Northern Territory Government
Office of Environment and Heritage

# PART B –GUIDELINES FOR PREPARATION OF A PUBLIC ENVIRONMENTAL REPORT

**Compass Resources NL**
**Browns Oxide Project**
**Batchelor NT**

**May 2005**

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The Public Environmental Report (PER) should include the following sections but need not be limited to these sections or inferred structure.

# 1 EXECUTIVE SUMMARY

The Executive Summary should include a brief outline of the project and each chapter of the PER, allowing the reader to obtain a clear understanding of the proposed project, its environmental implications and management objectives. The Executive Summary should be written as a stand-alone document, able to be reproduced on request by interested parties who may not wish to read or purchase the PER as a whole.

# 2 THE PROPOSAL

## 2.1 GENERAL INFORMATION

The PER must provide detail of the proposed location (including associated ancillary activity sites) and its surrounding environment to place the proposal in its local and regional context. As a minimum the PER should include the following:

a) Meteorological data;

b) Topography;

c) Surrounding land uses (including the location of residential properties, communities, military reserves or exercise areas, extractive industries, road and rail reserves etc);

d) Description of relevant NT Planning Scheme and Local Government planning schemes, local laws and applicable policies;

e) Identification of any development approvals or infrastructure proposals likely to be required or affected by the proposed project;

f) Areas under native title claim and determinations of native title, areas of Aboriginal Freehold or under claim; areas under the Aboriginal Sacred Sites (NT) Act;

g) Soil types in the region;

h) Groundwater resources in the region;

i) Ecological information including flora and fauna;

j) Availability of services/ infrastructure and accessibility; and

k) Land use history (where relevant).

The catchment in which the project lies should be described and maps included showing the proximity of the project and associated ancillary activities to any waterways. All water bodies including drainage lines, dams, wetlands etc should be defined on the maps. The PER should discuss the sensitivity and significance of the catchments from a public/ social, ecological and economic perspective.

## 2.2 DESCRIPTION OF THE PROPOSAL

The PER should describe the project in sufficient detail to allow an appreciation of the construction and operation timeframes and processes, and assist in determining the potential environmental impacts of the project. Key decision-making processes (such as risk assessment) should be detailed. Where appropriate, relevant Northern Territory and Commonwealth Government legislation, strategies and policies as well as international and national standards should be considered. Relevant NT Government environmental, work health and construction guidelines and legislation, as well as Environmental Health guidelines, standards and codes should be considered during the design phase of the project.

The use of a table describing the key characteristics of the project and a description of the phases of the proposal, including the nature and extent of proposed works likely to involve environmental impacts, may be an appropriate means of summarising this information.

The project description should consider the following, as a minimum, for all aspects and components of the project:

## 2.3 LOCATION DETAILS

- Provide a description of the project's location indicating distance from Darwin.
- Provide maps, and diagrams displaying the above information.
- Provide maps showing the project in relation to Batchelor, its water supply and Darwin River Dam and its catchment.
- Provide aerial photos of the project location.

## 2.4 PROJECT DESIGN

Provide an overlay of the proposed mine site (including pit, mill, waste dumps, tailings facilities, other infrastructure, access and vehicle routes) on a map/photo detailing natural and anthropogenic features (including topography, water courses, flora/vegetation, heritage and aboriginal sites etc).

- Describe the components of the project with a description of each component and its function.
- Location of the components (include detailed maps).
- Land area to be used including:
    - size (area of total project and area of past and future proposed disturbance);
    - tenure (mining and land);
    - current uses;
    - claims under the Native Title Act, 1993 and the Aboriginal Land Rights (Northern Territory) Act 1976;
    - Aboriginal Areas Protection Authority certificates issued or required under the Aboriginal Sacred Sites (NT) Act (for all aspects of the proposal);
    - acquisition requirements; and
    - access requirements.
- Current and proposed infrastructure (roads, airstrips, communications, power etc).

- Describe how the project design will interact with the former Rum Jungle mine site and facilities, and the potential for uranium and radium in existing facilities being disturbed.

## 2.5 CONSTRUCTION DETAILS

- Timing of construction activities (include a Gantt chart showing time-lines for all activities).
- Materials required for construction including:
    - solids;
    - liquids;
    - gases; and
    - power.

Tabulate details showing approximate quantities, hazardous and non-hazardous substances, NPI reporting requirements, greenhouse gas emissions, and potential sources.

- Outline proposed plant and machinery requirements.
- Outline personnel requirements.
- Wastes to be generated including:
    - solids (this does not include waste rock and overburden – see below);
    - liquids; and
    - gases.

Tabulate details showing approximate quantities and highlighting hazardous substances, NPI reporting requirements, and greenhouse gas emissions.

- Applicable standards including:
    - mining;
    - building;
    - environmental;
    - environmental health
    - occupational health and safety; and
    - project management.
- Traffic and freight requirements.
- Details of site security, particularly with regard to the storage of chemicals and fuels.
- Areas of borrow.
- Footprint for construction compared with operation.

## 2.6 OPERATIONAL DETAILS

### *2.6.1 MINE*

- Outline proposed design of pit and its approximate dimensions (including maps, plans and geological cross-sections). The principles of geotechnical engineering for safe design should be used for open pit mining for slopes, safety bunds and driveway size and support requirements.
- Describe on-site and off-site borrow material requirements, extraction methods and uses.
- Indicate extent of area to be cleared of vegetation (or substantially thinned) in the form of a “Clearing Plan”.
- Describe erosion and sediment control strategy.

- Describe proposed mining methods, scale of operations and timetable for ore extraction and open cut operations.
- Describe the potential for metal mobilisation from the various mining activities.
- Detail likely drilling and blasting requirements (including frequency).
- Outline possible future extensions to the mine operation, above ground and below ground level, and discuss the probability of mining satellite ore bodies.
- Identify availability and suitability of material for topsoil, borrow pit requirements and proposed uses.

