The Management of low level radioactive Gangue residue at the Mt Walton East Intractable Waste Disposal Facility, Western Australia

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Environmental Management Programme

Report and conclusions of the
Environmental Protection Authority

Environmental Protection Authority
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Summary and conclusions

This report provides the Environmental Protection Authority's advice to the Minister for the Environment on the acceptability of the Environmental Management Programme (EMP), prepared by the Waste Management Division of the Department of Environmental Protection, for the purpose of receiving and for the long-term encasement of gangue residue delivered to the Mt Walton East Intractable Waste Disposal Facility (IWDF). The IWDF is located in elevated, arid country in the Eastern Goldfields region of Western Australia.

The EMP arises from a proposal of Rhone-Poulenc Chimie Australia Pty Ltd to refine, at Pinjarra south of Perth, monazite sand to provide rare earth nitrates and phosphates.

The process produces a "gangue" waste comprising a moist clay-like insoluble material incorporating substances with low specific radioactivity. The waste is classified by the NHMRC as a Class C bulk waste. The NHMRC code for the disposal of Class C wastes has been adopted under the regulations of the Western Australian Radiation Safety Act 1975-1981. The EMP foreshadows that the gangue would be transported and deposited in bulka bags, in an encasement cell at the IWDF in accordance with the code.

As the IWDF is a facility operated by the Waste Management Division of the Department of Environmental Protection, the Environmental Protection Authority (EPA) has chosen to have the EMP reviewed, and the processes set out in the EMP audited, by an independent consultant specialising in the management of radioactive materials.*

The EPA commissioned Mark Sonter Consulting Pty Ltd. to undertake the review. The report of Mark Sonter Consulting Pty Ltd. has been considered by the Authority and is included with this EPA assessment report. The EPA has endorsed the "Conclusions and Strategic Recommendations" contained in the report (page 14).

In summary, the important conclusions derived by Mark Sonter Consulting Pty Ltd. are:

- the physical facilities at the IWDF are appropriate for the long-term encasement of the gangue waste material;
- the management system to be applied to the operation of the IWDF is professional and appropriate;
- the regulatory system for the present scale of operations is appropriate, but will need clarification and expansion for the purpose of any increased gangue waste disposal requirement;
- the current reporting obligations of the operators of the IWDF are being met, but in some aspects, will need to be more clearly stated at the time the residue is to be disposed; and
- the annual progress and compliance report documents prepared by the Department of Environmental Protection are clear.

The report further comments that:

- to accommodate the use of the IWDF for encasement of the Rhone-Poulenc gangue waste, if the proposal is approved by the Minister, the Ministerial Conditions (published as a "Statement that a proposal may be implemented") applying currently to the operation of the IWDF should be simplified and updated to reflect the Rhone-Poulenc project;

* Footnote — The Evaluation Division of the Department of Environmental Protection facilitates the assessment of development proposals on behalf of the Environmental Protection Authority and assists the Authority in preparing its "advice and recommendations" to the Minister for the Environment. However, for the assessment of the IWDF Environmental Management Programme, because the IWDF is operated by a Division of the Department of Environmental Protection, the Authority has sought the services of an external specialist consultant. This is the procedure established within the "Protocol on the handling of proposals (issues) in which the Department of Environmental Protection is a proponent, or has a material interest".

- the Radiological Council of Western Australia should be requested to comment on and make further recommendations toward the appropriate handling and management of "Class C wastes"** ; and

- the Department of Minerals and Energy along with the Department of Environmental Protection would need to resolve responsibilities in respect to the regulation, handling and management of waste radioactive materials likely to be stored at the IWDF.

The Environmental Protection Authority in accepting the Mark Sonter Consulting Pty Ltd. report - "Independent Review of the Proposal to Dispose of Rare-Earth Wastes at IWDF Operated by Waste Management Division of DEP at Mt Walton East" has requested the Department of Environmental Protection to provide views on the nature and adequacy of the present Ministerial Conditions and the need to rewrite those Conditions, and on the compliance or otherwise with the Ministerial Conditions as (appended) in the EMP, to accommodate the proposed operations (ie the disposal of gangue waste from Rhone-Poulenc if approved).

The Environmental Protection Authority provides the following advice on its assessment on the EMP:

The Environmental Protection Authority concludes that it is satisfied with and accepts, the Environmental Management Programme by the Waste Management Division of the Department of Environmental Protection in relation to "The Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility Western Australia" dated 25 October 1995, with modifications arising from public comment described in "Response to Submissions on the Environmental Management Programme. The Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility Western Australia" dated 2 February 1996.

The commitments made in the EMP, and any enhancements or modifications to the EMP that are listed in the "Response to submissions" document as further commitments, represent the manner in which the project should be implemented. These commitments will be consolidated by the Waste Management Division and will be available publicly on request. In addition where a commitment requires the Division to provide further information to the EPA on aspects of the project that information will also be made publicly available.

The Department of Environmental Protection will review the Ministerial (Environmental) Conditions) referred to by Mark Sonter Consulting Pty Ltd., and will consult with the Department of Minerals and Energy regarding responsibilities for the regulation, handling and management of radioactive waste materials. The Department will then provide advice to the Minister for the Environment.

** Footnote - The EPA understands that the Radiological Council of Western Australia pursuant to the Radiation Safety Act 1971-1981 is separately considering the proposal for the disposal of the Rhone-Poulenc gangue waste at the IWDF.

1. Introduction and background

1.1 Purpose of this report

The Waste Management Division of the Department of Environmental Protection was required to prepare an Environmental Management Programme (EMP) to accompany environmental documents relating to a proposal by Rhone-Poulenc Chimie Australia Pty Ltd. (Rhone-Poulenc) to produce, near Pinjarra, rare earth nitrates, and phosphates, from the refining of monazite sands. A low level radioactive waste product requiring appropriate disposal would also be produced. Rhone-Poulenc proposed that the waste "gangue" material be progressively deposited at the Mt Walton Intractable Waste Disposal Facility (IWDF) in burial trenches 15 metres deep. The wastes would be placed in layers and covered with soil. A final cover layer would be sealed with compacted clay and rock thus encasing the gangue in storage for the long term.

The EMP prepared by the Waste Management Division sets out procedures that show the use of the IWDF would be an environmentally responsible means for managing wastes from chemical processing of the kind arising from the Rhone-Poulenc proposal.

This report provides advice on the Environmental Protection Authority's (EPA) examination and assessment of the adequacy of the EMP. The EPA's assessment report of the Rhone Poulenc proposal (Bulletin 810) has been released in association with this report.

To assist in the evaluation of the EMP the EPA commissioned Mark Sonter Consulting Pty Ltd. to:

- Review the EMP and associated written material; and
- Audit the procedural steps set out in the EMP.

The EPA subsequently considered the report submitted by Mark Sonter Consulting Pty Ltd. both in relation to the objectives set for the review, and with reference to literature relevant to the Rhone-Poulenc proposal (Appendix 1). The report by Mark Sonter Consulting Pty Ltd. is given in Appendix 2.

1.2 Background

The purpose of the EMP was to set out management objectives and practices which would provide for the safe and environmentally sound management of the IWDF during the construction, operational and post-operational stages of disposal of the waste. The EMP explains the procedures for the operation of the IWDF, both as a location for the long-term disposal of intractable wastes and as an appropriate facility for the encasement of gangue waste material arising from the Rhone-Poulenc rare earth processing plant at Pinjarra.

