

Part B

Guidelines for Preparation of a Public Environmental Report

NEW TAILINGS STORAGE FACILITY FOR THE BROWNS OXIDE PROJECT

Batchelor, NT

- Compass Resources NL -

April 2008

TABLE OF CONTENTS

1	INTRODUCTION	- 3 -
	1.1 RISKS IDENTIFIED.....	- 4 -
2	ENVIRONMENTAL OUTCOMES	- 4 -
	2.1 GROUNDWATER.....	- 4 -
	2.1.1 Context	- 5 -
	2.1.2 Baseline	- 5 -
	2.1.3 Information Requirements	- 5 -
	2.2 SURFACE WATER	- 7 -
	2.2.1 Context	- 7 -
	2.2.2 Baseline	- 8 -
	2.2.3 Information Requirements	- 8 -
	2.3 HAZARDOUS RADIOACTIVE DISCHARGES.....	- 9 -
	2.3.1 Context	- 9 -
	2.3.2 Baseline	- 9 -
	2.3.3 Information Requirements	- 9 -
	2.4 <i>ENVIRONMENT PROTECTION AND BIODIVERSITY ACT</i> MATTERS - FLORA AND FAUNA.....	- 9 -
	2.4.1 Context	- 10 -
	2.4.2 Baseline	- 10 -
	2.4.3 Information Requirements	- 10 -
	2.5 HISTORIC AND CULTURAL HERITAGE VALUES	- 11 -
	2.5.1 Context	- 11 -
	2.5.2 Baseline	- 11 -
	2.5.3 Information Requirements	- 12 -
	REFERENCES	- 13 -

1 INTRODUCTION

These guidelines have been developed to assist Compass Resources NL (Compass) in preparing a Public Environmental Report (PER) for the proposed new Tailings Storage Facility (TSF) for the Browns Oxide Project (BOP), in accordance with Clause 8 of the Northern Territory (NT) *Environmental Assessment Administrative Procedures (1984)*.

Part B (this section) of the Guidelines details risk analysis and/ or information requirements with respect to specific risks/ impacts identified for the project by the Northern Territory Government.

Processes for risk management are formalised in Australian Standards (eg. AS/NZS 4360:2004; HB 436:2004; HB 158:2006) which provide generic guidance for application and more detailed guidelines for specific risks, including environmental. In addition, organisations such as the US Environmental Protection Agency have published guidelines for ecological risk assessment (e.g. US EPA 1998).

The PER should demonstrate that the proponent has identified all risks associated with the issues raised, undertaken comprehensive assessment of those risks (including quantification where practicable) and identified effective controls for significant risks. Residual risks should also be identified. All aspects of the risk assessment should be accompanied by statements about levels of uncertainty. Steps to reduce uncertainty or precautions taken to compensate for uncertainty should also be identified and their effect demonstrated.

Information provided should permit the reader to understand the likelihood of the risk, its potential severity, and any uncertainty about the effectiveness of controls. If levels of uncertainty do not permit robust quantification of risk, then this should be clearly acknowledged.

Compass will be expected to demonstrate the implementation of industry best practice measures in design of the facility, project planning, environmental risk assessment, and in all future aspects of the life of the project.

The assessment process aims to provide a mechanism for the proponent and the Government to gain a clear understanding of the potential extent of such impacts, and to examine the likely effectiveness of preventative measures proposed. This understanding creates an opportunity to reduce impacts by adoption of more effective up-front engineering and/or management mechanisms, if shown to be needed.

Compass is expected to work with close regard to community expectations and concerns and to respect that the community may perceive the level of risk for this proposal differently to the proponent. In the interest of achieving a balanced risk assessment, it is expected that the proponent will place a high priority on communicating with the local community.

1.1 RISKS IDENTIFIED

The major risks below have been identified through analysis of the Notice of Intent for the new Tailings Storage Facility (TSF). It is possible that further major risks will be identified in the Environmental Impact Assessment process. The major identified risks are:

1. GROUND WATER: Contamination (by seepage) of groundwater resources underlying the Tailings Storage Facility and shared by local bore users;
2. SURFACE WATER: Contamination of local water courses by surface water runoff and shallow seepage, impacting on aquatic and riparian ecosystems;
3. RADIOACTIVE ELEMENTS: Concentration and partitioning of radioactive elements in the new Tailings Storage Facility and TSF seepage, leading to off-site radioactive hazards; and
4. *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT* MATTERS: Flora and fauna.