### *2.6.2 WASTE ROCK*

- Characterise waste rock in terms of AGP (acid generation potential) from drill core samples and in-situ assessments (kinetic tests and field trials).
- Outline sampling criteria and test methods, identify possible chemical constituents in drainage, and specify test methods (provide all test information).
- Identify classes of waste rock for handling purposes, including the potential for uranium in waste rock from the open pit.
- Outline proposed waste dump locations (discuss alternatives), dimensions, water catchments, contingency drainage interception arrangements, surface treatment and final landform.
- Describe in detail the methods for waste rock disposal and dump construction; including sample selection methodology and characterisation to direct different waste rock types to appropriate locations for disposal, and cross sections for the design of the waste rock dumps. Problematic waste will require strategic positioning.
- Describe means of interception and management of potential acid mine drainage.

### *2.6.3 ORE PROCESSING*

- Detail the proposed method for processing the ore. Include flow diagrams.
- Indicate all input products (solids, gasses and liquids) and pathways for each item in the process. Tabulate, indicating the approximate quantity and nature of the substance, handling requirements, NPI reporting requirements, greenhouse value, and typical sources.
- Indicate all process pathways and emission products. Tabulate, indicating the approximate quantity and nature of the substance, handling requirements and disposal, reuse or recycling options.
- Indicate contingency arrangements including reporting protocols for dealing with incidents and process shutdowns.
- Discuss the measures to prevent cross contamination between potable water supply and the liquid from ore processing.
- Energy requirements at different stages of the project.
- Consider the potential for uranium being in the ore, its processing and disposal requirements.

### *2.6.4 TAILINGS*

- Characterise the tailings, including mineralogy, base metal content, neutralising capacity, sulfide content and net acid production potential.
- Describe proposed tailings storage facility location and catchment details (discuss the merits of the design for both valley and non-valley tailings disposal options).
- Describe tailings disposal and impoundment principles, surface configurations, wall designs and construction, estimated flood heights, erosion protection,

spillway design and location, subdrainage and collection sumps. Ensure current geotechnical engineering principles/practices and ANCOLD guidelines are met.
- Outline geotechnical details of dam (specifically seepage potential and expected chemistry of leachate).
- Indicate contingency arrangements including reporting protocols for dealing with both minor leakage and catastrophic failure of tailings dams.
- Groundwater interactions with tailings storage structures and the waste rock dump should be fully described and investigated.

### *2.6.5 WATER MANAGEMENT*

- Site water requirements and sources for construction and operation.
- Site water balance (all inputs and outputs) based on long term modelling using rainfall/runoff data for a period equivalent to the expected mine life, including rehabilitation and no more than monthly time steps.
- Management of clean, dirty and contaminated water.
- Management of effluent.
- Diversion of surface waters (East Finniss River).
- Dewatering of the pit.
- Management of high/extreme rainfall events.
- Management of process waters.
- Recycling.

### *2.6.6 RADIOLOGICAL ISSUES*

Detail the potential sources, pathways, and potential doses of radiation (taking into account epidemiological information from other mines where radiation is an issue). Include the impact on members of the public and the surrounding ecosystems. In detailing the sources, include:

- Radon gas and its decay products.
- Radioactive particles in dust.
- Gamma radiation.
- Exposure potential from ore and ore processing including tailings disposal, ore stockpiles and waste dumps.

### *2.6.7 SOCIAL AND FINANCIAL ISSUES*

Discuss the social and financial objectives and benefits of the project. This should include:

a) socio-economic objectives and benefits, including reference to local and global markets, other economic activities in the affected area (eg Tourism, Pastoral etc.), foreign trade objectives, occupational health and safety objectives, and benefit to the local workforce, land users and indigenous people;
b) the impact on the local health centre at Batchelor (the proponent should also discuss directly with Department of Health and Community Services);
c) commercial objectives (eg predicted volume of product and proportion of market demand to be met by output); and
d) local, regional and global environmental objectives (eg reference to the company's environmental policies and the implications of the project with respect to the National Greenhouse Strategy).

### 2.6.8 GENERAL

- Personnel requirements.
- Occupational Health and Safety, and Emergency Response Details:
    - fire and emergency services planning, including bush fire management;
    - spill response plans;
    - induction details;
    - radiological protection responsibilities;
    - management structure responsibilities; and
    - communication details.
- Operational traffic and freight requirements:
    - vehicle types and numbers; and
    - hours of operation.

### 2.6.9 REHABILITATION AND DECOMMISSIONING DETAILS

The text should outline a time scale for decommissioning and for determination of compliance with, and release from, requirements of the appropriate authorities.

Specific information requirements include:

- Identify decommissioning and rehabilitation objectives.
- Identify post mining land use.
- Identify proposed completion criteria or process of developing these criteria.
- Identify proposed environmental indicators to measure progress in achieving the completion criteria (or process to develop these).
- Integration of the rehabilitation program with mine design and operation.
- Design of rehabilitated landforms.
- Erosion and sediment control procedures.
- Describe progressive and/or final rehabilitation plan for the pit and surrounds.
- Natural and constructed drainage system design to ensure runoff discharge does not erode or add to downstream siltation.
- Actions to prevent the development of mosquito and other biting insect breeding habitats.
- On-going water management requirements linking storage, quantity and quality (including maintenance of wetlands or other systems).
- Describe progressive and final rehabilitation plans for waste rock dumps; specifically collection and selection strategy for native species, eg native grasses and other vegetation to be used for runoff and erosion control, final topographic and drainage morphology, maintenance of water quality, prevention of leaching and revegetation procedures.
- Establishment of vegetation to include seeding, flora selection, fertiliser use (if needed), and rehabilitation trials, including native plants to prevent future weed problems.
- Continued water monitoring and discharge requirements following decommissioning.
- Responsibilities of the proponent.

## 3 ALTERNATIVES

Alternative proposals, which may still allow the objectives of the project to be met, should be discussed, detailing reasons for the selection and rejection of particular

options. The selection criteria should be discussed, and the advantages and disadvantages of preferred options and alternatives detailed. The potential impacts of the alternatives should be described.