The EMP dated 25 October 1995, was made available for public comment. The response by the Waste Management Division to the public's submissions was also made available to the community.

Rhone-Poulenc had in 1988, proposed that waste materials from a similar project at Pinjarra (which was not implemented) should be stored or treated at a site to be found in the Goldfields area of Western Australia. Shortly after that time, and following a Health Department of Western Australia Public Environmental Review (PER), the State established an Integrated Waste Disposal Facility north east of Mt Walton in the Eastern Goldfields. At the time the Health Department was to be the manager/operator of the facility. That facility has now been renamed the "Intractable Waste Disposal Facility" (IWDF) and is managed by the Waste Management Division of the Department of Environmental Protection.

To support the 1988 Rhone-Poulenc proposal the Health Department of Western Australia prepared its Public Environmental Review (PER) to describe the environmental effects of the anticipated disposal of 7,000 tonnes of thorium hydroxide waste material at the IWDF. The Health Department's PER was assessed by the EPA and the Minister for the Environment consequently established "Ministerial (Environmental) Conditions" known as a "Statement that a proposal may be implemented", relevant to the IWDF (Appendix 3). Within those Ministerial (Environmental) Conditions dated 26 October 1988 the requirement was set that:

- "Prior to commissioning (ie receipt of waste from Rhone-Poulenc), the proponent shall prepare an Environmental Management Programme (EMP), to the satisfaction of the Environmental Protection Authority".

Since the Ministerial (Environmental) Conditions of 26 October 1988 a number of additional Conditions have been applied to the management and operation of the IWDF. These additional Conditions are set out in Appendix D of the Waste Management Division's EMP.

Hence, when Rhone-Poulenc's proposal was re-activated in 1995, the Department of Environmental Protection's Waste Management Division, prepared an EMP - the subject of this assessment - relevant to the new modified proposal. The details of that proposal are set out in a recent ERMP dated September 1995.

The EMP is written moreover to comply with the National Health and Medical Research Council's (NHMRC) Code of Practice for the Near Surface Disposal of Radioactive Waste In Australia (1992), for the operation of the IWDF. The Code's purpose is:

- to provide a basis for the near surface disposal of solid radioactive waste in a way which ensures that there is no unacceptable risk or detriment to humans, other biota or the environment, at present, and that future risks or detriment will not exceed those currently accepted.

The waste is classified by the NHMRC as a "Class C" bulk waste suitable for trench burial.

2. Assessment of the Environmental Management Programme and Plan

Within the EMP a strategic plan (Environmental Management Plan) has been developed with the purpose of ensuring the long term care and maintenance of the IWDF as a repository for intractable wastes. In this context the objectives of the Environmental Management Plan, as listed in the Code for Disposal, are:

- "To outline management strategies and practices which will prevent unacceptable dispersal of radioactive contaminants through the various environmental pathways, from the commencement of operations at the facility until institutional control ceases and which will minimise such releases thereafter.
- To establish performance indicators and outline monitoring procedures necessary to acquire the data needed:
  - to assess any impact of site operations on members of the public and on the environment;
  - to enable early detection of any inadvertent releases of radioactivity, and thus allow corrective action to be taken to limit the impact upon site personnel, the public or the environment;
  - to predict the long term behaviour of the waste in the site following closure of the facility; and

- To ensure that disposal operations comply with regulatory requirements"

For the purpose of assessment, the EPA commissioned radiological specialist Mark Sonter Consulting Pty Ltd. to review the EMP, audit the procedural steps and prepare advice.

3. Evaluation

Mark Sonter Consulting Pty Ltd. was required to:

- Receive copies of the Ministerial Conditions, DEP Audit Table, EMP and any other relevant documents, and consider their contents;
- Assess the adequacy of the proposal outlined in the EMP by —
  - visiting the site of the IWDF and examining the appropriateness of the operation and works;
  - holding discussions with operational staff and representatives of other organisations connected with the operation of the facility;
  - reviewing and comparing the (undertakings of) the EMP with the identified compliance requirements; and
  - commenting on the ministerial conditions.
- Consult with the Waste Management Division of the Department of Environmental Protection with regard to preliminary findings and receive their comments; and
- Prepare a report to the EPA which includes:
  - an assessment of the adequacy of the EMP; and
  - any recommendations for improvements to the proposal and the conditions of approval.

The report of Mark Sonter Consulting Pty Ltd. has been considered by the EPA and the "Conclusions and Strategic Recommendations" set out on Page 14 were adopted, and form the basis of the EPA's conclusions hereunder:

- the physical facilities at the IWDF are appropriate for the long-term encasement of the gangue waste material;
- the management system to be applied to the operation of the IWDF is professional and appropriate;
- the regulatory system for the present scale of operations is appropriate, but will need clarification and expansion for the purpose of any increased gangue waste disposal requirement;
- the current reporting obligations of the operators of the IWDF are being met, but in some aspects, will need to be more clearly stated at the time residue is to be deposited; and
- the annual progress and compliance report documents prepared by the Department of Environmental Protection are clear.
- to accommodate the use of the IWDF for encasement of the Rhone-Poulenc gangue waste, if the proposal is approved by the Minister, the Ministerial Conditions (published as a

"Statement that a proposal may be implemented") applying currently to the operation of the IWDF will need to be simplified and updated to reflect the Rhone-Poulenc project;

- the Radiological Council of Western Australia should be requested to comment on, and make recommendations toward, the appropriate handling and management of "Class C wastes"; and

- the Department of Minerals and Energy along with the Department of Environmental Protection will need to resolve responsibilities in respect to the regulation, handling and management of waste radioactive materials likely to be stored at the IWDF.

Presently the Ministerial Conditions relating to the IWDF reflect an earlier proposal to establish a high temperature incinerator at the site. Hence, those conditions are not altogether appropriate in relation either to the Rhone-Poulenc proposal or the EMP which is the subject of this assessment. The conditions will need to be re-ordered to relate clearly to the receipt and encasement of the Rhone-Poulenc gangue waste, if the proposal is approved by the Minister.

The EPA in accepting the Mark Sonter Consulting Pty Ltd. report - "Independent Review of the Proposal to Dispose of Rare-Earth Wastes at IWDF Operated by Waste Management Division of DEP at Mt Walton East", has requested the Department of Environmental Protection to provide views on the nature and adequacy of the present Ministerial Conditions and the need to rewrite those Conditions, and on the compliance or otherwise with the Ministerial Conditions as (appended) in the EMP, to accommodate the proposed operations (ie the disposal of gangue waste from Rhone-Poulenc if approved).

4. Conclusion

The EPA provides the following advice on its assessment of the EMP;

The Environmental Protection Authority concludes that it is satisfied with and accepts the Environmental Management Programme by the Waste Management Division of the Department of Environmental Protection in relation to "The Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility Western Australia" dated 25 October 1995, with modifications arising from public comment described in "Response to Submissions on the Environmental Management Programme. The Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility Western Australia" dated 2 February 1996.

The commitments made in the EMP, and any enhancements or modifications to the EMP that are listed in the "Response to submissions" document as further commitments, represent the manner in which the project should be implemented. These commitments will be consolidated by the Waste Management Division and will be available publicly on request. In addition where a commitment requires the Division to provide further information to the EPA on aspects of the project that information will also be made publicly available.

