maintenance decisions including monitoring, triggers and contingency implementation . This plan should outline the linkages between the management of the various site components and management objectives. This plan should address the management of the site during the five year licence renewal and should include a decision making framework.
- Describe the "mine" water management plans for the site. This should include pit water, water in the tailings impoundment, and seep collection and treatment. Provide details on seepage control measures or design features which will be used to improve effluent water quality.
- Describe all water treatment systems used on site including Faro pit water, Vangorda pit water, Grum pit water and water held and discharged from the tailings impoundment area. Information should be provided on the pit pumping schedules, treatment plant operation, reagent usage, volumetric treatment rates, sludge generation rates (volumes) and sludge quality and stability (chemical and physical).
- Provide sludge management plans for both the Faro and Vangorda treatment systems including location of sludge disposal facilities. These facilities should be sited taking into consideration interim disposal requirements prior to final closure. Provide information on existing sludge management practices.
- Describe the water management plans for "clean" site water, including diversion, withdrawal, drainage operations, stormwater management, sediment control, impoundments. The plans for these systems must consider erosion and sediment control issues on site.
- Describe activities and programs to address wastes not discussed above.
- Describe activities related to the use, transportation, storage and handling of supplies.
- Describe site security and access.
- Describe other routine maintenance activities not addressed above.

2.2.2.2 Proposed new construction/ activities

- Describe in detail any new undertakings being proposed in relation to the care and maintenance of the site including solid waste management facilities, bioremediation cell,

relocation/remediation of acid generating material and upgrading of diversion channels. Available information on schedules and designs should be provided for any proposed upgrade work on the site structures (Faro diversion, Vangorda diversion and seepage collection systems). For purposes of the EAR, these components of the project must be described in as much detail as is available to provide for a review of the technical adequacy and feasibility of the proposed work. Where inadequate detail is provided, further review and approval may be required once the appropriate information is available.

- Outline the proposed work on the diversion systems.
- Describe the size and location of the new facilities. Show the location of the new facilities on the appropriate maps.
- Provide options for the proposed management of solid waste on site which could include a landfill.
- Provide details on the proposed removal/demolition of buildings on site.
- Describe in details the proposed bio-remediation cell. Outline the mechanism for treatment that will be utilized in the bio-remediation cell including source of bacteria, nutrient addition, operation and monitoring, and closure.
- Outline any proposed work planned for the stabilization and/or remediation of the highly reactive materials on site.

2.2.2.3 Adaptive Management Program

An Adaptive Management Program is required to deal with specific environmental problems that may arise during the term of this project and determine what actions will be taken to remediate and/or rectify these problems to prevent environmental effects in the receiving environment. The goal of this program is to handle emergency situations such as groundwater contamination from either tailings or waste rock, Grum pit water management, failure of essential water treatment and water management equipment, water inputs exceed storage capacity, and emergency diversion ditch remediation.

- Describe in details the overall Adaptive Management Plan for the site including:
  - decision making framework for implementation of the plans,
  - a monitoring programs to assess the status of the individual activity or mine site component,
  - triggers/criteria for action based on the above mentioned monitoring program, and
  - outline of what actions will be taken.

2.2.2.4 Proposed Water Licence Amendments

- Describe in detail all planned amendments to the existing water licences including justification as to why these changes are required.

2.2.2.5 Proposed Studies

- Provide information regarding studies, related to care and maintenance, to be maintained and/or implemented over the course of the project including;
  - goals and objectives,
  - rationale,
  - incorporation of results from previous studies and investigations,
  - scheduling and timelines, and
  - consultation with various parties during the development, implementation and review of the studies including the relevant government agencies and First Nations.

2.2.3 Accidents and Malfunctions

- Describe emergency/contingency plans for items not included in the Adaptive Management Program including:
  - fuel and other hazardous material spills;
  - spill and/or accidents on the access route within the Yukon;
  - impoundment breach/failure;
  - accidents or malfunctions of project components not covered in the Adaptive Management Program; and
  - general emergency situations such as fire, extreme events, and natural disasters.
- Outline the procedures that will be used to notify the public, specifically those using the downstream environment, of spills and accidents at the site.