Alternatives to be discussed should include:

- not proceeding with the project;
- alternative locations, including ore processing;
- alternative sources of raw materials for the project;
- alternative extraction and processing technologies considered;
- alternative environmental management technologies considered, such as treatment and disposal of discharges, co-generation etc;
- alternative access routes, eg Batchelor Road or private mine road; and
- alternative service corridors for gas and/or power.

# 4 EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND ENVIRONMENTAL SAFEGUARDS

## 4.1 PRELIMINARY

Studies to describe the existing environment should be of a scope and standard sufficient to serve as a benchmark against which the impacts of the project may be assessed over an extended period. Control areas not impacted by the project should be included in proposed studies, and long-term monitoring locations should be established.

This section of the PER should include an in-depth description of the areas with the potential to or expected to be impacted by the project or any feasible alternatives and clearly identify, qualify and quantify, where appropriate, those potential environmental impacts. The section should also include an assessment of the level of significance of the impact, be it global, regional or local (eg. global and national implications of greenhouse gases and the localised impact of service roads or artificial water bodies). The possibility of remediation should also be discussed. Performance indicators for all potential impacts and remediation efforts should be identified. Environmental Management Plans will need to be developed in order to minimise and manage impacts associated with the project.

Cumulative impacts should also be discussed including the extent to which the environment is already affected by existing developments. The reliability and validity of forecasts and predictions, confidence limits and margins of error should be indicated as appropriate.

## 4.2 REGIONAL SETTING

- Describe the project area, in terms of broad climatic zones, land terrain types, regional population centres, Aboriginal relationship to the land including cultural values, land use and land sensitivities.

## 4.3 LANDFORM

### *4.3.1 BASELINE*

- Provide suitably detailed maps showing topographic features, geological information and soil types within the boundaries of the project.
- Describe topographical, geological or landform features/sites that may be of conservation or economic significance.
- Discuss the soil types and land units.
- Provide seismic information for the region.
- Detail the existing level of soil erosion and other disturbances.
- Discuss the occurrence of uranium within areas to be disturbed.

### *4.3.2 IMPACTS*

- Detail the extent and implications of possible impacts to topographical, geological or landform features/sites from mining operations.
- Provide details of properties of soil types and land units relating to erosion, rehabilitation, acid generation, occurrence of uranium or special management requirements.

### *4.3.3 MANAGEMENT*

- Discuss measures taken to avoid or minimise the impacts identified in 4.3.2.
- Provide management plans detailing strategies to manage potential environmental impacts arising from land form limitations previously discussed.

## 4.4 HYDROLOGY AND WATER QUALITY

### *4.4.1 BASELINE*

- Provide a broad description of any waterways or other wetland habitat, natural or artificial, ephemeral or permanent, including springs and mound springs that may be impacted by the project. Include a description of catchment systems, existing surface drainage patterns, flow, likelihood of flooding and present water uses;
- Provide a description of relevant groundwater resources in any areas likely to be affected by the construction and operation of the facility;
- Discuss the project's proximity to Batchelor township's potable and irrigation water supply bores and groundwater aquifers; and
- For both ground water and surface water systems, discuss;
    - their significance (RAMSAR etc);
    - current uses, including Batchelor water supply;
    - beneficial uses;
    - flows (including flood contours) and discharge rates;
    - water quality;
    - impact of acid drainage from past mining activities; and
    - release or seepage of uranium and radium.

### *4.4.2 IMPACTS*

- Describe how the project might impact on the surface and ground water features described in 4.4.1.
- Discuss the potential for the northern most reach of the development, to impact on surface flows to the Darwin River Dam catchment.
- Provide an assessment of local aquifer supply potential and the expected draw down on Batchelor's ground water supplies.

- Discuss pollution pathways from the project to regional groundwater systems with potential connection to the town aquifer and Darwin River Dam catchment.
- Discuss the potential for contamination of water bodies, by acid mine drainage, radionuclides or any other chemicals or pollutants.
- Consider and discuss the risks associated with the proximity of the proposed project to borefields or aquifer recharge zones that may supply potable water.
- Detail the potential impacts from wastewater generated by construction/operational water use including translocation or introduction of non-endemic aquatic fauna and flora.

#### *4.4.3 MANAGEMENT*

Detail safeguards and management strategies used to minimise the impacts of construction and operation on the hydrological features described in 4.4.1. In particular, provide details on the following:

- measures to safeguard surface and groundwater resources including options for the appropriate treatment and disposal of construction and operational wastewater. Identify the preferred option and the selection criteria used; and
- measures to safeguard downstream water quality.

### 4.5 AIR QUALITY & NOISE

#### *4.5.1 BASELINE*

- List meteorological conditions including but not limited to:
    - prevailing wind directions and strengths;
    - maximum wind gusts;
    - precipitation data (max., min., avg., design rainfall intensities);
    - temperature data;
    - evaporation data;
    - relative humidity data; and
    - barometric pressure data.
- Provide ambient air quality data for the site.
- Provide ambient noise levels for the area and the site.
- Discuss the current bushfire regime for the region.
- Describe emissions of greenhouse gases during both construction and operation phases.

#### *4.5.2 IMPACTS*

- Assess impacts of noise generated during construction and ancillary activities, against current background levels. Anticipated noise levels, their timing and duration should be considered in conjunction with the sensitivity of the receptor.
- Use modelling to assess the potential impact of noise generation from the operations.
- Identify and assess the possible impacts to air quality resulting from the construction and operation of the project.

#### *4.5.3 MANAGEMENT*

- Develop a Fugitive Dust Control Plan which outlines potential dust impacts of the project, discusses dust suppression strategies and initiatives, and describes dust monitoring programmes.
- Discuss the effectiveness of the pollution control technology in minimising odour emissions.

- Determine major sources of National Pollutant Inventory (NPI) emissions using the relevant NPI Handbooks: (http://www.npi.gov.au/handbooks/approved_handbooks/sector-manuals.html).
- Indicate any planned cleaner production activities or pollution control equipment that may reduce off-site NPI emissions.