The Department of Environmental Protection will review the Ministerial (Environmental) Conditions) referred to by Mark Sonter Consulting Pty Ltd., and will consult with the Department of Minerals and Energy regarding responsibilities for the regulation, handling and management of radioactive waste materials. The Department will then provide advice to the Minister for the Environment.

Appendix 1

Literature reviewed by the EPA in association with the report of Mark Sonter Consulting Pty Ltd. entitled "Independent Review of the Proposal to Dispose of Rare-Earth Plant Wastes at IWDF operated by Waste Management Division of DEP at Mt Walton East"

Dated 16 February 1996

Literature reviewed by the EPA in association with the report of Mark Sonter Consulting Pty Ltd. entitled "Independent Review of the Proposal to Dispose of Rare-Earth Plant Wastes at IWDF operated by Waste Management Division of DEP at Mt Walton East"

(a) R K Steedman memo to B R Jenkins/C Schuster/D Pitt, Assessment of Mt Walton East EMP and Audit, dated 31 January 1996;

(b) R K Steedman memo to B R Jenkins, Contract with Mr M Sonter re independent advice on EMP for Mt Walton East, dated 1 February 1996;

(c) Cameron Schuster letter to EPA, Preliminary Review — IWDF Site Security and Other Matters Proposed Disposal of Gangue Residue, dated 7 February 1996;

(d) Environmental Management Programme. The Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility Western Australia, Department of Environmental Protection. Waste Management Division, dated 25 October 1996;

(e) Response to Submissions on Environmental Management Programme. The Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility Western Australia, Department of Environmental Protection. Waste Management Division, dated 25 October 1996.

Appendix 2

Independent Review of the Proposal to Dispose of Rare-Earth Plant Wastes at IWDF operated by Waste Management Division of DEP at Mt Walton East

Mark Sonter Consulting Pty Ltd
16.2.96

1. Introduction

This review has been commissioned by the Chairman of the WA Environmental Protection Authority to provide an independent assessment of the proposal to dispose of rare-earth plant wastes, from the proposed Rhone-Poulenc Rare Earth Plant at Pinjarra, at the Intractable Waste Disposal Facility at Mt Walton East, operated by the Waste Management Division of the Department of Environmental Protection

The details of the proposal under review are given in the Environmental Management Programme (EMP), released by WMD for public comment in October 1995. Information regarding the source of the waste stream is available in the Environmental Review and Management Programme (ERMP) released by Rhone-Poulenc at the same time.

These wastes are derived from the dissolution (cracking) of monazite sand, produced during separation of zircon and ilmenite from mineral sands, and itself presently of no commercial value; monazite is radioactive, containing thorium and uranium and their radioactive breakdown products (see tabulation). Monazite, and monazite bearing mineral sands, and monazite cracking plant wastes, are all classified as Low Specific Activity Radioactive material for Transport purposes, and as Low Level Radioactive Waste for Disposal purposes.

It is noted that the concept of shallow-ground disposal, at a government facility, of large quantities of Low Specific Activity waste, generated from a rare earth processing operation, has received general political support since 1988 and has received ministerial approval contingent on preparation of the EMP here being reviewed.

An expected output of this review will be recommendations regarding conditions to be applied in operation.

This audit has been performed taking into account discussions with the proponent (Acting Director, Waste Management Division, Mr Cameron Schuster, and Senior Environmental Officer, Mr Greg Mueller and Dr Mark Shepherd of Alan Tingay and Associates), with the CEO of the DEP, Dr Bryan Jenkins, and the Director of Evaluation Division, Mr Rob Sippe, Mr Henk Van Der Wiele, regional DEP officers at Kalgoorlie, Manager, Mr Jim Tucker, and Field Officer Mr John Miragliotta, in the Radiation Health Section of the Health Department, Mr Des Hutchinson and Dr Bill Toussaint; and in Dept of Minerals and Energy, Principal Scientific Officer, Mr Greg Hewson.

2. Scope of work

"The consultant shall:

(a) Receive copies of the Ministerial Conditions, DEP Audit Table, EMP, and any other relevant documents, and consider their contents;

(b) Assess the adequacy of the proposal outlined in the EMP by -

(i) visiting the site of the IWDF and examining the appropriateness of the operation and works,

(ii) holding discussions with operational staff and representatives of other organisations connected with the operation of the facility,

(iii) reviewing and comparing the (undertakings of) the EMP with the identified compliance requirements, and

(iv) commenting on the ministerial conditions;

(c) Consult with DEP Waste Management Division with regard to preliminary findings and receive their comments; and

(d) Prepare a report to the EPA which includes -

(i) an assessment of the adequacy of the proposal (item (b) taking into account the comments received in item (c), and
(ii) any recommendations for improvements to the proposals and conditions of approval."

3. Documents reviewed

The following documents were perused:

Proposed Integrated Hazardous Waste Disposal Facility - Public Environmental Review. prepared by Maunsell & Partners, for WA Health Dept, May 1988.

Proposed Integrated Waste Disposal Facility - Eastern Goldfields, Western Australia - Report & Recommendations of the EPA. EPA Bulletin 353, Sept 1988.

Proposed Disposal of Radioactive Waste at Remote Site - Environmental Management Programme. Radiation Health Section, WA Health Dept, Sept 1989.

(This document specifically included 7000 tpa of Rhone-Poulenc waste, to be transported as moist filtercake, in bulkabags, for trench disposal. (i.e., the same as the present proposal). The Health Dept, as proponent, specified "radioactive content must be in general agreement with the (then) NHMRC draft on Shallow Land Burial. (and) contain no more than 20% by weight of thorium expressed as thorium hydroxide in general agreement with the Guideline figure of 4 (10^5 Bq/kg, equivalent to 10% elemental Th or 13% Thorium hydroxide.")

Supplement Technical Reports for this document, including reports by Soil and Rock Engineering, Aug 1989 , and Industrial Risk Management, Sept 1989.

EMP for Transport and Storage of Wastes at the Integrated Waste Storage Facility East of Mt Walton. Alan Tingay & Associates for WA Health Dept, April 1991.

Mt Walton Integrated Waste Disposal Facility EMP - Evaluation by the EPA. EPA Bulletin 571, Aug 1991.

Proposed Integrated Waste Disposal Facility, Eastern Goldfields - Change to Ministerial conditions. EPA Bulletin 572, Aug 1991.

Code of Practice for the Near-Surface Disposal of Radioactive Waste in Australia. NHMRC, 1992.

Intractable Waste Disposal Facility - Consultative Environmental Review. Tingay and Associates, for WA Health Dept, Oct 1993.

Disposal by Shaft Entombment or Trench Burial of a range of Intractable Wastes at the IWDF, Mt Walton East - Report & Recommendations of the EPA. EPA Bulletin 726, Dec 1993.

Environmental Management Programme - The Management of Low Level Radioactive Gangue Residues at the Mt Walton East Intractable Waste Disposal Facility, Western Australia. DEP Waste Management Division, Oct 1995.

Response to Submissions on EMP. DEP Waste Management Division, Feb 1996.

ARL - Draft Technical Report on Near- surface Waste Disposal. pers. comm., Dr M Cooper Oct 1995.

Annual Progress and Compliance Report for the IWDF, Mt Walton East. Alan Tingay & Associates, Dec 1994 and Dec 1995.