2 ENVIRONMENTAL OUTCOMES

The Public Environmental Report must demonstrate the following environmental outcomes, in order for approval to be considered.

2.1 GROUNDWATER

The proponent shall prevent unacceptable degradation of water quality in shared groundwater aquifers from direct and indirect mining influences, in the short and long term.

In risk management terms, the proponent shall demonstrate that the risk of significant degradation of water quality in shared groundwater aquifers from direct and indirect mining influences is low, that is, the measures put in place to mitigate impacts reduce the combined likelihood and consequence of an event occurring so that the residual risk is low. Potential risks to groundwater may occur as a result of the character of the tailings and the design of the TSF.

The proponent shall:

- Outline in risk management terms, the risks to the local shared groundwater resources, and its users. This includes but is not limited to current and future bore water users; surface water users; and, interrelated surface water ecosystems, vegetation and fauna;
- Demonstrate that seepage from the new Tailings Storage Facility of the Browns Oxide Project will not cause a loss of water quality in local shared groundwater resources, particularly once pit dewatering ceases after conclusion of oxide mining; and
- For the risk reduction measures proposed, demonstrate the magnitude of risk reduction, and the estimated residual risk level to environmental components following proposed treatment.

2.1.1 Context

- Good supplies of groundwater are available in the Coomalie region. Batchelor's public water supply is sourced from groundwater in the Coomalie dolomite close to the township;
- Ground water levels are influenced by tropical rain patterns and rise and fall accordingly;
- The proposed TSF is 7km northwest of Batchelor township and there are 115 registered bore users; and
- Groundwater resources of the region have been mapped and depict a northward flowing Coomalie Dolomite aquifer, connecting the Browns Oxide Project Mine site with the Darwin River catchment. An area of narrowing and faulting of the geological formation is apparent ~5km NW of the mine.

2.1.2 Baseline

- Present water quality monitoring data for ground water in the project area and include localised rainfall data ;
- Present multiple lines of evidence detailing assessment of groundwater ecosystem condition, including water quality data, rapid biological assessment data and existing land use data;
- In consultation with Environment Heritage and Arts Division establish draft Water Quality Objectives (WQO) for groundwater affected by the project;
- Demonstrate how draft WQO will be protected at the project site through wastewater management processes including avoidance of wastes, reuse, recycling, treatment and disposal of wastes; and
- If a discharge to surface of groundwater is required, the proponent is to demonstrate that for all water uses and conditions (low flow, base flow, cease to flow etc) that the treatments and discharge regimes will be adequate to ensure draft WQO are protected.

2.1.3 Information Requirements

- Describe the current groundwater monitoring program, any proposed modifications to the program, and how it will be implemented in order to demonstrate impact of the new TSF on the regional hydrogeological conditions;
- Describe with detailed maps the geology and aquifers underlying the new TSF and the surrounding areas, to the outer extent of the underlying aquifers. Determine whether faulting represents a discontinuity of the aquifer. Contour maps should include overlays of all proposed BOP infrastructure;
- Describe surface connections and expressions of groundwater aquifers potentially affected by the new TSF (eg. bores; springs, soaks, water courses);
- Examine and evaluate the potential for groundwater linkages between the new TSF and the catchment of the Darwin River Dam; and

- Describe the effect of groundwater mounding on geochemical processes within the new TSF.

2.1.3.1 Tailings Characteristics

- Tailings are to be characterised, presenting the full range of likely tailings constituents and qualities of environmental significance. Include likely ranges of mineralogy / base metal content, neutralising capacity, sulfide content and net acid production potential; and
- Describe the likely presence in tailings of process reagents, (eg. extractants), and their potential for environmental impacts.

2.1.3.2 TSF Design and Construction

- Present detail for the new TSF design to demonstrate how formation of acid and/or metalliferous seepage to groundwater aquifers would be prevented;
- Provide design depths of all liner systems, and underlying geological strata;
- Demonstrate the availability of suitable clays or appropriate low permeability material to construct any proposed liner systems for the new TSF;
- Predict and demonstrate the permeability of all new TSF layers and calculate likely oxygen diffusion and water percolation rates through the layers;
- Establish vertical and horizontal permeability data through the geological strata underlying the new TSF to enable appropriate design and construction;
- Demonstrate how construction quality control will be achieved;
- Quantitatively estimate (with evidence) the capacity of the underlying geology to neutralise any acid and/or metalliferous seepage outputs;
- Describe final rehabilitation and revegetation plans for the new TSF including whether a fully sealed liner is required;
- Describe how tree root and termite penetration issues are being addressed in new TSF designs; and
- Describe ongoing monitoring, and (contingency) management plans for the new TSF after BOP mining ceases.

