

PR90-008



NOLAN, DAVIS & ASSOCIATES

DUPLICATE AVAILABLE

PR 90-008

EXPLORATION OREX INC.
GOLDBORO PROJECT
GOLDBORO, NOVA SCOTIA

TERMS OF REFERENCE
FOR AN
ENVIRONMENTAL ASSESSMENT

Exploration Orex Inc.
Upper Penthouse
1660 Hollis Street
Halifax, Nova Scotia B3J 1V3

January 1990

DUPLICATE AVAILABLE



January 19, 1990

Mr. W.A. Coulter, P.Eng
Environmental Assessment Administrator
Nova Scotia Department of the Environment
P.O. Box 2107
Halifax, NS
B3J 3B7

Dear Mr. Coulter:

RE: GOLDBORO PROJECT

We are pleased to submit ten (10) copies of our Terms of Reference for the Environmental Assessment Report for our Goldboro Project. These have been prepared in accordance with the final guidelines which you submitted to us on December 27, 1989.

Yours very truly,

Musetta Thwaites

Musetta Thwaites, MBA
Regional Manager

MT/ca

**EXPLORATION OREX INC.
GOLDBORO PROJECT**

**TERMS OF REFERENCE
FOR
ENVIRONMENTAL ASSESSMENT**

These Terms of Reference have been prepared in accordance with the requirements of the Nova Scotia Environmental Assessment Act and address the Final Guidelines issued on December 27, 1989 (see Appendix 1).

1.0 GENERAL

The consultant shall prepare a concise report with a table of contents reflecting the Final Guidelines and organized into five parts as follows:

- . Part 1 Project Description
- . Part 2 Existing Environment
- . Part 3 Impact and Mitigative Measures
- . Part 4 Residual Impacts
- . Part 5 Proposed Effects Monitoring

A preface, executive summary and introduction will also be included. The report will be prepared in language easily understood by non-technical readers.

Except as otherwise noted, the report will be prepared on the basis of available data.

The report will be presented as an Orex document and will be signed by an officer of the company, thus signifying the commitment of the company to the contents of the report. Nolan, Davis and Associates (N.S.) Limited (the consultant) will be responsible for preparation of the report with inputs as noted from St. Michel Geoconseil.

2.0 PROJECT DESCRIPTION

This section of the report will be prepared by St. Michel Geoconseil and edited by Nolan, Davis to reflect a consistent style relative to the rest of the report.

The project description will include the following:

- . Description of the location of all mine facilities in relation to existing infrastructure and environmental features.
- . A review of past and present activity in the area, including a description of tailings facilities and old mine workings from the previous activity in the area.
- . Reason for and alternatives to the proposed undertaking.
- . A full description of the proposed mining facilities, including mining methods; mill buildings, including process flow diagram and water balance; water supply; water management methods, including liquid effluent, tailings disposal and waste rock, and domestic waste treatment/disposal, plus any other surface facilities.
- . Profile of the proposed labour force for each phase of development and the proposed camp facilities.
- . Review of alternative mining and beneficiation methods and the reason for selecting the scheme proposed.

Documentation supporting the tailings disposal concept and site selection will be included as an appendix to the report.

3.0 DESCRIPTION OF EXISTING ENVIRONMENT

This section of the report is already essentially complete and is organized to reflect the table of contents given in the Final Guidelines, as follows:

- 2.1 Study Area
- 2.2 Geology
 - 2.2.1 Surficial Geology
 - 2.2.2 Bedrock Geology
- 2.3 Climatology
 - 2.3.1 Precipitation
 - 2.3.2 Air Temperature
 - 2.3.3 Wind
- 2.4 Surface Water Hydrology
 - 2.4.1 Regional Hydrology
 - 2.4.2 Surface Water Resource
 - 2.4.3 Drainage Basin Morphology
 - 2.4.4 Channel Morphology
 - 2.4.5 Water Discharge
 - 2.4.6 Water Chemistry
- 2.5 Hydrogeology
 - 2.5.1 Hydrostratigraphic Units
 - 2.5.2 Groundwater Flow Systems
 - 2.5.3 Groundwater Chemistry
 - 2.5.4 Groundwater Utilization and Resource Potential
- 2.6 Biological Resources
 - 2.6.1 Fisheries - Freshwater
 - Marine (Seal Harbour and Coddles Harbour)
 - 2.6.2 Wetlands
 - 2.6.3 Mammals and Birds
 - 2.6.4 Rare and Endangered Species
- 2.7 Air Quality
 - 2.7.1 Noise
 - 2.7.2 Dustfall
- 2.8 Land Use and Sociology
 - 2.8.1 Land and Resource Use in the Study Area
 - 2.8.2 Local Attitudes to Project
 - 2.8.3 Archaeological Review
- 2.9 Overview of Existing Environment