Operational Radiation Monitoring Programme at IWDF, Mt Walton East, Progress Report, Sept 1995. K. Terry, Radiation-Wise Pty Ltd.

Western Australia's Intractable Waste Disposal Facility (brochure, DEP WMD).

Minutes of IWDF Community Liaison Committee Meetings, April and October, 1995.

4. Audit overview

The audit is intended to review the **present** facility, management system, and regulatory and reporting regime; and the **proposed future** facility, management system, and regulatory and reporting regime.

Are the present "system components" adequate? The judgement of this auditor is that the physical facilities are appropriate, that the management appears to be professional; that the regulatory system is appropriate for the present scale of operations, but will need to be expanded and clarified for the proposed expanded operation; reporting: obligations are being fulfilled, but the reports do not clearly state that there is no effect (which is what the data shows). In detail:

The present physical facilities at Mt Walton were inspected. They comprise accommodation, ablutions, and hygiene facilities, and four securely fenced and locked compounds containing the disposal trenches and shafts; they are properly signposted. There is visual evidence that heavy rainfall events post-placement have not caused any problems; in particular, (i) runoff was shed from the mounded trench and shaft clay cover caps as designed; and there has been no indication at all of either infiltration or slumping following these rainfall events. The only shortcoming of a physical nature is that drill holes

made for soil profile testwork have not yet been backfilled: this should be attended to at the earliest convenient opportunity.

The present management system was discussed and considered. WMD is manager and operator; Alan Tingay & Associates is contractor supplying environmental management, planning, and monitoring services. This appears to work well but it will be important to ensure formalisation of instructions and traceability of decisions and actions should the Rhone-Poulenc proposal proceed.

Present regulatory regime was reviewed. It is important to note that DEP officers at the Kalgoorlie regional office are Pollution Prevention Division personnel - when they visit Mt Walton, they do so as regulators, not as DEP personnel acting on behalf of WMD. Is the present level of regulatory review is adequate? - The answer is in the affirmative for present activities, but there may be merit in importing an idea from the Mining industry and instituting an "Inspection Record Book" for use on site to record any items that require addressing. This is not intended to replace formal memoranda, but to provide an on-site record made at the time of inspection, There would need to be a more "transparent" formal system such as this in the expanded case driven by continuous shipments of rare earth plant gangue. There may also be a need for , e.g,. external audit; or for a Perth-based DEP officer to inspect and report directly to EPA, or perhaps a six-monthly visit by the Appropriate Authorities.

Present reporting process: The reports generated so far were read. These were the Annual Progress and Compliance Reports, 1994 and 1995, prepared in fulfilment of Ministerial conditions, (the 1994 issue containing a good review of the history of the development and permitting of the IWDF), and the Six-Monthly Radiation Report to the Radiological Council, apparently prepared in fulfilment of NHMRC Code requirement 4.6.1 and various Ministerial Conditions (see below).

Annual Progress and Compliance Report for the IWDF, Mt Walton East, 1994 and 1995:

Good introduction, clearly states intent of document; provides a thorough review of MCs and compliance status at Section 6 in the 1994 Report and Section 3 in the 1995 Report. This auditor notes that this descriptive listing of conditions and their compliance status is very useful, (more so than the audit table, covering the same issues) and should be continued in future Progress and Compliance Reports.

This auditor agrees with the compliance status as given in the 1994 and 1995 reports, but notes completion of the groundwater drilling requirement 44M2, and the fencing/signposting requirement of 44P5; and notes that 44P44 is ongoing.

The need for simplification/rewriting of the MCs is a separate issue, but is quite real.

Radiation Monitoring Programme Progress Report, September 1995: Two criticisms can be made:

1. It is noted that the Radiation Report does not indicate, in its introduction, whether it is a contractor's report to client, or whether it is a report drawn up on behalf of the client for forwarding to the regulatory agency. Nor does it specifically state just what requirements it was written in response to. This lack of clarity is unfortunate but quite easy to overcome. (Ans: MC #7, and commitments #16, 24, 25, 26, and 44.)

2 No interpretation given of the meaning of the environmental radiation data collected: in fact, results given are consistent with a normal, low-background, continental environment, but this is not stated anywhere.

Query: Is the Radiological Council obligated to comment on this report? - if not, then it should be.

5. Review of Ministerial Conditions

Ministerial Conditions, and conditions set out in the NHMRC Code for Shallow Ground Burial were checked for compliance. Does the present system fulfill Ministerial Conditions?

The basic Ministerial Conditions applying to the proposal to dispose of this waste binds the WMD as the proponent to undertakings which it makes in its EMP, and to previous undertakings made by the Health Department when it was proponent. Because of the history and origins of the Waste Disposal Facility, many of these commitments are now irrelevant inasmuch as they relate to the previous plan for a high-temperature incinerator. Other conditions relate to ongoing commitments that will require to be reported on, generally on a yearly basis.

As will be seen when reading the Ministerial Conditions, there is now (with the passage of time and development of plans) considerable redundancy and repetition ; and lack of clarity. It is suggested that the Minister give consideration to redrafting these conditions, following the completion of the EMP review process, to reflect more clearly the final agreed set of operator obligations.

A minor but important point for readability and review is that Ministerial Conditions should always be numbered in the source document for easy reference.

The author has also reviewed the DEP Audit Table listing these obligations and commitments, but, for ease of readability, here paraphrases the original listing, with the following assessments:

1: already fulfilled
2: relevant only to incinerator proposal
3: ongoing commitment
4: subject to subsequent modification

Summary of Commitments	Assessment by this auditor
Owned, controlled and operated by Government Department	1 and 3
Only for wastes generated in WA	3
Biological and archaeological site surveys performed	1
Fencing and signposting performed	1 and 3
Construction activities in accordance with stat requirements for noise and dust	1 and 3
Properly trained and fully qualified operators	1 and 3
Wherever possible, transportation of waste by rail	4 (Bull 572)
Organochlorine wastes tested before transport	2
All wastes in double containment	N.A. for LSA material
Waste unloading and prep'n for incineration automated	2
Equipment to contain spills and remove excessive levels of vapours	2
Liquids tank farm fire control, spillage containment and vapour control	2

Capacitators will be drained using automatic equipment	2
Waste feed to the incinerator by positive displ pumping and by a ram feed	2
Continous and intermittent monitoring of plant operating conditions	2
DOSHWA to assist in devel. of safety guidelines	2 (Rad. Health Section for LLW)
All personnel trained in safety and emergency response procedures	1 and 3
First aid and hygiene measures	1 and 3
Protective clothing	2
Noise levels will comply with regulations	3
Current and future Radiation Codes of Practise	1 and 3
Baseline radiation survey will be carried out	1
Airborne dust, AMAD where applicable, and alpha and beta activities measured	3
Worker radiation monitoring and health surveillance program implemented.	3
ICRP annual dose limits will not be exceeded	1 and 3
Radiation assessments for containerised wastes will be verified	1 and 3
Combustion chambers will be operated at negative pressure	2
Air pollution control system will be installed	2
Combination of automatic and manual controls	2
Gaseous residues disposed of by enhanced atmospheric dispersion	2
Aqueous residues will be contained and evaporated	2
Solid residues will be disposed of as landfill on-site	2
Emergency services to include firewater supply, foam in flammable liquid storage areas, firebreaks, emergency washing facilities etc	1 and 3
Emergency contingency planning prior to transport and disposal	1 and 3
Destruction and Removal Efficiency of the incinerator not less than 99.9999%	2
Standards for residues from PCB incineration as prescribed by the EPA	2
Standards for organochlorine levels in the workplace	2
Ground level concentrations of organochlorines	2
Contamination will be less than 2ppm	2
On-site liquid wastes will be disposed of by evaporation	2
Solid residues will be disposed of as landfill	2
Monitoring of radiation levels	3
Annual reports on the environmental management and monitoring commitments	3
Proponent to initiate and co-ordinate a Control Committee incl local reps	1
Proponent will initiate and co-ordinate a Community Liaison Committee	1

Note that organochlorine-related requirements should be deleted.