## 4.6 ECOLOGY

### *4.6.1 BASELINE*

- Describe flora and fauna species (including weed or exotic species) and biological communities (including wetlands) which could be affected by the Project. Flora and fauna should be surveyed and described with rare, threatened or endangered species identified against relevant Territory and Commonwealth legislation. Species with Indigenous conservation values should also be described.
- Significant vegetation includes:
    - rare, threatened, 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; and
    - vegetation which is the habitat of rare and threatened fauna or has outstanding diversity.
- Specify the extent of clearing required during construction.

### *4.6.2 IMPACT*

- Discuss the impact of the proposal on species, communities and habitats of local, regional or national significance as described on 4.6.1.
- 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.

### *4.6.3 MANAGEMENT*

- Discuss ways in which impacts on species, communities and habitats can be minimised (eg 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.
- Include a strategic weed management plan in the EMP to cover construction, rehabilitation and operation periods (a weed management plan is required under the *NT Weeds Management Act 2001*).
- Discuss the method of managing/minimising the introduction of feral animals, and other exotic fauna species.

## 4.7 SOCIO-ECONOMIC

### *4.7.1 HISTORIC AND CULTURAL HERITAGE VALUES*

#### *4.7.1.1 Baseline*

Identify Indigenous and non-indigenous places of historic or contemporary cultural heritage significance, including;

- 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 Lands Rights (Northern Territory) Act 1976;*
- European historic sites such as the historic Rum Jungle Mine, recently nominated to the NT Heritage Register; 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.

The PER must include the results of an archaeological survey (see attached Scope of Works for an Archaeological Survey).

All prescribed archaeological places and objects defined in Regulation 3 of the Heritage Conservation Regulations are protected under the *Heritage Conservation Act 1991*. Under Section 29 and 39 of the Act it is an offence to disturb or destroy any prescribed archaeological places or objects without the consent of the Minister of Environment and Heritage, regardless of whether or not sites have previously been identified and reported.

The Office of Environment and Heritage should be notified of any intention to disturb or destroy an archaeological or heritage site, through an application of Sections 29 & 39 of the *Heritage Conservation Act 1991.*

#### *4.7.1.2 Impact*

- Describe the potential impacts on the features described in 4.7.1.1.
- The identification of indigenous cultural heritage impacts is to take place in consultation with relevant indigenous groups. This should assess the Project's effects on lifestyles, traditional fishing practices, heritage places, the impact of

increased visitation and the effects on indigenous culture generally. All groups should be consulted in relation to the traditional subsistence economy, their natural resource use, and Native Title interests.
- Discuss the impacts on the relationships between groups identified with traditional and/or contemporary interest in the project area.

#### *4.7.1.3 Management*

- Cultural Heritage Management Plans (CHMP's) should be developed and implemented with the direct involvement of indigenous people. The CHMP's should encourage ongoing protection and management of cultural values; maximise involvement in management strategies and enable proponents to meet duty of care to protect Aboriginal cultural values.
- Describe procedures for the discovery of as yet undiscovered sub-surface materials; and
- Further information should be included in the PER regarding a process for discovering items of potential Aboriginal significance, such as skeletal material. If such material is found, work should cease immediately and the NT Police, the AAPA and the Office of Environment & Heritage should be notified.

### *4.7.2 REGIONAL ECONOMICS*

#### *4.7.2.1 Baseline*

- Detail regional economic viability (including economic base and economic activity, future economic opportunities, etc).
- Outline a "Community Impact Statement" in relation to the township of Batchelor.

#### *4.7.2.2 Impacts and Management*

- The PER should present a balanced broad summary of the project's impact on the regional, territory and national economies in terms of direct and indirect effects on employment, income and production. It should specify any disturbance to existing land use or threat to wilderness areas, which may impact on commercial activities and potentially impact adversely on employment.
- An indication of the broader development benefits of the project should be included.

### *4.7.3 INFRASTRUCTURE AND TRANSPORT*

#### *4.7.3.1 Baseline*

- Detail existing transport networks (including road, rail and ports), telecommunications (optical fibre routes), gas and electricity infrastructure, and water supply and wastewater utilities. Include detail to differentiate between types of infrastructure eg. road type, dual carriage way/single lane bitumen/gravel.
- Identify constraints with the existing infrastructure (eg wet season access, periods of road closure and load limits).
- Provide details of new infrastructure that will be required for the project including any requirements to upgrade existing infrastructure. In particular, provide locations of new roads or tracks, lay down storage areas, turning circles, approach diversion lanes etc.
- Discuss the likely electricity requirements for both the construction and operational phases of the project, including base and peak loads.

#### *4.7.3.2 Impact*

- Describe the potential impacts of the proposal on existing and future local infrastructure and transport networks during construction and operation. This should include reference to increased road usage generated by the project;
- Describe the proposed route for any corridor for connection to electricity infrastructure; and
- provide an assessment of the likely impacts of such a corridor.

#### *4.7.3.3 Management*

Describe proposed safeguards, management and monitoring strategies that will be implemented to minimise potential transport impacts during construction and operation including, but not limited to:

- Methods for complying with any relevant road vehicle axis limits;
- Methods for securing loads;
- Measures to reduce any road traffic noise impacts;
- Consultation with local communities affected by transport impacts;
- Traffic management; and
- Management of driver fatigue.

### 4.8 BITING INSECTS

- Discuss the impact of biting midge and mosquito populations as pest and disease vectors on the work force and potential for construction activities to create new sources of biting insects for nearby residents.
- Identify measures to prevent the creation of new mosquito breeding sites.
- Identify measures to prevent construction activities causing impacts on drainage lines, which will lead to increases in biting insect species of pest and health significance.
- Discuss the effects of construction activities and disposal of construction wastes on biting insect species of pest and health significance, including measures to prevent increases in these species.