2.2.4 Project Schedule

- Provide an expected and realistic timetable of the project. Discuss any seasonal time constraints.

2.2.5 Environmental Monitoring and Protection Plans

- Describe environmental monitoring plans that will be put in place during the care and maintenance of the site to monitor various environmental attributes that may be affected by the operation. This should include water resources, aquatic resources, wildlife monitoring, as well as monitoring programs for physical structures.

2.3 ENVIRONMENTAL SETTING

This section should demonstrate the proponents understanding of and respect for the functioning and health of the physical, biological and socio-economic environments, both in the conditions in the surrounding environment and at the Faro mine site. Emphasis should be place on those components that are likely to be affected by the Project and on those identified as issues of concern during Government, First Nations and Public Consultation. The information should be presented in a concise manner with details and background information provided in appendices.

The "baseline" report submitted as part of the Project Description should be used as a basis for this section of the EAR. It should be presented in a manner that presents a conservative evaluation of the site and background conditions. Where applicable, preliminary data from the 2002 study program should be incorporated. This section should also incorporate, where applicable, the comments received during the review of the Project Description that are outlined in Appendix A.

2.3.1 Regional Setting

This section provides a description of the regional setting for the Anvil Range Mining Complex area including: climate and atmosphere, soils, geology, terrain, geological hazards, hydrology, hydrogeology, water quality, and aquatic resources.

2.3.1.1 Climate

- Provide a description of general climatic and atmospheric conditions in the project area.

2.3.1.2 Terrain

- Describe the regional setting for the area including such key terrain features as mountains, rivers and lakes.
- Describe the physical geography and surficial geology of the area.

2.3.1.3 Regional Geology/Geochemistry

- Describe the regional geology of the Faro area including the Faro, Vangorda and Grum ore bodies.
- Provide details on the regional geochemistry in the area.

2.3.1.4 Geological Hazards and Seismicity

- Identify and discuss natural features and hazards found within the project area, including slides, avalanches and faults. Provide information on area seismology and earthquake potential for various return periods including maximum credible earthquake (MCE).

2.3.1.5 Water Resources

2.3.1.5.1 Hydrology

- Describe the hydrological setting of the project area.
- Provide information on the hydrological characteristics (including runoff, seasonal distribution, flood frequency and PMF where available) based on the results of relevant

hydrological investigations and streamflow monitoring in the project area.

- Provide details of the 2002Water Balance for the mine area.

2.3.1.5.2 Water Quality

- Provide a summary of background and receiving surface water quality data for the project area.
- Provide a summary of background and receiving groundwater quality data for the project area.

2.3.1.5.3 Hydrogeology

- Provide a description of the geological elements and processes that affect the hydrogeology of the project area watersheds.
- Characterize the groundwater regime of the area, depth to groundwater and regional groundwater flow patterns.
- Discuss any changes to the local groundwater regime as a result of mining activities.

2.3.1.6 Aquatic Resources

2.3.1.6.1 Fish Resources

- Provide results of any fish resource studies that have been conducted in the area specifically those which focus on: fish species distribution, metal levels in fish tissues, aquatic and riparian habitat mapping. Include a summary of survey methodology for each of the studies referenced.
- For fish species documented in the area, identify critical and sensitive habitats, spawning periods and locations, rare and/or endangered species and associated habitats of these species.
- Conduct an analysis of fish capture data to delineate species abundance and composition (including estimated population densities) including an assessment of spatial and temporal distribution of species within the project area.
- If available, provide a summary of results from any other fishery-related field work conducted within the affected drainages.
- Provide a map of fisheries resources.

2.3.1.6.2 Benthic Invertebrates

- Provide results of any benthic invertebrate studies that have been conducted in the area including species abundance, richness and spatial distribution.

2.3.1.6.3 Stream Sediments

- Provide, where available, information describing the geological and chemical characteristics of stream bed sediments (grainsize and total metals analysis) in the project area.

