Rare Earth Project, 4 km south of Alcoa Alumina Refinery and next to Gallium Plant, Pinjarra

Rhone-Poulenc Chimie Australia Pty Ltd

Report and recommendations
of the Environmental Protection Authority

The appendices for this Bulletin are in a separate document accompanying this report

Environmental Protection Authority
Perth, Western Australia
Bulletin 810
April 1996

THE PURPOSE OF THIS REPORT

When proposals are referred to the Environmental Protection Authority under Section 38 of the *Environmental Protection Act 1986*, Section 44 of the Act requires the EPA to report to the Minister for the Environment on:

- the environmental factors relevant to the proposal; and
- the conditions and procedures to which the proposal should be subject if it proceeds.

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding Environmental Conditions which might apply to any approval.

APPEALS

If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on 18 April, 1996.

Environmental Impact Assessment (EIA)

Process Timelines in weeks

Date	Timeline commences from receipt of full details of proposal by proponent	Time (weeks)
16/10/95	Proponent Document Released for Public Comment	
27/12/95	Public Comment Period Closed	10
25/01/96	Issues Raised During Public Comment Period Summarised by EPA and Forwarded to the Proponent	4
19/02/96	Proponent response to the issues raised received	3
02/04/96	EPA reported to the Minister for the Environment	6

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Summary and recommendations

The proponent, Rhone-Poulenc Chimie Australia Pty Ltd (Rhone Poulenc), proposes to build and operate a rare earth plant on a site 4 km south of Alcoa Alumina Refinery and adjacent to the existing Rhone-Poulenc Gallium Plant at Pinjarra, approximately 100km south of Perth and 30 km southeast of Mandurah. The plant will produce 15,000 tonnes per annum (tpa) of solid rare earth nitrate concentrate.

The proponent referred the proposal to the Environmental Protection Authority (EPA) on 3 April 1995 for assessment. The EPA set the level of assessment at Public Environmental Review (PER) but the Minister for the Environment raised it to an Environmental Review and Management Programme (ERMP) level, in view of major public interest in and concern with the proposal.

During the assessment, the EPA sought expert advice from government agencies including the Radiological Council/Health Department of WA, Department of Minerals and Energy (DME), Water and Rivers Commission, Main Roads WA and Department of Environmental Protection (DEP). The EPA also utilised the information given in the ERMP Document, and has taken into account additional information supplied by the government agencies, the public and the proponent.

The EPA considered the main topics of concern relating to the proposal, and identified the following key environmental issues requiring evaluation:

- radiological impacts from road transport of gangue residue;
- atmospheric emissions of radionuclides from plant operations;
- impacts of plant operations on surface and ground water quality;
- noise emissions (from construction, plant operations and increased heavy vehicle traffic);
- post-operational management of radioactive contamination and evaporation ponds; and
- social surroundings.

The EPA finds the proposal acceptable on environmental grounds, subject to the proponent's commitments and recommendations in this assessment report.

It should be mentioned that the EPA's evaluation is limited to the impacts of radiation on the environment. The occupational aspects of radiation can be dealt with through the appropriate bodies such as the Radiological Council and DME.

The EPA is aware that there is a significant concern in the local community with the potential social impacts of the proposal, particularly the potential adverse impact on tourism. The EPA considers that this concern mainly relates to the "perceived" risks of radiation and should be further addressed by the proponent and other agencies including the Department of Resources Development, Shire of Murray and the WA Tourism Commission.

The EPA's recommendations are summarised in the following table. Recommended environmental conditions for the rare earth plant are also provided in this report.

Recommendation Number	Summary of recommendations
1	The proposal for a rare earth plant to produce 15,000 tpa of solid rare earth nitrate concentrate is environmentally acceptable subject to the recommendations in this report and the proponent's commitments.
2	Proponent should provide details of pre-operational and operational monitoring programmes for surface and ground water including quality assurance procedures, prior to commencing plant construction and plant commissioning respectively.
3	Proponent should prepare a decommissioning and rehabilitation plan, at least 12 months prior to decommissioning. The plan should include detailed procedures for decontamination and disposal of radioactive contaminated materials, and rehabilitation of the evaporation ponds.
4	Proponent should carry out an annual performance audit and prepare a major review of environmental performance every 5 years.

1. Introduction and background

1.1 The purpose of this report

The proponent, Rhone-Poulenc Chimie Australia Pty Ltd (Rhone-Poulenc), proposes to build and operate a rare earth plant at Pinjarra. The plant will produce 15,000 tonnes per annum (tpa) of solid rare earth nitrate concentrate from monazite feedstock.

This report and recommendations provide the EPA's advice to the Minister for the Environment on the environmental acceptability of the proposed rare earth plant at Pinjarra.

1.2 Background

The proposed rare earth plant is located on a site 4 km south of Alcoa Alumina Refinery and adjacent to the existing Rhone-Poulenc Gallium Plant at Pinjarra, approximately 100km south of Perth, 30km southeast of Mandurah, the nearest regional centre and 9.5km southeast of Pinjarra, the nearest town. Figures 1 and 2 (Appendix 1) show the locations of the plant .

Rhone-Poulenc Gallium Plant was designed and constructed during 1987-1989 and was operational from 1989 to 1990. Since 1190, the plant has been placed on a care and maintenance programme due to a downturn in market conditions of gallium. It is anticipated that the establishment of the rare earth plant will facilitate the early restart of the Gallium Plant.

Rhone-Poulenc also sought to establish a rare earth plant at the Pinjarra site in 1988. The EPA found Stage I (to produce rare earth hydroxide) of the rare earth project to be environmentally acceptable (subject to various conditions) but that Stage II (to separate the rare earths from the rare earth nitrate) of the project, which would generate quantities of ammonium nitrate as a by-product, was not environmentally acceptable due to the concern of long term storage of the ammonium nitrate residue at the Pinjarra site. The reasons are stated as follows (EPA, 1988a):

> "• The long term storage of large quantities of ammonium nitrate in the Peel-Harvey Catchment is unacceptable in the long term because of the potential to add significant quantities of nitrogen to the Peel-Harvey Inlet, an area already subject to nutrient enrichment problems;
>
> • The long term storage of large quantities of ammonium nitrate above potable and near potable ground water sources is unacceptable in the long term because of the potential to pollute those sources with nitrate; and
>
> • There is no apparent environmentally acceptable method for the removal, transportation and disposal of radium contaminated ammonium nitrate."

Consequently, Rhone-Poulenc developed a revised strategy for the management of the waste by-product (principally ammonium nitrate). Although an ERMP was prepared for the revised strategy, Rhone-Poulenc withdrew their proposal in 1990 hence the EPA was not required to give advice to Government.

The current proposal is based on a different process which does not result in the generation of ammonium nitrate or a separate radium stream, thereby effectively eliminating the waste streams of concern for the previous proposal.

The current proposal also involves transporting gangue residue, a low level radioactive waste from the rare earth extraction process, from the plant site for disposal at the Intractable Waste Disposal Facility (IWDF) near Mt Walton located in the Goldfields. Management of the disposal operations at the IWDF will be the responsibility of the Waste Management Division (WMD) of the Department of Environmental Protection (DEP), the operator of the IWDF on behalf of the Health Department of WA. To conform with the Environmental Conditions for the IWDF (Statement 044, published on 26 October 1988), the WMD has prepared an Environmental Management Programme (EMP) for the disposal of Rhone Poulenc's gangue residue, which is assessed by the EPA in parallel with this proposal.

1.3 Structure of the report

The report document has been divided into seven sections.

Section 1 describes the background to the proposed rare earth plant at Pinjarra (proposal), and the structure of this report. Section 2 describes the proposal. Section 3 explains the environmental impact assessment process, and provides a review of topics in order to identify environmental issues requiring evaluation by the EPA.

Section 4 provides an evaluation of the key environmental issues associated with the proposal. For each environmental issue, the objective of the assessment and an evaluation framework is defined. In addition, the likely effect of the proposal, the advice to the EPA from submissions, and the proponent's response to submissions are described. The EPA's analysis and recommendations with respect to the identified issues are contained in this section. The adequacy of the proponent's response is considered in terms of project modifications and environmental management commitments in achieving an acceptable outcome. Where an inadequacy is identified, a recommendation is made to achieve the environmental assessment objective.

Section 5 summarises the conclusions and recommendations while Section 6 describes the recommended environmental conditions.

References cited in this report are provided in Section 7.

Figures and Tables relating to the project are contained in Appendices 1 and 2 of the report.

2. The proposal

The proposal consists of the following facilities/components:

- a rare earth plant to produce 16,000 tpa of rare earth nitrates (Appendix 1, Fig 3); and
- transporting materials to and from the plant, including the transport of 12,000 tpa of monazite from existing mineral sand separation plants in WA and the transport of 6,000 tpa of low level radioactive waste (gangue residue) from the plant to Mt Walton IWDF (as mentioned earlier, the management of the disposal operations at the IWDF will be the responsibility of the Waste Management Division on behalf of the government).

The proposal would also make use of the following existing facilities on site which have been constructed for the Gallium plant:

- evaporation ponds (Appendix 1, Fig 3);
- stormwater ponds;
- caustic pipeline;
- liquid storage area; and
- ancillary facilities including utilities production, workshops, laboratory, and change rooms (ERMP, Section 3.8).

The project involves the processing of up to 12,000tpa of monazite to produce approximately 16,000tpa solid rare earth nitrate (for export), 17,000tpa of tricalcium phosphate (TCP) as a by-product and 6,000tpa of gangue residue as the principal waste product. Figure 4 (Appendix 1) shows the basic process flow diagram and the process main inputs and outputs.

The process of extracting the rare earth elements from monazite involves the following stages:

- Ore attack: the cracking of the ground monazite ore by caustic soda resulting in a slurry mixture of trisodium phosphate in solution and solid rare earth hydroxide. This solid contains all constituents of the monazite except the phosphate.
- Hydroxide separation and caustic recycling: the rare earth hydroxide will then be separated from the trisodium phosphate solution, backwashed and filtered to form hydroxide cake.

The phosphate stream will be treated with lime to recover caustic soda and to produce TCP as a by-product. The caustic soda will be separated from the TCP by filtration and reconcentrated for recycling to the ore attack unit. The TCP will be dried in the plant (instead of being stored in the evaporation ponds as originally proposed in the ERMP) and transported to selected fertiliser companies. The ponds will only act as a temporary storage for TCP if the fertiliser manufacturer is unable to receive it or if there is a mechanical problem with the drier. In this case, the TCP will be neutralised with sulphuric acid and/or with acidic effluent from the Gallium Plant before being stored in the evaporation ponds, for later recovery, drying and sale to the fertiliser industry.

- Acid attack of hydroxide: the hydroxide cake will be dissolved in nitric acid and chemically treated with barium carbonate, sulphuric acid and caustic soda to precipitate out its entire radioactive content (thorium, uranium and the decay products). The precipitated solid will be filtered out to leave a non-radioactive solution of rare earth nitrate. The solid will then be transported to the IWDF site. The rare earth nitrate solution will be concentrated by evaporation, cooled and packaged for export to France and the USA as the final product of the plant.

The main wastes generated by the process and their proposed disposal methods will be:

- non-radioactive liquid process wastes containing mainly sodium salts (sodium sulphate, sodium chloride) and some TCP and calcium sulphate, which will be disposed of in the on-site evaporation ponds; and
- low level radioactive gangue residue containing thorium, uranium and their radioactive decay products, which will be disposed of at the IWDF. The specifications of the waste will conform with those defined by the National Health and Medical Research Council (NHMRC) Code of Practice for Near-Surface Disposal of Radioactive Waste in Australia (NHMRC, 1992) and by the operators of the IWDF.

The monazite feedstock will be obtained from existing mineral sand separation plants at Narngulu (near Geraldton), Eneabba, Capel and Bunbury in WA. Monazite is a by-product from the processing of mineral sands to produce the titanium minerals, ilmenite, rutile and zircon. Currently monazite is transported back to the mine sites for burial. A typical composition of monazite is shown in Table A1 of Appendix 2. It is a rare earth phosphate which also contains small quantities of other elements including thorium (approximately 6 percent ThO_2), uranium, iron, titanium and other metals.

Table A2 (Appendix 2) indicates the annual requirements of process chemicals. Quantities and typical compositions of the rare earth plant's product/by-product and plant effluent/waste product (gangue residue) are shown in Tables A3 and A4 (Appendix 2) respectively.

Figures 5 and 6 (Appendix 1) show annual water balance and radionuclide balance for the rare earth processing.

Monazite feedstock and process chemicals will be obtained within Western Australia and transported to the site by road. However, caustic soda will be delivered directly from the nearby Alcoa Pinjarra Refinery via the existing pipeline constructed for the Gallium Plant (ERMP, Section 6.5).

The proposed road transport routes for raw materials, product, by-product and waste associated with the rare earth plant are shown in Figure 6.1 of the ERMP. These routes were established following consultation with the Department of Minerals and Energy (DME) and Main Roads WA.

Process chemicals (excluding caustic soda), TCP by-products and rare earth nitrate products would be transported to and from Kwinana to the Pinjarra site via the Mandurah-Pinjarra route (ie. Russel Road, Stock Road, Mandurah Road, Mandurah Bypass, Pinjarra Road and the Pinjarra-Williams Road and then Napier Road).

Due to the lack of a suitable railway siding at Pinjarra, Rhone Poulenc has proposed to transport monazite from the monazite production sources located in Geraldton, Eneabba, Capel and Bunbury to the Pinjarra site by road (preferably in bulk or in 2 tonne bulka bags) in

dedicated B-double configuration trucks (Appendix 1, Fig 7). This would also reduce the number of handlings due to the transfer between trains and trucks if both road and rail were used. The monazite suppliers would be responsible for the monazite transport operations. The proposed routes for transport of monazite are (ERMP, Fig 6.1):

- via Great Northern, Roe Tonkin, Albany and South Western Highways to Pinjarra-Williams Road and then Napier Road to the site (from Eneabba/Geraldton area); and
- via South Western Highway, Coolup Road, Burnside Road, Pinjarra-Williams Road and then Napier Road (from Bunbury/Capel area).

The gangue residue would contain the radioactive components of the monazite at approximately double the original concentration (Appendix 2, Tables A1 and A4), and would be insoluble (Appendix 2, Table A5). The waste would be packaged into 2 tonne bulka bags and loaded into either standard ISO steel shipping containers or purpose built steel containers. It is proposed to transport the waste by road to the IWDF in B-double trucks. Three truck movements a week would be required to transport the waste from Pinjarra to the IWDF via the following major roads and highways (Appendix 1, Fig 8):

> Napier Road, Pinjarra-Williams Road, South Western Highway, Albany Highway, Tonkin Highway, Roe Highway, Great Eastern Highway; and the IWDF Access Road.

The above routes are based on a qualitative risk assessment of feasible transport options (Fig 9 of Appendix 1, and Table A6 of Appendix 2).

The IWDF has been established following approval by the WA Government, for the disposal of low level radioactive waste amongst other intractable wastes (EPA, 1988a, 1991 and 1993). Management of the disposal operations at the IWDF will be the responsibility of the Waste Management Division (WMD) of the DEP, the operator of the IWDF on behalf of the Health Department of WA. The WMD has prepared an Environmental Management Programme (EMP) for the disposal of Rhone Poulenc's gangue residue, for assessment by the EPA in parallel with this proposal.

The existing evaporation pond system constructed for the Gallium Plant has been operational for Gallium Plant effluents, and comprises two stormwater ponds and two larger evaporation ponds (Appendix 1, Fig 3). The evaporation pond system was designed and constructed following consultation with appropriate Government authorities and experienced engineering consultants (Appendix 1, Figs 10 and 11). An additional 5 ha pond (B3) may be required to allow both the rare earth and Gallium plants to operate at full capacity (Appendix 1, Fig 12).

The potential environmental impacts associated with the proposal, as discussed in the ERMP document, include radiation, surface and ground water quality, and noise. Figs 13a and 13b (Appendix 1) shows the potential pollution sources from the plant. Table A7 (Appendix 2) is the proponent's summary of potential environmental impacts associated with the proposal and proposed management measures.

The proponent has conducted an extensive community consultation programme during the preparation of the ERMP (ERMP, Section 4) and during the public review period. The proponent intends to continue the programme throughout the project life.

More detail on the proposal is provided in the proponent's ERMP document.

Construction of the proposed plant is anticipated to take approximately 12 months and will take into account special requirements for a processing plant of this type. The majority of the plant infrastructure and services for the Rare Earth Plant already exists as part of the Gallium Plant (ERMP, Section 3.8). Existing off-site facilities and transport networks will be used where necessary. The additional infrastructure required for the rare earth plant will include a steam boiler, one cell expansion to the recirculating cooling water system, additional laboratory equipment and electrical power transformer.

The plant will be operated on a 24 hours per day, 7 days per week, 46 weeks of the year. The expected life of the project is a minimum period of 20 years, however, this could be extended depending on the longevity of the monazite source from the Titanium Mineral Producers.

The proponent indicated that the benefits of the project to WA include the generation of up to 150 jobs during the construction phase and at least 50 permanent positions once the plant is operational, and an additional $27 million per annum of export earnings (the restart of the Gallium Plant would add another $20 million per annum of export earnings).

3. Identification of environmental issues

3.1 Method of assessment

The purpose of the environmental impact assessment process is to determine whether a proposal is environmentally acceptable or under what conditions it could be made environmentally acceptable.

The environmental impact assessment process for this proposal followed the *Environmental Impact Assessment Administrative Procedures, 1993*. (refer to flow chart in Appendix 3).

The proponent referred the proposal to the Environmental Protection Authority (EPA) on 3 April 1995 for assessment under the *Environmental Protection Act 1986*. The EPA set the level of assessment at Public Environmental Review (PER) but the Minister for the Environment raised it to an Environmental Review and Management Programme (ERMP) level, in view of major public interest in and concern with the proposal.

The possible topics associated with the proposal were identified. These were incorporated in the Guidelines prepared by the DEP on behalf of the EPA, which were referred to relevant agencies and local community groups for comment prior to being finalised.

The topics were considered by Rhone-Poulenc in its ERMP document (September 1995). The ERMP document was checked by the DEP on behalf of the EPA to ensure that each topic had been discussed in sufficient detail by the proponent prior to release for public comment. The review document was available for comment for a period of 10 weeks between 16 October 1995 and 27 December 1995.

The public submissions received were summarised by the DEP on behalf of the EPA, and the proponent was asked to respond to the topics raised in submissions. The proponent also received copies of the full submissions from government agencies and that of a public submission (a group of radiation health physicists). Appendix 4 contains a summary of the topics raised in submissions from public and the proponent's response to those topics, while Appendix 5 contains submissions from government agencies and the proponent's response to those submissions. A list of submitters appears as Appendix 6. The proponent's commitments appear in Appendix 7.

The ERMP document, the submissions and the proponent's response were then subjected to analysis for environmental acceptability. All topics raised were considered by the EPA. The key environmental issues requiring evaluation by the EPA were identified from these topics. For each environmental issue, an objective was defined and an evaluation framework established for the EPA's consideration of the issue.

The expected impacts of the proposal, with due consideration to the proponent's commitments to environmental management, were then evaluated against the environmental objectives. The EPA then determined the acceptability of the impacts.

Limitation

This evaluation has been undertaken using information currently available. The information has been provided by the proponent through preparation of the review document, by DEP officers utilising their own expertise and reference material, by utilising expertise and information from other State government agencies, information provided by members of the public, and by contributions from EPA members.

The EPA recognises that further studies and research may affect the conclusions. Accordingly, the EPA considers that if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the EPA.

In regard to radiological impacts from the proposal, the EPA's evaluation is limited to the impacts of radiation on the environment. The EPA considers that occupational aspects of radiation should be dealt with through the appropriate body such as the Radiological Council and the Department of Minerals and Energy.

3.2 Public and agency submissions

Comments on the proposal were sought from the public, community groups, as well as local and State government agencies. During the public review period, 394 submissions were received.

Submissions were within the following categories:

- 384 submissions from members of public (including 13 submissions from groups/organisations and 310 proforma submissions); and
- 11 submissions from government agencies (3 submissions from local governments, 1 submission from the Commonwealth Environmental Protection Agency (Commonwealth EPA) and 7 submissions from State government agencies excluding the DEP).

The topics of concern raised in the submissions can be grouped under the following broad categories:

Pollution impacts

- transport of process-related materials to and from the plant including radioactive gangue residue and monazite, and other non-radioactive materials;
- atmospheric emissions from plant operations (including radioactive gases, dust);
- impacts of plant operations on surface and ground water quality;
- noise emissions (from construction, plant operations and increased heavy vehicle traffic);
- post-operational management of radioactive contamination and evaporation ponds.

Other concerns

- social surroundings; and
- other concerns including long term management of gangue residue at Mt Walton (liability, security and risk to future generations), buffer zone, contingency planning and alternative feedstocks to monazite.

A synopsis of the submissions is provided below.

3.2.1 Synopsis of submissions

The submissions received from the public indicated a strong objection to the proposal (Appendix 4). These submissions were primarily concerned with the potential radiological impacts associated with the rare earth plant operations and road transport of gangue residue to Mt Walton. The community believed that there is no safe level for radiation exposure hence any

additional exposure to radiation should be avoided. Many of the submissions expressed concern with the potential contamination of surface and ground water from the plant operations, particularly from the evaporation ponds, since the plant site has high water table level in winter and is in the catchment area of the Murray River which flows into the Peel Harvey Estuary. Concern was also raised about management of radioactive contamination and the evaporation ponds during and after plant decommissioning.

A large number of submissions expressed a concern with the potential social and economic impacts of the proposal to the Pinjarra community and Peel area, and in particular, the impacts on tourism, agricultural industries and land values.

Some submissions expressed a view that the proponent did not provide sufficient information in the ERMP on the above topics and had consequently caused much fear and uncertainty.

Concern was raised about the generation of the gangue residue from the proposal, which has extremely long radioactive half-life, the need to safely store the waste at Mt Walton for several billion years and its associated cost to the WA community. Other concerns expressed in the submissions include no consideration in the proposal for alternative feedstocks for rare earth production which are not radioactive or have low level of radioactivity, and a lack of detailed analysis of the real costs and benefits of the proposal to the community (particularly the local community) in terms of short, medium and long term.

The submissions and subsequent advice from Commonwealth EPA and State government agencies, namely the Department of Minerals and Energy (DME), Radiological Council/Health Department, Water and Rivers Commission, Main Roads WA, WA Fire Brigades Board indicated no major problem with the proposal (Appendix 5). The submission from the WA Tourism Commission, however, indicated a concern with the potential negative impacts of the proposal on tourism development in the Peel area.

3.3 Review of topics

There were no additional topics generated from other information sources during the assessment process. Hence the topics raised in submissions (Section 3.2) are considered as the topics identified for this proposal.

These topics are considered and reviewed in conjunction with the characteristics of the proposal and the comments received, in order to identify the environmental issues requiring evaluation by the EPA.

The identification of issues is provided below and summarised in Table 1.

3.3.1 Transport of process-related materials including radioactive gangue residue and monazite, and other non-radioactive materials

The ERMP indicated that, with the exception of caustic soda which would be delivered directly from the nearby Alcoa Pinjarra Refinery via the existing pipeline, other materials associated with the rare earth processing were proposed to be transported to or from the plant by road. The proposed road routes were established following consultation with the DME and Main Roads WA (ERMP, Fig 6.1).

The submissions indicated concern with the potential impacts on public health/safety and the environment from road transport of process materials (and from the caustic pipeline), particularly the consequences of a spill. Concern was raised about the increase in traffic volumes of heavy haulage through Pinjarra and populated areas such as Armadale, and their associated impacts on noise to residents and on road transport safety. The submissions were concerned with the choice of road instead of rail for transporting radioactive materials and other hazardous chemicals and suggested that a study on comparative risk between road and rail should be carried out, particularly for the transport of gangue residue.

The concern with the potential impacts on public health/safety and the environment from transport of the materials associated with the proposal (including the caustic pipeline) and from

Topics	Proposal Characteristics	Government Agencies' Comments	Public Comments	Identification of Issues
Pollution Impacts				
Transport of process related materials including radioactive gangue residue and monazite, and other non-radioactive chemicals.	•Except caustic solution, which is provided via an existing 5km pipeline from Alcoa, all materials are transported to and from the plant by road. • Proposed transport routes were established following consultation with DME and Main Roads. • Transport routes for gangue residue were based on a qualitative assessment of feasible transport options and route selection criteria. • Transport of monazite (usually in bulk) and gangue residue (packaged into 2 tonne bulka bags) in ISO containers or purpose-built steel containers by B-double trucks. • Draft Transport Emergency Response Plan for the gangue residue has been developed. • Emergency response plans and clean-up procedures for dangerous goods will be prepared •Minimal impact on the environment in the event of a rupture of the caustic pipeline.	• Proposed road routes and transport management procedures are acceptable (DME, Main Roads WA). • "Door-to-door" rail option for gangue residue since it gives minimum radiation dose to drivers (Radiological Council). • No major objection to Draft Emergency Response Plan for gangue residue (Radiological Council, DME, WA Fire Brigade). • Transport of dangerous goods is of a routine nature and can be effectively managed by standard industry practice (DME). • Transport routes selected for bulk acids should avoid public drinking water resources areas, and wetlands recommended for the preservation of aquatic biota. Thorough contingency plans for spillage are required, and must be reviewed and accepted by all revevant and responsible agencies (Water and Rivers Commission). • Heavy haulage on South Western Highway is not considered a safe option (Shire of Serpentine-Jarradale).	• Public exposure to radiation, particularly in an accident. • Public risks from heavy haulage through populated areas (eg Armadale). Rail is the preferred option . • Noise impacts to residents at Pinjarra. • Integrity of the gangue residue and its packaging for safe transport and disposal at Mt Walton. • Public risk from transport of hazardous materials by road through major town centre. • Consequences of a rupture of caustic pipeline .	•Main Roads is responsible for heavy haulage movement on roads. • DME is responsible for public and safety of transport of dangerous goods. Ecological impacts should be addressed as a whole under the ecological risk policy currently being developed by the DEP under the auspices of WAACHS. No further evaluation is required. •DME and Radiological Council are responsible for transport of monazite, which has been transported by both road and rail without any major incident. No further evaluation required. • Concern about the caustic pipeline should be managed under Part V. • Transport of gangue residue requires evaluation by EPA.

TABLE 1. Identification of Issues requiring EPA Evaluation

Topics	Proposal Characteristics	Government Agency Comments	Public Comments	Issue Identification
Air emissions including radioactive gases and dust from plant operations.	• Commitment to ALARA principle in designing and operating the plant. • Radioactive emissions would be well below regulatory acceptable limits for public exposure to radiation. • No chemical or odour emissions was anticipated since process chemicals are used in enclosed system.	• Radioactive emissions are acceptable subject to proponent's commitments (DME, Radiological Council). • A worst case estimate of dust emission and dispersion is required to clearly demonstrate a negigible public dose (Commonwealth EPA).	• There is no safe level for radiation exposures. •Increased health risk (of cancers, birth defects etc.) in the Pinjarra community from exposure to radiation from the plant. • Impact of caustic and acid mists and vapours including odours.	• Chemical or odour emissions would be minimal due to enclosed process and equipment design. • Radiation emissions requires evaluation by EPA.
Impacts of plant operations on surface and ground water quality, particularly the evaporation ponds.	• Site is located in the Murray River catchment area. • Process effluents, and other wastewaters are collected for either recycling or treatment prior to being directed to the evaporation ponds (have been constucted for the Gallium plant). • Stormwater runoff from the plant site is collected prior to being discharged to the evaporation ponds or into surface drainages. • Ponds contains mainly sodium salts and only non-radioactive effluents are directed to the ponds.	• More information on the integrity of the ponds and on drainage and water courses in the area is required (Water and Rivers Commission).	• Impacts of pond seepage and a total breach of the ponds on groundwater quality, the Murray River system and subsequently the Peel Harvey Estuary. • Contamination of surface and ground water with process chemicals and radionuclides.	• Evaluation by EPA is required.
Noise emissions, vibration, light spill.	• There will be provision for noise containment in the plant design. • During plant operations, vehicle movements along the Pinjarra-Williams Road would result in 2% increase in current use of this road and 18% increase inheavy vehicles. • Vibration and light spill are contained within plant site due to the nature of plant design and location.	• No quantitative assessment of noise impacts has been carried out. Hence an assessment of plant operational and construction noise is required. Procedures should also be put in place to ensure that trucks associated with the project can achieve the lowest practicable noise emissions (DEP).	•Impact of noise during plant construction and operations, and particularly from increased traffic movements. • Impacts vibration and light spill on amenity of local residents.	• Impacts of vibration and light spill would be unnoticeable, no further evaluation is required. • Noise impacts require evaluation by EPA.

TABLE 1 Identification of Issues requiring EPA Evaluation (cont'd)

Topics	Proposal Characteristics	Government Agencies' Comments	Public Comments	Identification of Issues
Post-operational management of radioactive contamination and evaporation ponds.	• All freewater will be evaporated from the ponds prior to placing cover materials over the ponds. • Crystalised salt may be left in the ponds. • Radioactive contaminated material will be either decontaminated or disposed of at Mt Walton.	• Decommissioning should include a plan to deal with and disposed of any radioactively contaminated material (Radiological Council).	Concern about: • the plant site being radioactive for many years after the plant ceases to operate; • disposal of radioactive contaminated materials; • long term management of the salts left in the ponds and potential impacts on groundwater quality.	Evaluation by EPA is required.
Other Concerns				
Impacts on social suroundings.	• Negative impacts on tourism and agricultural industries and land value were not envisaged by the proponent, hence were not addressed in the ERMP.	• Concern that growth in tourism may be negatively affected by the plant (WA Tourism Commission). • An assessment of the impact of the project on tourism in the Shire of Murray should be carried out as part of the ERMP (Shire of Murray). • Proponent's assertion of overall employment and social benefit would be useful (Commonwealth EPA).	• Negative impacts of the proposal on Pinjarra community, particularly on tourism, agricultural industries and property values, due to perceptions regarding radiation. • Impacts on the quality of life of people living in Pinjarra.	Consideration by EPA is required.
•Long term management of gangue residue at Mt Walton. • Buffer zone. • Contingency planning. • Alternative feedstocks.	• Proponent is responsible for transporting gangue residue to Mt Walton. WMD is responsible for disposal and long term management of waste at Mt Walton. • In agreement with the State Government, proponent will fund disposal operations including disposal costs, monitoring of disposal operations, long term monitoring, and remedial work in first five years after a disposal opreation. • There is a minimum 500m buffer zone around the plant. • Monazite feedstock for plant is by-product from mineral sands industry.		• Long term management of waste including liability, security of waste strorage and of the site, and radiation risk to future generations. • Inadequacy of the 500m buffer zone around the plant to protect nearby residents from impacts of radioactive emissions, noise and odours. • Protection of the community from accidental release of radioactive materials. • No consideration for alternative feedstocks which are not classified as radioactive or have very low radioactivity.	No further EPA evaluation is required as concerns either relate to Mt Walton EMP assessment, are appropriately considered by the EPA in evaluating other issues, or have been adequately addressed by proponent.

TABLE 1. Identification of Issues requiring EPA Evaluation (cont'd)

the consequences of a spill during road transport are addressed individually in Sections 3.3.1.1 to 3.3.1.4 below. The potential noise impact of increased traffic, particularly of heavy haulage traffic is discussed in Section 3.3.4.

In regard to other impacts associated with increased heavy haulage volumes, the EPA considers that the Main Roads WA has responsibility to determine the capacity of the road system to safely handle additional traffics and heavy haulage movement. The Main Roads WA advised that its Road Transport Operations Branch had been liaising with the proponent on road transport issues relating to the proposal and hence it found the proposal acceptable (Appendix 5). The EPA notes the proponent's assessment of traffic impacts due to the project (ERMP, pages 6-3 to 6-6) which indicated that the impacts of traffic volumes on the roads would be acceptable although there may be some concern with heavy haulage through populated areas such as Armadale. The EPA also notes the proponent's commitment to arrange scheduled movements of all process-related materials to minimise traffic impacts on the community (Appendix 4).

3.3.1.1 Gangue residue

When the rare earth plant proposal was originally assessed by the EPA in 1988, the transport of low level radioactive thorium hydroxide (without radium) waste was separately addressed in the Public Environmental Review for the Mt Walton IWDF (Health Department, 1988) and assessed by the EPA (EPA, 1988b). The EPA recommended that wherever possible, all wastes should be transported to the IWDF by rail. The EPA also considered that the transport of the thorium hydroxide waste in ISO-containers by a combination of road (from Pinjarra to Kewdale and from Koolyanobbing or Jaurdi to the IWDF) and rail (from Kewdale to either Koolyanobbing or Jaurdi) to the IWDF was "manageable but required further investigations and liaison with local communities". The current proposal to transport the gangue waste by road to the IWDF requires evaluation by the EPA in regard to its potential radiological impacts to public and the environment (see Section 4.1).

3.3.1.2 Monazite

Monazite is a low level radioactive substance and a classified Dangerous Goods (Class 7). The Radiological Council has regulatory responsibility for the radiological aspects of monazite transport under the *Radiation Safety (Transport of Radioactive Substances) Regulations 1991*, while the DME retains responsibility for licensing of vehicles for monazite transport under the *Dangerous Goods Regulations 1992*. According to the *Radiation Safety (Transport of Radioactive Substances) Regulations 1991*, the packaging and transportation of monazite are governed by the Commonwealth Code of Practice for the Safe Transport of Radioactive Substances (Commonwealth, 1990). The *Dangerous Goods Regulations 1992* ensures that the non-radiological aspects of monazite transport such as the vehicles and transport management procedures comply with the Australian Code for the Transport of Dangerous Goods by Road and Rail 1992.

When the EPA originally assessed the rare earth plant proposal in 1988, it considered that the transport of monazite by rail (from Eneabba) and/or by road (from the Capel area) acceptable. Rhone Poulenc has now proposed to transport monazite (preferably in bulk or in 2 tonne bulka bags) from all sources (Geraldton, Eneabba, Capel and Bunbury) to the plant site by road in dedicated B-double configuration trucks.

In response to the Radiological Council's indicated preference for "transport of monazite in bulk in a purpose built vehicle", the proponent has made a commitment to transport monazite in bulk wherever possible. The Main Roads WA advised that the B-double trucks, as proposed for monazite transport, are recognised as very stable and safe combination vehicles. Both the Council and the DME indicated no other objection to the proposed transport of monazite.

In its submission, the WA Fire Brigades Board requested a revision of emergency plans for monazite transport, and provision of adequate briefings and training to all fire service personnel

at fire stations located along monazite transport routes. The proponent indicated that the emergency response plans will be reviewed in conjunction with the appropriate authorities and the mineral sands producers, and that briefings and training on safety and emergency procedures to all fire service personnel along the transport routes will be provided as appropriate.

The EPA understands that, based on the radiation dose limit of 1 milli-sievert per year (mSv/year) for the general public (set by the International Commission on Radiological Protection and adopted by the National Health and Medical Research Council) and the actual measurements of radioactivity of monazite by the DME, public exposure to radiation during transport of monazite would be negligible. For example, with a dose rate of 100 micro-sievert per hour (uSv/hr) at zero distance and 2.5uSv/hr at 4-5m from a container of monazite, as measured by the DME, if a member of the public were to stand right next to the monazite container or at 4-5m from the container, then it would take 10 hours or 400 hours of exposure respectively to reach the radiation dose limit.

In the event of a spill of monazite during transport, the EPA believes that appropriate emergency response measures as outlined in Section 6.2.2 of the ERMP which will be reviewed in conjunction with the appropriate authorities and the mineral sands producers, would ensure that public exposure to radiation and any environmental impacts (see Section 4.1) are as low as reasonably achievable. Hence the EPA considers that the likelihood of a spill of monazite causing risk to the public and the environment is low.

In view of the above information and the fact that monazite has been transported by both road and rail for about 30 years without any major incident (ERMP), further evaluation by the EPA on the transport of monazite is not necessary.

3.3.1.3 Non-radioactive process chemicals, by-product and product

Process chemicals including nitric acid, sulphuric acid, hydrochoric acid, lime, hydrogen peroxide, barium carbonate are classified as Dangerous Goods and would be transported in purpose-built trucks or vehicles in accordance with the DME's requirements. Solid rare earth nitrate and TCP are not classified as Dangerous Goods. These materials would be transported to and from Kwinana to the plant site via the Mandurah-Pinjarra route which is the most direct and safest route on advice from the Main Roads WA and DME (ERMP). Transport and emergency procedures for the transport of these materials are outlined in Section 6.2.2 of the ERMP.

The EPA believes that public risk associated with transport of non-radioactive dangerous goods should be managed by the DME under the *Dangerous Goods Regulations 1992* (EPA 1995). The DME advised that it "considers that the transport of dangerous goods (other than Class 7-radioactive) to the plant is of a routine nature and accordingly does not envisage any transport issues which cannot be effectively managed by standard industry practice".

The Water and Rivers Commission commented that transport routes selected for bulk acids should avoid public drinking water resources areas, and wetlands recommended for the preservation of aquatic biota. In addition, thorough contingency plans for spillage are required, and must be reviewed and accepted by all relevant and responsible agencies. The proponent indicated that the proposed road routes avoid Forrest Road in the Jandakot Underground Water Pollution Control Area (UWPCA). and that emergency response plans and clean-up procedures for dangerous goods will be prepared.

The EPA's view on ecological impacts associated with transport of dangerous goods is that this issue should be addressed as a whole, through a development of an approach or policy on ecological risk assessment for major transport routes for dangerous goods (EPA, 1995). This policy is currently being developed by the DEP under the auspices of the Western Australian Advisory Committee on Hazardous Substances (WAACHS).

Hence the EPA considers that the transport of process chemicals, TCP and rare earth nitrate is manageable through other agencies requirements and does not require further evaluation.

3.3.1.4 Caustic soda pipeline

The submissions raised concern with the consequences of a rupture in the caustic soda pipeline.

The proponent indicated that the 5km caustic soda pipeline was constructed for the Gallium Plant in 1989. The pipeline is a 75mm (3 inches) diameter carbon steel pipe which traverses only Alcoa's and Rhone-Poulenc's property. The pipeline would be used intermittently (once or twice a week) and would contain $22m^3$ of 50% caustic solution (equivalent to 11 tonnes of 100% caustic). In a worst case scenario where there was a serious line rupture while the line was used and which was not attended to for some time (say 1 hour), the contents plus additional solution being pumped through the line would only disperse over a few hundred square metres and there would be no impacts on other properties.

The DEP, following an inspection of the caustic pipeline and consideration of the potential consequences of the above worst case scenario, advised that the environmental impacts of a line breakage could be managed and that bunding is not required for the pipeline. This matter is not addressed further.

3.3.2 Air emissions from plant operations (including radioactive gases and dust)

3.3.2.1 Radioactive gases and dust

The submissions indicated a high level of community concern with the potential health effects from exposure to radioactive gases and dust emitted during the rare earth plant operations. This topic requires further evaluation by the EPA.

3.3.2.2 Chemical emissions including odours

The submissions also raised concern with the potential emissions of caustic and acid mists and vapours, which may be odorous. The submission from the DME suggested that an assessment of the impact of venting of vessels and emergency venting, if relevant, should be provided.

In response to the above concern, the proponent indicated that caustic soda and acids would be used in an enclosed system so there would not be any fumes emanating from the plant. Blowdown tanks for pressurised reactors would be vented through water-cooled heat exchangers to condense steam and water vapours. There would be no detectable odours emanating from the plant site.

The DEP advised that any impact of chemical emissions would be very minimal, based on the information provided in the current proposal and the assessment of the previous proposal in 1988. Hence this topic does not require further evaluation by the EPA.

3.3.3 Protection of surface and ground water quality

A large number of submissions expressed concern with the potential contamination of surface and ground water from the plant operations, particularly from the evaporation ponds, since the water table in the plant site area is very high in winter and the site is located on the Murray River catchment area. This topic requires evaluation by the EPA.

3.3.4 Noise emissions, vibration, light spill

Concern was expressed within the submissions regarding potential impacts of noise, vibration and light spill on the amenity of local residents, from activities associated with plant construction and operations. In particular, the submissions were concerned with lack of

adequate information in the ERMP on noise issues, such as noise modelling, to estimate the impacts of noise on local residents from the plant and from increased traffic .

The potential noise impacts from the proposal require evaluation by the EPA.

The EPA considers that the impact of vibration and light spill would be very minimal and un-noticeable to the residents due to the nature of the plant process/design and the location of the plant. Hence this concern is not addressed further in the report.

3.3.5 Post-operational management of radioactive contamination and evaporation ponds

Concern was expressed within the submissions regarding the management of radioactive contamination and the evaporation ponds after the plant ceases to operate. This concern requires further evaluation by the EPA.

3.3.6 Social surroundings

The submissions indicated a significant concern within the community about the potential impacts of the proposal on local tourism, agricultural industries and land values, due to perceptions by other people regarding radiation, particularly in the event of a spill of radioactive materials. This issue of the impacts on social surroundings needs to be considered by the EPA.

3.3.7 Other concerns including long term management of gangue residue at Mt Walton, buffer zone, contingency planning and alternative feedstocks

Concern was expressed within the submissions regarding the long term management of the gangue residue, which has extremely long half-life, at the Mt Walton IWDF. These concerns include liability in terms of costs to the people of WA to look after the buried waste in perpetuity, long term security of the site to prevent future inadvertent intrusion into the waste, and radiation health risk to future generations. The proponent indicated that, in agreement with the State Government, it will fund disposal costs, monitoring of disposal operations, long term monitoring, and remedial work in the first five years after a disposal operation. The EPA considers that these concerns relate to the disposal of the gangue waste at Mt Walton which should be addressed in the assessment of the EMP for disposal of Rhone Poulenc waste at Mt Walton IWDF.

Concern was expressed regarding the inadequacy of the 500m buffer zone around the plant to protect nearby residents from impacts of radioactive emissions, noise and odours. As mentioned in Section 3.3.2.2, there would be no detectable odours emanating from the plant site. The impacts of radioactive emissions and noise are addressed in the EPA's evaluation of these impacts.

Concern was raised about the need to protect of the community from accidental release of radioactive materials from the plant such as spillages, earthquake and fires. The proponent advised that the contingency plans, as outlined in the ERMP (Section 6.7) for both commissioning and operation of the plant, would ensure high standards of safety and reliability for the plant, thus minimising any accidental release of radioactive materials and process chemicals to the environment. The impacts of an earthquake (with intensity not greater than any experienced in WA) or fires would be manageable. The EPA considers that this concern has been adequately addressed by the proponent.

The submissions indicated that the proponent did not consider alternative feedstocks (eg. bastnasite from China or rare earth ore from Mt Weld, WA), which are not radioactive or have a low level of radioactivity. The proponent advised that both bastnasite and Mt Weld rare earth ores contain radioactive elements but in smaller quantities than monazite, and the same techniques for monazite would be required to deal with these ores. The EPA considers that this concern has been adequately addressed by the proponent's response.

The submissions also raised a concern that the proponent did not provide a detailed analysis of the real costs and benefits of the proposal to the community (particularly the local community) in terms of short, medium and long term. This concern is considered to be outside the scope of the EPA's assessment and should be addressed by other agencies such as the Department of Resources Development. No further evaluation by the EPA is appropriate.

4. Evaluation of environmental issues

The EPA has considered the topics raised during the environmental impact assessment process, including matters identified in public submissions. The EPA believes the environmental issues requiring evaluation are as follows:

- radiological impacts from road transport of gangue residue;
- atmospheric emissions of radionuclides from plant operations;
- impacts of plant operations on surface and ground water quality;
- noise impacts (from construction, plant operations and increased heavy vehicle traffic);
- post-operational management of radioactive contamination and evaporation ponds; and
- social surroundings.

The EPA's evaluation of the environmental issues is discussed below.

4.1 Radiological impacts from road transport of gangue residue

4.1.1 Objective

The EPA's objective is to ensure that the transport of gangue residue for disposal at the IWDF site meets statutory requirements and relevant standards for transport safety procedures and public radiation protection.

4.1.2 Policy

The gangue residue, which contains the radioactive components of monazite at approximately double the original concentration in monazite, is also a low level radioactive substance and a classified Dangerous Goods (Class 7). Like monazite, the Radiological Council has regulatory responsibility for the radiological aspects of gangue residue transport (under the *Radiation Safety (Transport of Radioactive Substances) Regulations 1991*) while the DME has responsibility for licensing of the transport vehicles (under the *Dangerous Goods Regulations 1992*). The packaging and transportation of the gangue residue are principally governed by the Commonwealth Code of Practice for the Safe Transport of Radioactive Substances (Commonwealth, 1990).

The purpose and scope of the 1990 Code of Practice for Safe Transport of Radioactive Substances states that:

> "Taking into account the present levels of safety in transport of radioactive material, it is not generally necessary to recommend routing restrictions. However, when such requirements are imposed, account shall be taken of all risks including normal and accident risks, both radiological and non-radiological."; and
>
> "In the transport of radioactive material public and worker safety is assured when these Regulations are complied with".

On the issue of ecological risk associated with radiation, the EPA understands that there is still insufficient information available on the subject. However, the International Commission on Radiological Protection (ICRP, Publication 60, 1990, page 3) provided the following comment:

"The Commission believes that the standard of environmental control needed to protect man to the degree currently thought desirable will ensure that other species are not put at risk. Occasionally, individual members of non-human species might be harmed, but not to the extent of endangering whole species or creating imbalance between species. At the present time, the Commission concerns itself with mankind's environment only with regard to the transfer of radionuclides through the environment, since this directly affects the radiological protection of man".

Thus the EPA accepts that radiation control measures required to protect public health will ensure that the environment is protected.

Although the disposal of the gangue residue at the IWDF is addressed separately in the Mt Walton EMP, the EPA considers that, for this proposal, the specifications of the gangue waste should conform to the NHMRC Code of Practice for the Near Surface Disposal of Radioactive Waste in Australia (NHMRC, 1992). The waste should also be in a form that takes into account the potential for environmental dispersion during a transport accident.

4.1.3 Technical information

The ERMP indicated that the gangue residue would be a clayey material with 40% moisture to ensure that it would not dust and to allow it to be readily recoverable should an accidental spill occur. The waste would be insoluble (Appendix 2, Table A5). The results of the drying tests (air or oven-dried) performed on samples of similar material to the gangue waste indicated that the waste would behave as a typical clay, and negative pore pressures generated by the drying process bind the material into a hard solid which does not dust unless mechanical effort is applied (ERMP, page 6-15). Tests to further confirm the physical dispersion characteristics of the waste in water will be undertaken and the results will be used to assist in preparing clean-up procedures in the event of a spill of the waste during transport (Appendix 8). Details of the specifications of the gangue waste for disposal at the Mt Walton IWDF are provided in Appendix E of the ERMP.

Rhone Poulenc has proposed to package the gangue residue into heavy duty 2 tonne "bulka bags" for transport in steel containers made to ISO standards or purpose-built. These will be designed to comply with the transport and packaging codes. The waste would be transported by road to the IWDF in B-double trucks (ERMP, Sections 2.4.2 and 3.5.2). The trucks comprise a prime mover and 2 trailers connected in a manner that provides more rigidity and safer control than a 2-trailer road train (Appendix 1, Fig 7). The estimated dose rates from a bulka bag and transporting container of the waste, based on the DME's actual measurements of radiation levels from trucks transporting monazite are provided in Table A8 (Appendix 2). These dose rates, when compared with the current radiation dose limit for the public of 1milli-sievert per year (mSv/yr), indicate that public exposure to radiation during transport of the waste would be negligible. For example, with a dose rate of 180 micro-sievert per hour (uSv/hr) at zero distance and 10uSv/hr at 3m from a container of the waste, if a member of the public were to stand right next to the monazite container or at 3m from the container, then it would take 5.5 hours or 100 hours of exposure respectively to reach the radiation dose limit.

Three truck movements a week would be required to transport the waste from Pinjarra to the IWDF via the northern route as follows (Appendix 1, Fig 8):

> Napier Road, Pinjarra-Williams Road, South Western Highway, Albany Highway, Tonkin Highway, Roe Highway, Great Eastern Highway; and the IWDF Access Road.

The above route was based on a qualitative assessment of feasible transport options (Appendix 1, Fig 9 and Appendix 2, Table A6) and road route selection criteria. Road and a combination of road/rail have been evaluated to assess the health, environmental and economic aspects of transporting the gangue residue from the plant site to the IWDF. "Door-to-door" road transport showed occupational health, management and economical advantages over the road/rail options since extra handling requirements at change of road/rail transport modes involve greater exposure to workers. Two alternative road transport routes were considered (Appendix 1, Fig

8) and the northern route was selected on the basis of safety consideration and the following route selection criteria:

- the safest route;
- minimisation of the potential impact on communities and traffic;
- Category 1 and Category 2 roads (as defined by DME) wherever possible as the waste is classified as a Dangerous Good;
- four lane roads in preference to two lane roads, where possible;
- roads of suitable width and condition for truck usage;
- the availability of Emergency Response Teams to minimise response time; and
- preference for roads that have already been approved by Main Roads Western Australia for B-double use.

The proponent's Emergency Response Plan for the transport of the gangue waste has been prepared in consultation with the Radiation Health Branch, DME, WA Fire Brigades Board and the DEP (Appendix 8). The Plan will be revised following consultation with local authorities and emergency response groups along the proposed transport route.

4.1.4 Comments from key government agencies and public

The DME advised that, in regard to the transport of the gangue residue, the Explosives and Dangerous Goods Division will retain responsibility for licensing requirements, but "such requirements will be minimal and consistent with those applied to the licensing of vehicles for monazite transport". The DME noted that the use of B-Doubles would place the waste container closer to the driver's cabin than would have been the case with a prime-mover or semi-trailer, which would result in increased driver's exposure to radiation. Hence it supported Rhone Poulenc's proposal to place a water tank between the cabin and the container to reduce this exposure. The DME also commented that adherence to the 1990 Commonwealth Code of Practice for the Safe Transport of Radioactive Substances would ensure minimum risk to public health and the environment. The DME considered that the average annual risk to the public from incidental exposure arising from the transport of the waste is likely to be much less than 1 in a million; a level of risk usually considered acceptable.

The Radiological Council indicated that its preferred option for transporting the gangue residue is in bulk, in purpose-built containers and "door-to-door" by rail as this option gives the lowest radiation dose to transport workers. However, the Council recognised that cost would be higher with the rail transport option unless "the rail line (and hence cost) could be shared by other companies/agencies to offset the cost over 20 years". The Council commented that the road train (double bottom) option (Appendix 1, Fig 7) would be likely to give the least unshielded dose. The Council indicated that the effectiveness of the proposed water tank shielding between the driver's cabin and the waste container in the B-double option should be verified with respect to minimising the driver's dose.

The WA Fire Brigades Board indicated no major objection to the proposal, but requested a number of conditions relating to the transport of the gangue residue be accommodated by the proponent. The conditions include adherence to designated road routes and to non-peak traffic hours, development of a comprehensive emergency response plan in consultation with relevant authorities and provision of training on emergency procedures to all Fire & Rescue Service personnel along the designated transport routes (for monazite as well as the gangue waste).

As mentioned earlier (Section 3.3.1), the Main Roads WA advised that the proposal is acceptable with respect to road transport issue, and that the B-double trucks are very stable and safe combination vehicles.

The submissions from the public (Appendix 4) expressed a number of concerns with the proposed packaging and transport of the gangue residue, which can be summarised as follows:

- the proposed form of gangue waste without further treatment/conditioning to solidify and/or to increase the particle size (such as cementation, calcination, dilution) would not be adequate or sufficient to (i) minimise the risk of dispersion in the environment (eg dispersion by wind and/or water) in a spill incident during its transport and disposal at Mt

Walton, and (ii) conform to the classification specified in the NHMRC Code of Practice for the Near Surface Disposal of Radioactive Waste in Australia;

- the integrity of the proposed packaging in 2 tonne bulka bags to remain intact during transport and disposal operations;
- the proposed transport of waste by road via the northern route is not the safest option since (i) transporting the waste by road instead of rail would present a higher radiological risk to the communities along the transport routes, particularly the densely populated eastern suburbs of Perth, for radiation from the waste can penetrate through the walls of the transport containers, and (ii) road transport of the waste would be safer via the southern route in smaller vehicles than via the proposed northern route in B-double trucks;
- comparative risk assessment between road and rail and for possible road routes for transporting the waste from Pinjarra to the IWDF should have been carried out; and
- contingency plans and consequences of a spill of the gangue waste during transport should be provided.

4.1.5 Response from proponent

In response to the submission from the Radiological Council, the proponent indicated that (Appendix 5) although the direct "door-to-door" rail transport of the gangue residue would reduce radiation exposures for the transport workers, this option does not exist. The "door-to-door" road option as proposed will utilise shielding between the driver and the waste container to reduce the driver's exposure to radiation. However, the proponent would not rule out the rail option and would be prepared to re-examine this option should other users provide opportunities to make it more practical in the future.

The proponent considered that the conditions raised in the submission by the WA Fire Brigades Board are appropriate and will be complied with, with the exception of the condition that Rhone-Poulenc should cover the cost of additional equipment that may be required along the transport route. The proponent advised that it is prepared to provide any specialised equipment necessary for emergency or spillage clean-up operations, which will be included in the inventory of items to be provided by Rhone-Poulenc's emergency response team (see the summary of the proponent's commitments below).

In response to the submissions from public (Appendix 4), the proponent provided advice as follows.

As far as the transport of the waste is concerned, there is no particular advantage in cementing or calcining the waste as it is insoluble and is transported in a moist clay like form to minimise dust generation. Further treatment of the waste is likely to increase radiation exposures to plant and transport workers as well as increase the potential hazard at the plant site. In regard to the disposal aspect, the proponent will ensure that the waste meets the requirements of the NHMRC Code of Practice for Near-Surface Disposal of Radioactive Waste in Australia (NHMRC, 1992), and other requirements by the Radiological Council and by the WMD for disposal at the IWDF.

Regarding the packaging of the waste, the 2-tonne bulka bags have been successfully used to package monazite for transport in Western Australia and for export shipments for at least 25 years, and would be suitable for transport and handling of the gangue residue. These bags will meet the requirements of Australian Standard AS 3688-1978 "Flexible Intermediate Containers" and the Australian Dangerous Goods Code. The bags will be loaded into either standard ISO steel shipping containers or purpose-built steel containers for transport, thus any spill would be unlikely even in the event of an accident.

The northern road route was selected as a result of a qualitative assessment of feasible transport options. An evaluation of road and a combination of road/rail options for transporting the waste to the IWDF was initially carried out to qualitatively assess a number of important aspects of the transport options including public and occupational health, environmental, and transport management aspects. The evaluation indicated that road transport was the preferred option.

The northern road route was then proposed following an assessment of possible road routes using the route selection criteria based on road quality and safety considerations.

Details of emergency response and recovery/clean-up procedures in the event of an accident or a spill are provided in the ERMP and the Emergency Response Plan prepared for the transport of the gangue residue (Appendix 8). In the unlikely event of a spill, there is very little chance of the waste dispersing in the environment due to its moist cake form and its insoluble nature. The waste could be easily recovered and replaced into suitable packages for transport to the disposal site. If any spilled waste escapes the immediate location, it could be located by a radiation detector and recovered. Although the waste is radioactive, it does not pose any immediate hazard to the public or environment in the event of a spill compared with other chemicals such as petrol or LPG.

Commitments made by the proponent

Commitments made by the proponent regarding management of the gangue residue transport (Appendix 7) are summarised as follows:

1. The proponent will comply with all applicable standards and regulations pertaining to and appropriate for disposal of the gangue waste, including the NHMRC Code of Practice for the Near Surface Disposal of Radioactive Waste.
2. The proponent will transport the waste in compliance with the 1990 Code of Practice for Safe Transport of Radioactive Substances, and will develop an Emergency Response Plan to deal with an accident in consultation with the Radiological Council, DME, WA Fire Brigades Board and DEP.
3. The proponent will liaise with all relevant government agencies, local authorities and emergency response groups along the proposed waste transport route to ensure there are appropriate emergency response management measures in place, including adherence to the designated road routes, truck movements during off peak hours, and any specialised equipment necessary for emergency or spillage clean-up operations.
4. The proponent will restrict truck movements (including the gangue waste trucks) wherever practicable to outside peak traffic and school bus time.
5. The proponent will provide appropriate training to all drivers and relevant emergency response personnel, and refresher courses will be conducted yearly.
6. The proponent will prepare a shipment manifest in accordance with the Code of Practice for the Safe Transport of Radioactive Substances, which will accompany each truck load of gangue residue.
7. The proponent will investigate any non-compliance regarding the waste specifications and modify procedures to minimise the risk of repeating such non-compliance.
8. The transport of gangue waste will be subject to an annual audit by an independent auditor, in accordance with the NHMRC Code of Practice for the Near Surface Disposal of Radioactive Waste. The audit report will be submitted to the Radiological Council and DME.

4.1.6 EPA evaluation

The EPA considers that the Radiological Council and DME have statutory responsibility for managing public health and safety associated with the transport of the low level radioactive gangue waste. Although the Radiological Council has indicated its preference for the direct "door-to-door" rail transport option (instead of road) and for the road train vehicles (instead of B-double trucks) for transporting the waste, this relates to minimising radiation dose to transport workers and not to public exposure to radiation. The EPA understands that neither the Radiological Council nor DME has considered it necessary for the proponent to carry out a more detailed risk assessment than that provided in the ERMP for feasible transport options for the waste in terms of public health and safety risk. Adherence to the relevant transport Codes would manage such risk, even in the event of a spill.

The EPA considers that the emergency management procedures required to meet public risk requirements would ensure acceptable environmental risks in the event of a spillage of the gangue waste.

With respect to the concern expressed in the public submissions about the need for further conditioning of the waste such as solidifying and/or increasing the particle size of the waste, the EPA has sought further advice from the Radiological Council, DME and Mark Sonter Consulting Pty Ltd, the EPA's independent consultant for the assessment of the disposal of the gangue waste at the IWDF site, on these specific issues. Advice from the Radiological Council and DME indicates that there is no real benefit in increasing the particle size of the waste for transport purposes. The issue of further treatment/conditioning of the waste to minimise its risk of dispersion in the environment during storage at Mt Walton are addressed in the EPA's assessment of Mt Walton EMP.

Regarding the classification of the waste as specified in the NHMRC Code of Practice for the Near Surface Disposal of Radioactive Waste in Australia, the EPA considers that the waste would not be accepted for disposal at Mt Walton if it did not meet the code specifications and that this issue should be addressed in the EPA's assessment of the Mt Walton EMP. Advice from the DME and Mark Sonter Consulting and the results of a preliminary calculation done by the Australian Radiation Laboratory indicate that the proposed specifications of the gangue waste comply with the waste classification in the NHMRC Code of Practice for the Near Surface Disposal of Radioactive Waste, and hence it is suitable for storage at the IWDF.

On the basis of the information provided by the proponent (including the ERMP), the advice from the relevant government agencies and expert bodies, and the proponent's commitments, the EPA considers that the radiological impacts on the public and the environment from the transport of the gangue residue from the plant site to the IWDF are acceptable.

4.2 Atmospheric emissions of radionuclides from plant operations

4.2.1 Objective

The EPA's objective is to ensure that radiological impacts to members of public and the environment from plant operations are kept as low as reasonably achievable through compliance with statutory requirements and radiation protection standards.

4.2.2 Policy

The rare earth processing plant will be classified as a "mining operation" as defined in the *Mine Safety and Inspection Act 1994*. Hence the proponent will be required to meet all provisions relating to radiation protection and radioactive waste management of this Act and the accompanying *Mine Safety and Inspection Regulations 1995*, both administered by the DME. The EPA understand that the radiation protection provisions of the Regulations are consistent with the latest recommendations from the International Commission on Radiological Protection (ICRP) and the NHMRC, and require adherence to the ALARA principle (that radiation dose be kept As Low As Reasonably Achievable, economic and social factors being taken into account). As stated in the DME's submission, the ALARA principle requires the proponent to ensure that the exposure of employees and members of the public to radiation is limited by:

(a) not exposing them to radiation so far as practicable;

(b) isolating sources of radiation, so far as is practicable, through shielding, containment and remote handling techniques;

(c) providing engineering controls to reduce absorbed dose rates and contamination levels in workplaces;

(d) adopting safe work practices; and

(e) if other means of controlling exposure are not practicable or adequate, by providing personal protective equipment.

The plant operations will also have to comply with the requirements of the Radiological Council under the provisions of the *Radiation Safety Act (1975)* and *(Radiation Safety (General) Regulations (1983)*, which are also consistent with the international (ICRP) and national (NHMRC) guidelines for radiation protection. As mentioned earlier, the radiation dose limit for the public is 1 mSv/yr (ICRP adopted limit).

4.2.3 Technical information

A survey of baseline radiation levels was carried out at the plant site in 1988 by Rhone-Poulenc as part of the original proposal. The data obtained from the survey are provided in Table A9 (Appendix 2).

Gamma radiation levels at the site (0.08 micro-Gray per hour (uGy/hr) to 0.28uGy/hr) can be compared with those naturally occurring on the Swan Coastal Plain of 0.02-0.03uGy/hr and on the Darling Scarp of up to 0.04-0.35uGy/hr, although higher levels have been recorded in the Darling Scarp. Measurements of radionuclide content of clays from the site confirm that the area has levels of natural activity which are above world average levels for soil of 2-14 parts per million (ppm) thorium oxide (ThO_2), 1-6ppm uranium oxide (U_3O_8), and 8-50 becquerel per kilogram (Bq/kg) Ra-226 (ERMP).

The potential sources of radiation emissions to atmosphere during the operation of the plant were identified in the ERMP (pages 6-33 to 6-35) as follows:

- gamma radiation from the presence of radioactive materials (monazite and radioactive waste) on the site;
- emissions of radon and thoron gases during the monazite treatment process; and
- release of radioactive dust, particularly during the handling and grinding of monazite feedstock.

Although gamma radiation levels are difficult to estimate, a conservative calculation of the dose rates at 500m from an unshielded container of the waste indicates that the gamma radiation dose rates at the boundary of the site would be negligible in relation to the natural radiation levels and that public exposure to gamma radiation at the site boundary would also be negligible. The proponent indicated that shielding will be provided to monazite and radioactive waste storage areas and process vessels, which would further reduce the gamma radiation dose rates at the site boundary.

The ERMP indicated that radon and thoron gases will be discharged through a single stack at 20m above the ground. The maximum ground level concentrations of radon and thoron were estimated by air dispersion modelling (using MAXMOD worst case prediction model and emission rates of 18,000Bq/s for radon and 120,000Bq/s for thoron). The maximum ground level concentrations of radon and thoron would be likely to occur within the plant boundary and the estimated concentrations at the closest plant boundary (500m) are provided in Table 6.7 of the ERMP. The worst case concentration of radon was 19Bq/m^3, which can be compared to the average radon concentration in houses in Australia of 11Bq/m^3. The emission rate of radon would also be at least 9 times less than the natural radon emanation rate from soils in the proponent's property. The estimated worst case concentration of thoron was 126Bq/m^3. However due to its short half life (56 seconds) the thoron concentration at the plant boundary would actually be $5x10^{-4}$ Bq/m^3 which can be compared to the average thoron concentrations in houses of about 4 Bq/m^3 (Perth coastal plain) and 20 Bq/m^3 (Darling Scarp area) (DME's advice).

The proponent indicated that there would be minimal generation of radioactive dust from the plant, as the handling (unloading and transfer) of dry monazite feedstock will be fully enclosed with efficient dust collection provision (ERPM, page 3-5) and the grinding of monazite will be a wet operation (ERMP, Section 3.2.1).

A comprehensive Radiation Management Plan (RMP) for the plant and its environment will be prepared for approval by the Radiological Council and DME before the commencement of plant operations (ERPM, Section 6.4.4.5). The RMP will include a comprehensive radiation monitoring programme for all operations of the plant, with the aim to detect/determine releases of radioactive materials and to estimate radiation doses to workers and to the general public (ERMP, Section 6.4.4.6). The monitoring programme will cover pre-operational, operational and post operational monitoring. The pre-operational monitoring programme has been approved by the Radiological Council and DME and includes the following components:

- Gamma radiation monitoring;
- Radon flux;
- Radionuclides in soil or sediment;
- Radionuclides in air;
- Radon, thoron and descendants; and
- Radionuclides in water.

The proponent indicated that the pre-operational programme commenced in December 1995 and will continue for approximately 18 months. The operational monitoring programme will be developed following consideration of the results of the pre-operational monitoring programme.

4.2.4 Comments from key government agencies and public

The DME advised that it has checked the exposure pathway models and assumptions used by the proponent to estimate the impacts of gamma and radon/thoron radiation, and "has confirmed the veracity of the estimated impacts". Calculations of radiation doses from the maximum predicted radon and thoron concentrations in the ERMP were further provided by the DME. The results of the calculations indicate that the maximum radon and thoron doses to a person residing permanently inside a house located 500m downwind from the plant (or next to the plant boundary) would be 0.32 mSv and 3.8x10-5 mSv per year respectively, which can be compared to the annual dose limit of 1mSv for members of the public. Thus the incremental dose from radon and thoron emissions from plant operations will not be discernible from background exposure. In regard to the release of radioactive dust, the DME advised that releases of fine monazite dust into the atmosphere will have to comply with a maximum site discharge limit of 150 grams of thorium per day for mineral sands industry. This discharge limit is based on Gaussian plume dispersion modelling and corresponds to less than the radiation dose limit of 1mSv/yr for a member of the public residing 500m permanently downwind of such discharge.

