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URANIUM MINING
CHEMICAL LEACHING

Guidelines for an Environmental Impact Statement

For use by Mines Administration Pty Ltd at Honeymoon on Kalkaroo Station

PROJECTS & ASSESSMENTS DIVISION
SOUTH AUSTRALIAN DEPARTMENT FOR THE ENVIRONMENT

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1. INTRODUCTION

The main text of an environmental impact statement should be a straightforward document treating its subject in terms which are clear and readily intelligible to the general reader. Technical detail should be included in an appendix so that the environmental impact statement forms a complete and self-contained entity.

The discussion should focus attention on the salient features of the proposed operation, and the environmental considerations associated with them. Alternatives should be discussed where they offer a practical and potentially acceptable way of achieving the principal objectives; alternatives should be treated in sufficient detail to make clear the reasons for selection of a particular option, the less clearcut the decision the more supporting detail should be provided.

The document should include references to the sources of technical data and to organisations and individuals consulted so that interested parties can examine the basis for environmental decisions. Relevant diagrams, figures and maps should be included but the presentation should be such as to minimise, as far as convenient, the cost of preparation or of obtaining the environmental impact statement, and of making it available to the public.

The following guidelines indicate the areas which should be considered in the preparation of an impact statement. They should however be dealt with only to the extent considered appropriate to the development under consideration with a view to concentrating on the more significant environmental impacts.

2. CONTENTS OF ENVIRONMENTAL IMPACT STATEMENT

1. Title of Proposed Development.
2. Name of Proponent.
3. Summary.

The environmental impact statement should include a concise summary of relevant information to enable the reader to obtain a quick but thorough understanding of the proposal and the resulting environmental impact.

That summary of all matters pertaining to the E.I.S. should be based on the following sub-titles:

(a) Objective of Proposal
(b) Background of the proposed development
(c) Existing Environment
(d) Description of Proposal
(e) Description of alternatives both to and within the proposal
(f) Environmental Impact
(g) Environmental Safeguards Proposed
(h) Monitoring and review
(i) Map(s) showing Location, Boundary, and Access.

The general content of the impact statement should include the following:

4. Broad Objectives of the Proposed Development

The E.I.S. should be introduced with a statement of the objectives of the proposed development.

5. Background to the Proposed Development

The E.I.S. should fully disclose the decision-making process that led to the objectives. As a result, consideration must be given to any known alternatives to the proposal which could feasibly attain the basic objectives, and why they were rejected in favour of the ultimate choice. The specific alternative of 'no project' must also be evaluated. Attention should be paid to alternatives that would substantially impede the attainment of the project objectives or add significantly to cost, but would reduce the environmental impact of the proposed development.

This section should contain the following sub-sections:

(a) Analysis of the need for the proposal including an evaluation of the advantages and disadvantages of not proceeding with the proposed development and of other alternatives to the proposed development (including proceeding at different rates).

(b) Description of the proposal including:

- anticipated cost;
- time-scale of implementation and mine-life;
- proposed uranium production levels and value ex-mine;
- projected markets for and uses of uranium produced;
- alternative available processes and combinations of processes;
- reasons for selection of preferred process.

(c) Resource requirements for the proposal:

- resource consumption expected (energy, water, etc);
- options available for supply of resources;
- reasons for selection of preferred options;
- transportation of product;
- infrastructure requirements and public facilities required.

(d) Locational considerations for the proposal and its elements, including:

- location proposed;
- total area required;
- land title;
- land form, (geology, pedology, seismicity, hydrology, etc);
- alternatives available;
- reasons for selection of preferred options.
- Workforce requirements: proximity, number, skills.

6. Description of the Existing Environment

A description of the existing environment, on both a local and regional basis, is required to gain a knowledge for baseline environmental date required for process development, an evaluation of the impact of the proposal and the subsequent monitoring programme.

The factors to be considered are listed in Appendix A.

7. Description of Proposed Development

The E.I.S. should describe the proposed development. The social technical and broad economic characteristics of the uranium mining project and associated facilities, both public and private should be discussed. Adequate information and technical data, including maps, flowsheets, diagrams, photographs, etc., should be presented to allow a careful evaluation and review of the proposed action. Reference should be made to any further documents which describe the proposal in more detail.

Information should be included on the following aspects of the proposal:

(a) Location of the mine and ore body; location in reference to readily determined datum. Depth, thickness and shape of ore body. (include plans/sections)
Describe ore mineralogy, chemistry, tonnages and grade.

(b) Geological, pedological, hydrological constraints to site.

(c) Location of injection and production wells; basis for well spacing, rates of flow and fluid pressures proposed.

(d) Leaching solution to be used; chemical reactions involved in leaching process, storage and transport of leaching solution.

(e) Engineering in injection and solution recovery; process used in treating leached solution, equipment involved in pumping, concentrating and drying leachate.

(f) Volume of leached uranium ore stored.

(g) Chemical control measures: for leaching process and product quality.