The report has been prepared on the basis of available data, with the exception of some biological field work undertaken to better understand the fishery resources of the area; an ecological overview of the proposed tailings disposal area; and interviewing of local community leaders to address local sociological and attitudinal aspects.

4.0 IMPACT AND MITIGATIVE MEASURES

This section of the report will be prepared by Nolan, Davis as an integration of Parts One and Two previously described. The format will reflect the following headings as in the Final Guidelines:

- 3.1 Potential Impacts
 - 3.1.1 Impacts Requiring Mitigation
- 3.2 Waste Disposal System
 - 3.2.1 Tailings
 - 3.2.2 Cyanide Bearing Wastes
 - 3.2.3 Other Wastes
 - 3.2.4 Cyanide Destruction
- 3.3 Hydrogeology
 - 3.3.1 Blasting
 - 3.3.2 Dewatering
 - 3.3.3 Underground Waste Disposal
- 3.4 Impacts on Surface Waters and Associated Habitat
 - 3.4.1 Gold Brook Lake
 - 3.4.2 Cold Brook River
 - 3.4.3 Other Systems
- 3.5 Air Quality Impacts
 - 3.5.1 Noise
 - 3.5.2 Dust

- 3.6 Community and Land Use Impacts
 - 3.6.1 Social Impacts - on community resources and systems including health care, fire and police protection, housing, social services, water supply, transportation and schools.
 - 3.6.2 Land and Water Use Impacts
 - 3.6.3 Program of Public Information
- 3.7 Site Reclamation
- 3.8 Contingency Planning
 - 3.8.1 Cyanide Spills in the Mill
 - 3.8.2 Cyanide Spills on Transit to the Mill
 - 3.8.3 Cyanide Movement in the Groundwater System
 - 3.8.4 The Release of HCN Gas in the Active Workings Due to Migration of Cyanide in the Groundwater System

Particular attention will be given to the environmental issues associated with the use of cyanide (Sections 3.2.2 and 3.2.4). In this regard, the previous proposal to dispose of the cyanide-rich sulphide tailings underground has been abandoned by Orex in favour of land-based tailings disposal and treatment of cyanide residuals. The revised proposal will be thoroughly described as a function of Part One and its environmental implications addressed in Part Three.

A conceptual reclamation plan will be developed by Nolan, Davis for inclusion as Section 3.7. This will address the abandonment of the mill, mine, tailings disposal area and any other facilities.

A contingency plan will be prepared by Nolan, Davis in which potential release of contaminants such as cyanide or fuel oil will be addressed and proposed plans to minimize and mitigate such occurrences will be described.

This section of the report will include a description of Orex's Public Information Program, including activities conducted to date and proposed for the future.

5.0 PARTS FOUR AND FIVE

The final two parts of the report dealing with Residual Impacts and Proposed Effects Monitoring will be prepared by Nolan, Davis. Part Four will, in effect, be a summary of discussions presented in Part Three, emphasizing those impacts which will not be mitigated and thus represent a cost to society.