In its submission, the Radiological Council did not provide specific advice on atmospheric emissions of radionuclides from the plant operations, but commented in general that (occupational) radiological impacts are difficult to assess from the ERMP, as the ERMP "tends to refer radiological commitments to a future RMP" and in some cases, the "specific mechanism on how radiation safety and dose minimisation will be achieved is not addressed". Thus the proponent's commitments must be relied upon. The Council stressed that environmental approval for the proposal should be subject to the RMP being acceptable to the Council as well as the DME.

The Commonwealth EPA advised that, based on the information provided in the ERMP, "there is no reason to believe there will be any public radiological health impact from the operation provided the plant is suitably constructed". However it recommended that "a worst case estimate of radioactive dust emission and dispersion should be attempted to clearly demonstrate a negligible public dose". The Agency further commented that the ERMP lacks sufficient detail for an adequate assessment of radiation doses to workers although the implementation of the proponent's commitments would provide adequate occupational radiation protection.

The submissions from the public indicated the following concerns with the plant operations:

- there is no safe level for radiation exposure and low level radiation is cumulative;

- exposure to radiation from the plant, irrespective of its levels, in addition to the already high background radiation levels in the Pinjarra area can increase health risk such as the risk of cancers and birth defects etc. to the community ;
- releases of radioactive dust and gases to the environment; and
- protection of plant workers from radiation exposure.

4.2.5 Response from proponent

In response to the comments from the DME and Commonwealth EPA regarding atmospheric emissions of radioactive dust, the proponent stated that (Appendix 5) the estimated dust emission level from the plant is 4g/day (or less than 10g/day) of monazite, which is equivalent to 0.24g/day of thorium. This is well below the maximum site discharge limit of 150g of thorium per day set by the DME. Furthermore, the results of dust emission measurements conducted at the La Rochelle plant in France in 1992 showed that dust levels within the plant are not discernible from the background levels.

Regarding the comments by the Radiological Council and Commonwealth EPA on the general lack of specific details on occupational radiation protection measures, the proponent stated that it intends to complete and comply with the RMP which will be submitted for approval by the Radiological Council and DME prior to commencement of operations. In addition, from the experience that Rhone Poulenc has with its La Rochelle plant in France, in the rare earth industry and in the processing of monazite, the company can confidently forecast the occupational radiation exposures of plant personnel and implement best practice initiatives for keeping these well within acceptable levels.

The following is the summary of proponent's response to the public submissions.

Radiation is known to be a cause of cancer and other health effects at high levels of exposure. Studies of persons exposed to radiation from the atomic weapons at Hiroshima and Nagasaki have not revealed any adverse health effects at exposures less than 200 mSv (ie 10 times the annual limit for workers and 200 times the annual limit for public). Radiation effects are not cumulative at doses below about 1 sievert delivered in a short time, and no effects of radiation exposure are discernible below about 100 milli sievert.

The plant will be designed and operated so that radiation doses to the workers and particularly the public will be as low as practically achievable. Dust collection equipment will be employed at all potential dust generating points in the process including the monazite loading and unloading points. Dust from the collectors will be recycled back into the process, and any monazite dust release will be well below the discharge limit set by the DME. The annual average levels of radioactive gases at the site boundary would be much less than 10% of the background concentrations in houses in Australia. The buffer zone is more than adequate to protect the public from gamma radiation. The additional radiation doses to the general public from the plant operations give an estimated cancer risk of less than 1 in 1,000,000 per year (using the ICRP risk factor) which is negligible. This can be compared with a risk of about 1 in 8,000 per year from average natural background radiation (of 2.5 milli sievert per year). Thus it can be predicted with confidence that there will be no radiation induced health effects from the plant operations.

The proponent agrees with the submissions that occupational radiation health and safety are amongst the most important issues of the project. The proponent has made commitments on plant design criteria (radiation exposure to plant operators will be reduced to half the specified occupational dose limits) and a comprehensive RMP to ensure the health and safety of its workers (and the general public).

Commitments made by the proponent

Commitments made by the proponent relating to radiation protection during the operation of the plant (Appendix 7) can be summarised as follows:

1. The proponent will comply with all current and future applicable standards and regulations relating to radiation protection.

2. The proponent is committed to the ALARA principle and best practical technology in designing and operating the plant.
3. The proponent will prepare a comprehensive RMP for the plant and its environment for approval by the Radiological Council, DME and DEP prior to commencement of plant operations.
4. The proponent will conduct a comprehensive survey of the existing radiation environment at the Pinjarra site prior to commissioning of the plant.
5. The proponent will verify radiation protection assessments given in the ERMP during the plant commissioning, to the requirements of the Radiological Council, DOME and DEP.
6. The proponent is committed to achieving certification of ISO 9002 for both the rare earth plant and the Galium Plant and will operate a quality assured system.
7. The proponent will involve local residents and the Shire of Murray in the monitoring process at the plant site, through a Community Liaison Committee.

4.2.6 EPA evaluation

The EPA considers that the Radiological Council and DME have statutory responsibility for managing occupational and public radiation protection associated with the operation of the plant. As mentioned earlier (Section 3.1), the EPA's assessment is limited to the impacts of radiation on the public and the environment. On the basis of the advice from the Radiological Council, DME, Commonwealth EPA and the proponent's information and commitments, the EPA considers that the impacts to public health from atmospheric emissions of radionuclides from the plant operations are manageable and would be very minimal.

On the issue of ecological risk associated with radiation, as discussed earlier in Section 4.1.6, the EPA accepts that the radiation control measures required to protect public health will ensure that the environment is protected.

Accordingly, the EPA considers that the radiological impacts on the public and the environment from atmospheric emissions associated with the operation of the plant are acceptable. As mentioned earlier, the EPA considers that occupational aspects of radiation should be dealt with through the appropriate body such as the Radiological Council and the Department of Minerals and Energy.

4.3 Impacts of plant operations on surface and ground water quality

4.3.1 Objective

The EPA's objective is to ensure that the existing water quality of surface and ground water in the surrounding environment of the plant site is maintained as a result of the proposal. The plant and the evaporation ponds should be designed for zero discharge to the surface and groundwater environment.

4.3.2 Policy

In general, the EPA believes that the guiding principle for the protection of surface and ground water is toward preventing or minimising the generation of pollutants at the source, rather than focusing on effluent controls. Preventative management strategies should incorporate cleaner production and waste minimisation principles and practices (EPA, 1993b), which include cleaner technologies, water conservation, waste recycling and re-use. In regard to water quality criteria, the "Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters" (EPA, 1993c) should apply where appropriate.

For this proposal, the EPA considers that the plant and the evaporation ponds should be designed for zero discharge to the surface and groundwater environment, and that the

operations of the plant should be managed to ensure the maintenance of existing water quality in the surface and ground water environment, particularly in relation to levels of radionuclides, nutrients and salts. Radioactive contaminated wastes should be managed in accordance with statutory requirements by the Radiological Council and DME, under the Radiation Safety Act and Radiation Safety (General) Regulations, and the Mine Safety and Inspection Act and Regulations respectively. The proposal should be consistent with the environmental quality objectives stated in the Environmental Protection (Peel-Harvey Estuary) Policy (1992) regarding phosphorous loading into the Estuary.

On the issue of ecological risk associated with radiation, as discussed earlier in Section 4.1.6, the EPA accepts that the radiation standards required to protect public health will ensure that the environment is protected.

4.3.3 Technical information

The plant site is located within the Murray River catchment area, which flows into the nutrient enriched Peel-Harvey Estuary (ERMP, Section 5.2). Major streams in the area include Oakley Brook (3km north of the site) and Marrinup Brook (1km south of the site) (Fig 2).

As mentioned earlier, all radioactive materials will be separated from other waste streams as the "gangue residue" which will then be removed from the plant site for disposal at the IWDF. The proposed on-site waste management is described in the ERMP (Sections 3.4.1, 6.3.1, and 6.3.2). Process chemicals will be stored in a dedicated storage area of the plant with a separate bunded area for each storage tank in accordance with the Dangerous Goods Regulations (Appendix 1, Fig 14) (the DEP indicated that its requirements for bunding may exceed those required under the Dangerous Goods Regulations). Process effluents and other wastewaters are collected for either recycling or treatment (including neutralisation with Gallium Plant effluents) prior to being directed to the existing evaporation ponds which have been constructed for the Gallium plant. Stormwater runoff from the plant site is also collected prior to being discharged to the evaporation ponds or into surface drainages (depending on the water quality). These measures are designed to prevent accidental releases of chemicals and radioactive materials to the environment.

The evaporation ponds have been designed and constructed with a clay liner, underdrainage system and monitoring bore network to minimise seepage (Appendix 1, Figs 10 and 11). The underdrainage system sumps are impervious to ground water. The ponds currently contain residue of effluents from the Gallium Plant and rainwater. Only non-radioactive effluents from the rare earth plant will be directed to the evaporation ponds and the ponds will contain mostly dissolved sodium salts (sulphates and chlorides) and possibly some tricalcium phosphate.

The results of the ground water monitoring data from 1987 to 1995 have demonstrated that the performance of the ponds and the drainage/recovery system over the past 7-8 years has been satisfactory (ERMP, Appendix I). The proponent indicated that the monitoring programme will be extended upon commissioning of the rare earth plant to ensure that the ground water quality is not affected by the operation of the evaporation ponds.

As a result of concerns raised during community consultation regarding the security of the ponds, an assessment was carried out by the proponent on the potential leakage from the ponds caused by flood, earthquake and bushfire events (ERMP, Appendix J). The assessment concluded that in the unlikely event of a breach of the pond wall, the impacts would be manageable.

Radiation monitoring at the plant site will be detailed in the RMP (Section 4.2.3). The pre-operational monitoring programme has been approved by the Radiological Council and DME, which includes monitoring for radionuclides in groundwater (via existing monitoring bores) and in surface water (from the two creeks on the proponent's property which flow after periods of rain). Water samples will be analysed for gross alpha and beta activity with selected samples being analysed for thorium, uranium, Radium-226 and Radium-228 (ERMP, page 6-39).

4.3.4 Comments from key government agencies and public

The Pollution Prevention Section of the Water and Rivers Commission noted that the evaporation ponds and associated ground water monitoring system should minimise seepage losses from the ponds. As the evaporation ponds will hold significant concentrations of salts, it considered that further evaluation should be carried out by the proponent to confirm the integrity of the ponds and their potential impacts on ground water quality.

The Peel Inlet Management Authority (PIMA) of the Water and Rivers Commission also considered that the evaporation pond system is "good and robust". PIMA advised that water quality monitoring for radioactive substances, nutrient and salinity parameters in the drains and streams which leave the proponent's property and potentially flow into surrounding streams (eg the two drains which flow into a drain which runs parallel to the Hotham Valley Railway, Oakley drain and Marrinup Creek) would be prudent and necessary. The proponent should also be requested to carry out a survey of the drains and water courses for the area and provide a report to the PIMA. PIMA believed that an independent consultant should be used for surface and ground water monitoring. In the interest of surface and ground water protection, PIMA suggested that the site should be connected to deep sewerage or alternative treatment units (ATUs).

The submissions from public indicated the two main concerns as follows:

- impacts of seepage from and breaching of the evaporation ponds on ground water system, the Murray River system and subsequently the Peel Harvey Estuary ; and
- possible contamination of surface and ground water with radionuclides and process chemicals resulting from accidental spillages from the plant.

4.3.5 Response from proponent

In response to the comments from the Water and Rivers Commission, the proponent has agreed to provide further information on the integrity of the ponds and the potential impacts on groundwater quality, to carry out water monitoring for Oakley and Marrinup Brooks in addition to the two creeks on its property, and to provide a report on a survey of all water storage (such as dams), drains and water courses within 4 km of the site. Regarding PIMA's comment on the need for water monitoring to be carried out by an independent consultant, the proponent advised that, under the requirements of the current DEP's licence conditions for the Gallium Plant, Rhone-Poulenc monitors the ground water system and samples are analysed by an external laboratory. The results are then forwarded to an external consultant for data interpretation. For the rare earth plant, the proponent intends to monitor water level and quality and forward the results to an external consultant for data interpretation. The proponent is committed to obtaining ISO 9002 quality accreditation for both the rare earth and the Gallium plants. To maintain this accreditation the proponent's quality systems including the surface and ground water monitoring programme, will require ongoing review by a certified external auditor. The proponent indicated that the existing sewerage facilities on site, established for the Gallium Plant and approved by the Shire of Murray in 1988, are adequate.

The proponent's response to the submissions from the public can be summarised as follows:

- the proposed waste management plan, with removal of the radioactive waste to the IWDF and using evaporation ponds for process effluents and some phosphate storage, is the most appropriate strategy for wastes from this project;
- the on-site evaporation system has been designed and constructed with an objective to achieve zero discharge to the ground water environment. The saline process waste is the only wastewater stream proposed to be directed to the ponds. The proposed management and monitoring of the ponds and wastewaters should ensure the integrity of the ponds and therefore any potential impacts are manageable; and
- the recycling of spillages and washings from the plant will prevent accidental releases of chemicals and radioactive materials to the environment. The existing plant stormwater drainage and collection system will prevent the spreading of any possible spillages to the environment by stormwater runoff.

Commitments made by the proponent

Commitments made by the proponent relating to surface and ground water protection during the operation of the plant (Appendix 7) can be summarised as follows:

1. The proponent will dispose of all process and non-process wastes in an environmentally acceptable manner and in accordance with statutory requirements.
2. Any additional ponds required for the project will be constructed in accordance with approved design standards.
3. There will be no significant radionuclides disposed in the evaporation ponds. The effluents directed the ponds will be analysed to ensure that any traces of radionuclides are within acceptable levels.
4. The proponent will continue to monitor for both ground water level and ground water quality on a routine basis. The evaporation pond and underdrainage sumps will also be monitored for water level and water quality. The DEP will be notified immediately if the results indicate that leakage from the ponds is entering the groundwater.
5. The RMP will include a monitoring programme to determine the content of radionulides in ground water, surface water, water in the ponds and effluents to the ponds.
6. Prior to plant commissioning, the proponent will provide further information on the integrity of the ponds and the potential impacts on ground water quality, and on the survey of all water storage, drains and water courses in the vicinity of the site, to the Water and Rivers Commission.
7. The proponent will implement contingency plans and remediation procedures in the event of a pond leakage throughout the life of the project.

4.3.6 EPA evaluation

The EPA has reviewed the information contained in the ERMP and the advice from the Water and Rivers Commission, which indicate that any potential impacts on the existing surface and ground water quality in the surrounding environment from the operation of the plant, particularly in relation to radiation contamination, would be minimal and manageable. The EPA considers it important that comprehensive pre-operation and operational water monitoring for both surface and ground water in the immediate vicinity of the plant site, to establish baseline data and to ensure that the baseline levels for nutrients, salts and particularly radionuclides are maintained throughout the life of the project. The EPA notes the proponent's commitments to such a monitoring programme.

The EPA considers that the potential impacts on surface and ground water quality as a result of the operation of the plant are acceptable.

Accordingly the EPA recommends that the proponent be required to develop monitoring programmes for surface and ground water including quality assurance procedures (Section 5, Recommendation 2). The programmes should be submitted to the EPA for approval on advice from the Radiological Council, the DME, the Water and Rivers Commission and the DEP, and should be developed and implemented:

- prior to commencing plant construction to establish baseline data; and
- prior to plant commissioning for operational activities.

4.4 Noise impacts

4.4.1 Objective

The EPA's objective is to protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.

4.4.2 Policy

Noise levels for projects within Western Australia are subject to the Noise Abatement (Neighbourhood Annoyance) Regulations 1979 (existing noise regulations), which are currently the prescribed standard for noise under the *Environmental Protection Act 1986*. These regulations specify the Assigned Outdoor Neighbourhood Noise Levels for various types of noise-receiving premises for different times of the day. In the case of rural residences and residential areas, such as Pinjarra, the Assigned Noise Levels are 30-35 dB(A) at night (10.00 pm - 7.00 am); 35-40 dB(A) during the evening (7.00 pm - 10.00 pm) and on weekends/public holidays (7.00 am - 7.00 pm); and 40-45 dB(A) during weekdays (7.00 am - 7.00 pm).

The EPA will shortly be considering the draft Environmental Protection (Noise) Regulations 1995, currently being prepared by the DEP. The EPA's evaluation of noise impacts for the rare earth project considered the draft regulations, since these are likely to be in force by the time of commencement of the project.

The draft regulations specify a method for determining the Maximum Allowable Noise Level for a noise-receiving location, based on the land use zonings and the presence of major roads around the receiving point. For a residence with no commercial or industrial zonings and with no major roads within 450 metres, the lowest of the Maximum Allowable Noise Levels would apply. These levels would be 35 dB(A) at night, 40 dB(A) during the evening and on Sundays, and 45 dB(A) during the day on Monday to Saturday.

4.4.3 Technical information

The ERMP (Section 6.11.1) indicated that the nearest residence is 800m from the plant site. Noise impacts during the construction phase of the rare earth plant would be similar to or less than those evident during the construction of the Gallium Plant and would be manageable.

Noise impacts from the operation of the plant would be minimal, based on noise data from other rare earth and processing plants operated by the proponent and on the provision for noise containment in the plant design (ERMP, Section 6.11.2).

Traffic counts for major roads most likely to be affected by the transportation relating to the project are provided in the ERMP (Section 5.6). The roads that will experience the greatest traffic noise impacts from the proposal are the Pinjarra-Williams Road and Napier Road in Pinjarra (ERMP, Section 6.2). Vehicle movements along the Pinjarra-Williams Road would increase the current use of this road by around 2% based on the existing traffic counts, and result in a 18% increase in heavy vehicles. The increase in heavy traffic would be expected to result in a relative increase in traffic noise to the 43 residences fronting the Pinjarra-Williams Road between the Napier Road intersection and the Pinjarra siding. However the impact to these residents is expected to be low since truck movements will be restricted to normal business hours where possible. There are no current traffic data available for Napier Road which currently has a very low traffic volume.

4.4.4 Comments from key government agencies and public

The DEP advised that the ERMP contains no quantitative assessment of noise impacts. In order to meet a noise level of 35 dB(A) at the nearest residence some 800m away, the total sound power level from the construction and operation of the plant would need to be in the order of 100 dB(A) from the plant. This noise level is likely to be exceeded from the operation of plant equipment and particularly from construction equipment, without allowance for annoying noise characteristics such as tonality. A quantitative assessment of noise impacts from the construction activities and from the plant operations by a recognised accoustical consultant is therefore required.

The DEP also advised that while the 18% increase in heavy haulage movements on the Pinjarra-Williams Road (and smaller percentage increases on other roads) as a result of the plant

operation are accepted as being small, it needs to be recognised that most complaints related to truck noise relate to vehicles which are unusually noisy. The same should apply to heavy vehicles used in the construction phase of the project. The proponent hence should put in place a procedure to ensure that trucks used for both the operational and construction phases of the project are procured and maintained so as to achieve the lowest practicable noise emissions.

The submissions from the public expressed concern with the potential impacts of noise from construction activities, plant operations and particularly from the expected increase in heavy vehicle movements.

4.4.5 Response from proponent

In response the proponent indicated that due to the location of the plant, the relative quietness of a rare earth plant and the nearest residence being 800m from the plant site, noise impact from the project activities would be unlikely. However, the proponent is committed to conducting noise modelling once the plant design has been sufficiently finalised.

The proponent acknowledged that the increase in heavy vehicle movements has the potential to impact on the residents at the newly constructed house on the corner of the Pinjarra-Williams Road and Napier Road. Other residents along Napier Road are well set back from the road. The proponent has used the British Method of predicting traffic noise to determine the potential noise impact from the traffic movements, which gave an estimated L10 18hr (0600-2400) value of 44 dB(A) compared to the Main Roads criteria of 63 dB(A). Appropriate management procedures including restriction on truck movements to business hours and use of trucks with noise emissions complying with Australian Design Rules, will minimise the traffic noise impact.

Commitments made by the proponent

Commitments made by the proponent regarding management of noise (Appendix 7) are summarised as follows:

1. The proponent will conduct modelling of noise emissions from plant operation and construction and submit the results to the DEP at least one month before commencing the plant construction.
2. The proponent will conduct plant noise surveys (including baseline measurements) in consultation with the DEP, and will provide a report to the DEP detailing measurements and assessments made (including the impact of tonal noise) to confirm compliance with acceptable limits, within three months of the commissioning of the plant.
3. Appropriate management procedures will be implemented to ensure that construction noise levels are within acceptable limits as defined by regulations, and that noise impacts from heavy vehicles associated with the project are minimised.

4.4.6 EPA evaluation

The EPA has considered the information provided by the proponent in the ERMP and in its response to submissions, and the advice from the DEP, which indicate that the noise impacts from the proposal (plant operations, construction and increase in heavy vehicle movements) would be manageable. The EPA notes the proponent's commitments on noise assessments and management to ensure that the noise levels associated with the proposal are within acceptable standards.

The EPA considers that the potential noise impacts from the plant as a result of the proposal are manageable.

4.5 Post-operational management of radioactive contamination and evaporation ponds

4.5.1 Objective

The EPA's objective is to ensure that plant decommissioning and site rehabilitation will be carried out in an environmentally acceptable manner and that the State does not incur any ongoing liability.

4.5.2 Policy

As a standard condition of environmental approval, the proponents of projects within Western Australia are required by the Minister for the Environment to prepare a (final) decommissioning and rehabilitation plan, at least 6 months prior to decommissioning, to satisfactorily address decommissioning of the project, removal of the plant and installations and rehabilitation of the site and its environs.

For this proposal, such decommissioning and rehabilitation plans should include radioactive decontamination of the plant installations and its environs, and rehabilitation of the evaporation ponds.

4.5.3 Technical information

The proposed strategies for decommissioning and rehabilitation are outlined in the ERMP (Sections 7.2 and 7.3). The strategy for decommissioning will include site clean-up, decommissioning of machinery and building and decommissioning of the evaporation pond system. The strategy for rehabilitation will include considerations of design life and structural life criteria, hydrological design criteria, revegetation etc. At this stage it is likely that the rehabilitated site, including the evaporation pond system, will be revegetated and returned to pasture. Future land uses at the site will only be constrained by the need to avoid deep excavation of the rehabilitated evaporation pond system.

As mentioned earlier (Section 4.2.3) the Radiation Management Plan (RMP) to be prepared by the proponent will include post-operational monitoring to identify if radioactive materials have accumulated in any areas of the plant and to ensure that all radioactive materials associated with the plant operations are removed from the site (ERMP, Section 7.5). This will also be part of the decommissioning plan.

The main residual wastes remaining in the ponds will be sodium salts since the phosphate solids will have been recovered and sold to the fertiliser industry (ERMP, Section 7.4). Consideration must be given to the long term management of the wastes since it is anticipated that the underdrainage system to the ponds will become inoperative after the plant ceases operation. Decommissioning and rehabilitation management of the evaporation ponds will require that the remaining free water be evaporated, and cover materials placed over the ponds and contoured to promote runoff.

As a result of concern raised during community consultation regarding a phosphate source remaining in the ponds after decommissioning, the proponent carried out an assessment of the "worst case" phosphorus loading to the environment caused by infiltrating rainfall and a rising water table, assuming that all of the tricalcium phosphate remains in the ponds and the pond underdrain system is not in operation after decommissioning (ERMP, Appendix J). The assessment indicate that the potential impacts on the Murray River system associated with phosphorus movement from the ponds would be manageable.

4.5.4 Comments from key government agencies and public

The Radiological Council commented that the decommissioning plan should include procedures to deal with and to dispose of all radioactive contaminated materials.

The submissions from the public indicated the following concerns:

- the plant site being radioactive for many years after the plant ceases operation;
- disposal of radioactive contaminated plant components; and
- long term management of the salts left in the ponds after decommissioning and potential impact on ground water quality.

4.5.5 Response from proponent

In response the proponent indicated that although sections of plant equipment from the controlled areas may require decontamination and/or disposal at an appropriate site, there will be no widespread radiation contamination of the site. In the decommissioning of the plant, any radioactive contaminated parts of the plant will be isolated for assessment of radioactivity level prior to being decontaminated to a level where they can be reused or treated as normal scrap. If this level cannot be achieved then the parts will be packaged suitably for disposal at the IWDF. Any scale removed from the parts will also be packaged for disposal at the Mt Walton site.

It is estimated that there would be 200,000 tonnes of crystalised sodium salts remaining in the ponds upon decommissioning of both the rare earth and Gallium plants (25% from the rare earth plant and 75% from the Gallium Plant), over a 20 year operational life. A number of the EPA's objectives for closure of a tailings facility (Commonwealth EPA, 1995) can be applied to the evaporation ponds. These objectives together with the general rehabilitation completion criteria will ensure a successful rehabilitation of the ponds. At the time of decommissioning, all aspects of rehabilitation will be investigated including removal of the crystallised salts, modification of the pond underdrainage system to minimise the risk of rising ground water entering the ponds in winter.

Commitments made by the proponent

Commitments made by the proponent regarding decommissioning and rehabilitation (Appendix 7) are summarised as follows:

1. The proponent will undertake decommissioning in accordance with statutory requirements and to the requirements of the Minister for the Environment
2. The RMP will include procedures for decontamination of radioactive components of the plant and operational monitoring.
3. Upon decommissioning, the proponent will ensure that all free water is evaporated from the ponds prior to placing materials over the ponds. The proponent will also investigate all aspects of rehabilitation of the ponds at the time of decommissioning.

4.5.6 EPA evaluation

Based on the information provided by the proponent, its commitments and the advice from the Radiological Council, the EPA considers that although the basic strategies outlined for the decommissioning and rehabilitation programme are acceptable, aspects of decontamination and disposal of radioactive contaminated materials and of long term management of the pond residual wastes will need to be addressed in detail at the time of decommissioning.

Accordingly, the EPA recommends that at least 12 months prior to decommissioning, the proponent should be required to prepare a decommissioning and rehabilitation plan to the requirements of the Minister for the Environment on advice of the Radiological Council, DME and Commission. The plan should include detailed procedures for decontamination and disposal of radioactive contaminated materials, and rehabilitation of the evaporation ponds. The proponent should be required to implement the plan to the requirements of the Minister for the Environment on advice of the Radiological Council, DME and Water and Rivers Commission (Section 5, Recommendation 3).

4.6 Social surroundings

4.6.1 Objective

The EPA's objective is to examine the impacts of the proposal in regard to social surroundings.

4.6.2 Policy

The *Environmental Protection Act 1986* states that the "social surroundings of man are his aesthetic, cultural, economic and social surroundings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings".

4.6.3 Technical information

The proponent did not anticipate any potential impacts on local tourism, agricultural industries and land values as a result of the proposal, hence these impacts were not addressed in the ERMP. However, the Department of Resources and Development (DRD) advised that, following consultations between the proponent, WA Tourism Commission, and a local tourism project proponent in the Pinjarra area, the proponent has commissioned a study into the impact of the proposal on tourism in the Peel region. The study commenced in mid-March 1996 and is being conducted by two external consultants.

4.6.4 Comments from key government agencies and public

The WA Tourism Commission expressed a concern that growth in tourism in the Peel area may be negatively affected by the proposal. The Commonwealth EPA commented that the "proponent's assertion of overall employment and social benefit would be useful". The Shire of Murray indicated that an assessment of the impact of the project on tourism in the Shire of Murray should be carried out as part of the ERMP.

A significant number of submissions (including a submission from a developer of a major tourist resort and residential project in Pinjarra) expressed concern with the potential impacts of the proposal on local tourism, agricultural industries and land values, due to perceptions by other people regarding radiation, particularly in the event of a spill of radioactive materials. The submissions also indicated that the proposal may have adverse impacts on the quality of life of the people living in or near Pinjarra, which originally attracted them to the area.

4.6.5 Response from proponent

In response to the above concern, the proponent has made a commitment to work closely with the WA Tourism Commission and Pinjarra tourism operators to ensure that aspects of the proposal which may have adverse impacts on tourism activities in the area are adequately addressed. The EPA understands that, following consultation between the Department of Resources Development, Shire of Murray, WA Tourism Commission, local tourism representatives and the proponent, it has been agreed that a study will be carried out by an independent consultant on impacts of the proposal on tourism in the Peel Region.

The proponent will also liaise with the local agricultural industry to clarify the "perception" regarding radiation. The proponent advised that according to the property values assessment done by a valuer engaged by Rhone-Poulenc, property values have not decreased as a result of the proposal. The proponent does not envisage that the quality of life of the local people would be adversely impacted by the proposal, and that the proposal would help bring prosperity to the region.

Commitments made by the proponent

Commitments made by the proponent regarding social issues (Appendix 7) are summarised as follows:

1. The proponent will involve local residents and the Shire of Murray in the monitoring process at the Pinjarra plant site.

2. The proponent will liaise with the Mt Walton Community Liaison Committee, local Shires and interest groups on issues relating to the low level radioactive gangue residue.

3. The proponent will liaise with the WA Tourism Commission, Pinjarra tourism operators and local agricultural industry to clarify the "perception" regarding radiation.

4.6.6 EPA evaluation

The EPA is aware that there is a significant concern within the community about the potential impacts of the proposal on local tourism, agriculture industries and land values. The EPA understands that the concern is based upon a perception about radiation.

The radiological impacts have been evaluated in Sections 4.1 and 4.2 of the report and have been considered to be environmentally acceptable. To this extent the proposal does not adversely affect the social surroundings. However, the perceptions of the community may still remain. The EPA does not have data on which further advice on this subject can be provided. However, the approach taken by the proponent to communicate and consult with the people who have raised concerns about the social surroundings is an appropriate approach to address the issue. The proponent has also commenced a study in association with the DRD into the impacts of the proposal on tourism in the Peel Region.

The EPA considers that it would be appropriate for the issue to be further addressed by the proponent and relevant agencies including the DRD, the Shire of Murray and the WA Tourism Commission.

5. Conclusions and recommendations

5.1 Conclusions

The EPA concludes that Rhone Poulenc's proposal to build and operate a rare earth plant of 15,000 tpa production rate of solid rare earth nitrate, is environmentally acceptable, subject to the proponent's commitments and the recommendations contained in this report.

In reaching this conclusion, the EPA has considered all the topics of concern and has evaluated the main environmental issues including radiological impacts associated with the transport of the gangue wastes and with the operation of the plant, impacts on surface and ground water quality, noise emissions, and post operational management of the site. The EPA believes that the radiological issues can be appropriately managed by the Radiological Council and DME.

As mentioned earlier, the EPA's evaluation is limited to the impacts of radiation on the environment. The occupational aspects of radiation can be dealt with through the appropriate body such as the Radiological Council and DME.

The EPA is aware that there is a significant concern in the local community with the potential social impacts of the proposal, particularly the potential adverse impact on tourism. The EPA considers that this concern relates to the "perceived" risks of radiation and should be further addressed by the proponent and other agencies including the DRD, Shire of Murray and the WA Tourism Commission.

A summary of the EPA's evaluation of the issues and recommendations is set out in Table 2.

The EPA notes that the proponent has made a commitment to review the environmental performance of the rare earth plant on a 5 yearly basis. The EPA considers that compliance and continuous improvement are an important part of environmental management and recommends that a condition requiring an annual performance audit and the 5 year performance review be set in the Ministerial Statement for the proposal (Recommendation 4).

Issues	Objective	Evaluation Framework	Technical Information	Proponent's Commitments	EPA Recommendations
Pollution Impacts					
Radiological impacts from road transport of gangue residue.	Transport of gangue residue meets statutory requirements and relevant standards for transport safety procedures and public radiation protection.	• Waste packaging and transport procedures to comply with Commonwealth Code for Transport of radioactive substances (Radiological Council). • Vehicle safety to comply with Dangerous Goods Regulations (DME). • Radiation safety measures required to protect public health will ensure that the environment is protected. • Waste characteristics to conform to NHMRC Code for Near Surface Disposal, and be in a form that minimises environmental dispersion during a transport accident.	• Transport routes were based on a qualitative assessment of feasible transport options and route selection criteria. • Gangue residue is packaged into 2 tonne bulka bags), loaded in ISO containers or purpose built steel containers for trasport by B-double trucks. • Draft Transport Emergency Response Plan for the gangue residue has been developed and reviewed by Radiological Council, DME, WA Fire Brigades, and DEP.	• Preparation of an Emergency Response Plan for the transport of gangue residue. • Liaison with all relevant authorities to ensure appropriate emergency response management measures in place, including adherence to designated routes and truck movements during off pealk hours. • Provision of training to drivers and to all relevant reponse personnel. • Transport of gangue waste will be subjected to an annual audit by an independent auditor. • Preparation of shipment manifest. • Waste specification audit reviews.	Objective met through proponent's commitments.
Air emissions of radionuclides from plant operations.	Radiological impacts to public and environment are minimised through compliance with statutory requirements and radiation protection standards.	• Radiation emissions within acceptable environmental levels required by DME and Radiological Council. • Plant design and operations in accordance with ALARA principles and best practical technology.	• Radioactive emissions are estimated tobe well below regulatory acceptable limits for public exposure to radiation, hence negligible public dose.	• Commitment to ALARA principles and best practical technology in designing and operating the plant. • Preparation of a comprehensive RMP for the plant and its environment, which will include pre-operational, operational and post operational monitoring programmes for radiation in air, soil/sediment and water • Commitment to achieve ISO 9002 for both rare earth and Gallium plants • Involvement of the Shire of Murray and local residents in the monitoring process at the plant site through a Community Liaison Committee.	Objective met through proponent's commitments.

TABLE 2. Summary of EPA Recommendations

Issues	Objective	Evaluation Framework	Technical Information	Proponent's Commitments	EPA Recommendations
Impacts on surface and ground water quality from plant operations, particularly evaporation ponds.	Existing water quality of surface and ground water in the surrounding environment of the plant site is maintained as a result of the proposal. Plant and evaporation ponds are designed for zero discharge.	• Waste minimisation. • "Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters" (EPA, 1993) be conformed to where appropriate. • Management of radioactive wastes in accordance with ALARA principles, best practicable technology, and other requirements by DME and Radiological Council. • Management of non-radioactive wastes in accordance with requirements by DME, WAWA and DEP. • Conform to Environmental Protection (Peel Inlet-Harvey Estuary) Policy (1992).	• Process effluents, other wastewaters and contaminated stormwater runoff are collected for either recycling or treatment prior to being directed to existing ponds. • Only non-radioactive effluents are directed to the ponds. Ponds contains mainly sodium salts. • Ponds have been designed to minimise seepage. • Monitoring and sampling programme shows that the performance of the ponds over the past 7-8 years has been satisfactory. • Assessments made on potential impacts of a total breach of the ponds on the Murray River system indicated minimal impacts.	• Continuation of current ground water monitoring programme to detect leakage from existing ponds • RMP will include pre-operational, operational and post operational monitoring programmes for radionuclides in groundwater, surface water, effluents to ponds and water in ponds. • Implementation of contingency plans and remediation procedures in the event of a pond leakage. • Approval from DEP and Water & Rivers Commission for any new ponds to be constructed. • Provision of further information on pond modelling and on drainage/water courses to Water & Rivers Commission, prior to plant commissioning.	Proponent be required to provide details of pre-operational and operational monitoring programmes for surface and ground water including quality assurance procedures, prior to commencing plant construction and plant commissioning respectively.
Noise emissions	Protection of amenity of residents from noise impacts resulting from the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.	Compliance with existing and new noise regulations.	• No quantitative assessment of noise impacts has been carried out. Hence an assessment of plant operational and construction noise is required. Procedures should also be put in place to ensure that trucks associated with the project can achieve the lowest practicable noise emissions.	• Compliance with appropriate noise regulations. • μanagement procedures to minimise noise impacts from construction activities. • Results of noise modelling for plant operations to be submitted to DEP one month before commencement of plant construction • Noise monitoring survey prior to and during plant operations. • Management procedures to minimise noise impacts from heavy vehicles movements, which include restriction on truck movements to Monday to Friday business hours where possible, and use of trucks with noise emissions complying with Australian Design Rules.	Objective met through proponent's commitments.

TABLE 2. Summary of EPA Recommendations (cont'd)

Issues	Objective	Evaluation Framework	Technical Information	Proponent's Commitments	EPA Recommendations
Post-operational management of radioactive contamination and evaporation ponds.	Plant decomissioning and rehabilitation will be carried out in an environmentally acceptable manner, and that the State does not incur any ongoing liability.	Proponents of all projects are required to prepare a decommissioning and rehabilitation programme prior to plant decomissioning.	• All freewater will be evaporated from the ponds prior to placing cover materials over the ponds. • Crystalised salts may be left in the ponds. • Radioactive contaminated material will be either decontaminated or disposed of at Mt Walton.	• RMP will include procedures for radioactive decontamination and post-operational monitoring. • Plant decomissioning will be in accordance with statutory. requirements and in a manner acceptable to the Minister for the Environment. • Procedures will be developed and designed to the requirements of the Minister for the Environment. All aspects of rehabilitation will be investigated at the time of decomissioning, including possible removal of the crystallised salts, modification of the pond underdrainage system .	At least 12 months prior to decommissioning, the proponent should be required to prepare a decommissioning and rehabilitation plan. The plan should include detailed procedures for decontamination and disposal of radioactive contaminated materials, and rehabilitation of the evaporation ponds.
Social surroundings	The EPA's objective is to examine the impacts of the proposal in regard to social surroundings	The *Environmental Protection Act 1986* states that the "social surroundings of man are his aesthetic, cultural, economic and social surroudings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings".	• Potential impacts on local tourism, agricultural industries and land values were not addressed in the ERMP. • A study into the impact of the proposal on tourism in the Peel region is being carried out by external consultants.	• Involvement of local residents and the Shire of Murray in the monitoring process at the Pinjarra plant site. • Liaison with the Mt Walton Community Liaison Committee, local Shires and interest groups on issues relating to the low level radioactive gangue residue. • Liaison with the WA Tourism Commission, Pinjarra tourism operators and local agricultural industry to clarify the "perception" regarding radiation.	The approach taken by the proponent to address the issue is an appropriate approach. The issue should be further addressed by the proponent and relevant agencies including DRD, Shire of Murray and WA Tourism Commission.

TABLE 2 Summary of EPA Recommendations (cont'd)

5.2 Recommendations

Recommendation 1

The Environmental Protection Authority concludes that the proposal by Rhone Poulenc Chimie Australia Pty Ltd to build and operate a rare earth plant of 15,000 tpa production rate of solid rare earth nitrate next to the Gallium plant at Pinjarra, is environmentally acceptable.

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to the proponent's commitments to environmental management and the following recommendations.

Recommendation 2

The Environmental Protection Authority recommends that, the proponent be required to develop monitoring programmes for surface and ground water including quality assurance procedures. The programmes should be submitted to the EPA for approval on advice from the Radiological Council, the DME, the Water and Rivers Commission and the DEP and should be developed and implemented:

- **prior to commencing plant construction to establish baseline data; and**
- **prior to plant commissioning for operational activities.**

Recommendation 3

The Environmental Protection Authority recommends that at least 12 months prior to decommissioning, the proponent be required to prepare a decommissioning and rehabilitation plan to the requirements of the Minister for the Environment on advice of the Radiological Council, DME and Water and Rivers Commission. The plan should include detailed procedures for decontamination and disposal of radioactive contaminated materials, and rehabilitation of the evaporation ponds. The proponent should be required to implement the plan to the requirements of the Minister for the Environment on advice of the Radiological Council, DME and Water and Rivers Commission.

Recommendation 4

The Environmental Protection Authority recommends that the proponent be required to carry out an annual performance audit and each 5 years following the commencement of construction, the proponent be required to prepare a major review of the following:

- **environmental protection, including but not limited to consideration of the environmental objectives;**
- **the audit of performance against the environmental objectives;**
- **the audit of performance of the Radiation Management Programme and the surface and groundwater monitoring programmes; and**
- **the annual audits of environmental performance**

to the requirements of the Environmental Protection Authority on advice of the Radiological Council, DME, Water and Rivers Commission and the DEP.

These environmental objectives should include but not be limited to those identified by the Authority in this assessment report and take account of operating experience and new knowledge.

6. Recommended environmental conditions

Based on the assessment of this proposal and recommendations in this report, the Environmental Protection Authority considers that the following recommended environmental conditions are appropriate.

1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, the proponent shall fulfil the relevant environmental management commitments made in the Environmental Review and Management Programme document "Rare Earth Project, Pinjarra, Western Australia" (September 1995) and in response to issues raised following public submissions, reported on in Environmental Protection Authority Bulletin 810; provided that the commitments are not inconsistent with the conditions or procedures contained in this statement.

The environmental management commitments (March 1996) were published in Environmental Protection Authority Bulletin 810 (Appendix 7) and a copy is attached.

2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal, shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal.

2-2 Where, in the course of the detailed implementation referred to in condition 2-1, the proponent seeks to change the designs, specifications, plans or other technical material submitted to the Environmental Protection Authority in any way that the Minister for the Environment determines, on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Proponent

These conditions legally apply to the nominated proponent.

3-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

4 Surface and Ground Water Monitoring Programmes

4-1 Prior to plant construction, the proponent shall develop a pre-operational monitoring programme (stage 1) for surface and ground water including quality assurance procedures, to the requirements of the Environmental Protection Authority on advice of the Radiological Council, the Department of Minerals and Energy, the Water and Rivers Commission and the Department of Environmental Protection. The proponent shall implement the programme to the requirements of these agencies.

4-2 Prior to plant commissioning, the proponent shall develop an operational monitoring programme (stage 2) for surface and ground water including quality assurance procedures, to the requirements of the Environmental Protection Authority on advice of

the Radiological Council, the Department of Minerals and Energy, the Water and Rivers Commission and the Department of Environmental Protection. to the requirements of these agencies.

4-3 At appropriate times, the proponent shall implement the two monitoring programmes required by conditions 4-1 and 4-2.

5 Decommissioning

5-1 The proponent shall achieve the satisfactory decommissioning of the plant, removal of the plant and installations and rehabilitation of the site and its environs.

5-2 At least twelve months prior to decommissioning, the proponent shall prepare a (final) decommissioning and rehabilitation plan to achieve the objectives of condition 5-1, to the requirements of the Environmental Protection Authority on advice of the Radiological Council, the Department of Minerals and Energy and the Water and Rivers Commission. The plan shall include detailed procedures for decontamination and disposal of radioactive contaminated materials, and rehabilitation of the evaporation ponds.

5-3 The proponent shall implement the plan required by condition 5-2.

6 Time Limit on Approval

The environmental approval for the proposal is limited.

6-1 If the proponent has not substantially commenced the proposal within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the proposal has been substantially commenced.

Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period to the Minister for the Environment.

Where the proponent demonstrates to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years.

7 Performance Review

7-1 Following commencement of operation, the proponent shall carry out an annual audit of environmental performance. The proponent shall provide the audit report to the Department of Environmental Protection each year for the first five years of the operation.

7-2 Each five years following the commencement of construction, the proponent shall prepare a major review of the following:

1. environmental protection, including but not limited to consideration of the environmental objectives;
2. the audit of performance against the environmental objectives;
3. the audit of performance of the Radiation Management Programme and the surface and groundwater monitoring programmes; and
4. the annual audits required in condition 7-1,

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Radiological Council, the Department of Minerals and Energy and the Water and Rivers Commission.

These environmental objectives shall include but not be limited to those identified by the Environmental Protection Authority in the assessment report (Environmental Protection Authority Bulletin 810) and account for operating experience and new knowledge.

The environmental objectives may be changed by the Environmental Protection Authority following the review.

8 Compliance Auditing

To help determine compliance with the recommended environmental conditions, periodic reports on progress in implementation of the proposal are required.

8-1 The proponent shall submit periodic Progress and Compliance Reports, in accordance with an audit programme prepared by the Department of Environmental Protection in consultation with the proponent.

Procedure

1 Unless otherwise specified, the Department of Environmental Protection is responsible for assessing compliance with the conditions contained in this statement and for issuing formal clearance of conditions.

2 Where compliance with any condition is in dispute, the matter will be determined by the Minister for the Environment.

3 The Environmental Protection Authority will undertake a detailed review of the proposal and the results of the Environmental Radiation Management Programme and the surface and ground water monitoring progammes referred to in condition 7-1 after the first five years following commencement of construction.

Note

The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the Environmental Protection Act.

7. References

Commonwealth Environmental Protection Agency (1995). Best Practice Environmental Management in Mining - Tailings Containment.

Commonwealth of Australia (1990). *Code of Practice for the Safe Transport of Radioactive Substances.* Environment Protection (Nuclear Codes) Act 1978.

Environmental Protection Authority (1988a). *Proposed Rare Earth Treatment Plant Pinjarra, Western Australia. Report and Recommendations.* Bulletin 352, Perth.

Environmental Protection Authority (1988b). *Proposed Integrated Waste Disposal Facility, Eastern Goldfields Western Australia. Report and Recommendations.* Bulletin 353, Perth.

Environmental Protection Authority (1991). *Mt Walton Integrated Waste Disposal Facility, Environmental Management Programmes. Evaluation Report* . Bulletin 571, Perth.

Environmental Protection Authority (1993a). *Disposal by Shaft Entombment or Trnch Burial of a Range of Intractable Wastes at the Intractable Waste Disposal Facility, Mt Walton East. Report and Recommendations.* Bulletin 726, Perth.

Environmental Protection Authority (1993b). *Sustainable Development and the Kwinana Industrial Area. Position Paper.* Bulletin 723.

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Environmental Protection Authority (1995). *Transport of Sodium Cyanide Solution from Kwinana. Report and Recommendations of the Environmental Protection Authority.* Bulletin 772.

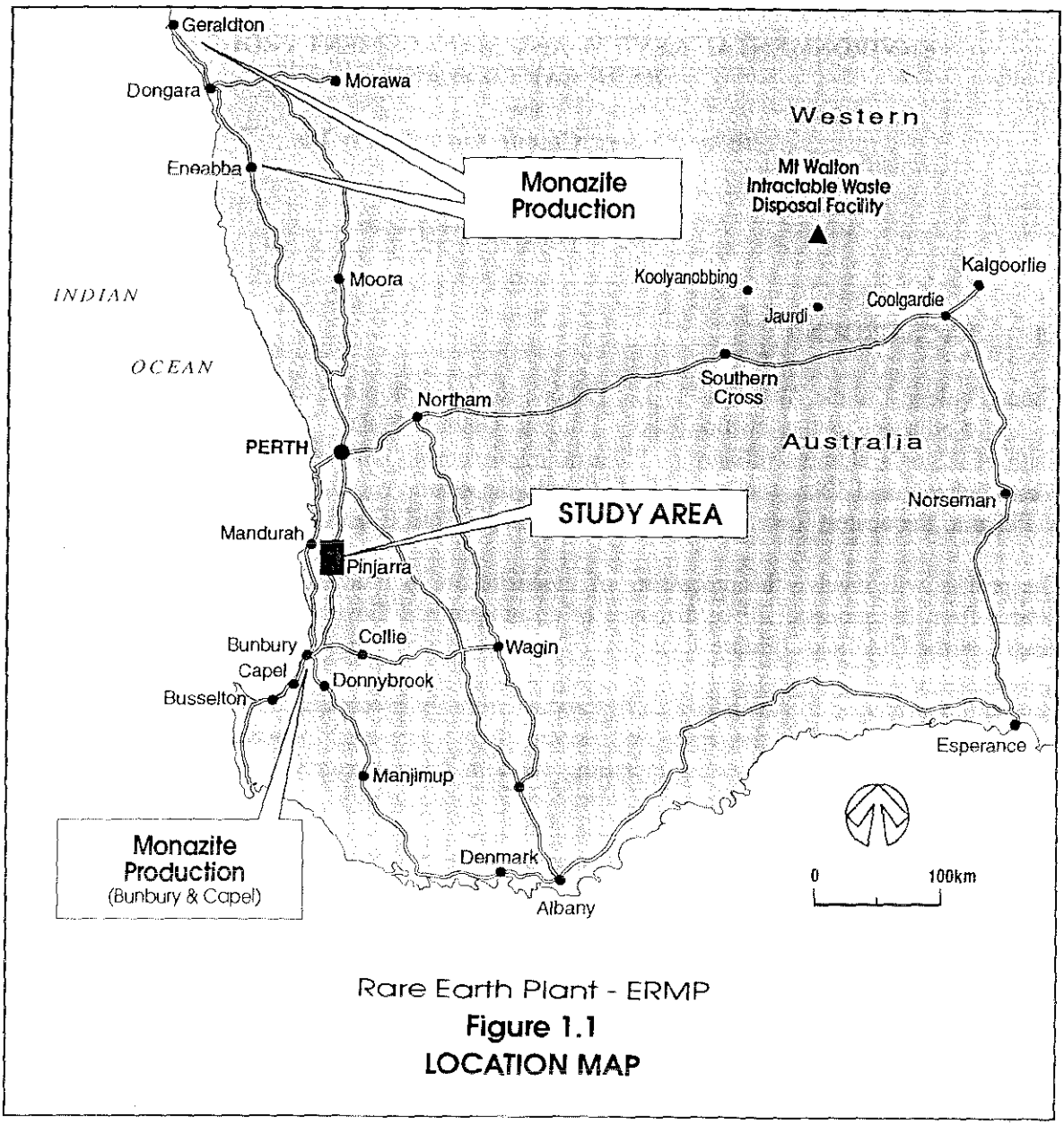
Health Department of Western Australia (1988). *Proposed Integrated Hazardous Waste Disposal Facility.* Public Environmental Review

International Commission on Radiological Protection (ICRP, 1990). *1990 Recommendations of the International Commission on Radiological Protection.* ICRP Publication 60. Pergammon Press, Oxford.

National Health and Medical Research Council (NHMRC) (1992). *Code of Practice for the Near-Surface Disposal of Radioactive Waste in Australia.* Radiation Health Series No. 35.

Appendix 1

Figures (Source: ERMP)



Rare Earth Plant - ERMP

Figure 1.1

LOCATION MAP

Figure 1

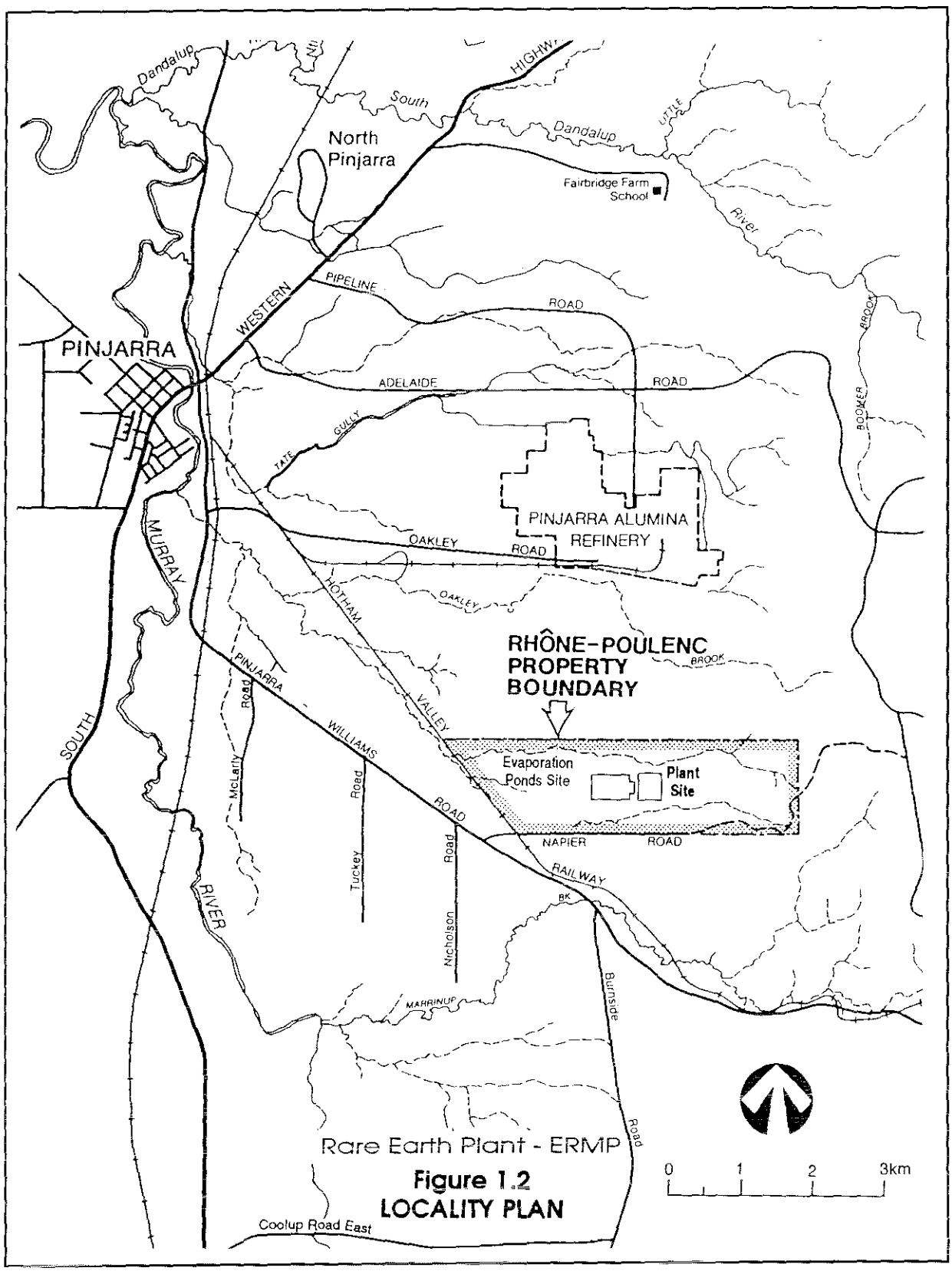
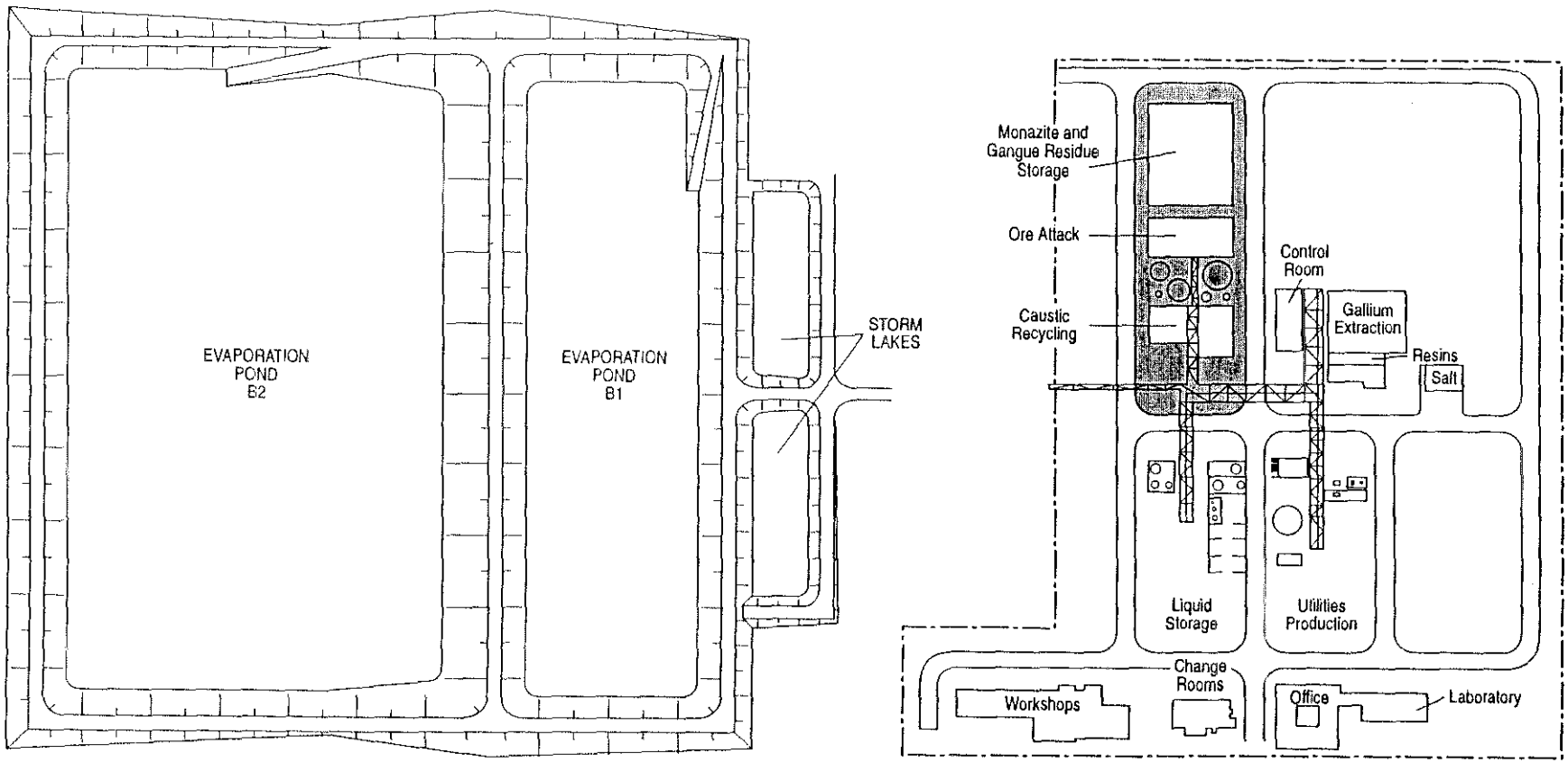

Dandalup
South
North
Pinjarra
HIGHWAY
Dandalup
LITTLE
Fairbridge Farm
School
River
WESTERN
PIPELINE
ROAD
PINJARRA
ADELAIDE
ROAD
BROOK
BOOKER
YATE
GULLY
PINJARRA ALUMINA
REFINERY
OAKLEY
ROAD
MURRAY
HOTHAM
OAKLEY
RHÔNE-POULENC
PROPERTY
BOUNDARY
BROOK
PINJARRA
Road
VALLEY
WILLIAMS
SOUTH
Evaporation
Ponds Site
Plant
Site
McLarty
Road
ROAD
NAPIER
ROAD
Tuckey
Road
RAILWAY
RIVER
BK
Nicholson
Road
MARRINUP
Burnside
Road
Rare Earth Plant - ERMP
Figure 1.2
LOCALITY PLAN
Coolup Road East
0
1
2
3km

Figure 2.

Figure 3



Rare Earth Plant - ERMP

Figure 1.3

PLAN OF THE PROJECT SITE

GALLIUM EXTRACTION AND RARE EARTH PLANT

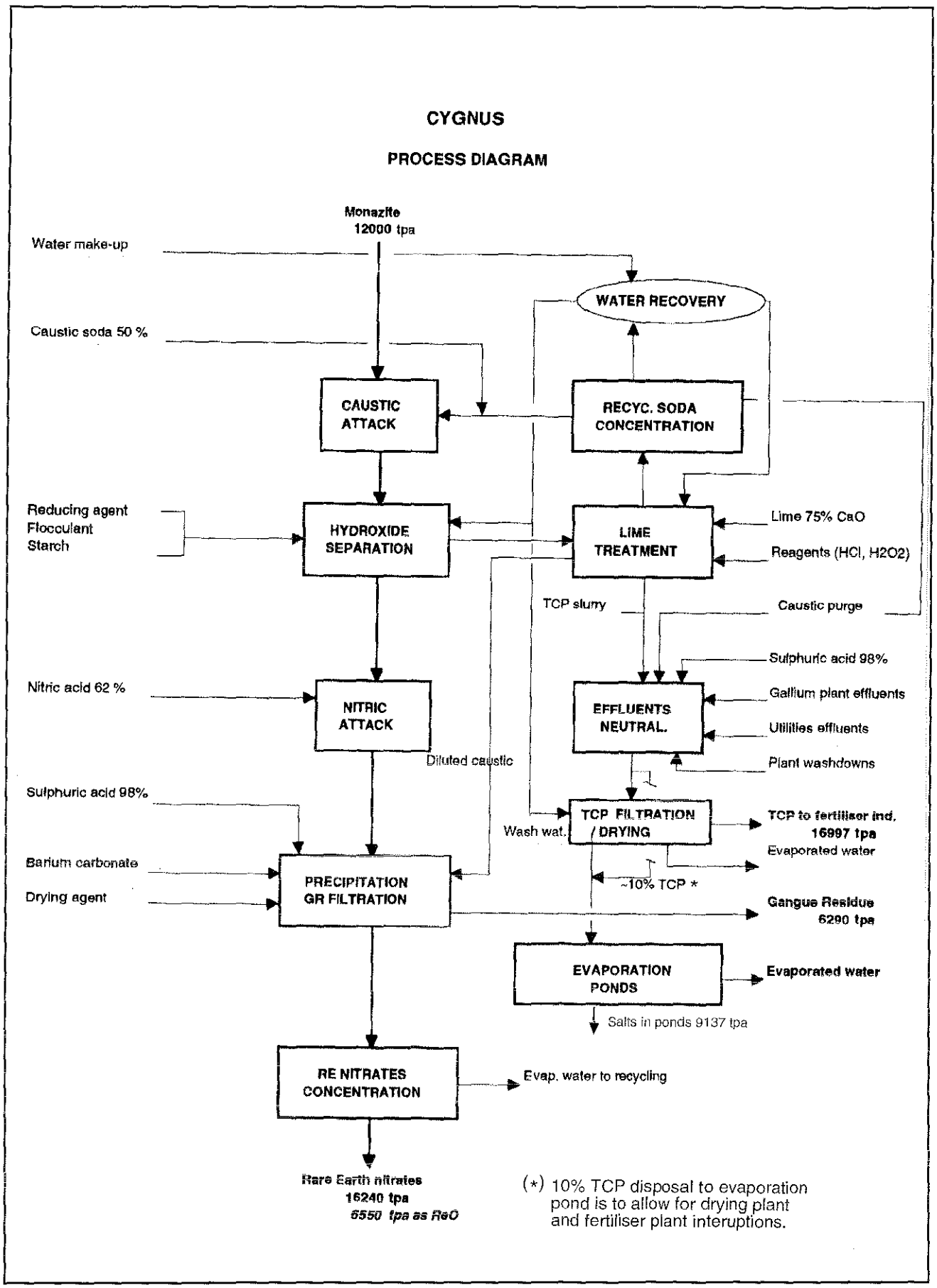
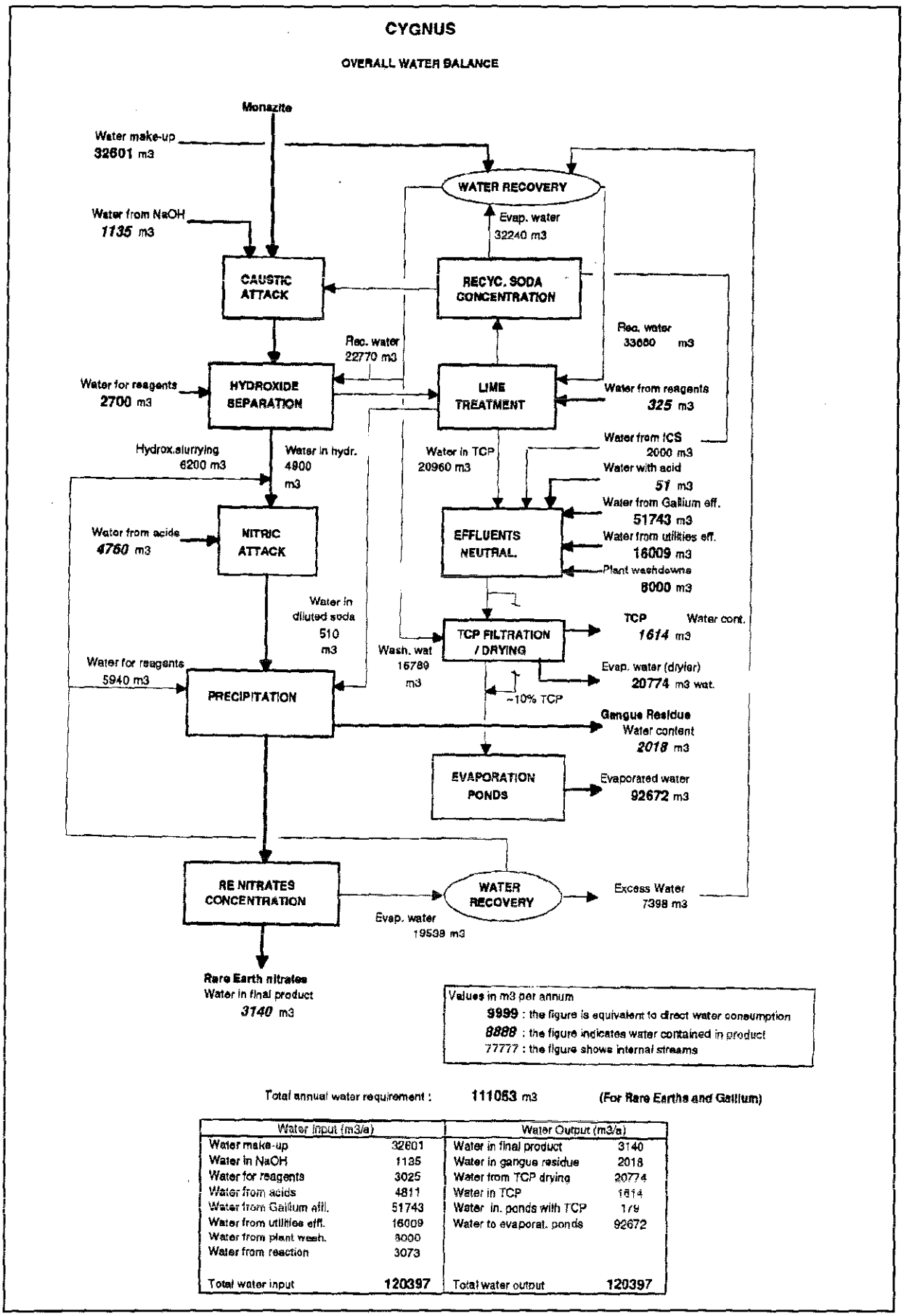

CYGNUS
PROCESS DIAGRAM
Monazite
12000 tpa
Water make-up
Caustic soda 50 %
WATER RECOVERY
CAUSTIC ATTACK
RECYC. SODA CONCENTRATION
Reducing agent
Flocculant
Starch
HYDROXIDE SEPARATION
LIME TREATMENT
Lime 75% CaO
Reagents (HCl, H2O2)
TCP slurry
Caustic purge
Sulphuric acid 98%
Nitric acid 62 %
NITRIC ATTACK
EFFLUENTS NEUTRAL.
Gallium plant effluents
Utilities effluents
Plant washdowns
Diluted caustic
Sulphuric acid 98%
TCP FILTRATION / DRYING
Wash wat.
TCP to fertiliser ind.
16997 tpa
Evaporated water
Barium carbonate
Drying agent
PRECIPITATION GR FILTRATION
~10% TCP *
Gangue Residue
6290 tpa
EVAPORATION PONDS
Evaporated water
Salts in ponds 9137 tpa
RE NITRATES CONCENTRATION
Evap. water to recycling
Rare Earth nitrates
16240 tpa
6550 tpa as ReO
(*) 10% TCP disposal to evaporation pond is to allow for drying plant and fertiliser plant interuptions.