2.1.3.3 TSF Seepage

- Tailings seepage quality is to be comprehensively predicted, with impact analysis presented of qualities significant to environmental and/or human health, over time.
- Institute regular monitoring and reporting for radionuclides including Uranium-238;
- Compare predicted new TSF seepage quality with existing groundwater quality;
- Detail mitigation measures available / proposed to manage the new TSF seepage, with focus on the post-mine-closure period; and

- Solute Transport Modelling is required of solute transport (quality and quantities) (eg.MODFLOW) from the new TSF to surrounding ground and surface water bodies for periods of 1, 5, 10 and 20 years. If results indicate ongoing impacts, modelling should clearly be applied to their future extent temporally and spatially.

An appropriate minimum radius should be identified, modelled, and incorporated to identify any potential connections with the catchment of the Darwin River Dam. Describe (map) impacts from the new TSF seepage on groundwater quality to depict gradients of impact on water resources.

2.1.3.4 Community Consultation Plan

Engaging with the local community particularly bore users will be important in the identifying and managing of risks.

A Community Consultation Plan is to be created, engaging at least the bore users of aquifers common to the new TSF. Public information should include as a minimum the suite of risks to common aquifers from the new TSF, and available opportunities for public discussion and feedback. Records of findings and outcomes of the public consultation process are to be submitted with the PER.

The outcomes of surveys, public meetings and liaison with interested groups should be discussed and any resulting changes made to the proposal clearly identified. Details of any ongoing liaison should also be discussed.

Negotiations and discussions with local and community government, the Territory Government and the Commonwealth Government should be detailed and any outcomes referenced. Details of any ongoing negotiations and discussion with government agencies should also be presented.

2.2 SURFACE WATER

The proponent will ensure that the surface-water runoff from new TSF does not degrade water quality within Rum Jungle creek or the East Finniss River (1-2km to the NE), the site of potential BOP wastewater discharge.

In risk management terms, the proponent shall demonstrate that the risk to shared surface-water resources from direct and indirect TSF influences is low. In other words, the measures put in place to mitigate impacts must reduce the combined likelihood and consequence of an event occurring so that the residual risk is low.

2.2.1 Context

The *Coomalie Planning Concepts and Land Use Objectives* applying to the greater Coomalie area include *the protection of land and water resources* (DLPE, 2000);

The Coomalie region provides the main source of potable water for greater Darwin, via the Darwin River Dam. Manton Dam is currently used as a back-up supply and forms part of Darwin's long term water source strategy. The Coomalie region will play an important role in Darwin's future water supply, with three potential future dams located within or adjacent to the area. The future Mt. Bennett dam site is located on the Finniss River, downstream of the project area.

Rum Jungle Creek, <1km SE of the site of the new TSF, is likely to receive any S/SE flows following shallow subsurface drainages from the tailings dams or surface runoff not captured by the mine's drainage network. Aquatic and riparian ecosystems of Rum Jungle Creek are relatively intact and high quality compared to those of the East Finniss River, which continues to be heavily impacted by the Rum Jungle mine.

2.2.2 Baseline

- Present water quality monitoring data for surface water in the project area and include localised rainfall data;
- Undertake Rapid Biological Assessment (RBA) of surface waters in the project area using the Australian Rivers Assessment System (AUSRIVAS) framework;
- Present multiple lines of evidence assessment of surface water ecosystem condition, including water quality data, RBA data and existing land use data;
- In consultation with the Environment Heritage and Arts (EHA) Division establish draft Water Quality Objectives (WQO) for surface, water affected by the project;
- Demonstrate how draft WQO will be protected at the project site through wastewater management processes including avoidance of wastes, reuse, recycling, treatment and disposal of wastes; and
- If a discharge to surface water is required, the proponent is to demonstrate that for all water uses and conditions (low flow, base flow, cease to flow etc) that the treatments and discharge regimes will be adequate to ensure draft WQO are protected.