2.3.1.7 Terrestrial Resources

2.3.1.7.1 Soils

- Include, where information available, information on terrain mapping, soil classification, and erosion potential. Descriptions should also include consideration of attributes that influence or facilitate runoff, such as infiltration and rates of percolation, slope, aspect, vegetation, presence of and extent of permafrost and thickness of the active layer.

2.3.1.7.2 Vegetation

- Provide information on any vegetation studies carried out in the project area. Outline the study methodology, results and include any information on identified rare and/or endangered species and ecological reserves.
- Plant communities existing, where information available, should be documented to the species level and note made of the site and community characteristics.

2.3.1.7.3 Wildlife

- Describe, based on available information, major wildlife species abundance and distribution within the project area (which may include rare and/or endangered species).
- Identify and describe critical/key and sensitive habitats and periods of habitat use in the project area.
- Provide information, where available, on wildlife use in the mine area, specifically the tailings area.
- Identify those species that reflect a general level of public and government awareness and concern (Valued Ecosystem and Cultural Components or VECCs) on the basis of perceived intrinsic value, economic importance, traditional use, recreational value, rarity, and sensitivity.
- Provide, based on available information, a map of key wildlife habitat areas.

2.3.1.8 Socio-economic and Cultural Conditions

Provide the following information on aspects that may be affected by the environmental changes resulting from the project. Indicate and identify the information on maps, where possible.

- land tenure and designation (leases, ownership, mining claims, settlement land, Parks, land use plans, special management zones, etc.)
- physical infrastructure (roads, trails, powerlines, communication lines,

habitations, cabins, camps, campgrounds, facilities or other structures)

- current land and resource uses - both commercial, recreational, and non-aboriginal uses such as:
  - recreational activities (fishing, hunting, gathering, hiking etc.),
  - trapping concessions (identify all registered trapping concession holders affected by the project and discuss the frequency, intensity, and location of trapping activities in the area),
  - harvesting,
  - local hunting,
  - fisheries including information of cultural, subsistence and commercial fishing activities, and
  - commercial wilderness activities (including guided fishing, outfitting, hunting and others as applicable)

2.3.1.9 Heritage Resources/Traditional Land Use

- Describe major heritage resources within the project area including known traditional land use (such as hunting, harvesting, trapping, gathering and fishing), historic, archeological and palaeontological sites.
- This should also include areas of new development where ground disturbance may take place.

2.3.1.10 Valued Ecosystem and Cultural Components (VECC's)

- Present the selected list of expected VECCs for the project and the methodology and rationale used for selection. Justify VECC boundaries.
- The proponent should describe how Traditional Knowledge was used in the determination of VECCs.

2.3.2 Mine Site Characterization

In this section of the EAR the proponent should describe the environmental conditions at the current mine site, based on the available information, with a focus on those that could potentially have environmental effects on the receiving environment.

2.3.2.1 Geochemistry and Acid Rock Drainage

- Provide details on the geochemistry and acid rock drainage characteristics of the various mine components including tailings, waste rock dumps and pit walls.

2.3.2.2 Site Surface Water Quality and Water Balance

- Provide details on the site surface water quality including a contaminant loading balance for the site outlining contaminant levels and loadings from the various mine components.

2.3.2.3 Site Groundwater Quality

- Provide details on the site groundwater quality

2.3.2.4 Site Soil Quality

- Provide details on the site soil quality including metals and petroleum hydrocarbons.

3.0 ENVIRONMENTAL EFFECT ASSESSMENT

3.1 PROJECT AND ASSESSMENT SCOPE

3.1.1 Scope of the Project

The scope of the project for this assessment includes the physical works and undertakings in relation to the care and maintenance and related activities of the Anvil Range Mining Complex during the period of the proposed 5 year water licence. This must include the principal undertaking and any accessory activities or physical works that are directly linked to, or interconnected with, the principal project. In this case the physical work is the actual mine site and the principal undertaking in relation to that physical work is the care and maintenance, new activities/undertakings, adaptive management program, ongoing studies and other accessory activities.