(h) Chemistry, nature (physical and chemical) and volumes of concentrates. Equipment involved in concentrating, drying and packaging yellow cake and any other products.

(i) Chemistry, nature and volumes of waste products. Disposal practice and management proposed of sludge, liquids, solids, gases.

(j) Noise levels, on site and at site boundaries should be estimated

(k) Township: size required, proximity to operations, facilities, amenities, and visual appearance of township and associated developments; social structure.

(l) Workforce requirements in terms of numbers, skills etc.:

- Mine
- Treatment Plant
- Supporting facilities
- Construction.

(m) Water supply requirements: including quantity and quality for human consumption, ore processing, domestic consumption (non potable). Alternative sources should be discussed.

(n) Energy requirements: quantity of energy required (e.g. kW per annum) and types of energy which can be utilized (e.g. coal, oil, electricity, gas etc.)

(o) Access and transportation requirements. This should include volume or weight for people, goods, products, wastes etc. into and out of the township, between the township and the mine and processing plant, between the mine and processing plant and for transportation of the final processed product. Types of vehicles to be used, road requirements and other transport facilities required should be discussed, and examined in relation to existing facilities.

(p) Visual appearance of mine, processing plant and township should be discussed (use photographs and sketches).

(q) Construction of plant, township and associated developments - volume, nature and source of construction materials and mode of transport to site.

(r) Construction schedule.

(s) Rate of mining and life of mine.

(t) Economic Analysis For the public document, a broad analysis of the viability of the proposal is required. Information on the following will be required but may be given in confidence where commercial 'considerations' could be compromised by publication:

(1) Production tonnages
(2) Capital costs
(3) Operating costs
(4) Rate of return
(5) Effect on balance of payments
(6) Source of funds
(7) Investment required for infrastructure.

(u) Rehabilitation proposed: of all disturbed areas.

8. Environmental Impact

There should be an assessment of the direct and indirect impacts of the uranium mining and processing operation with associated developments, as proposed in Section (7), based upon the description of the existing environment provided in Section (6). Due consideration should be given to both the short-term and long-term effects of construction, operation, transportation of products and disposal of wastes, and of associated developments like township establishment and operation and power supply. A summary of factors requiring study and a description of the scope of such a review is given in Appendix B.

Such an assessment of the environmental impact will also enable the proponent to instigate design changes at an early stage to minimize the impact of the proposal.

9. Safeguards and Standards

The safeguards and/or standards proposed to minimize the environmental effects of the proposed action should be discussed. Reference should be made to existing environment legislation (both State and Federal), and relevant codes of practice.

Reference should also be made to international safeguards and standards which are applicable to uranium mining proposals. In particular, emphasis should be placed on the occupational health standards for those people involved both directly and indirectly with the proposal.

The safeguards and standards should also consider the ultimate rehabilitation of the mine location and the means to achieve this.

10. Monitoring and Review

In order to monitor the environmental impact of the uranium mining proposal after commencement of operation, base-line data extracted from the survey of the existing environment is necessary to gauge relative changes in environmental parameters. These studies should be made over a time span long enough to obtain information on any seasonal or long term changes, should be commenced prior to operations and should continue until long term impacts are fully documented.

Monitoring is required during construction of the township and over the operational and post operational phases of the work to cover all those areas likely to be affected by the mining operation, and associated activities.

It will be necessary to carry out a comprehensive long-term monitoring programme once the mine is operating in order to check the effectiveness of the safeguards and standards that have been set. The programme will use the base-line data to distinguish between natural and artificially induced changes in the environment. If monitoring gives an indication of environmental degradation, there must be provision in design to allow for remedy and for tightening of the initial standards.

11. Public Participation

The level of public involvement in the planning and decision making process leading to the compilation of the environmental impact statement should be described.

12. Sources of Information

The sources of information (e.g. reference documents, literature sources, research projects, authorities consulted) should be cited.

13. Appendices

Additional information relevant to the Environmental Impact Statement but not appropriate for the text should be included in the appendices. (maps, graphs, tables, photographs, reports, etc.).

APPENDIX A

The Existing Environment

The description of the existing environment falls into three groupings:

(i) Abiotic characteristics
(ii) Biotic characteristics
(iii) Human environment characteristics

(i) Abiotic characteristics

A. Terrestial

1. Geomorphology
   - land form
   - elevation (include contour map of site)
   - unique physical features.

2. Soils
   - profile of soil type and extent of each, with emphasis on land potentially affected by erosion and sites for tailings and water impoundment structures.
   - physical, chemical and biological characteristics of soils affected by development.
   - productive capacity.

3. Geology
   - general description of geology of site.
   - seismicity (i.e. probability of earth-quakes.
   - mass movements, including erosion and sedimentation.

4. Hydrology
   - description of surface and underground water systems with reference to geological extent, flow capacity, water quality storage capacity, recharge areas; (detail required depends on the significance of potential use or impact).
   - incidence of flooding which could affect mine site

5. Resources
- sources of construction materials on both a local and regional basis.
- on-site minerals, metals, precious stones.