The monitoring program to be described in Part Five will be divided into two parts:

- . Biophysical Environment
- . Socio-economic and Community

APPENDIX 1
Final Guidelines

ENVIRONMENTAL ASSESSMENT REPORT

FINAL GUIDELINES
FOR THE PREPARATION OF
TERMS OF REFERENCE

Exploration Orex Inc.
Goldboro Project

NOVA SCOTIA
DEPARTMENT OF THE ENVIRONMENT

DECEMBER 27, 1989

**FINAL GUIDELINES
FOR THE
PREPARATION OF TERMS OF REFERENCE
FOR AN
ENVIRONMENTAL ASSESSMENT REPORT

EXPLORATION OREX INC.
GOLDBORO PROJECT**

INTRODUCTION

This document presents Final Guidelines for the preparation of Terms of Reference for an Environmental Assessment Report in accordance with the requirements of the Environmental Assessment Act and Regulations.

The guidelines were prepared in consideration of comments and concerns expressed by government reviewers and following a public review period from November 2, to December 12, 1989. These Final Guidelines are presented in the form of a modified Table of Contents (modifications are shown as underlined, bold face type) based on a document submitted to the Nova Scotia Department of the Environment for Exploration Orex Inc. by Nolan, Davis and Associates on September 6, 1989 (received on September 14, 1989).

FINAL GUIDELINES - OREX

The Environmental Assessment Report must address the requirements of Section 13 of the Environmental Assessment Regulations and therefore the Terms of Reference shall incorporate those requirements in their entirety. The Terms of Reference shall also address all items contained in the final Guidelines.

Since the Report may be examined by those without technical backgrounds it shall include an executive summary prepared in non-technical terms. The Report shall use non-technical language wherever possible.

FINAL GUIDELINES - OREX

FINAL GUIDELINES

PREFACE

EXECUTIVE SUMMARY

INTRODUCTION

Part 1 - Project Description

- 1.1 Location - in relation to existing infrastructure as well as environmental features such as lakes, streams, etc.
- 1.2 Past and Present Activity - including a description of any environmentally sensitive remnants of previous activities that may be disturbed by this project.
- 1.3 Reasons For and Alternatives To Proposed Undertaking
- 1.4 Proposed Development Facilities
 - 1.4.1 Surface Facilities
 - 1.4.2 Mine - including proposed mining methods.
 - 1.4.3 Mill Facilities - including process flow diagram with water balance if available.
 - 1.4.4 Water Supply
 - 1.4.5 Waste Management
 - 1.4.5.1 Liquid Effluents
 - 1.4.5.2 Tailings Disposal
 - 1.4.5.3 Waste Rock
 - 1.4.5.4 Solid and Domestic Wastes

FINAL GUIDELINES - OREX

- 1.4.6 Employment and Camp Facilities
- 1.4.7 Management of Hazardous Materials
- 1.4.8 Other Methods of Carrying Out the Undertaking**
e.g. open pit, heap leach, gravity, etc. (This section should present a discussion of the various options which are available to the proponent and which have been rejected. Reasons for the rejection for options should be presented along with reasons for the selection of the preferred options.)

Part 2 - Existing Environment

- 2.1 Study Area**
- 2.2 Geology
 - 2.2.1 Surficial Geology
 - 2.2.2 Bedrock Geology
- 2.3 Climatology
 - 2.3.1 Precipitation
 - 2.3.2 Air Temperature
 - 2.3.3 Wind
- 2.4 Surface Water Hydrology
 - 2.4.1 Regional Hydrology
 - 2.4.2 Surface Water Resource
 - 2.4.3 Drainage Basin Morphology
 - 2.4.4 Channel Morphology
 - 2.4.5 Water Discharge
 - 2.4.6 Water Chemistry

FINAL GUIDELINES - OREX

2.5 Hydrogeology

2.5.1 Hydrostratigraphic Units

2.5.2 Flow Systems - this section should include a detailed description of the groundwater flow systems which may be impacted by the disposal of cyanide rich waters and/or tailings in the Boston-Richardson workings.

2.5.3 Groundwater Chemistry

2.5.4 Groundwater Utilization and Resource Potential

2.6 Biological Resources

2.6.1 Fisheries - Freshwater and Marine (Seal Harbour and Coddles Harbour) including habitat and recreational and commercial use of the resource.

2.6.2 Wetlands

2.6.3 Mammals and Birds

2.7 Air Quality

2.7.1 Noise

2.7.2 Dustfall

2.8 Land Use and Sociology

2.8.1 Land Use in Study Area - this section should include an evaluation of other resource uses that may be denied as a result of the project. Examples would include forestry and recreation.