3.1.2 Scope of the Assessment

The following factors and scope of factors must be considered to meet the requirements of CEAA as set out in the definition of environmental effect and as described in Section 16 of CEAA:

- The environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- The significance of these effects;
- Comments from the public that are received in accordance with CEAA;
- Measure that are technically and economically feasible and that would mitigate any significant adverse environmental effects for the project; and
- Any other relevant matter that the Responsible Authority may require to be considered.

Spatial and temporal boundaries are scoped to indicate the range of appropriate scales at which particular baseline descriptions and the assessment of impacts must be presented. The temporal scope of this assessment include the environmental effects of the project for the period of the proposed water licence (5 years), plus the duration of any adverse environmental effects triggered during that time period. The proponent shall identify the criteria that they used to define the scope of the assessment, and describe the methodology used to apply the criteria.

In determining the spatial boundaries to be used in assessing impacts, the proponent shall consider the following:

- the physical extent of the project itself and the territory the proponent will control through lease (surface or sub-surface);

- the extent of aquatic and terrestrial ecosystems potentially affected by the project (e.g. zone of influence should be defined by a range of a species);
- the zones of socio-economic impact including local and territorial.

3.2 FIRST NATIONS AND PUBLIC CONSULTATION

- Provide a distribution list of the parties who have received the Project Description.
- Describe the consultation methods used to identify, inform and solicit input from potentially interested parties. Identify who provided input and their key concerns. Outline similarities or differences in perceived viewpoints.
- Describe how First Nations were consulted and how their specific concerns, issues and comments were identified and incorporated into the EA.
- Describe how First Nation's traditional knowledge was sought, and integrated into the EA including scoping of valued ecosystem and cultural components, description of the existing environmental conditions, predictions of environmental effects, development of mitigation measures, evaluation of significance, and monitoring and follow-up.
- Describe and discuss how public comments or concerns relating to the project and environmental effects were identified and integrated into the EA.

3.3 PREDICTED ENVIRONMENTAL EFFECTS OF THE PROPOSED PROJECT

The environmental assessment report should provide a comprehensive analysis of the potential effects of the proposed project, including the existing mine site conditions described in Section 2.3.2, on the physical, biological, social, economic and cultural components as identified in Section 2.3.1 and how the environment may affect the project. This section of the report should also address issues identified in the consultations to date, including the review of the Project Description as outlined in Appendix A.

3.3.1 Methods Used to Predict Effects

- Describe the methods used to predict the potential effects of the Project on environmental components.
- For quantitative modelling and predictions, a discussion of the model assumptions, data quality, and the confidence levels should be included.
- Identify any consultations and how traditional knowledge was used in determining and predicting environmental effects.

3.3.2 Effects on the Environmental Components

- Describe the predicted effects the project will have on the environmental components, with a focus on VECCs. This should include the effects of the current mine site conditions, in conjunction with the proposed activities and undertakings, on the receiving

environment.

- Describe the effects of the proposed care and maintenance activities on risks associated with the physical structures.
- Describe the sensitivity of each environmental component to the projects activities that may affect it. Document the methods used to define sensitivity.
- Water flow and contaminant loading balances can be used to provide a basis for the prediction of effects on the receiving environment.
- The effects assessment should incorporate comments previously provided to the proponent following the Project Description review (Appendix A) as well as concerns raised in ongoing First Nations and public consultation and government review.

3.3.3 Effects of Environmental Changes on Human Health

- Describe the predicted effects of environmental changes on human health.

3.3.4 Effects of Environmental Changes on Socioeconomic Conditions

- Describe the predicted effects of environmental changes due to the project on socioeconomic conditions.

3.3.5 Effects of Environmental Changes on Physical and Cultural Heritage

- Describe the predicted effects of environmental changes on physical and cultural heritage.

3.3.6 Effects of the Environment on the Project

- Identify the predicted effects of the environment on the project including those components of the environment identified in Section 2.3.1 and potential effects associated with extreme events.