Figure 4



Water input (m3/a)		Water Output (m3/a)	
Water make-up	32601	Water in final product	3140
Water in NaOH	1135	Water in gangue residue	2018
Water for reagents	3025	Water from TCP drying	20774
Water from acids	4811	Water in TCP	1614
Water from Gallium effl.	51743	Water in ponds with TCP	179
Water from utilities effl.	16009	Water to evaporat. ponds	92672
Water from plant wash.	8000		
Water from reaction	3073		
Total water input	120397	Total water output	120397

Figure 5

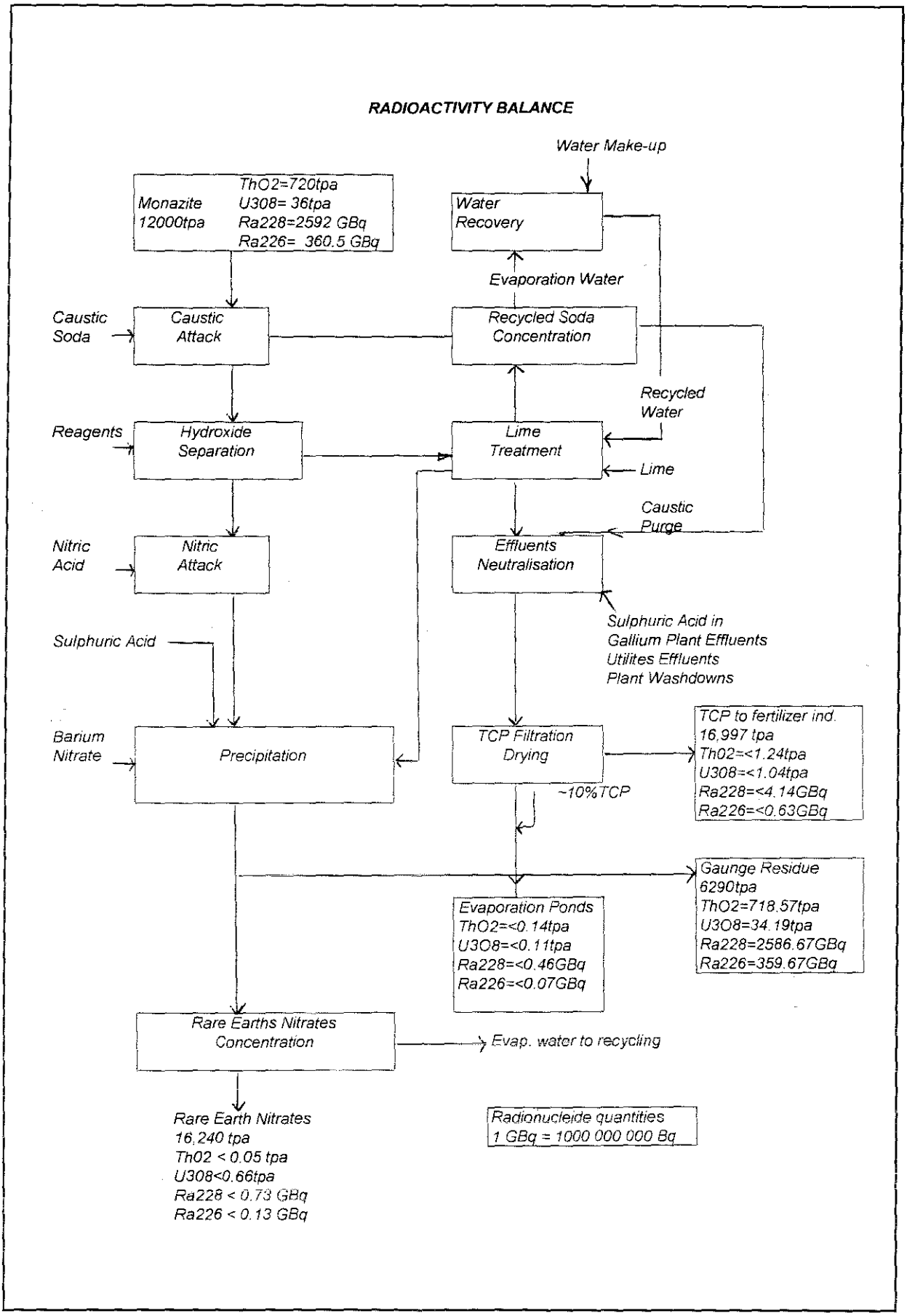
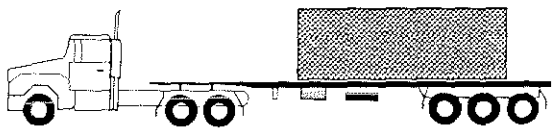
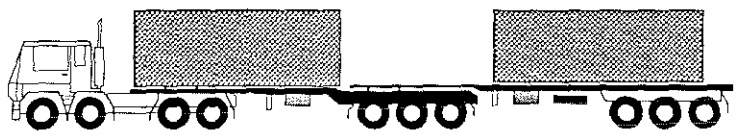

RADIOACTIVITY BALANCE
Water Make-up
Monazite 12000tpa
ThO2=720tpa
U308= 36tpa
Ra228=2592 GBq
Ra226= 360.5 GBq
Water Recovery
Evaporation Water
Caustic Soda
Caustic Attack
Recycled Soda Concentration
Recycled Water
Reagents
Hydroxide Separation
Lime Treatment
Lime
Caustic Purge
Nitric Acid
Nitric Attack
Effluents Neutralisation
Sulphuric Acid in
Gallium Plant Effluents
Utilites Effluents
Plant Washdowns
Sulphuric Acid
Barium Nitrate
Precipitation
TCP Filtration Drying
TCP to fertilizer ind.
16,997 tpa
Th02=<1.24tpa
U308=<1.04tpa
Ra228=<4.14GBq
Ra226=<0.63GBq
~10%TCP
Gaunge Residue
6290tpa
ThO2=718.57tpa
U3O8=34.19tpa
Ra228=2586.67GBq
Ra226=359.67GBq
Evaporation Ponds
ThO2=<0.14tpa
U3O8=<0.11tpa
Ra228=<0.46GBq
Ra226=<0.07GBq
Rare Earths Nitrates Concentration
Evap. water to recycling
Rare Earth Nitrates
16,240 tpa
Th02 < 0.05 tpa
U308<0.66tpa
Ra228 < 0.73 GBq
Ra226 < 0.13 GBq
Radionucleide quantities
1 GBq = 1000 000 000 Bq

Figure 6



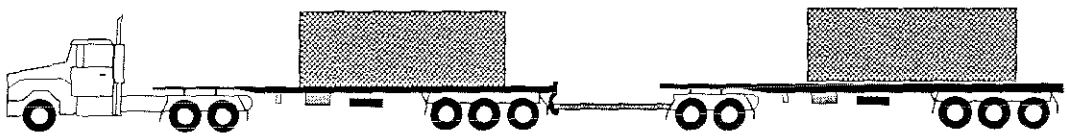
SEMI TRAILER

Maximum Length: *19.0m*
Maximum Mass: *42.5t*
Maximum Payload: *25.0t*



B DOUBLE

Maximum Length: *25.0m*
Maximum Mass: *67.5t*
Maximum Payload: *47.5t (concessional loading)*



ROAD TRAIN (Double Bottom)

Maximum Length: *36.5m*
Maximum Mass: *84.0t*
Maximum Payload: *60.0t (concessional loading)*

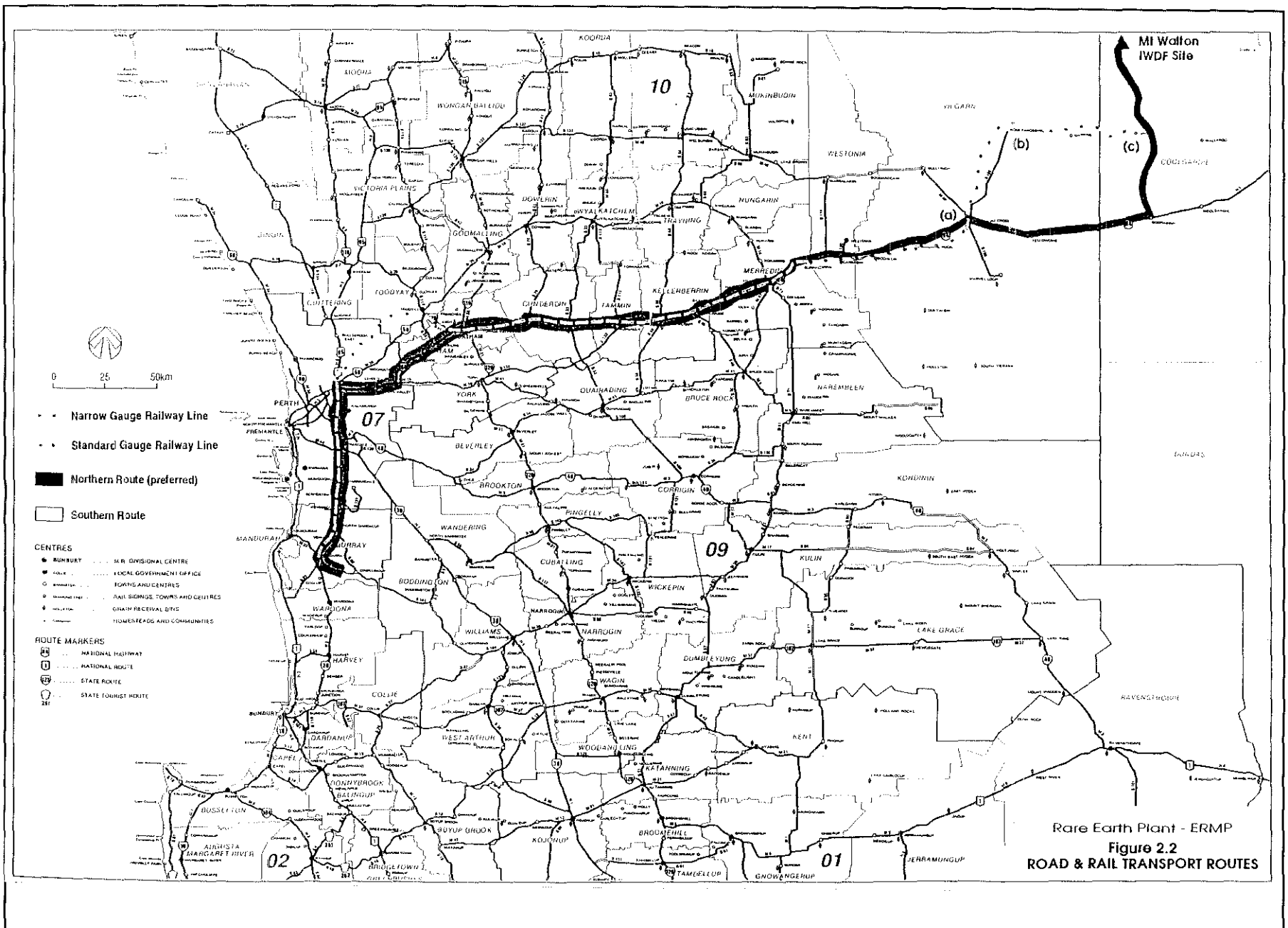
Rare Earth Plant - ERMP

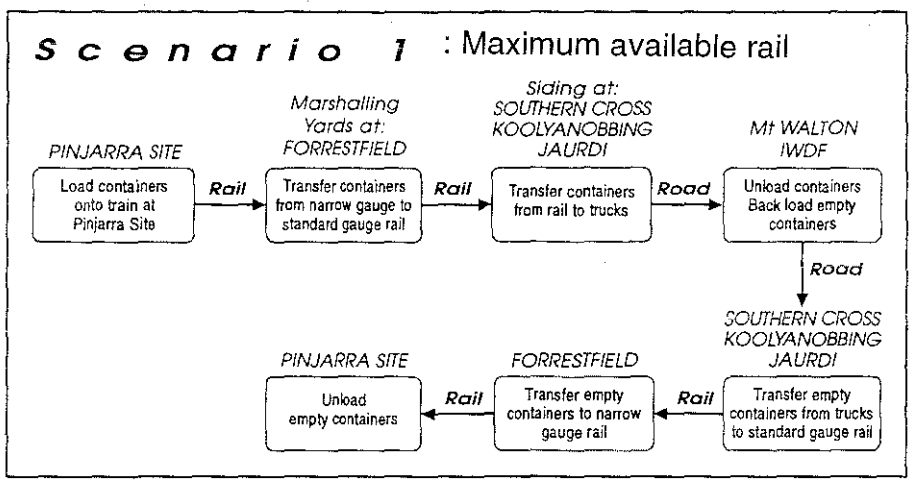
Figure 3.9

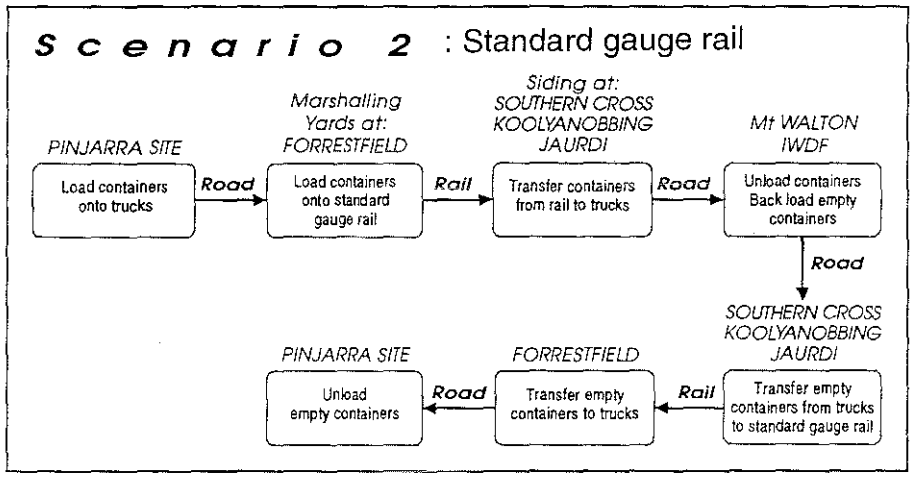
SEMI TRAILER, B-DOUBLE AND ROAD TRAIN CONFIGURATIONS FOR THE TRANSPORT OF STANDARD ISO - CONTAINERS

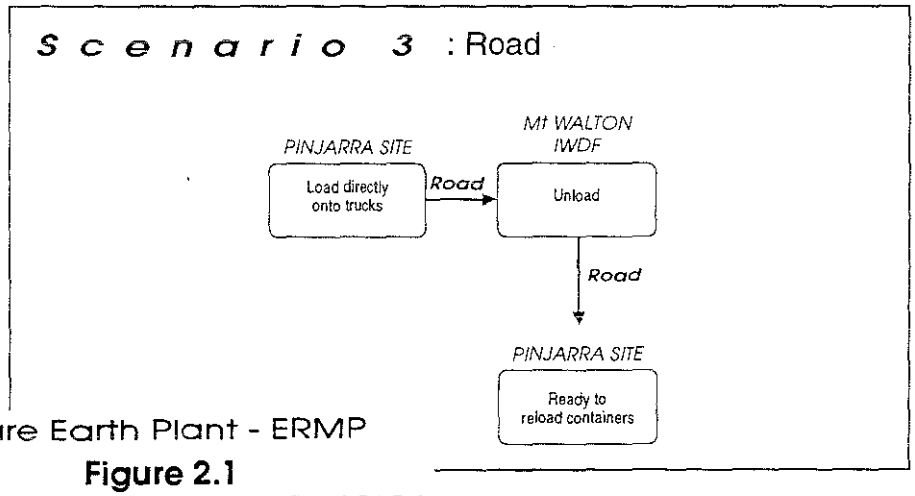
Figure 7

Figure 8


Mt Walton
IWDF Site
(a)
(b)
(c)
0 25 50km
Narrow Gauge Railway Line
Standard Gauge Railway Line
Northern Route (preferred)
Southern Route
CENTRES
ROUTE MARKERS
10
07
09
02
01
PERTH
FREMANTLE
MERREDIN
NARROGIN
BUNBURY
Rare Earth Plant - ERMP
Figure 2.2
ROAD & RAIL TRANSPORT ROUTES





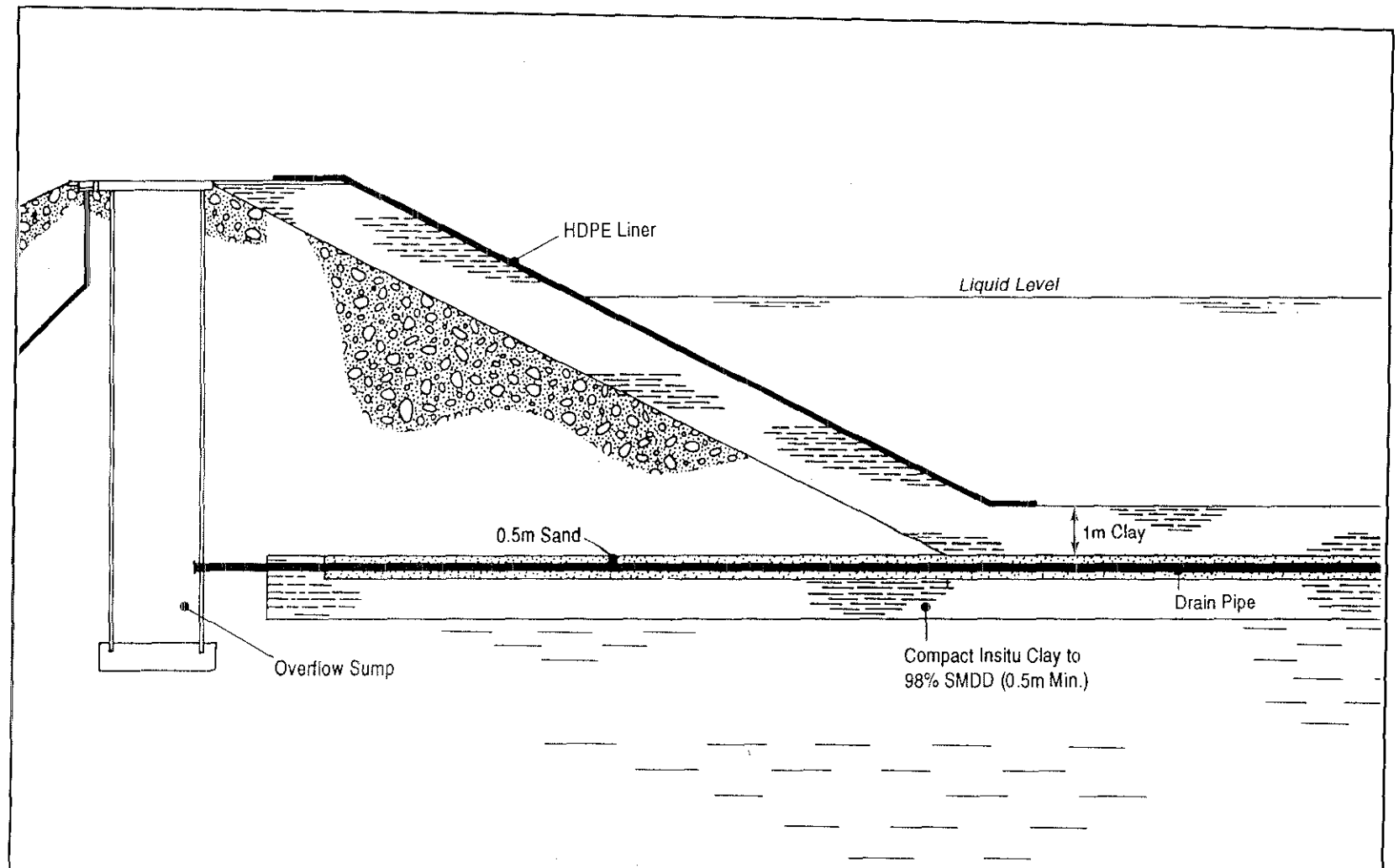


Rare Earth Plant - ERMP

Figure 2.1
MODE OF TRANSPORT SCENARIOS

Figure 9

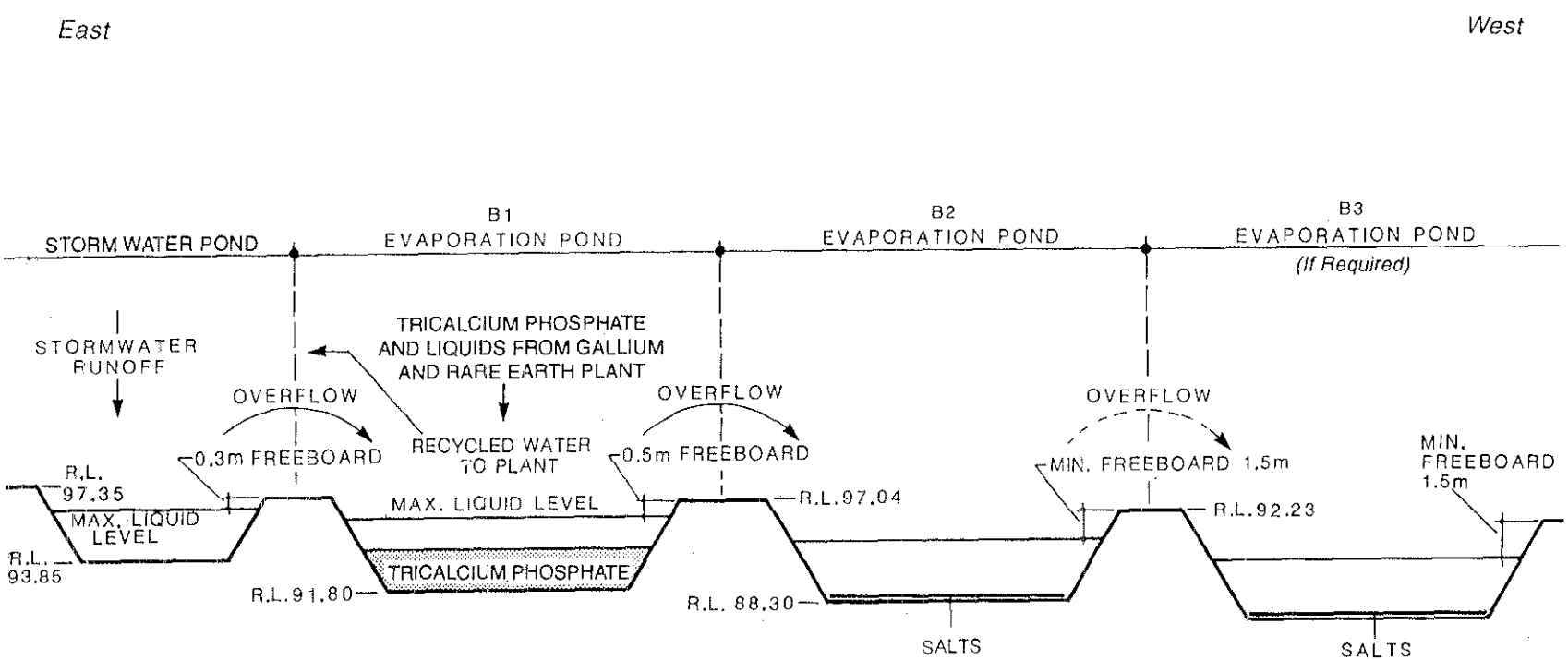
Figure 10



Rare Earth Plant - ERMP

Figure 3.7
CROSS-SECTION OF EVAPORATION POND WITH UNDERDRAIN SYSTEM

Figure 11

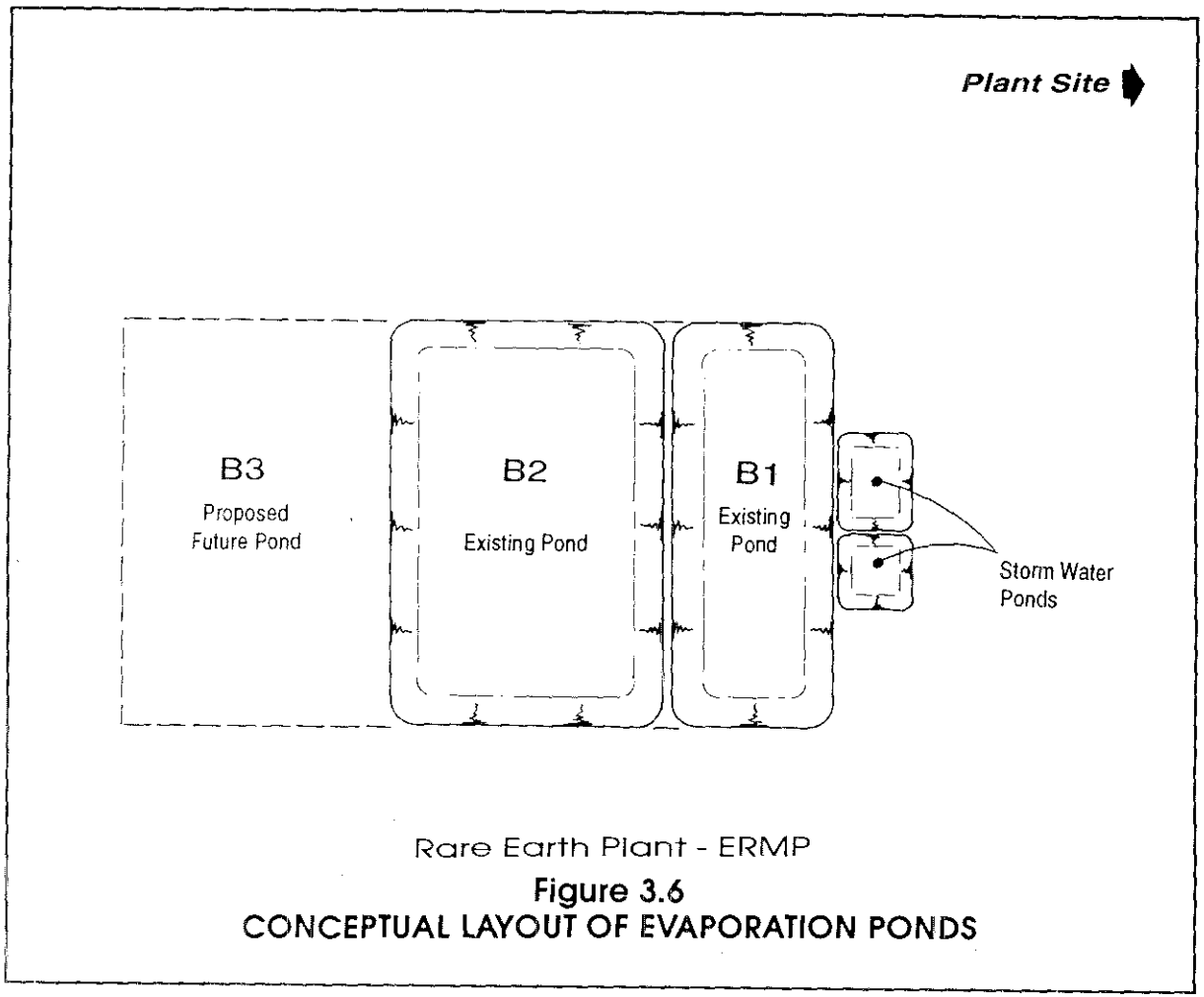


Rare Earth Plant - ERMP

Figure 3.8

SCHEMATIC SECTION THROUGH THE EVAPORATION POND SYSTEM

Figure 12



Rare Earth Plant - ERMP

Figure 3.6
CONCEPTUAL LAYOUT OF EVAPORATION PONDS

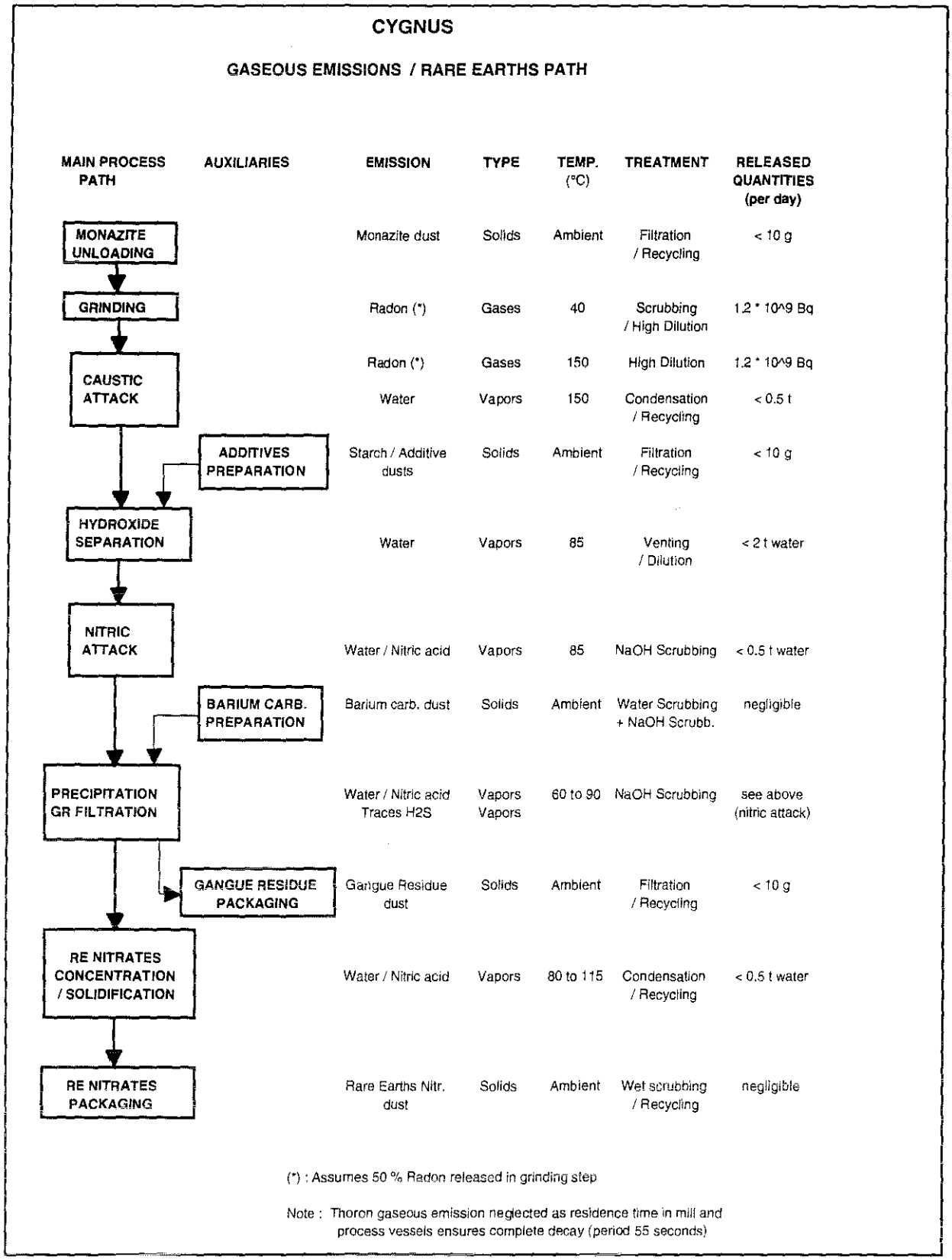
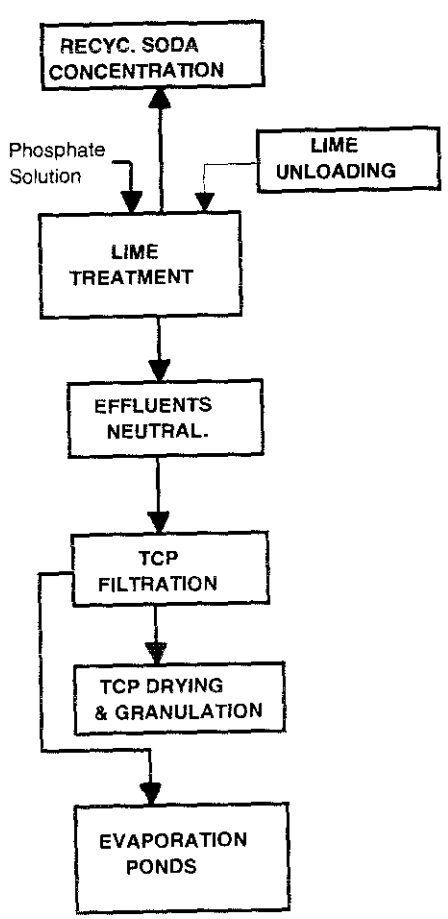

CYGNUS
GASEOUS EMISSIONS / RARE EARTHS PATH
MAIN PROCESS PATH
AUXILIARIES
EMISSION
TYPE
TEMP. (°C)
TREATMENT
RELEASED QUANTITIES (per day)
MONAZITE UNLOADING
Monazite dust
Solids
Ambient
Filtration / Recycling
< 10 g
GRINDING
Radon (*)
Gases
40
Scrubbing / High Dilution
1.2 * 10^9 Bq
CAUSTIC ATTACK
Radon (*)
Gases
150
High Dilution
1.2 * 10^9 Bq
Water
Vapors
150
Condensation / Recycling
< 0.5 t
ADDITIVES PREPARATION
Starch / Additive dusts
Solids
Ambient
Filtration / Recycling
< 10 g
HYDROXIDE SEPARATION
Water
Vapors
85
Venting / Dilution
< 2 t water
NITRIC ATTACK
Water / Nitric acid
Vapors
85
NaOH Scrubbing
< 0.5 t water
BARIUM CARB. PREPARATION
Barium carb. dust
Solids
Ambient
Water Scrubbing + NaOH Scrubb.
negligible
PRECIPITATION GR FILTRATION
Water / Nitric acid
Traces H2S
Vapors
Vapors
60 to 90
NaOH Scrubbing
see above (nitric attack)
GANGUE RESIDUE PACKAGING
Gangue Residue dust
Solids
Ambient
Filtration / Recycling
< 10 g
RE NITRATES CONCENTRATION / SOLIDIFICATION
Water / Nitric acid
Vapors
80 to 115
Condensation / Recycling
< 0.5 t water
RE NITRATES PACKAGING
Rare Earths Nitr. dust
Solids
Ambient
Wet scrubbing / Recycling
negligible
(*) : Assumes 50 % Radon released in grinding step
Note : Thoron gaseous emission neglected as residence time in mill and process vessels ensures complete decay (period 55 seconds)

Figure 13a

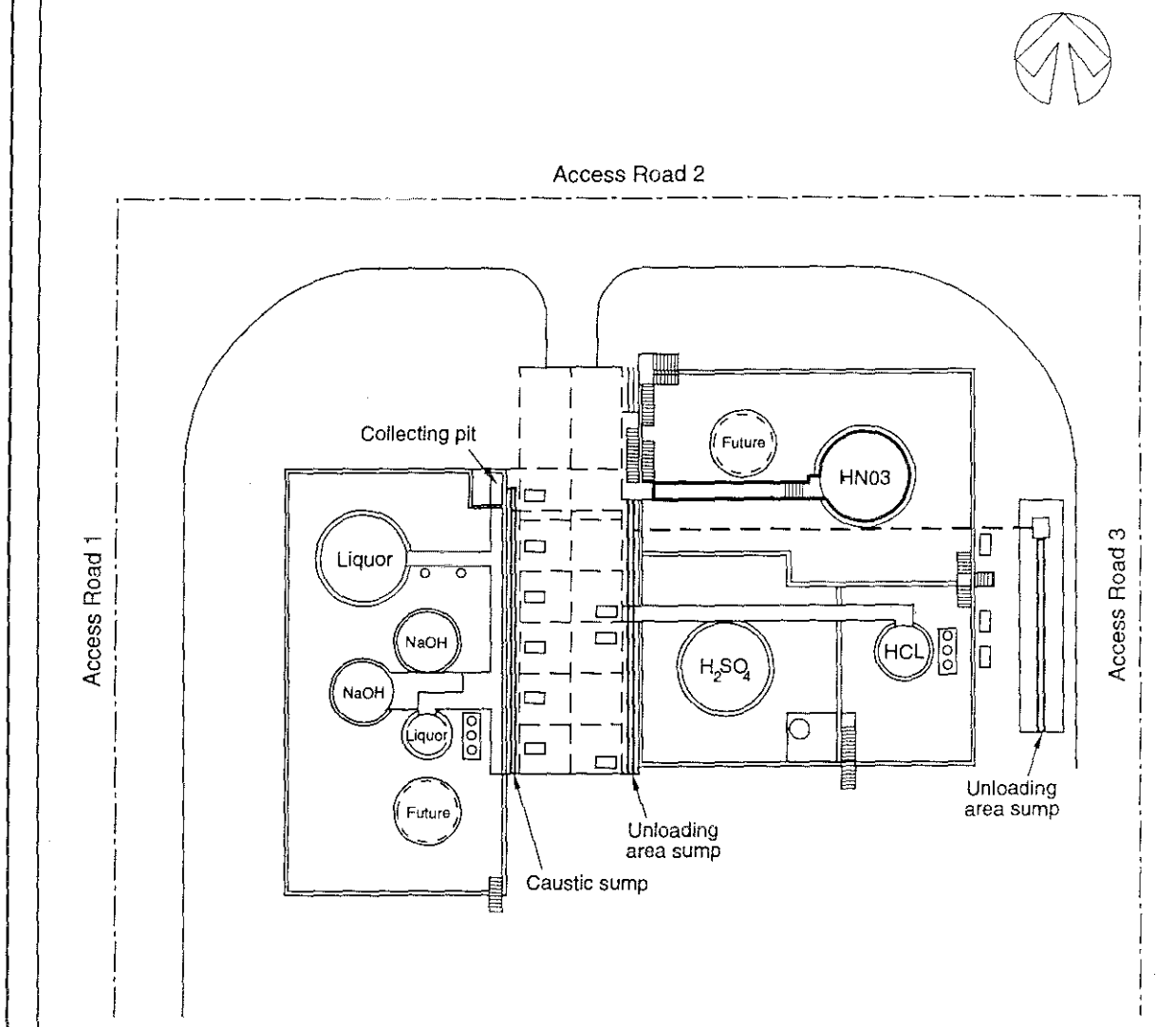
CYGNUS

GASEOUS EMISSIONS / PHOSPHATES PATH



MAIN PROCESS PATH	AUXILIARIES	EMISSION	TYPE	TEMP. (°C)	TREATMENT	RELEASED QUANTITIES (per day)
RECYC. SODA CONCENTRATION		Water	Vapor	80 to 115	Condensation / Recycling	< 0.5 t water
	LIME UNLOADING	Lime dust	Solid	Ambient	Filtration / Recycling	< 10 g
LIME TREATMENT		Lime dust	Solid	Ambient	Wet scrubbing	negligible
		Water	Vapors	85	Wet scrubbing	< 0.5 t
EFFLUENTS NEUTRAL.		Water	Vapors	75	Venting	< 2 t water
TCP FILTRATION		Water	Vapors	65	Venting	< 2 t water
TCP DRYING & GRANULATION		Water TCP dust	Vapors Solids	90	Filtration / Recycling	65 t water < 0.5 kg TCP
EVAPORATION PONDS		Water	Vapors	Ambient	None	254 t

Figure 13b



Rare Earth Plant - ERMP

Figure 3.3

LIQUID STORAGE AREA DESIGN

Figure 14

Appendix 2

Tables (Source: ERMP & Rhone-Poulence)

Tables (Source: ERMP & Rhone-Poulenc)

TABLE A1 (ERMP, Table 3.1)

COMPOSITION OF MONAZITE

Name	Components	Percentage
Rare Earth Oxide	RE_2O_3	58.0%
Thorium Oxide	ThO_2	6.0%
Uranium Oxide	U_3O_8	0.3%
Phosphate	P_2O_5	27%
Calcium Oxide	CaO	1.5%
Titanium Dioxide	TiO_2	0.7%
Zirconium Oxide	ZrO_2	3.0%
Silicon Oxide	SiO_2	3.0%
Iron Oxide	Fe_2O_3	0.5%

TABLE A2

ANNUAL REQUIREMENTS OF PROCESS CHEMICALS

Process Chemicals	Annual Consumption (tonnes)
Caustic Soda (50% NaOH)	2356
Nitric Acid (62% HNO_3)	12495
Lime (77% CaO)	7,195
Sulphuric Acid (98% H_2SO_4)	3295
Hydrochloric Acid (33% HCl)	498
Barium Carbonate	1,220
Hydrogen Peroxide (50% H_20_2)	124
Drying agent	356
Miscellaneous Chemicals	230

TABLE A3

COMPOSITION OF RARE EARTH NITRATE PRODUCT AND TRICALCIUM PHOSPHATE BY-PRODUCT

Stream	Form	Annual Quantities (for 12,000t monazite)	Typical Composition	
Rare Earth Nitrate	Solid	16,240tpa	$RE(NO_3)_3$ $NaNO_3$ Water	79.5% 1.5% 19%
Filter Cake Tricalcium phosphate	Solid	16,997tpa	$CaHPO_4$ Na soluble salts (Cl, SO_4) $CaSO_4,2H_2O$ Lime gangue	31.6% 8.6% 45.4% 14.4%

TABLE A4 (ERMP, Table 3.5)

COMPOSITION OF PLANT EFFLUENT AND GANGUE RESIDUE

Stream	Form	Annual Quantities (for 12,000t monazite)	Typical Composition	
Plant Effluent	Liquid	101,809 t or 90,000m^3	Water Na_2SO_4/NaCl Lost TCP	91% 7.1% (78g/l) 1.9%
Gangue Residue	Solid	6,290t	Th $(OH)_4$ UO_2 $(OH)_2$ Insoluble SO_4: (Ba, Ra, Pb) Monazite RE (OH) Zr O_2 SiO_2 Ti $(OH)_4$ Fe $(OH)_3$ Drying agent Water ^{226}Ra ^{228}Ra	12.6% 0.6% 25.7% 5.7% 4.1% 5.7% 5.7% 1% 1.3% 5.6% 32% 57Bq/g 411Bq/g

TABLE A5 (ERMP, Table 6.2)

SOLUBILITY OF GANGUE RESIDUE

Component	Solubility of samples* of similar gangue material in demineralised water			Guidelines for Quality of Drinking Water**
	1	2	3	
Ra-228 (Bq/l)	0.3	0.3	0.5	0.5
Ra-226 (Bq/l)	<0.2	<0.2	<0.2	0.5
U (mg/l)	0.08	0.04	0.03	0.25
Th (mg/l)	<0.5	<0.5	<0.5	0.1***
Pb (mg/l)	0.025	<0.1	<0.1	0.1
SO_4 (mg/l)	230	135	100	500

Sources:
* Rhône-Poulenc.
** NHMRC/ARMCANZ, 1994.
*** DOME, 1995 pers. comm.

TABLE A6 (ERMP, Table 2.2)

COMPARISON OF TRANSPORT OPTION FOR GANGUE RESIDUE

	Scenario 1 (Rail to Eastern Goldfields and road to IWDF)	Scenario 2 (Road to Forrestfield, rail to Eastern Goldfields and road to IWDF)	Scenario 3 (Road to IWDF)
Infrastructure and Equipment Required	New siding at Pinjarra. Hardstand area and extra track at Jaurdi. Short term storage area at sidings. Lifting equipment at site, sidings and IWDF. Upgrading of Westrail and IWDF Access Roads.	Hardstand area and extra track at Jaurdi. Short-term storage area at sidings. Lifting equipment at site, sidings and IWDF. Upgrading of Westrail and IWDF Access Roads.	Loading equipment at the site and IWDF. Upgrading of the IWDF Access Road.
Environmental Issues	Rail Transport along the existing railway system from Pinjarra to the Goldfields siding passing through country and metropolitan areas. The railway passes through many regions including river valleys and water catchment areas.	Road transport along the existing main roads from Pinjarra to Forrestfield passing through the metropolitan area. Rail transport from Forrestfield to the Goldfields siding following the river valley for a section of the route and passes through water catchment areas.	Road transport along the existing major highways and roads, passing through many country towns and the metropolitan area. The route crosses rivers and passes through water catchment areas.
Risks Associated with Accidents	If there was a derailment there is a 40m wide rail reserve in which any spillage is likely to be contained. However, there is not likely to be any spillage as the waste material will be in bulk bags stored inside containers. Mobilisation time for emergency response teams will be longer if the accident occurs in an area away from the main roads.	Potential risk of road accidents for the road sections of the route, and potential derailment for the railway section as discussed for Scenario 1.	Potential risk of road accident along the route. The waste material will be in bulk bags stored in locked containers therefore the potential for spillage is low. Even if there is spillage the risk of harmful exposure to those involved is small.

Transfer Handling of Waste	Five transfer handlings: 1. Load containers onto truck if new siding is off the Proponent's property. 2. Transfer on to rail at the new Pinjarra siding. 3. Transfer from narrow gauge to standard gauge at Forrestfield. 4. Transfer from rail to road at the Eastern Goldfields siding. 5. Unload containers at the IWDF.	Four transfer handlings: 1. Load containers onto trucks at site. 2. Transfer from road to rail at Forrestfield marshalling yards. 3. Transfer from rail to road at the Eastern Goldfields siding. 4. Unload containers at the IWDF.	Two handlings: 1. Load containers on to trucks at site. 2. Unload containers at the IWDF.
Occupational Health Issues	Minimal potential exposure to train drivers. Multiple handling of the containers increases the risk of accidental spillage and potential exposure to a greater number of people due to transfer operations.	Potential exposure to truck drivers for a short period of time. Minimal potential exposure to train drivers. Multiple handlings of the containers increases the risk of accidental spillage and potential exposure to a greater number of people due to transfer operations.	Potential exposure to truck drivers, however, trucks will be designed with a shield to reduce the potential dosage. Minimum number of handling operations therefore reducing potential exposure to the least number of employees. All persons involved in the handling of the waste will be health monitored.
Public Health (Normal Operations)	Minimal potential exposure to the general public. Perceived impact if containers are stored at sidings.	Minimal potential exposure to the general public. Perceived impact if containers are stored at sidings.	Minimal potential exposure to the general public.
Public Health (Accident Scenario)	Depending upon location of the accident and ease of access. Response time may be slower than for road options. Risk to public health in the event of an accident is small.	Response time of emergency crews will be shorter if accident occurs in close proximity to main roads. It may take longer to reach the accident if it occurs along the section of railway in the valleys. Minimal risk to public health in the event of an accident.	Emergency teams will be located along the route. Therefore, response time will be short further reducing the risk to public health.
Scheduling and Management	A dedicated train would be required to transport a relatively small quantity of material. Inefficient use of Westrail resources. Transport time could be in excess of 24 hours depending on time for transfer operations.	Movements of waste would need to coincide with existing train services to the Eastern Goldfields. Transport time could be in excess of 24 hours depending on time for transfer operations.	Proponent has greater control and management of transport of waste including scheduling of movements and control of contractors. Transport time would be around 10 hours from Pinjarra to IWDF.

TABLE A7

SUMMARY OF THE ISSUES AND MANAGEMENT OF THE RHÔNE-POULENC RARE EARTH PLANT AT PINJARRA

Category	Topic	Aspects of Concern	Present Status	Proposed Action and Objective	Proposed Management	Predicted Outcome
Biophysical Environment	Vegetation and Flora	Loss or degradation to vegetation and flora	• Plant site already cleared. • Small percentage of native vegetation remaining on the proposed additional pond site (if required).	• Clear area required for pond (if necessary). • Aim is to minimise disturbance to vegetation.	• Area to be cleared for the pond is less than 1% of the total property. • Revegetation is well established on the property (20ha of screening vegetation and 170ha of hardwood plantation).	• No significant impact on vegetation and flora on the site.
	Fauna	Impact on rare, restricted and endangered fauna due to vegetation clearing and plant operations	• Unlikely to be any rare, restricted or endangered fauna on the site. • No likely habitats on site to be cleared.	• Clearing is unlikely to result in the disturbance to fauna.	• None required.	• No impact on rare, restricted or endangered fauna.
	Reserves	Impact on Reserves in the area	• Nearest reserves and State Forest blocks are greater than 1km from plant site.	• Not applicable.	• None required.	• No impact on Reserves.
	Radiological Environment	Increase in ambient radiation levels around the Proponent's property	• Site already has natural levels of radiation above those of world average, but are within the range of natural background radiation levels found in WA.	• Radioactive components in the process are due to those contained in the monazite feedstock. There is no additional radioactivity generated by the process. • Some minor releases of radon during the processing of monazite. • All radioactive material will be contained in the waste to be disposed of at the Government's Intractable Waste Disposal Facility (IWDF) in the eastern Goldfields of WA.	• Plant designed in both layout and process technology to minimise radiation emanation. • A Radiation Management Plant (RMP) will be prepared detailing operational procedures and environmental monitoring for radiation levels including radon.	• No significant increase in ambient radiation levels at the plant boundary.
	Hydrology	Impact on surface drainage	• Gallium Plant and infrastructure exist alongside proposed plant site. • Rare Earth Plant site already cleared. • Evaporation ponds have been constructed and operational.	• Construct Rare Earth Plant building. • Additional evaporation pond may be required. • Plant and pond sites are located with respect to surface drainage of the site.	• Plant runoff initially directed to the stormwater ponds. • Additional pond designed not to impact on surface drainage.	• Minimal impact on surface drainage.
Pollution Potential	Effluent Disposal	Impact of the disposal of process effluents on the environment	• Gallium Plant effluents directed to the existing evaporation ponds when the plant was operational. • Ponds currently contain residue of Gallium Plant effluents and rainwater.	• Process effluent from the Rare Earth Plant will be neutralised with Gallium Plant effluent and directed to the evaporation ponds. • The effluent will principally comprise sodium salts. • Effluents will be concentrated by solar evaporation, thereby reducing the volume to be disposed.	• Regular monitoring of the evaporation ponds to determine, input and output volumes, quality of the effluent. • Sumps in the underdrainage systems will be monitored for water levels and water quality to determine if there is any seepage from the ponds. • Water collected in the underdrainage system will be collected and returned to storage.	• Minimal potential impact on the environment.
	Evaporation Ponds	Impacts on groundwater resources under the site due to leakage from the evaporation ponds	• Moderate amount of reasonable quality groundwater under the site. • Evaporation ponds are constructed and have been operational for Gallium Plant effluents.	• To dispose of non-radioactive process effluents into the existing evaporation ponds. • Ponds have been designed with a substantial clay liner to minimise leachate and an under drainage system to collect any seepage and return it to storage. • The objective of the ponds is to achieve zero discharge to the groundwater environment.	• Pond design to minimise leachate. • Groundwater monitoring system comprising 33 bores at 11 locations around the site. • Bores are monitored on a regular basis for groundwater levels, and quality determination and will thus indicate any development of leachate plumes in the subsurface. • Bores will allow for plume recovery by abstraction, if necessary.	• No impact on groundwater quality is expected. • Seven years of monitoring has indicated that there have been no significant changes in the chemistry of the groundwater due to the presence or operation of the evaporation ponds.
		Impact of a breach of the evaporation ponds on the surface hydrology of the area	• Evaporation ponds are located in the Murray River catchment area. • Murray River flows into the nutrient enriched Peel-Harvey Estuary.	• Non-radioactive process effluent will be disposed of in the evaporation ponds. • Tricalcium phosphate will be stored temporarily in the ponds prior to being recovered for sale to the fertiliser industry. • Evaporation ponds have been designed to ensure containment of material.	• Design of the evaporation ponds has accounted for factors such as overtopping and erosion. • The contents are unlikely to escape from the evaporation ponds, however, worst case situations due to a total breach of a wall or overtopping have been assessed.	• Minimum potential impact on the Murray River system due to the normal storage and disposal of process effluent in the ponds. • Minimal potential impact on the Murray River system in the unlikely event of a total breach of the ponds.

TABLE A7

(continued)

Category	Topic	Aspects of Concern	Present Status	Proposed Action and Objective	Proposed Management	Predicted Outcome
Pollution Potential (continued)	Solid Waste Disposal	Impact of the disposal of the low level radioactive gangue residue	• The State Government has established an Intractable Waste Disposal Facility (IWDF) near Mt Walton in the Eastern Goldfields of Western Australia. • The IWDF has been approved as a suitable site for the disposal of this type of waste.	• Gangue residue will be disposed of by burial at the IWDF. • The disposal of the waste will be the responsibility of the State Government but will be funded by the Proponent. • Waste disposal and operations will be detailed in an Environmental Management Programme (EMP) to be prepared by the operator of the IWDF in conjunction with this project.	• The IWDF has been selected from a detailed site selection study as an appropriate site for a disposal facility due to factors such as remoteness, geological stability, arid climate and lack of potable aquifers. • Waste disposal operations will be the responsibility of the Government and will be conducted in an environmentally acceptable manner and in accordance with legislative requirements including the detailed EMP and RMPs prepared specifically for the disposal of waste from the Rare Earth project. • Environmental and personnel monitoring will be conducted to ensure the management objectives are being achieved.	• Disposal of the gangue residue at the IWDF will have minimal impact on the environment.
	Transport of Materials	Impact of a spill of raw materials and process chemicals whilst being transported	• There is an existing regime of truck movements of raw material (monazite and lime) and process chemicals (acids) on metropolitan and country roads in Western Australia in much larger quantities than required for this project. • Most of the materials are classified as Dangerous Goods.	• Raw materials and process chemicals will be transported to the Pinjarra plant site by road in appropriate trucking containers by the suppliers of the materials in a safe manner. • There will be approximately 22 trucks per week transporting the raw materials and process chemicals to the plant.	• All materials will be transported according to the appropriate codes and regulations. • Acids and monazite will be transported according to the requirements of the Dangerous Goods Regulations, 1992. • Monazite, a low level radioactive material, will be transported also according to the requirements of the Code of Practice for the Safe Transpoct of Radioactive Substances, 1990. • Emergency Response plans are established for these materials. • Drivers contracted to the companies supplying the material are specifically trained for emergency situations.	• The potential for a spill from trucks transporting materials for this project is low due to the small increase in number of trucks required. • In the unlikely event of a spill, adequate emergency response plans will be in place to minimise any pollution potential from a spill.
		Impact of a spill of tricalcium phosphate or rare earth nitrate products	• Similar products containing phosphate and nitrate are currently transported by road in Western Australia. These products are not classified as Dangerous Goods.	• Tricalcium phosphate will be transported from the Pinjarra plant site to Kwinana in the form of a moist slurry most likely in a tanker truck. • Rare earth nitrate will be packaged and transported by road from Pinjarra to Fremantle for export. • Transport of these materials will be the responsibility of the Proponent and transport procedures will ensure that there is minimal potential of a spill should an accident occur. • A total of 28 trucks per week is likely to be transporting the products from the Rare Earth Plant.	• Transport of these materials will be according to the appropriate Codes and Regulations as will the packaging requirements of the product. • The Proponent will contract only reputable transport operators and will ensure that the codes and regulations are adhered to. • Emergency response plans and clean-up procedures will be prepared to ensure that in the unlikely event of a spill there is little or no impact on the environment.	• There is unlikely to be any impact on the environment due to the transport of the products from the Rare Earth Plant.
		Impact of a spill of low level radioactive gangue residue	• Low level radioactive materials, such as from mineral sand processing, are currently transported on country and metropolitan roads in Western Australia. • Other radioactive materials of much higher radioactivity (such as Industrial Radiography sources, radio-pharmaceutical and some industrial sources) are regularly transported throughout the State.	• The gangue residue will be packaged in bulka bags and transported in containers on trucks, from Pinjarra to the IWDF. • The transport operations and procedures will minimise the risk of a spill.	• The material will be packaged into heavy duty bulka bags and packed into containers to minimise the potential of spillage. • The material will be a moist clay like form which will not flow or dust. It will be insoluble and immobile thus minimising dispersion into the environment from a spill and allowing for ease of recovery. • Transport will be according to the requirements of the Code of Practice for the Safe Transport of Radioactive Substance, 1990. • Transport operations will be approved by the appropriate authorities. • Detailed emergency response plans and clean-up procedures will be prepared to deal with a spill if it occurs. • All of spilt material will be retrieved and repackaged for disposal.	• There will be minimum potential hazard to the public or impact on the environment from a spill of the gangue residue.

TABLE A7

(continued)

Category	Topic	Aspects of Concern	Present Status	Proposed Action and Objective	Proposed Management	Predicted Outcome
Pollution Potential (continued)	Noise	Noise impact from construction activities	• No current construction activities.	• Construction of the Rare Earth Plant involves heavy machinery and transport of construction materials. • The objective is to minimise any potential noise impact due to construction activity.	• Restriction of construction activities to daylight hours. • Acceptable and appropriate site management through the construction stage. • Appropriate noise regulations will be adhered to. • Large buffer area between plant site and nearest neighbour.	• No significant impact expected from construction activities. • Any potential impact due to noise from construction activities will be short-lived.
		Noise impacts during the operations due to the plant	• Plant site is located within a large buffer area. • Some existing noise levels from the nearby Alcoa Refinery. • Noise levels from other rare earth plants indicate that the plant operations will be relatively quiet.	• The main noise source will be from electrical motors. These motors will be relatively small and will be enclosed in buildings. • Noise from plant operations will be minimal.	• The plant will be designed for noise containment, such as housing motors inside building. • A noise monitoring survey will be conducted prior to and during plant operations. • Noise levels from the Gallium Plant and Rare Earth Plant operating simultaneously will meet the requirements of the noise regulations and appropriate actions will be taken to rectify any noise problems should levels exceed those in the noise regulations.	• No noise impact is expected due to plant operations.
		Noise relating to transport of materials due to plant operations	• High frequency of existing heavy vehicle movements associated with industry throughout the region.	• 22 heavy vehicle movements per day or an increase of between 4-18% in heavy vehicle movements in the Pinjarra region. • The objective is to minimise the noise impact of heavy vehicles associated with the project.	• Truck movements will be restricted to Monday to Friday business hours, wherever possible.	• No significant impact due to the increase in heavy vehicle movements.
	Caustic Soda Pipeline	Rupture of the pipeline supplying caustic soda	• A carbon steel pipeline has been constructed to supply caustic soda to the Gallium Plant. • Alcoa has many kilometres of similar pipes throughout its site.	• Caustic soda will be pumped directly from Alcoa's Refinery to the Proponent's operations.	• Monitoring will be conducted at each end measuring the rate, pressure and temperature. • Inbuilt alarm systems. • Pipeline inspected daily. • Pipeline can be shutdown immediately. • Clean-up procedure will be implemented in the unlikely event of a spill.	• Minimum potential impact on the environment.
Social Surroundings	Ethnographical Sites	Impact on Aboriginal sites near the plant	• One Aboriginal site identified as a relatively short term camping site (external to plant site).	• No disturbance planned.	• Avoid site.	• No impact.
	Archaeological Sites	Impact on archaeological sites	• No archaeological sites have been identified at the plant site.	• Not applicable.	• None required.	• No impact.
	Historical Sites	Impact on historical sites	• No sites in or near the process plant site are listed on the National Estate.	• Not applicable.	• None required.	• No impact.
	Traffic	Impact of increase in traffic numbers due to the project in terms of safety and noise	• Relatively high volumes of traffic through the region including heavy vehicles. • Annual average daily traffic volumes range between 1,000 to 11,000 on the main roads in the Pinjarra region with an estimated 6% to 12% heavy vehicle component through Pinjarra.	• 22 truck movements per day in the Pinjarra region increasing the heavy vehicle components through Pinjarra between 4-18%. • Other vehicle movements per day increasing existing levels by around 5%. • The objective is to manage the impact of additional vehicle movements due to the project.	• Truck movements will be scheduled, wherever possible, for business hours Monday to Friday. • The most appropriate and safest roads will be used as the transport route.	• A relative impact on Pinjarra residents due to the 4-18% increase in heavy vehicles and 5% increase in other vehicle movements.
	Visual	Impact of the Plant on Visual Amenity	• Gallium Plant and infrastructure exists on the site. • Alcoa's Alumina refinery in the region. • Extensive vegetation screening already on the Proponent's property. • Large buffer area around plant site.	• Construction of an additional building for the Rare Earth Plant.	• Use of vegetation to screen the buildings. • Construction of the new building will be designed to blend in with the existing buildings.	• No impact on visual amenity.
	Economic	Regional benefits of the project	• Gallium Plant is currently on a care and maintenance programme and will be restarted with the Rare Earth Plant. • High unemployment in the region. • Monazite is currently being disposed of as a waste. • No income to the State or Australia from the monazite resource.	• Establish the Rare Earth Plant and restart the Gallium Plant. • Employ up to 60 people (from local area). • Process the monazite to produce a valuable product for export.	• Preference to employ local people. • Use of local services, suppliers and contractors for plant operations.	• Provide employment opportunities and flow on effects to the local community. • Help to reduce the high levels of unemployment in the region. • Increase the export income to Australia of around $50 million for Rare Earth and Gallium. • Produce a product suitable for future downstream processing in Australia.

TABLE A8 (ERMP, Table 6.8)

ESTIMATED DOSE RATES FROM A BULKA BAG AND CONTAINER OF GANGUE RESIDUE

Dose Rates in uSv/hr	In Contact	1 Metre	3 Metres	10 Metres
Single Bulka Bag	200	40	4	0.4
Exposure Time* (hour)	5	25	250	2500
Transporting Container (20 tonne of waste)	180	20-50	8-10	0.8-1.0
Exposure Time* (hour)	5.5	20-50	100-125	1000-1250

* Exposure time is the hours of exposure required for member of public to receive annual limit of 1mSv.