6. Assessment of Adequacy of Proposal as outlined in Environmental Management Programme:

The requirement of the review in this case was to determine whether the plans, as outlined or committed to in the EMP, are likely to satisfy all safety and environmental concerns, and are likely to provide acceptable containment for the residue material.

The EMP was reviewed in the following terms:

- does the concept appear technically reasonable?
- what are the technical issues of concern? - and does the EMP address these issues?
- what further detail is needed? (either in EMP supplementary information or as conditions of operation).

Technical reasonableness:

The concept of trench disposal in clay, below grade, of partially dried material in which remaining water is at negative pore pressure, is a very sound approach to ensuring no contamination of groundwater. Given that site selection has provided a site with no groundwater at all detected, one can be confident that an almost ideal concept has been proposed.

Technical issues:

These are almost non-existent in terms of potential impacts on the environment, as discussed above. In terms of occupational radiation dose, the gangue will be a significant source of gamma radiation, and thus the external gamma doses received by the workers will require to be actively managed, by monitoring and the use of time limitation, distance, and shielding, to minimise total dose.

There is a very slight probabilistic dose potential arising from bag breaks and spills, with subsequent dust production. The obvious control mechanism will be to recover and bury the spillage before it dries; and if this is not possible, respiratory protection can be used as a fallback option. It is important to note that quite long term exposures to high dust levels would be needed to approach the ICRP annual limit (e.g., many tens of hours exposure at a dust concentration of 1 milligram per cubic metre). These issues will be addressed in the Radiation Management Plan, and ultimately assessed by the Radiological Council.

At a remote site such as Mt Walton, one must be aware of the hazards associated with distance from medical help. The workers are handling wastes that are generally regarded with concern, but the hazards which will most threaten them will be snakebite, vehicle accidents on the road, and 'normal' workplace injuries. It is thus reassuring to note that WMP is planning to install a radiotelephone or satellite phone, and is planning to construct a helipad. These decisions have my strong support.

Do the EMP proposals appear to address all hazards adequately? - yes.

Do the EMP proposals appear to fulfill all ministerial conditions? - yes, although Ministerial conditions in some cases are complex, repetitious, or not relevant to the present proposal. (see Appendix for suggested redraft).

Comments on issues raised in Public Comments, and WMD's responses to them.

The following comments arise from the attendance by the independent auditor at the Community Liaison Committee meeting in Coolgardie, on 5th Feb, and from review of comments submitted by members of the public and by government agencies during the Public Review process. They were presented as notes for discussion at the EPA Environmental Assessment Committee meeting, 8th Feb.

EMP for Disposal of Rare Earth Plant Waste - notes for EAC Meeting:

Issues (Raised following the Community Liaison Committee mtg, 5 Feb):

1. Said by the "sceptics" to be major community fear lest Mt Walton become the "national repository".

2. Inappropriate that Community Liaison Committee chairman is the senior officer of the Proponent/Operator.

   Recommendation: The proponent may consider requesting the President of the Shire of Coolgardie to chair these meetings.

3. Said to be inadequate separation between operator (Waste Management Division of DEP) and regulator (Evaluation Division of DEP, reporting to EPA, for compliance with Ministerial conditions; and Pollution Prevention Division of DEP when project is in operation).

4. Belief of the "sceptics" that EPA should overview IWDF directly (and sit on the Comm Liaison C'tee).

5. Belief of the "sceptics" on the Comm Liaison C'tee that they have been the main "audit/review" agent, and that govt regulators have been conspicuous by their absence.

6. Community would appreciate further briefings from Radiation Health to Comm. Liaison C'tee (altho' Rad Health staff are adamant that they have given plenty of briefings before); and indeed, would appreciate ongoing briefings as plans develop.

   Recommendation: Further ongoing technical briefings are indeed appropriate, after design decisions have been made by the proponent and reviewed by the "Appropriate Authority".

Issues raised in public comments:

7. Need for Rad. Council and EPA to "clearly define which duties and responsibilities will become their primary responsibility as the "appropriate authority"... and a need to set up formal liaison arrangements.."

8. Appropriate Authority should check present site compliance with Near-Surface Disposal Code and public reporting requirements.

9. Appropriate Authority should check EMP against Code requirements in detail.

10. Should be proper dose calculations done for drivers and site workers.

    Recommendation: Items numbered 7 to 9 inclusive should be reviewed by a series of meetings of the regulatory agencies. Item 10 should be addressed in more detail by the proponent, when more detailed plans and procedures have been developed, and presented to the "AA".

11. Suggestions were made regarding cementation, calcination, chemical stabilisation, and high-integrity packaging of the gangue material, so as to minimise possibility of migration of radionuclides out of the containment structure (i.e., the trench). (Independent Advisor's comment is that these thoughts may be appropriate for disposal in the agricultural districts of the Perth coastal plain, where groundwater is exploited for human consumption and for agriculture, but they appear to miss the point of the site selection process and are quite unnecessary for the chosen site.)

12. Concern was raised regarding the respirable nature of the gangue material, in the event of a spill and subsequent drying and dusting and suspension. (Independent Advisor's comment is that the ease of monitoring, in the case of a spill, e.g. during transport, or

during emplacement, and the well-known control methods, i.e. wetting or covering, and if necessary, use of respirators during collection and repackaging, are such as to render unnecessary any draconian measures such as agglomeration. Furthermore, the hazard being protected against is a chronic or longterm one, and the DAC - Derived Air Concentration - against which air monitoring results would be judged, would be based on an assumed 40 hour per week, 50 week per year, 50 year exposure, whilst the actual exposure would be much shorter and intermittent. It should also be noted that very fine material does not have a propensity to dust (claypans don't dust; sand dunes do). As a result, this commentator finds no concern with the particle size of the waste - **see later comment.**

Recommendation: Radiation Management Plan will need to address potential occupational dust exposure, its monitoring and control; the Transport Emergency Plan will need to address the potential for Member of Public dust exposure and its control.

13. Several comments expressing concern about the safety of the disposal facility over geological periods of time, and possible increased erosion rate following climate change. This concern is applicable to all disposal facilities, and not unique to Mt Walton. The point should be made that the site is near-ideal for all wastes, not just those that decay exponentially over time to zero activity, but also those of infinite half-life.