3.3.7 Effects of Possible Malfunctions or Accidents

- Identify and describe the possible malfunctions or accidents associated with project activities.
- Identify the proposed safeguards that will be established to protect against possible malfunctions and accidents.
- Identify the contingency/emergency responses procedures that will be in place if a malfunction or accident does occur.

3.4 MITIGATION MEASURES AND RESIDUAL EFFECTS

This section identifies measures to mitigate the adverse environmental effects of the project. Mitigation includes the elimination, reduction or control of adverse environmental effects, including restitution for environmental damage, such as replacement, restoration, compensation, or other appropriate means. In some cases, mitigation measures are included as part of the proposed project such as water treatment and the adaptive management program.

Identification of adverse environmental effects from project components or undertakings is conducted as early as possible in the assessment process. Proponents then identify mitigation measures to eliminate or reduce the adverse environmental effects. The residual effects are then assessed for their significance.

Mitigation measures are part of the project design, defined early in the planning stages of a project, and may be refined throughout the assessment process as adverse environmental effects are clarified or in response to comments from specialist advisors and Responsible Authorities. Mitigation measures are often part of the industry's code of good practice, standards or environmental policies, and can include plans such as water management, waste management, monitoring or decommissioning.

- Mitigation should be proposed for the adverse environmental effects that could occur as a result of activities proposed for the project. A description of strategies, methodologies, schedules and plans for mitigation should be provided in the Environmental Assessment Report. In some cases more than one option for mitigation could be proposed.

- Where damage to the environment will not be completely avoided, restitution measures should be described. This should include a description of commitments, approaches and specific options for restoration, replacement and/or compensation for any potential/predicted environmental damage.

- In addition the following should be provided if not already described as part of the proposed project in Section 2.2:
  - Outline contingency measures for accidents, failures and malfunctions.
  - Describe health and safety programs for workers, the public and wildlife.
  - Describe material handling for hazardous materials or dangerous goods and provide any contingency plans for hazardous materials, particularly fuels and reagents or chemicals.
  - Present and describe any Environmental Management Systems or Environmental Protection Plans or programs.

3.5 DETERMINATION OF SIGNIFICANCE

The RA's for a project are responsible for making a determination on the significance and likelihood of environmental effects, taking into account the implementation of mitigation measures. However, the proponent is encouraged to conduct an analysis of significance and likelihood as part of the Environmental Assessment Report. The methodology for determining the significance and likelihood of effects (after mitigation has been applied) should be clearly defined, as the RA's will analyse the process and rationale used to assist in making a significance determination.

- The significance of predicted effects should be evaluated according to the following as appropriate:
  - Magnitude;
  - Geographic extent;
  - Timing, duration and frequency;
  - Degree to which effects are reversible;
  - Ecological and social/cultural context; and
  - Probability of occurrence (likelihood) and confidence levels (certainty) (risk assessment).

A CEAA Reference Guide entitled "Determining Whether a Project is Likely to Cause Significant Environmental Effects" outlines a process for determining whether environmental effects are *adverse, significant, and likely*. This document can be downloaded from the CEAA web site. The Guide's three step process includes:

1. Deciding whether the environmental effects are adverse
2. Deciding whether the adverse environmental effects are significant
3. Deciding whether the Significant Adverse Environmental Effects are likely.

3.6 CUMULATIVE EFFECTS ANALYSIS

A cumulative effects assessment for the project is a requirement under CEAA. Cumulative effects are the effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out. For this project the cumulative effects assessment should include all existing and all reasonably foreseeable projects. Reasonably foreseeable projects will include those that have entered the assessment process under CEAA, those where a right has been issued with respect to use of land or water resources, and those where binding commitments have been made by governments. The cumulative effects must result at least in part from the project being proposed, and only those environmental effects of the project which interact or accumulate with effects from other projects or activities are to be included as potential cumulative effects.