TABLE A9 (ERMP, Tables 5.2 and 5.3)

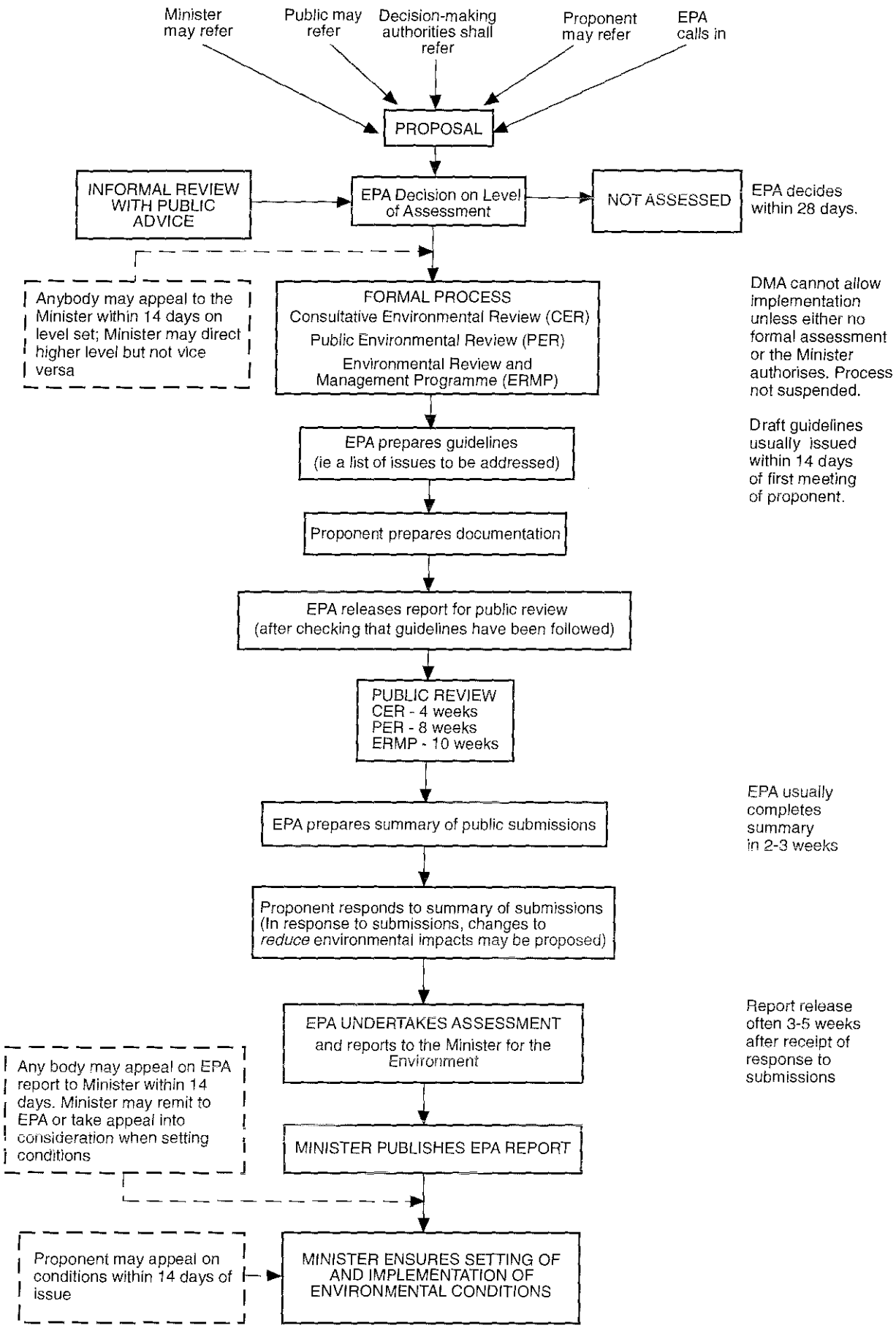
BASELINE RADIATION DATA FOR THE PINJARRA PLANT SITE (MEASURED IN 1988)

Measurement	Range
Gamma Level (uGy/hr)	0.08 - 0.28
Airborne Dust	
- concentration (TSP) (ug/m^3)	6 - 10
- gross alpha activity (Bq/m^3)	$<7.5 \times 10^{-4}$
Groundwater	
- Th (mg/L)	<5
- U (mg/L)	<1
- ^{226}Ra (Bq/m^3)	0 - 137
- ^{228}Ra (Bq/m^3)	<400
Radioactivity in underground clay	
ThO_2 (ppm)	90 - 155
U_3O_8 (ppm)	11 - 24
^{226}Ra (Bq/kg)	120 - 250

Appendix 3

Environmental impact assessment flow chart

EIA PROCESS FLOW CHART



Appendix 4

Public submissions and proponent's response

3.0 RESPONSE TO SUBMISSIONS

3.1 RARE EARTH PROCESSING PLANT AT PINJARRA

3.1.1 Radiological Issues

1. *Rhône-Poulenc in its ERMP suggested that this industry will pose no risk, and that radioactivity will be of such a low level that no one need to be worried about it. It is understood that radioactive substances used in this industry are highly radioactive and radiotoxic.*

The plant will treat radioactive material using chemicals; both of these can pose occupational hazards. The level of risk will be comparable or less than risks in other chemical processing plants and will be minimised by observance of appropriate quality control and safety measures. Radiation exposures will be kept As Low As Reasonably Achievable (ALARA principle) and less than one half of levels recommended by the International Commission on Radiological Protection and adopted by the Western Australian Health Department in regulations under the Radiation Safety Act.

The materials being treated are not highly radioactive and their radiotoxicity is not particularly high in the concentration in which they will occur, being naturally radioactive and present already in the environment.

Rhône-Poulenc therefore considers that the procedures and management proposed for the plant will ensure that the operations will be low risk to employees and the public.

2. *It is a known scientific fact that there is no safe level of radiation exposure. Hence any additional radiation load into the biosphere should be avoided. Radiation is a known carcinogen, teratogen and mutagen, and causes many other health problems such as thyroid cancers, suppression of human immune systems etc. Low level radiation is cumulative and small doses over extended periods can still be very dangerous (i.e. may cause leukaemia, sterility, cancer and birth defects). Rhône-Poulenc has given no written guarantee that the plant will not cause any adverse short or long term health effects to the community and to the future generations.*

Radiation is known to be a cause of cancer and other health effects at high levels of exposure. This is why the processing of radioactive materials must be undertaken with due care. Intensive studies of persons exposed to radiation from the atomic weapons at Hiroshima and Nagasaki have not revealed any adverse health effects at exposures less than 200 milli Sievert. The annual limit for workers is 20 milli sievert and persons exposed in the plant will be limited by engineering and administrative controls to less than 10 milli sievert.

The biological effects of radiation exposure are not cumulative like the effects of some heavy metal poisons. The biological effects of radiation are caused by the ionisation which the radiation produces in the cells of the body. Natural background radiation at the rate of 2.5 milli sievert per year produces approximately 50 million ionisation events in every kilogram of tissue each second. Following such ionisation events it is very improbable that a cell will be affected by that ionisation. Any extra radiation exposure simply increases

the rate of ionisation in the body. Ionisation in the body has a very short lifetime, the longest in the order of tenths of a second, so the ionisation from natural and artificial radiation does not remain in the cells.

There is usually little or no effect on cells due to this ionisation. The cells are not affected and continue to reproduce as normal. A small fraction of the cells which are ionised die and are eliminated from the body by the normal biological processes. This cell death is normal and part of the process of a living organism. In rare cases a cell repairs itself incorrectly and continues to reproduce as an abnormal cell. Such cells can become cancers. The formation of a cancer cell due to radiation exposure is a very rare event, however, the probability of this occurring increases with radiation exposure.

In summary, if radiation exposure previously received from natural radiation or from artificial sources has produced no effect, there is no greater probability that the next radiation exposure will. Unlike a cumulative poison for which a limit can be defined as to the amount which can be accumulated in the body before illness will occur. At the radiation doses which will be encountered in the Rare Earth Plant the probability of any person contracting a cancer from the additional radiation exposure from the plant, is very small.

It is an assumption that there is "no safe level of radiation exposure". The quotation from the United Nations Scientific Committee on the Effects of Atomic Radiation (1988) may be appropriate.

> *"At the present time, estimations of the effects of low doses are based upon assumptions as to the mathematical form governing the dependence of effect on dose, since we must extrapolate from the dose region where we have evidence of effects, to the lower doses where effects have not been observed or may not be large enough to be detected."*

Doses to the workers and particularly the public will be so low that with very great confidence one would predict that the most probable outcome is that there will be no radiation induced health effects from the operation of the plant.

3. *Background radiation levels are exceptionally high in the site area (ERMP). Hence the residents in Pinjarra already run a higher than average chance of developing radiation illnesses (there is a strong anecdotal evidence which indicates an abnormally high incidence of cancer and asthma in this region, and one of the Perth universities is actually conducting a study on this subject). To add to this by permitting a radioactive plant in the area, would significantly increase the risk of cancers and birth defects. This factor should be considered and radiation standards for this area should be proportionally lowered.*

Although it appears that there are higher than world average radiation levels near Pinjarra they are not extraordinarily high and not such that any adverse health effects would be discernible in the population. Any additional exposure simply adds to the very low risk from natural background. The additional radiation level for the general public will be so low that they will not be discernible from the natural background levels.

4. *The milling of monazite to a very fine dust will facilitate an increased release of the previously encapsulated radioactive elements and make it much more hazardous through increased surface areas. The chemical processing of the ground monazite also releases further radioactive gases.*

The only radioactive materials which may be released during the processing of monazite are the gases radon and thoron. The milling of monazite will take place in a totally enclosed plant. Therefore not all of these gases will be released to the environment. Any gases escaping will be rapidly dispersed in the atmosphere and the levels at the site boundary will be a very small fraction of natural background levels and not discernible. If all the radon were released from the process it will represent about one tenth of the natural release of radon over Rhône-Poulenc's property.

As the process is carried out in enclosed vessels and in a slurry/liquid state there will be no escape of dust from the equipment even though the monazite particles are of reduced size.

5. *What precautions will be taken to prevent radioactive dust from escaping during the loading and unloading of monazite and gangue residue, and from dispersing into the environment?*

Dust collection equipment will be employed at all potential dust generating points in the process including the locations for loading and unloading monazite. See Question 6 for the efficiency of these collectors.

It is to be noted that the gangue residue is a moist clay-like material and has little potential to dust.

6. *What percentage of radioactive dust will escape into the atmosphere? How is the dust recycled?*

Based on current technology and commercially available dust collection equipment, it is estimated that monazite dust release will be less than 4g/day equivalent to 0.24g of thorium/day. This is well below the maximum site discharge limit of thorium of 150g/day established by the Department of Minerals and Energy (DME, 1996 pers. comm.).

Dust from the collectors will be recycled back into the process.

7. *Under the right conditions barium sulphate would precipitate out and entrap the radium in its crystals. This reaction can be carried out but needs very carefully controlled conditions to achieve the desired efficiency. Reactions which work well on a laboratory scale often do not work well on large production scale. Has the radium removal reaction been tried out on a scale comparable to the plant and under the same production conditions, and if so, where and when?*

Yes, radium removal using barium sulphate and thorium precipitation reactions have already been used successfully on an industrial scale both in Rhône-Poulenc's La Rochelle in France and Freeport in the USA, Rare Earth plants.

8. *The hazards of the radioactive gas emissions of thoron and radon were not adequately mentioned in the ERMP. These gases will be discharged from the plant into the atmosphere to prevent excessive radiation doses for workers. These gases form a series of radioactive daughters which are in solid phase and are more dangerous when inhaled that the gases themselves (eg thoron daughters include lead 212 which has a half life of 10.6 hours and thallium 208 which emits very penetrating high energy gamma radiation). The constant emissions of radioactive dust and gases, and the potential for radioactive elements to remain in the air, and eventually settle around the plant or downwind of the plant (particularly in the river valley areas due to the gas being heavier than air), was not discussed in the ERMP.*

   See response following Question 11.

9. *The radioactive gases from the plant (half life 3.8 days) would affect many people, produce and livestock in the surrounding farms and towns of Pinjarra, North Pinjarra, Coolup and Dwellingup. These gases should be removed and collected before being released to the environment.*

   See response following Question 11.

10. *People in Greenhill and Pinjarra could be exposed to radioactive dust (radium) and gases (radon and thoron) under certain wind conditions (particularly under strong easterly wind during the summer months).*

    See response following Question 11.

11. *There is a risk that emission of radioactive dust and gases from the plant could contaminate farmland and enter the food chain.*

    The release of the radioactive gases, radon and thoron, will be at levels which are less than the natural releases of radioactive gases. Their release due to the project would produce an indiscernible increase in the natural levels.

    The concentration of lead arising from the decay of radon will be insignificant. To receive 1mSv from radon a person requires about 50Bq/m^3 of radon in equilibrium equivalence. 50Bq of radon is approximately 6 x 10^{-15} grams which will all decay to lead-210. Such levels of lead are extremely small and will not be able to be detected. Radon concentrations at the boundary of the plant which arise from the release of radon from the plant will be less than the 50Bq/m^3 used for the reference calculation above.

    Radon and thoron do not accumulate in valleys as a result of their being denser than air. Their concentrations in air are very low and they do not further accumulate as a result of their density.

12. *A guarantee should be sought from Rhône-Poulenc that all radioactive materials from the project are going to Mt Walton.*

Rhône-Poulenc can guarantee that all significant radioactive waste streams resulting from the processing of monazite at the Rare Earth Plant will be transported to the IWDF at Mt Walton for disposal or disposed of in other approved sites.

13. *There is a concern about potential radiation pollution from the evaporation ponds, as the content of the ponds will include some radioactive materials, such as the tri-calcium phosphate contains uranium and thorium (ERMP pp$^{3-8}$), and washings and spills in the plant could contain radioactive elements. Radioactive material in washing or spills may be difficult to remove as it was shown at LaPorte (now SCM Chemicals) in Australind that thorium becomes more mobile in acidic solutions containing high sulphate ion concentrations, while radium becomes more soluble in more basic sea water. What precautions will be taken to ensure that no presence of radionuclides in the ponds?*

Rhône-Poulenc has revised its process since the 1988 proposal (Dames & Moore, 1988) to ensure that the radioactive waste materials are combined in the gangue residue to be disposed of at the IWDF. There will be no significant radionuclides disposed of in the on-site evaporation ponds.

It is now intended that the tricalcium phosphate will be dried and transported to the fertiliser plant which will eliminate the need for temporary storage in the ponds under normal operating conditions. The TCP will only be directed to the ponds in the event of the fertiliser plant not being able to receive the TCP or a mechanical breakdown of the drier at the Rare Earth Plant. Once normal operations resume, the TCP will be recovered from the ponds and transported to the fertiliser industry.

The TCP has a very low radioactivity level similar to natural phosphate rock. The TCP will be considered as a finished product and will be closely monitored during production and the final quality will be audited.

Page 3.10 of the ERMP explains how wastewaters will be managed and indicates that no waste waters (including washdowns) will be allowed directly to the ponds. All wastewaters will be either recycled back into the process or into the effluent neutralisation facility. This will ensure that no radioactive materials escape to the ponds.

14. *How is radiation going to be monitored and policed both on and off the plant site? Will the monitoring be carried out by an independent company or by Rhône-Poulenc? It is vital that accurate measurements of radiation levels (particularly the radioactive dust levels) be established before the commencement of the project (as base line data) and be taken during the plant operation. It is suggested that radiation monitoring for both inside and outside the plant should be carried out by the WA Government.*

A comprehensive radiation monitoring programme will be put in place for the operation of the plant. A pre-operation monitoring programme has already been implemented and the operational monitoring will be an extension of that programme. The pre-operational monitoring programme has been approved by the Department of Minerals and Energy

(DME) and the Radiological Council and is being conducted by a private consulting company. The operational monitoring will be conducted by Rhône-Poulenc. The site will be under the regulatory and inspectorial control of DME who will inspect the site and conduct confirmatory monitoring. The Company will operate to ISO 9002 standards so all documentation and readings will be recorded and audited within the quality system.

This programme of measurement and checking is considered to be the most effective way of achieving adequate control of the radiation levels in and around the plant.

15. *Pinjarra is known to be in an earthquake prone zone, and the recharge area of valuable aquifers (the plant will be situated on the very restricted intake area for the Jurassic aquifer which is a valuable water resource in the district), so any accidents could have a disastrous effect for many years. Ground water would be at risk from chemical and radioactive contamination. Radioactive contamination of the aquifers, Murray River and the Peel-Harvey Estuary would be hard to detect and impossible to clean up. Radioactivity would concentrate in food chains and shell fish are especially vulnerable.*

Details on seismic risk at the Pinjarra site are presented in the ERMP Section 5.2.6, page 5-7. A paper titled "Probabilistic earthquake risk maps of Australia" (Gaull *et al.*, 1990) presents a peak ground intensity contour map which indicates Pinjarra has a risk of an intensity MMVI to MMVII for a 1:500 year return event. From the definition of Modified Mercali intensities, it is not until tremors reach an intensity of MMIX that dam structures may be seriously damaged (Standards Association of Australia, 1978).

The more important recharge area for the Jurassic aquifer is north of the site near Alcoa's Pinjarra refinery. All of the materials stored in the evaporation ponds are either insoluble or benign and should not pose a threat to the groundwater under the site or the Murray River. There will be no radionuclides stored in the ponds (refer to response to Question 41).

All rainwater runoff from the plant site will be collected in stormwater ponds and analysed and treated if required prior to being discharged or directed to the evaporation ponds as described in Section 6.3.2.2, Page 6-19 of the ERMP.

As a component of the Radiation Monitoring Programme, described in Section 6.4.4.6, Pages 6-37 to 6-40, surface water will be sampled and analysed from the two creeks on the property which flow after periods of heavy rain.

16. *What precautions will be taken to prevent contamination on the plant site, as this can lead to contamination of nearby properties through waterways such as brooks, and underground water (the water table in the area is very high in winter)?*

The Rare Earth Plant will be designed to ensure there is no runoff from the plant site directly into the adjacent environment. All washwaters will be collected in sumps and either recycled back into the process or discharged to the effluent neutralisation facility prior to being directed to the evaporation pond system. The procedures for collection and disposal of stormwater runoff and washwaters are described in Section 3.4.1 of the ERMP Page 3-10.

Process chemicals will be stored in dedicated bunded liquid storage areas of the plant as described in Section 3.3.2, Page 3-6 of the ERMP.

17. *The clay from Pinjarra site is several times more radioactive than the world average (9-15 times for thorium dioxide, 3-6 times for uranium oxide, and 12-25 times for radium 226), hence the phosphates by-product proposed to be sold as fertiliser can be quite radioactive. Comprehensive, regular and strict testing procedures would need to be adopted to avoid similar results to Kerr McGee in the USA who sold their waste fertilisers known as "Eternal Sunshine" to farmers which was alleged to have irradiated the soils of properties that used it forever.*

The response to Question 11 described the naturally high level of radioactivity emanating from the soils at Pinjarra.

The clay from Pinjarra is not the source material for the tricalcium phosphate as is indicated by the question.

The level of radioactivity allowable in the tricalcium phosphate will be set at levels comparable with the levels in phosphate rocks from other sources (ERMP Section 3.4.1, Page 3-8). Regular checks of those levels will be made and control procedures put in place to ensure that each shipment of the tricalcium phosphate leaving the plant meets those requirements.

18. *How does the Proponent plan to protect the community from release of radioactive compounds in the event of an accident, such as spillages from the plant, earthquake, fires, etc?*

In order to ensure safe and reliable plant operations Rhône-Poulenc has incorporated contingency plans listed in Section 6.7.3, Page 6-48 of the ERMP.

In the unlikely event of an earthquake, assuming that the intensity is not greater than any experienced in WA (i.e. Meckering), the most probable damage would be some breakage of short pipes. Long pipes being more flexible are not likely to fail.

In case of fire as mentioned in the ERMP (page 6-49) none of the chemicals used in the Rare Earth Plant are combustible. Therefore if a fire occurs it is likely to be caused by other combustible materials such as electrical insulation. Water is not the correct agent to extinguish electrical fires. Water could be used to cool heat affected equipment or buildings. The fire water would be confined to kerbed or bunded areas.

In the absolute worst case of a spillage of chemicals or fire water onto plant roads, such spillages would drain into the stormwater ponds. This spillage would then be directed to the evaporation ponds or if necessary, recycled back to the neutralising facility for treatment prior to pond disposal.

19. *In the proposed process, monazite grains will be cracked by milling to particle sizes down to 1μm and less. The gangue residue, after the caustic attack and other chemical processing, will also have the same particle sizes. Particle sizes around 1μm are respirable and readily transported by wind and water. Hence the gangue residue form proposed for transport and disposal in bulka bags without further treatment (ie. dilution, particle size increase) is not considered to be in compliance with the NH&MRC Code of Practice for the near surface disposal of radioactive waste in Australia (1992). In order to achieve non-respirable size and compliance with the 1992 NH&MRC Code of Practice, the suggested treatment methods for the gangue residue include: (i) calcining the gangue waste in a uranium mill type calciner similar to the one at Narbalek, (ii) adding cement to solidify the gangue waste, (iii) undertaking research to reform the characteristics of the original monazite by combining the tricalcium phosphate with the radioactive gangue waste.*

The Company will comply with the requirements of the Code of Practice for Near-Surface Disposal of Radioactive Waste in Australia (NHMRC, 1992) and with the requirements of the Radiological Council.

The waste is not considered to be dispersible in the form in which it will be produced and it is not considered necessary to increase the particle size.

Treatment of the waste by calcining would introduce a stage of processing with very undesirable occupation health problems by increasing radiation exposure in the plant and increasing the potential hazard at the site from radioactive particulates.

Cement or another drying agent will be added to the waste to eliminate the possibility of the formation of free water during transport and disposal. This will not be sufficient to solidify the waste during transport but may increase the potential for the material to become solid in the disposal site. There is no significant advantage to be gained in solidifying the waste further.

The moist clay like form of the waste proposed is adequate for transport and disposal.

20. *The gangue residue produced from the proposed plant contains thorium and uranium which are several times more radioactive than uranium yellow cake. (It is 3 times the radioactivity level of monazite, hence, up to 9 times more radioactive than uranium yellow cake.)*

Yellow cake is several times more radioactive than the monazite or the gangue waste to be produced by the plant.

The specific activity of uranium is 12,300Bq/g. At the time of its production yellowcake contains both uranium-238 and uranium-243 in equilibrium; so the total activity is 24,600Bq/g. After some 200 days yellowcake contains protactinium-234 and thorium-234 in equilibrium as well, giving a total potential activity of 49,200Bq/g. Yellowcake contains about 60% Uranium so the activity is about 15,000Bq/g if fresh or 30,000Bq/g after storage for 200 days.

The specific activity of thorium-232 is 4,100Bq/g. In equilibrium there are 10 descendants with the same activity so the total activity is 41,000Bq/g. If the thorium concentration in monazite were approximately 10% then its total activity is 4,100Bq/g.

Yellowcake is therefore between 3.5 and 7 times more radioactive than the monazite or the gangue calculated as 10% thorium, respectively.

21. *What is the absorbent agent to be added to the gangue residue (ERMP, Sect 3.4.3)?*

The absorbent agent may be cement, diatomaceous earth or attapulgite.

22. *The waste should be compacted and cemented before transport.*

There is no particular advantage to be gained by solidifying the waste by cementing it. Tests were done during the consideration of a previous proposal which indicated that to solidify the material in cement it would require a large quantity of cement, due to the relatively small particle size of the gangue, in order to form a mix which would solidify. Such a process before transport would at least double the bulk of material requiring a greater number of truck movements to the disposal site. This method would not decrease the total radiation exposure to the truck drivers as a larger number of trips would be required albeit with lower individual radiation exposures.

23. *The gangue waste should be analysed prior to leaving the plant site to ensure it conforms to waste specifications. To ensure effective control, it is suggested that qualified technicians be employed by the Government, at cost to Rhône-Poulenc, to supervise the sampling of gangue, its assay, packaging identification and packing into containers at the Pinjarra site.*

The waste will be analysed at the Pinjarra site to ensure that it conforms to waste specifications as defined in the Code of Practice for the Near-Surface Disposal of Radioactive Waste in Australia (NHMRC, 1992). Details on the waste specifications are provided in Appendix E of the ERMP.

A shipment manifest will be prepared by Rhône-Poulenc and will accompany each truck load of gangue residue. Details on waste documentation and acceptance at the IWDF are presented on Pages 6-16 to 6-18 of the ERMP. The Company will operate to ISO 9002 standards for procedural documentation. The Operator of the IWDF site will provide accurate audit documentation.

Plant operations will be audited by the Department of Minerals and Energy and the Radiological Council of Western Australia to ensure compliance with regulations and codes.

24. *The more meaningful and standard procedures for the impact of leaching of the gangue residue is to use the TLCP leachate procedure.*

The Toxicity Characteristic Leaching Procedure (TCLP) has been developed and adopted by the USEPA and has been designed to determine the mobility of contaminants in waste. In landfills, acidic conditions are most likely to mobilise heavy metals and other toxic compounds into ground and surface waters. The test is intended to represent these conditions.

In Australia the TCLP test is used in Western Australia, New South Wales, Victoria and South Australia to assess the environmental acceptability of hazardous wastes for landfill disposal.

The test procedure and the application of the TCLP waste acceptance criteria in Western Australia are described in the draft document "Waste Acceptance Criteria for Landfills in Western Australia" (Waste Management Division of the Department of Environmental Protection, 1994). In Western Australia the TCLP results are compared to drinking water quality standards and the classification of landfill into which the waste can be disposed is determined. This comparison is based on <10, >10 & <100, and >100 times the drinking water standards. Wastes with a TCLP result in the last category must be placed in a Class V landfill (hazardous & intractable waste). However, regardless of any TCLP result, owing to the radioactivity of the gangue residue other regulations stipulate that it must be disposed at an intractable waste disposal facility. Consequently, the TCLP test does not, for the gangue residue, serve any purpose in terms of classification of the waste.

The TCLP is not a meaningful procedure for evaluation of the potential of leaching of gangue residue because, as discussed above, it is intended to model acidic conditions in landfills. Such conditions will not occur in the gangue residue disposed at the IWDF. The TCLP is, however, useful in providing an ultra-conservative evaluation of the leachability of the gangue residue and the results can be considered in assessment of leachability. It does not provide a definitive evaluation of leachability of the residue. As there was a request for TCLP tests to be conducted, Rhône-Poulenc performed tests on samples of residue. The results are presented in the following table. These results essentially show that, owing to the radium and uranium concentrations, the waste would need to be disposed in a Class V landfill, as is intended.

RESULTS OF TCLP TESTS

Ra 228 (Bq/L)	6.8
U_3O_8 (mg/L)	180
ThO_2 (mg/L)	755
Pb O_2 (mg/L)	1.7
Ba O (mg/L)	<5

Source: Rhône-Poulenc, La Rochelle.

Rhône-Poulenc believes that the test conducted and reported in the ERMP on the gangue residue to determine the solubility of its constituents in water is more appropriate for the disposal option for this material. It also assists in assessing the potential impact of a spill into a watercourse. Table 6.2 of the ERMP tabulates the results of the solubility tests.

25. *It is necessary to carry out a comprehensive test on the 2 ton plastic bulka bags which carry the waste, under various conditions of pressure and temperature, and moistness of the waste.*

Since the heavy duty two tonne capacity bulka bags would be designed and made to meet the requirements of Australian Standard AS3688-1987, "Flexible Intermediate Containers" and Supplement 2 to the Australian Dangerous Goods Code (Federal Office of Road Safety, 1992(b)) there will be no requirement for testing of the bags other than that specified in these standards.

These bags have been successfully used to package monazite for transport in Western Australia and for export shipments for at least 25 years.

The gangue residue is a moist clay like material which will not dust or flow if the bag is ruptured.

26. *Are the bulka bags able to withstand being dropped, such as in the event of a lifting lug breaking during a lifting manoeuvre?*

Supplement 2 to the Dangerous Goods Code (Federal Office of Road Safety, 1992(b)) requires the bags to pass top lift, tear, stacking, drop, topple and righting tests. Details of test procedures and acceptance criteria are presented in the Supplement.

The top lift test involves loading a bag to six times its capacity and raising it clear of the floor for five minutes. The bag or its lifting devices must not be damaged by this test.

The drop test comprises lifting a bag to a height of 1.2m and dropping it onto a rigid surface. There shall be no loss of contents from the bag.

The righting test comprises lifting a bag lying on its side to upright position by one lifting device or by two lifting devices when there are more than two attached.

It is considered that bags designed and tested to these requirements will be suitable for transport and handling of the gangue residue.

In case of the unlikely event of a bag containing waste being damaged during loading at the Pinjarra plant or unloading at the IWDF, formal procedures will be developed for the handling of such incidents. These procedures will include repackaging of the waste, clean-up of any spilt waste and recording and reporting of such incidents.

27. *No data has been given regarding the comparison of radiation leak from bulka bags versus drums, respective operator exposure times for filling bags or drums and the handling of these at Mt Walton (i.e. placement into the trenches).*

Rhône-Poulenc has assessed both drums and bulka bags as forms of packaging at its processing plant. The comparison details are shown in Table 2.1 of the ERMP. To summarise the findings, the use of bulka bags allows a saving in time of approximately 60% in man hours. This is a significant reduction in potential radiation exposure to the workers as replacing and tightening the lids requires time and close contact with the drums filled with gangue residue.

There is not a significant difference in gamma radiation from the residue when packaged in drums or bulka bags.

28. *Occupational health and safety issues are amongst the most important issues raised by this proposal, which were not adequately addressed in the ERMP.*

Rhône-Poulenc agrees that occupational health and safety are amongst the most important issues of the project. In the ERMP, Rhône-Poulenc has presented details on the radiological issues (Section 6.4) relating to occupational exposure both at the plant site and during transport.

Rhône-Poulenc has made commitments (Commitments 14-24) on design criteria to ensure the health and safety of its workers (including drivers) and the general public.

In addition, Rhône-Poulenc has committed to prepare a Radiation Management Plan (RMP) (Commitment 17) once the final plant design is known. The RMP will be submitted for approval from DME and the Radiological Council and will contain details on occupational health and safety issues.

29. *In addition to exposure to hazardous chemicals, workers at the plant will be exposed to radioactive dust, radioactive gases (radon and thoron) and gamma rays. Would the likelihood of cancers and leukemia be 20 times higher for workers than for the general population?*

At the low levels of radiation exposure which will be encountered in the plant the risks of cancers will be very low. The level of risk for a worker would be about the same as that for a resident in the Darling Range.

30. *How much education will workers at the site be given about exposure to radiation?*

Employees will be fully trained in all aspects of plant safety including radiation protection.

31. *Why is the radiation dose limit objective for drivers (2mSv/yr) set lower than that for the plant operators (10-12mSv/yr)? What would happen to a worker if the set radiation dose were exceeded (ERMP, 6.4.4.7)?*

The radiation dose limit for drivers of transport vehicles is set in regulation by the ICRP at 5mSv/yr. The limit for a designated radiation worker is 20mSv/yr.

The difference in regulatory limits between drivers and radiation workers is not explained in the regulation. However, it is thought that the lower limit applies to drivers as transporting materials is their principal work, not specifically radioactive materials, whereas a person working in industry involved in handling radioactive materials is employed principally in that occupation.

Another factor could be that, in general, drivers are not usually monitored for radiation exposure in the same manner as for other radiation workers. Rhône-Poulenc will conduct radiation monitoring on the drivers as well as the plant workers to assess individual doses to which they are exposed.

Rhône-Poulenc will set radiation objectives for design and management of the plant. These objectives are presented in Table 6.6 of the ERMP. It is pertinent to note that the design objective of the plant is set at 10mSv/yr for plant personnel, which is half the regulatory limit of 20mSv/yr, and 2mSv/yr for the drivers, which is less than half of the 5mSv/yr limit. Details on how these limits will be achieved are described in Section 6.4 of the ERMP.

Commitment 21 of the ERMP states:

> *"The Proponent will establish an operational dose constraint for plant personnel of 10mSv/yr to be agreed upon with DME and the Radiological Council. Should any worker exceed this dose constraint on a pro rata basis, the circumstances relating to that exposure will be investigated and measures taken to ensure that the dose to an individual of 10mSv in any one year will not be exceeded."*

Commitment 24 of the ERMP states:

> *"An operational dose constraint of 2mSv/yr will be established by the Proponent, in agreement with the Radiological Council, for drivers transporting the gangue residue. Should a driver exceed this dose constraint on a pro rata basis, the circumstances relating to that exposure will be investigated and measures taken to ensure that the dose to an individual driver of 2mSv in any one year will not be exceeded."*

32. *With worker exposure limits trending downwards, will Rhône-Poulenc be able to protect its workers at these lower limits?*

Rhône-Poulenc has allowed for future changes in regulatory standards and codes. Commitments Nos. 1, 31 and 32, in the ERMP encapsulate the intention of the Company to comply with improving practices and standards.

Commitment 32 is particularly pertinent in this regard and is quoted in full below:

> *"In addition to complying with the requirements of the Radiation Protection (Mining and Milling) Code (1987), the Radioactive Waste Management (Mining and Milling) Code (1982) and the Code of Practice for the Near-Surface Disposal of Radioactive Waste (1992), the Proponent will meet any future changes in these and other relevant standards throughout the life of the Project."*

Rhône-Poulenc has also committed to design objectives for the plant of at least one half of the standards as discussed in the response to Question 31.

33. *Although the ERMP proposed a management program for the radiation protection of plant personnel, these measures only provide a minimum protection of the safety and health of the workforce.*

Rhône-Poulenc will establish an operational dose constraint for plant personnel of 10mSv/yr (Commitment 21). This dose constraint is twice as stringent as the internationally accepted criteria of ICRP of 20mSv/yr and is therefore more than adequate.

The Radiation Management Programme, to be approved by DME and the Radiological Council, will ensure that dose constraints are met.

34. *The ERMP states that workers' exposure to radiation will be measured by standard approved air sampling equipment. The equipment available to measure radioactive dust (usually known as "personal cascade compactor equipment") is certainly not accurate or reliable for the following reasons:*

- *the equipment cannot be recalibrated in Australia; and*
- *the equipment is incapable of detecting the Aitken particles (which have a diameter equal to or less than 0.1um) which are the most biologically dangerous.*

It is not anticipated that the workers at the Rare Earth Plant will be required to employ personal air monitoring equipment on a routine basis as the monazite will be processed under wet conditions in an enclosed system. However, area monitoring including personal monitoring for dust and other airborne particulate such as radon daughters will be conducted, particularly in the first few months of plant operation. After assessment of the the monitoring results, the monitoring programme in the RMP will be reassessed and modified to focus on the radiation sources and pathways which could lead to the most significant exposures of the workforce.

35. *It is necessary to monitor radiation of all employees including transport contractors and workers at Mt Walton and not just direct employees of Rhône-Poulenc.*

All workers involved in the Rare Earth Plant operations and the transport and disposal of the gangue residue will be monitored for radiation exposure.

Details on the occupational monitoring at the plant site and of the transport operators are presented in Sections 6.4.4.7 and 6.4.4.8 of the ERMP, respectively. Radiation monitoring of the workers at the IWDF is discussed in the Waste Management Division's Environmental Management Programme (EMP) (DEP - Waste Management Division, 1995).

Specific details on radiation monitoring will be presented in the Radiation Management Plans (RMP) prepared for both the plant site (including transport) and the IWDF site. These RMPs will be issued for approval by the appropriate authorities once final plant design is known.

36. *The radiation management plan for the project, when completed, should be made available for public review.*

Commitment 17 states:

> *"A comprehensive Radiation Management Plan will be prepared by the Proponent for the Rare Earth Plant and its environment, and submitted for approval from DME and the Radiological Council prior to commencement of operations".*

Once the RMP has been approved by DME and the Radiological Council, Rhône-Poulenc would not be opposed to the public having access to it.

37. *Has consideration been given to the possibility of some radionuclides being present in some areas of the plant, particularly in areas following precipitation (eg where calcium sulphate is formed)? These areas can become heavily contaminated and cause a significant health hazard.*

Rhône-Poulenc has taken this factor into account in plant design. Appropriate cleaning procedures will be in place for these areas and special precautions will be taken upon decommissioning. The RMP will ensure that any contaminants would be detected through monitoring and would not be allowed to accumulate.

3.1.2 Non-Radiological Issues

38. *There is little information in the ERMP about the chemical process which makes it very difficult to assess the environmental impacts of the plant.*

The important aspects of the chemical process for environmental assessment are related to the input and output of materials and the overall chemical process.

Rhône-Poulenc has detailed the overall chemical process in the ERMP text and also on Figure 3.2 in the ERMP. The company has also detailed the annual consumption of process chemicals.

Further details on the specific process are commercially sensitive and confidential and are not necessary for the environmental assessment of the project.

39. *The impacts of caustic fumes does not appear to be mentioned in the ERMP, such as unpleasant odour, health problems, glass frosting, caustic snow on cars (when combined with carbon dioxide in air which forms a white deposit of sodium carbonate).*

Caustic soda will be piped directly from the nearby alumina refinery and stored in an enclosed tank. The process where caustic soda is used is also an enclosed system so there will not be any fumes emanating from the plant. Caustic soda is not considered to be an odorous material.

Therefore, there will be no impacts such as those raised in this question.

40. *Local residents are likely to suffer from noise, vibration, odour, dust (the wet process will not stop all of the dust) and light spill from the plant. There is also noise impact during construction. Noise issues are dismissed in the ERMP without any attention to noise modelling. Assurances must be sought from the proponent and the proposal must be carefully scrutinised to ensure that the amenity of local residents will be protected.*

Noise issues are addressed in the ERMP (Section 6.11). Due to the location of the plant, the surrounding vegetation in the buffer area, the relative quietness of a rare earth plant and the nearest residence being 800m from the plant site, there is unlikely to be a noise impact from project activities.

Rhône-Poulenc's Commitment 27 states:

> *"A noise monitoring survey will be conducted by the Proponent prior to and during plant operations. Appropriate actions will be taken by the Proponent to rectify any noise problems should levels exceed those in noise regulations and to reduce noise levels to meet those specified in the DEP regulations."*

Noise modelling will be conducted by Rhône-Poulenc once the plant design has been finalised. The results from the modelling will be submitted to the DEP one month before commencement of plant construction.

During construction, contractors will be required to comply with noise regulations.

There will be no impact due to vibration from plant operations.

There will be no detectable odours emanating from the plant site.

Dust collecting systems are incorporated in the design of the plant. There will be no impact from dust due to plant operations.

Due to the location of the plant and the substantial buffer area light spill from the plant will not be an impact.

41. *The siting of the evaporation ponds in such a key position in the Peel catchment area would pose a risk to the Murray River which is already under stress. The evaporation ponds pose a high risk to the ground water as one of the ponds cuts below the water table. The storage of hundreds of thousands of tonnes of salts on the intake area for an important aquifer (Jurassic aquifer) is unacceptable. What guarantee is there that the ground water quality would not be affected during the plant operations?*

The evaporation ponds have already been constructed for Gallium Plant effluent and have been in operation since 1989. All of the materials stored in the evaporation ponds are either insoluble or benign and cannot therefore pose a threat either to the groundwater under the site or the Murray River. As an added guarantee Rhône-Poulenc has designed and constructed a system of underdrains and sumps within the evaporation pond system which intercepts and recovers any seepage from the ponds. This system has worked successfully since 1989 and is regularly monitored.

The more important recharge area for the Jurassic aquifer is north of the site near Alcoa's Pinjarra Plant. Under the Rhône-Poulenc site there are 20-25m of clayey low permeability superficial sediments (Yoganup Formation) which restrict the vertical movement of groundwater. Given the nature of these sediments, he proven pond underdrain system and the lack of contaminants in the ponds, the ponds will have no effect on the Murray River, the Jurassic aquifer, or the local groundwater under the site.

An ongoing groundwater monitoring programme associated with the pond operation, will ensure that groundwater quality will not be affected by the evaporation ponds.

42. *During the life of the plant, a flash flood could overflow the ponds causing major dispersal. What are the consequences if a severe flood occurred and the contents of the evaporation ponds were overflowing?*

Wastewaters directed to the ponds will contain principally sodium chloride, sodium sulphate and calcium sulphate, none of which are toxic or cause eutrophication of river systems.

Factors relating to potential leakage from the ponds including overtopping due to flooding are detailed in Appendix J of the ERMP which states:

> *"The first pond (B-1) in the evaporation pond system will operate at a constant adjustable level and will overflow into the second pond (B-2), hence overtopping of the first pond cannot occur. The second pond will be operated with a minimum freeboard of approximately 1.5 metres.*

> *The storm ponds are designed to accommodate 100mm of rainfall from the plant site area. The operating philosophy of the storm ponds is to direct clean rainwater to the adjacent creeks and contaminated water to the evaporation ponds. Allowing for no diversion and up to 100mm of rainfall, this would increase the depth of the second evaporation pond by an additional 130mm. Combining the effects of heavy rainfall on the plant site and the ponds system, together with the maximum operating level intended in the ponds, still leaves approximately 1.3 metres of freeboard."*

Rhône-Poulenc also assessed the impact of erosion due to flooding and the unlikely event of a breach of the pond wall resulting in the free water in the ponds flowing from the breach. Details of such a breach are presented in Appendix J of the ERMP.

43. *The ERMP does not mention that natural groundwater levels are very close to the ground surface in this area. Groundwater contamination from the plant or the ponds could discharge at the ground surface in the "swampy area" (ERMP, pp I2) thus leaving the site as surface water flow.*

Process and storage areas are kerbed and bunded and any spills within these areas will be drained to sumps.

There can be no contamination of groundwater from the plant as all runoff is collected in the stormwater ponds. If analysis of the water in these storm ponds does not comply with the discharge requirements of the licensing conditions, the water will be either recycled or directed to the evaporation ponds.

See response to Question 41 for explanation why there should be no contamination from the evaporation ponds.

In the event of a spill of radioactive material near the plant site, clean-up procedures would be undertaken. These procedures would be similar to those proposed for a spill outside the plant boundary. Details on these procedures will be provided in the on-site emergency response plan and RMP.

44. *Developments in adjacent land could channel much more water towards the ponds than would appear possible on the present topography. Has allowance been made for this?*

Rhône-Poulenc owns the 515ha site on which the 18ha of plant and infrastructure is located. There are no plans for current development on the remainder of this site.

Rhône-Poulenc is not aware of any developments on adjacent properties. Should there be any developments they will not be permitted to direct water into the evaporation or stormwater ponds.

45. *What precautions will be taken to eliminate nitrates from entering the evaporation ponds completely? For example if the product or the gangue residue are backwashed, the washing may contain nitrates in solution which could then be channelled into the ponds.*

The nitric attack and residue precipitation process is designed to ensure full recycling of the waters used to backwash the filters as well as any nitrate contaminated water. The water balance flow diagram is shown as Figure 3.4 in the ERMP.

The hydroxide cake containing the rare earths will be reslurried prior to nitric attack hence the need for water addition at this step. Priority is given to using process waters containing nitrates or traces of radioactive material for this dilution step.

All the waters coming from nitrate product concentration will be totally recycled together with process waters.

46. *There appears to be a discrepancy between the amount of nitric acid being used and the total nitrates in the product and the gangue residue. An ion balance of Tables 2.3, 3.2 and 3.5 (ERMP) indicate an excess of about 3000 tonnes of nitrate ion in the process, which presumably would be disposed of in the evaporation ponds. Please explain.*

The 15,000t/year nitric acid consumption is a rounded figure for an actual consumption of 13,800t.

The 15,000t/year of solid nitrates product was based on an assumption of 44% ReO content. The actual composition of the product is now confirmed at 78% Re $(NO_3)_3$, 5% $NaNO_3$, 17% H_2O corresponding to 39% ReO. Hence the quantity of solid rare earth nitrates leaving the plant will be 16,900t/year.

Rhône-Poulenc has designed the process to ensure that no nitrates will be directed to the ponds even in small quantities.

47. *The ponds are not an impermeable container. What is the permeability of the ponds, and what is the dispersivity of tricalcium phosphate and other chemicals which will be stored in the ponds? An attempt should be made by the Proponent to quantify the amount of ions entering the groundwater.*

The ponds are constructed with an extensive underdrain system. The system comprises 500mm of sand over a minimum thickness of 500mm *in situ* clay compacted to 98% Standard Maximum Dry Density with a design permeability of 5×10^{-9}m/s. The underdrains have been isolated from the pond contents by a 1m thick compacted clay liner which also has a permeability of less than 5×10^{-9}m/s.

The underdrain system intercepts any leakage and return it to the ponds, therefore there will be no material from the ponds entering the groundwater. The ponds have been operational for 7 years during which time extensive groundwater monitoring has been undertaken. Results from this monitoring are summarised in the ERMP Section 6.3.2.3 and Appendix I. Results have shown that there have been no significant changes in the chemistry of the groundwater under the site identified due to the presence or operation of the evaporation ponds.

The monitoring bores will continue to be monitored on a regular basis and the programme will be extended upon commissioning of the Rare Earth Plant.

Dispersivity does not relate to a chemical, as is posed by the question, but is a measure of the mixing ability of a porous medium i.e the soil. Dispersivity is one parameter which is used to determine solute transport in the equation for hydrodynamic dispersion. Details on these parameters and the results from the Pinjarra site are presented in Volume 2 (Supporting Document) of the Environmental Review and Management Programme for the previous Rhône-Poulenc proposal (Dames & Moore, 1988).

48. *The quantity of sodium chloride and sulphate salts going into the ponds was not stated. A breach of the ponds could bring large quantities of salt to the Murray River and further damage the ecosystem.*

The major source (75%) of dissolved sodium salts (sulphates and chlorides) to be disposed into the ponds is from the Gallium plant. There will also be some salts from the Rare Earth Plant.

The predicted combined concentration of the wastewaters from both plants, is as follows:

NaCl	845kg/hr
Na_2SO_4	455kg/hr

A discussion on the unlikely breach of the ponds is presented in Appendix J of the ERMP and also in the response to Question 42. In these assessments Rhône-Poulenc evaluated the potential loading of phosphate to the Murray River in the event of a breach as it is the loading of nutrients which are of particular concern to the Murray river system. A similar assessment can be made for the sodium salts which will be in the evaporation ponds.

As stated in Appendix J of the ERMP, the volume of water that would be expected to escape as a result of the breaching of a pond wall is estimated to be approximately 25,000m^3. Applying the solubility of the salts, this volume of water could contain 5,800 tonnes of NaCl and 2,600 tonnes of Na_2SO_4.

While the probability of such a breach occurring is extremely low, the assumed worst case conditions that would maximise the potential for the wastewaters to reach the Murray River are wet, winter conditions, and high natural flow rates (and hence a high rate of dilution) would be anticipated for the river. Conversely, when flow rates in the Murray River are at a minimum (in dry, summer conditions) the potential for any breached wastewaters to reach the river will be minimised. The solid or semi-solid waste that would be deposited downslope from the evaporation ponds would be cleaned-up and re-deposited into a secure storage on Rhône-Poulenc's property.

49. *What is the current status of markets for trisodium phosphate? As trisodium phosphate is very soluble, what contingencies will be in place to minimise pollution risks in the watercourses of the Peel Harvey Estuary?*

Rhône-Poulenc investigated the market for both trisodium phosphate (TSP) and tricalcium phosphate (TCP). The Company found that in Western Australia there was a ready market for the TCP as a feedstock for superphosphate production, but there was no current market for the TSP.

All of the TSP will be converted to TCP so there is no potential risk of TSP reaching the watercourses of the Peel-Harvey estuary.

50. *How effective is the process of converting trisodium phosphate to tricalcium phosphate? What is the percentage of trisodium phosphate remaining in the resultant by product?*

The conversion rate of TSP to TCP using 'quick lime' is greater than 99% efficient in the conditions proposed by this process.

The successive filtration, washing and slurring steps will result in a very efficient elimination of residual TSP with less than 0.01% of the original TSP remaining in the TCP.

51. *What impact can the sulphur based salt have on the phosphorous products in the filter cake (i.e. products that are more soluble that tricalcium phosphate)?*

The presence of sulphates has no impact on solubility of phosphate as sulphate salts present in the mixture are more soluble than phosphate salts.

52. *Calcium phosphate has the potential to cause serious pollution to groundwater and rivers. Where will it be stockpiled awaiting sale and what will the proponent do if no markets are found for it? What are the measures taken to ensure that phosphate is not leached into the Peel-Harvey, particularly given that P is the limiting nutrient in the system?*

Tricalcium phosphate (TCP) has a low solubility. Rhône-Poulenc originally proposed to store the TCP temporarily in the ponds prior to recovery for sale. However, as the fertiliser industry requires the TCP in a dry state it is now proposed that the TCP be dried in the plant prior to being transported to the fertiliser manufacturing plant. Hence TCP will only be temporarily stored in the ponds if the fertiliser manufacturer is unable to receive it or if there is a mechanical problem with the drier. If this occurs, the TCP will be recovered from the pond for drying and sale to the fertiliser industry.

Due to the size of the fertiliser market in WA, there is no indication that this material cannot be fully utilised.

The Company assessed the potential impact of a breach in the ponds, in the event of the ponds containing the TCP and the potential impact of a breach or leakage in a worst case scenario of the long term storage of TCP in the on-site ponds.

These evaluations are presented in Appendix J of the ERMP.

53. *What measures will be used to prevent contamination of the waterways from seepage or spillages of chemicals. How can seepage of chemicals be adequately contained during the unloading from a truck to storage tanks?*

Process chemicals will be stored in a dedicated liquid storage area of the plant as detailed in the ERMP Section 3.3.2 and Section 6.6. Each tank will be contained in a separate bunded area to avoid any possible mixing of chemicals in the event of an accidental spill. Separate drainage systems have been designed for each bunded area to collect and direct any spill to process effluent collecting pit prior to treatment by the plant effluent neutralisation facility.

Any spills which may occur during the unloading of a truck will be collected and treated in a similar manner.

The unloading of chemicals from the tankers will occur in specially designed unloading areas as shown on Figure 3.3 of the ERMP. These areas are graded so that in the case of a spillage, the liquids will be drained to a below ground sump. A pump will be used to recover the spillage from the sump directing it to a storage tank prior to neutralising.

54. *It is proposed to release water in the runoff storage ponds into "surface drainage" (ERMP, pp 3.14), if the water quality is acceptable. The surface drainage are ephemeral tributaries of the Oakley Brook. It is suggested that the stormwater runoff be tested before release to drainages, and acceptable water quality parameters should be defined. Background water quality data for the tributaries should be collected to justify the release of plant runoff water. There is no mention of monitoring for Oakley and Marrinup Brooks (ERMP, 6.3.2.3). This should be done as there is great danger of leakage into the brooks and then into the Murray River and Peel Inlet.*

Page 3-14 of the ERMP states:

> *"Stormwater runoff from the plant site is directed to the stormwater ponds, which are designed to accommodate 100mm of rainfall from the plant site area. The water will be analysed and will either be discharged to the evaporation pond or into surface drainages, depending on the chemical composition of the stormwater'.*
>
> *Section 6.3.2.2 of the ERMP states 'Water in the stormwater ponds will be analysed to ensure the quality complies with licence requirements set by the DEP prior to discharging in a controlled manner into an existing surface drainage on the Proponent's property. Water that does not comply with licence requirements will be directed to the evaporation ponds system."*

Rhône-Poulenc has not to date sampled surface water tributaries. As a component of the Radiation Management Plan (RMP) (Section 6.4.4.6 of the ERMP) surface water will be sampled and analysed for radionuclides from the two creeks on the property which flow after periods of heavy rain.

Rhône-Poulenc do not see the need to sample Oakley and Marrinup Brooks.

55. *What action/measures will be taken if ground water monitoring results show an increase in phosphates, radioactivity and salts? The monitoring results be published every year where the public can have access to.*

Groundwater monitoring results will be issued annually to the Department of Environmental Protection (DEP). Rhône-Poulenc will also make the results available to an established community committee and to the public should they be interested.

If groundwater monitoring results show increases in phosphates, radioactivity and salts then the reasons will be investigated. However, there is unlikely to be any increase in phosphates or radioactivity in the groundwater as the main potential source of contaminants reaching the groundwater is from the evaporation ponds and there will be no radionuclides of any significance in the ponds and any phosphates will be in an insoluble form.

Salts will be contained in the evaporation pond system which is described in the ERMP Section 3.5.1.1 and the response to Question 47.

In the unlikely event of an increase in salts detected in the groundwater under the site, then the reasons will be investigated and procedures put in place to manage any impacts caused by such as increase including recovery of water from the bores, if necessary.

56. *The groundwater monitoring review (ERMP, Appendix I) does not adequately explain the sporadic occurrence of high nitrate levels in the monitoring bores. Is it possible to get a definite reason for the high level of Aluminium in bore 12 (ERMP, 6.3)?*

The sporadic occurrence of high nitrate levels in the monitoring bores is thought to be due to analytical errors and/or the use of fertilisers in the region. The background levels of nitrate in the groundwater are generally less than 20mg/L and it is felt that such background concentrations are due to the use of fertilisers on pastures in the region.

The aluminium concentration in bore 12 is atypical of background concentration of this metal in the other bores on the site. The most likely explanation for these concentrations is due to the cement-grout surrounding the bore.

57. *The proponent should provide a complete list and discussion of the possible contaminants of surface water and groundwater.*

Rhône-Poulenc interprets this question as relating to the possible contaminants from the Rare Earth Plant. The possible contaminants from around the plant site include:

- process chemicals listed in Table 3.2 of the ERMP which will be all contained in tanks located in separate bunded areas. The storage and handling of these process chemicals is presented in Section 6.6 of the ERMP;

- caustic soda which will be delivered through the existing pipeline from the nearby alumina refinery, the management of such is presented in Section 6.5 of the ERMP; and

- radioactive particles from the handling of monazite and gangue materials. Special design and operating procedures will be implemented to ensure the rigorous and fully controlled management of the monazite and the gangue. These are detailed in Sections 3.3.1, 3.4.2, 3.5.2 and 6.4 of the ERMP.

58. *What are the other elements (eg. heavy metals) that may occur in the filter cake which could influence its suitability as a fertiliser source?*

Monazite contains some lead (approximately 6,000ppm). The lead will follow the rare earth stream during the caustic attack and will precipitate out and be contained in the gangue residue.

TCP was analysed at Rhône-Poulenc's La Rochelle plant for Pb, Zn and Cd. The analysis indicated that the levels of these heavy metals were below the analytical detection limits.

59. *The section on biological environment (ERMP, 5.3) which consists of 4 sketchy paragraphs, is inadequate. A more detailed inventory of the flora and fauna should be prepared and a conservation management plan for the site drawn up and implemented, so that the site is better understood and its nature conservation potential realised.*

Section 5.1 of the ERMP on Existing Environment states:

> *"The existing environment of the Pinjarra area has been well described as a result of the various developments proposed for the area. The climate is temperate mediterranean with a substantial excess of evaporation over precipitation. The plant site lies in the foothills of the Darling Scarp and extensive site studies have been undertaken to assess and describe the climate, geology, hydrogeology, biology, radiology, heritage, ethnography and archaeology of the site. These studies are described in detail in the previous ERMP/EIS (Dames & Moore, 1988a) for the previous project. Aspects of the existing environment, relating to potential environmental issues for this project, are summarised in the following sections."*

The 0.6ha site for the Rare Earth Plant is within an 18ha site already cleared in 1988 for existing Gallium plant facilities. It is therefore not necessary to prepare a conservation management plan for the site of the Rare Earth Plant.

60. *Barium is highly toxic. What special measures are proposed for the handling of solid barium carbonate?*

Unloading of barium carbonate (as well as all solid powdered reagents to be used in the plant) will be conducted with an efficient dust collecting system in place. The recovered dust will be automatically recycled.

61. *What procedures will be used to prevent or collect dust during the transfer of material to minimise worker exposure to hazardous dust?*

There is a potential for dust generation during the handling of monazite. Procedures for the management of this dust are outlined in Section 3.3.1 of the ERMP. Protection measures at the plant site are described in Section 6.4 of the ERMP.

Section 3.3.1 describes the procedures for the unloading of the monazite which states:

> *"Bulk trucks will be unloaded directly into a 200 tonne capacity overhead storage bin using an automatic pneumatic system. The automatic nature of the system minimises workforce exposure to gamma radiation and hence reduces occupational risk. The storage hopper will be sufficiently shielded to reduce gamma radiation exposure.*
>
> *The two tonne bulka bags will also be unloaded into the process storage bin using the same pneumatic equipment. All dust generated at this stage will be collected efficiently through a venting/filtering system to eliminate any internal contamination risks for workers. This system will ensure full automatic recycling of the dust recovered from the filters, with no human operation required for cleaning of the filters."*

The gangue residue will be sufficiently moist (around 40%) to ensure that it does not generate dust.

3.1.3 Monazite Feedstock

62. *Monazite is more radioactive than uranium yellow cake.*

The response to Question 20 clarifies this issue.

63. *The proposal to use monazite, a radioactive waste product from the mineral sand industry (ex Capel and Eneabba), which is at present buried, covered with overburden and revegetated will no doubt bring economic benefits to mineral sand companies but it will increase the environmental risks of radiation exposure and of radioactive contamination of water and food supplies. For example, the reading above a rehabilitated monazite site at Eneabba was taken as 1μSv/hr while the reading at the surface of one of the bulka bags of monazite is 100μSv/hr. Thus the removal of monazite from its disposal site increases the radiation exposure risks 100 times. In addition the overburden over monazite dumps reduces exposure to radioactive gases and their daughters.*

The Intractable Waste Disposal Facility site was selected due to its remoteness from population centres, the geological stability and its arid environment. The gangue residue will be placed in trenches and covered with adequate material to ensure the levels of radioactivity at the surface are well within the regulatory limits.

Details on the trench design are presented in the Environment Management Programme (EMP) for the disposal of the gangue residue at the IWDF (DEP - Waste Management Division, 1995). The conceptual design is shown on Figures 6.1 and 7.3 of the EMP.

Estimates of radiation levels through the soil layers are presented in the EMP (DEP - Waste Management Division, 1995). The estimates are presented in the following table.

ESTIMATED REDUCTIONS IN GAMMA RADIATION THROUGH SOIL LAYERS

Layer	Thickness (m)	Number of Half Value Layers (HLVs)	Estimated Radiation Level (μSv/h)	
			Waste Surface	Layer Surface
Intermediate	0.4	2.4	200	35
	0.8	4.7	200	9
Final Cover (excluding rock layer and topsoil)	3.0	17	200	2×10^{-5}

Source: DEP - Waste Management Division, 1995.

The radiation levels at the surface above the final cover of the trench is estimated to be 2×10^{-5}μSv/hr which is much less than the figure quoted in the question for the Eneabba site of 1μSv/hr.

64. *Excavating the monazite and loading it will generate dust including radioactive dust which will be a health hazard and could concentrate in food chain.*

The Mineral Sands Industry does not 'excavate' monazite as such. It is a byproduct of the processing of mineral sands to recover the titanium and zirconium bearing minerals which include:

- ilmenite;
- rutile;

- leucoxene; and
- zircon.

Monazite is a mineral which contains the naturally occurring radioactive element thorium. The presence of thorium in the monazite requires the Minerals Sands Industry to take radiation safety measures during handling.

These radiation safety measures have been well established and implemented by the Mineral Sands Industry for many years. The industry is now recognised as a world leader in radiation protection (DME; 1995 pers. comm.).

65. *The use of monazite as a source of rare earths is regarded as a dying technology. No extraction from monazite should be undertaken within this State. The use of other rare earth ores that are not radioactive, or only slightly radioactive should be encouraged, eg bastnasite (ex China), rare earth ore (ex Mt Weld) (The Mt Weld rare earths plant was assessed by the EPA and found to be environmentally acceptable in 1992 (EPA Bulletin 646)).*

All radioactive ores with elemental distribution in the broad category of monazite, mainly bastnasite, contain radioactive elements, although in smaller quantities. The Mt Weld ore also contains radioactive elements although in smaller quantities than monazite.

The same techniques are required to deal with the smaller quantities of radioactive elements bastnasite as those in monazite.

The monazite that will be used for the Rare Earth project is a byproduct of the mineral sands industry (see response to Question 64).

3.1.4 Site Location and Buffer Zone

66. *The plant should be located closer to disposal site so that there would be no need to transport the waste through major town centres, unless a safe, foolproof transport system can be implemented. Alternatively, there are more suitable sites available at Kemerton and Narngulu for the processing plant which are closer to the supplies of monazite.*

The issues relating to the site of the Rare Earth Plant were examined thoroughly during the previous proposal (Dames & More, 1988) and a summary of the findings is presented in Section 2.1 of the ERMP.

The final choice of Pinjarra was influenced strongly by the decision of Rhône-Poulenc to proceed with establishing a Gallium Plant. The Gallium Plant needed to be located in close proximity to an alumina refinery of which Alcoa's Pinjarra refinery is the largest in Western Australia and offers the greatest potential for gallium extraction from the Bayer Liquor Stream. The Gallium Plant was completed in 1988 and has a number of facilities that can be shared with the Rare Earth Plant.

Rhône-Poulenc has extensively detailed transport operations (Section 6.2.2.3) and the radiological issues associated with the transport of the gangue residue (Section 6.4.4.8) in the ERMP. The gangue residue is of comparatively low hazard compared to petrol, LPG, sodium cyanide and other hazardous products and there will be only three truck movements of gangue residue per week.

The Company has also prepared an Emergency Response Plan that will be implemented in the event of an accident.

With all the procedures in place for packaging and transport Rhône-Poulenc believes that the transport of the gangue residue can be managed effectively and safely.

67. *Pinjarra is the most inappropriate site for the plant as the area is in prime agricultural land, over an important water resource and has an expanding tourism industry and residential development. The chosen site is also 100km south of Perth GPO and only 8km south-east of Pinjarra GPO in a rapid growth area. The plant should be sited in an area of zero population and with suitable geology (such as away from underground water table, aquifers, rivers, etc).*

The site of the Gallium Plant and the proposed Rare Earth Plant is zoned industrial as per the Shire of Murray Shire Planning Scheme No. 4 gazetted 23 June 1989 and revised 6 November 1995. The 0.6ha site required for the Rare Earth Plant is within the 18ha of Gallium Plant and infrastructure located on Rhône-Poulenc's 515ha property.

The operations of the Rare Earth Plant will not be hazardous as any potential impacts will be managed appropriately and there is negligible risk of radiation exposure to the public from the Rare Earth Plant. The Department of Minerals and Energy (DME) stated in its submission to the EPA on the project that the site is <u>not</u> classifiable as a 'major hazards site'.

Rhône-Poulenc has a similar Rare Earth Plant at La Rochelle in France. La Rochelle is one of the premier tourist areas of France. It has a permanent population of 110,000 with an estimated 150,000 visitors during the summer. The La Rochelle plant does not have the large buffer area available at the Pinjarra site and there are residences in close proximity to the plant. The La Rochelle plant has had no adverse impact on tourism or residential developments.

The Pinjarra plant will be designed and operated by Rhône-Poulenc by drawing on its experience at the La Rochelle Plant and using the latest technology and best practice initiatives.

68. *The buffer zone around the plant is quite inadequate for an industry of this nature. The 500m of buffer in some areas (eg. buffer zone on the southern side boundary?) is not adequate enough to protect nearby residents from radon and thoron gases and other radioactive dusts, noise and odour pollution.*

The Rare Earth Plant site in relation to the Gallium Plant infrastructure and Rhône-Poulenc's property is shown on the cover of the ERMP. The nearest residence is approximately 800m from the Rare Earth Plant site as shown on Figure 5.4 in the ERMP.

The substantial buffer area around the plant site will be more than adequate to protect nearby residents from impacts of radon and thoron gases, dust, noise and odours.

Radon and thoron emissions from the plant are discussed on pages 6-33 to 6-38 in the ERMP. The calculations show, assuming the worst case of all the radon being released, that the emanation rate resulting from the process is likely to be 10 times less than the natural rate of radon emanation from soils over Rhône-Poulenc's property. (As the process is enclosed the actual release of radon during processing will be much less.) Thus the natural levels of radon exposure will not be significantly increased by the presence of the Rare Earth Plant.

Due to the small quantity of thoron likely to be emitted and the short half life of the isotopes, the natural background levels of thoron will not be significantly increased by the project.

There will be little or no generation of radioactive dust at the plant. Dust emissions will be well within permissible limits. See response to Question 6.

Noise in relation to the project activities is discussed in Section 6.1 of the ERMP and with the response to Question 40.

No detectable odours are expected to occur from the plant.

3.1.5 Plant Decommissioning

69. *There is a concern about the plant site being radioactive for many years, ie. Is Rhône-Poulenc going to leave the area as they found it? Is there a guarantee that the plant will be decontaminated in 20 years time? Do we need to risk another Wittenoom? Who will be responsible for the site after decommissioning?*

Section 7.0 of the ERMP outlines Rhône-Poulenc's objectives and strategy for decommissioning and rehabilitation. The ERMP states:

> *"A decommissioning and rehabilitation programe will be undertaken for the Pinjarra site at the end of the Plant's life. The objectives of the programme will be to:*
>
> - *eliminate unacceptable health hazards;*

- *restore the site to a condition such that it may be returned to its former land use or such other use as may be appropriate at the time of decommissioning; and*
- *ensure that the State does not incur any ongoing liability with regard to the plant."*

Rhône-Poulenc's Commitment 34 on decommissioning states:

> *"Decommissioning by the Proponent will be undertaken in accordance with statutory requirements in force at the time and in a manner acceptable to the Minister for Environment."*

By this legally binding commitment, the State and the public can be assured that the plant will be decommissioned in an appropriate and responsible manner by Rhône-Poulenc.

It should be noted that the 20 year life is the minimum expected life for the plant and subject to availability of monazite plant life could extend well beyond 20 years.

70. *The Proponent should be required to market all phosphate or export it as part of the decommissioning plan.*

The TCP is a valuable by-product of the Rare Earth Plant. Rhône-Poulenc has an agreement in place with a fertiliser company for the purchase of the TCP. It is intended that the TCP be dried at the plant and then be transported to the fertiliser plant, eliminating the need for temporary storage in the evaporation pond. It is not intended that any TCP will remain on-site upon decommissioning. Due to questions raised during the community consultation programme, Rhône-Poulenc has assessed the 'worst-case' scenario of the TCP remaining in the ponds. These assessments were presented in Appendix J of the ERMP. See response to Question 52.