2.8.2 Local Attitudes to Project

FINAL GUIDELINES - OREX

2.9 Overview of Existing Environment

The Nova Scotia Museum Complex advises that an archaeological survey was conducted in the area in the fall of 1988 and showed nothing of particular significance. This work should be documented in the Report. Similarly, the Museum advises that they have no knowledge of any ecological features that would be threatened. If the Museum has not surveyed the project area for rare and endangered species of plant and animal life then a professional evaluation of the area should be undertaken.

PART 3 - IMPACT AND MITIGATIVE MEASURES

3.1 Potential Impacts

3.1.1 Impacts Requiring Mitigation - including construction, operation and abandonment phases of the project.

3.2 Waste Disposal System

3.2.1 Tailings - including geotechnical considerations and surface and groundwater characteristics of the preferred tailings disposal site.

3.2.2 Cyanide Bearing Wastes - this section should address the potential for migration of cyanide-laden groundwater from the abandoned mine to the active workings and the possibility of natural acidification of the waters resulting in the release of HCN gas in the active mine. The potential for the occurrence of a sulphide fire in the abandoned mine should be examined.

FINAL GUIDELINES - OREX

- 3.2.3 Other Wastes - this section should include an evaluation of the efficacy of both the existing ore and waste storage pads with reference to their ability to handle increased loading. Concepts for leachate collection and treatment for ore and waste rock storage areas should be presented in this section.
 - 3.2.4 Cyanide Destruction - this section should present a comparison of the available processes for the removal of cyanide from effluents along with the reasons, including environmental considerations, for the selection of the preferred option.
- 3.3 Hydrogeology
- 3.3.1 Blasting
 - 3.3.2 Dewatering
 - 3.3.3 Underground Waste Disposal - this section should describe the proposed groundwater monitoring programme for the flow system(s) that may be impacted by the disposal of cyanide contaminated waters and sulphide rich tailings in the abandoned workings of the Boston-Richardson.

FINAL GUIDELINES - OREX

- 3.4 Impacts on Surface Waters and Associated Habitat
 - 3.4.1 Gold Brook Lake
 - 3.4.2 Gold Brook River
 - 3.4.3 Other Systems - these systems should include the area of Seal Harbour into which Gold Brook River discharges.

- 3.5 Air Quality Impacts
 - 3.5.1 Noise
 - 3.5.2 Dust

- 3.6 Community and Land Use Impacts
 - 3.6.1 Social Impacts - as construction camps may have a significant negative effect on the existing community this section should include a discussion of specific mitigative measures related to the community impacts of the camp. It is also recognized that the proposed undertaking has the potential to stress the service infrastructure in the vicinity. The Report should address the impacts of the project on such items as: health care, fire and police protection, housing requirements, social services, water supplies, transportation systems, schools, etc.

FINAL GUIDELINES - OREX

- 3.6.2 Land and Water use Impacts
- 3.6.3 Program of Public Information - the Report should contain a detailed discussion of any proponent initiated public information program including dates and locations, numbers of people in attendance, the issues discussed, and the outcome of the consultations including any commitments by the proponent. Any ongoing consultation procedures planned by the proponent should be described.

3.7 Site Reclamation

3.8 Contingency Planning

- 3.8.1 Cyanide spills in mill
- 3.8.2 Cyanide spills on transit to the mill
- 3.8.3 Cyanide movement in the groundwater system
- 3.8.4 The release of HCN gas in the active workings due to migration of cyanide in the groundwater system.

Part 4 - RESIDUAL IMPACTS

Residual Impacts are those impacts that cannot or will not be mitigated and thus represent the Environmental Costs of the proposed undertaking. In order to allow reviewers and decision makers to assess the environmental tradeoffs associated with the project it is essential that the Report contain a detailed discussion and evaluation of Residual Impacts.

Part 5 - PROPOSED EFFECTS MONITORING

- 5.1 Biophysical Environment
- 5.2 Socio-Economic and Community