The cumulative effects assessment for the proposed project should include, but not be limited to,

the following projects/activities:

- Remediation/removal of the Fresh Water Storage Dam,
- Town of Faro,
- Ketza River Mine, and
- Hunting and trapping in the area.

The intent of the cumulative effects assessment is to assess potential environmental effects over a larger (i.e., "regional") area, that may cross jurisdictional boundaries, including effects due to natural perturbations affecting environmental components and human actions, and assess those effects during a longer period of time into the future.

- Describe the activities of the other projects identified in the scoping, and indicate the environmental effects that are expected.
- Discuss the predicted environmental effects of the project in context of the other projects already underway or that will occur.
- Document the sources of information used to identify other projects, and if possible briefly describe the methods used to determine the environmental effects of these other project activities.
- Predict the cumulative effects.
- Suggest how these cumulative effects should be avoided, mitigated, and managed.
- Identify how the proponent plans to monitor residual cumulative effects.

Additional direction as to what is required for the cumulative effects assessment can be obtained from the "Cumulative Effects Assessment Practitioners Guide" which can be downloaded from the CEAA web site. As well, the "Users Guide for Level 1 Screening of Cumulative Effects" prepare by DIAND Yukon Region provides valuable information to assist with cumulative effects assessment.

3.7 MONITORING AND FOLLOW-UP PROGRAM

- Clearly define and identify a follow-up program to:
  - verify the accuracy of the environmental assessment and the predicted performance of the Project;
  - determine the effectiveness of any mitigation measures implemented and the need for modification to those measures to ensure impact predictions remain valid;
  - verify compliance with approval conditions, and;
  - identify unanticipated effects and environmental problems.
- Describe how the results of the monitoring program will be used to refine or modify management plans, commitments and policies.
- Describe how the results of the monitoring program will be used to implement additional mitigation measures.
- Include details such as sampling and analytical protocols, sampling and analytical

equipment as an appendix.

3.8 APPENDICES

- Provide references used in the EAR and any supporting data, reports, or other information used to document project information and support assessment conclusions.

APPENDIX A - Additional Comments from Review of Project Description

Project Description

Presently the management of the site appears to be component by component, which fails to address the interdependent and conflicting nature of some of the objectives.

It is not clear what meterological conditions have been assumed for the pit pumping programs.

A number of options for alternative treatment schemes, etc. are littered throughout the document. Specific details of these programs, or an approach to managing these types of modifications should be included in the license application for review. Examples of the types of operating modifications we refer to include:

p.48 The mill (treatment system) may be altered, enlarged or otherwise modified as appropriate to increase economic, operational and safety efficiencies

p.48 Other sources of contaminated water may be directed to the mill (treatment system) in the future where this is deemed practical and within the scope of diligent environmental management".

p.48 Implementation of variations on the contingency treatment system.

p.49 Other treatment methods might also be employed on a trial or permanent basis as appropriate to achieve efficient treatment of water

p. 53 Testing of flocculant systems in Sheep Pad Pond

p. 54 Diversion of Grum Creek into Moose Pond as a groundwater recharge scheme may or may not be continued.

A key area of potential hydrogeological impact is Rose Creek and the Rose Creek aquifer. There is discussion of a groundwater contingency program for the North Fork of Rose Creek (Item 39 of licence), however, the trigger program and contingencies require further development, rationalization, and description. In addition, there is no other mention of contingencies for groundwater impacts that may occur in other locations.

Environmental Setting

The "baseline" report submitted as part of the Project Description should be recognized as part of the EAR. The presentation of this information needs to be revised to more accurately reflect site conditions including the following:

- The data presented does not describe true baseline conditions but rather current conditions or an average calculated on the basis of changing conditions over the life span of the facility. The terminology used to describe the findings should be revised to more accurately reflect the true nature of the data presented.
- Some of the data are presented in formats that fail to illustrate obvious conclusions. For example, much of the water quality data for impacted sites is presented as averages, where in some cases the standard deviation is greater than the mean. Mean values provide only very limited useful information at sites where obvious trends are apparent.