14. Why institutional control period of "only" 100 years? (see later, para 20, and Independent assessor's comments, 2nd last para)

15. Queries re cost recovery.

16. The various documents and reports quoted in EMP and required by Code should be publicly available.

    Recommendation: There needs to be confidentiality between proponent/operator and its regulators, but the Public has a Right-to-Know which must be catered for: some reports have been identified as for public release; in addition, there should be report summaries developed and pre-approved by proponent for release or quoting at any time by regulators in response to queries from members of the public; in further addition, the proponent may wish to consider an annual "glossy" recording its activities and successes!

Issues (Government Depts' Comments):

17. Dept of Minerals & Energy: Dept has no significant concerns with EMP. "The Mt Walton site has all the desirable features for disposal of thorium gangue waste as (well as) the natural geological and hydrogeological conditions (that) render the potential environmental pathways negligible." Deposition as described in trenches is satisfactory and is supported by the Department.

18. Dept of Minerals & Energy: The assumed exposures for the inadvertent intrusion scenarios are "very conservative". Recent ICRP dose conversion factor changes make the calculated doses even more conservative. Thus the exact specific activity of the thorium waste is "of no practical consequence".

19. Minerals and Energy: It is presently unclear whether DOME should be the regulator - DEP is awaiting Crown Law advice on this.

20. Radiation Health: Noted the defacto indefinite nature of the "institutional control period".

21. Radiation Health: Development of the split-up or sharing of responsibilities of the "Appropriate Authority" will require Radiological Council, EPA, and (probably) DOME to come to a mutual understanding and organise frequent formal communications meetings. Advisor's comments: Agreed; in South Australia, during the exploration and pilot plant stage of the Olympic Dam Project, this took a long time to formulate, but it ultimately worked very well.

    Recommendation: Advice should be sought from Mrs Jill Fitch, Director Radiation Control Branch, SA Health Commission regarding the development of the regulatory regime in consultation with other regulators..

22. Rad'n Health: Radiological Council needs to be intimately involved in the development of the database/inventory/tracking system, both for small sources and for Rhone-Poulenc waste.

    Recommendation: Both Radiation Health and EPA have an interest in the success of this database, and therefore both should be involved, together with the proponent, WMD.

23. Rad'n Health: More detailed occupational dose calculations both for forklift driver and for truck drivers should be made available to Radiological Council when operating procedures have been firmed up.

24. Rad'n Health: Site registration requirements should be discussed with Radiological Council at an early stage.

    Recommendation: This should not be a one-shot briefing, but a series of mutual briefings, if necessary before the full Council.

25. OSS: Overall plan appears to be sound.

26. OSS: Several detailed comments on Enviro Monitoring Program (endorsed by the present author as technical auditor).

Independent Assessor's comments on Issues Raised in Public Comments:

Technical comments

Given that a rare earth processing plant is deemed to be a "good thing", and enjoys bipartisan support, Mt Walton is one of the best sites in Australia, as confirmed by the DPIE desk study, most recently, and is vastly better than disposal at Pinjarra, as originally proposed by Rhone-Poulenc and still preferred by the GASP group. This assessor's technical opinion is that the plan for disposal of wastes arising from treatment of monazite, in trenches at Mt Walton, is in conformity with international best practice, and poses no risk to the environment. The occupational hazard is small, readily quantifiable, and easily controlled. Any spillages during transport or during handling can easily be cleaned up with good dose control both for operators and for members of the public, provided proper plans are prepared ahead of time.

If this were a co-located monazite mine, treatment plant, and tailings disposal system, there would be **absolutely no debate** about whether the waste needs encapsulation or conditioning: the emphasis would be solely on the integrity of the tailings containment system.

Trench disposal of uranium mill wastes was actively considered in the US for at least one project in the early 1980's, the Marquez Project, owned by Bokum Resources, in the Ambrosia Lake district near Grants, New Mexico. An advantage of the trench disposal system is that spoil created during excavation of trench number 2 can, if properly segregated, be used immediately for cover of trench number 1, thus minimising double handling and speeding rehabilitation. In fact, consideration should be given to using **all material** from the trenches to cover the filled trenches: this will create a "tumulus", and solve the question of disposal of any excess spoil.

This assessor's technical opinion is that the plan for emplacement of gangue by bulkabags with interposed clay/sand layer is appropriate, not only because it provides a dilution over the volume of the deposit to ensure averaged specific activity meets the arbitrary and very conservative specific activity limit for category C waste as set out in the Code, but also, and more usefully, and more importantly, the clay layer provides a trafficable surface for forklift to travel on when placing the subsequent layers, and, even more importantly, it provides radiation shielding for the forklift operator during this task.

Regulatory regime comments

Whilst the close relationship of operator/proponent (Waste Management Division of DEP) and regulator (Evaluation Division of DEP acting for EPA during licensing process; and Pollution Prevention Division of DEP when in operation) has been commented on, it is not unique: every Health Commission in Australia is both operator and regulator (e.g. of x-ray apparatus in hospitals); Mines Depts in Australia generally have an Exploration Drilling Section which is an operator, working under the regulatory surveillance of the Mining Inspectorate.

There is the potential for Radiological Council to give advice which is at variance with that from either DOME or independent advisor with uranium mining background. This needs to be managed, not least by the Radiological Council, which **should seek specialist technical advice** before it formulates its position on such things as licence conditions.

It is essential that the Radiological Council does not set conditions for the disposal of thorium hydroxide (Rhone-Poulenc) waste at Mt Walton that are out-of-kilter with recognised best-practice for tailings disposal in uranium mining; as it is at least possible that this will occur at some time in the future in this state, and unnecessarily restrictive precedents should be avoided. Also, the credibility of the Radiological Council would be at risk if seen to be vastly more conservative than (say) advice from Australian Radiation Laboratory or well-regarded international regulators (such as the Canadian Atomic Energy Control Board).

It is most important that the Radiological Council position itself so as to provide ongoing advice to the proponent and to the other regulatory agencies during the planning and design process, so that when the proponent seeks its licence, and other operations approvals, both proponent and regulators will be fully aware of the requirements of the other parties, and will have agreed how those requirements will be met. It is strongly recommended that there be mutual briefing sessions so that each of the parties is fully acquainted with the requirements of, and constraints on, the other parties.

It may be argued that Radiological Council has responsibility for matters of occupational radiation protection, and for here-and-now public-health radiation protection, whilst EPA has responsibility to look after potential far future exposures of low probability.

> **Recommendation**: There should be **regular, formal, mutual briefing meetings** between the operator (Waste Management Division) and the regulators, those being Evaluation Division officers acting for EPA **during the condition-formulation process**, and DEP Pollution Prevention Division officers once operations commence, and Radiation Health Section officers acting for Radiological Council, and also, probably, officers of the Dept of Minerals and Energy. Note that these meetings are essential so as to ensure that the regulatory agencies "speak with one voice" and so that good communication may be achieved. It is **also essential for the proponent and regulators to meet regularly during the design stage, to review details of design and details of proposed procedures**. To refrain from formulating a regular project review briefing with proponent and regulators is not an option.

This means that Radiological Council must defacto delegate some of its condition-setting powers to its Radiation Health Section - based officers, so that they can attend such meetings and be empowered to make decisions at them.

The environmental monitoring program as proposed by the proponent/operator is considered to be considerably more than is needed in terms of number of samples, but is not one which appears to be amenable to easy interpretation of results: the proponent will end up with lots of data, but not data that is capable of properly defining background, nor data capable of unequivocally showing zero deviation from background (or otherwise). For instance, radon must be tied in with weather data, on an hour-by-hour basis; dust samples will require for anything countable, continuous-running Hi-Vol airsampler data; subsurface soil analysis is probably pointless; charcoal-can radon emanation should relate to radium content of the surface layer of soil;.... basically, you should devise your environmental sampling program to get the best picture you can, cheaply, of the natural environment at the site.