### 4.9 GREENHOUSE GAS EMISSIONS INVENTORY AND BENCHMARKING

Refer to the attached NT Environmental Impact Assessment Guide – Greenhouse Gas Emissions

### 4.10 WASTE MANAGEMENT

#### *4.10.1 IMPACT*

- Identify and describe (amount and characteristics) all sources of waste associated with construction, operation and decommissioning of the mine.
- Describe all activities including chemical and mechanical, to be conducted on the construction sites/camps (eg. chemical storage, sewage treatment, power generation, fuel burning, mechanical workshop, diesel storage).
- Detail any chemicals used, which may impact on primary producers quality programs.

#### *4.10.2 MANAGEMENT*

- Discuss waste management strategies, including reduction, reuse, recycling, storage, transport and disposal of waste including site drainage and erosion control.
- Detail hazardous materials to be stored and/or used onsite; provide their Material Safety Data Sheets and environmental toxicity data and biodegradability for raw materials and final products.
- Waste management strategies should incorporate measures to avoid waste generation where possible.

### 4.11 FIRE

- Identify activities, which pose a risk of wildfire and describe safeguards for minimising the likelihood of wildfire and fire response plans.
- Develop a strategic fire management plan in consultation with traditional Aboriginal owners, pastoralists and their representative organisations, including the NLC, that have specialist knowledge in fire management.

## 5 PROJECT ENVIRONMENTAL MANAGEMENT

Specific safeguards and controls, which would be employed to minimise or remedy environmental impacts, are to be outlined. These are to be covered in detail in the Environmental Management Plans (EMP's).

A draft Environmental Management Plan (EMP) should be provided in a form suitable for inclusion in a Mining Management Plan as required under the *Mining Management Act*. The draft EMP should be strategic, describing a framework for environmental management. Where possible specific management policies, practices and procedures should be included in the draft EMP. A final EMP would be prepared at the conclusion of the assessment, taking into consideration comments on the PER and incorporating the Assessment Report recommendations.

The draft EMP should:

- Define the management structure of both the construction and operational phases and identify persons responsible for the environmental management of the site.
- Describe the proposed measures to minimise adverse impacts and the effectiveness of these safeguards (e.g. provide performance indicators by which all anticipated and potential impacts can be measured).
- Detail a complaints mechanism to report and respond to complaints from the community about environmental issues. This should highlight obligations under current NT legislation to report potential pollution.
- Describe proposed reporting procedures reporting of accidents and incidents.
- Describe monitoring to allow early detection of adverse impacts.
- Describe remedial action for any impacts that were not originally predicted.
- Detail how monitoring will be able to determine the differences between predicted and actual impacts.

- Include a summary table listing undertakings and commitments made in the PER, including performance indicators, with cross-references to the text of the report.
- Reference relevant legislation and standards, and proposed arrangements for necessary approvals and permits should be noted.
- Identify the agencies responsible for implementing and overseeing the management plan.
- Describe proposed reporting procedures on the implementation of the management plan, independent auditing or self auditing.
- Provide for the periodic review of the management plan itself.

## 6 RISK ASSESSMENT AND EMERGENCY MANAGEMENT PLANS

The PER should include a preliminary hazard analysis and assessment of the risks to people, the environment and nearby facilities from potential accidents associated with the construction, operation and maintenance of the various components of the proposal, storage and transport of materials to and from the complex.

The preliminary hazard analysis and risk assessment should outline and take into account emergency plans that detail strategies, response procedures and staff responsibilities in the event of an emergency or accident. Issues such as floods, bush fires, lightning strikes, mine collapse and landslip should be considered. Contingency plans for dealing with spillage of any Controlled or Listed Wastes and any substances listed under the Dangerous Goods Code should be detailed. The risks in relation to open pit rescue should also be discussed.

The hazard and risk analysis will identify the critical areas that need to be addressed in management plans, monitoring programs, contingency and emergency plans.

## 7 PUBLIC INVOLVEMENT AND CONSULTATION

Public involvement and the role of government organisations should be clearly identified. 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.

## 8 BIBLIOGRAPHY

The PER should contain a comprehensive reference list/bibliography. Any source of information such as studies, research, maps and personal communications used in the preparation of the PER should be clearly identified, cited in the text and referenced in the bibliography.

## 9 GLOSSARY

A glossary should be provided, defining the meaning of technical terms, abbreviations and colloquialisms. (Note: throughout the PER, technical terms and jargon should be minimised).

## 10 APPENDICES

Information and data related to the PER but unsuitable for inclusion in the main body of the report (eg. because of its level of technical detail) should be included as appendices. This may include detailed analyses, monitoring studies, baseline surveys, raw data and modelling data. Where necessary, specific guidance should be provided on the most appropriate means of accessing information not appended to the PER.

## APPENDIX 1 - NT ENVIRONMENTAL IMPACT ASSESSMENT GUIDE

## GREENHOUSE GAS EMISSIONS

### 1. PURPOSE

The Northern Territory Government's objective for managing greenhouse gas emissions from new and expanding operations is to minimise emissions to a level that is as low as practicable.

This Guide aims to assist proponents in providing the information needed by the Office of Environment and Heritage (OEH) to assess the impact of greenhouse gas emissions from proposed projects during assessment under the *Northern Territory Environmental Assessment Act 1994*.

### 2. THE GUIDANCE

#### 2.1 Emissions estimates

▪ Proponents should detail the following in their environmental impact assessment documentation:

a) an estimate of the **greenhouse gas** emissions for the construction and operation phases:

- in **absolute** and **carbon dioxide equivalent** figures (refer to the Glossary in this Guide) for each year of the project; and
- identified on a gas by gas basis and by **source** (including on site and upstream sources such as emissions arising from land clearing and the production and supply of energy to the site).

*Emissions estimates are to be calculated using the methodology developed and periodically updated by the **National Greenhouse Gas Inventory Committee**[1] or another national or internationally agreed methodology.*

b) details of the **project lifecycle greenhouse gas emissions** and the greenhouse gas efficiency of the proposed project (per unit and/or other agreed performance indicators).