- There is little consistency in the treatment of data. In some cases data sets are truncated to eliminate values that are of questionable validity (i.e. groundwater wells in the area of the Main waste rock dumps). In other cases, obvious erroneous values are left in the data sets, resulting in average values that are not reflective of real conditions (i.e. V2)

The people (Ross River Dena) were not drawn to the Anvil Range Area, but to Mount Mye, also called the Mountain of Everything. Names are important as they claim areas. This area is claimed for generations by the Ross River Dena. Everything did not only include the items listed above, but also medicine, water, all kind of berries and different materials, as well as for spiritual and cultural purposes.

RRDC would like to inform the IR that there are great concerns that the gravesite, located at the mine site, has been damaged through road construction.

What "other sources" of contaminated water report to Vangorda pit? In what volume and at what rate?

What are the characteristics and estimated volumes of seepage from the Vangorda pit? What are the characteristics and volumes of seepage from the Seepage from Grum pit?

What is the condition of the Little Creek Dam (stores runoff from Vangorda waste dump)?

Where does drainage from the Grum ore transfer pad report?

Where does off-spec water from the Vangoorda WTP report? plan document.

Effect Assessment

At some point a water quality model will be required for both of these sites which demonstrates that the proposed mitigation meets the water quality objective established for Rose and Vangorda Creeks. The information to support this has improved significantly in many areas but we are concerned that the mine has not been measuring flows for several of the key contaminant loads such as X23 on an on-going basis. It is important that the model not rely exclusively on the use of average concentrations but also consider peak loads and minimum flows. In many cases, these scenarios are the most significant factors for regulators to assess whether mitigation proposals are acceptable.

Seven observations are presented from the results of the draft 2001 report on the hydro geochemistry of the tailings. There are several additional observations which should have been highlighted as they are of some relevance for weighing the implications of the current proposals. The chemical changes from 1988 to 2001 were assessed in the vertical profile of the tailings in the Original and Second Impoundments at four locations and the following observations noted: a) tailings located above the current water table elevation and/or capillary fringe have undergone

a substantial decrease in pH (for example at one site the tailings at a depth of 10m went from a pH of 8.7 down to 4.8); b) at locations where the water table is below the bottom of the tailings the tailings have now undergone oxidation throughout the entire profile, and; c) in the unsaturated zone soluble zinc over 1000 mg/kg were frequently found and levels went up to 9000 mg/kg.

The effect of CO_2 degassing to produce the relatively high pH for the high Zn content of the surface waters of the flooded Faro pit should be considered in interpreting these data.

It is good that water quality data has been collected since the late 1990's. The data is comprehensive and seems complete. It is good that the database includes full metal scans and not merely selective metals as in earlier years.

The 2002 preliminary contaminant loading study probably provides an indication of contaminant loading in its current state. It is unclear how much predictive power this model has or how the model will be applied during the water license application process. However, we suggest the model would be improved using flow weighted averages rather than simple averages for some load sources. It is also unreasonable to expect 100% correlation between measured and predicted loads when one grab sample is often used to represent 6 months of loading (a single time step in model). If the model is to be an important supporting element of the design and operations plan for the site, it is suggested it should be refined.

The document states that the impacts to the underlying aquifer, as measured by zinc concentrations, do not extend beyond the toe of the Rose Creek Dam (Item 6, Section 2.3.5, page 21). Further explanation of the actual measurements of dissolved zinc at this location, and a discussion of the compliance boundary would be necessary for a critical evaluation. Specific criteria for groundwater quality are not outlined.

In addition, there is no mention of predictive modeling of the groundwater conditions being undertaken, which is necessary to evaluate the potential for future impact to the groundwater resources.