> **Recommendation**: The proponent should review its proposed monitoring plan with Rad Health, EPA, and DOME personnel, for simplification and focus.

> **Recommendation**: A continuous-recording weather station should be set up on site.

It would be easy to obtain experimental gangue drying curve data ("characteristic curve" showing moisture content versus pore pressure) and wetting curve data for local clay, and from simple calculations, determine (a) the actual final equilibrium gangue moisture potential and content; (and hence determine whether 10% is correct or not as an ultimate gangue moisture content); and (b) the ultimate distance that moisture can diffuse in the insitu clay, to bring it to the same moisture potential (and hence determine explicitly the containment capacity of the clay).

In addition, note that Soil & Rock Engineering report (1989) recommended testwork to "ascertain cation exchange capacity" of the local clay.

> **Recommendation**: Experimental work should be commissioned to address these issues.

Note that the project does not depend on the outcome of these experiments, because the inherent conservatism of (a) the site and (b) the choice of below-grade emplacement virtually guarantees no radionuclide movement, anyway.

> **Recommendation**: EPA should be provided with information on the "sorptive capacity" of clayey soils by the proponent. Useful references may be found in the annual University of Colorado Tailings Symposium Proceedings.

Recent rainfall events (Cyclone Bobby, and the heavy rains of 1993 show that nothing untoward happens at the site, following extreme rainfall events, because it is indeed on the high separating two catchments.)

> **Recommendation**: There should be regular photographic records to show, inter alia, the effects of weather extremes and drought and intense rainfall episodes.

Bush fires represent a threat to operations and equipment.

> **Recommendation**: proper firebreaks must be established.

Conversations with Malcolm Cooper and Peter Burns of Australian Radiation Laboratory confirm that the ICRP have recently relaxed the Annual Limit of Intake for Thorium by a factor of ten (they have also tightened the ALI for Radium for reasons that are not clear). Thus there is certainty that the Specific Activity limit for category C will ultimately be relaxed, as it applies to the gangue waste under discussion, but it is not yet clear by what factor.

The IRM report's assumption of erosion of 5 metres of cover over 12,000 years to expose the waste is not credible, in the absence of the onset of a new Ice Age. (note that we are presently in an "Interglacial" period.) Aeolian erosion would at most deflate the present surface to the resistant silcrete layer and there produce an armouring pebble layer. One way to add yet more conservatism to the design is to plan that **all** silcrete extracted will be used for armouring the backfilled trenches.

It is not obvious why the "Institutional Period" should be limited to 100 years; should our present society survive, surely our descendants would retain some interest in maintaining institutional oversight, if not continue to use, this facility?

The practice of formally controlled in-ground disposal of radioactive wastes is not new to Australia. This reviewer knows of or has been involved in the following instances (all with the written authority of the regulatory agency and recorded in agency files at the time):

- disposal of sealed industrial slurry density gauges at Mt Isa, in large mined-out open stopes during cement backfilling, with approval of Qld Health Dept, Health and Medical Physics Division, in the late 1970's;
- disposal of contaminated wastes from demolition of the Mary Kathleen Uranium mill, in the MKU pit, subsequent to mine closure, early 1980's, for covering with mine subgrade waste;
- disposal of a large quantity of contaminated soil and rubble from the University of Queensland metallurgical research facilities to the MKU pit, during the same period;
- disposal of small quantities of smoke detectors, gauges, etc., to the Radium Hill mine waste dumps prior to rehabilitation, in the mid 1980's;

- disposal of some 3000 drums of assorted radioactive and non radioactive metallurgical testwork wastes from AMDEL Thebarton in suburban Adelaide for emplacement in trenches at the site of the (then yet to be constructed) Olympic Dam Project tailings dam, about 1987..

Conclusions and Strategic Recommendations

The proposal presented in the EMP is assessed to represent negligible risk to the environment from emplacement of the wastes. There is a necessity for proper planning and management to control the occupational exposure of workers, and to ensure there is a robust capability to respond in the event of a transport spillage. The appropriate commitments have been made to address both of these issues.

Matters of detail with regard to further testwork, environmental and occupational monitoring programmes, operational procedures and manuals, and so on, should be worked out in an iterative manner with the Appropriate Authorities.

It is therefore essential that regulators commence regular joint meetings to (i) review and mutually agree their various roles as "appropriate authorities" (ii) review, with the proponent, the proponent's physical designs and management plans as they are developed; (iii) accept reports as required either by the Code or by Ministerial condition; and develop the details of the regulatory regime so as to cater for the requirements of all stakeholders, including the proponent. Such a meeting could be given status as a subcommittee of the Radiological Council, or could be a committee reporting to EPA, or could stand-alone.

The ministerial conditions as presently set out are cumbersome, difficult to read, and contain "hangovers" from the high-temp incinerator proposal, and thus need to be simplified; they also need to be expanded to include conditions arising out of the present review.

If the involvement of Dept of Minerals and Energy as a regulator is confirmed, then they could bring to the forum of regulatory agencies several useful capabilities:

(a) They have scientifically accepted expertise in radiation protection in the minerals industry;

(b) they have a general OH&S function that provides extra persuasive force,

(c) they have personnel in the Goldfields area, and

(d) the sensitivity of the DEP being apparently in the position of being its own regulator is diminished by the surveillance of another Inspectorate.

It is sensible that, in the event of Crown Law NOT finding that DOME has jurisdiction, EPA should consider some other way to issue inspectorial powers to DOME, or otherwise engage their expertise.

Comments on Rare Earth Plant Waste classification as Category C

Why is it sensible to treat waste from monazite cracking plants as "Category C" under the Near-Surface Disposal Code?

1. The Radiation Health Section of the Health Commission did so, as proponent, in its document entitled "Proposed Disposal of Radioactive Waste at Remote Site - Environmental Management Programme", in Sept 1989.

2. ARL draft Technical Report on near-surface waste disposal says: "one type of radioactive porous media waste that could be included in Category C waste is thorium dioxide slurry residue generated from the processing of monazite for the extraction of rare earth minerals."

3. The NHMRC Code for Near-Surface Disposal of Radioactive Waste says, in **definitions**: "Category C covers solid waste containing alpha, beta, or gamma emitting radionuclides with activity concentrations similar to those for Category B. However, **this waste will typically comprise bulk materials, such as those arising from downstream processing of radioactive minerals, ... for which conditioning would prove to be impractical."** (emphasis added by present author)

Comments on Concerns regarding Respirability of Gangue Waste.

Respirability of dried gangue waste has been raised as a potential concern. This concern needs to be considered in regard to 3 scenarios: (i) occupational exposure of forklift driver to airborne gangue dust whilst unloading bags from seafreight-container and placing them in the disposal trench; (ii) exposure of a member of the public to dust as a result of spillage following an accident during transport; (iii) exposure in the distant future of a member of the public as a result of inadvertent intrusion in the course of an archaeological dig.