2.2.3 Information Requirements

- Estimate peak stormwater flows and potential environmental impacts from surface-water runoff from the new TSF, with reference to Rum Jungle creek and the East Finniss River;
- Describe how the project might impact on any waterways, wetlands, springs, riparian habitats, aquatic ecosystems, existing surface drainage patterns, flows, the likelihood of flooding and present and future water users;
- Detail safeguards and management strategies used to minimise the impacts of construction and operation on the hydrological features described above. In particular, provide details on the following:
 - measures to safeguard surface water resources including options for the appropriate treatment and disposal of construction and operational wastewater. Identify the preferred option and the selection criteria used;
 - measures to safeguard downstream water quality; and
- Describe and evaluate monitoring and management mechanisms to mitigate identified impacts.

2.3 HAZARDOUS RADIOACTIVE DISCHARGES

The proponent will ensure that long term hazards from radioactive discharges are prevented.

The proponent will ensure that the new TSF does not become a source of hazardous radioactive seepage, stormwater runoff or dust, to mine workers, surrounding areas, biota or water resources as a result of concentration and partitioning of radioactive elements in the TSF.

2.3.1 Context

Uranium and Thorium are present within the mined material occasionally at 'radioactive ore' concentrations. Blending is proposed to homogenise such concentrated pockets to below 'radioactive ore' classification concentrations, and thus avoid further radioactivity management requirements that would otherwise be triggered. Potential exists for radioactive elements to re-concentrate and partition in the new TSF and/or TSF seepage, to create off-site impacts.

2.3.2 Baseline

- The proponent is to demonstrate how low risk to mine workers, surrounding areas, biota and water resources is to be achieved. Consideration should address concentration and partitioning of radioactive elements in the new TSF; and
- The proponent is to include measures to minimise the potential impact of an event occurring.

2.3.3 Information Requirements

- Examine all potential for radioactive elements to concentrate and partition in the new TSF or TSF seepage;
- Detail the radiological exposure potential of the new TSF and TSF seepage. Include potential impacts to mine workers, members of the public and the surrounding ecosystems in the operational and post-operational mine phases. In detailing the sources, include:
 - Radon gas and its decay products;
 - Radioactive particles in dust;
 - Gamma radiation; and
 - Exposure potential from ore and ore processing including tailings disposal, ore stockpiles and waste dumps.

2.4 ENVIRONMENT PROTECTION AND BIODIVERSITY ACT MATTERS - FLORA AND FAUNA

The proponent will ensure that impacts upon local native flora and fauna species and communities associated with the construction and operation of the TSF are minimised and mitigated as far as possible. Where impacts on Commonwealth and Northern Territory listed vulnerable and endangered species are unavoidable, appropriate offsets should be incorporated into the proposal.

2.4.1 Context

The Commonwealth Department of the Environment and Water Resources has identified that the proposal is likely to have significant impacts upon listed threatened species and communities protected under the *Environment Protection and Biodiversity Conservation Act (1999)*.

The proposal involves the clearing of 35 Hectares of native vegetation known to provide habitat for the nationally threatened Northern Quoll.

The proposal involves the clearing of *Cycas armstrongii*, protected under the NT *Territory Parks and Wildlife Conservation Act (2000)*.

Site specific surveys have not occurred at the project site.

2.4.2 Baseline

Describe flora and fauna species for the proposed new TSF site (including weed and exotic species) and biological communities (including wetlands). Flora and fauna is to be surveyed and described with rare, vulnerable or endangered species identified against relevant Territory and Commonwealth legislation. Species with Indigenous conservation values should also be described.

Significant vegetation includes:

- rare, vulnerable, endangered and regionally restricted species, vegetation types or habitats;
- communities that are particularly good examples of their type;
- vegetation types which are outside their normal distribution or have other biogeographical significance;
- ecologically outstanding areas which have importance beyond the immediate site, eg. wetlands, riparian forests, etc;
- vegetation which is the habitat of rare and threatened fauna or has outstanding diversity; and
- vegetation types with relatively high biodiversity values, including riparian vegetation and rainforest.

Specify and justify the extent of clearing required during construction.

Sampling methodology should be designed in consultation with the Biodiversity Conservation branch of the NT Department of Natural Resources, Environment and the Arts.