Appendix C

Letter: Ms. Leslie Gomm, Re. Water Licence Renewal CEAA Process – Comment on the Draft Guidelines, March 6, 2003

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March 6, 2003

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Dear Leslie:

Water Licence Renewal CEAA Process - Comment on the Draft Guidelines

Thank you for providing us with the opportunity to comment on the Draft Guidelines issued by DIAND Environment Directorate on February 13, 2003. These guidelines relate to our submissions (*Project Description* dated May 31, 2002 and *Project Description Supplement* dated September 16, 2002) relating to the renewal of the water licences for the Anvil Range properties. We had submitted these documents in our capacity as Interim Receiver of Anvil Range Mining Corporation. Further to our discussions, we look forward to receiving the Final Guidelines in early March 2003.

We are pleased to have taken part in the public consultation process and to see that the Draft Guidelines incorporate a number of useful comments and suggestions that were generated from that process. We look forward to working with all of the parties in an open and responsive manner to continue to move this project ahead.

We have outlined below several specific comments regarding the Draft Guidelines that we put forward for your consideration. These comments are made to confirm our understanding of the intent and expectations of certain clauses.

Section 2.1.4:

We will include and summarize the information regarding the DIAND/YTG Project Management team on the basis of our understanding of this matter at the time of writing of the Environmental Assessment Report. The formation of the management team is not under the Interim Receiver's control. As such, we will obtain this information from the Project Management team.

Sections 2.2.2, 2.2.2.2, 2.2.2.4, 2.3. and 2.3.1.7.2:

Our overall understanding of the intent of the Draft Guidelines is to request information that is appropriate to, and sufficient for the assessment of, environmental effects of care and maintenance activities at the site and to identify possible adverse effects and evaluate proposed mitigation measures.

Relating to the request for 'detailed information' regarding designs and operating procedures for proposed project activities, we understand that the level of detail required must be sufficient to allow reviewers to assess that the activities are both feasible and provide adequate environmental protection. We envision that the Water Licence Application will present additional detail regarding proposed project activities which will allow for the regulatory process to be successfully completed.

As regards to Section 2.3 ("Environmental Setting "), our understanding is that the Draft Guidelines are requesting information to be provided at a level of detail that is consistent with the level of information provided in Volume II of our Project Description submission ("Anvil Range Mine Complex 2002 Baseline Environmental Information - Volume II of II, 2002 Project Description").

Additionally, it is our understanding from the statement of the scope of the project, that any information that relates to long term reclamation planning and not to the proposed care and maintenance activities, is not requested to be included in the EAR (i.e. Section 2.3.1.7.2 bullet 2).

Appendix A, Environmental Setting and Effect Assessment Sections:

It is our understanding that the information provided in the second and third sections of Appendix A ("Additional Comments from Review of Project Description"), with the two exceptions referred to below, is provided for reference and interest and are not requests for information to be included into the EAR. Our conclusion in this regard stems from the fact that these comments relate to reclamation planning rather than to the proposed care and maintenance activities or consist of constructive criticism of our Project Description submissions. We will endeavour to address the latter comments to the extent that available information permits us do so. The two items which we consider to be excepted from our above-stated conclusion are paragraphs three and four of the Environmental Setting Section. These relate to community concerns expressed by Ross River. We will consider these to be a direct inclusion into sections 2.3.1.8 and 2.3.1.9 of the Draft Guidelines.

In closing, the Interim Receiver has endeavoured, since the beginning of the CEAA process, to respond to enquiries and requests and to provide all necessary submissions with all due haste. As such, we have begun the compilation of the Environmental Assessment Report in order to be in a position to respond to the Final Guidelines in a complete and timely manner. This proactive work will, we hope, facilitate the Environmental Assessment and Water Licencing processes, working towards issuance of a new Water Licence by December 31, 2003. In support of this effort, we would appreciate if you could inform us if we have incorrectly interpreted the Draft Guidelines.

We have been grateful for the interest and involvement of stakeholders and First Nations to date and look forward to on-going engagement and dialogue with yourself and these parties with respect to this property.

Yours very truly,
DELOITTE & TOUCHE INC.
in its capacity as Interim Receiver of
ANVIL RANGE MINING CORP.

Shannon Glenn
Manager, Environmental Services
Enterprise Risk Services

c. Wes Treleaven, Deloitte & Touche Inc.