71. *What will happen to the parts of the plant which are too highly radioactive to be accepted at Mt Walton disposal site? The radiation consultant for Rhône-Poulenc indicated at a meeting that the highly radioactive components would just be left at Pinjarra until they had dropped in level of radioactivity sufficiently. This is totally unacceptable as there has been no environmental review of the suitability of Pinjarra as waste site for high level radioactive waste.*

Rhône-Poulenc does not believe that its Radiation Consultant indicated that 'the highly radioactive components would just be left at Pinjarra until they had dropped in level of radioactivity sufficiently'. It is unclear as to what comments could have been misinterpreted in this manner.

Any parts of the plant which accumulate a radioactive scale will be isolated in the decommissioning of the plant or if they are taken out of service during the operation of the plant. The level of activity will be assessed and they will be decontaminated to a level where they can be returned to further use or treated as normal scrap. If the required level of decontamination cannot be achieved they will be packaged suitably and taken to the

IWDF site, or another approved site, for disposal. Any scale removed from the parts will be packaged and taken to an approved site for disposal.

72. *Who will take over the responsibility for the waste left in the evaporation ponds? What guarantee is there that the ground water quality would not be affected after decommissioning when the ponds underdrainage system will not be monitored?*

The predominant residual wastes remaining in the ponds will be sodium salts. It is anticipated that the underdrainage system to the ponds will become inoperative after the Rare Earth Plant ceases operation, therefore, other means of long term management of the wastes contained in the pond must be considered.

Decommissioning and rehabilitation of the ponds is outlined in Section 7.4 of the ERMP. Commitment 35 states:

> *"Upon decommissioning, the Proponent will ensure all free water is evaporated from the ponds prior to placing materials over the ponds. The cover material will be developed and designed to the satisfaction of the Minster for the Environment."*

It is anticipated that Rhône-Poulenc's ownership of the site will extend well beyond the stated 20 year operational life of the plant. Rhône-Poulenc will assess the condition of the pond and monitor the groundwater throughout the life of the project and will put in place appropriate rehabilitation measures.

73. *There is no proposed plan for cleaning up the contamination at the Pinjarra site in the future. No indication is given of the estimated quantity of contaminated soil which will require removal (as was required at the Fisherman's Bend site).*

There will be no widespread contamination of the site. There may be small sections of plant equipment from the controlled areas which may require decontamination or disposal at an appropriate site.

There is not likely to be any contaminated soil which will require removal.

74. *How much salts will be left in the ponds after decommissioning? How and where will the accumulated salts be disposed of? How will be evaporation ponds be rehabilitated given the difficulty of rehabilitating saline areas (ERMP, Appendix J).*

The predicted combined concentration of sodium salts in the wastewaters from the Gallium and Rare Earth Plant entering the ponds is approximately 1,300kg/hr (975kg/hr from the Gallium Plant and 325kg/hr from the Rare Earth Plant). This will result in approximately 10,000 tonnes per annum of crystallised sodium salts or 200,000 tonnes remaining in the ponds upon decommissioning of the two plants. This estimate is based on 24 hours of operation for 46 weeks of the year over a 20 year life. The total mass of crystallised sodium salts will increase if the operational life of the plant extends beyond 20 years.

The basic procedures for rehabilitating the ponds are outlined in Section 7.4 of the ERMP. There are objectives and developed techniques for rehabilitating such a system. The Environmental Protection Agency (EPA, 1995) list a number of objectives when planning the closure of a tailings facility which can be applied to the evaporation ponds, these include:

- containing/encapsulating contents to prevent leaching into ground and surface waters;
- providing surface drainage and erosion protection to prevent surface water transporting material from the storage area;
- providing a stabilised surface cover to prevent wind erosion, and
- designing the closure to minimise post-closure maintenance.

These objectives together with the general rehabilitation completion criteria will ensure that a successful rehabilitation programme is established and implemented at the time of pond decommissioning.

Management of the closure and rehabilitation of the evaporation ponds will require that the remaining free water be removed and/or evaporated and cover materials placed over the ponds and contoured to promote runoff. The nature, thickness and configuration of the cover will necessarily depend upon matters such as the materials in the pond at the time of closure. It would, therefore, be necessary to undertake an investigation of the pond at that time in order to develop an adequate design for the cover.

It may be appropriate to modify the underdrainage system of the ponds upon decommissioning to allow any rising groundwater to flow from under the ponds and disperse into the environment. The clay liner under the ponds will minimise the amount of rising groundwater during winter which could enter the ponds.

Rhône-Poulenc believes that by rehabilitating the ponds in a manner to minimise rainfall infiltration and, if necessary, modifying the underdrainage system to minimise rising groundwater from entering the ponds, any salts escaping from the ponds after decommissioning will be of concentrations unlikely to cause significant impact on the environment.

At the time of decommissioning, all aspects of rehabilitation will be investigated including the removal of the crystallised salts, if necessary.

3.2 TRANSPORT OF GANGUE RESIDUE, RAW MATERIALS AND PRODUCT

75. *Transportation of monazite and radioactive waste by road is unacceptable as it is much more dangerous than rail transport, and presents a risk to communities in the vicinity of the passage of the transport truck due to radiation penetrating through the walls of the transport containers.*

Rhône-Poulenc has addressed the transport alternatives for both monazite (Section 2.4.1.2) and gangue residue (Section 2.4.2.2 in the ERMP). The ERMP also presents a summary of the comparison of risks and hazards for road and rail based on studies conducted both in Australia and overseas (Pages 2-12 to 2-13 and Appendix D).

These studies indicated that a general conclusion cannot be made as to rail being the safer mode of transport or vice versa.

Radiation dose assessments were made for trucks transporting the monazite where actual measurements have been taken by DME, and the gangue residue which is expected to be approximately twice as concentrated in radionuclides as monazite. These estimated dose rates from a single bulka bag and from the transporting container are shown in Table 6.8 of the ERMP.

For comparison purposes the dose level at about 4.5m from a container of the waste will be approximately 5μSv/hr which is comparable to the level of natural radiation passengers experience in air travel at a normal cruising altitude of 10,000m (United Nations Environment Program, 1985).

76. *A study on comparative risk between road and rail for transporting radioactive waste and other hazardous chemicals should be carried out (using transport of sodium cyanide solution as the most recent example).*

A comparison of risks and hazards for road and rail is presented on Pages 2-12 to 2-13 and Appendix D of the ERMP.

Rhône-Poulenc, as requested by the DEP, used a similar approach to the Australian Gold Reagents report on the Transport of Sodium Cyanide Solution from Kwinana (O'Brien *et al.*, 1994) in the comparison of road versus rail. However, it is pertinent to note that the nature of the material is not as hazardous as other materials which are transported daily on metropolitan and country roads and that there will be only an average of three truck movements per week of gangue residue.

The DEP requested in its guidelines and verbally that an evaluation of feasible transport options and a qualitative risk assessment of the consequences of a spill along the proposed transport routes be undertaken. Table 2.2 of the ERMP summarises the comparison of feasible transport modes and also compares the risks associated with an accident.

77. *There is a concern about potential noise impacts from increased traffic (3-4 truck movements per day to transport reagents from Kwinana, and 7 truck movements per day to transport product and waste from the plant). What are the effects on residents regarding noise, pollution, car fumes and loss of privacy from the increased traffic without using the term "minimal impact" or "no significant impact")? Pinjarra has already had a problem with traffic noise. It is considered that the traffic impact on residents at the corner of Williams Road and Napier Road, resulting from the proposal, would be severe not minimal.*

Rhône-Poulenc acknowledges that there will be an increase in traffic in Pinjarra due to the project and there will be a significant increase in heavy vehicle movements along Napier Road (although there is no current traffic data available for Napier Road) which currently has a very low traffic volume.

The increase in traffic has the potential to impact on the residents at the newly constructed house on the corner of Williams Road and Napier Road. Other residents along Napier Road are well set back from the road.

To determine the potential noise impact from these traffic movements, Rhône-Poulenc has used the British Method of predicting traffic noise based on the following:

- 125 vehicles/day (25 trucks);
- 60km/hr average speed;
- gradient = 0; and
- 30 metres from road.

The L_{10} 18hr (0600-2400) value of 44dB(A) was estimated. This can be compared to the Main Roads criteria of 63dB(A).

The increase in traffic movements due to the project on the other Pinjarra roads are estimated in Section 6.2.2. of the ERMP.

Calculations on road traffic noise made in the United Kingdom (Department of Transport, Welsh Office; 1988) indicate that on roads with a traffic flow of greater than 1,000 vehicles per 18 hour day it would take a 100% increase in traffic to raise traffic noise levels by 3dB(A). The project will produce an increase of between 4-18% in heavy vehicles and 5% in other vehicle movements. Therefore the maximum additional noise impact from traffic due to the project can be estimated to be less than 1dB(A) for the L_{10} 18hr noise level.

78. *The ERMP stated that "truck movements will be scheduled, wherever possible, for business hours Monday to Friday". Can the truck movements also be scheduled to avoid school hours?*

Truck movements will be scheduled, wherever possible, during business hours Monday to Friday. Rhône-Poulenc will also endeavour to manage the delivery times of trucks transporting raw materials and process chemicals from Kwinana to avoid peak hours and school bus times. The scheduled movements of the product, by-product and waste will be arranged so as to minimise traffic impacts on the community.

3.2.1 Transport of Gangue Residue (low level radioactive waste) for Disposal at Mt Walton

79. *Although transportation of waste by road minimises handling, it means some 280km of road transport with higher risk factor than rail. A credible risk assessment should be carried out which should consider the routes involved, degree of traffic encountered and quality of roads.*

Rhône-Poulenc has undertaken a comparison of the risks and hazards of road versus rail based on the studies conducted both in Australia and internationally. A summary of the results are presented in Section 2.4.2.2 and Appendix D of the ERMP and the response to Question 75.

Rhône-Poulenc undertook a qualitative risk assessment, as requested by the DEP, of the feasible transport options. Once road transport was assessed as the preferred option, the Company then assessed the possible road transport routes from Pinjarra to the IWDF at Mt Walton. These alternatives and the criteria for route selection are presented in Section 2.4.2.3 and Figure 2.1 of the ERMP.

When the possible routes were evaluated, with their potential of meeting the route selection criteria, it was found that there was only one viable option which is the northern route shown on Figure 2.1 of the ERMP.

80. *In its report on the previous Rhône-Poulenc proposal, the EPA stated that rail transport should be used as it is safer than road. The proponent should be required to negotiate with Westrail to upgrade the Pinjarra siding, either immediately or within the next 5 years. (The proponent should be required to pay for the rail link).*

In the 1980s rail was assumed to be the safest mode of transport based on a 1982 report by the Dutch Consultant TNO. This finding has been superseded by various studies including one by the same company TNO which showed that rail and road have comparable safety factors.

A summary of these comparisons is presented in Section 2.4.2.2 and Appendix D of the ERMP and also in the response to Questions 75 and 79.

Road and a combination of road and rail have been evaluated to assess the health environmental and economic aspects of transporting the gangue residue from the Pinjarra plant site to the IWDF. Three transportation scenarios have been assessed by Rhône-Poulenc, Westrail and Main Roads Western Australia. These are detailed in Section 2.4.2.2 and Figure 2.1 of the ERMP.

Scenario 1 requires the construction of a new siding in Pinjarra as Rhône-Poulenc has been advised that the existing Pinjarra siding would not be a suitable location for the loading and unloading of materials from the plant. A discussion on the siding options is presented in Section 2.4.2.2 Page 2-11 of the ERMP.

81. *The proposed route includes many single lane sections which are not suitable for a hazardous material being transported in 25m trucks. The Dwellingup route is even more hazardous as the roads are narrower and include the hill climbing up the scarp on a narrow winding section of road. The road to Mt Walton East from Great Eastern Highway will need to be upgraded. The increase in traffic and risk on Great Eastern Highway from the transport of gangue residue was not in the ERMP and needs to be considered by the proponent.*

The preferred route as described in Section 2.4.2.3 and shown on Figure 2.2 in the ERMP has been selected from advice from Main Roads Western Australia and the Department of Minerals and Energy (DME) based on the Route Selection Criteria listed in Section 2.4.2.3 of the ERMP.

The Dwellingup route is not preferred by Rhône-Poulenc, Main Roads or DME.

The road to Mt Walton East IWDF from Great Eastern Highway will need to be upgraded and Rhône-Poulenc will contribute, along with other users, to the upgrading and maintenance of this road.

The increase in traffic on Great Eastern Highway due to the three additional truck movements per week will be insignificant as the Annual Average Daily Traffic (AADT) volume is around 33,000 east of Midland reducing to 2,600 east of Southern Cross (Table 5.4 of the ERMP).

The potential risk of an accident occurring is in proportion to this low increase in numbers of truck movements.

82. *The alternative route to Mt Walton via Boddington, Narrogin and Narembeen should be considered in preference to the proposed route through the densely populated eastern suburbs of Perth.*

The alternative route (southern route on Figure 2.2 of the ERMP) was considered and is discussed in Section 2.4.2.3 Page 2-16 of the ERMP. The advantage of the southern route not passing through the Perth metropolitan area is more than offset by its disadvantages.

83. *Calculations show that a truck driver who transports the waste from Pinjarra to Mt Walton would reach his yearly radiation dose limit after one trip.*

The calculations (although not given) must be incorrect. Unshielded radiation doses in the cabin of the vehicle could be 5μSv per hour. A normal working year is 2000 hours. A driver will only drive 1000 hours carrying waste as he must return with an empty truck. Therefore, in a full year with an unshielded load a driver may receive 5mSv. A water or soil barrier will be placed between the driver and the load which would be expected to reduce radiation levels in the cab to a limit of 2mSv/yr.

84. *Rhône-Poulenc has suggested that, to reduce driver's exposure to radiation, the distance between the cabin and trailer be increased. Will detachable semi-trailer transporters be used to transport the wastes from Pinjarra to Mt Walton, so that the distance between driver and the waste load is maximised? Would maximising the distance between the cabin and trailer increase the dangers to other road users, as the trailer is more dangerous, and jackknifing could occur.*

Detachable semi-trailer transporters will not be used. As stated in Section 3.5.2.2 of the ERMP "B-double" trucks will be used. The B-double provides more rigidity and safer control than a two-trailer configuration.

The distance between the driver and the waste container will be maximised within the dimensions of the B-double and physical safety considerations.

As stated in Section 6.4.4.8 of the ERMP Rhône-Poulenc aims to limit driver exposure to 2mSv/yr by the use of at least two drivers. The regulatory limit is 5mSv/yr.

85. *In the event of an accident, people at the scene of the accident and emergency workers would be at risk. For example, the dose limit of 20μSv/hr for a member of public would be exceeded after 6.6 minutes if a person standing next to the sides of the truck, and after one hour if standing 2.5m from the truck. A person close enough to touch a bag of waste could exceed his annual limit of radiation in less than 2 hours. In reality, if you stand 1m from a railcar carrying the gangue waste only, you would be exposed to a whole body X-ray every 30 minutes.*

The radiation dose limit for the general public is 1mSv/year not 20μSv/hr. The figure quoted is from the Radiation Safety General Regulations Schedule 1 where it states that:

> *"A licensee or the person in whose name any premises are registered shall not:*
>
> *(a) without the authority in writing of the Council possess ... sources of radiation .... so as to create in any area occupied by persons who are not radiation workers .... radiation levels which .... could result in the person receiving a dose equivalent in excess of*
>
> *(I) 20 microsievert in any one hour."*

The normal process of gaining licensing for transport of radioactive materials entails obtaining written permission from the Radiological Council to operate so as to have radiation levels in excess of 20μSv/hr.

Table 6.8 in the ERMP gives estimated dose rates, relative to distance, from a container carrying gangue residue. The estimated dose rate of a person in contact with the container is 180μSv/hr therefore, a person would have to be in contact with the container for 5.5 hours to reach the public exposure limit of 1mSv.

The estimated dose for a person standing 3m from the container is 8-10μSv/hr therefore it would take up to 100 hours for a person 3m from the container to receive the public exposure dose limit.

Table 6.8 of the ERMP also gives estimated dose rates from a bulka bag of gangue residue. This table gives the dose rate of 200μSv/hr for a person in contact with a bag of waste. This means that the person must be in close contact (lying on the bag) for at least five hours before public exposure limit of 1mSv is exceeded.

There is no such general procedure as a whole body X-ray so it is not clear what radiation level the question is referring to.

Typical doses 1m from a container carrying the gangue waste are estimated to be 20-50μSv/hr (Table 6.8 in the ERMP) therefore it would take a minimum of 20 hours for a person to receive the annual public limit of 1mSv, which is half the world average level of background radiation.

86. *The waste produced is quite radioactive and the bulka bags may be the cheapest option but not the safest option. It should be solidified with cement or other suitable material before transport, as the material in a clay paste form may be dispersed by wind and water in the case of a spill. It should be then set solid in steel drums for transport, to minimise the risk of dispersion into the environment in a spill incident. To allow the waste to be transported in a non solidified form is a breach of the ALARA principle.*

There is no significant advantage to be gained in encasing the material in cement or placing it in drums. These operations would entail an additional occupational radiation risk and may require a greater number of transport operations without reducing total driver exposure. To treat the waste by any further processing would therefore breach the ALARA principle.

87. *The proposed plastic bag containers would hardly contain radioactive elements, especially if disrupted in an accident scenario. In the event of a spill, if it was raining, the clay like material from the bags would be dispersed and a complete clean-up would be impossible. What plans are there to deal with accidents involving this dangerous waste material?*

The gangue residue will be placed into heavy duty two tonne bulka bags of the type widely used for many years in the mineral sands, chemical and packaging industries. The bags are designed and made to meet the requirements of Australian Standards AS3688-1987 "flexible intermediate containers" and Supplement 2 to the Australian Dangerous Goods Code (Federal Office of Road Safety, 1992b). They are made of woven polypropylene and are lined with 60µm thick polyethylene film and fitted with polypropylene lifting lugs. These bags were used for transport of monazite from Australia to France and the USA by Rhône-Poulenc without any handling problems.

Information has been obtained from the Titanium Mineral producers on their experience with the performance of bulka bags used for transport of monazite. Their experience is that bulka bags made to the appropriate standards are a reliable, efficient packaging medium and no significant problems have been experienced with breakage or spillages during transport operations.

The bulka bags will be loaded into either standard ISO steel shipping containers or purpose built steel containers, therefore, there is unlikely to be a spill even in the event of an accident.

Details on emergency response and clean-up procedures in the event of a spill are presented in the ERMP (pages 6-10 to 6-16 and Appendix H).

If, for some reason, there is some spillage there is very little chance of the material dispersing into the environment due to its moist cake form and its insoluble nature. The material does not pose any immediate hazard to the public or environment compared with a spill of liquid chemicals such as petrol or LPG. The gangue material could be easily recovered and replaced into suitable packages for transport to the disposal site. If any spillage escapes the immediate location, it could be located by a radiation detector and recovered.

Radiation levels from spilt material will depend on the amount of material dispersed over an area. If a small amount is spilt over a large area then the radioactivity levels are unlikely to be much higher than background levels. If a large quantity is spilt in a pile then the radioactivity from this pile of material will be higher and easier to locate.

Table 6.8 estimates the radiation levels emanating from a bulka bag of gangue residue. These estimates indicate that it would take a person to be in contact with a bulka bag of the waste for a minimum of five hours to reach the annual public exposure limit of 1mSv.

Rhône-Poulenc, together with the appropriate authorities, has developed a detailed Emergency Response Plan to be implemented in the event of an accident.

89. *What contingency plans will apply; (i) in the event that a waste transporter cannot have access to the IWDF, particularly via the 100km of unsealed gravel access road due to rain, (ii) to recover the transporter (with a full load) which become bogged along the gravel road so as to minimise the radiation dose received by recovery personnel.*

(i) In the event of the access road becoming unusable Rhône-Poulenc will not transport waste to the IWDF but hold the waste in storage at the Pinjarra plant site until the road is reopened. The storage area at the plant site would be a dedicated concrete area with a storage capacity of approximately 600t for gangue residue which is approximately one months production.

In the event of the road becoming unusable whilst a truck is in transit to the IWDF site, the truck driver would be contacted by the control room at the plant site via the driver communications system and instructed to return to a designated area or to the Pinjarra plant site depending on the predicted time the road would be unusable.

If heavy rains occur, or are predicted to occur, in the area then the weather and road conditions would be checked with the Operator of the IWDF before a truck is despatched.

(ii) Procedures will be specified in the Transport Emergency Response Plan for recovery of a bogged truck.

These procedures will include control of the incident, site communications, traffic control, provision of expert radiation advice and personnel monitoring equipment, recovery of the truck and waste. All these procedures will be designed to keep exposure to the public workers involved in the recovery well within the allowable limits.

As stated in Section 6.4.4.8 of the ERMP and response to Question 85 a person would need to be in contact with a 20t container of waste for 5.5 hours to receive the allowable annual public limit of 1mSv or 100 hours at a distance of 3m.

90. *Murray River, Pinjarra township and other towns along the proposed transport route to Mt Walton would be severely affected if there was an accident.*

The chances of a spill occurring are very low. The emergency response and clean-up procedures which are proposed (Pages 6-10 to 6-14 and Appendix H of the ERMP) will ensure that no areas will be severely affected if there was an accident. Refer to response to Question 87.

91. *The gangue residue may not deliver radiation doses that cause immediate harm but exposure gives cumulative doses, and therefore must not be compared with other acute hazardous materials such as cyanide, chlorine, etc (ERMP, Sect 6.2.2.3).*

The effect from exposure to radiation is not cumulative. The risk of exposure to the waste is very low and members of the public would not receive discernible exposure from the normal transport of the waste. It is true that the waste should not be compared to the transport of Cyanide or Chlorine as they are more hazardous.

92. *In September this year, an accident occurred on South West Highway in which the trailer of a transport vehicle carrying lime overturned. It took over 6 hours, from the time of the accident, before the police and emergency crews were able to clear the highway. What would have happened if the truck had been carrying toxic (radioactive) wastes from Rhône-Poulenc instead of lime?*

There will be trained teams of emergency response personnel along the transport route, therefore, response time and clean-up procedures will be implemented in the shortest possible time.

The time to clear the highway would depend on many aspects including the physical nature of the accident, number of other vehicles involved, the location, whether or not any gangue residue is spilt and if the gangue residue needs to be transported to another vehicle. The gangue residue represents a relatively low hazard so procedures will be undertaken to clean-up the spill so the highway could be reopened.

Rhône-Poulenc has prepared a draft Transport Emergency Response Plan. This draft plan has been submitted to the DEP, Department of Minerals and Energy and the Radiological Council for their review. The plan will be finalised after discussions and review by these bodies, the W.A. Fires Board and emergency response personnel along the transport route.

The plan will comply with the Western Australian Hazardous Material Emergency Management Scheme (WAHMEMS). It will include procedures for management of incidents so that exposure of the public and emergency response personnel is kept well within regulatory limits and minimised as much as realistically achievable; and impacts on the environment, if any, are minimised and any spilt residue is removed and disposed at the IWDF.

93. *A spill of radioactive waste during transport could be difficult to clean up and may contaminate land and water courses (via dispersion by wind and/or water) for billions of years.*

The clean-up procedures in the unlikely event of a spill are detailed in the ERMP (Pages 6-10 to 6-14 and Appendix H). See responses to Questions 87 and 90.

94. *Is there an evacuation plan in the event of a spillage of the waste during transport?*

Owing to the nature of the material and its relatively low level of radioactivity there is no need to include an evacuation plan in the Transport Emergency Response Plan. An exclusion zone around an accident site would be established so that response actions can be undertaken in a controlled and safe manner. It is proposed that, for radiation protection considerations, this zone be 5m around any contained or spilt waste. For control of the incident area and recovery of vehicles, it is expected that the emergency response personnel would set a larger exclusion zone.

3.2.2 Transport of Monazite

95. *Transport of monazite in trucks by road (bulk transport) through major town centres and good agricultural land will put many people at risk.*

Monazite has been transported on country and metropolitan roads for approximately 25 years, for export prior to 1994, and is currently being returned by road to the mine sites with other waste materials from the mineral sand processing plants. There is an extremely good safety record for the transport of monazite in Western Australia (DME, 1995 pers. comm.).

96. *Monazite is more radioactive than uranium yellow cake (up to 3 times greater in radioactivity).*

The misconception of monazite being more radioactive than uranium yellowcake is addressed in the response to Question 20.

97. *There is a concern that if a person was close enough to touch a bulka bag of monazite, this person could receive the annual dose limit in less than 5 hours.*

If a person was in contact with a bag of monazite he would be exposed to 100μSv per hour. In such a position it would take 200 hours to reach the annual worker dose limit of 20mSv or 10 hours to reach the annual public dose limit of 1mSv. It is considered unlikely that a person would remain in such a position for this period of time.

3.2.3 Transport of Other Raw Materials and Product

98. *There is concern about transport of hazardous materials including nitric acid, hydrochloric acid, sulphuric acid, by road through major town centres, particularly in the event of a spill.*

Road transport of nitric, hydrochloric and sulphuric acids is common practice in Western Australia. These acids are classified as Dangerous Goods and will be transported in purpose-built trucks of 20-40 tonne capacity. Rhône-Poulenc will source these materials from reputable companies with safe transporting practices.

Transport handling methods for the acids will conform to the requirements of the Dangerous Goods Regulations, 1992, minimising the risks of accidental spillage during transport. Suppliers of these goods have a 24-hour emergency service with an emergency response plan based on the Western Australian Hazardous Materials Emergency Management Scheme (WAHMEMS) (Section 6.2.2.3 of the ERMP). Drivers contracted to these companies are specifically trained in accordance with the Australian Code for Transport of Dangerous Goods by Road and Rail (ADG Code) (Federal Office of Road Safety, 1992a) (Section 6.2.2.3 of the ERMP).

There is a good safety record for all these materials being transported on metropolitan and country roads in large quantities. The relative increase in the number of truck movements of these materials due to the project will be small.

99. *What would be the effect of a transport accident of chemicals or a spill at the plant? The transport accident question was asked on page 28 of Appendix F (ERMP) but was not answered fully.*

The response on Page 28 of Appendix F of the ERMP in relation to an acid spillage states:

> *"Industries supplying the chemicals will have the ultimate responsibility for their transport. Transport handling methods will conform to the requirements of the "Dangerous Goods Regulations, 1992 minimising the risks of accidental spillage during transport. Suppliers of these goods have a 24-hour emergency service with an emergency response plan based on the WAHMEMS. Drivers contracted to these companies are specifically trained in accordance with the Australian Code for Transport of Dangerous Goods by Road and Rail (Federal Office of Road Safety, 1992a)."*

Rhône-Poulenc believes that if the proper emergency and clean-up procedures are implemented and the safest transport routes are adopted, then there should be minimal effect of a transport accident of chemicals.

There is a good safety record for all these materials being transported on metropolitan and country roads in large quantities.

Material Safety Data Sheets obtained from the suppliers of these chemicals are presented in Attachment I.

100. *Both nitric acid and ammonia have the capacity to cause a full scale evacuation of an area if a transport accident occurs.*

Ammonia will not be required for the Rare Earth Plant.

The emergency response and clean-up procedures for nitric acid are well established and will follow the procedures of WAHMEMS which are described in the ERMP Section 6.2.2.3 and the response to Questions 98 and 99. The suppliers of the nitric acid has documented procedures to follow in the event of a hazardous material spill. These are as follows:

"ACTION SHEET - NO. 10
HAZARDOUS MATERIAL (LIQUID/SOLUTION) SPILL
FORWARD CONTROLLER

In the event of a spill either on or off-site, the team leader (Forward Controller) will ensure this procedure is followed.

1. *Establish a forward command post.*

2. *Don personal protective equipment before approaching spill:*
   * *Full PVC overalls*
   * *Rubber boots*
   * *Elbow length chemical gloves*
   * *Goggles*
   * *Safety helmet with face shield*
   * *Respiratory protection (as required)*
   * *Fully encapsulated chemical suit (as situation dictates).*

3. *Eliminate all possible ignition sources.*

4. *Apply basic life support to injured personnel.*

5. *Secure the area for 50 metre radius to prevent unauthorised entry with:*
   * *Stands and flashing beacons*
   * *Bunting flagging*
   * *Danger tape*

6. *Set up de-contamination area inside secured area.*

7. *Contain Spill (if not already contained) with:*
   * *Dirt, sand or other inert material*
   * *High pressure patching equipment from 6 tonne vehicle*
   * *Wooden bungs from 6 tonne vehicles*

8. *Recover liquid spill (where possible) into appropriate marked container.*

9. *Neutralise contaminated area including containment material.*

10. *Arrange for the removal of the contaminated material.*

11. *Ensure all equipment is de-contaminated prior to packing up.*

12. *Update emergency controller regularly with details."*

Source: CSBP; 1996 pers. comm.

101. *The caustic solution is provided via a 5km pipeline from Alcoa. What are the consequences if there is a burst pipe? Would it pose severe problems in groundwater and streams, killing vegetation and burning humans and animals?*

The caustic soda pipeline has been established and was operational for the Gallium Plant operations. It is not new infrastructure required for the Rare Earth Plant. Monitoring and safety measures incorporated in the caustic soda pipeline are described in Section 6.5 of the ERMP.

The chemical and mineral processing industry in Western Australia have been handling caustic soda solutions via pipelines for over 30 years, in significantly larger volumes than required for the project, without major incident. Experience with the pipeline for the Gallium Plant has indicated no problems with sourcing the caustic via the pipelines.

The pipeline which is used intermittently contains approximately $22m^3$ of 50% caustic soda. If there was a rupture in the pipeline, the contents would only disperse over a few hundred square metres. Caustic soda converts to sodium carbonate, a relatively benign chemical, on exposure to air.

Any spill of caustic will be monitored to minimise any impacts of the spill.

3.3 SOCIAL AND OTHER ISSUES

102. *The project is not a value added one as claimed by Rhône-Poulenc. This proposal is only the first stage of downstream processing to produce rare earth nitrates. The major part of value adding by the refining of the nitrates is intended to be done overseas. Rhône-Poulenc should be required to complete the whole cycle of value added refining and production of the rare earths in WA so that more of the profit, investment and employment opportunities remain here to help offset the long term detriment to the State in storing and looking after the radioactive gangue waste in perpetuity.*

The project is a value added project. The value added factor to the product due to processing at the Pinjarra plant is approximately 15, whereas the value added factor of the rare earths from the rare earth nitrate at the La Rochelle plant is approximately four.

In the previous proposal, Rhône-Poulenc intended to separate the rare earths from the rare earth nitrate which resulted in the generation of ammonium nitrate. The long term storage of ammonium nitrate at the Pinjarra site was of concern to the EPA, therefore, the revised project takes the process as far as possible without generating ammonium nitrate.

Both the Commonwealth and State Government's strategy is to develop downstream processing of Australia's mineral resources and this development is consistent with that strategy.

103. *The project is not in the best interest of WA as a whole. The cost to the people of WA will far exceed any short-term gains from the project in terms of costs for long term management of the buried wastes, cleaning up any contamination, health risks to the public from radiation exposure, and monitoring the health of workers and others for illnesses and diseases caused by radiation.*

The economic benefits associated with the project are substantial to the local community, the State and Australia. The benefits are listed in Section 1.10.4 of the ERMP.

The raw material, monazite, to be processed in the Rare Earth Plant is currently regarded as a waste from the processing of mineral sands and is returned to the mine sites on the coastal plain for storage/disposal.

It is pertinent to note that there is no additional generation of radioactive material by the project and the waste contains only the original radioactive component of the monazite.

The health risks to the public from radiation exposure are detailed in the ERMP and verified by the Department of Minerals and Energy (DME) in its submission to the EPA on the project, stating that:

> *"radioactive emissions from the Rare Earth Plant will be significantly less than natural emissions from the ground in the vicinity of the plant and site boundaries."*

Rhône-Poulenc will fund the Radiation Monitoring Programme established for both the environment and employees. There will be no cost to the State from these programmes.

Rhône-Poulenc through its contract with the State Government will fund the costs of waste disposal as listed in Section 6.3.3.1 of the ERMP. Therefore, the cost of waste disposal will not be borne by the State.

If there is any need for clean-up of contamination due to accidental spills at the plant site or along the transport route, Rhône-Poulenc will fund the clean-up operation to the satisfaction of the appropriate authority.

104. *What are the long term benefits of this project to society? A detailed analysis of the costs and benefits of the project to the community (in particular the local community), in terms of short, medium to long term should be carried out.*

The project has a number of significant economic and community benefits, including improved utilisation of Western Australian mineral resources, enhanced export earnings and employment opportunities. These are detailed in Section 1.10 of the ERMP.

The project will supply materials that can be used in the manufacture of products with environmental benefits such as catalytic converters to help reduce pollution from car emissions. Approximately 35% of all cars produced worldwide are likely to be fitted with these catalytic converters produced using Pinjarra Rare Earths which will reduce pollution from these cars by 90% with a predicted 99% efficiency in the future.

Other environmental benefits include improved energy efficient lights, a replacement for toxic metals in pigments and plastics and a variety of medical applications.

The economic benefits to the community are listed in Section 1.10.4 of the ERMP.

105. *There are social and economic impacts on the local agriculture industry, in the event of a spillage of radioactive materials, as primary producers may have difficulty in marketing their produce due to perception from others on radioactive contamination.*

If a spillage of radioactive materials occur on agricultural land or at any other location, Rhône-Poulenc will ensure a thorough clean-up of the spillage is conducted to the satisfaction of the appropriate authorities. There should be no need for 'perception' if the appropriate authorities have ensured that there is no remaining radioactive materials of concern.

Details on the clean-up procedures are presented on Pages 6-10 to 6-14 of the ERMP.

Rhône-Poulenc has a well established (over 50 years) Rare Earth Plant at La Rochelle in France. The La Rochelle plant is in the town and near to the old port which is a major tourist attraction. The presence and operation of this plant has had no adverse impact on the agricultural, aquacultural or tourism industries in the La Rochelle region.

106. *Agriculture production in the Peel Region is a significant contributor to the regions economy (worth approximately $70 million per annum). It is suggested that the proponent liaise with the agricultural industries to prepare a strategy to ensure that the marketing advantages of agricultural enterprises are not jeopardised by the proponents project.*

Rhône-Poulenc will liaise with the Agricultural industries to ensure that the low risk of this industry is understood and that 'perception' issues are clarified with facts.

107. *Concern about decrease in the value of houses and land in Pinjarra as a result of the rare earth plant.*

In June 1995 Rhône-Poulenc engaged a reputable licensed valuer to assess property values immediately adjacent to its property.

The valuer reported property values had increased by 100% in the period January 1987 to March 1995 (January 1987 was immediately before the time Rhône-Poulenc commenced plans to establish a Gallium and Rare Earth Plant at Pinjarra. March 1995 was just prior to Rhône-Poulenc announcing its intention for the second time to establish a Rare Earth Plant).

During the same period CPI increased by 42%.

In late 1995 two properties previously valued were sold at or slightly lower than the March 1995 valuations. This demonstrates that property values have not been significantly affected as a result of the proposal.

108. *Pinjarra is just starting its career into the tourist industry (some improvements to land and waterways are on the rise) as the region has great natural beauty and many tourist attractions. A French chemical/radioactive rare earth plant and particularly the transport of radioactive material by trucks on single lane roads, can have negative effects on tourism (and development) in the region.*

The location of the Rare Earth Plant is on a property 10km from Pinjarra which is well screened (by vegetation including a hardwood plantation). The plant will pose no radiation risk to the general public or tourists. The La Rochelle plant is located in a premier tourism region of France and has certainly had no negative effect on tourism (see response to Question 105).

The transport of radioactive materials has been conducted on Western Australian roads for at least 25 years including the Geraldton, Bunbury and Capel areas. The movements of these trucks does not appear to have had a negative impact on tourism (and development) in those regions as they are listed by the WA Tourism Commission as the 4th, 5th and 6th most popular tourist locations in Western Australia (The 'West Australian' 12 December 1995).

109. *There is a concern that the proposed 124 million dollar Everland tourist resort and residential project would be placed at risk as a result of the proposal. The resort will include facilities to promote a concept of healthy living, and will not be attractive to the public at large if they perceive that a hazardous health risk exists in the near vicinity.*

Rhône-Poulenc do not believe that the Everland tourist resort and residential development would in any way be placed at risk as a result of this proposal. The Everland resort and residential development is located to the west of Pinjarra, approximately 16km from the plant site which is to the east of Pinjarra.

As has been stated in te ERMP and many responses to questions in this document, there will be no radiation impacts to the public from the plant. The plant is not visible from any of the roads leading to the proposed Everland's developments and the trucks transporting the gangue residue will not pass in the vicinity of the Everland development.

Rhône-Poulenc could see a positive impact on the residential component of the Everland development as Rhône-Poulenc's policy is to give a preference for employment of local people who may take the opportunity of residing at the Everland development.

The Everland developers should take note of the location of Rhône-Poulenc's Rare Earth Plant at La Rochelle and the responses to Questions 105 and 108.

110. *The people who live within 1 to 10km from the proposed plant feel that they put the life of their own family to radiation danger from the plant, and that, in order to protect the health of their family, they may be forced to sell their houses/land if the plant gets the go ahead.*

The ERMP is a technical document which presents scientifically based facts such as estimates of radiation emanation which are checked by the authorities.

Calculations are made as to the predicted radiation concentrations that could result from the plant due to the following four potential sources of exposure (Page 6-33 of the ERMP):

- Gamma Radiation;
- Radon and Thoron emissions;
- Release of Radioactive Dust; and
- Release into Water.

A conservative estimate of gamma radiation, 500m from a container of waste of 0.00028μSv/hr has been calculated. This equates to a total dose of 2.5μSv/year if a person was at the boundary for 24 hours a day for 365 days per year, an unlikely scenario. The 2.5μSv can be compared with the regulatory annual public exposure limit of 1mSv.

Radon and Thoron emissions have also been predicted at a distance 500m downwind from the plant (Table 6.7 of the ERMP). These estimates indicate that the maximum radon emissions will be at least 9 times less than the natural rate of radon emanation from soils in the area over Rhône-Poulenc's property. Thus the natural levels of radon exposure will not be significantly increased by the presence of the Rare Earth Plant. Due to the small quantity of thoron likely to be emitted and the short half life of these isotopes, it is unlikely that natural thoron background levels will be significantly increased by the project.

There will be little or no generation of radioactive dust at the plant.

No liquid process waste containing radionuclides will be released into the environment. Therefore there will be no impact on the public in terms of risk of water contamination.

These estimates show that the level of radiation exposure outside the Proponent's property will be so low that they will be undetectable. The world average dose from natural background radiation is in the order of 2mSv so there is no justified scientific concern that there is 'radiation danger' from the plant.

111. *The proposal may have adverse impacts on the quality of life of the people living in or near Pinjarra, which originally attracted them to the area.*

Rhône-Poulenc do not believe the project will have adverse impacts on the quality of life of the people living in or near Pinjarra, and with the economic benefits to the local community the project will help bring prosperity to the region.

112. *It is requested that the proponent makes a commitment to liaise with the Shire of Pinjarra, the WA Tourism Commission, and local landowners and tourist facility operators, in order to identify and agree on design and operational procedures for the facility, which will minimise potential detrimental impacts on residential, recreational and aesthetic values of the Pinjarra locality and its surrounds.*

During the course of the Environmental Impact Assessment process, Rhône-Poulenc has liaised with all those listed in this question and with many other members of Government, industry and the community. This liaison will continue throughout the life of the project.

Rhône-Poulenc will work closely with the WA Tourism Commission and Pinjarra tourism operators to ensure that there are no adverse impacts on tourism activities in the area. The Company has conducted and will continue to conduct tours of the plant site to show the public the high technology implemented in the plant, in a similar way to Alcoa's tours which the WA Tourism Commission list as one of the interesting holiday experiences for tourists in Pinjarra.

113. *Since the rare earth product is going to be exported to France, Rhône-Poulenc should set up the processing facility in France and import monazite raw material from Australia. If processing of monazite is prohibited by law in France then it should not be allowed here.*

Processing of monazite is not prohibited in France.

The processing of Western Australian monazite ceased when alternate and more economical rare earth ore became available as a feedstock for the Rare Earth Plant at La Rochelle.

Both the Commonwealth and State Government's strategy is to develop downstream processing of Australia's mineral resources and this development is consistent with that strategy.

114. *Although the ERMP indicates that the estimated life of the plant is a minimum of 20 years, the established reserves of raw materials from Capel could extend the operations of the processing plant indefinitely.*

Rhône-Poulenc hope that this is the case as the Company would like the plant to operate as long as there is an adequate supply of the monazite feedstock.

115. *Can Rhône-Poulenc guarantee the employment of 60 - 80 people from Pinjarra on a permanent basis?*

Rhône-Poulenc expect to employ approximately this number of personnel for the duration of operations at the site which is expected to be at least 20 years. Where possible, preference will be given to local residences.

116. *(i) Are all health and emergency workers (eg Ambulance, Fire Brigade, casualty staff) going to have full training to cope with chemical spillages, radioactive exposures and accidents, burns etc? (ii) Is there currently a Disaster Plan to facilitate this type of industry in the Shire of Murray? And if there is, does it relate specifically to radioactive accidents? (iii) Will the Murray District Hospital be upgraded to a fully operational and equipped emergency facility? Do the local medical practitioners have the training to deal with such radioactive emergencies? (iv) Is Rhône-Poulenc going to subsidise money towards all of the aforementioned items? How much and for how long?*

(i) Rhône-Poulenc will be, and has been to date, in contact with all health and emergency departments in order to ensure that appropriate training, information and equipment are available to deal with accidental spillages of chemicals and radioactive materials.

(ii) A draft Transport Emergency Response Plan has been prepared by Rhône-Poulenc. This plan would be implemented in the event of an accident wherever it may occur. This plan will be available to the appropriate authorities and emergency service providers. Training of emergency response teams will be conducted as necessary. The Emergency Response Plan and training programmes will be reviewed and refined by the Company in conjunction with the emergency response providers.

There will also be an Emergency Response Plan prepared for the plant site which would detail the procedures for an accident on-site.

(iii) With the exception of the monazite and gangue, all of the chemicals used in the process are currently used and transported in the Murray Shire. The medical practitioners in the area should be able to treat injuries resulting from an accident with these materials.

No special treatment or equipment is required, other than basic washing and hygiene precautions, if persons accidentally come in contact with the radioactive materials.

(iv) Rhône-Poulenc will subsidise the cost of training for emergency crews and the appropriate authorities. These subsidies will be of a material kind such as the provision of training materials, preparation of training programmes, dissemination of information and provision of radiation detection equipment.

This assistance will continue throughout the life of the project.

While no special or unique equipment is needed additional to that normally used in emergency situations, the Company will consider any special needs as they arise.

117. *The Proponent should be required to supply paid emergency workers on the Great Eastern highway route so that volunteers are not put at risk. It could be difficult for many Emergency Services organisations to maintain their service as some "volunteers" may not wish to be exposed to radiation risk.*

The assumption made by this question is that volunteers would be put at risk. This is not the intention. A training programme would be available to volunteers along the transport route so that they are aware of the radiation risks, are familiar with the organisation and operation of the Transport Emergency Response Plan and do not expose themselves or others to any unnecessary risks. Volunteers would not be involved in clean-up activities. These activities would be undertaken by the Emergency Response Team (Appendix H of the ERMP).

It will be the volunteers' decision whether or not to attend an incident site. Rhône-Poulenc would prefer that only those volunteers which had received awareness training as described above would attend an incident.

The advice and special needs of the emergency service providers in the relatively remote areas of Southern Cross and Coolgardie has been sought by the Company and further consultation is proposed during the course of the development of procedures and training programmes.

118. *Would Rhône-Poulenc be able to supplement the cost of maintenance of major roads within the Shire of Murray and other Shires along its waste transport route to Mt Walton?*

Trucks transporting waste from Pinjarra to Mt Walton will occur at a frequency of three per week. This number will be insignificant on the major roads within the Shire of Murray and other Shires. However, on minor roads where these truck movements are a significant increase in traffic volumes such as the access road to the Mt Walton IWDF, Rhône-Poulenc will contribute to the cost of maintenance of such roads.

119. *After Rhône-Poulenc, will there be more heavy industries coming to the Murray district?*

This is not a question to be responded to by Rhône-Poulenc. The plant site is on an industrial zoned area which centres around the Alcoa plant on the east side of Pinjarra.

120. *The presence of the rare earth plant will increase the pressure on forrest and bushland in this State, as areas of forrest located above mineral sands deposits may be clearfelled in order to mine the sands to provide enough raw material for the plant. Pressure may also be put on the WA Government to open up the sand mining areas between Pinjarra and Perth.*

A discussion on the mineral sands mining is presented in the response to Question 64. Monazite is a component (less than 1%) of the mineral sands mined to recover the titanium and zirconium bearing minerals.

The extraction of monazite alone, will never provide sufficient justification to mine a mineral sands deposit.

Rhône-Poulenc has a CALM hardwood plantation of Blue Gums (170ha) on its property.

121. *Why is Rhône-Poulenc now responsible for the transport of wastes when the Ministerial Statement 1988 clearly state that transport is the responsibility of the proponent of the IWDF?*

During the initial stages of the project, discussions were held between Rhône-Poulenc and the Department of Environmental Protection (DEP) as to whom the Government would prefer the responsibility for the transport and disposal of the gangue residue to reside with.

The DEP advised Rhône-Poulenc that the transport of the gangue residue would be the responsibility of Rhône-Poulenc and it has therefore be assessed as part of Rhône-Poulenc's project.

122. *What is the possibility of the waste being retrieved for use in the new generation of breeder reactors which use thorium as their fuel?*

In some future scenario where breeder reactors supplied a significant proportion of the world's energy needs, the gangue waste could be retrieved for use. It would be up to the Government of that time to make a decision to use such a resource. The activation products of thorium are not the 'first choice' material for the manufacture of nuclear weapons. Activating thorium does not produce plutonium.

123. *The proposal is a high risk industry which should not be allowed to operate in Australia which is seen as a relatively clean continent, particularly in terms of radioactivity.*

The Department of Minerals and Energy has determined, in its submission to the EPA on the project, that this plant is not classifiable as a 'major hazard site'.

There is no generation of additional radioactive material as the gangue residue contains only the original radioactive component of the Western Australian monazite. The gangue residue will be disposed of at a remote site specifically selected for the disposal of such waste.

Final products from the plant will be used in the manufacture of products with environmental benefits (refer to response to Question 104).

124. *Given the attitude of the French Government to nuclear testing in the South Pacific, the proposal is objected on the ground that Rhône-Poulenc is a French Company.*

Rhône-Poulenc is a publicly listed company and has no influence on the French Government's policy to nuclear testing.

4.0 CONCLUSION AND LIST OF COMMITMENTS

Rhône-Poulenc has prepared this document in response to the submissions received by the EPA on the Pinjarra Rare Earth Plant. Each question directed to Rhône-Poulenc by the DEP has been cited and responded to.

During the preparation of the Response to Submissions, the Company thought it appropriate to modify and expand its List of Commitments presented in the ERMP (Section 8.0) to ensure all of the issues raised in the submissions will be managed in an environmentally acceptable manner. The consolidated List of Commitments is as follows:

1. During all phases of the project, the Proponent will comply with all applicable standards and regulations pertaining to and appropriate for a chemical and mineral processing plant and for waste disposal.

2. The Proponent will transport the low level radioactive gangue residue in compliance with the Code of Practice for the Safe Transport of Radioactive Substances (1990) and will develop an Emergency Response Plan to deal with an accident.

3. The Proponent will prepare an emergency response plan for the transport of the low level radioactive gangue residue, outlining the emergency and clean-up procedures in the event of an accident, for review by the DEP, DME, WAFBB and the Radiological Council.

4. The Proponent will ensure that drivers attend approved Driver Training Courses including specific training for the transport of radioactive materials prior to any transport of waste materials. Refresher courses will be conducted at least yearly. This will be a condition of contract with the transport operators. The companies transporting radioactive material shall, under the Radiation Safety Act, 1975-1981, hold an appropriate licence.

5. The Proponent will liaise with all relevant Government agencies, local authorities and emergency response groups along the proposed gangue residue transport route to ensure there are appropriate emergency response management measures in place.

6. Emergency Management Teams and Field Response Teams will be trained in emergency response and clean-up procedures, prior to the transportation of waste and with refresher courses conducted yearly. Training will be funded and co-ordinated by the Proponent.

7. A shipment manifest will be prepared prior to disposal operations in accordance with the Code of Practice for the Safe Transport of Radioactive Substance (1990) by the Proponent detailing the following information:

   - waste specification;
   - transport identification;
   - waste description;
   - approval certificate; and
   - declaration.

   The manifest will accompany each truck load of gangue residue.

8. If the waste delivered to the IWDF is found to not meet the required specifications it will be returned to the plant for reprocessing. The Proponent will investigate and identify the reason for non-compliance and modify procedures to minimise the risk of repeating such non-compliance to the satisfaction of the Minister for the Environment.

9. The Proponent will dispose of all process and non-process wastes in an environmentally acceptable manner and in accordance with licensing and other requirements from the DEP, DME, Water and Rivers Commission and the Radiological Council throughout the life of the project.

10. Any additional ponds required for the project will be constructed by the Proponent according to the design standard approved by the DEP and Water and Rivers Commission.

11. There will be no significant radionuclide disposed in the ponds. The effluent will be analysed to determine if there are any traces of radionuclides and to determine if there are any traces of radionuclides and to ensure these levels are below the levels acceptable to the DME, Water and Rivers Commission and the DEP.

12. The existing evaporation pond and groundwater monitoring systems have been approved by the DEP and Water and Rivers Commission. The monitoring bores have been and will continue to be monitored by the Proponent for both groundwater level and groundwater quality on a routine basis. The evaporation ponds and underdrainage sumps will also be monitored for level and quality. The results of the monitoring will be made available to the DEP at a frequency to be determined. If results indicate that leakage from the ponds is entering the groundwater under the site the DEP will be notified immediately.

13. The RMP prepared by the Proponent will include a monitoring programme to determine the content of radionuclides in groundwater, surface water and water in the ponds.

14. The Proponent will provide further information to the Water and Rivers Commission prior to plant commissioning, on the integrity of the evaporation ponds and on the potential impacts on groundwater quality.

15. The Proponent will implement contingency plans should there be any leakage from the ponds throughout the life of the project and remediation procedures will be undertaken to the satisfaction of the Minister for the Environment.

16. The Proponent will fund, in agreement with the State Government, the following aspects of waste disposal operations:

- planning of site operations with respect to Rhône-Poulenc's waste;
- disposal costs;
- backfilling and rehabilitation of the trench area;
- monitoring of the disposal operations of Rhône-Poulenc's waste;
- contribute to long term monitoring at the IWDF site;
- contribute, together with other users of the road, to the maintenance of the IWDF access road;
- a provision for maintenance and any costs of remedial work necessary in the first five years after a disposal operation; and

- the proportion of salaries and overheads for agreed Government management staff and site management contractors in relation to disposal of Rhône-Poulenc's gangue residue, including a proportion of out-of-pocket expenses related to the involvement of Government staff on the technical committee.

17. Waste disposal operations including transport will be subject to an annual audit in accordance with the Code of Practice for the Near-Surface Disposal of Radioactive Waste (NHMRC, 1992). The auditor will be selected by the Government to the satisfaction of the Radiological Council.

18. The Proponent will comply with the requirements of the applicable legislation and codes of practice relating to radiation protection.

19. Details on final plant design will be made available to DME on completion of design.

20. The Proponent is committed to the ALARA principle (that radiation dose be kept as low as reasonably achievable, economic and social factors being taken into account) in accordance with DME and the Radiological Council regulations.

21. A comprehensive Radiation Management Plan (RMP) will be prepared by the Proponent for the Rare Earth Plant and its environment and submitted for approval from the DME, DEP and the Radiological Council prior to commencement of operations. The RMP will include pre-operational, operational and post-operational monitoring for:

- gamma radiation;
- radon flux; and
- radionuclides in air, water, soil and sediment.

22. The Proponent will implement the following strategies for the radiation protection of plant personnel:

- Controlled areas will be established to include the monazite handling and storage facilities, filtering stages, purification area and residue handling/transport/disposal facilities and areas.
- Handling of potential dust generators (monazite and residue) will be minimised to reduce air contamination; in particular, wet milling of monazite and disposal of residue in moist form will be undertaken.
- Adequate ventilation will ensure that radon and thoron daughter levels are maintained within acceptable levels.
- Supervised areas and appropriate procedures will be established to limit access by members of the public to the plant site.
- Where necessary, equipment containing bulk quantities of radioactive material will be shielded to reduce exposure rates.
- Equipment in controlled areas will be selected and designed for reliable operation and ease of maintenance.
- Floor surfaces in controlled areas will be non-absorbent and designed for reliable operation and ease of maintenance.
- Facilities will be provided for easy washing of floors and equipment. All washings will be returned to the process via floor sumps or the purpose designed wastewater treatment plant.

- Designated staff will be trained in radiation protection practices.
- Protective equipment and clothing will be issued to workers, where required. Such workers will be fully trained in the use of this equipment.
- Special clothing worn by plant operators will be laundered on-site with changerooms specially designed to allow work clothing to remain on-site.

23. Prior to commissioning of the plant, a comprehensive survey of the existing radiation environment at the Pinjarra site will be conducted by the Proponent as required by DME and the Radiological Council.

24. The Proponent will implement a comprehensive monitoring and health surveillance programme for Rare Earth Plant personnel according to the requirements of DME and the Radiological Council.

25. The Proponent will establish an operational dose constraint for plant personnel of 10mSv/yr to be agreed upon with DME and the Radiological Council. Should any other worker exceed this dose constraint, on a pro rata basis, the circumstances relating to that exposure will be investigated and measures taken to ensure that the dose to an individual of 10mSv in any one year will not be exceeded.

26. Monitoring of radiation levels by the Proponent will continue over the life of the project. Reporting of radiation monitoring data and record keeping will be undertaken by the Proponent in accordance with the applicable legislation of DME and the Radiological Council.

27. Radiation protection assessments given in the ERMP will be verified by the Proponent during plant commissioning, to the satisfaction of the DEP and DME.

28. An operational dose constraint of 2mSv/yr will be established by the Proponent, in agreement with the Radiological Council for drivers transporting the gangue residue. Should a driver exceed this dose constraint on a pro rata basis, the circumstances relating to that exposure will be investigated and measures taken to ensure that the dose to an individual driver of 2mSv in any one year will not be exceeded.

29. Plant and employee safety will be maximised by the Proponent ensuring that the storage and handling of hazardous materials such as process chemicals is in accordance with the relevant statutory standards and codes.

30. Construction activities at the plant site will be undertaken in accordance with the statutory requirements and appropriate management techniques will be implemented to ensure that noise levels are within acceptable limits.

31. A noise monitoring survey will be conducted by the Proponent prior to and during plant operations. The Proponent will conduct modelling of noise emissions from the plant once final plant design is known. The results will be submitted to the DEP at least one month prior to commencement of construction of the Rare Earth Plant. Appropriate actions will be taken by the Proponent to rectify any noise problems should levels exceed those in noise regulations and to reduce noise levels to meet those specified in the DEP regulations.

32. The Proponent will implement management procedures to ensure noise impacts from heavy vehicles are minimised. Management procedures will include the restriction of truck movements wherever practical to Monday to Friday business hours, and the use of contractors whose trucks which comply with the Australian Design Rule noise emissions.

33. The Proponent is committed to achieving certification of ISO 9002 for both the Rare Earth and Gallium Plants and will operate a quality assured system.

34. The Proponent endorses the concept of a Community Liaison Committee which will encourage the active involvement of local residents and Shire of Murray officials in the monitoring process at the Pinjarra plant site.

35. The Proponent will liaise with the Mt Walton Community Liaison Committee, local Shires and interest groups on the transport, disposal, safety and environmental issues relating to the low level radioactive gangue residue.

36. The Proponent will ensure that the best practicable technology is applied throughout the life of the project where best practicable technology is defined in Clause 1(3) of the Radioactive Waste Management (Mining and Milling) Code (1982) as:

> *"that technology, from time to time relevant to a specific project, which enables radioactive wastes to be managed so as to minimise radiological risks and detriment to people and the environment, having regard to:*
>
> *(a) the achievable levels of effluent control and the extent to which pollution and degradation of the environment is minimised or prevented in comparable mining and milling operations elsewhere;*
> *(b) the cost of the application or adoption of that technology relative to the degree of radiological and environmental protection expected to be achieved by its application or adoption;*
> *(c) evidence of detriment or lack of detriment to the environment after the commencement of mining or milling operations;*
> *(d) the location of the mine or mill;*
> *(e) the age of the equipment and facilities in use for mining and milling purposes and their relative effectiveness in achieving radiological and environmental protection; and*
> *(f) the potential hazards from the wastes over the long term".*

37. In addition to complying with the requirements of the Radiation Protection (Mining and Milling) Code (1987), the Radioactive Waste Management (Mining and Milling) Code (1982) and the Code for Disposal (NHMRC, 1992) the Proponent will meet any future changes in these (and other relevant) standards throughout the life of the project.

38. The Proponent will prepare reports detailing the environmental management of the plant which will be submitted to the DEP for review. The frequency will be determined by the DEP, but is likely to be at least every five years.

39. Decommissioning by the Proponent will be undertaken in accordance with statutory requirements in force at the time and in a manner acceptable to the Minister for the Environment.

40. The RMP prepared by the Proponent will include procedures to be approved by the DME and Radiological Council, for decontamination of radioactive components of the plant and post-operational monitoring.

41. Upon decommissioning, the Proponent will ensure all free water is evaporated from the ponds prior to placing materials over the ponds. All aspects of rehabilitation of the ponds will be investigated at the time of decommissioning including the design of the cover material. Pond rehabilitation will be developed and designed to the satisfaction of the Minister for the Environment.

5.0 REFERENCES

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* * *

ATTACHMENT I

MATERIAL SAFETY DATA SHEETS

MATERIAL SAFETY DATA SHEET

CSBP

IDENTIFICATION

PRODUCT DESCRIPTION

Hydrochloric Acid (32% Solution)

U.N. NUMBER	1789
DANGEROUS GOODS CLASS	8
SUBSIDIARY RISK	N/A
HAZCHEM CODE	2R
TRADING NAME	Hydrochloric Acid
POISONS SCHEDULE	Sixth
OTHER NAMES	• Muriatic Acid • Spirits of Salts • Chlorohydric Acid
NFPA CODE	3, 0, 0.
MANUF. CODE	—
STATEMENT OF HAZARDOUS NATURE	Hazardous

USE

- Metal cleaning.
- Swimming pool chemical.
- Petroleum exploration.
- Chemical synthesis.
- Ore reduction.
- Food processing.

PHYSICAL DESCRIPTION/PROPERTIES

Colourless to yellow liquid with a pungent, acidic odour emitting toxic hydrochloric gas. Decomposes on heating to form additional toxic gases.

Boiling point — 110°C
Specific gravity — 1.16 (approximately)

INGREDIENTS

CHEMICAL ENTITY	CAS NO.	PROPORTION
Hydrochloric acid [HCl]	7647-01-1	32.0%
Water	—	Remainder

HEALTH HAZARD INFORMATION

HEALTH EFFECT

Has a high toxicity and is a severe irritant if it comes in contact with skin, eyes or mucous membranes, or if swallowed or inhaled.

Ingested : Severe internal irritation due to corrosive effect.
Eye contact : Severe irritation and burns.
Skin contact : Severe irritation and burns.
Inhaled : Acute irritation of upper respiratory tract.

FIRST AID

Ingested : Do not induce vomiting. Give water to drink as tolerated.
Eye contact : Irrigate with water immediately for 15 min.
Skin contact : Wash with large amounts of water. Remove affected clothing and wash underlying skin.
Inhaled : Remove from exposure. Keep warm and at rest.

ADVICE TO DOCTOR

Treat symptomatically.

Continued on the back page

Hydrochloric Acid (32% Solution) (Continued from the front page)

PRECAUTIONS FOR USE

EXPOSURE LIMITS

Exposure Standard—Peak Limitation = 7 mg/m^3 (5 ppm)

VENTILATION

Use in open or well ventilated areas.

PERSONAL PROTECTION

When there is a risk of spill or splash, wear chemical goggles, safety helmet and face shield, PVC gloves, rubber boots, and PVC jacket and trousers. If risk of inhaling vapour exists, use acid mist respirator or supplied-air breathing apparatus.

FLAMMABILITY

Non-flammable.

SAFE HANDLING INFORMATION

STORAGE AND TRANSPORT

Store in high-density polyethylene or glass-fibre-reinforced plastic tanks that conform to AS 2634-1983 or other approved standards. Ensure that:

- storage area is cool, well ventilated and away from combustible materials, other class 8 corrosive substances,
- storage and tanker receival installation meets the CSBP "Tanker Delivery Requirements" particular to this product,
- there are safety showers and eyewash facilities available in the storage area.

Transport as for class 8 (corrosive) substances. For detailed storage and transport information contact Mines Department of WA or Chemical Division of CSBP.

SPILLS AND DISPOSAL

Wear Protective PVC wet weather gear with canister respirator. Minimise leak and/or spills. Dilute them with large amounts of water or neutralise with lime or soda-ash. (Uncontrolled neutralisation can liberate large amounts of heat.) After treatment, transfer spills to an approved liquid waste land fill site.

FIRE/EXPLOSION HAZARD

In a fire it emits toxic fumes. Use self-contained breathing apparatus. When in contact with most metals, explosive hydrogen gas evolves.

OTHER INFORMATION

None.

CONTACT POINT

Fertilisers Customer Service - (09) 377 9177
Emergency Advice - 1800 093 333
Chemicals Customer Service - (09) 411 8666
Wesfarmers CSBP Limited - (09) 411 8777

Issue Date: November 1995

MATERIAL SAFETY DATA SHEET

CSBP

IDENTIFICATION

PRODUCT DESCRIPTION			
Nitric Acid (58% Solution)		U.N. NUMBER	2031
		DANGEROUS GOODS CLASS	8
		SUBSIDIARY RISK	5.1
		HAZCHEM CODE	2PE
TRADING NAME	Nitric Acid	POISONS SCHEDULE	Sixth
OTHER NAMES	• Azotic Acid • Aqua Fortis	NFPA CODE	3, 0, 0 OXY
MANUF CODE	—		
		STATEMENT OF HAZARDOUS NATURE	Hazardous

USE

- Manufacture of ammonium nitrate (fertiliser, blasting agent).
- Printing industry—photo engraving
- Metallurgical practices—anodizing, etching, etc.
- Chemical intermediate (e.g. for organic dyes, drugs, explosives).

PHYSICAL DESCRIPTION/PROPERTIES

Colourless to light brown corrosive liquid with characteristic suffocating odour. Gas above the liquid contains oxide of nitrogen (NO_2) and is yellow-brown in colour.

Boiling point — 122°C
Specific gravity — 1.38 @ 15°C

INGREDIENTS

CHEMICAL ENTITY	CAS NO.	PROPORTION
Nitric acid [HNO_3]	7697-37-2	58.0%
Water	—	Remainder

HEALTH HAZARD INFORMATION

HEALTH EFFECT

Has a very high toxicity. Extremely irritating to skin, eyes and mucous membrane. Corrosive to tissue, including teeth.

Ingested : Severe internal irritation due to corrosive effect.
Eye contact : Severe irritation and burns.
Skin contact : Severe irritation and burns.
Inhaled : Severe irritation due to corrosive effect.

FIRST AID

Seek urgent medical attention.

Ingested : Wash out mouth with water and give water to drink. Do **not** induce vomiting.
Eye contact : Irrigate immediately with water for 15 min.,
Skin contact : Wash with large amounts of water. Remove affected clothing and wash underlying skin.
Inhaled : Remove from exposure. Keep warm and at rest.

If any of the effects persists, seek further attention.

ADVICE TO DOCTOR

Treat symptomatically.

Continued on the back page

Nitric Acid (58% Solution) (Continued from the front page)

PRECAUTIONS FOR USE

EXPOSURE LIMITS

- Exposure Standard—Time-Weighted Average (TWA) = 5 mg/m³ (2 ppm)
- Exposure Standard—Short Term Exposure Limit (STEL) = 10 mg/m³ (4 ppm)

VENTILATION

Nitric acid vapours are highly toxic. Ventilate to a concentration level below Exposure Limits.

PERSONAL PROTECTION

Where there is a risk of spill or splash, wear chemical goggles, safety helmet and face shield, PVC gloves, rubber boots, ad PVC jacket and trousers. If risk of inhaling vapour exists, use acid mist respirator or supplied-air breathing apparatus.

FLAMMABILITY

Non-flammable.

SAFE HANDLING INFORMATION

STORAGE AND TRANSPORT

Store in stainless steel containers that conform to AS 1692-1983 or API-650 standards. Ensure that:

- storage area is cool, well ventilated and away from combustible materials, other class 8 corrosive substances and foodstuffs,
- all pipe joints and fittings conform to AS CB 15.1-1967 and screw fittings are avoided wherever possible,
- storage and tanker receival installation meets the CSBP "Tanker Delivery Requirements" particular to this product,
- there are safety showers and eyewash facilities available in the storage area.