2.4.3 Information Requirements

- Discuss the impact of the proposal on species, communities and habitats of local, regional or national significance as described on 2.4.2;
- Describe the impact associated with the proposed vegetation clearing;
- Discuss the ability of identified stands of vegetation and fauna to withstand any increased pressure resulting from the proposal and measures proposed to mitigate impacts;

- Identify pest species/noxious weeds that are likely to occur as a result of construction and operation;
- Discuss ways in which impacts on species, communities and habitats can be minimised (e.g. minimised disruption to fish passage, timing of works, minimise catchment disturbances);
- Describe the methods for rehabilitating disturbed areas following construction, including revegetation strategies, surface stabilities and monitoring programs;
- Revise the strategic weed management plan in the BOP EMP to cover construction, rehabilitation and operation periods (as required under the *NT Weeds Management Act 2001*).

2.5 Historic and Cultural Heritage Values

The conservation of Aboriginal and non-Aboriginal heritage in the TSF site will focus on; avoiding known locations of significance, minimising disturbance to locations discovered during project activities and managing adverse impacts where unavoidable.

2.5.1 Context

Archaeological surveys were conducted as part of the original assessment of the Compass Resources Browns Oxide Project. It is unclear whether the area for the new TSF was included at the time.

2.5.2 Baseline

Undertake appropriate surveys to identify Indigenous and non-Indigenous places of historic or contemporary cultural heritage significance, including;

- areas nominated for listing or listed on the Register of the National Estate or the Interim list of the Register of the National Estate;
- areas nominated for listing or listed on Commonwealth and Territory Heritage registers and Commonwealth and Territory registers of indigenous cultural heritage;
- sacred sites - provide evidence of an Authority Certificate under the *Northern Territory Aboriginal Sacred Sites Act 2000* and compliance with protection of sites under the *Aboriginal Land Rights (Northern Territory) Act 1976*;
- areas of traditional indigenous land use;
- European historic sites; and
- areas with special values to Indigenous and non-Indigenous people (eg. traditional land use);

The PER must describe the arrangements that have been negotiated with relevant indigenous groups in relation to archaeological surveys.

Advice and permits on the conduct of these studies should be sought from the responsible authorities. Independent qualified professionals in consultation with the Traditional Owners, or their representative bodies in the relevant area must conduct

surveys. Research and surveys are to be carried out using an appropriate methodology which provides for involvement of indigenous people and which is acceptable to the traditional owners concerned with the relevant areas. Relevant indigenous groups should be consulted in relation to the nature and scope of surveys and the appointment of the people to undertake them. Consultation with historical organisations should also be undertaken.

2.5.3 Information Requirements

- Describe the potential impacts on the features described in 2.5.2;
- Identification of the impacts on Indigenous cultural heritage is to be undertaken in consultation with relevant indigenous groups;
- Discuss the impacts on the relationships between groups identified with traditional and/or contemporary interest in the project area;
- The Cultural Heritage Management Plan developed for the BOP should be reviewed and revised in line with survey findings;
- Describe procedures for the potential unearthing of as yet undiscovered sub-surface materials; and
- The PER should include information detailing a process for discovery of items of potential Aboriginal significance, such as skeletal material or artefacts.

REFERENCES

DLPE. 2000. *Coomalie Planning Concepts and Land Use Objectives*. Department of Lands, Planning and Environment. Lands Planning and Environment. Northern Territory Government.

AS/NZS 4360:2004 Risk Management. Standards Australia, Third edition 2004. Sydney and Standards New Zealand, Wellington.

HB 436:2004 Risk Management Guidelines: Companion to AS/NZS 4360:2004 (Incorporating Amendment No. 1). Handbook. Standards Australia, Sydney and Standards New Zealand, Wellington.

HB 158—2006 Delivering assurance based on AS/NZS 4360:2004 Risk Management. Handbook. Standards Australia, Sydney and Standards New Zealand, Wellington.

HB 203:2006 Environmental risk management - Principles and process. Standards Australia. Handbook. Third edition 2006. Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6020

TEAM NT (2004) Northern Territory Minerals Council (Inc.) and the Mines and Petroleum Management Division of the Northern Territory Government. *TEAM NT: Technologies for Environmental Advancement of Mining in the Northern Territory: Toolkit*. D.R. Jones & M. Fawcett principal authors.

US EPA 1998. *Guidelines for Ecological Risk Assessment*. EPA/630/R-95/002F. US Environmental Protection Agency, Washington DC.