*Lifecycle emissions and greenhouse gas efficiency should be compared with similar technologies producing similar products.*

To provide an understanding of the broader impact of the proposal, proponents are encouraged to place the estimated greenhouse gas emissions from the proposal into a national and global context[2].

[1] Up to date methodology can be obtained from the Australian Greenhouse Office. See www.greeenhouse.gov.au.

## 2.2 Measures to minimise greenhouse gas emissions

Proponents must demonstrate consideration of a wide range of options and indicate the intended measures and efficient technologies to be adopted to minimise total greenhouse gas emissions from the proposed project, including:

(a) identifying energy conservation measures, opportunities for improving energy efficiency and ways to reduce fugitive emissions where applicable;

(b) indicating where potential savings in greenhouse gas emissions can be made through the use of renewable energy sources, taking into account fossil fuels used for supplementary power generation; and

(c) their commitment to offsetting greenhouse gas emissions.

*The design measures to maximise efficiency and minimise emissions should represent **best practice** at the time of seeking project approval.*

Proponents are to advise whether they will join the **Commonwealth Government's Greenhouse Challenge** program.

▪ Emission offsets include activities that remove carbon from the atmosphere or reduce the greenhouse gas intensity (output per unit product) from current or future activities. Examples may include but are not limited to:

- establishment and maintenance of perennial vegetation;
- **sequestration** of carbon by geological, chemical, biological or other means;
- reducing the carbon intensity of existing activities;
- replacing fossil fuels with renewable fuels;
- trading emissions permits in a nationally approved system;
- synergistic linking of enterprises to reduce net greenhouse gas outputs; and
- development of new greenhouse gas efficient technologies.

Proposed emissions offsets projects should include an estimate of greenhouse gas emissions savings that are likely to be achieved through implementation.

*Measures that offset emissions within the NT are encouraged, and OEH staff can discuss possible options with proponents.*

## 2.3 Emissions monitoring and reporting

Consistent with the principles of continuous improvement, a program is to be outlined in the proponent's Environmental Management Plan which includes ongoing monitoring, investigation, review and reporting of greenhouse gas emissions and **abatement** measures. It should be noted that in 2006, large energy users (those using greater than 0.5 petajoules per year) will be required by the Commonwealth Government to report publicly on their greenhouse gas emissions.

[2] Information on Australia's national emissions profile can be obtained from the Australian Greenhouse Office at www.greenhouse.gov.au; international emissions from the United Nations Framework Convention on Climate Change (UNFCCC) webite at http://unfccc.int/2860.php/ .

### 2.4 Preparedness for climate change

Proponents should demonstrate due consideration of the risk of climate change impacts to the proposal. Relevant variables may include, but are not limited to:

- increasing average temperature and evaporation rates;
- variation in rainfall and the incidence of floods;
- sea level rise;
- increased frequency and intensity of cyclones and storm surge levels; and
- altered distribution of pests and disease.

In assessing climate change risk, proponents should be guided by recent projections published by organisations such as the CSIRO and Intergovernmental Panel on Climate Change (For CSIRO projections, see: http://www.ipe.nt.gov.au/whatwedo/greenhouse/documents/pdf/ntclimatechange.pdf .

## 3. GLOSSARY OF TERMS

- **Abatement:** Limiting, abating, avoiding or sequestering greenhouse gas emissions through source reduction, fuel displacement or switching, carbon stabilising techniques or **sink** enhancement.

- **Absolute emissions:** Refers to the total emissions of greenhouse gases expressed in terms of the actual mass of each individual gas emitted over a specified time period.

- **Best Practice:** A best practice is a process, technique, or use of technology, equipment or resource that has a proven record of success in minimising energy use and greenhouse gas emissions. A commitment to use best practice is a commitment to use all available knowledge and technology to ensure that greenhouse gas emissions are minimised.

- **Carbon Dioxide Equivalent:** A unit of greenhouse gas emissions calculated by multiplying the actual mass of emissions by the appropriate **Global Warming Potential**. This enables emissions of different gases to be added together and compared with carbon dioxide (see Table 1 below).

- **Commonwealth Government's Greenhouse Challenge program:** A cooperative effort by industry and the Commonwealth Government to reduce greenhouse gas emissions through voluntary industry action. See: www.greenhouse.gov.au/challenge.

- **Greenhouse Gases:** Table 1 lists the greenhouse gases proponents are required to report on.

- **Global Warming Potential (GWP):** The warming potential of a gas, compared to that for carbon dioxide. GWPs are revised from time to time as knowledge increases about the influences of different gases and processes on climate change. Refer Table 1.

- **Project Lifecycle Greenhouse Gas Emissions:** Those greenhouse gas emissions measured cumulatively over a defined period. Typically this period is from the point of extraction of the raw materials to either the beginning of the consumer phase of a product or the final disposal or recycling stage of a product, depending on its nature. Proponents should justify their choice of the defined period.

- **National Greenhouse Gas Inventory Committee:** A committee comprising representatives of the Commonwealth, State and Territory Governments that oversees the development of greenhouse gas inventory methods and compilation of inventories for Australia.

- **Sequestration:** Removal of greenhouse gases from the atmosphere by vegetation or technological measures. Sequestration is not yet precisely defined for the purposes of recognised trading or offset schemes. Accordingly, OEH will take a common sense approach on a case by case basis in the interim. To assist proponents, OEH regards sequestration as a process that results in the isolation of carbon dioxide from the atmosphere for a period which is significant in terms of influencing the global warming effect.

- **Source:** Any process or activity that releases a greenhouse gas into the atmosphere.

- **Table 1: Greenhouse gases and respective Global Warming Potentials (GWPs)**[3]

| Greenhouse Gas | Global Warming Potential |
|---|---|
| Carbon dioxide ($CO_2$) | **1** |
| Methane ($CH_4$) | **21** |
| Nitrous oxide ($N_2O$) | **310** |
| Perfluorocarbons ($CF_x$) | **6500 - 8700** |
| Hydrofluorocarbons (HFCs) | **560 – 11 700** |
| Sulphur hexafluoride ($SF_6$) | **23 900** |

- Greenhouse gas emissions expressed in carbon dioxide equivalent ($CO_2$-e) are calculated by multiplying the actual mass of emissions for each greenhouse gas by its respective GWP factor.