Transport as for class 8 (corrosive) substances. For detailed storage and transport information contact Mines Department of WA or Chemical Division of CSBP.

SPILLS AND DISPOSAL

Wear full protective clothing and breathing apparatus. Minimise leak and/or spills. Dilute them with large amounts of water or neutralise with lime or soda-ash. (Uncontrolled neutralisation can liberate large amounts of heat.) After treatment, transfer spills to an approved liquid waste land fill site.

FIRE/EXPLOSION HAZARD

In a fire it emits toxic fumes. Use self-contained breathing apparatus.

OTHER INFORMATION

None.

CONTACT POINT

Chemicals Customer Service	— (09) 411 8666
Emergency Advice	— 1800 09 3333
Fertilisers Customer Service	— (09) 377 9177
Wesfarmers CSBP Limited	— (09) 411 8777

Issue Date: November 1995

IMPORTANT NOTES

- This MSDS summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products.
- If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company.
- Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.

MATERIAL SAFETY DATA SHEET

CSBP

IDENTIFICATION

PRODUCT DESCRIPTION

Sulphuric Acid (98% Solution)

TRADING NAME	Sulphuric Acid
OTHER NAMES	• Oil of Vitriol • Dipping Acid
MANUF CODE	—

U.N. NUMBER	1830
DANGEROUS GOODS CLASS	8
SUBSIDIARY RISK	N/A
HAZCHEM CODE	2P
POISONS SCHEDULE	Sixth
NFPA CODE	3, 0, 2, W
STATEMENT OF HAZARDOUS NATURE	Hazardous

USE

- Fertilisers.
- Oil refining
- Water treatment (to lower pH).
- Chemicals manufacture.
- Pickling and anodising metals.
- Textiles.
- Explosives

PHYSICAL DESCRIPTION/PROPERTIES

Clear to brown, hygroscopic, oily, corrosive liquid. Reacts violently with water to generate heat. Miscible with water in all proportions.

Boiling point	—	330°C
Specific gravity	—	1.84 (approximately)

INGREDIENTS

CHEMICAL ENTITY	CAS NO.	PROPORTION
Sulphuric acid [H_2SO_4]	7664-93-9	98.0%
Water	—	Remainder

HEALTH HAZARD INFORMATION

HEALTH EFFECT

Harmful if swallowed. Extremely corrosive, irritating and toxic to tissue.

Ingested	:	Severe internal irritation due to corrosive effect.
Eye contact	:	Severe irritation and burns.
Skin contact	:	Severe irritation and burns.
Inhaled	:	Acute irritation of upper respiratory tract.

FIRST AID

Ingested	:	Wash out mouth with water and give water to drink. Do not induce vomiting.
Eye contact	:	Irrigate immediately with water for 15 min.
Skin contact	:	Wash with large amounts of water. Remove affected clothing and wash underlying skin.
Inhaled	:	Remove from exposure. Keep warm and at rest.

If any of the effects persists, seek further attention.

ADVICE TO DOCTOR

Treat symptomatically.

Continued on the back page

Sulphuric Acid (98% Solution) (Continued from the front page)

PRECAUTIONS FOR USE

EXPOSURE LIMITS

Exposure Standard—Time Weighted Average (TWA) = 1 mg/m³

Short Term Exposure Limit STEL= 3 mg/m³

VENTILATION

Use in open or well ventilated areas.

PERSONAL PROTECTION

Where there is a risk of spill or splash, wear chemical goggles, safety helmet and face shield, PVC gloves, rubber boots, ad PVC jacket and trousers. Where acid mists and vapours are present wear a P3 and E type filter and appropriate respirator.

FLAMMABILITY

Non-flammable.

SAFE HANDLING INFORMATION

STORAGE AND TRANSPORT

Store in mild steel containers that conform to AS 1692-1983 or API-650 standards.
Ensure that:

- storage area is cool, well ventilated and away from combustible materials, other class 8 corrosive substances, foodstuffs, organic materials, alkalis, oxidants and reductants,
- all pipe joints and fittings conform to AS CB 15.1-1987 and screw fittings are avoided wherever possible,
- storage and tanker receival installation meets the CSBP "Tanker Delivery Requirements" particular to this product,
- there are safety showers and eyewash facilities available in the storage area.

Transport as for class 8 (corrosive) substances. For detailed storage and transport information contact Mines Department of WA or Chemical Division of CSBP.

SPILLS AND DISPOSAL

Wear full protective clothing and canister respirator. Clear the spillage area and extinguish all ignition sources. Flood small spills with water. Dam large spills with soil and neutralise them with soda-ash. After treatment, transfer spills to an approved liquid waste land fill site.

FIRE/EXPLOSION HAZARD

In a fire it emits toxic fumes. Use self-contained breathing apparatus. When in contact with most metals, explosive hydrogen gas evolves.

OTHER INFORMATION

Sulphuric acid is also available in 70%, 51%, 34% 30% and 20% solutions from CSBP & Farmers Ltd.

CONTACT POINT

Chemicals Customer Service	— (09) 411 666
Emergency Advice	— 1800 09 3333
Fertilisers Customer Service	— (09) 377 9177
Wesfarmers CSBP Limited	— (09) 411 8777

Issue Date: November 1995

MATERIAL SAFETY DATA SHEET

CSBP

IDENTIFICATION

PRODUCT DESCRIPTION

Sodium Hydroxide (50% Solution)

U.N. NUMBER	1824
DANGEROUS GOODS CLASS	8
SUBSIDIARY RISK	N/A
HAZCHEM CODE	2R
TRADING NAME	Sodium Hydroxide Solution
POISONS SCHEDULE	Sixth
OTHER NAMES	• Caustic Soda • White Caustic • Lye Solution • Sodium Hydrate Solution
NFPA CODE	3, 0, 1
MANUF. CODE	—
STATEMENT OF HAZARDOUS NATURE	Hazardous

USE

- Soap manufacture.
- Cleansers.
- Chemical synthesis.

PHYSICAL DESCRIPTION/PROPERTIES

Colourless or grey syrupy liquid with a slight characteristic odour.

Boiling point	—	142 to 148°C
Freezing point	—	5°C
Specific gravity	—	1.53

INGREDIENTS

CHEMICAL ENTITY	CAS NO.	PROPORTION
Sodium hydroxide [NaOH]	1310-73-2	50.0%
Water	—	50.0%

HEALTH HAZARD INFORMATION

HEALTH EFFECT

Has a high toxicity if swallowed. Highly corrosive to all body tissues.

Ingested	:	Severe internal irritation due to corrosive effect.
Eye contact	:	Severe irritation and burns.
Skin contact	:	Severe irritation and slow healing burns.
Inhaled	:	Damaging to respiratory tract.

FIRST AID

Ingested	:	Wash out mouth with water and give water to drink. Do **not** induce vomiting.
Eye contact	:	Irrigate with water for 15 min and seek medical attention.
Skin contact	:	Wash skin with water. Remove affected clothing and wash underlying skin.
Inhaled	:	Remove from exposure. Keep warm and at rest.

If any of the effects persists, seek further attention.

ADVICE TO DOCTOR

Treat symptomatically.

Continued on the back page

Sodium Hydroxide (50% Solution) Continued from the front page

PRECAUTIONS FOR USE

EXPOSURE LIMITS

Exposure Standard—Peak Limitation = 2 mg/m^3

VENTILATION

Use in open or well ventilated areas. Maintain enough ventilation to ensure that no evidence of skin, eye, nose or throat irritation exists.

PERSONAL PROTECTION

When there is a risk of spill or splash, wear chemical goggles, safety helmet and face shield, PVC gloves, rubber boots, and PVC jacket and trousers. If risk of inhaling vapour exists, wear cartridge respirator as the minimum protection.

FLAMMABILITY

Non-flammable.

SAFE HANDLING INFORMATION

STORAGE AND TRANSPORT

If maximum storage pressure is 100 kPa (gauge), store in mild steel tanks that conform to AS 1692-1983 or API-650. For operations at atmospheric pressure, use glass-fibre-reinforced plastic storage tanks that conform to AS 2634-1983 or other approved standards. Ensure that:

- storage area is well ventilated and away from acids and oxidants.
- storage and tanker receival installation meets the CSBP "Tanker Delivery Requirements" particular to this product.
- there are safety showers and eyewash facilities available in the storage area.

SPILLS AND DISPOSAL

Wear full protective clothing and breathing apparatus. Minimise leak and/or contain spills. Absorb them for removal to an approved site for burial or incineration. Do not dilute spills with water because the reaction liberates large amounts of heat. (The reaction is highly exothermic.) Attempt to recycle surplus.

FIRE/EXPLOSION HAZARD

When in contact with some metals, sodium hydroxide generates explosive hydrogen gas.

OTHER INFORMATION

Sodium hydroxide is available in 50% and 30% solutions from Wesfarmers CSBP Limited..

CONTACT POINT

Chemicals Customer Service	— (09) 411 6666
Emergency Advice	— 1800 09 3333
Fertilisers Customer Service	— (09) 377 9177
Wesfarmers CSBP Limited	— (09) 411 6777

Issue Date: November 1995

COCKBURN CEMENT

COCKBURN CEMENT LIMITED
A.C.N. 008 673 470
LOT 242, RUSSELL ROAD EAST
MUNSTER
POST OFFICE BOX 38
HAMILTON HILL
WESTERN AUSTRALIA 6163
TELEPHONE: (09) 411 1000
FACSIMILE: (09) 411 1150

MATERIAL SAFETY DATA SHEET	QUICKLIME	Page 1 of 4 12 May 1995

Product Name:	Quicklime
Other Names	Calcium Oxide
Manufacturers Product Code	QL
U.N. Number	None
Dangerous Goods Class	None
Hazchem Code	None
Poisons Schedule	None
Major Recommended Use:	Quicklime is used to produce Hydrated Lime, used in alumina production, neutralising water and sewerage, and sugar refining. Quicklime is used as a feed stock and in gold production to keep cyanide solutions alkaline.
Major Recommended Methods of Application:	Mixed with water under controlled conditions to form calcium hydroxide for pH modification.

Physical Properties:

Appearance	White/grey powder.
Specific Gravity	3.2-3.4
Boiling Point	Not applicable
Vapour Pressure	" "
Flash Point	" "
Flammability Limits	" "
Solubility in Water	Sparingly soluble.
Other Properties:	Non combustible, not explosive, no odour. Reacts vigorously with water generating much heat and steam. Acid or acid fumes produce similar reaction.

Composition/Ingredients:	**Percentage by Weight:**
Calcium Oxide	80 - 90
Magnesium Oxide	5 - 6
Calcium Carbonate	1 - 3
Aluminium Oxide	0.4 - 1.0
Iron Oxide	0.2 - 0.5
Silicon Dioxide	4 - 10
CAS Number	1305-78-8

HEALTH HAZARD INFORMATION

Health Effects:

Swallowed	Very irritant. May cause nausea and abdominal pain.
Eyes	Very irritant. May result in burns to eye and eyelids. Permanent damage possible with prolonged exposure.
Skin	Very irritant. Rash, burns or dermatitis may occur.
Inhaled	Very irritant. May result in burns to nose, mouth and throat. Chest discomfort and bronchitis may occur.

First Aid:

Swallowed	Wash mouth with water. Drink plenty of water or milk. Do not induce vomiting. Seek medical attention.
Eyes	Urgently wash face and eyes with plenty of water. Wash out eyes with water for 10 minutes. Remove any accessible particles of lime (pain may prevent proper washing out of eyes, unless local anaesthetic used). Seek urgent medical help. Continue washing out with eye stream if irritation persists, until medical attention available.
Skin	Remove contaminated clothing. Wash off with water. Seek medical attention if rash or burns.
Inhaled	Leave exposure area, wash with water. If assisting a victim, wear an approved Class L particulate respirator. Avoid becoming a casualty. If victim not breathing, give artificial respiration. Seek urgent medical attention.
Advice to Doctor:	Contact a Poisons Information Centre.

PRECAUTIONS FOR USE

Exposure Limits: TLV: 2m g/m^3

Engineering Controls:

Ventilation — Suitable means of dust suppression/collection should be applied as necessary in the working environment to maintain acceptable levels of air-born dust.

Personal Protection: Personnel involved in working with Quicklime should wear approved aprons, gloves, boots and face shield and wear full cover clothing.

Approved dust masks, such as in AS1716 (Class L) should be worn.

The use of barrier creams for skin protection is also recommended.

It is advisable that persons working with Quicklime should shower and change their clothes, including underwear, after exposure.

Persons with a history of respiratory illness or reduced pulmonary function should avoid work places with high dust levels.

Flammability: Quicklime is not flammable, but on contact with water or acids may generate sufficient heat to ignite surrounding materials.

SAFE HANDLING INFORMATION

Storage and Transport:

Quicklime must be kept dry, away from moisture, steam, acid or acid fumes during transport or storage. Steel silos and air tight rail or road tankers are common forms of storage and transport.

Enclosed conveyors and dust collection and extraction equipment are required for safe handling.

Common storage and handling equipment must not be used for both Quicklime and materials containing water of crystallisation such as alum or copper sulphate, etc.

Spills and Disposal:

Spills should be cleaned up only by dry means such as brooms, shovels, vacuum equipment, etc by suitably protected personnel.

After clean up and relocation to a safe place, Quicklime should be slowly hydrated by flooding with water, and then neutralised with diluted hydrochloric acid to a pH of 7-9 before disposal into a drain with sufficient water, or preferably recycled.

Precautions for Clean up Crew:

Personnel involved in working with Quicklime should wear approved aprons, gloves, boots and face shield and wear full cover clothing.

Fire/Explosion Hazard:

Quicklime is not flammable, but on contact with water or acids may generate sufficient heat to ignite surrounding materials. ***DO NOT USE WATER*** for fire fighting as this could compound the situation. ***USE DRY CHEMICAL OR CO_2 TYPE EXTINGUISHERS.***

Other Information:

Reactivity Data

Note Quicklime is incompatible with (B_2O_3 + $CaCL_2$), BF_3, CIF_3, F_2, HF, P_2O_5, water.

Appendix 5

Government agencies' submissions and proponent's response

Western Australia
Health Department of Western Australia

RADIATION SAFETY ACT
RADIOLOGICAL COUNCIL
Address all correspondence to The Secretary

Your ref CS212/G
Our ref
Enquiries D E Hutchinson (09) 346 2260

The Chairman
Environmental Protection Authority
8th Floor Westralia Square
141 St George's Terrace
PERTH W A 6000

Attention: Ms Xuan Nguyen

Dear Sir/Madam

RHONE POULENC - RARE EARTH PROJECT AT PINJARRA

Thank you for the Environmental Review and Management Programme document which was circulated to Council members.

The following comments were compiled by Council officers at the Radiation Health Section and provided to Council members at the 100th meeting of the Radiological Council on 23 November 1995.

GENERAL COMMENT

The ERMP document itself is very well presented and very comprehensive in terms of what is required in an ERMP.

The question arises however, when reviewing a document such as this, as to whether comments should be confined solely to radioactive contamination of the *environment* or whether comments should be given on *all* radiological matters (such as radiation doses to both worker and public) that are apparent from the proposal.

As the name implies, the document is an *Environmental* Review and Management Programme. It thus deals with how the proposal affects the *environment.* The Radiological Council's main interest is the radiological impact of the project on *people.* This in turn comes down to assessment of likely radiation doses to people, now and in the future, as a result of the operation.

These comments, therefore, relate mainly to the potential for radiation exposure of people.

In many ways, radiological impacts are difficult to assess from simply the ERMP. The ERMP document itself tends to refer any radiological commitments to a future Radiation Management Plan. It is thus necessary to take in good faith the proponent's commitment

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to comply with regulations relating to radiation safety. This means that in some cases in the ERMP the *specific mechanism* of how radiation safety and dose minimisation will be achieved is not addressed and the proponent's commitment must be relied upon.

Any approval for the ERMP should thus be subject to the Radiation Management Plan being acceptable.

SPECIFIC COMMENTS

1. Transport:

The preferred option for minimum dose is "door to door" via rail. It is, however, appreciated that cost will be higher with this option, but transport by rail should not be ruled out if the rail line (and hence cost) could be shared by other companies/agencies to offset cost over 20 years.

Monazite

- 2.4.1.1 Transport of monazite in bulk in a purpose-built vehicle is the preferred option if it is the "least dose" option.

Gangue

- 2.4.2.1 - 2.4.2.3 Transport of gangue by rail (bulk, in purpose built containers) should not be ruled out for future consideration. Such an option may become viable if there are other materials from other companies which need to be transported to/from Mt Walton. The rail option gives minimum radiation dose to transporters.

- Page 6-8: If B-double transport is used (p3-19), the radiation dose rate in the cabin of a truck could be 5μSv/h (see Table 6.8). This may mean that the truck driver might have to be considered as a radiation worker. The ERMP does, however, mention the use of a shield to reduce driver-dose. In terms of the ALARA principle (and if future IAEA limits are lowered) the road train option (see fig 3.9) is likely to give the least unshielded dose.

- Page 6.42 to 6.43: Based on the 1 metre dose-rate quoted in Table 6.8, the category of a Bulka Bag should be Category III, not Category II.

- It is noted that GPS will be used in trucks during transport. Will it automatically plot truck position in a central location, or will the truck radio back its position every so often?

2. Site Considerations

- Page 6-37: It states that the RMP will go to DOME for approval. As it will be a site that needs to be registered with the Radiological Council, the Council will also need to approve the RMP. Other parts of the document

which mention "as approved by DOME" will also require Radiological Council approval. Also (7.3 - last para) post operational monitoring will have to satisfy the Radiological Council, particularly if the area is to be returned to public use.

- 3.18 (5th para): A dose assessment for the fork lift driver would be useful.

- Section 6.7.2: Although the possibility of radioactive build-up is acknowledged, (and dose minimisation to workers is discussed), it would be appropriate to address means of detecting build-up and how piping will be designed to minimise it.

- Section 7 (Decommissioning): Should include a plan to deal with and dispose of any radioactively contaminated material.

3. Miscellaneous

- Perhaps should say "storage" at Mt Walton rather than "disposal". This is because of the long half-life of thorium-232.

- Page 2-12. States: "The Health Department recognises....." It should be noted that the operator (and registrant) is the DEP, not the Health Department.

- Regulation 30 requires that the dose-rate be less than 25 μGyh^{-1} at the boundary of any storage areas and also requires compliance with public limits.

- Appendix F: page 56. Typos in second para. Should be ^{232}Th, not ^{232}Thu

Yours faithfully,

Mr D E Hutchinson
Secretary, Radiological Council
14 December 1995

rp8ermp.wp5

RHÔNE-POULENC

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February 16, 1996

The Chairman
Environmental Protection Authority
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Perth. W.A. 6000

Attn: Ms. Xuan Nguyen

Response to the Submission by the Health Department of Western Australia (Radiological Council) (ERMP - Proposed Rare Earth Plant, Pinjarra).

In response to the Radiological Council Submission on the Rhone-Poulenc rare earth project, the following information is provided. The headings correspond with those in the Council's submission.

General

Rhone-Poulenc intends to complete and comply with a Radiation Management Plan (RMP). (ERMP Committment 17). This RMP will be submitted for approval by DME and the Radiological Council prior to commencement of operations.

Transport

Para 1 The "door-to-door" rail option for the transport of the waste from the Pinjarra site to the IWDF site does not exist. However, Rhone-Poulenc would be prepared to re-examine the transport of gangue by rail should other users provide opportunities to make this option more practical in the future.

Para 2 Wherever possible monazite will be transported in bulk, from the mineral sands separation plants to the Pinjarra site, in purpose built vehicles.

Para 3 Rhone-Poulenc will not rule out rail for the transport of the gangue in the future. At such time the Company would also consider the form of packaging, i.e. bags versus bulk.

Para 3 The direct transport "door to door" by rail of the waste would reduce exposures for train crews. However, at present the only option of using rail is the road/rail/road option resulting in exposure to a greater number of transport workers due to the requirement for multiple handling and transfer operations.

The Company considers the "door to door" road option as preferable as exposure limits can be controlled by the use of shielding between the driver and the container. Further, with less personnel involved, monitoring of exposure levels will be simplified.

Para 4 The drivers of the vehicles transporting the gangue residue will be monitored for radiation exposure. After approximately one year of monitoring their doses will be assessed and reviewed to determine which is the more appropriate classification - designated worker or transport worker.

Para 5 Noted that the Bulka bags will be Category III. This will be confirmed at the operational stage.

Para 6 It is intended that the GPS will automatically plot the trucks position into the Company's central control room at Pinjarra. Voice communications will also be maintained between the vehicle and the control room.

Site Considerations

Para 1 Rhone-Poulenc notes that the RMP and the post-operational radiation management plan will require approval from DME and the Radiological Council as stated in Committment 17 of the ERMP. Committment 17 states " *A comprehensive Radiation Management Plan (RMP) will be prepared by the Proponent for the rare earth plant and its environment and submitted for approval from DME and the Radiological Council prior to commencement of operations."*

The pre-operational radiation management plan has already been approved by DME and the Radiological Council. Rhone-Poulenc assumes that all radiological issues associated with the project will be referred to the Radiological Council by other Government bodies.

Based on experience at the Companys rare earth plant at La Rochelle, the average dose rate for a fork lift driver is 11 u Sv/hr without a protection screen. By using a 4cm thick high density glass screen this dose can be halved. At Pinjarra a minimum of 2 operators will share the duties of handling the bulka bags of gangue residue. It is estimated their annual dose will be around 3.3mSv.

Para 3 Rhone-Poulenc's experience at its rare earth plant in La Rochelle will be drawn upon in the preparation of the RMP. The RMP will include a programme to monitor location prone to scale build-up such as slurry pipelines. As discussed in the ERMP (p6-48) the piping fluid velocities will be selected to minimise build-up. The piping will be designed for ready access to minimise descaling times and thus reduce the exposure times for personnel engaged in these operations.

Para 4 Section 7 (Decommissioning) of the ERMP states the objectives and strategy for decommissioning. Any parts of the plant which accumulate a radioactive scale will be isolated in the decommissioning of the plant. The level of activity will be assessed and they will be decontaminated to a level where they can be returned to further use or treated as normal scrap. If that level of decontamination cannot be achieved they will be packaged suitably and taken to the Mt. Walton site for disposal. Any scale removed from the parts will be packaged and taken to the IWDF site for disposal.

Miscellaneous

Para 1 Rhone-Poulenc prefers to use "disposal" rather than "storage" as there are no plans to retrieve the waste from the disposal facility.

Para 2 Point noted.

Para 3 Regulation 30 will be complied with.

Para 4 Typographical error noted.

Yours sincerely,

M.J. Webb
Operations Manager

SUBMIS7.WPS

Your Ref
Our Ref GH:CPM:
Enquiries to Mr G Hewson
Telephone 222 3129
Facsimile FAX: 222 3441

- 3 JAN 1993

DEPARTMENT OF
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PERTH WA 6000

Attention: Ms Xuan Nguyen

RARE EARTH PROJECT - PINJARRA, WA

The Environmental Review and Management Programme for the above proposal has been reviewed by the Department of Minerals and Energy.

1. General Comments

In reviewing the proposal the Department notes that this will be the third time it has submitted comments on the development of a rare earth processing plant at Pinjarra. Earlier advice was provided in May 1988 and November 1989. The Interim Mines Radiation Committee (the precursor to the Mines Radiation Safety Board) also provided comments in May 1988. On each occasion, the Department has contended that a rare earth processing plant, and associated facilities for the handling and disposal of waste products, can be designed, constructed and operated such that all statutory environmental, radiation and occupational health and safety legislation can be readily complied with. The Department has consistently held the view that suitable control technologies exist, including engineering, operational and administrative control measures, to ensure that this will be the case. It has also considered that the proponent, Rhone-Poulenc Chimie Australia Pty Ltd, has made suitable management commitments, including a commitment to the As Low As Reasonably Achievable (ALARA) principle, to assure that high standards of compliance will be met and maintained.

The Department further notes that the current proposal appears to represent a substantial improvement in environmental management over the previous proposals, in that ammonium nitrate is no longer produced and the need to dispose of potential chemical and radioactive contaminants at the Pinjarra site is eliminated. All radioactive wastes will be combined and transported to the Mt Walton facility.

Given the above comments, and the fact that radioactivity issues, including transport, waste disposal, plant emissions and in-plant exposure, were comprehensively canvassed in previous proposals, the Department considers the level of assessment assigned for this proposal higher than anticipated.

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Notwithstanding the above point, the principal environmental issues associated with this project are (in order of significance):

(1) transportation and handling of dangerous goods, such as acids and caustic;
(2) disposal of gangue residue at the IWDF site at Mt Walton;
(3) transportation and handling of low specific activity radioactive materials, such as monazite and thorium gangue residue; and
(4) potential radioactive emissions from the plant.

While it is noted that plant site safety has been listed as a community concern and that the ERMP guidelines required this issue to be addressed, this issue is specifically covered by the Mines Safety and Inspection Act 1994 and its Regulations.

In relation to environmental issue (1), the Explosives and Dangerous Goods Division has reviewed the proposal and has determined that the site is not classifiable as a "major hazards site". The Division also considers that the transport of dangerous goods (other than Class 7 - radioactive) to the plant is of a routine nature and accordingly does not envisage any transport issues which cannot be effectively managed by standard industry practice.

Regarding transport of radioactive substances, the Explosives and Dangerous Goods Division defers regulatory responsibility to the Radiological Council. However, the Division will retain responsibility for licensing requirements, but advises that such requirements will be minimal and consistent with those applied to the licensing of vehicles for monazite transport. The Division notes that the proponent proposes to use "B-Doubles" and this mode of transport places the container closer to the driver's cabin than would be the case with a prime-mover/semi-trailer. To compensate for the expected increased exposure, the proponent proposes to place a water tank between the cab and the container. This proposal is supported.

In relation to environmental issue (2), an Environmental Management Plan for the disposal of thorium gangue residue at Mt Walton has been prepared by the Waste Management Division of the Department of Environmental Protection and comments on the EMP will be provided under separate cover.

This response will mainly deal with environmental issues (3) and (4) but will include some comment on occupational radiation exposure issues and the management of dangerous goods.

In addressing these issues it is worthwhile briefly reviewing the regulatory framework which will control the rare earth project.

2. Regulatory Framework

The Pinjarra rare earth processing plant is a "mining operation" as defined in the Mine Safety and Inspection Act 1994 and therefore the proponent will be required to meet all occupational health and safety requirements, including provisions relating to radiation safety and radioactive waste management, outlined in the Act and accompanying Mine Safety and Inspection Regulations 1995. The Act and Regulations were brought into operation on 8 December 1995.

The radiation safety provisions of the Regulations are consistent with the latest international and national recommendations, via the International Commission on Radiological Protection (1991) and the National Health and Medical Research Council (1995), respectively. They are the most up-to-date regulations in Australia and their application should ensure a very high standard of radiation protection in mining operations.

The regulations will be enforced by the Department's inspectors, and, in terms of radiation safety, the Department has qualified and experienced scientists/inspectors with extensive knowledge of radiation protection in mining and mineral processing, including uranium mining and treatment, mineral sands processing and various downstream processing industries using mineral sands products. The Department's Occupational and Radiation Health Section has had a profound effect on considerably improving radiation control in the mineral sands industry since assuming responsibility for radiation safety in the mid-1980s. The industry is now recognised as a world leader in radiation protection and any new operation will be expected to conform with industry best practice.

The Department's Principal Scientific Officer has visited rare earth plants in France, USA and Malaysia, undertaken work for the United Nations in investigating radiological hazards in mineral sands operations in South East Asia, and is currently drafting a safety guide for the International Atomic Energy Agency on radiation protection from occupational sources of thorium. Thus, the Department has officers with substantial knowledge on radiation protection matters.

One of the principal requirements of the regulations is that the proponent must prepare a plan for the safe management of radiation. The radiation management plant must:

(a) consider measures that can be taken to control the exposure of employees and members of the public to radiation at or from the mine including the following -

- the use of appropriate equipment, facilities and operational procedures at the mine;
- monitoring programs (occupational and environmental);
- procedures for the assessment of dose;

- procedures for reporting incidents; and
- instruction and training programs;

(b) designate any controlled or supervised areas; and

(c) include a radioactive waste management system for the mine, details of which must include -

- restricted release zones;
- facilities and procedures involved in the handling, treatment, storage and disposal of radioactive waste; and
- an outline of the proposal for the eventual decommissioning and rehabilitation of the mine.

The plan must be prepared and be approved by the State Mining Engineer before the facility comes into operation. The proponent has committed to provide such a plan.

The regulations also require adherence to the ALARA principle and establish a clear hierarchy of control by requiring that the proponent ensure that the exposure of employees and members of the public to radiation is limited by:

(a) not exposing them to radiation so far as is practicable;

(b) isolating sources of radiation, so far as is practicable, through shielding, containment and remote handling techniques;

(c) providing engineering controls to reduce absorbed dose rates and contamination levels in workplaces;

(d) adopting safe work practices; and

(e) if other means of controlling exposure are not practicable of adequate, by providing personal protective equipment.

Again, the proponent has committed to incorporate these important principles into plant design.

In addition to the usual inspection provisions, the effectiveness of regulatory surveillance is subject to tripartite review via the Radiation Safety Sub-committee of the Mines Occupational Health and Safety Advisory Board and further overview is provided by the Radiological Council, operating under the Radiation Safety Act 1975.

Thus, the rare earth plant will be subject to a comprehensive regime of regulatory surveillance and Departmental inspectors are very knowledgeable on radiological hazards associated with mineral processing operations.

3. Handling and Transport of Low Specific Activity Materials

Transportation procedures and safeguards for shipment of low specific activity radioactive ores and concentrates of thorium and uranium are well established in Australia, and within Western Australia in particular. Prior to the cessation of monazite export in mid 1994, about 10,000 to 15,000 tonnes of monazite per year were being transported around the South West of the State over the previous 10 years. To the Department's knowledge, no major accident with any significant environmental impact has occurred. The mineral sands industry is well versed in procedures for the loading and transport of monazite and no significant environmental or occupational health impacts are envisaged if monazite transport were to resume.

The operation of the rare earth plant will result in additional shipment of radioactive material in Western Australia, namely the transport of thorium gangue residue from Pinjarra to the IWDF site at Mt Walton. The gangue residue will be approximately twice as radioactive as monazite, but will still be classified in the same category as monazite, namely, Low Specific Activity - Type I. In other words, procedures and safeguards for the transport of gangue residue may be similar to those used for monazite.

The proponent has committed to comply with the Radiation Safety (Transport) Regulations 1991 which adopts the Commonwealth Code of Practice for the Safe Transport of Radioactive Substances 1990 and which in turn is consistent with international guidelines. Adherence to these regulations will ensure minimum risk to public health and the environment.

Based on the estimated dose rate rates from a bulka bag and container of gangue residue, and a risk coefficient of 7% per sievert of effective radiation dose, the average annual risk to the public from incidental exposure arising from shipments of residue and associated activities such as storage and transfers, is likely to be much less than 1 in a million; a level of risk usually considered acceptable.

In relation to occupational exposure, the proponent's commitment to establish an operational dose constrain of 2 mSv/y is supported.

The coverage of transport issues in the ERMP is comprehensive and the proponent should be congratulated for providing such a detailed account and for committing to a number of "best practice" initiatives.

4. Plant Emissions

4.1 Radioactive emissions

The proponent correctly states (p6-33) that the operation of the rare earth plant will not have significant impact on the radiation exposure of the general public.

The proponent has identified four potential sources of exposure (gamma radiation, radon and thoron emission, release of radioactive dust, and release of radionuclides into water) and provides simple exposure pathway models to demonstrate the lack of impact. The Department has checked the models and assumptions used by the proponent and has confirmed the veracity of the estimated impacts.

It may be concluded from the worst case analyses presented in the ERMP that radioactive emissions from the rare earth plant will be significantly less than natural emissions from the ground in the vicinity of the plant and site boundaries. This conclusion would appear to be supported by the complete absence of papers in the scientific literature indicating environmental radioactivity problems associated with the operation of rare earth processing plant.

In relation to releases of radioactive dust, the proponent states that there will be little or no generation of radioactive dust at the plant. However, there will be potential for dust emissions during the unloading of the monazite feedstock and transfer to the process storage bin. On page 3-5 of the ERMP the proponent states that all dust generated at this stage will be collected efficiently through a venting/filtering system. While this system is likely to be of low capacity because of the relatively small volumes of dust to be captured it is assumed that the system will not be 100% efficient and therefore there will be some potential for release of fine monazite dust into the atmosphere.

The Department has established a maximum site discharge limit of 150 grams of thorium per day for the mineral sands industry, based on Gaussian plume dispersion modelling. Using conservative assumptions the model indicates that a member of the public residing 500 metres permanently downwind of such a discharge will receive less than the radiation dose limit for the public of 1 mSv/y.

During operation the rare earth plant will be required to comply with this discharge limit and should have no difficulty in doing so.

To confirm that radioactive emissions are indeed negligible, the proponent has committed to undertake a comprehensive pre-operational (or baseline) monitoring survey and regular operational monitoring for relevant environmental radioactivity parameters. The Department has already received and approved (via the State Mining Engineer) the pre-operational monitoring programme and understands that measurements will commence shortly.

Future public exposure to radiation may also arise if the site is not properly decontaminated following cessation of operation or if there is indiscriminate disposal or removal of contaminated equipment such as process and other machinery. The proponent has committed to undertake decommissioning in accordance with statutory requirements and in a manner acceptable to the Minister for Environment. This commitment is appropriate. However, it would be appropriate to further state that another objective of decommissioning and rehabilitation is to restore radiological conditions at the site to those existing prior to commencement of operations (i.e. as characterised by the baseline survey).

Brazilian studies show that site contamination can be a significant problem if adequate control measures and monitoring are not in place. The contamination usually occurs as a result of spillages of thorium/uranium/radium bearing material onto soil or because of inappropriate disposal practices. This underlines the importance of having good operational procedures in place in the event of spillages and of undertaking regular environmental surveys. At a Brazilian site where such measures are in place (a radium waste storage site) no radiological impact upon the site has been detected.

It would also be appropriate to establish procedures to ensure that contaminated equipment (for example, old pipework, filters and vessels) can not leave the site during the operational phase of the plant. If it is found necessary to decontaminate equipment prior to removal, then there will need to be an assessment of the handling and disposal of radioactive residues removed during the cleaning process.

4.2 Chemical emissions

A final comment on plant emissions relates to the potential for process chemical emissions. Such emissions would be of far greater environmental significance than radioactive emissions (despite community perceptions about radiological hazards). The plant will use caustic in the monazite cracking stage and will use substantial quantities of nitric acid, as well as smaller amounts of sulphuric and hydrochloric acids. The reaction vessels are presumably under temperature and pressure and thus there is the potential for the generation of alkali and/or acid mists and vapours. There is no description in the ERMP of the management of such emissions. This could be because there is no or very little potential for such emissions to occur or that the process is in closed circuits. However, if there is a need for venting of vessels used for chemical treatment, then a description of the appliances (e.g. scrubbers) used to remove fumes, mists or vapours should be provided, together with an assessment of likely environmental impacts, Similarly an assessment of the impact of emergency venting, if relevant, should also be provided.

The proponent should be requested to provide additional information to demonstrate that appropriate consideration has been given to the environmental management of process chemical emissions.

5. In Plant Explosives

The ERMP includes considerable coverage of plant radiation protection and management, and while this is not an environmental issue per se, the Department acknowledges community concerns about occupational health and safety issues. For this reason it is appropriate that the Department provide some comments on in-plant exposures.

The Proponent has committed to comply with all relevant radiation protection legislation and has committed to provide the Department with details on final plant design. The proponent has also listed strategies for dose reduction which mirror those suggested in a Departmental report (1). The adoption of the strategies should ensure that the radiation objectives for design and management of the plant (listed in Table 6.6) are achieved.

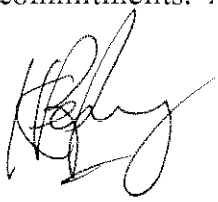
In considering in-plant exposures it is difficult to determine the relevance or feasibility of design criteria on the basis of operational experience as there is relatively little quantitative information on occupational radiation exposure. This is despite the fact that the production of rare earths from monazite has occurred for over 30 years and that plants have been operating in Brazil, Ceylon, China, France, India, Malaysia, Japan and USA. A recent review of available exposure information has been published (2) and previously provided to the Department of Environmental Protection. This review indicates that exposure to external (gamma) radiation and radioactive dust may be substantial, and possibly in excess of limits, in old plants, but that new plants should be able to achieve exposures below 20 mSv/y provided careful attention is paid to intrinsic radiation protection at the design stage.

Notwithstanding the fact that estimated elevated doses occur in old plants and that many thousands of workers have been involved in rare earth processing over the last 30 years, a review of the literature has not revealed any reports of negative health effects among these workers. This could be due to the fact that relatively few workers are exposed to high doses of external radiation and that the estimated doses arising from internal radiation are significantly overstated. Indeed, the International Commission on Radiological Protection has just recently relaxed the "intake-to-dose" conversion factors for uranium and thorium bearing dusts by factors of between 3 and 10 (3). This will have significant consequences for industries involved in production and processing of monazite, and associated waste disposal activities, as the radiation risk from exposure to airborne dusts (usually the critical pathway) is much lower than previously assumed.

Considering the above comments, the Department believes that the proponent's radiation objectives can be successfully met and expects that the internal radiation exposure pathway will be less significant than assumed by the proponent because of recent refinements to protocols for assessing radiation dose following intake.

6. Summary

The proponent has prepared a very good ERMP which provides an excellent description of likely significant environmental issues and measures to be adopted to ensure sound and supportable environmental management. Many of the initiatives in radiation protection management proposed by the proponent are "best practice" and the proponent has also proposed a comprehensive list of management commitments. All of these commitments are supported.



K R Perry
DIRECTOR GENERAL

2 January 1996

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RHÔNE-POULENC

RHÔNE-POULENC CHIMIE AUSTRALIA PTY LTD ACN: 009 237 718
RARE EARTHS AND GALLIUM PROJECT
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TEL: (09) 531 7200 FAX: (09) 531 2270

February 16, 1996

The Chairman
Environmental Protection Authority
Westralia Square
141 St. George's Terrace
Perth. W.A. 6000

Attn: Ms. Xuan Nguyen

Response to the Submission by Department of Minerals and Energy (ERMP - Proposed Rare Earth Plant, Pinjarra).

1. GENERAL COMMENTS

The Department of Minerals and Energy (DME) considers that Rhone-Poulenc Chimie Australia has made suitable management committments to assure that a high standard of compliance will be met and maintained (page 1 paragraph 1). These commitments are listed in the ERMP (Section 8.0).

The Explosive and Dangerous Goods Division has reviewed the proposal and has determined that the site is not classifiable as a "major hazards site". The Division also considers that the transport of dangerous goods (other than Class 7 - radioactive) to the plant is of a routine nature and does not envisage any transport issues which cannot be effectively managed by standard industry practice (page 2 paragraph 4).

Rhone-Poulenc proposes to use B-double trucks to transport the waste, as B-doubles are considered the safest vehicles for transporting material as they provide more rigidity and safer control than a two trailer road train. Rhone-Poulenc acknowledges that the container will be closer to the driver than would be the case with a prime mover/semi-trailer, therefore the Company will plan for a water tank to be placed on the vehicles between the cab and the container. It is estimated that a shield of about 350mm containing water would reduce radiation levels by at least a factor of four (page 2 paragraph 5).

2. REGULATORY FRAMEWORK

Rhone-Poulenc will not only meet the regulations specified in the submission (page 3 paragraph 1) but has committed (Commitment 1 in the ERMP) to *"During all phases of the project, the Proponent will comply with all applicable standards and regulations, pertaining to and appropriate for a chemical and mineral processing plant and for waste disposal".*

Rhone-Poulenc has also committed to meet any future changes to standards throughout the project (Commitment 32 in the ERMP).

Rhone-Poulenc has set radiation design objectives for occupational exposure limits of half those recommended by the ICRP. Therefore, Rhone-Poulenc operations will ensure an even higher standard of radiation protection for their employees (page 3 paragraph 2).

In addition to drawing upon experience from the DME and the Western Australian Mineral Sands Industry for radiation protection, which the DME state is recognised as a world leader in radiation protection, Rhone-Poulenc has over 50 years experience in handling monazite at its Rare Earth Plant in France and the USA.

Together, this experience will ensure that the operations conform with industry best practice (page 3 paragraph 3).

A comprehensive Radiation Management Plan will be prepared (Commitment 17) and will include those items listed in the submission (page 3-4 [a, b and c].

Rhone-Poulenc will incorporate the principles identified in the submission (page 4 a-e) into the plant design to ensure adherence to the ALARA principles.

3. HANDLING AND TRANSPORT OF LOW SPECIFIC ACTIVITY MATERIALS

Rhone-Poulenc has conducted a thorough evaluation of issues associated with the transport of the gangue residue and in doing so have determined procedures which DME has identified as "best practice" initiatives.

4. PLANT EMISSION

4.1 Radioactive Emissions

Based on current technology and commercially available dust collection equipment, it is estimated that the monazite dust emissions from the plant will be less than 4g/day, which is equivalent to 0.24g of thoron per day. This is well below the maximum site discharge limit of 150g of thorium per day established by DME (page 6 paragraph 4).

The pre-operational monitoring programme (page 6 paragraph 7) approved by DME and the Radiological Council commenced in December 1995 and will continue for approximately 18 months.

An objective for the plant decommissioning and site rehabilitation plan will be to restore the radiological conditions at the site to those existing prior to commencement of operations as characterised by the pre-operational baseline survey (page 7 paragraph 1).

The Radiation Management Plan, prepared for the plant site, will include procedures for the identification, removal, collection and disposal of any parts of the plant which accumulate a radioactive scale. If these parts are taken out of service during the operational phase, they will be stored on-site until decommissioning. Upon decommissioning, any parts which may contain radioactive contaminants will have their level of activity assessed and, if necessary, decontaminated to a level where they can be returned to further use or treated as normal scrap. If that level of decontamination cannot be achieved they will be suitably packaged and disposed at a suitable site such as the IWDF at Mt. Walton (page 7 paragraph 3).

4.2 Chemical Emissions

Chemical emissions from the plant will be collected and vented through appropriately designed facilities to protect both plant and personnel and the environment. This equipment will include:-

- dust collectors for monazite transfer and storage systems

- Blowdown tanks for reactors. Blowdown tanks will vent through water cooled heat exchangers to condense steam and water vapours.

Details of such facilities will be provided once the detailed plant design has been finalised (page 7 paragraph 4).

5. IN-PLANT EXPOSURES

As mentioned above, under Regulatory Framework, Rhone-Poulenc will use its experience and that available in DME and the Western Australian Minerals Sands Industry to achieve industry best practices for radiation protection for processing, transport and waste disposal operations for the proposed project.

Yours faithfully,

M.J. Webb
Operations Manager

EPASUBM.WPS

YOUR REF 194/94
OUR REF B 17226
ENQUIRIES Mr.P.N. Ryan
DIRECT TEL 420 2431
420 3176 -fax

Water
AUTHORITY

Water Authority of
Western Australia
629 Newcastle Street
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PO Box 100
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Tel (09) 420 2420
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The Chairman, Environmental Protection Authority
8th Floor Westralia Square
141 St Georges Terrace
Perth WA 6000

Attn: Ms X. Nguyen

Rhone Poulenc Chimie Australia- Rare Earth Project, Lot 150 Napier Rd Pinjarra, ERMP September 1995.

Thank you for your letter of October 10 seeking our comments on the above project. The document has been reviewed & is considered to provide for generally acceptable levels of protection to terrestrial water resources.
The following issues were noted for response by the proponent:

a) The Water Authority notes that the evaporation ponds proposed to hold significant concentrations of salts have an engineered double clay lining & interstitial water recovery system which should limit seepage losses from the ponds. Has the proponent modelled potential seepage losses through the base liner & evaluated the impact (rise in salinity of the underlying aquifer immediately west of project operations) to confirm that no significant risk is posed to the tree plantation on Lot 150?

b) How does the proponent intend to protect the primary clay liner in Pond B1 from damage during the recovery of tri-calcium phosphate?

c) There is a dominant focus on the monazite & gangue transport (routine & emergency) management procedures in the ERMP due to concerns related to radionuclide escape. I believe that the risk posed by the transport of bulk acids (20 -40t loads) should not be underplayed. Effective procedures considered for their management & recovery (even though neutralised) should an accident occur between Kwinana & Pinjarra.

092739

Transport routes selected for bulk acids should avoid public drinking water source areas (such as Forrest Rd in the Jandakot UWPCA) & wetlands recommended for the preservation of aquatic biota.

Please contact this office if you require clarification.

Yours faithfully

K.J. Taylor
Manager, Water Quality
Protection Branch
December 14, 1995

cc. Regional Water Resources Manager
WAWA, Bunbury

Please note: The present Water Authority of W.A. is expected to cease operations from Dec. 31 1995. The Authority will be replaced by 3 new agencies providing water related services. Most of the functions now conducted by the Authority's Water Resources Directorate, the Waterways Commission & the Mines Dept's Geological Survey will be then undertaken by a newly established **Water & Rivers Commission**. During the period to the end of December 1995, most of the structures & operational arrangements will be put into place to allow the new **Commission** to be fully functional by Jan. 1 1996. **The Water Resources Division of the Water Authority will operate from the Hyatt Centre, 3 Plain St , East Perth, from Monday December 18 , 1995. Contact may be made by phone: 278 0300 or fax : 278 0301.**

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February 16, 1996

The Chairman
Environmental Protection Authority
Westralia Square
141 St. George's Terrace
Perth. W.A. 6000

Attn: Ms. Xuan Nguyen

Response to the Submission by the Water Authority (ERMP - Proposed Rare Earth Plant, Pinjarra).

In reply to the above referenced submission, we make the following comments:

a) Rhone-Poulenc, through its consultant, carried out modelling studies for the evaporation ponds at the time of its earlier proposal in 1988. These studies modelled the migration of radium -226 and ammonium nitrate. Neither of these materials will now be stored in the ponds. The modelling results showed that radioactive materials would not migrate any significant distance from the ponds provided that a clay liner was constructed in the ponds.

The results also showed that due to the ammonium nitrate not being significantly attenuated by the subsurface materials there was the potential for migration of the nitrate away from the site. Rhone-Poulenc decided to design and construct the ponds with a clay liner and an interstitial drainage layer to minimise any potential leachate from the ponds reaching the groundwater.

Modelling for the sodium salts is likely to produce similar results as that for ammonium nitrate therefore the underdrainage collection system will intercept any seeping sodium salts and return them to storage. Unlike the nitrate, these salts are not nutrients and do not have the potential to contribute to the eutrophication of the Peel-Harvey Estuarine system.

The monitoring and sampling programme has demonstrated that the performance of the ponds and the drainage and recovery system over the last 7 - 8 years has been satisfactory. There have been no significant changes in the chemistry of the groundwater under the site identified due to the presence or operation of the evaporation ponds.

Rhone-Poulenc believes that with the present pond design, there is no risk to the nearby hardwood plantations on Alcoa's and Rhone-Poulenc's properties. However, the Company will carry out further modelling based on no recovery from the under-drain system.

b) The fertilizer company has requested that the TCP be delivered to the fertiliser plant in a dry form therefore Rhone-Poulenc now proposes to dry the T.C.P. prior to sale obviating the need for temporary storage in the ponds.

Nevertheless, if at any time it is necessary to recover solids from the pond, it is proposed that this would be done by "dredging" with a slurry pump and keeping the suction inlet of the pump at sufficient height above the seal so as to not damage it.

c) Road transport of bulk acids, lime and other dangerous goods is common practice in Western Australia. These materials will be transported in purpose-built trucks of 20-40 tonne capacity. Rhone-Poulenc will source these materials from reputable companies with safe transporing practices. The movement of these materials to Pinjarra will utilise the same roads as those currently used for such chemicals.

Transport handling methods for the acids will conform to the requirements of the Dangerous Goods Regulations, 1992, minimising the risks of accidental spillage during transport. Suppliers of these goods have a 24-hour emergency service with an emergency response plan based on the procedures in the Western Australian Hazardous Materials Emergency Management Scheme (WAHMEMS) (Section 6.2.2.3 of the ERMP). Drivers contracted to these companies are specifically trained in accordance with the Australian Code for Transport of Dangerous Goods by Road and Rail (ADG Code) (Section 6.2.2.3 of the ERMP).

There is a good safety record for all these materials being transported on metropolitan and country roads in large quantities. The relative increase in the number of truck movements of these materials due to the project will be small.

Fig. 6.1 of the ERMP shows the water resource areas (including the Jandakot UWPCA) and the proposed transport routes.

Rhone-Poulenc agrees with the Water Authority that the preferred option is to avoid Forrest Road in the Jandakot UWPCA region, both for environmental and road quality reasons. Wetlands are present all over the State and there is unlikely to be any route transporting materials between regions that does not pass either over or nearby to wetlands.

The Explosives and Dangerous Goods Division of the Department of Minerals and Energy has reviewed the E.R.M.P. It notes that the *"transport of dangerous goods ..... to the plant does not envisage any transport issues which cannot be effectively manage by standard industry practice".*

Yours sincerely,

M.J. Webb
Operations Manager

SUBMIS3.WPS

W A T E R W A Y S
C O M M I S S I O N

PEEL INLET
MANAGEMENT
AUTHORITY

PROTECTING OUR WATERWAYS

Our Ref: MU112/95
Your Ref:
Enquiries: Dr Thomas Rose

29 DEC 1995

Chairman
Environmental Protection Authority
Westralia Square
141 St George's Terrace
PERTH WA 6000

FAXED
27/12/95

Attention: Ms Xuan Nguyen

Dear Sir/Madam

ERMP Rhône Poulenc - Rare Earth Project in Pinjarra

Reference is made to the above ERMP which was received by the Peel Inlet Management Authority in October, 1995. The Authority at its meeting on 15 December, 1995 resolved to advise as follows:

> **That the Authority advise the Department of Environmental Protection that it cannot recommend approval until the issues provided in the attached table are addressed and resolved to ensure that there are no risks to the waterways and groundwater resources of the Peel-Harvey Estuarine System.**

Should you have any queries regarding the above, please contact Jason Byrne on 535 3760, quoting the file reference number.

Yours faithfully

OH TUCKEY
Chairman

21 December, 1995

093044

cc. Dr. Bruce Hamilton - Water and Rivers Commission

8/21 Sholl Street, (P.O. Box 332), Mandurah Western Australia, 6210. Telephone: (09) 535 3411. Facsimile: (09) 581 4560

Table of Issues ERMP Rhône-Poulenc - Dames and Moore December, 1995

Issue	Proponents comments	Authority comments
1. Surface water run-off. **(Pond Design Section 3.5.1.1 pp 3-14)**	Extensive pond design to allow for flooding and stormwater run-off. Rhône-Poulenc have indicated that water in ponds will be a soup of mainly tricalcium phosphate, which is a salt mixture and is non-toxic.	***Contingency plans to cover surface water breaching of ponds during both wet and dry conditions need to be provided and approved by relevant agencies.***
2. Groundwater contamination and monitoring. **(Groundwater Monitoring Section 6.3.2.3)**	Rhône-Poulenc have constructed a three part system with clay lining, underground drains and polyethylene lining to capture and contain evaporation pond liquid. Rhône-Poulenc to monitor groundwater.	The system appears robust and good. ***Authority believes the proponent should provide an independent consultant to monitor and report on groundwater data. Clarification needed on destination and fate of water used for plant wash down. An acceptable management plan detailing treatment of waste water is required.***
3. Overall impacts on drains and rivers. **(Hydrology Section 5.2.5 pp5.2)**	Rhône-Poulenc believe no impacts will occur.	This issue is related to risk assessment for accidents and then, what severity will accidents have on waterways. This is not a major issue if ponds and surface water controls are effective and they look to be so. Either salt, rare earth nitrates or radioactive gangue-like residue can contaminate waterways. Chances are minimal and nature of accidental spillage material and its impact appears to be slight.
4. Radioactivity **(Radiological Issues, Occupational and Transport and Storage; Section 6.4 pp6-25).**	1. Rhône-Poulenc have committed themselves to maintaining dose levels for personnel to be half of world standards. 2. However, the gangue to be transported in 2 tonne Bulka bags is radioactive but not alarmingly so and is relatively resistant to dispersal if accidents expose the damp residue.	***Contingency plans clearly stating susceptibility of gangue residue to water solubility or desiccation and winds needs to be provided.***
5. Transportation of Gangue residue **(Section 3.5.2.2 pp3-18)**	Rhône-Poulenc prefer to use bulk trucks to transport gangue radioactive waste to Mt Walton for burial. Two routes are provided on maps.	***Maps showing transport routes need to provide location of all waterways and population numbers of towns located on route.***

Issue	Proponents comments	Authority comments
6. Transportation Raw materials (Section 6.2.2.1 pp6-3)	Monazite, tricalcium phosphate and other raw material will be transported in from both southwestern and northern access routes. Approx. 22 trucks per week will enter plant and proponent claims the potential for accidental spillage is low.	***Insist on thorough contingency plans for spillage while transporting material in. They must be reviewed and accepted by all relevant and responsible agencies with all parties trained in their implementation and use. Proponent must make commitment to train all emergency staff from relevant agencies.***
7. Remanent vegetation. (Vegetation and flora, Section 6.8 pp6-49)	Rhône-Poulenc have already cleared much of the vegetation in late 1980s for the Gallium plant and the area where the rare earth plant will be situated is cleared. Land was also cleared when used for farming.	A non-issue. Considerable vegetation exists as buffer from roads and edge of property. ***The Authority encourages the planting of more native vegetation as a buffer around property.***
8. Construction impacts and associated dust. (Construction Section 6.2.1 pp6.2)	Rhône-Poulenc have made commitments to minimise these issues and will use water to suppress any problems if they arise.	Non-issue. Proponent has made a commitment to minimise dust during construction.
9. Remediation and clean up after plant closure. (Decommissioning Section 7.1 pp7-1)	Rhône-Poulenc have made a commitment to totally clean up the area and will remove all radioactive material and re-contour pond areas.	***The Authority considers it appropriate to have Rhône-Poulenc provide a bond to cover clean up costs when decommissioning and closing plant.***
10. Contingency plans. (part Contingency Planning Section 6.7.3 pp6-48)	Rhône-Poulenc say they are preparing them or will have them prepared for all contingencies.	***The Authority needs to be assured they are in place and of a high standard. It should particularly insist on the preparation of plans which are related to waterways and relevant to foreshore land associated with waterways. They must be familiar to all parties who need extensive training for implementation. Rhône-Poulenc need to make a commitment to train all emergency staff from all relevant agencies.***
11. Infrastructure (sewage, water, power).	The proponent has permission to extract extra water for processing from WAWA. Water already provided by ALCOA for Gallium plant. Propose to use septics for staff and plant.	***PIMA insists proponent connect to deep sewerage or ATUs. The base of the ATUs needs to maintain a minimum distance from the highest level of groundwater of 2 metres and that a minimum of 100 m be maintained from the nearest waterbody.***
12. Risk assessment.	The ERMP indicates that there is a very small and most acceptable risk associated with the rare earth processing plant.	***Commitments to extremely safe work practices, partitioning plant into discrete units which isolate radioactive processing and a full range of contingency plans will reduce these risks even further. Safe and secure transportation and well trained staff will further minimise accidents and improve contingency response times (Best Management Practices).***

WATER AND RIVERS
COMMISSION

YOUR REF MU112/95
OUR REF Dr Thomas H. Rose
ENQUIRIES
DIRECT TEL

Department of Environmental Protection
Westralia Square
141 St George's Terrace
PERTH WA 6000

Attention: Xuan Nguyen

Dear Xuan

Need for Extra Water Quality Monitoring Surrounding Rhone Poulenc's Rare Earth Facility - Pinjarra

Further to our recent conversation on the need for certain environmental conditions related to the above development, I wanted to provide both the Authority's and my view on the need for further water quality monitoring by Rhone Poulenc.

The Authority felt that water quality monitoring for radioactive substances, nutrient and salinity parameters in the drains and streams which leave Rhone Poulenc's property and potentially flow into surrounding streams would be prudent and necessary. These water courses are the two drains which flow into a drain which runs parallel to the Hotham Valley Railway, the more northerly Oakley drain which is downstream of Alcoa, and the southern located Marrinup Creek.

Monitoring these water courses before the rare earth operations begin and for a time after operations have been initiated, would give authorities an indication of background water quality and radioactivity. It would also let us monitor and detect any unanticipated adverse water quality and radioactivity in these water courses which surround the rare earth operation. In other words, any potential leaks or poor water quality associated with the operations could be identified.

It would be advisable to conduct this sampling either on a wet and dry basis or seasonally. Either way the sampling regime needs to be comprehensive enough to defend environmental approval and to detect any potential adverse public health concerns (ie needs to be conducted on a seasonal basis for at least 3-5 years).

Thank you for your time and consideration of these points. Please do not hesitate to contact me should you have any further questions on 535 3411.

Yours sincerely

Thomas H. Rose

DR THOMAS H. ROSE
Branch Manager
27 February 1996

PEEL INLET MANAGEMENT AUTHORITY
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February 16, 1996

The Chairman
Environmental Protection Authority
Westralia Square
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Perth. W.A. 6000

Attn: Ms. Xuan Nguyen

Response to the Submission by Waterways Commission and Peel Inlet Management Authority (ERMP - Proposed Rare Earth Plant, Pinjarra).

In response to the submission by the Peel Inlet Management Authority on our rare earth project ERMP, the following information is provided. The numbering of the issues corresponds to those used by PIMA in its table.

ISSUE 1

It is not possible for surface waters to breach the evaporation pond walls due to the geophysical nature of the pond site. Pond elevations are well above flood levels and there are no streams or rivers nearby that could cause local flooding in the vicinity of the ponds.

The subject of contingency planning for the evaporation ponds is discussed in Appendix J of the ERMP including overtopping of the ponds due to flooding. It concludes that breaching of the pond walls is most unlikely and even if this scenario were to occur, the event would be manageable.

ISSUE 2

(a) Rhone-Poulenc does not consider that the groundwater system needs to be monitored by another independent consultant Rhone-Poulenc monitors the system and forwards the results to Rhone-Poulenc's consultants for analysis. The results are then submitted to the DEP for evaluation.

The current environmental licence for the Gallium plant requires Rhone-Poulenc to regularly monitor the 33 observation bores, the evaporation ponds and sumps and to report the results to DEP.

(b) All wash down waters will be recycled back into the processing plant. This effectively re-treats these washings, resulting in the separation of any chemicals or residues in the wash water. The annual water balance is shown on Figure 3.4 of the ERMP.

The water effluent from the plant is neutralised in a separate neutralising facility prior to disposal to the evaporation ponds. It should be noted that this effluent will contain no significant radioactive materials. It will contain mostly sodium chloride (common salt), sodium sulphate, calcium sulphate (gypsum) and possibly some tri-calcium phosphate (TCP). The TCP is highly insoluble. Note that Rhone-Poulenc now intends to dry the tri-calcium phosphate prior to sale as the fertilizer industry has requested that it arrive in dry form. TCP will be stored in the ponds only for contingency reasons, such as when the dryer is out of service or the fertiliser plant is not able to accept it. The TCP will later be recovered from the ponds and transported to the fertiliser plant. With the large demand for superphosphate in Western Australia, it is not expected that there will be any difficulty in marketing the TCP.

ISSUE 3

Rhone-Poulenc agree with the submission that contamination of waterways is unlikely.

ISSUE 4

The emergency response and clean up procedures for a spill of gangue residue are presented in section 6.2.2.3 of the ERMP. In this section of the ERMP Rhone-Poulenc has also assessed the impact of a worse case scenario of a spill of the gangue residue (p6-14 to p6-16 of the ERMP). Tests were conducted on the potential for dispersal due to drying and solubility. The results of these tests showed that the gangue residue dried to a hard cake like material with little potential for creating dust. The solubility tests showed that the possible discharge levels in the environment under the Radiation Safety (General) Regulations, 1983, would not be exceeded.

ISSUE 5

Figure 6.1 of the ERMP indicates the location of the water resource areas and rivers together with the proposed transport routes for the chemicals, waste and product.

The Proponent considers that this figure should provide adequate information to supplement paragraph 3.5.2.2. of the ERMP.

Figure 2.2 of the ERMP indicates the preferred transport route for the gangue residue. Most of the major towns are shown on this figure. Rhone-Poulenc do not see the value of adding population numbers to those towns along the transport route as these figures are readily available to Government departments and the public.

ISSUE 6

The road transport of chemicals such as sulphuric acid, lime, hydrochloric acid etc., is already practiced in Western Australia. Rhone-Poulenc has been advised that emergency response plans are already in place for these materials. Hence, providing the Company utilises accredited transport contractors, it will not be necessary to train emergency response staff specifically for the transport requirements for the rare earth project.

Transport handling methods for acids will conform to the requirements of the Dangerous Goods Regulations, 1992, minimising the risks of accidental spillage during transport. Suppliers of these goods have a 24-hour emergency service with an emergency response plan based on the Western Australian Hazardous Materials Emergency Management Scheme (WAHMEMS) (Section 6.2.2.3 of the ERMP). Drivers contracted to these companies are specifically trained in accordance with the Australian Code for Transport of Dangerous Goods by Road and Rail (ADG Code) (Federal Office of Road Safety, 1992a) (Section 6.2.2.3 of the ERMP).

The Explosives and Dangerous Goods Division of the Department of Minerals and Energy has reviewed the E.R.M.P. It notes that the *"transport of dangerous goods ..... to the plant does not envisage any transport issues which cannot be effectively managed by standard industry practice"*.

For the transport of monazite it will be necessary to review the procedures that are currently in place for the transport of monazite concentrates. If necessary the procedures will be updated and additional training provided.

Tri-calcium phosphate is not classified as a dangerous good. However, the Company is committed to ensuring that it will be appropriately transported and packaged and only appropriately accredited contractors will be employed in this transport operation.

ISSUE 7

There is approximately 170 ha. of hardwood plantation and 20 ha. of screening vegetation as shown on Figure 5.4 of the ERMP.

ISSUE 8

Dust will be minimised during construction.

ISSUE 9

A decommissioning and rehabilitation programme will be undertaken for the Pinjarra site at the end of the plant's life. The objectives of the programme are listed in the ERMP (section 7.1) and these are to:

- *eliminate unacceptable health hazards*
- *restore the site to a condition such that it may be returned to its former land use or such other use as may be appropriate at the time of decommissioning; and*
- *ensure that the State does not incur any ongoing liability with regard to the plant.*

Therefore, Rhone-Poulenc does not consider it is necessary to provide a bond to cover cleanup costs for decommissioning of the plant. The Company has made 35 commitments in the ERMP in relation to its proposed rare earth plant. These include committment No. 34: *"Decommissioning by the Proponent will be undertaken in accordance with statutory requirements in force at the time and in a manner acceptable to the Minister for the Environment".*

ISSUE 10

Rhone-Poulenc will ensure that its onsite emergency response plan will consider any impacts on waterways. Any washdowns of a spillage will be recycled as discussed in response to Issue 2(b).

Rhone-Poulenc reaffirms its intention to implement the contingency plans listed on p6-48 and 6-49 of the ERMP.

In addition to plant site contingencies, Rhone-Poulenc has also prepared for emergency situations during transport of materials. These are detailed in the ERMP.

In particular, the emergency response for a spill of the gangue material is the subject of a specific Emergency Response Plan (ERP). An outline of the ERP is presented in Appendix H of the ERMP. The ERP is currently in a draft form and the Company has recently agreed to provide a copy of this draft to PIMA.

ISSUE 11

The existing sewerage facilities on site established for the gallium plant were approved by the Murray Shire Council. These facilities serve the laboratory, office, amenities, workshop and production offices.

Ground level at these locations is approximately 57 metres A.H.D. The highest water table levels recorded in the vicinity of these buildings is 48 metres A.H.D.

The nearest waterbody is a storage dam on Alcoa property which is approximately 4kms away.

Therefore the Proponent believes the existing sewerage facilities, approved by the Shire of Murray in 1988, are adequate.

ISSUE 12

The Department of Minerals and Energy has determined in their submission to the EPA that the site is not classifiable as a "major hazards site" and that Rhone-Poulenc has committed to a number of "best practice" initiatives in plant operation, and in the transport of low specific activity materials.

Rhone-Poulenc is an international company with a world wide policy for adopting best management practices in all aspects of its plant operations. These include safety, industrial hygiene and environmental protection. The company has included an outline of this policy in Appendix G of the ERMP. The Company's 1994 Environmental Report has been made available to the public at the Workshops and through the Information Centre and plant office. The report highlights the company's policy and objectives on safety and environmental protection and records progress towards these objectives.

Rhone-Poulenc is committed to achieving ISO9002 Quality Accreditation (Commitment 28), training of drivers for transport of the waste (Commitment 3) training of emergency response teams (Commitment 5) and training of designated staff (Commitment 18). (Commitments from the ERMP).

The layout of the plant will be such that all areas for the storage and processing of the low level radioactive materials will be isolated from other process areas.