B. Atmospheric
- climatic characteristics (rainfall/ intensity, temperature, wind, evaporation).
- air quality - particulates, gases, odours.

(ii) Biotic Characteristics

1. Biological
- plant species and recognizable vegetation communities, characteristics and associations.
- condition of vegetation.
- fauna species, communities and associations.
- delineation of faunal habitats (including breeding grounds) and description of species supported.
- significance of vegetation associations, faunal habitats or any individual species on a regional basis; including unusual, unique, rare or endangered associations habitats or species.

(iii) Characteristics of the Human Environment

1. Population development & structure.
- distribution, occupation and employment characteristics, structure and description of existing population and any trends that are evident;

2. Land Use
- historical development;

- existing land uses and developments in the location of the proposal or in its vicinity; including open space, recreational, rural, residential, commercial, industrial, mining and quarrying;
- features and sites of cultural and scientific interest; particular emphasis should be placed on sites, and relics, of Aboriginal and archaeological significance,
- barriers (fenced and restricted areas),
- access, utility and transportation network;
- service corridors (road, rail, powerlines, pipelines etc).

3. Facilities and infrastructure

- existing infrastructure and facilities in the region including education, health, social services, water supply, telephone electricity, gas, transport, recreation and leisure, shopping facilities,
- infrastructure negotiations with
- appropriate authorities.

4. Activities

- existing levels of human activity in relation to (1), and (2) above;

5. Wastes

- existing nature and levels of wastes generated in the region and the methods and locations of disposal and these;

APPENDIX B

Environmental Studies

1. The recommended environmental studies may require revision as further information on the proposal becomes available. For each study, details of the factors considered to be of some importance are included.

2. Study Areas
   (a) Mine locality
   (b) Associated development
   (c) Human environment

3. Recommended Studies

   A. Mine Locality

      1. Geomorphology, Pedology, Geology, Seismicity

         A description of the major geological aspects of the area should be provided. The detail required will depend upon the nature of the specific operation to be undertaken; for example, the construction of tailing dams would require a detailed description of soil and bed rock types. The preparation of a landform or contour map, and an evaluation of the erosion susceptibility of the soil (e.g. wettability, infiltration, run-off), will enable an assessment of the impact of soil erosion, and flood effects. Emphasis should be placed on construction sites and access tracks. From these studies, the potential effects both physically and visually after disturbance to the land surface should be reviewed.

2. Hydrology

The significance of the surface and underground water systems should be discussed.

The effects of site development and mine operation should be evaluated, including tailings dams and possible ingress of leaching solution into the underground water system.

The effects on water quality and quantity of the development and water disposal in relation to surface and underground water with particular attention to heavy metal contamination should be reviewed.

3. Microclimatology

A study of the weather patterns to determine the micrometeorology and regional characteristics of the lower atmosphere is required. Particular emphasis should be concerned with wind patterns and the carriage of particulate matter from processing plant, and with the nett effect of the project on air quality arising from gaseous and dust emissions and increased levels of radiation.

4. Ecology

A study of the effects of site preparation, fencing, barriers, alteration of land form and natural drainage, noise, increased population pressure etc. should be carried out to determine its probable effect on wildlife habitat, including territories, food chains and migration patterns, particularly on endangered and endemic species. Changes to the balance of eco systems both locally and regionally as a result of the development should be reviewed.

An evaluation of the effects of exposure of humans and other species to gaseous, liquid and solid products, wastes is required. The following aspects should be considered:

(a) A description of the projected extent and nature of radionucleides including radon gas present in all stages of the operation.

(b) Extent of projected worker exposure to radon gas and other sources of radiation.

(c) Review of current and proposed State, National and International Exposure Standards and relevant Codes of Practice for radioactive materials, relative to projected exposure levels.

5. Historical and Archaeological Features

A study of the extent of Aboriginal relics and sites of Aboriginal cultural significance in the locality of the mine and associated developments should be undertaken, to a standard acceptable to the Aboriginal and Historic Relics Unit of the Department for the Environment.

B. Associated Developments

1. External Power Supply

Effects of power generation or transmission on landform, flora and fauna, existing land use and visual amenity.

If power is to be transmitted from the exisitng ETSA system the impact of extension from existing connections will require discussion of the entire route of the proposed transmission line.

2. Transport Facilities

Effects of airstrips, roads, etc on landform, erosion, flora and fauna, existing land use and visual amenity.

C. Human Environment

1. Population

An assessment of the impact of the project on the regional, local and introduced population of the proposal during the construction, operational and post-operational periods, including requirements for facilities, services, infrastructure and for employment etc;

D. Miscellaneous Impacts

1. Resources commitment

The effects of the proposal on options for future resources utilization in the area and region should be reviewed.

2. Land utilization

The impact of the project developments on future land use should be assessed.

3. Interaction between physical and social aspects