- [3] GWP factors listed are those published by the International Panel on Climate Change at the time of publication of this Guide.

## APPENDIX 2 - SCOPE OF WORKS FOR AN ARCHAEOLOGICAL SURVEY - BROWNS OXIDE PROJECT (COMPASS RESOURCES NL)

### Introduction

The aim of the archaeological survey is to locate and record any prescribed archaeological objects or places as defined under the *Northern Territory of Australia Heritage Conservation Act 1991* and to assess the nature, distribution and significance of these materials. The survey should also identify historic places resulting from early non-indigenous settlement, mining or pastoralism activities.

The brief also requires recommendations regarding mitigative procedures where appropriate, and the formulation of short and long term management strategies for any materials located within the proposed mining area, if necessary. The survey program should be undertaken in two stages.

- **Stage 1** should involve an archaeological survey of those areas that will be impacted upon in the short term to medium future and possess some potential to contain prescribed archaeological places or objects resulting from Aboriginal occupation activities. A survey of the existing mining fringe, including the historic Rum Jungle Mine should also be undertaken.

- **Stage 2** should involve a series of stratified and random archaeological surveys to further define the nature of Aboriginal occupation within the Rum Jungle area. These surveys should also target areas proposed for mining in the medium to long term future

The survey should be undertaken in consultation with the relevant Aboriginal people, Northern Land Council and Heritage Conservation Services.

This study is to be undertaken to ensure that sites protected within the terms of the *Heritage Conservation Act* 1991 are not damaged or destroyed without the appropriate consideration and authority (in this case, the Minister for Environment and Heritage).

### The Survey

The survey will:

1. Be undertaken by a qualified archaeologist and will produce a report, the general headings and contents for which are provided below.
2. Incorporate a strategy for locating sites which takes into account the results of previous research in the area.

### The Report

Generally the information contained in the consultant's report should be detailed enough to permit an independent assessment of the results by Heritage Conservation Services. The consultant's report should, without infringing academic freedom, contain the information described below or its equivalent in the following or similar format.

1. Cover page

This should include title, who the report was prepared for and their contact address, who prepared the report, their contact address, and the date. Other leading papers should include:

- Table of contents
- List of figures if appropriate
- List of plates if appropriate
- List of tables if appropriate
- Executive summary and recommendations

2. Introduction

This should contain the location of the survey area, who commissioned the consultancy, the scope of works, report structure, who carried out the survey and report preparation.

3. Physical Environment

Should contain a description of the physiography, geology, hydrology, land systems, vegetation, current land use and integrity where appropriate. A map of the survey area should be included.

4. Cultural Setting

Should contain a brief description of ethnographic/ethnohistoric data describing indigenous occupation relevant to the survey area where appropriate. This section should also contain a brief historical overview of non-indigenous occupation and activities relevant to the study area prior to and including the Second World War. This overview will provide an appropriate context in which the significance of non-indigenous sites may be assessed.

5. Previous Archaeological Research

Should contain an overview of previous archaeological research in the general area (if any) and also descriptions of any previously recorded sites on the Archaeological Resource Database held by Heritage Conservation Services which may be in the survey area.

6. Methodology

Should contain a description of the survey methodology including when the survey was carried out, over what time period, and the survey strategy(ies) employed; site recording methodology including definitions of “site” and site types as appropriate; artefact identification methodology defining criteria used in the recognition of artefacts. An indication of the actual survey coverage including area actually traversed (indicated on a map) together with an estimate of the effective coverage should be included in the results section.

7. Results

- Should contain a description of ground visibility in the survey area at the time of the survey, the survey coverage achieved by the survey methodology(ies) described in section 6 above.

For compliance with Regulation 4 of the *Heritage Conservation Act 1991*, site

descriptions must provide data for the following:

- Site Location: 13 digit easting and northing, compliant with the GDA94 Datum, and map sheet reference.
- Site Setting: biogeographic zone, geomorphology, vegetation mapping unit, distance to water.
- Site Contents: the nature of archaeological materials found, a detailed description of archaeological materials, site size (length, width, height if appropriate), artefact densities (minimum, maximum, average), raw materials and artefact types, type of faunal remains (if any) and NISP and MNI counts where appropriate.
- Site Disturbance (if any).

The degree to which the actual distribution and nature of archaeological sites conforms to previously developed predictive model(s), if any, should be discussed. Convergence or divergence should be considered in detail and where appropriate incorporated into the assessment of significance.

8. Discussion

Should discuss the significance and heritage values of indigenous and non-indigenous archaeological materials and places located during the survey, and should define the criteria by which significance is assessed.

9. Summary and Recommendations

Should contain a summary of the survey results together with recommendations concerning:

a) whether or not permission should be given to disturb the archaeological materials (if any), and
b) mitigative procedures and suggested management options where appropriate.

This section should also clearly indicate those archaeological materials, if any, for which a permit to disturb under the *Heritage Conservation Act* 1991 will be required.

10. Digital Lodgment

Where feasible (and this should be most instances) reports should be lodged in digital format. The consultant and the client should liaise with Heritage Conservation Services regarding a mutually agreed format standard.

11. References

Should include references in accordance with the Harvard System.

12. Appendices

To be included where appropriate.

## APPENDIX 3 - EPBC ACT SPECIES INFORMATION REQUIREMENTS IN PER DOCUMENTS

### Attachment to letter to Ms Lyn Allen NT Office of Environment and Heritage

Information about species listed under the EPBC Act should be provided in electronic format when the final PER is submitted. The provision of this information will help facilitate decision-making under the EPBC Act and assist in the protection and recovery of species and communities. Guidance to the proponent about standards and formats for the data is provided below.