Yours sincerely,

M.J. Webb
Operations Manager

AUSTRALIA

EPA
Environment Protection Agency

FILE NO 95/2227

CONTACT Gillian Morrison
EXTENSION 06 2741592

Environmental Protection Authority
Westralia Square
141 St George's Terrace
PERTH WA 6000

Attention: Ms Xuan Nguyen

RARE EARTH PROJECT, PINJARRA, WESTERN AUSTRALIA

I refer to the Environmental Review and Management Programme (ERMP) for the Rhone-Poulenc Chimie Australia Pty Limited's proposed Rare Earth Plant at Pinjarra, Western Australia. I also refer to the associated Environmental Management Programme (EMP) for the management of Low Level Radioactive Gangue Residue at the Intractable Waste Disposal Facility (IWDF) at Mt Walton, East Western Australia. The Environmental Protection Agency offers the following comments.

GENERAL

While pre-operational monitoring can provide a baseline of environmental radiation data there appears to be no commitment or plan to rectify possible excessive radiation of the site on decommissioning. The statement that: 'contamination will not occur because of the integrity of the disposal system' is considered insufficient. It is noted that five hours before a public dose limit is reached is a relatively short time period.

It is noted that commitments refer to present standards. These standards may change - most likely become more stringent - over the twenty or more years of plant life and the environmental management regimes put in place should contain sufficient latitude for changing standards to be applicable to the plant and the waste disposal site at Mt Walton, provided such changes are not to the detriment of the environment.

Social issues in the ERMP focus on employment generated by the plant. Local opposition focuses on employment from tourism and suggests growth in this sector would be negatively affected by the plant.

It is noted that local opinion regarding desirability for the proposal to be sited at Pinjarra, or anywhere, is divided. The Pinjarra area has been developing as a holiday and tourist area and the plant may not be an appropriate land use for this

093041

40 Blackall Street Barton ACT 2600 Australia Telephone (06) 274 1999 Facsimile (06) 274 1666

area. Further discussion and evidence for the proponent's assertion of overall employment and social benefit would be useful.

The ERMP and the EMP do not adequately address the cost of maintaining and monitoring the gangue waste at the Mt Walton facility. The statement that the Western Australian Government will accept this cost in perpetuity (EMP page ii) is inadequate given the life of the radioactive elements and the continuing cost to the Australian taxpayer. It would be appropriate to consider this long term cost against any short term financial benefit to the Australian taxpayer.

The trucking arrangements are considered adequate provided they are in accordance with the Transport Code and to the satisfaction of the local authorities.

It would have been advantageous for the report to have recorded the distances, standard and traffic densities of the roads investigated as alternatives in the routes to the Mt Walton IWDF.

The Office of the Supervising Scientist (OSS) - an element of the EPA with expertise in the environmental management of radioactive materials - offers the following comments on the Rhone-Poulenc Rare Earth Proposal ERMP. In addition **Attachment 1** provides specific comment by OSS on the EMP for the Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility.

RADIOLOGICAL ISSUES - GENERAL COMMENT

The Radiation Management Plan for the project and its environment does not exist at this stage. This is a little surprising as this document for public review is meant to be an Environmental Review and Management Programme and a key aspect of the proposal is the utilisation of radioactive materials. However it is noted that there is a commitment (17) to develop such a plan which will meet the requirements of the WA DME and the Radiological Council.

OCCUPATIONAL

The radiological discussion lacks sufficient detail to adequately assess doses to workers. However Commitments 14, 16 and 20 to 23 if implemented will provide adequate occupational monitoring and dose assessment during plant operation.

Table 6.5 contains a set of very fundamental radiation protection measures. The related discussion (6.4.4.4 - Plant Site on p30) indicates that these measures will 'be considered in the design'. 'COMMITMENT 15' should be firmer and state that the proponent will as part of its commitment to ALARA principles (p xi), endeavour to fully introduce these measures as for COMMITMENT 16.

ENVIRONMENTAL

Based on the information provided, there is no reason to believe there will be any public radiological health impact from the operation provided the plant is suitably constructed.

Radon gas and gamma exposures at the boundaries are demonstrated to be trivial. Unfortunately there is little detail of the plant construction upon which to base comment on dust releases. Given that the process is wet and contained, releases are anticipated to be small and dust concentrations very dilute at the boundaries. However, a worst case estimate of dust emission and dispersion should be attempted to clearly demonstrate a negligible public dose.

Similarly, the discussion of possible spills/leakage from the plant and evaporation pond needs to demonstrate that plant equipment and procedures are adequate.

Disposal of contaminated equipment should also be addressed in the RMP

PRE-OPERATIONAL MONITORING

This appears to be a sufficient pre-operational program for a plant of this size. However, 'Commitment 19 ' should be changed to read, 'To provide a least 12 months background monitoring data a comprehensive survey....'. This will ensure background data collection begins well before the plant commissioning stage and is therefore not open to question.

In relation to dust and radon daughter sampling, a single 12 month sample for each at the plant site would probably provide adequate background data. Concentrations of radon daughters in particular vary considerably throughout the year and any locational differences at the boundaries would be lost in the background variation.

It would be prudent for the pre-operational monitoring program to include some vegetation sampling for radionuclide analysis. This would provide clear reference values for use in rehabilitation measures.

Thank you for the opportunity to comment on this proposal.

Clark Gallagher
Acting Assistant Secretary
Environment Assessment Branch

21 December 1995

ATTACHMENT 1

oss minute

OFFICE OF THE SUPERVISING SCIENTIST

REF

TO John Ashe
Assistant Secretary
Environmental Assessment Branch

20 December, 1995

FROM Stewart Needham

SUBJECT Mt Walton IWDF - Environmental Management Programme

ENVIRONMENTAL MANAGEMENT PLAN

The Management of Low Level Radioactive Gangue Residue at the Mt Walton East Intractable Waste Disposal Facility, WA

The MT Walton IWDF has been used in the past for the disposal of some radioactive and other hazardous wastes originating in WA, and is the disposal site proposed for this project.

The requirements for a near surface disposal site are set out in the NHMRC 'Code of Practice for the Near Surface Disposal of Radioactive Substances (1992)'. The Code gives direction on the types of radioactive waste that can be disposed of in this manner, construction and location requirements for the site and the management requirements.

An Environmental Management Plan is required under 3.2.4 of the Code and also under a condition on the initial establishment of the facility deriving from Ministerial Statement 44 (Oct 1988) (WA).

This document has been produced specifically to meet these two requirements as they relate to the disposal of radioactive gangue residue from the proposed Rhone Poulenc Rare Earth Plant at Pinjarra.

1. GENERAL COMMENT

The EMP appears to meet the overall aims of the Code in terms of location, design, operation and management plan. Provided the facility is operated as proposed and the gangue transported and handled according to the appropriate Codes, the environmental and public health hazards should be negligible and worker doses low.

There may however be difficulties regarding public perceptions of the independence of the Appropriate Authority (AA). The AA means one or more statutory authorities which are responsible for enforcing the provisions of legislation implementing any part or the whole of the Code. The AA is 'expected' to be a joint Radiological Council/EPA arrangement (5.1.3) the details of which, they will determine.

The current proponent for the EMP is the WA Health Department. However, action is being taken to transfer this responsibility to the EPA. Should this occur, the Technical Auditor would appear (from Table 5.1) to be reporting on the actions of

the proponent (EPA) to the AA(RC & EPA). One way to ensure this is seen as a reasonable approach is for the WA Government to place greater weight on the role of an independent Radiological Council within the AA agreement. An alternatives to replace the EPA with the Health Department as an AA. WA Health Department has responsibility for at least some of the Code under 31A of the Radiation Safety Regulations (see p-25). This is however an administrative issue (and probably a trivial one) and does not effect the practicality or acceptability of the proposal as a whole.

2 COMMENTS ON MINOR ISSUES

Ch 7. Disposal Operations

p-55

It is not clear if the bunded unloading area is also a wash down pad in the event of spills. If so where does the waste water go?

Ch 9. Environmental Issues and Management Strategies

p-63

The Code (3.2.4.b) requires that performance indicators are established to assess impacts, enable early detection of release, predict long term behaviour of the waste and ensure compliance with regulatory requirements. There is no clear statement of these indicators although the associated monitoring program is satisfactory.

p-72

The reference to the ICRP implies the radiation standards and dose calculation methods are tied directly to ICRP recommendations. If this is so , it should be clearly stated.

10. Environmental Radiation Monitoring

Table L-2.

Radon concentrations should be in Bq/m^3 not $\mu Bq/m^3$ as stated in the table.

p-79

Radionuclides in Air - a 4 day sample once a quarter is not a very representative sample. High volume samplers can often require weeks to get a meaningful sample in such areas. These samples should be analysed as least as thoroughly as the dust deposition samples.

p-81

Subsurface soil profile measurements as part of the operational program seem irrelevant. It is hard to see how release of active material could reach -5m and more without being observed on the surface first.

p-82

There is no physical reason to expect a change in emanation rates at undisturbed locations around the site., These measurements should provide similar values to those of the pre-operational phase. An alternative suggestion

is to conduct emanation measurements on completed burial pits as this would provide information useful for evaluating rehabilitation options for the site.

Appendix 8.

Radiation Management Plan

The appointment of a Radiation Safety Officer was not discussed. A RSO is not specifically required by the Code although it may be required under the WA Radiation Safety Act.

p-A3

Thoron/Radon Daughters:

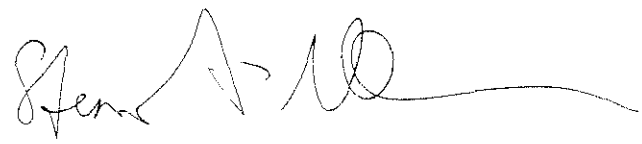
A 'significant potential exposure' is not defined

p-A3

Induction & Retraining:

Suggest regular annual retraining/refresher course would be appropriate given the range of responsibilities outlined in 9.13

Thank you for the opportunity to comment on this Environmental Management Programme



Stewart Needham

Assistant Secretary

RHÔNE-POULENC

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February 16, 1996

The Chairman
Environmental Protection Authority
Westralia Square
141 St. George's Terrace
Perth. W.A. 6000

Att: Ms. Xuan Nguyen

Response to the Submission by Environmental Protection Agency (Federal Environment Department) (ERMP - Proposed Rare Earth Plant, Pinjarra).

I refer to the Submission lodged by the Federal Environment Protection Agency (EPA) on the Rhone-Poulenc rare earth project. Listed below are our responses to that Submission. The headings correspond with those in the EPA submission.

GENERAL

Para 1 Decommissioning

Committment Number 34 states: *"Decommissioning by the Proponent will be undertaken in accordance with statutory requirements in force at the time and in a manner acceptable to the Minister for the Environment."*

With this committment the Proponent will ensure that radiological conditions are restored to pre-operational levels after decommissioning.

Para 2 Improved Standards

Rhone Poulenc has allowed for future changes in regulatory standards and codes. Committments Nos. 1, 31 & 32 encapsulate the intention of the Company to comply with improving practices and standards.

Committment 32 is particularly pertinent in this regard and is quoted in full below:
"In addition to complying with the requirements of the Radiation Protection (Mining and Milling) Code (1987), the Radioactive Waste Management (Mining and Milling) Code (1982) and the Code of Practice for the Near-Surface Disposal of Radioactive Waste (1992), the Proponent will meet any future changes in these (and other relevant standards throughout the life of the project."

Para 3 Tourism

Rhone-Poulenc is very conscious of the allegations that its project will impact on tourism. The Company has made extensive enquiries within the local and State Tourism industry and, with one exception, has established that there is not a high level of concern. The Company is continuing to address this perceived issue and is seeking ways to overcome any negative concerns and impacts and if possible to develop positive benefits for the tourism industry. In this regard, the Company is liaising with and will continue to work closely with the Western Australian Tourism Commission.

Para 4 Land Use

It should be noted that the Rhone-Poulenc proposal is a relatively small development of 0.6 hectares within its existing gallium plant and infrastructure, totalling 18 hectares of a 515 hectare site. The site is immediately adjacent to a very large alumina refinery and some 10 kilometers from the Pinjarra townsite. The area is zoned industrial within the Pinjarra Town Planning Scheme No. 4 dated 23/6/89 and revised 6/11/95 and is therefore considered an appropriate land use.

Para 4 Project Benefits

The Company considers that its project benefits of export earnings, employment opportunities and the consequential multiplier effect, are significant to the local area. There is a 15 fold increase in the value added to monazite by processing it into rare earth nitrates.

The ERMP (p6-52) states that 150 construction jobs will be created during the construction phase. This is a conservative estimate based on the expectation that at least $8 million or 16% of the project capital cost will be expended on site construction labour. This represents approximately 150 jobs over a period of one year.

The 50 permanent positions for plant operation have been estimated from the organisational structure planned for the project. This structure has been developed from Rhone-Poulenc's experience with the job functions and manning levels required at its Freeport (USA) and La Rochelle (France) rare earth plants.

Para 5 Cost of maintaining and monitoring gangue waste

The objective for the disposal of the residue at the IWDF is to achieve a satisfactory environmental solution. The company has committed to funding all identifiable and foreseeable costs associated with the disposal of its gangue residue including contributing to ongoing monitoring costs at the IWDF. (p6-23 and Committment No. 12, p6-24)

The disposal trenches and their capping and rehabilitation will be designed so as to require no maintenance with minimal ongoing surveillance and archiving costs. The cost of such a solution would not be burdensome on future generations.

The IWDF covers a large area and was selected for long term disposal of all intractable wastes generated within the State. Its operating life is expected to be for a very extensive period and could well be beyond the institutional control period prescribed by the Code of Practice for the near surface disposal of radioactive waste (1992).

As the IWDF will accommodate other intractable wastes, surveillance and archiving costs will be shared by other users. .

Ownership of the site is vested with the State Government. Caveats will be placed on the title providing adequate warning to any potential new owner should a transfer of title be required.

Para 7 Transport

During the course of the project, Rhone-Poulenc considered transport route alternatives for the transport of gangue residue. The selection of the route was based on route selection criteria presented in section 2.4.2.3 and on Figure 2.2. in the Evaluation of Alternatives section of the ERMP.

An assessment on route selection was conducted in liaison with Main Roads Western Australia and the Department of Minerals and Energy (DME).

From the assessment, only one route was identified which satisfied the route selection criteria and was preferred by Main Roads and DME. This was the northern route shown as Figure 2.2 of the ERMP. Rhone-Poulenc, therefore, proposed this route as the preferred route and carried it through to the project description where the route was assessed for potential impacts and management.

RADIOLOGICAL ISSUES - GENERAL COMMENT

A Radiation Management Plan (RMP) will be developed (Committment 17). This committment states: *"A comprehensive Radiation Management Plan (RMP) will be prepared by the Proponent for the rare earth plant and its environment and submitted for approval from DME and the Radiological Council prior to commencement of operations."*

The contents of the RMP will be based on the elements presented in section 6.4.4.5 of the ERMP. The RMP cannot be finalised until the plant design is completed.

OCCUPATIONAL

Details on radiological issues will be presented in the RMP. An outline of the RMP is presented in section 6.4.4.5 of the ERMP. Rhone-Poulenc has committed to a worker dose constraint of half those limits proposed by the I.C.R.P.

Rhone-Poulenc has approximately 50 years experience at La Rochelle, France in the rare earths industry and in the processing of monazite. From this experience the Company can confidently forecast the occupational exposures of plant personnel to radiation and implement best practice initiatives for keeping these well within acceptable levels. Wherever practical the Company will implement the radiation protection measures listed in Table 6.5 of the ERMP, to the satisfaction of DME.

ENVIRONMENTAL

Para 1 Rhone-Poulenc concurs with the EPA that public exposure to radiation from the plant will be insignificant and there will be no public radiological health impact.

Para 2 Dust emission measurements were conducted at the La Rochelle plant in 1992. The results of these tests show that dust levels within the plant are not discernible from background levels from offsite monitoring stations up to 13 kms from the site. See Attachment A for these test results.

Improved air filtration equipment will be employed on the Pinjarra plant to further reduce dust emission levels. It is estimated that the emission level from the plant will be 4g/day of monazite, equivalent to 0.24g Th/day compared to a DME prescribed limit of 150 g Th/day. The DME limit is derived from a public exposure limit of 1 mSv/yr at 500 metres from the plant.

Para 3 The process chemicals will be stored in a dedicated liquid storage area of the plant as described in Section 3.3.2 of the ERMP. The ERMP (section 3.4.1, p3-10) contains a description of the system for the handling of process area washdowns. Spillage cleanups would be part of these washdowns.

The ERMP (Section 3.5.1.1 pp 3-14, 3-15) contains a description of the evaporation pond design and construction. Section 6.3.2.3 (p 6-20 to 6.22 incl.) includes discussions on the effectiveness of the pond system and monitoring bores. Appendix I presents the groundwater monitoring data for the period 1987 to 1995. This data demonstrates the effectiveness of the pond design in preventing leachate from migrating into the underlying aquifiers.

Para 4 Rhone-Poulenc will address the decontamination and disposal of any contaminated equipment and materials in the RMP.

PRE-OPERATIONAL RADIATION MONITORING PROGRAMME

The pre-operational radiation monitoring programme commenced in December 1995. Therefore close to 18 months of base line data will be collected prior to plant commissioning. The programme will include the collection of data during both wet and dry periods so as to accommodate seasonal variations.

The pre-operational monitoring programme has been approved by the W.A. Department of Minerals and Energy and the Radiological Council. Vegetation sampling was not deemed to be a requirement by these authorities.

Please note that responses to your comments on the Mt. Walton IWDF and those by the Office of the Supervisory Scientist will be made separately when responding to the EMP for the disposal of the gangue residue at that facility.

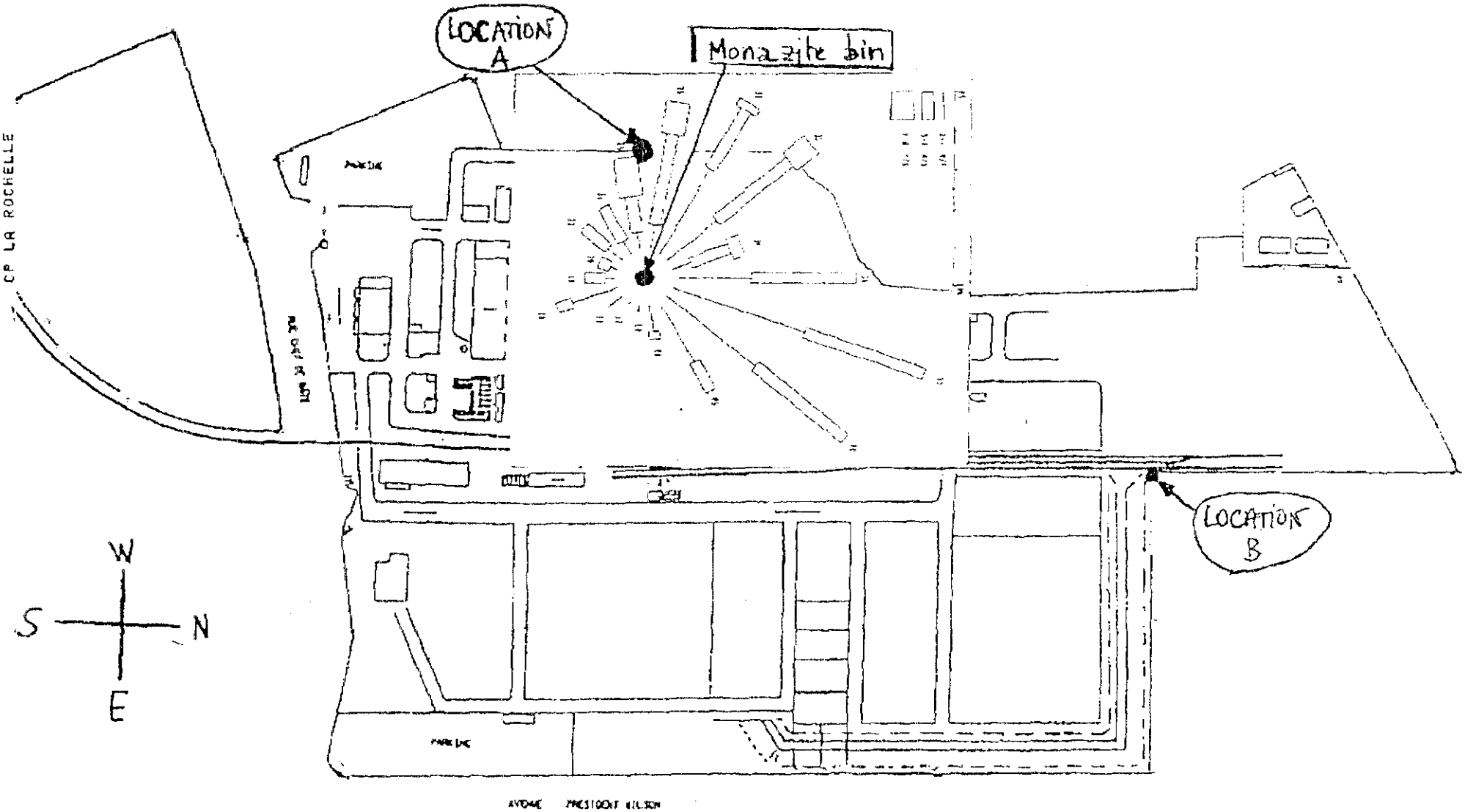
Yours sincerely,

M.J. Webb
Operations Manager

SUBMIS6.WPS

ATTACHMENT A

LONG-LIVED ALPHA PARTICLE COLLECTOR LOCATIONS



LA ROCHELLE PLANT

LONG-LIVED ALPHA PARTICLES AT LA ROCHELLE PLANT BOUNDARY

Measures in mBq/m^3

ite boundary	Distance to monazite bin	Feb.92	March.92	Apr-92	May-92	Jun-92	Jul-92	Aug-92	Sep-92	Oct-92	Nov-92	Dec-92	Jan-93	Annual average
Location A	130m	0.4	0.5	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.6	0.38
Location B	450m	0.7	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.5	0.9	0.41
nvironment														
Locations 1 to 8	1km to 13km	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.5	0.37

MRWA 496A

FACSIMILE TRANSMISSION

In reply please transmit to facsimile number 09 4723828

MAIN ROADS
Western Australia

Don Aitken Centre
Waterloo Crescent
East Perth WA 6004

TO: **Jeanette Della Bona**

FROM: Ian Tarling
Road Transport Section

FACSIMILE NUMBER: 3234629

TELEPHONE NUMBER: 4700724

NUMBER OF PAGES: 1
(Including this one)

DATE: February 8 1996

YOUR REFERENCE:

OUR REFERENCE: RTS 1

SUBJECT: Rhone-Poulenc proposed rare earth plant Pinjarra

MESSAGE:
The following comments are offered on the submission by Shire of Serpentine Jarrahdale.

1. Transport of materials
   1.1 Monazite: Bdoubles are acknowledged as a very stable and safe combination vehicle the majority of multiple vehicle accidents involving Bdoubles have been caused by the other vehicle/s involved.
   1.2 Other Raw Materials/Phosphates: The alternative route via Thomas Rd and Armadale Bunbury Rd. This route is currently single lane, a contract has been let for the design upgrading Armadale-Bunbury Rd from Armadale to Byford, however the project has not been allocated funds over the next 10 years
   1.3 Rare Earth nitrates: See comment at 1.2
   1.4 Low radiation waste: The comment on the safety aspects of Bdoubles is relevant.
2. Road network
   2.1 Armadale Bunbury Rd (South Western Hwy) There are no funds allocated to carry out any future improvements, however road designs are being put in place to cater for requests to upgrade the route.
   2.2 Wongong Brook: Using Bdoubles to transport the product would mean that conflict with other vehicles is reduced because of the higher payload in a combination acknowledged as a safe vehicle.
3. Recommendations
   3.1 Gangue residue: As previously noted smaller vhicles with less payload would increase the number of trips thereby increasing potential conflict without any improvement in the safety of the vehicle.
   3.2 Monazite,Nitrates,Phosphates/other materials: Main Roads would not be issuing permits for specific routes as both routes are part of the Bdouble network and available to all applicants for Bdouble permits. If route approvals are required from other Authories i.e D.O.M.E. then that Dept may request a specific route.

Please advise if you require anything further
Regards Ian

SIGNATURE: Ian Tarling

MRWA 498A

FACSIMILE TRANSMISSION

In reply please transmit to facsimile number (09) 323 4629

MAIN ROADS
Western Australia

Don Aitken Centre
Waterloo Crescent
East Perth WA 6004

TO: **Xuan Nguyen**
Senior Environmental Officer, Industrial Development

FROM: Jeanette Della-Bona
Environment Strategy Branch

FACSIMILE NUMBER: 322 1598

TELEPHONE NUMBER: 323 4566

NUMBER OF PAGES: 2
(Including this one)

DATE: February 8 1996

YOUR REFERENCE:

OUR REFERENCE: 72-394-194

SUBJECT: **Rhone-Poulenc's ERMP Rare Earth Plant Pinjarra**

MESSAGE:

Dear Xuan,

Sorry about the delay in forwarding these comments.

Regarding the fax you sent January 31 1996 are the following comments:

- As you are aware, Main Roads - Road Transport Operations Branch had been liaising with the proponent Rhone-Poulenc on road transport issues relating to the project proposal. In this respect, Main Roads finds the above proposal to be acceptable.
- With regard to the submission sent by the Shire of Serpentine-Jarrahdale, the following comments are offered for your consideration. (See following page.)

Hope this answers your queries. Good luck in your endeavours!

Regards
Jeanette

SIGNATURE: Della-Bona

WARNING

Facsimiles on thermal paper will deteriorate quickly. Important documents should be photocopied if they need to be kept for any period of time.

Western Australian Fire Brigades Board

480 Hay Street,
Perth,
Western Australia, 6000
[DX 60103 Hay Street, Perth]
Telephone : (09) 323 9300
Facsimile : (09) 221 1935

Our Ref. MLH:PO 620 Your Ref.

Phone Enquiries: 323-9311 Leith Higgins

15 December, 1995

The Chairman
Environmental Protection Authority
Attention: Ms Xuan Nguyen
8th Floor - Westralia Square
141 St George's Terrace
PERTH WA 6000

Dear Sir,

RARE EARTH PROJECT, PINJARRA

The Fire & Rescue Service of WA (FRS) has reviewed the Environmental Review and Management Programme (ERMP) of the proposed rare earth project at Pinjarra.

The FRS has two areas of concern, and they are as follows:

1. Associated with this proposal is the need to transport monazite, and while the report advises that monazite has been safely transported for the last 30 years, it can be anticipated that there will be an understandable public concern over the continued need to transport monazite once this project becomes well known. This will partly be directed towards the opening up of new transport routes for monazite, particularly from Geraldton through the metropolitan area. For this reason the FRS believes the Proponent should also provide adequate briefings for all fire service personnel at fire stations located along monazite transport routes, as well as assist with a revision of emergency plans for monazite.

2. Commitment number 4 offered by the Proponent states, "*During the ERMP public review period, the Proponent will prepare an emergency response plan for the transport of low level radioactive gangue residue, outlining the emergency and clean-up procedures in the event of an accident, for review by the DEP, DOME and the Radiological Council.*" The FRS, as the Lead Combat Authority in WA, should be included in commitment 4 as the FRS intends to be actively involved in the development of an emergency response plan involving radioactive gangue residue.

Otherwise the FRS does not have any major objection to the proposal provided the following conditions are accommodated:

1. That the designated road routes for waste transport are adhered to at all times.

2. The waste is transported through the metropolitan area at non-peak traffic hours.

3. The drivers of vehicles who transport waste receive special training and are certified by the appropriate competent authorities.

4. A comprehensive emergency response plan be developed by the proponent in association with the FRS and other relevant authorities.

5. The proponent shall consult with the FRS and other relevant authorities if changes to the emergency plan are ever proposed.

6. The proponent provide a comprehensive briefing of the hazards involved and training of emergency procedures to all FRS personnel along designated routes where radioactive materials are being transported.

7. The proponent is prepared to cover the cost of additional equipment that may be identified as being required along proposed transport routes of radioactive materials.

There is always some risk associated with the transport of dangerous goods, however if all conditions and commitments are met in the ERMP, and our specific concerns addressed, the FRS believes these risks can be substantially managed.

Yours faithfully,

ML HIGGINS
SCIENTIFIC OFFICER

RHÔNE-POULENC

RHÔNE-POULENC CHIMIE AUSTRALIA PTY LTD ACN: 009 237 718
RARE EARTHS AND GALLIUM PROJECT
LOT 1, NAPIER ROAD
PINJARRA, WESTERN AUSTRALIA 6208
P.O. BOX 355, PINJARRA 6208
TEL: (09) 531 7200 FAX: (09) 531 2270

March 19, 1996

The Chairman
Environmental Protection Authority
Westralia Square
141 St. George's Terrace
Perth. W.A. 6000

Attn: Ms. Xuan Nguyen

Response to the Submission by the W.A. Fire Brigade (ERMP - Proposed Rare Earth Plant, Pinjarra).

In reply to the above referenced submission, we provide the following comments.

1) Prior to 1994 monazite was transported from the mineral sands producers at Geraldton, Bunbury and Capel to the port of Fremantle for export. Fire service personnel along the routes at that time would have been aware of emergency procedures in relation to a spill of monazite.

   If necessary, Rhone-Poulenc will update all fire service personnel with briefings on safety and emergency procedures along the monazite transport routes to Pinjarra. The company, in conjunction with the appropriate authorities and the mineral sands producers, intends to review the emergency response plans for the transport of monazite for the rare earth project.

2) Rhone-Poulenc has liaised with the Fire and Rescue Service of W.A. (FRS) in the development of its draft emergency response plan for the transport of the gangue residue and will continue to liaise with the FRS as the plan is revised.

3) The Company considers that points 1 - 6 on page 2 of the submission raised by the W.A. Fire Brigade are appropriate and will be complied with, providing other factors and requirements do not conflict or prevent adherence to these conditions, e.g. road works could require a temporary deviation from the designated route.

In relation to point 7, the Company is prepared to provide any specialised equipment necessary for emergency or spillage clean-up operations. This equipment will be included in the inventory of items to be provided by the Company's emergency reponse team. The equipment is listed in the Gangue Residue Transport Emergency Response Plan.

Yours sincerely,

M.J. Webb
Operations Manager

SUBMISS.WPS

Western Australian
TOURISM COMMISSION

Chairman
Environmental Protection Authority
8th Floor Westralia Square
141 St George's Terrace
PERTH WA 6000

28 DEC 1995

Attention: Ms Xuan Nguyen

RE: ENVIRONMENTAL REVIEW AND MANAGEMENT PROGRAMME RARE EARTH PROJECT, PINJARRA

The Western Australian Tourism Commission appreciates the opportunity to comment on the Environmental Review and Management Programme for the proposed Rhone Poulenc Rare Earth Project in Pinjarra.

After reviewing the document and liaising with local and state government agencies, the Conservation Council, the tourism industry and development proponents, it was evident that the document had not addressed the growing tourism industry in the Shire of Murray and the larger Peel Region.

In preparing the attached submission the Tourism Commission met with a representative from Rhone Poulenc and undertook a site inspection of the existing Gallium plant.

While we are grateful for the Rhone Poulenc briefing, the Tourism Commission, on behalf of the tourism industry, raises concerns that the Rhone Poulenc proposal may have serious detrimental implications on the existing and potential tourism operators in this Region, and the economic contribution they make to the State's economy.

Please find attached the Tourism Commission's submission for your consideration.

If you require any further information or wish to discuss any aspect of the submission please do not hesitate to contact Mr Eugene Stankevicius, Planning Manager, on 220 1825.

Yours sincerely

TERRY MCVEIGH
DIRECTOR - REGIONS, PLANNING AND POLICY

033076 WFO

22 December 1995

Enc

Sixth Floor, St. George's Court, 16 St. George's Terrace, Perth, W.A. 6000.
GPO Box X2261, Perth, W.A. 6001.
Telephone (09) 220 1700, Facsimile (09) 220 1702.

TOURISM IN THE SHIRE OF MURRAY

The Peel Region is an extremely popular tourist destination offering visitors a host of scenic waterways, magnificent bushlands and forests as well as interesting heritage and Aboriginal cultural experiences.

It is estimated that in 1992-93 approximately 967,000[1] visitors travelled in the Peel Region. The contribution of these visitors to the region's economy is estimated at $34.1 million.

Although the Peel Region is a significant daytripping destination attracting some 778,000[2] day visitors, it is also seen as a holiday destination in its own right. Approximately, 186,000[3] accommodated visitors holiday in the Peel Region, expending some $21.1 million.

The Tourism Commission is working with the Peel Regional Tourism Council to establish a co-ordinated approach to tourism marketing and development in the Peel Region. The Commission sees the Peel Region as a strategically important sub-region within the entire South West Province.

Traditionally, tourism has been centred around Mandurah and it still remains by far the most popular daytripping destination outside the metropolitan area. However, in recent years the tourist potential of areas closer to the Darling Scarp have also begun to develop.

The Shire of Murray is in a unique position to offer visitors a host of interesting holiday experiences. The municipality offers extensive recreational forestry reserves, industry education in the form of the Forest Heritage Centre, Alcoa tours, Aboriginal cultural experiences, preserved heritage buildings, special events and Hotham valley railway tours.

The Shire of Murray is an important contributor to the development of tourism in the entire Peel Region. The statistical data below indicates the Shire of Murray's tourism visitation in 1992/93[4].

	Visitors	$ Value
Commercial Accommodation	20,000	$2.9 million
Private Accommodation	27,000	$2.4 million
Daytrippers	102,000	$1.7 million
Lane Pool Reserve		
* Accommodation	40,000	$3.3 million
* Day visitors	145,000	$1.5 million
Alcoa Tours	25,000	$0.07 million

[1] WA Tourism Monitor (1992/93) and Australian Bureau of Statistics (1992/93)
[2] Ibid
[3] Ibid
[4] Ibid

Tourism Infrastructure Audit

The table below indicates the tourism infrastructure currently available in the Shire of Murray and the remaining Peel Region. An attached map indicates the location of existing and future development.

	Shire of Murray	Remaining Peel Region
Accommodation	13	29
Major Tour Operators	2	8
Tourist Bureaux	2	4

TOURISM IMPACTS

The Shire of Murray, which includes the towns of Pinjarra and Dwellingup, has tremendous potential to sustain environmentally friendly tourism. The Shire is a key stakeholder in this tourism opportunity, having expended large amounts of funding over the years to develop and promote tourism in the municipality.

The establishment of the Rhone Poulenc proposal has the probability to compromise the tourism economic future of the municipality, and may have repercussions on the entire Peel Region.

One of the major concerns from a tourism view point is that of perception. Tourism operators, developers, visitors and communities have the tendency to view radioactive processing as a destructive, harmful and amoral industry.

Visitors travel to Western Australia to gain a unique environmental and lifestyle experience which may not be obtainable elsewhere. Visitors are not keen to visit a destination that has associations with radioactive processing.

Community based groups, tourism operators and at least one major developer, Everland Management Pty Ltd, have indicated the potential for the Rhone Poulenc proposal to be incompatible with tourism.

Everland Management Pty Ltd is the proponent of the Ravenswood Sanctuary Resort, a $159 million residential and tourism health resort complex.

The major areas of concern include:

• Transportation Issues

The Tourism Commission has concern regarding the transportation of raw resources and waste product to and from the site.

From a tourism perspective, the transportation of 'gangue residue', low level radioactive solid residue, via road networks, especially those that experience significant tourism use, is seen as a conflict in road usage in the area.

It is evident from the Community Workshops, undertaken by Rhone Poulenc, that there is concern of possible trucking accidents which may result in the leakage of gangue residue. The Tourism Commission sees this as a significant issue as the road network provides visitors with the main transport access to the Shire of Murray and the Peel Region.

From a general perspective, there is concern as to the departure and travelling times of the heavy haulage vehicles, especially those carrying radioactive waste products. Such vehicles should not be present on the roadways during peak traffic and particularly during the peak holiday season.

The Tourism industry and developers have expressed concern that the vehicles, labelled with 'radioactive signage' will provide a most unpleasant welcome for visitors. In the Ravenswood Sanctuary Resort situation, many of the international and interstate guests will have travelled many kilometres to visit the resort for a 'health' related experience.

The following comments are made on the suggested road transportation routes:

Northern Route: South Western Highway/Great Northern Highway

The South Western Highway is an extremely important tourism access route to the Peel and the South West Regions.

Considering the single lane (each direction) status and the high levels of heavy haulage the highway currently experiences, there are concerns for visitor safety. Overtaking heavy haulage vehicles is a significant safety risk, there is no need to add additional heavy haulage vehicles to this already serious problem.

Consideration should be given to undertaking community consultation with metropolitan householders who will experience heavy vehicles laden with radioactive materials travelling past their homes. These people should be made aware of the precautions that need to be undertaken in the event of an accident, should the project proceed.

There are also concerns of potential traffic congestion and risks along the Great Eastern Highway, especially the stretch after Sawyers Valley to the Northam turnoff. This stretch of the Highway converts to single lane status causing traffic conflict between passenger and heavy haulage vehicles.

Southern Route: Dwellingup/Narrogin

The Pinjarra to Williams Road, between Pinjarra and Dwellingup, is a popular, well travelled tourist route. The route provides spectacular scenic value for travellers as it winds its way over the Darling Scarp.

This route although very scenic, provides some concern for drivers. The road is very narrow and winding, with frequent rail crossings and a strict speed limit. The Tourism Commission is concerned that conflict may result between passenger and heavy haulage vehicles.

Recommendation

Further investigation will need to be undertaken to determine the most appropriate travel route.

Departure and travelling times will need to be carefully controlled and monitored, if the project proceeds.

• Perception of Radiological Exposure

From the extensive questioning that was received during the Community Workshops it is clearly evident that there is concern at the levels of radioactivity omitted during the processing, transporting and disposal stages of operations.

Although the ERMP indicates that there is 'little' or no generation of radioactive material, there is still the issue of 'perception'. The tourism industry is reliant on promoting safe, environmental experiences. There is a real possibility that the appealing and environmentally friendly 'Sea to Scarp' image, which the Peel Region adopts, may be tarnished by the introduction of radioactive processing.

The tourism industry thrives on reputation and recognition. The introduction of the proposed plant will distort the heritage image that Pinjarra has built up over many years.

Tourism operators and developers are concerned that the perception of 'radioactive industries' in the Pinjarra area will affect patronage to tourism and recreational facilities, as well as adversely impact on the sale of residential land in the tourism resort/residential developments.

Recommendation

That Government acknowledges and considers the social impact of such an industry and the conflict that results between tourism development and heavy industry.

That the Shire of Murray investigates the adoption of a 'newly' named locality/ward for the industrial area of Pinjarra, inclusive of Alcoa and the current Rhone Poulenc plant.

• Aesthetic Values

Although vegetation screens will reduce the visual impact of the processing plant, the ERMP indicates that some of the higher structures will still be visible. In a pristine, low level development area, such as Pinjarra, the appearance of tall structures will be clearly notable. Gas omissions from tall structures will emphasise the visually obtrusiveness to a great extent.

From a tourism perspective, such infrastructure may become a deterrent for tourists to visit Pinjarra. Members of the tourism industry view such visual obtrusiveness emphasising visitors' perceptions of both Pinjarra and the Shire of Murray as an unattractive, heavy industrial area.

• Gaseous Omissions

Odour Omission

Concern is expressed as to the possible omission of gaseous odours. It has been indicated to the Tourism Commission that the processing of caustic soda will result in the release of a smelling vapour.

The presence of this odour may become an annoyance to not only residents but may also be evident to visitors. Visitors may take offence to the odour resulting in decreasing visitation to Pinjarra.

The odour may hinder tourism and residential development in the surrounding area. During time of prevailing winds it may be likely that the odour may carry. Prospective developers would consider such deterrents in their feasibility studies.

Radioactive Omission

Tourism developers have indicated concern as to the venting of the radioactive gases, Radon and Thoran from the proposed plant.

From advice that the Tourism Commission has received, it is evident that although Radon and Thoran have a relatively short 'half-life', it is during the decaying stage that radioactive solid products are produced. These solid particles remain radioactive for a prolonged period of time and have the ability to attach themselves to dust. The inhaling of this dust is the area of concern. (Environmental Chemistry, published by WH Freeman- New York (1995) - "Radioactivity: Air Pollution from Radon Gases", Colin Baird)

From a tourism developer's perspective, the success of the development is largely dependent on residential land sales. Developers fear that the presences of additional radioactivity, in excess to that occurring naturally, will deter 'buyers' from considering Pinjarra. This may result in poor residential sales and the likelihood of the cancellation of the tourism component.

Recommendation
That further investigation is undertaken to identify:
- **Prevailing wind patterns and the possibility of radioactive gases being dispersed by the winds**
- **Effect of radon and thoran levels on the community**
- **Possible odour omission**

• Waste Management Issues

The ERMP indicates grave public concern for the management of waste products produced from the processing plant. From a tourism perspective, there is concern of possible leakage or accidents during the handling, transporting and disposing of the waste material.

There is also fear as to the possible pollution of the river system by the seepage of effluent from the evaporative ponds.

Recommendation
That further investigation is undertaken into the waste management issues.

That the evaporative ponds are investigated as to possible seepage of effluent into the river system.

Tourism Development

In recent years tourism has re-established itself in the Peel Region. This is evident by the increased presence of tourism developments. Mandurah in particular, is experiencing a 'boom' with the development of the Mandurah Quay and Port Bouvard.

The Shire of Murray is also attracting the interest of the international investor. The Tourism Commission's Tourism Development Register (June 1995) indicates that there are currently four projects in either the concept or planning stages within the Shire of Murray.

It is concerning that the Environmental Review has not addressed the presence of these tourism developments or consulted with the proponents to ascertain the impact the Rhone Poulenc project may have on future tourism investment.

A list of prospective tourism developments is listed below:

PROJECT	DEVELOPMENT PROPOSAL
Murray Airfield/Golf Course/Resort Complex (Developer: RDG Investments)	120 resort units, 86 condominiums, convention centre, 9 hole golf course, airfield & hangars
Ravenswood Sanctuary Resort (Developer: Everland P/L)	120 room hotel, holiday apartments and chalets, golf course, Italian resort health spa, 1050 residential sites, theme park, retirement village
Murray Lakes Golf Course (Developer: Murray Lakes P/L)	Hotel, golf course, club house, residential sites
Point Grey Development (Developer: Robert Day Group)	2,000 Residential village, 18 hole golf course and resort hotel and apartments

There is always the likelihood that any of the above developers may re-consider investing in the Peel Region if the Rhone Poulenc plant is considered a threat to the success of the tourism venture.

Recommendation
That consultation is undertaken with the tourism development proponents to ascertain the impact that the Rhone Poulenc project may have on their tourism developments.

Economic Impact

Tourism is one of the State's most rapidly growing industries, it is an industry which provides many economic and social benefits to regional communities such as Pinjarra. Such benefits include;

- Tourism dollars contribute to a community's economic well-being and keeps the lid on local taxes.
- The jobs tourism creates locally can help strengthen communities by re-uniting families and providing career opportunities within the community for future generations.
- Local Government spending on tourism requirements such as picnic facilities, boat ramps, the overall beautification and restoration of the landscape and landmarks are all positive benefits. These facilities will be enjoyed by the community and not only the tourists.
- The flow-on benefits of the tourism dollar creates work for many people, not even directly associated with tourism, such as chemists, hairdressers, plumbers etc.
- Improvements to the area, and appreciation of what the area has to offer, usually results in a positive and welcome transformation in community pride and attitudes.

As previously acknowledge, Pinjarra is dawning on a new tourism boom. Highlighted below are statistics to indicate the economic benefit of tourism to the Shire of Murray.

	Ravenswood Sanctuary	**Murray Airfield**	**Murray Lakes**	**Total**
Employment Creation				
Construction phase	100 per annum for 8 years	120	30	250
Permanent positions	40	300	20	360
Construction Cost				
Total project	$159 M	$27 M	$50 M	$236M
Tourism component	$ 38 M	$27 M	$20 M	$ 85 M

*** *PLEASE NOTE THE POINT GREY DEVELOPMENT IS YET TO FINALISE DETAILS*

*** *STATISTICS PROVIDED BY THE DEVELOPMENT PROPONENTS*

Tourism generates approximately 12 jobs for every additional million dollars of investment. It is reasonable to assume $100 million of tourism investment in the area in the next 10 years. If the projects goes ahead as planned, 1200 permanent jobs will be created.

In comparison, the Rhone Poulenc Project:

Employment Creation	
Construction phase	150
Permanent positions	50
Construction Cost	
Rare Earth	$50 M

(plus $50 million for the Gallium Plant)

Implications on the Tourism Industry

There have been incidences in the past where media coverage has been responsible for unfavourable publicity and stereotyping. The Australian tourism industry thrives on positive promotion about the country, its people and the Australian way of life.

Any negative publicity has implications far reaching than the event itself. For example the recent NSW Bangalore Forest murders received international notoriety as 'The Backpacker Murders'. This publicity had a damaging affect on the Australian backpacker industry.

Today's global climate is one that nurtures environmentally friendly projects and frowns upon nuclear or radioactive activities. In the event that the Rhone Poulenc plant experiences a major accident causing radioactive spillage, there is every possibility that Pinjarra, Perth, and in fact Western Australia will attract unfavourable international focus.

The effect on the international tourism market place needs further investigation. In various market places, especially Japan, UK and South East Asia, the consumer is greatly influenced and guided by the retail travel agent.

Should the travel agent receive knowledge of a rare earth plant with radioactive association it is likely that the 'smart' travel agent will discourage visitors from travelling to that particular destination.

Travel agents will not risk a travel compensation damage claim for the loss of enjoyment, in the event of a radioactive accident. It is simply easier to direct consumers to destination where there are no industrial risks.

The implication of this Rhone Poulenc plant is not confined to Pinjarra and the Peel Region but has ramifications on the entire Western Australian Tourism Industry, an industry which currently contributes $2.1 billion and 76,300 (May 1995) tourism related jobs to the State's economy.

Project Life

The ERMP indicates that the Rhone Poulenc project has a life span of approximately 20 years. Although the ERMP demonstrates a 'decommissioning and rehabilitation programme' there is a need to investigate the land use opportunities and value of the plant location after the departure of Rhone Poulenc.

There is also a need to consider long term economic viability for the Shire of Murray. Once the Rhone Poulenc plant has completed operations what will replace the employment and earnings for the municipality?

Earlier this year the State Government released the 'Value of Tourism' campaign which promoted the slogan, 'Tourists go hand in hand with our Future'. Tourism is one of the few industries which provides for long term economic, social and environmental sustainability of regional areas.

Conflicting Land Use

It is evident that tourism is incompatible with some industries. For example, the sensory and perceptual impact of the Kwinana industrial area renders it unsuitable for tourism development of any significant scale. The same holds true for the Kewdale and Osborne Park areas. Governments at all levels make their choices regarding land use and certain consequences follow.

Government needs to consider Statewide land use planning to eliminate the opportunity of industry conflicts. Pinjarra, is currently experiencing such a conflict between heavy industry, rural activity and tourism.

Recommendation
That State and Local Governments establish and implement a Statewide land use planning strategy.

Bibbulmun Track

Opened in 1979, the Bibbulmun Track is Western Australia's first long-distance walking track. The track travels 650km from Kalamunda to Walpole, however, extensions will see it extend to Albany and increase the distance to 830km.

The Track winds through the pristine conservation parks and state forests of the spectacular Dwellingup area. An area that is renowned for its heritage and natural values.

Bushwalkers and nature lovers may find the location of the Rhone Poulenc plant in direct contrast with the experience they wish to encounter.

RHÔNE-POULENC

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February 16, 1996

The Chairman
Environmental Protection Authority
Westralia Square
141 St. George's Terrace
Perth. W.A. 6000

Attn: Ms. Xuan Nguyen

Response to the Submission by Western Australian Tourism Commission (W.A.T.C) - (ERMP - Proposed Rare Earth Plant, Pinjarra).

In the above submission, the Tourism Commission has made a number of recommendations.

Rhone-Poulenc's response to those recommendations are listed below in the sequence listed in the Tourism Commission's submission.

It is to be noted that Rhone-Poulenc, at the request of the Department of Environmental Protection, responding only to the recommendations highlighted in the Western Australian Tourism Commission submission.

RECOMMENDATION 1
(Page 4 of submission)

Rhone-Poulenc does not believe further investigation is required to determine the most appropriate travel route.

During the course of the project, Rhone-Poulenc considered transport route alternatives for the transport of gangue residue. The selection of the route was based on route selection criteria presented in section 2.4.2.3 and on Figure 2.2. in the Evaluation of Alternatives section of the ERMP.

An assessment on route selection was conducted in liaison with officers from Main Roads Western Australia and the Department of Minerals and Energy (DME).

From the assessment, only one route was identified which satisfied the route selection criteria and was preferred by Main Roads and DME. This was the northern route shown as Figure 2.2 of the ERMP. Rhone-Poulenc, therefore, proposed this route as the preferred route and carried it through to the project description where the route was assessed for potential impacts and management.

Rhone-Poulenc is sensitive to departure and travelling times for heavy road vehicles for all incoming goods, products and the gangue residue. Where possible it will schedule these vehicles to avoid community-sensitive times.

RECOMMENDATION 2
(Page 5 of submission)

Rhone-Poulenc believes that the overall social impacts of its project will be beneficial, including employment opportunities during both construction and plant operation, multiplier effects to the community, local business opportunities, new skills and training to the community.

There are many examples where mining operations and industrial plants provide great interest to tourists. These include monazite producing plants. At Pinjarra there is a fine example of Alcoa providing guided tours of its alumina refinery and bauxite mines.

Properly packaged, there is no reason why the Rhone-Poulenc plants could not be promoted as a tourist feature. Many people would be interested in visiting the gallium and rare earth plants as they are unique, employing high technology equipment and are the source of raw materials for many environment enhancing products.

There will be no adverse social impacts on the general community due to the following:-

a) The proposed plant is located approximately 10 kms from the town of Pinjarra and even further from the proposed and existing tourist developments listed in the submission.

b) The plant will occupy 0.6 hectare of a 515 hectare site. The site has screen plantings and a hardwood plantation on approximately 495 hectares of buffer zone.

c) The plant cannot be seen from the Hotham Valley railway line and is only visible from small sections of the Pinjarra - Williams Road.

The naming of a new locality or ward for the Alcoa and Rhone-Poulenc plants is not a matter for Rhone-Poulenc. However, if the local tourism industry is in favour of distinguishing this industrial area, then Rhone-Poulenc would support the concept.

RECOMMENDATION 3
(Page 6 of submission)

Modelling of radon and thoron emissions from the plant was carried out using the DEP's worse case MAXMOD prediction model. Results are detailed in the ERMP (p6.33 to 6.35 inclusive). A worse case scenario at 500 metres downwind of the plant predicts a radon level of 19Bq/m^3 which can be compared to the average radon concentrations in houses in Australia of 11Bq/m^3. Under other stability conditions, radon levels are between 1 to 4 Bq/m^3.

The ERMP considers the worse case scenario of 100% of the radon from the monazite being released into the atmosphere. Even in this unlikely scenario, the radon emissions will be at least nine times less than the natural radon emanating from the Company's property. The process is contained within vessels and pipes, therefore, the amount of radon actually released will be much less than this worse case scenario.

From these predictions there can be no impacts on the community from radon and thoron emissions from the Rare Earth Plant.

None of the chemicals used in the processing of monazite is considered to be odorous. Therefore there will be no odour emissions from the plant.

The advice that the Tourism Commission received on odours from processing with caustic soda is incorrect. It is possible there is a confusion with the distinct, but not offensive, odour from processing bauxite with caustic soda. This odour is due to organic matter in the bauxite and not from caustic soda. The rare earth plant does not process bauxite and will not have an odour.

RECOMMENDATION 4
(Page 6 of submission)

Waste management issues are described in the ERMP Section 6.3 (p6.18 to 6.24 inclusive).

Emergency response procedures for the transport of gangue waste have been documented in a separate Emergency Response Plan (ERP). This ERP, now in draft form, is outlined in the ERMP (Appendix H).

Details on the evaporation ponds are presented in Section 3.5.1 and Section 6.3 of the ERMP. Groundwater Monitoring Data is presented in Appendix I and Contingency Planning for the Evaporation Ponds is presented in Appendix J of the ERMP.

Rhone-Poulenc cannot add to the information already detailed on waste management as recommended by the Tourism Commission, unless there are specific issues the Commission would like clarified.

RECOMMENDATION 5
(Page 7 of submission)

The WATC recommendation that consultation with tourist development proponents be undertaken is appropriate. Rhone-Poulenc adopted this approach in April 1995, immediately after it announced its intention to seek approval to develop a rare earth plant on its Pinjarra site. The company has increased its efforts towards this consultation in recent months and will continue to do so. It intends to work with the W.A.T.C. with a view to setting up briefing meetings for interested tourist operators.

On p7 of the WATC submission, there is a comment that "any of the above developers may reconsider investing in the Peel Region if the Rhone-Poulenc plant is considered a threat to the success of the tourism venture".

Rhone-Poulenc was able to contact one of these developers (Murray Lakes Pty Ltd.) who advised that the company project was seen as an advantage, as it provided a source of potential sales from prospective workers engaged in the project.

Rhone-Poulenc contacted a number of tourism operators including the Hotham Valley Tourist Railway, Murray Lakes Resort, Pinjarra Tourist Centre Inc., Nanga Bush Camp and the Tourism Council of Australia.

These operators have assured the company that they have no concerns with the proposed rare earth development.

On 11 January 1996, Rhone-Poulenc attended a tourism workshop in Pinjarra.

This was attended by approximately 20 people. These people represented the catering industry, Hotham Valley Tourist Railway, Peel Region Tourism Council, caravan parks, Everlands, Fairbridge Farm, arts and crafts etc. This was a representative cross section of the tourist industry and supporting services.

Mining was the only perceived impact on the industry. It was mentioned only briefly and in passing. Rhone-Poulenc was not mentioned at all.

Rhone-Poulenc will continue to liaise with the Western Australian Tourism Commission to identify ways for the rare earth project to have positive impacts on tourism developments particularly through conducting plant tours. The rare earths and gallium plants are state of the art and produce finished products which are raw materials for a range of high technology industries. They are expected to attract visitors to the area.

RECOMMENDATION 6
(Page 10 of Submission)

Rhone-Poulenc supports the existing State and Local Government planning processes. It is not able to comment on the merits of new planning strategies.

Yours sincerely,

M.J. Webb
Operations Manager

SUBMIS8A.WPS

Appendix 6

List of submitters

List of submitters

Government Agencies

Commonwealth Environmental Protection Agency

Department of Minerals and Energy

Radiological Council/Health Department of WA

Water and Rivers Comission

Main Roads WA

Department of Transport

WA Tourism Commission

WA Fire Brigades Board

Shire of Murray

Shire of Yilgarn

Shire of Serpentine-Jarrahdale

Public

The Country Women's Association of WA Inc.

Peel Preservation Group Inc.

Everland Management Pty Ltd

Dwellingup Greenbelt Committee

Nield Consulting Pty Ltd

Radiation Health Physicists (Messrs L Munslow Davies, M W Rafferty, G C Kerrigan)

Merredin Volunteer Fire Brigade

T.S. Plunkett Pty Ltd

Conservation Council of WA Inc.

Murray Conservation Group

Goldfields Against Serious Pollution (GASP)

The Royal Chemical Institute (WA Branch)

Peel Harvey Catchment Support Group

Ms E Horne (Statewide Network of Action Groups)

Dr H Cohen

Mr R Martin

Mrs R Martin

Mrs A Clifford

Mr A G Thomson

Ms S Kree Eyre

Mr and Mrs Radford

Mr P Hawke

Mr B Maiolo

Mr R Maiolo

Mrs A Maiolo

Mr J Smith

Mr and Mrs Smith

Ms D Steinbacher

J Gallagher

J York

Mr Vaughan

D Larke

A Larke

G Larke

A Vaughan

B Patterson

Mr D Stone

Mr J Buckley

Mrs M Sewell

Mr B Sewell

D F Challen

Mr W Smith

Ms P Miles

Ms R Martin

Mr P Colum

Mrs L Nancarrow

Mrs R Colum

Ms J Crofts

Ms C Gava

Ms C Sherwin

P C Alley

W R Hendry

Mr R J Smith

D E Stone

Mrs J Giumelli

Mr R Giumelli

Ms M Bingel

Mr and Mrs Gunn
Mr P C Cook
Mr I H Watkins
Mr N Conway
Mr G N Marston
Mr A Martin
Mr T Curtis
Ms J M Waters
Ms J Vallentine
Mrs R Hull
Mr R Hull
Mr T S Gardner
Mrs J L Gardner
Mrs V R Bennett
Mr D R Bennett
Mr K Rhodes
Mr J Rhodes
Mrs J Rhodes
D Simmonds
Mrs Robertson
P T Brayn
Ms E M Brayn
Ms S Cudby
Ms T Campbell
Mr P M Darbin
Ms L O'Meara
Ms S Scott
Ms J Workman
Ms N Kinal
M J Rhodes
S L Smit
Ms T Rhodes
Ms B Ethrington
J M Etherington
E A Etherington
J K Crozier
H M Crozier
S Edwards
Mr and Mrs Flemming
P A Beer

G Jewell
Ms T Mayo
Mr M Mayo
E Summerfield
S Munday
Mr C Turner
Mr C Birtles
Ms J Gliddon
Mr A D Froude
J Rutherford
Ms R Spann
Mr D Spann
S Fiander
Ms D Watts
Ms G Franklin
Mrs S Terzic
P O'Louglyhid (?)
W Herbertson
D Herbertson
Ms F Grant
Ms V Edwards
Mr D Steinbacher
Mr D Sturgoon
Mr A Laird
Ms P Laird
Ms J Hughes
E M Perham
Mrs C Geshel
W Bloonfield
Mr D Phillips
Mr P Roberts
J Rutherford
Mr J Aulsebrook
J W Gestec
Ms S Sturgoon
Mr R Aulsebrook
S Nancarrow
Ms D MacMillan
A E Phillips
P M Elrington

Mrs B Hartley
Mr W Hartley
G C Bladged
Ms June Badham
A P Culbertson
B Godwin
Mr L Ingram
Mrs D Cowan
Ms J Crosswell
Ms J Francis
Ms G M Williams
F Maranta
J H Williams
Mr G McLarty
Ms D J McLarty
Ms A M Powell
Ms R Hamdorf
Ms E Winning
Mr J Clifford
Dr M Hamdorf
Mr and Mrs Bennett
Mr and Mrs McKay
Mr B Radford
Mrs M Radford
J Clark
Ms D L Anderson
R Cocivera
L Cocivera
M Cocivera
C Cocivera
M Jordan
A Morris
P Burton
Ms T Castellas
Ms T Stewart
Ms K Stokes
S A Hambly
Ms R Lorimer
Ms J Cukrov
Ms Kristi Mortas
Ms A O'Rourke
Mr G Warren
M Dobra

C A Slater
Mr T J Ross
A M Staines
C M Steinbacher
Mr T Rodgers
Mr T Moorison
Ms C Brown
Ms P Jacques
Ms S Macers
EB Cartwell
Mrs M Connelly
Ms J Fairweather
Mr D Seymour
Mr and Mrs Foulkes-Taylor
Ms D Challen
G J Smith
Ms R James
Mr and Mrs Gunn
Mr R Ellul
Mrs D Ellul
Mr D Klhitton
Mr G Heeley
Ms J Bennett
E S Nancarrow
K Eyre
Ms V Eyre
B J E ?
Ms D Gunn
C J Nancarrow
Ms E James
Ms and Mrs Burkett
Mr P Bennett
Ms M Seymour
B Stewart
C J Gunn
Ms C Michalowsky
Mr G Cull
Ms A Smith
Mr W Morley
D G Seymour
Mr P Zuks
Mr R Ellul
E Houghton

G L Littay
L Howard
Ms J Simper
Mr P Simper
Mr P J Gray
Ms J Gray
Ms M Fay
Mr G Challen
Ms J Croft
Mrs J I Moore
Mr G J Droppert
E A Watson
Mrs M Watson
Ms E Pinell
Ms M Tranah
D M Munday
A W Tranah
F Nagi
J R Williams
E M O'Meara
B J Austerberry
Ms G Walton
Mrs K Hill
D W Hill
J Heads
L Neubauer
E Neubauer
Ms M Brown
J D Sayer
Ms M Benaim
Mrs V Fraser
Mr R Fraser
Mrs I G Attrill
Mrs P Stewart
Ms D A Hunt
Ms J Boyd
Ms S Boreski
E M Smith
M J Smith
M E Seymour
Mr and Mrs Kemsley
Ms B E Armstrong
N G Armstrong

L T Nelson
Ms M Martin
Ms J D'Orsa
C A Pickles
D G Nelson
N and L Pemberton
Mrs M McCormick
Mr E McCormick
Mr and Mrs Gallagher
R M Connelly
Mr W F Wilson
Ms D Ingram
D Harman
Ms S Ludbey
Mr C D Lambert
M Sewell
A Sinclair
A H Pickles
E Roetheli
Mr C Bond
Mr P M White
Ms A Moore
Ms G M Howson
G A Stewart
P J Coxon
Mrs K Harris
Mr I S Horton
Ms K Horton
Ms S Phillips
Mr K Phillips
Ms J Blyth
Mr R L Ewing
Ms N Bussell
Mr A Wesley
J E and K L Steinbacher
Mr A R Martin
Mr R Martin
Ms A Smith
Mr G Cull
Mrs D Honeybone
J L Wesley
Mr RA Adam
Ms C Gava

Mr M Hayward
Mrs M Hayward
Mr and Mrs W Kosleszyn
Mr and Mrs Patterson
Mr J Clifford
T J Robinson
R Dallavolta
M Mc Kenna
L Dallavolta
P S Beaver
Mr W Smith
Mr P A Summerfield
H M Buld
Ms M Davies
Mrs L Seyton
G Giles
S Giles
J Barns

Mr P Davis
R J Drayton
G Grant and P Costa (+)
Mrs M Tropiano
Dr A Tropiano
Mr and Mrs Florides
L J Wheatley
M T Howell
Mrs T A Folezzani
J C Lepper
M Ellis
J E Richards
Ms E Richards
A W Dorling
Mr N R Jones
N R Jones
Ms S Jones
A McG Hancock

Appendix 7

Proponent's consolidated list of commitments

Proponent's consolidated list of commitments

During the preparation of the Response to Submissions, the proponent thought it appropriate to modify and expand its List of Commitments presented in the ERMP (Section 8.0) to ensure all of the issues raised in the submissions will be managed in an environmentally acceptable manner. The consolidated List of Commitments is as follows:

1. During all phases of the project, the Proponent will comply with all applicable standards and regulations pertaining to and appropriate for a chemical and mineral processing plant and for waste disposal.

2. The Proponent will transport the low level radioactive gangue residue in compliance with the Code of Practice for the Safe Transport of Radioactive Substances (1990) and will develop an Emergency Response Plan, prior to any transport of the waste, to deal with an accident.

3. The Proponent will prepare an emergency response plan for the transport of the low level radioactive gangue residue, outlining the emergency and clean-up procedures in the event of an accident, in consultation with the DEP, DME, WAFBB and the Radiological Council.

4. The Proponent will ensure that drivers attend approved Driver Training Courses including specific training for the transport of radioactive materials prior to any transport of waste materials. Refresher courses will be conducted at least yearly. This will be a condition of contract with the transport operators. The companies transporting radioactive material shall, under the Radiation Safety Act, 1975-1981, hold an appropriate licence.

5. The Proponent will liaise with all relevant Government agencies, local authorities and emergency response groups along the proposed gangue residue transport route, prior to any transport of waste materials, to ensure there are appropriate emergency response management measures in place, including adherence to designated road routes. The proponent is prepared to provide any specialised equipment necessary for emergency or spillage clean-up operations, which will be included in the inventory of items to be provided by Rhone-Poulenc's emergency response team.

6. Emergency Management Teams and Field Response Teams will be trained in emergency response and clean-up procedures, prior to the transportation of waste and with refresher courses conducted yearly. Training will be funded and co-ordinated by the Proponent.

7. A shipment manifest for each load will be prepared prior to disposal operations in accordance with the Code of Practice for the Safe Transport of Radioactive Substance (1990) by the Proponent detailing the following information:

   - waste specification;
   - transport identification;
   - waste description;
   - approval certificate; and
   - declaration.

   The specific manifest will accompany each truck load of gangue residue.

8. If the waste delivered to the IWDF is found to not meet the required specifications it will be returned to the plant for reprocessing. The Proponent will investigate and identify the reason for non-compliance and modify procedures to minimise the risk of repeating such non-compliance.

9. The Proponent will dispose of all process and non-process wastes in an environmentally acceptable manner and in accordance with licensing and other requirements from the DEP, DME, Water and Rivers Commission and the Radiological Council throughout the life of the project.

10. Any additional ponds required for the project will be constructed by the Proponent according to the design standard approved by the DEP and Water and Rivers Commission.

11. To ensure that there will be no significant radionuclide disposed in the ponds, all effluents to the ponds will be analysed to determine if there are any traces of radionuclides and to ensure these levels are below the levels acceptable to the DME, Radiological Council, Water and Rivers Commission and the DEP.