The appropriate ways of managing these three scenarios so as to be confident of adequate control, are:

(i) Occupational dust control is required to be addressed in the Radiation Management Plan, which should be delivered to the regulatory agency in draft form, so that any agreed modifications can be made; the RMP must consider monitoring and possible need for respiratory protection.

(ii) Public exposure control must be addressed in the Transport Emergency Plan; including provision for traffic control equipment, monitoring equipment, provision for wetting-down and for covering, vacuum cleaner, drums or bulka bags for collection of cleanup material, communications, etc..

(iii) Archaeological dig scenario: The definition of Category C was intended to adequately define the limits of acceptability of material for acceptance for +5 metre burial, **for minimisation of doses under this scenario, and assuming failure of any cementation process at some time after 300+ years:** thus, acceptance as Category C implies that the dose to archaeological dig workers, **whatever it is**, is deemed to be low enough to be acceptable.

Note that under the Transport Code, this material can legally be transported in bulk, loose, in trucks on the public roads: and this is in accordance with IAEA Guidelines. It would therefore seem unreasonable and unnecessary to require either agglomeration or conditioning, or indeed, further packaging prior to burial.

Appendix: Radioactive decay chains:

Thorium decay chain (simplified):

Nuclide	Radiation	Half-life
Thorium 232	alpha	14 billion yrs
Radium 228	beta	6.7 yrs
Actinium 228	beta	6 hrs
Thorium 228	alpha	1.9 yrs
Radium 224	alpha	3.6 days
Radon 220	alpha	55 seconds
Polonium 216	alpha	0.16 secs
Lead 212	beta	10.6 hrs
Bismuth 212	beta	1 hr
Polonium 212	alpha	0.3 microseconds
Thallium 208	beta	3 minutes
Lead 208	-----	infinite

Uranium decay chain (simplified):

Uranium 238	alpha	4.5 billion yrs
Thorium 234	beta	2.4 days
Protactinium 234	beta	1.2 minutes
Uranium 234	alpha	250 000 yrs
Thorium 230	alpha	80 000 yrs
Radium 226	alpha	1600 yrs
Radon 222	alpha	3.8 days
Polonium 218	alpha	3 minutes
Lead 214	beta	27 minutes
Bismuth 214	beta	20 minutes
Polonium 214	alpha	160 microseconds
Lead 210	beta	22 yrs
Bismuth 210	beta	5 days
Polonium 210	alpha	140 days
Lead 206	------	infinite

Ministerial Conditions redrafted for consideration:

Summary of Commitments	Assessment by this auditor
Management:	
Owned, controlled and operated by Government Department	1 and 3
Only for wastes generated in WA	3
Annual reports on the environmental management and monitoring commitments	3
Proponent to initiate and co-ordinate a Control Committee including local reps	1
Proponent to initiate and co-ordinate a Community Liaison Committee	1
Site:	
Biological and archaeological site surveys performed	1
Fencing and signposting performed	1 and 3
Emergency Services:	
All personnel trained in safety and emergency response procedures	1 and 3
First aid and hygiene measures	1 and 3
Emerg services to include firewater supply, firebreaks, washing facilities etc	1 and 3
Emergency contingency planning prior to transport and disposal	1 and 3
Occupational Radiation Protection:	
Rad Health to assist in devel. of guidelines for safe handling of waste	1 and 3
Current and future Codes of Practise dealing with radioactive wastes will be met	1 and 3
Airborne dust, AMAD where applicable, and alpha and beta activities measured	3
Worker radiation monitoring and health surveillance program implemented.	3
Radiation assessments for containerised wastes will be verified	1 and 3
Environmental:	
Baseline radiation survey will be carried out	1
Monitoring of radiation levels	3
Workplace Safety:	
Properly trained and fully qualified operators	1 and 3

Appendix 3

Existing Ministerial Conditions from previous proposals

Ass # 168

Bull # 353

State # 044

MINISTER FOR ENVIRONMENT

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

PROPOSED INTEGRATED WASTE DISPOSAL FACILITY
EASTERN GOLDFIELDS WESTERN AUSTRALIA

HEALTH DEPARTMENT OF WESTERN AUSTRALIA

This proposal may be implemented subject to the following conditions:

1. The proponent shall adhere to the proposal as assessed by the Environmental Protection Authority and shall fulfil the commitments made in the Public Environmental Report (copy of commitments attached).

2. Prior to construction of the proposal, the proponent shall undertake a drilling programme at the chosen site to confirm (or otherwise) the absence of potable water and to confirm (or otherwise) that the depth of clay is in excess of 15 metres, and forward results to the Environmental Protection Authority for assessment.

3. Prior to construction, the proponent shall undertake biological surveys to the satisfaction of the Environmental Protection Authority, to indicate the impact of the facility on any rare and/or endangered species.

4. Prior to construction, the proponent shall undertake a survey to the satisfaction of the Registrar of Aboriginal Sites, to determine if any Aboriginal sites exist on the project area.

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5. Prior to commissioning, the proponent shall prepare an Environmental Management Programme (EMP) to the satisfaction of the Environmental Protection Authority. The EMP shall be made available to the public and shall include:

   - size of the incinerator;
   - operational procedures;
   - transportation of the wastes;
   - details of packaging of the wastes;
   - emergency procedures;
   - protection of any rare or endangered species found on or near the site;
   - disposal of waste containers and other solid wastes from the facility;
   - a monitoring programme.

6. Prior to commissioning, the proponent shall undertake, for all stages of the transport operation, the following:

   - establish detailed specifications for waste loading, transfer and unloading areas;
   - outline specific safeguards for rail containers and their contents;
   - detail plant site storage and handling requirements, including fire safety;
   - identify responsibility for the various aspects of transport and transfer operations;
   - prepare contingency plans for dealing with spillages should they occur; and
   - liaise with the local communities over emergency procedures.

   The above matters shall be included in the Environmental Management Programme and shall be to the satisfaction of the Environmental Protection Authority and relevant Government agencies.

7. The proponent shall report the results of the monitoring programme to the Environmental Protection Authority at six monthly intervals. These results shall be made available to the public following their consideration by the Environmental Protection Authority.

8. Prior to commissioning, the proponent shall prepare a hazard and safety management strategy for the incinerator to the satisfaction of the Environmental Protection Authority and relevant Government agencies.

9. Any proposal to dispose of wastes other than those specified in the Public Environmental Report at the Integrated Waste Disposal Facility, shall be referred by the proponent to the Environmental Protection Authority for assessment. No such wastes shall be disposed of at the facility unless it is found to be environmentally acceptable to do so following referral and assessment.

10. The proponent shall be responsible for decommissioning the facility and rehabilitating the site and its environs to the satisfaction of the Environmental Protection Authority.

11. The proponent shall, at least six months prior to decommissioning, prepare a decommissioning and rehabilitation plan to the satisfaction of the Environmental Protection Authority.

12. The proponent shall obtain a Works Approval (prior to construction) and a Licence (prior to commissioning) for the proposed facility under the provisions of Part V of the Environmental Protection Act 1986.

13. For any proposal to dispose of "other wastes" referred to the Environmental Protection Authority pursuant to Condition 9, and subsequently found to be acceptable, the proponent shall prepare (to the satisfaction of the Environmental Protection Authority) an Environmental Management Program, which shall include the issues listed in Conditions 5 and 6 for that proposal.

Barry Hodge, MLA
MINISTER FOR ENVIRONMENT

25 OCT 98