*Flora*

- Conduct baseline surveys and consult relevant databases and listings by scientific committees established under the *Environment Protection and Biodiversity Conservation Act 1999*. Surveys for threatened species must be conducted by recognised scientific experts and in accordance with best practice field survey practice and analysis standards. The surveys should reflect seasonal variation. The surveys should include species structure, assemblage, diversity and abundance. The description should contain a review of published information regarding the assessment of the significance of the vegetation to conservation, recreation, scientific, educational and historical interests. Methodology used for flora surveys should be specified in the appendices to the report.
- Identify any species and ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and international agreements, treaties or conventions;
- Identify the major habitats, communities and animal/plant species within them, including (where relevant) aquatic ecosystems, the presence of introduced species, noxious weeds and plant pathogens;
- Assess ecological relationships and significance, including the conservation status of species or associations which may be disturbed by the proposal within local, regional and national contexts;
- Identify other sensitive environments or areas of special significance adjacent to or potentially affected by the proposal (e.g. breeding sites, seasonal habitats, wetlands, waterways, riparian zones, and habitat corridors etc.) and discuss the relationship of these sites with areas of environmental significance on the airport;
- Vegetation maps at a suitable scale should be provided, with descriptions of the units mapped. Sensitive or important vegetation types should be highlighted along with the existence of rare or threatened species. Vegetation mapping should provide vegetation mapping for all relevant project sites including new transport or other infrastructure. Adjacent areas may also require mapping. The terrestrial vegetation communities within the affected areas should be described at an appropriate scale (i.e. 1:10,000) with mapping produced from aerial photographs and ground truthing, showing the following:
    - location and extent of vegetation types using recognized NT regional ecosystem type descriptions;

- location of vegetation types of conservation significance based on regional ecosystem types and occurrence of:
  - the current extent (bioregional and catchment) of protected vegetation types of conservation significance within the protected area estate (National Parks, Conservation Parks, Resource Reserves, Nature Refuges etc);
  - any plant communities of cultural, commercial or recreational significance should be identified;
- the occurrence of pest plants and animals in the project area should be described;

*Fauna*

- the terrestrial, and (if appropriate) riparian fauna occurring in the areas affected by the proposal should be described, noting the broad distribution patterns in relation to vegetation, topography and substrate. The PER should indicate how well any affected communities are represented and protected elsewhere in the province where the site of the proposal occurs. The description of the fauna present or likely to be present in the area should include:
  - species diversity (i.e. a species list) and abundance of animals, including amphibians, birds, reptiles, mammals and bats;
  - any species that are poorly known but suspected of being rare or threatened;
  - habitat requirements and sensitivity to changes; including movement corridors and barriers to movement;
  - existence of any rare, threatened or otherwise noteworthy species/communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (e.g. any requirements of protected area management plans); and
  - use of the area by migratory birds, nomadic birds, fish and terrestrial fauna.
- Any aquatic flora and fauna occurring in the areas affected by the proposal should be described, noting the patterns and distribution in the waterways. The description of the fauna and flora present or likely to be present in the area should include:
  - fish species, mammals, reptiles, amphibians, crustaceans and aquatic invertebrates occurring in the waterways within the affected area;
  - aquatic plants;
  - habitat downstream of the project or potentially impacted;

## DATA FORMATS AND STANDARDS

The provision of information about species listed under the *Environment Protection and Biodiversity Conservation Act 1999* in an electronic format will help facilitate decision-making under the Act and assist in the protection and recovery of species and communities.

Information may be presented as database point records or spatially referenced data. All datasets and their attributes must be appropriately documented and metadata associated with datasets should be developed in consultation with the Department of the Environment and Heritage (DEH).

Data provided to DEH in electronic format should accord with the following:

**PREFERRED DATA TRANSFER FORMATS:**

Vector spatial data:

- ESRI ArcSDE export files or ESRI ArcView shapefiles

Raster spatial data:

- ESRI ArcINFO export files (GRID), ArcINFO ASCIIGRID files or georeferenced image files in commonly used formats such as JPEG, TIFF or BIL

Tabular data:

- Oracle export format, MS Access 2000 or 97, flat ASCII files with comma delimited fields or as MS Excel spreadsheets

Data can be provided by CD-ROM or transferred electronically over DEH's public FTP site. Very small sets of data may be provided as e-mail attachments. All data should be scanned for viruses.

**DATA QUALITY:**

Data should be checked and repaired / updated to ensure that it meets the following minimum standards.

Vector spatial data:

- No slivers, unclosed polygons, missing label-points, duplicate arcs, dangles, gaps nor edit masks.
- Data cleaned with an appropriate tolerance. Arcs densified appropriate to its scale.
- Data accurate to a level appropriate to its publication scale.

Raster spatial data:

- No artefacts from vector data overlays such as line work or text.
- Data accompanied by information on number of bands, rows and columns to allow it to be easily reconstructed.

Tabular data:

| | |
|---|---|
| | – Understandable, rationally constituted (eg. a data table should not be so large as to be unusable).<br>– Avoid code sets where possible. If these need to be used, provide look-up tables describing these.<br>– No spaces (except between words in standard text fields), slashes nor ampersands, and dates with full 4 digit year field.<br>– Accurate in accordance with the supplier's attribute standards and internally consistent.<br>– Table item names not identical to Oracle keywords, and should be 8 characters or less in length. |
| **SPATIAL DATA REFERENCE SYSTEMS – MAP PROJECTIONS:** | All spatial data should be georeferenced.<br>– It is preferred that data are provided in geographic coordinate system, ie. latitude and longitude, in decimal degree units.<br>– If a map projection is used, specify the type of map projection and all of its parameters. |
| **PREFERRED SPATIAL DATA REFERENCE SYSTEMS – DATUMS:** | All spatial data to have a datum specified in its georeferencing:<br>– Geocentric Datum of Australia (GDA), WGS84 or GRS80 datums. For most spatial purposes these three datums are identical.<br>– If unable to provide data based on any of the above datums, use: AGD66 or AGD84 for mainland data, and WGS72 for marine or external territories. The datum used for the data must be clearly specified. |