12. The existing evaporation pond and groundwater monitoring systems have been approved by the DEP and Water and Rivers Commission. The monitoring bores have been and will continue to be monitored by the Proponent for both groundwater level and groundwater quality on a routine basis. The evaporation ponds and underdrainage sumps will also be monitored for level and quality. The results of the monitoring will be made available to the DEP at a frequency to be determined. If results indicate that leakage from the ponds is entering the groundwater under the site the DEP will be notified immediately.

13. The RMP prepared by the Proponent will include a monitoring programme to determine the content of radionuclides in groundwater, surface water, effluents to the ponds and water in the ponds.

14. The Proponent will provide further information to the Water and Rivers Commission prior to plant commissioning, on the integrity of the evaporation ponds and the potential impacts on groundwater quality, and on water storage, drainage and water courses in the vcinity of the site.

15. The Proponent will implement contingency plans should there be any leakage from the ponds throughout the life of the project and remediation procedures will be undertaken.

16. The Proponent will fund, in agreement with the State Government, the following aspects of waste disposal operations:

- planning of site operations with respect to Rhône-Poulenc's waste;
- disposal costs;
- backfilling and rehabilitation of the trench area;
- monitoring of the disposal operations of Rhône-Poulenc's waste;
- contribute to long term monitoring at the IWDF site;
- contribute, together with other users of the road, to the maintenance of the IWDF access road;
- a provision for maintenance and any costs of remedial work necessary in the first five years after a disposal operation; and
- the proportion of salaries and overheads for agreed Government management staff and site management contractors in relation to disposal of Rhône-Poulenc's gangue residue, including a proportion of out-of-pocket expenses related to the involvement of Government staff on the technical committee.

17. Gangue waste disposal operations including transport will be subject to an annual audit in accordance with the Code of Practice for the Near-Surface Disposal of Radioactive

Waste (NHMRC, 1992). The auditor will be selected by the Government to the satisfaction of the Radiological Council.

18. The Proponent will comply with the requirements of the applicable legislation and codes of practice relating to radiation protection.

19. Details on final plant design will be made available to DME on completion of design.

20. The Proponent is committed to the ALARA principle (that radiation dose be kept as low as reasonably achievable, economic and social factors being taken into account) in accordance with DME and the Radiological Council regulations.

21. A comprehensive Radiation Management Plan (RMP) will be prepared by the Proponent for the Rare Earth Plant and its environment and submitted for approval from the DME, DEP and the Radiological Council prior to commencement of operations. The RMP will include pre-operational, operational and post-operational monitoring for:

- gamma radiation;
- radon flux; and
- radionuclides in air, water, soil and sediment.

22. The Proponent will implement the following strategies for the radiation protection of plant personnel:

- Controlled areas will be established to include the monazite handling and storage facilities, filtering stages, purification area and residue handling/transport/disposal facilities and areas.
- Handling of potential dust generators (monazite and residue) will be minimised to reduce air contamination; in particular, wet milling of monazite and disposal of residue in moist form will be undertaken.
- Adequate ventilation will ensure that radon and thoron daughter levels are maintained within acceptable levels.
- Supervised areas and appropriate procedures will be established to limit access by members of the public to the plant site.
- Where necessary, equipment containing bulk quantities of radioactive material will be shielded to reduce exposure rates.
- Equipment in controlled areas will be selected and designed for reliable operation and ease of maintenance.
- Floor surfaces in controlled areas will be non-absorbent and designed for reliable operation and ease of maintenance.
- Facilities will be provided for easy washing of floors and equipment. All washings will be returned to the process via floor sumps or the purpose designed wastewater treatment plant.
- Designated staff will be trained in radiation protection practices.
- Protective equipment and clothing will be issued to workers, where required. Such workers will be fully trained in the use of this equipment.
- Special clothing worn by plant operators will be laundered on-site with changerooms specially designed to allow work clothing to remain on-site.

23. Prior to commissioning of the plant, a comprehensive survey of the existing radiation environment at the Pinjarra site will be conducted by the Proponent as required by DME and the Radiological Council.

24. The Proponent will implement a comprehensive monitoring and health surveillance programme for Rare Earth Plant personnel according to the requirements of DME and the Radiological Council.

25. The Proponent will establish an operational dose constraint for plant personnel of 10mSv/yr to be agreed upon with DME and the Radiological Council. Should any other worker exceed this dose constraint, on a pro rata basis, the circumstances relating to that exposure will be investigated and measures taken to ensure that the dose to an individual of 10mSv in any one year will not be exceeded.

26. Monitoring of radiation levels by the Proponent will continue over the life of the project. Reporting of radiation monitoring data and record keeping will be undertaken by the Proponent in accordance with the applicable legislation of DME and the Radiological Council.

27. Radiation protection assessments given in the ERMP will be verified by the Proponent during plant commissioning, to the satisfaction of the DEP, DME and Radiological Council.

28. An operational dose constraint of 2mSv/yr will be established by the Proponent, in agreement with the Radiological Council for drivers transporting the gangue residue. Should a driver exceed this dose constraint on a pro rata basis, the circumstances relating to that exposure will be investigated and measures taken to ensure that the dose to an individual driver of 2mSv in any one year will not be exceeded.

29. Plant and employee safety will be maximised by the Proponent ensuring that the storage and handling of hazardous materials such as process chemicals is in accordance with the relevant statutory standards and codes.

30. Construction activities at the plant site will be undertaken in accordance with the statutory requirements and appropriate management techniques will be implemented to ensure that noise levels are within acceptable limits.

31. The proponent will conduct modelling of noise emissions from plant operation and construction and submit the results to the DEP at least one month before commencing the plant construction.

    The proponent will conduct plant noise surveys (including baseline measurements) in consultation with the DEP, and will provide a report to the DEP detailing measurements and assessments made (including the impact of tonal noise) to confirm compliance with acceptable limits, within three months of the commissioning of the plant. Appropriate actions will be taken by the Proponent to rectify any noise problems should levels exceed those in noise regulations and to reduce noise levels to meet those specified in the DEP regulations.

    Appropriate management procedures will be implemented to ensure that construction noise levels are within acceptable limits, and that noise impacts from heavy vehicles associated with the project are minimised

32. The Proponent will implement management procedures to ensure impacts from transport of materials, including noise impacts from heavy vehicles, are minimised. Management procedures will include the restriction of truck movements wherever practical to Monday to Friday business hours and to outside peak traffic and school bus time, and the use of contractors whose trucks which comply with the Australian Design Rule noise emissions.

33. The Proponent is committed to achieving certification of ISO 9002 for both the Rare Earth and Gallium Plants and will operate a quality assured system.

34. The Proponent endorses the concept of a Community Liaison Committee which will encourage the active involvement of local residents and Shire of Murray officials in the monitoring process at the Pinjarra plant site.

35. The Proponent will liaise with the Mt Walton Community Liaison Committee, local Shires and interest groups on the transport, disposal, safety and environmental issues relating to the low level radioactive gangue residue.

36. The Proponent will liaise with the WA Tourism Commission, Pinjarra tourism operators and local agricultural industry to clarfy the "perception" regarding radiation.

37. The Proponent will ensure that the best practicable technology is applied throughout the life of the project where best practicable technology is defined in Clause 1(3) of the Radioactive Waste Management (Mining and Milling) Code (1982) as:

> *"that technology, from time to time relevant to a specific project, which enables radioactive wastes to be managed so as to minimise radiological risks and detriment to people and the environment, having regard to:*
>
> *(a) the achievable levels of effluent control and the extent to which pollution and degradation of the environment is minimised or prevented in comparable mining and milling operations elsewhere;*
>
> *(b) the cost of the application or adoption of that technology relative to the degree of radiological and environmental protection expected to be achieved by its application or adoption;*
>
> *(c) evidence of detriment or lack of detriment to the environment after the commencement of mining or milling operations;*
>
> *(d) the location of the mine or mill;*
>
> *(e) the age of the equipment and facilities in use for mining and milling purposes and their relative effectiveness in achieving radiological and environmental protection; and*
>
> *(f) the potential hazards from the wastes over the long term".*

38. In addition to complying with the requirements of the Radiation Protection (Mining and Milling) Code (1987), the Radioactive Waste Management (Mining and Milling) Code (1982) and the Code for Disposal (NHMRC, 1992) the Proponent will meet any future changes in these (and other relevant) standards throughout the life of the project.

39. The Proponent will prepare reports detailing the environmental management and performance of the plant which will be submitted to the DEP for review at least every five years.

40. Decommissioning by the Proponent will be undertaken in accordance with statutory requirements in force at the time and in a manner acceptable to the Minister for the Environment.

41. The RMP prepared by the Proponent will include procedures to be approved by the DME and Radiological Council, for decontamination of radioactive components of the plant and post-operational monitoring.

42. Upon decommissioning, the Proponent will ensure all free water is evaporated from the ponds prior to placing materials over the ponds. All aspects of rehabilitation of the ponds will be investigated at the time of decommissioning including the design of the cover material. Pond rehabilitation will be developed and designed to the satisfaction of the Minister for the Environment.

Appendix 8

Emergency response plan for transport of Gangue residue

Rhône-Poulenc Chimie

Pty Ltd

Gangue ResidueTransport Emergency Response Plan

Pinjarra Rare Earth Plant

Western Australia

This Plan will be communicated to emergency response groups and local shires along the transport route from Pinjarra to Mt. Walton. This may result in further revisions to the Plan.

This plan was devised in December 1995.
and reviewed by:
Dangerous Goods Transport Branch (Department of Minerals and Energy W.A)
Radiation Health Section (Health Department of Western Australia)
Department of Environmental Protection
W.A. Fire Brigades

The Plan must be reviewed on or before 8 December 1996, or after any transport emergency where this plan was invoked

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Prevention

Preparedness

Response

CONTENTS, continued

Introduction

1. Transport Emergencies

Transport emergencies are defined as any un-planned event occurring during the course of transporting gangue residues from the Plant Site at Pinjarra to the IWDF which has the potential to pose a threat to people and the built or natural environment. The definition covers such events as: leaks, spillages, vehicle breakdowns or traffic accidents. Drivers despatched ex Pinjarra shall be advised that any incident which delays their orderly progress to the destination is to be reported to the Control Centre Pinjarra immediately. Where the driver is injured and cannot report, the fact that the Global Positioning System shows the vehicle stationary shall be treated as a reported emergency until proven to be for a different reason.

2. Aims

The aims of this plan are:

- to provide sufficient instructions for RP Chimie staff to deal effectively with a transport emergency
- to provide an agreed plan of action that is uniformly acceptable to all parties involved in WAHMEMS (West Australian Hazardous Materials Emergency Management Scheme)
- to minimise, by careful planning, any danger to the public, employees, members of Emergency Services and the built and natural environment

3. Objectives

The objectives of this plan are:

- to prescribe the organisation, principles, responsibilities and procedures to be followed at the time of a transport emergency
- to establish a basis for co-ordinating the activities of all interested parties at State, Local and Company levels in respect of transport emergencies involving RP Chimie products
- to provide a basis for the provision and co-ordination of resources required during and after an emergency
- to expedite the recovery of the community from any adverse effects of a transport incident

4. Scope

This plan is applicable to all transport emergencies arising during the transport of gangue residues to the IWDF. The procedures and responsibilities set down are for the compliance of all Rhône-Poulenc employees and the guidance of all departments and agencies of State and Local Governments. Interested community groups are to be supplied with copies of the plan for their information.

5. Substance Data

Gangue residue is generated by the Rare Earth Plant as waste from the production stream. It is radioactive but has a low level of activity . Gangue residue presents no chemical hazard. An MSDS (Material Safety Data Sheet) is shown in Annexure A to this plan.

6. Associated Documents

This plan is complementary to those at State, Regional and Local levels. It is consistent with WAHMEMS principles and forms part of the company's Safety and Environmental Management Plan for the Rare Earth Plant Pinjarra.

7. Related Organisations

This plan is co-ordinated with:

- Police Department
- Western Australian Fire Brigades Board
- St Johns Ambulance
- Hospitals on the designated route & the Sir Charles Gairdner Hospital
- Bush Fires Board
- Radiation Health Section, Health Department of West Australia
- Department of Environmental Protection
- Main Roads
- Water Authority
- Department of Minerals and Energy
- Local Government Authorities on the designated route
- State Emergency Service
- The Transport Company involved[1]

Footnote [1] See Annexure B for Selection Check-List

8. General Principles

The plan is based on the well-known principle of PPRR — Prevention, Preparedness, Response and Recovery. Each of these may be defined as:

Prevention: those measures taken to ensure, as far as is possible, safe transport. Such measures basically involve compliance with legislative measures, the selection of complying and suitable packaging and the selection of a competent carrier.

Preparedness: those activities, such as planning and training, which prepare the Emergency Services and RP staff for their role and explanatory material distributed to the wider community to aid their understanding of the hazards involved.

Response: the urgent actions taken during and immediately after an incident. It may be argued that the first five or ten minutes are the most critical in dealing with the incident successfully.

Recovery: those activities which assist the community to return to normal, ensure that the incident site is safe and that all residues are removed.

9. Relevant Legislation

A significant part of the prevention of transport incidents hinges upon compliance with legislative measures designed to assist safe transport. On this basis compliance with the under-mentioned legislative measures shall be absolute:

- *Dangerous Goods Regulations 1992 made under the Explosives and Dangerous Goods Act 1961 -1979 W.A.*
- *The Radiation Safety(Transport of Radioactive Substances) Regulations 1991 made under the Radiation Safety Act 1975-1981 W.A*
- *The Code of Practice for the Safe Transport of Radioactive Substances 1990 Fed.*
- *The Australian Code for the Transport of Dangerous Goods by Road and Rail (the ADG Code) 1992 Federal*

Those portions of the under-mentioned that are applicable shall be complied with:

- *Occupational Health Safety and Welfare Regulations 1989 W.A*
- *The Environmental Protection Act 1986 as amended to January 1994 W.A.*

The transport shall also comply with the conditions specified under the Environmental Approval for the project.

Prevention

1. Transport

Only that carrier selected by due process is to be utilised for the transport task. Any vehicle used by the carrier shall comply with all mandatory provisions of the legislation mentioned above and the *Road Traffic Act 1974.* All drivers used by the carrier are to be appropriately trained and licensed. Random spot checks are to be made by Despatch staff to ensure that the carrier complies with these requirements and that the vehicles are suitable for the task, correctly equipped and roadworthy. (See also Vehicle Check-List in Annexure C)

No alternative transport arrangements are to be made without the express permission of the Operations Manager, Rare Earth Plant, Pinjarra.

2. Route

The route approved by the Minister for the Environment, as shown on the map in Annexure D, is to be adhered to by all transport vehicles travelling to the Intractable Waste Disposal Facility (IWDF) at Mt Walton. Despatch staff are to verify, prior to despatch, that the drivers understand the route they are to follow and the nominated places at which they may stop for rest periods. **No alternative route may be used** without the express permission of the Operations Manager, Rare Earth Plant, Pinjarra.

3. Other Driver Briefing

Despatch staff are to ensure that drivers read and understand the Emergency Procedure Guide supplied. The staff are to verify that the driver understands the method of operating the GPS unit and the radio. No driver is to be permitted to leave the premises with a load unless the staff are satisfied that the driver understands all relevant procedures including the radio/GPS checks set out below.

4. Testing GPS and Radio Contact

All drivers are required to test communication with the Pinjarra Control Room prior to leaving the Plant and on joining the Great Eastern Highway. Should communication or the GPS be unsatisfactory at that point the driver is to telephone (using the 1800 number) and report for instructions.

Communications are to be checked again on arrival at Merredin, Southern Cross and Boorabin. On each occasion the driver is to telephone via the 1800 number if unable to make radio contact. The person on duty in the Control Room is to decide if conditions are favourable for the journey to continue using telephone checks to verify location and instruct the driver accordingly.

If radio communication fails and the telephone system is to be utilised or the journey temporarily delayed, the Operations Manager, Rare Earth Plant, Pinjarra is to be advised immediately.

5. Loading

A person nominated by the Despatch manager is to carry out the following checks:

- All bulka bags are to be inspected prior to placement in shipping containers. Any bag showing signs of damage is to be rejected and put aside for re-packing.
- Shipping containers are to be inspected prior to loading with bulka bags and prior to placing on road vehicles. Any damage affecting the weather proofing capability of the container are to be rejected. Special attention is to be paid to container locking points for rust, corrosion or damage affecting the unit's ability to hold the locking pins.
- Trailers are to be inspected to ensure that all container locking pins are fully serviceable. See also Vehicle Check List in Annexure C.

On no account are vehicles to be loaded over their permissable gross mass. No other goods are to be loaded on vehicles carrying gangue. Containers are to be locked and sealed after packing.

6. Post - Loading Radiation Check

When loading is complete a radiation check of the surface of the container and vehicle shall be carried out by a person nominated by the Despatch Manager. Radiation levels shall be recorded in a book kept for that purpose in the Despatch Office. Any vehicle where the radiation levels exceed 4 Bq/cm^2 is NOT to be despatched. The vehicle is to be unloaded and the Plant Manager, Rare Earth Plant, Pinjarra or the Radiation Safety Officer advised.

(Readings are to be averaged over any area of 300 cm^2 of any part of the surface vide Table III and paragraph 409 of the Code of Practice for the Safe Transport of Radioactive Substances 1990)

7. Preparation of Documentation

The Despatch Manager is to cause a Manifest to be prepared for each shipment of gangue waste leaving the facility. The detail to be included in the manifest is shown in Annexure E. The document is to be explained to the driver, placed in an envelope bearing the Manifest Number, Vehicle Registration Number and the words "Radioactive Residues – Low Specific Activity. In the event of an emergency involving this load please phone 1800 *** *** as soon as possible". The shipping manifest envelope is to be kept in the EPG Holder fitted to the inside of a cab door or, where this is not feasible, in a prominent position in the cab of the vehicle and handed to a responsible person at Mt Walton facility.

8. Emergency Procedure Guides

Every vehicle laden with gangue residue is to be issued with an Emergency Procedure Guide (EPG). The document is to be explained to each driver. The EPG is to be kept in a holder marked in red letters, not less than 10 mm high, on a white background mounted in the cabin of the vehicle. *(An example of the EPG is shown in Annexure J)*

9. Labelling & Marking

(a) Bulka Bags — The bulka bags of gangue residues are transported under "exclusive use" *q.v.* the *Code of Practice for the Safe Transport of Radioactive Substances 1990* (the Code). As such, each bag is to display the following marking:

- "Permissable Gross Mass xxx kg"
- "Industrial Package"
- An Identification Number (which may be crossed referred to a book kept for that purpose to show Vehicle, Container and Manifest under which the bag travels)
- A quarter size version of the Emergency Information Panel described below

All such markings are to be clearly legible and durable.

Each bulka bag is to display Class 7 Category III Radioactive labels on opposing sides. *(See sample label in Annexure I)*

On each label the Contents line is to have the phrase "LSA I", the Activity line is to show the maximum activity in units of Becquerels (Bq) or Curies (Ci) obtained by physical measurement of that specific bag The remaining entry — Transport Index, is determined by multiplying the radiation level at one metre from each bulka bag in mSv/h by 100. The Transport Index for the entire load is taken as the sum of the Transport Indices of all the bags multiplied by 3 *(For further information on marking and labelling bulka bags see para 440 et seq in the Code)*

(b) Shipping Containers —The shipping containers are carried under the the Code and the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (the ADG Code). Vehicles carrying containers are to display:

- On each side and to the rear — an Emergency Information Panel (EIP)
- To the front — a 250 x 250 mm Class 7 Category III label as shown below (note that these labels do not display Activity, Contents or Transport Index) Immediately below the word Radioactive the UN Number 2912 shall be entered in numerals not less that 65 mm high in black.

(A sample vehicle label and Emergency Information Panel is shown in Annexure I.)

(c) EIPs — EIPs are to be completed legibly in black letters and numerals of the height specified on page 111 of the ADG Code. Each EIP is to display the Class label as described for the front of the vehicle. (Note that EIPs and Class labels are to be removed after the vehicle has been un-loaded at Mt Walton and kept in a secure place, out of sight, on the vehicle ready for re-use)

10. Despatch

No laden vehicle is to be despatched until the following checks have been carried out by a person nominated by the Despatch Manager, or, by the Manager personally:

- Has the driver read and understood the EPG ?
- Is the vehicle displaying the correct signage ?
- Is the correct EPG in a holder in the cab ?
- Is the vehicle fitted with 2 x 30B or 1 x 60B fire extinguisher ?
- Has the GPS been tested ?
- Has the two-way radio been tested ?
- Is there a manifest in an envelope (duly marked) in the cab ?
- Does the driver have the correct PPE (Personal Protective Equipment)?
- Does the driver understand the route to be followed and the approved rest places?
- Is the driver aware that radio checks must be carried out during the journey ?
- Has a "walk-round" inspection of the vehicle (incl. container locks) been carried out ?
- Has the Control Centre been advised of an imminent despatch ?
- Does the driver understand his/her responsibilities regarding reporting accidents and following the instructions given in the EPG ?

When an affirmative answer can be given for each of the above checks and all items were found to be satisfactory the Despatch Manager may give approval for the vehicle to depart.

Aa record will be kept of such despatch checks.

Preparedness

1. Introduction

This section deals with those matters which are designed to prepare the company, the Emergency Services and the transport company for an emergency involving the transport of gangue residues to the IWDF Mt Walton.

2. Planning Policy and Responsibilities

This plan is consistent with the emergency planning policies of:

- Metropolitan Emergency Management Committee in respect of that portion of the journey which passes through the Perth Metropolitan area.
- Local Government Authorities through which the transport route passes
- Local Emergency Management Advisory Committee outside the Perth metropolitan area or, in the absence of such a committee,
- The Senior Police Officers whose jurisdiction includes the Local Government Area

This plan defines the role of the company in support of the above bodies at the time of an incident. The responsibilities and duties of Rhône Poulenc Chimie are defined as:

- To attend the emergency site when requested or required
- To provide technical advice concerning gangue residues which is available on a 24 hour basis.
- To assist as required with resource provision
- To organise and carry out the clean-up operation at the site
- Carry out all statutory reporting and other tasks as required
- To ensure that all applicable company personnel receive appropriate training in their role during a transport emergency
- That training, suitable to their needs, is made available to those members of the WAHMEMS along the route to be used that are likely to be involved in the response to an incident.
- To ensure that only a competent and trained transport company, using appropriate vehicles and drivers, is utilised for the task of carrying the gangue to the IWDF site.
- To ensure that the selected transport company is capable of supplying replacement vehicles, container handling equipment, and such other heavy equipment as may be required, at the time of an incident.

3. Organisational Structure

(a) Rhône Poulenc Chimie Emergency Response Team(ERT)

The plant ERT shall consist of:

• Emergency Controller	Plant Manager
• Alternate and assistant Controller	Despatch Manager
• Communications Officer	Shift Production Supervisor
• Technical Advisor/ Radiation Safety Officer	Chief Chemist or R.S.O.
• Recovery and Clean-Up Team	2 x Production workers
• Recovery Team Driver	1 x Production Worker

(b) Place in WAHMEMS Structure

The ERT forms part of the Support Organisations under the WAHMEMS structure and will provide support in terms of technical advice, radiation monitoring and asssistance in clean-up and recovery.

4. Duties of the ERT

The duties of the ERT are:

- To control initial reactions to reported emergencies
- To provide assistance on demand to Emergency Services
- To facilitate the provision of company resources
- To provide a trained clean-up team on demand
- To maintain a liaison link with the transport company and the Emergency Services

5. Responsibilities of the ERT

The ERT are responsible for:

- Ensuring that the RP Chimie response is timely
- Ensuring that any advice given is technically accurate and couched in terms the caller will relate to
- Ensuring that permitted radiation levels amongst Emergency Services and other workers at the site are not exceeded
- That the clean-up is conducted in a manner which ensures that all traces of spilt product have been recovered
- That the site and surrounds of an incident is rendered completely safe

The **Emergency Controller** is responsible that the ERT are deployed in an efficient manner consistent with their individual safety. The Emergency Controller is responsible for ensuring that the Alternate Controller is advised when the Emergency Controller is to be absent from the normal place of duty.

The **Technical Advisor** is responsible for ensuring that no member of the ERT receives more than the permitted radiation dose during clean-up operations. The Technical Advisor is also responsible for ensuring that all equipment and personnel are correctly de-contaminated and that contaminated clothing is removed, placed in a suitable receptacle and returned to the Plant for laundering. The responsibility of declaring the site and surrounds safe will be held by the Technical Officer in consultation with the Emergency Controller.

The **Communications Officer** is responsible that all necessary communication links are opened as soon as possible and maintained for the duration of the emergency.

The **Alternate Emergency Controller** is responsible for the ERT in the absence of the Emergency Controller and for ensuring that he or she is aware of those times when this responsibility is in force.

6. ERT Training

The Operations Manager, Rare Earth Plant, Pinjarra is to ensure that suitable training is provided for the ERT. Such training is to include, but is not limited to:

- Receiving emergency calls, passing emergency messages
- Who is to be notified of an emergency
- The nature and hazards of gangue
- Basic Radioactivity, the terms and measurements used
- Working with Radioactives in the field (Clean-up operations)
- The Emergency Response Plan
- First Aid
- Decontamination, personal and equipment

Response

1. Introduction

This section of the plan deals with the response by Rhône Poulenc Chimie to an emergency involving a shipment of gangue. It defines the method of propagating the emergency message and mobilising the company's response.

2. Credible Scenarios

During the formulation of this plan three scenarios were identified as being credible events:

1. A head- on collision on a main highway with a laden fuel tanker;
2. A collision or driver error resulting in the cargo being spilt near a fast flowing stream;
3. A vehicle break-down resulting in the vehicle being disabled in a town centre.

3. The Company's Response

The basic response to any incident is the same:

- Ascertain the validity of the report
- Identify the vehicle and driver involved
- Identify the location of the incident
- Establish the extent of the incident
- Notify the relevant authorities
- Mobilise the ERT to stand-by readiness

From this point a number of decisions contingent upon circumstances will be taken. Each and every incident presents a number of variables – how far away has the incident occurred; is the cargo in danger of leakage; are any other life-threatening events occurring at the scene; what is the terrain at the site; are there any sensitive receptor sites nearby ? These matters are discussed further in "Procedures" later in this Section.

4. Methods of Notification

Notification of an incident will come from:

- the driver acting in accordance with ADG Code 8.3.13.2 & 8.3.13.3
- the Police or Fire Brigade via 000
- a member of the public
- a warning from the GPS tracking system in the Central Control Room

The person receiving notification will follow the procedures outlined over-page.

5. Procedures

The following procedures are to be followed by the persons concerned:

5.1 The person on duty in the Central Control Room receiving notification of an incident from a member of the public or the driver of a vehicle is to:

(a) Verify the callers bona fides

(b) Complete the questionnaire (Sample at Annexure H)

(c) Notify the nearest Police and Fire Brigade Stations to the incident site

(d) Notify the Operations Manager/ Emergency Controller

(e) Notify the ERT

(f) Notify the transport company and place them on stand-by

(g) Test communications to all parties and stand-by for further instructions

(h) Prepare a briefing pack for the Emergency Controller which will consist of a map showing the incident site, weather conditions on-site if available, details of the vehicle and driver involved and any messages from the On-Site Controller

(i) Carry out any further instructions given by the Emergency Controller

If the call originates from the Police or Fire Brigade step (c) above should be omitted.

5.2 Action by the Emergency Controller

When notified of an incident the Emergency Controller is to:

(a) Collect PPE Bag and go to the Central Control Room

(b) Verify that the ERT are on stand-by and that suitable vehicles are available (sedan/wagon fitted for towing ERT Trailer)

(c) Obtain the briefing pack from the Duty Operator and consider:

- Whether to despatch the ERT to the scene; OR
- Wait for a request from the On-Site Controller; OR
- Instruct the carrier to arrange vehicle recovery or removal from present location under Police escort

(d) Issue any necessary instructions to the Duty Operator

(e) Discuss with the On-Site Controller if any further assistance is required

Where circumstances dictate it may be necessary:

- to send the Radiation Safety Officer forward urgently to assist radiation control at the scene
- arrange light aircraft or other rapid deployment means for the ERT or the Radiation Safety Officer
- instruct Duty Operator to alert Earth Moving and/or Crane Company

7. ERT Equipment

An emergency response trailer is to be located on the Pinjarra site. The trailer is NOT to be used for any other purpose. It is necessary that at least two company owned sedans/wagons, nominated by the Plant Manager Pinjarra, are fitted with a suitable towing hitch and electrical socket to ensure that a vehicle is always available for towing.

The ERT Trailer is to be equipped with:

6 Shovels	4 Brooms Bass
5 Empty Bulka bags	10 x 1.8m star posts
1 x 50mx12 mm rope and single reeve block	2 x Roll Cordon Tape
8 x 20L Plastic closed top containers w/sealable lid	1 x Sledge hammer
2 x 1m² signs "Caution – Accident Ahead"	2x 8x8 Plastic Tarpaulin

1 x Emergency Flood Light with lead and crocodile clips, 1x small portable generator

6 x Complete Personal Protective Clothing Sets

2 x 10 box Industrial Dust Masks

1 x Collapsible Bulka Bag Holding Frame

1 x set hand tools (Pliers, screwdrivers, adjustable spanners etc)

1 x Portable Shower unit with hose and water drum

1 x Portable Pool w/frame large enough to take the longest tools to be used

8. ERT Members Equipment

All members of the ERT are to be issued with a full set of personal protective clothing and 5 dust masks. This equipment is to be kept in a suitable receptacle which each person has available at all times (both during and out of working hours). Note that this PPE issue is additional to any made for normal work. Each member of the Team is responsible for placing his or her personal box in the trailer if called out.

9. Transport Company

Part of the contractual arrangements between Rhône-Poulenc Chimie and the selected carrier will be that the carrier:

- Provides only vehicles which are suitable and fit for the task *q.v.* 8.2.6.1 of the ADG Code
- Provides only drivers who are trained and in possession of an authority to drive a vehicle carrying Dangerous Goods in Bulk *q.v* 8.3.14.1 to 8.3.14.7 inclusive of the ADG Code and act in line with 8.3.13.2 & 3
- Provides only drivers who have received training in the carriage of radioactive materials (Training may be by an authorised Radiation Training Officer of the transport company or by arrangement with Rhône-Poulenc Chimie)

9. Transport Company, continued

- Have in place an emergency system which is available on a 24 hr basis
- Have sufficient resources to ensure that a vehicle of the type used for the task of gangue transport can be made available on demand in an emergency.
- Have available on demand for use in an emergency recovery equipment capable of recovering a disabled vehicle of the type used for gangue transport and suitable equipment for handling containers involved in a spill or breakdown.

10 Other Resources

In the event of a transport spill it may be necessary to call for earth moving equipment or cranes at short notice for use at any point on the route. To this end a listing of Local Government Authorities through whose area the route passes is given in Annexure F. Where Local Government assistance is not available a list of suitable contractors is also given. These should be regarded as a second line of supply due to time factors in their equipment reaching a possible incident site. Annexure F is to be prominently displayed in the Control Centre.

11. Emergency Contacts

A listing of contact telephone numbers of all involved parties during an emergency is given in Annexure G. This list is to kept up-to-date by a person appointed by the Operations Manager, Rare Earth Plant, Pinjarra and a copy displayed prominently in the Control Centre.

12. Vehicle Ancillary Equipment

Under arrangements to be made with the transport company by the Manager Rare Earth Plant, Pinjarra, all vehicles engaged in gangue transport are to be fitted with GPS location units and suitable two-way radios. *(It may be desirable to use satellite 'phones — decision to be made prior to start of operations)*

The selected transport company is responsible that their vehicles are equipped with fire extinguishers, PPE for the driver and three breakdown triangles *q. v.* the ADG Code.

13. Emergency Control Centre

Under the direction of the Manager, Rare Earth Plant, Pinjarra a room is to be established as the Control Centre. This room is to house the GPS link, the two-way radio base station and telephones. Normal office furniture will be required. Suitably scaled maps of the transport route should be available and a supply of writing materials/computer. The room is to be manned by a competent person at all times whilst shipments of gangue are en-route for Mt Walton. That person's duties are defined under the "Response" section of this plan. A copy of this plan is to be kept in the Central Control Room at all times.

5.3 Action by the Radiation Safety Officer

When notified of an incident the Radiation Safety Officer is to:

(a) Collect PPE Bag, Geiger Counter, TL Dosimeter and 20 Film Badges

(b) Go to the Central Control Room and report to the Emergency Controller

(c) Follow any instructions given by the Emergency Controller

5.4 Action by other members of the ERT

On being advised of a Stand-By situation all members of the ERT are to collect their PPE Bags and proceed at once to the Central Control Room. On arrival each member is to report his or her presence to the Assistant Controller and await further instructions. If a road move to an incident scene is likely the **Team Driver** is to check that the Trailer is ready in all respects and hooked in to the ERT Vehicle.

5.5 Action on Despatch of ERT

When the decision is made to despatch the ERT to an incident scene the Emergency Controller is to advise the On-Site Controller of the ETA (Expected Time Arrival) at the scene. Whilst en-route the Emergency Controller is to up-date the ETA as necessary. The Duty Operator in the Central Control is to log all such reports.

5.6 Action upon arrival at incident site

Wherever possible the arrival route should be from an up-wind direction. Where this is not possible the ERT vehicle should be stopped 100 metres from the actual incident site.

(a) The Emergency Controller (EC) is to report arrival to the Central Control Room and the On-Site Controller(OSC). The EC is to verify that a 5 metre exclusion zone has been establishedaround the perimeter of any vehicles involved or spilt materials including gangue residue and that only persons actively employed in recovery tasks and wearing suitable protective clothing and film badges are permitted entry. The actual location of the ERT should be discussed with the OSC and instructions for parking passed to the Assistant Controller. Note that in cases of major fire the exclusion zone should be increased to 40 metres.

(b) The Assistant Controller is to ensure that all members put on their PPE. When advised by the EC the Assistant Controller is to organise the parking location of the Trailer. The team members are to stay in close proximity to the trailer until deployed by the EC.

(c) The Radiation Safety Officer is to issue a Film Badge to each member. When satisfied that all ERT members are suitably protected the Radiation Officer is to enquire if the OSC wishes Film Badges to be issued to any other workers on the actual site. (Persons in Control and Command Posts etc do not need film badges since such places will be outside the 5 metre restricted zone.)

5.7 Actions if ERT are first to arrive

When an incident occurs within easy reach of the Plant it is possible that that ERT will be first on the scene.

(a) When this happens the EC is to:

- Endeavour to approach from an up-wind direction
- Stop the vehicle 100m from the incident site and investigate on foot
- Verify the location and condition of the driver, take any necessary action to ensure the drivers safety.
- Call the team forward and establish a 5 metre exclusion zone
- Detail one member for traffic control duty
- Advise the Central Control of exact location and best approach route. **Duty Operator** is to pass this information to the nearest Police and Fire Brigade Stations
- Consider the need for extra equipment i.e cranes or earth mover, vehicles or recovery vehicles and issue instructions accordingly via the Control Room
- Deploy the remaining team members on the clean-up task after discussion with the Radiation Safety Officer

(b) The Assistant Controller, on arrival at the scene, is to ensure that all team members don their PPE and that the vehicles are parked in a suitable position. When such tasks are completed report to the EC for further instructions.

(c) The Radiation Safety Officer, on arrival at the scene, is to take gamma readings of the area to establish if the 5 metre zone is suitable and what periods of work may be undertaken without relief staff. The RSO is to report his or her conclusions to the EC and advise that officer accordingly. Film badges are to be issued to any worker entering the exclusion zone. The RSO is to supervise the safety aspects of the work of recovery under the directions of the EC.

(c) On the arrival of the Combat Authority **(Fire Brigade)** or the On-Site Controller **(Police)** the EC is to hand control of the site to the senior officer present and brief that person on the actions taken and any other pertinent details.

5.8 Action in special cases

5.8.1 Action when vehicle accident results in fire (Scenario 1 on page 13)

(a) When a report that a gangue laden vehicle has been involved in an accident resulting in fire the Duty Operator is to alert the nearest Fire Brigade and carry out all normal incident procedures.

(b) The Emergency Controller is to carry out all normal incident procedures and verify that the Combat Authority is following the Hazchem Code displayed on the EIPs.

(c) On arrival at the scene the ERT is to follow all normal procedures, waiting until advised by the OSC that entry to the fire ground may be made. It is probable that the shipping containers are intact but if they have warped or left the vehicle an immediate inspection of the Bulka Bags is to be made. The RSO is to supervise this inspection taking such readings as he or she feels appropriate. Where possible fire water should be contained to prevent the spread of spilt materials including gangue residue.

5.8.2 Spill near a river or stream (Scenario 2 on page 13)

When a report is received that there has been an incident near a stream or river:

(a) The Duty Operator receiving the message is to verify if the shipping containers are intact or have released any Bulka Bags and pass this information to the Emergency Controller.

(b) The EC is to make an immediate assessment of the quantity of gangue, if any, which has entered the waterway. This may necessitate contact with the driver, or if not available the OSC. Should it appear likely that a quantity of gangue has entered the waterway the EC is to advise the On-Site Controller to alert the Water and Rivers Commission and the Dept. of Environmental Protection (DEP) stressing that it is highly unlikely that water quality will be adversely affected.

The EC should request approval to temporarily dam the river, if practicable and necessary, to retrieve bags or portions of gangue which have managed to enter the waterway. A water quality testing programme, to the satisfaction of the Water Authority, and the DEP, should be put in place as soon as possible and continue for such period as the Authorities may direct.

All other procedures outlined for action on an incident site are to be adhered to in addition to the measures set out above.

5.8.3 Actions when vehicle breakdown is reported (Scenario 3 on page 13)

(a) The Duty Operator, upon receipt of a vehicle breakdown report is to:

- Verify the exact location of the vehicle
- Obtain brief details of the problem
- Alert the transport company and pass all information to them
- If the breakdown has occurred in a built up area notify the nearest Police Station and request that an exclusion zone be established 5 metres around the vehicle until it can be moved. Other vehicles may pass the breakdown but should be instructed to keep moving. Pedestrian traffic must be kept out of the exclusion zone.
- Notify the Emergency Controller and seek further instructions.
- Place the ERT on Stand-By readiness.

(b) The contracted transport company is to despatch, as quickly as possible, a suitable vehicle for recovery. If the breakdown has occurred within a built up area it will be necessary to tow the vehicle clear of the area before transfer of the load takes place.

(c) The transport company is to organise any equipment required to enable the load to be transferred to a serviceable vehicle for onward transmission. The transport operator's control room should liaise with RPC regarding the time frame for the RPC Emergency Response Team to arrive.

(d) Where a vehicle is to be towed clear of a built up area the Transport Company is to liaise with the nearest Police Station regarding a suitable place for the transfer operation to take place and whether escorts are needed. When the place is decided RPC Central Control Room should be advised.

(e) If it is decided to transfer a load to an alternative vehicle the ERT less the Emergency Controller should travel to the scene to assist. The Radiation Safety Officer is to verify that it is safe for the work to proceed and is to supervise the safety aspects of the transfer. A 10m exclusion zone is to be established around the transfer site.

(f) If the location of the breakdown is such that it is not realistically possible for the ERT to reach the site within 4 hours the **Radiation Safety Officer** should be despatched by the fastest available means, selected by the Emergency Controller, to the scene to supervise. In these circumstances the transport company should be advised to find local labour but not to permit entry until the RSO arrives. The RSO is to take his or her PPE, Geiger Counter, Film Badges, Dosimeter and 5 sets of basic PPE for local labour.

5.9 Action during Clean-Up

Whatever the circumstances of an incident, if any gangue has been spilt, from a ruptured bag etc. it is necessary that a thorough clean-up is undertaken as soon as possible. The Rhône Poulenc Chimie Emergency Response Team will be responsible for all clean -up activities except the recovery of the vehicle, if disabled. Recovery of the vehicle and the provision of a replacement shall be the responsibility of the appointed carrier. The carrier is also responsible for the provision of cranes or other means of lifting the Bulka Bags back into a container.

5.9.1 The Clean Up Procedure

(a) **The Emergency Controller**, when advised by the OSC that clean up may begin is to:

- Verify that the ERT members are dressed in suitable protective clothing and are wearing a film badge.
- Cause the Assistant Controller to mark out the first area to be cleaned
- Nominate the clean up party and instruct them to start by collecting any lumps of gangue that are visible in the area marked and place them in a spare, clean Bulka Bag
- Leaving the Assistant Controller in charge go, with the Radiation Safety Officer, and mark out the second area for cleaning working in a down wind direction
- When area 1 is declared finished instruct the Radiation Officer to check the area with a radiation detector the area to check for small particles or dusts. When satisfied that the area is clean move the clean up party to area 2 and repeat the process.
- Instruct the Radiation Safety Officer to examine downwind and to the flanks to determine if a third area should be establish
- Repeat process above as necessary until satisfied that all traces of gangue have been recovered

(b) The Assistant Controller is to:

- Carry out tasks as set out above, and
- Ensure that no visible lumps are missed
- Report to the EC when the first area is nominally clean
- Under the direction of the EC repeat the process with the next area and stand-by for instructions. It may be necessary to return to area 1 if traces are detected by the Radiation Safety Officer. If this is the case take one member and set him or her working under the directions of the Radiation Safety Officer.
- Continue to supervise the clean up party until the task is complete.

5.9.1 Clean Up Procedures, continued

(c) **The Radiation Safety Officer** in addition to the tasks outlined above is to:

- Continually supervise the safety aspects of the clean-up
- At the conclusion of the task have a final "sweep" of the whole area to verify that no identifiable gangue is left
- Check, at intervals, that all film badges are registering minimal radiation doses. Where any person is near the lower limit of permitted exposure that person is to be decontaminated and returned to base.
- Assisted by the EC erect the portable shower unit (unless the Fire Brigade have established a de-con area) in a safe place as instructed by the EC
- On return to base the RSO is to enter each persons name, the affiliation if not a RPC employee, the estimated total dose received during the operation, the number of hours involved and the date in a book kept in the Radiation Safety Office

(d) **Members of the ERT** are to work as directed and:

- Check their film badge at intervals, reporting if required to the RSO
- Ensure that they wear all protective clothing issued in the manner taught
- Place all recovered gangue in a Bulka Bag or other receptacle if instructed to do so at minor clean up sites
- Ensure that when filled Bulka Bags are clearly marked "Recovered from (name of location)" and "date"
- Take part in the decontaminating process when instructed

(e) At the conclusion of the clean up the EC and the RSO are to determine if the Bulka Bags are fit for onforwarding to IWDF or if they are to be returned to the plant for re-processing and packing. The transport company must be given instructions as to the destination required.

5.10 Decontamination

(a) All personnel, **including those from other combat, control or support groups,** that have been on the site during the clean up process must be checked by the RSO for contamination at the conclusion of the operation. Any person showing a positive reading is to be sent through the decontamination shower and given clean, dry, PPC for the return to base trip. Any contaminated clothing, including that of the combat, control or support groups, is to be placed in a sealed drum, put in the trailer and returned to base for laundering.

(b) All equipment used in the clean up task is to be thoroughly washed in the portable pool under running water decanted from the plastic containers in the ERT Trailer to the RSO's satisfaction before being returned to the ERT Trailer. Water accumulated in the pool is to be siphoned or pumped into the 20L containers and returned to the plant for recycling. Care must be taken that NO wash water is spilt on the ground and that all such contaminated water is returned to Pinjarra Plant.

5.11 Stand Down Procedure

When satisfied that no further action is immediately required on-site the EC, in consultation with the RSO and OSC, may order a stand-down of the ERT. When ordered to stand-down the ERT members will:

- Check that all equipment has been collected, decontaminated and replaced in the Trailer
- Remove their PPE and place in a plastic drum with lid for return to base for laundering
- The Radiation Safety Officer, under the direction of the Emergency Controller, is to conduct a final "sweep" of the area
- The Emergency Controller is to despatch the team to base, have a final discussion with the OSC during which arrangements are to be made for any validation checking of the area that may be considered necessary. When the OSC and the EC have agreed on any future actions including de-briefing sessions the EC may return to base.

5.12 De-briefing

After every incident in which this plan was activated a de-briefing session is to be held as soon as practicable. At the session every action and reaction which occurred during the incident is to be discussed with a view to correcting any anomalies or finding improvements to be incorporated in this plan.

5.13 Records

The Plant Manager is to cause a record book to be maintained in which all incidents are recorded in full. The record should be cross referred to the Radiation Safety Incident Book held by the RSO and the log maintained by the Duty Operator in the Central Control Room.

5.14 Reporting

All incidents involving the transport of gangue are to be reported by the Plant Manager to the Rhône Poulenc Management Safety Committee.

The transport company is responsible for any mandatory reporting that may be required in terms of the transport task.

The Plant Manager is responsible for reporting any leakage or loss of containment of gangue to the Regulatory Authorities.

Recovery

1. Introduction

This section of the plan deals with those matters designed to assist the community and Emergency Services to recover from an incident during which gangue transport suffered a loss of containment.

2. Validation of clean up

(a) Where directed by the On-Site Controller or when the Emergency Controller considers it may be necessary in the interests of public safety the Emergency Controller is to:

- Instruct the Radiation Safety Officer and the Assistant Controller to visit the scene of a transport incident on as many days as may be considered necessary to take readings of the site and surrounds.

3. Consultation with Authorities and Agencies

- The EC is to consult with the Radiation Health Section of the Health Department to establish if they have any areas of concern. Should any actions present as a result of this consultation the EC is to put in place, as soon as possible, any measures needed to address those concerns
- If an incident lead to gangue entering the waterways the EC is to consult with the Water and Rivers Commission and address any testing requirements or concerns the Authority may express.
- Where gangue was re-packed and sent forward after an incident the EC is to consult with the Manager IWDF on the day of arrival and address any concerns the Manager may have regarding the condition and radiation levels of the consignment .
- The EC is to consult with the DEP and address any concerns that Department may express.
- Where the Emergency Services were involved in an incident the EC is to contact the Stations involved to establish if they have any concerns. Where necessary to allay any fears expressed an officer of the company is to visit the Station and discuss their concerns. Note that contact with Fire Stations is to be via the Regional Manager.
- Where a Local Government Authority responded to an incident the EC is to contact that Authority to discuss any problems they may have with the incident. Any concerns are to be addressed to the satisfaction of the Authority.
- If the FRS determines that a post incident analysis is required RPR will co-operate fully with the analysis.

4. Public Awareness

Where an incident occurred in or close to any residential or other built up public area the EC may consider a mail drop giving details of the incident, explaining the low level risk that was generated and the clean up actions taken. The mail drop should provide a telephone number where members of the public may have any questions answered. For incidents occurring on or adjacent to private land the Landowner should receive information as above.

MATERIAL SAFETY DATA SHEET

Date of Issue: 21. 12. 95

HAZARDOUS NATURE

Low Activity Radioactive Clay - like waste by-product. Non-combustible, non-corrosive. This material is HAZARDOUS according to the criteria of WorkSafe Australia.

COMPANY DETAILS

Rhône Poulenc Chimie Australia Pty Ltd
Lot 1 Napier Rd, Pinjarra W.A. 6208

Telephone : (09) 531 7200 **Facsimile: (09) 531 2270**

IDENTIFICATION

Product Name:	Gangue
Other Names:	Gangue Residue
Manufacturers Product Code:	
UN Number:	2912
Dangerous Goods Class & Sub Risk:	7 Radioactive Material N.O.S. Nil Sub Risk
Poisons Schedule:	Not Applicable
Activity Level & Category:	LSA 1 Category III
Use:	Waste by-product of rare earth nitrate concentrate

Physical Description/Properties

Appearance:	Clay-like Earth packed in Bulka Bags in 2 tonne lots
Boiling Point:	Not Applicable
Vapour Pressure:	Nor Applicable
Flashpoint:	Non-combustible
Solubility in water:	Insoluble
Other Properties:	Is chemically inert, non-corrosive. Radioactive Low Specif ic Activity LSA I

Ingredients

Chemical Name	CAS Number	Proportion
Thorium $(0H)_4$	Not Available	13.2 %
Uranium $Oxide_2(OH)_2$	Not Available	0.6 %
Insoluble SO_4	Not Applicable	46.2 %
Water	7732-18-5	40.0 %
Radium 228		420 Bq/g
Radium 226		60 Bq/g

Health Hazard Information

Health Effects

Acute:

Swallowed: The quantity likely to be accidentally swallowed will have negligible effects , however all cases of accidental exposure to ionising radiation should be reported to a medical practitioner.

Eye: Usual irritation experienced from entry of dusts

Skin: May be mildly irritating

Inhaled: Minor cough may be experienced

Chronic: Not firmly established. The material has a low level of activity and it is highly unlikely that the conditions required to produce high received dosages (close contact over a number of years) leading to chronic ill health would occur.

First Aid

Swallowed: Do not induce vomiting without medical instructions. Make patient rest and transport to Hospital or Doctor as soon as possible

Eye: Flush eye with clean water for at least 20 minutes. If pain persists transport to medical practitioner

Skin: Remove contaminated clothing and wash affected area with soap and water continuously for at least 20 minutes

Inhaled: Remove patient to clean air area and rest. May have small amounts of water to drink to ease dry throat. If symptoms persist transport to Hospital or Doctor as soon as possible

First Aid Facilities: Normal industrial first aid facilities are required. If suitably trained personnel are available radiation measuring devices (dosimeters) should be made available. Industrial plants handling radioactive materials are required to have suitably trained personnel and the specialised equipment for measuring radiation available at all times when the plant is operating.

Advice to Doctor: Patient has suffered a mild to severe exposure to a very low activity radioactive material. Seek radiological advice if necessary.

Precautions for use

Exposure Standards: The Dose Limits established by the NHMRC and NOHSC are:

- For radiation workers — 20mSv/yr averaged over five years. The effective dose in any one year may not exceed 50mSv/yr. Approval may be sought in exceptional circumstances for a temporary change in the dose limitations. In such cases the dose may not exceed 50mSv per year for the period granted which may not exceed 5 years. The period for which the effective dose for which the limit of 20mSv/yr average applies shall not exceed 10 consecutive years and the effective dose in any one year shall not exceed 50mSv/ in any single year.
- For transport workers — the dose limitation is 5mSv/yr.
- For members of the public — the dose limitation is 1 mSv/yr

Precautions for use, continued

Exposure Standards, continued
Limits are placed on the Annual Equivalent Dose in:

- The lens of the eye — For radiation workers — 150mSv/yr
  For members of the public — 15 mSv/yr
- The skin — For radiation workers — 300mSv/yr
  For members of the public — 50mSv/yr
- The hands and feet For radiation workers — 500mSv/yr

NB — Compliance with NHMRC international standards ensures compliance with Western Australian Regulations

Engineering Controls

All work involving radioactive materials must be based on the ALARA (as low as may be reasonably achievable) principle in regard to protective measures. Where it is not possible to control exposures by engineering methods the time the workers spend in that particular area must be rigorously controlled to ensure minimum exposure. In a normal situation this material will be packaged in a manner which ensures that it is kept moist and contained. In those circumstances time and proximity control will satisfactorily protect workers involved in the disposal task.

Personal Protection

Coveralls, industrial safety boots, helmets and gloves should be worn when handling the bags of gangue. Where the material has escaped containment and dried out dust masks should be worn. In severe dust conditions goggles should be used to protect the eyes.

Flammability/ Fire Explosion Hazards

The material will not burn and does not react violently to heating.

Safe Handling and Storage

Storage and Transport: Transport as Dangerous Goods in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail* and the *Code of Practice for the safe Transport of Radioactive Substances.* All states have legislation covering radioactive materials — please check your local legislation

Store in a dry storage area and provide complete weather protection. Do not store or transport with Dangerous Goods of any Class.

Spills and Disposal: Cover spill and keep material moist. Collect spilt gangue and shovel into clean dry containers and return to Rhône Poulenc Chimie for re-processing. Full protective clothing must be worn by clean up parties and exposure should be limited to less than 5 hours.

Contact Points

For further information or advice please contact:

Chief Chemist, Rhône Poulenc Chimie, Pinjarra, Telephone: 09 531 7200

Selection of Carriers — Check-List

No.	Item	Yes	No	Remarks
1.	Does the carrier regularly handle DG ?			
2.	Are all bulk carriage vehicles registered for DG ?			
3.	Does the carrier have third party liability cover specifically for DG clean-up costs to $2.5 million ?			
4.	Has the carrier developed an Emergency Response System ?			
5.	Is a FreeCall 1800 number available ? If yes — is it availabe on a 24 hour basis ?			
6	Are all drivers trained and licensed for DG in bulk ?			
7.	Is there a preventative maintenance programme covering vehicles and trailers ?			
8.	Has the carrier got any pre-arranged emergency towing or cranes available ?			
9.	Are all drivers issued with suitable PPE ? Attach list of contents			
10.	Are back-up vehicles always available ?			
11.	Does the carrier have any facilities on the proposed route ?			
12.	Are any associated company facilities available on the proposed route ?			
13.	Can the drivers be made available for radiation training ?			
14.	Can the carrier carry out such training in-house ?			
15.	What is the company's policy on equipment quality and replacement?			
16.	How long has the carrier been involved in the DG field ?			
17.	Is the company signatory to any Industry Association Code of Practice e.g. "Responsible Care" or similar scheme			
18.	Does the carrier have an accredited Quality Assurance System in place ?			
19.	Does the carrier conduct DG Compliance Audits on a regular basis ? Is there a "paper trail" ?			
20.	What action is taken re detected non-compliance ?			
21.	Does the company have sound financial backing ?			
22.	Is a copy of the last Annual Report available ?			
23.	Are there any Regulatory Authority actions pending against the company ?			
24	Does the company hold the necessary licenses to transport Radioactive Substances ?			

Vehicle Check-List

No.	Item	S	U/S	Remarks
1.	Vehicle is clean and tidy, suitable for task			
2.	Wheels and Tyres			*All wheel nuts fitted, any sign of re-cap lifting from tyre, fully inflated, good tread depth etc*
3.	Lights, Indicators and reflectors			
4.	Windscreen, clean and free from cracks in driver line of sight			
5.	Trailers fitted with container pins ?	Yes	No	
6.	Container pin mountings and pins free from rust or corrosion			*Check for bent, damaged or jammed pins*
7.	Driver confirms sufficient fuel for trip ?	Yes	No	
8.	EPG Holder fitted inside cabin door ?	Yes	No	
9.	Driver has full set PPE including eyewash and dust masks	Yes	No	
10.	Vehicle fitted with 2 x 30B or one by 60B Dry Chemical fire extinguisher ? Extinguisher in cab ?	Yes	No	*Cab extinguisher not less than 10B dry chemical. All ext should have servicing label.*
11.	Are extinguishers fully charged and serviceable?	Yes	No	
12.	Is driver in possession of Bulk Driver Authorisation	Yes	No	
13.	Is vehicle insured for DG in bulk ?	Yes	No	
14.	Is vehicle registered to carry DG in bulk ?	Yes	No	*Check label if in doubt*

Vehicle Regd. No ..... Trailers .....

Drivers Name..... Date.....

Checkers Initials.....

Hand to Despatch Manager when completed

Rhône Poulenc Chimie Australia Pty Ltd Dangerous Goods Manifest — Class 7 Radioactive Material

Transport Company: **Manifest No.** **Date:**

Consignee Name and Address:

EXCLUSIVE USE

Nature and Quantity of Radioactive

AUTHORITY NO:

Proper Shipping Name	Radionuclide	Form	UN No.	S/Risk	No. of Packages	Type of Package

Bag Identification No.	Activity (Bq)	Category	Transport Index

Shippers Declaration

I hereby declare that the contents of this consignment are fully and accurately described and are classified, packed, marked and labelled and are in all respects, in the proper condition for transport according to the applicable regulations.

Title and Name (Print): .....

Date: .....

Signature: .....

Consignors Name: Rhône Poulenc Chimie Australia Pty Ltd

Address: Lot 1 Napier Road,
Pinjarra,
W.A. 6208

Incident Questionnaire

No.	Question	Response	Remarks
1.	What is caller's name and organisation ?		
2.	What is call-back number ?		
3.	What is location of incident ? Caller ?		
4.	Are there any casualties ?		
5.	Where are they now ?		
6.	Are the Emergency Services attending ?		
7.	When was the incident ?		
8.	What happened — roll-over/fire/spill ?		
9.	Are the containers still on the trailers ?		
10.	Are the container doors closed ?		
11.	Have any bags fallen out ?		
12.	What is weather like ?		
14.	Is the area built up ? (Houses etc)		
15	Is there a river/stream/dam/lake nearby ?		
16.	Can the vehicle be moved ?		
17.	Is the highway/road blocked ?		
18.	Could the Police arrange a diversion ?		
19.	Can we get heavy equipment to the scene ?		
20.	Are spectators being kept away ?		If not advise 10 metre cordon immediately

Notes

Remember that the caller may be excited/frightened — try to keep caller calm.

The caller may not have your command of English — speak slowly and distinctly

Do not allow caller to launch into a lengthy description of a traffic accident - we must know the results only at this stage.

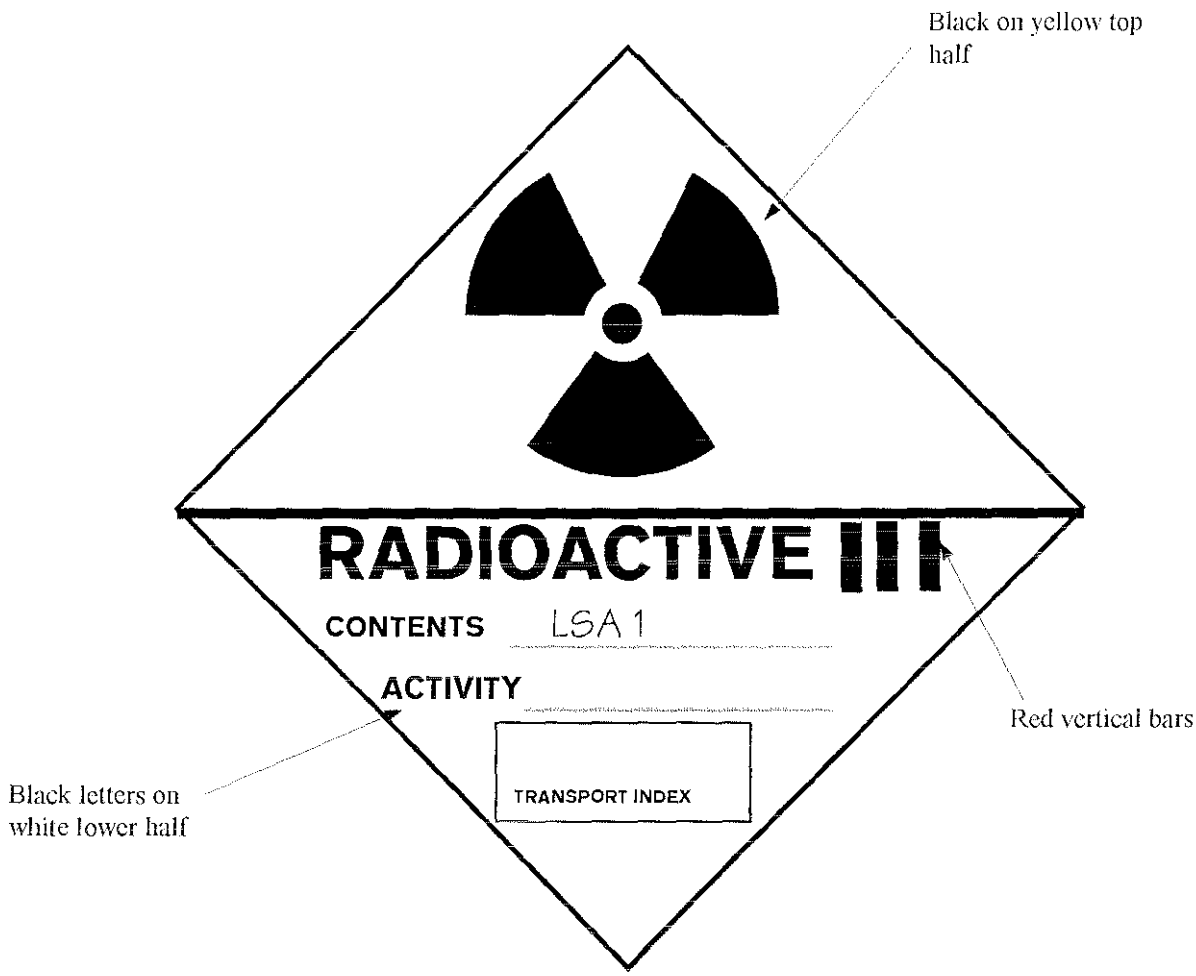


Fig 3 — Bulka Bag Label (To be displayed on opposing sides of each bag)

Note that "Contents" will always be LSA 1. "Activity" will be measured and may vary slightly . "Transport Index" is derived from the radiation level 1 metre from each bag multiplied by 100 . To obtain Transport Index for load multiply the sum of the T.I. for the individual bags by 3. (See also the *Code of Practice for the Safe Transport of Radioactive Substances 1990)*

Annexure I — Labels and Signs (Page 2)

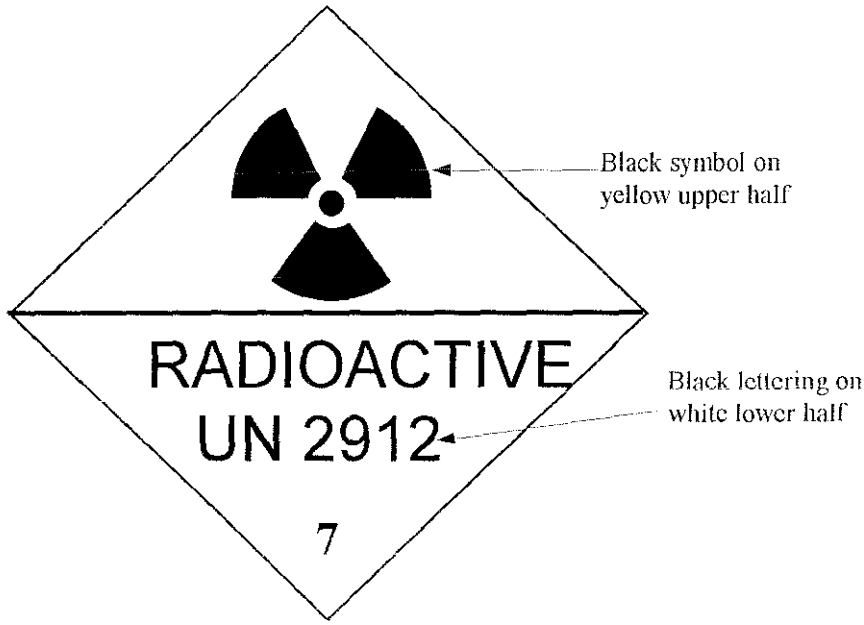


Fig 2 — Vehicle Class Label (To be displayed on front of vehicle and on the three EIPs)

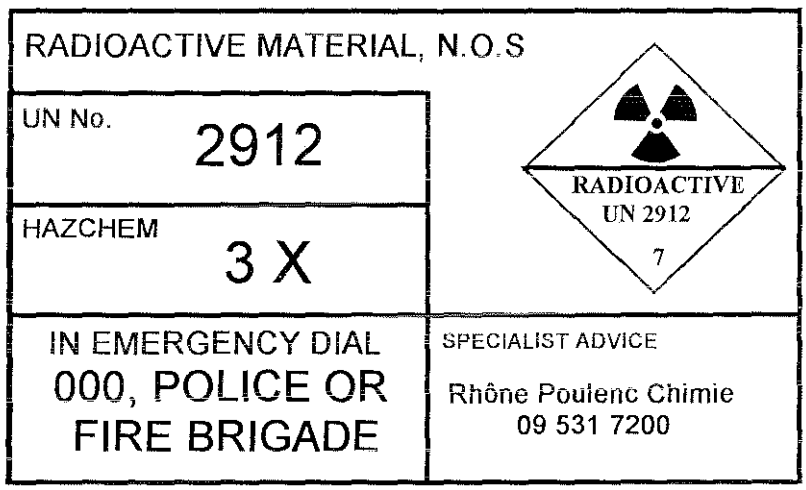


Fig 3 — Emergency Information Panels (EIP) (To be displayed on both side and rear of vehicle) Quarter-size version to be displayed on each Bulka Bag. *See ADG Code for dimensions.*

Under the provisions of the ***Australian Code for the Transport of Dangerous Goods by Road and Rail*** the Prime Contractor or Vehicle Owner is responsible for the provision of the Emergency Procedure Guide "Vehicle Fire" (A.S. 1678 0.0.001) and for ensuring that the Consignor of the goods provides an E.P.G. appropriate to the goods to be carried.

This Annexure shows the Rhône-Poulenc Chimie E.P.G. for Gangue Residues.

Both E.P.G.s are to be carried in a holder duly fitted and marked in accordance with the ADG Code on the inside of a cab door or, where this is not feasible, in a prominent position in the cabin of the vehicle and adjacent to the door.

Annexure K

Additional Credible Scenarios

1.0 Collision with fully laden Tourist Coach

A highway accident in which a vehicle carrying gangue residue collides with a Tourist or School Bus is treated the same as any other of the scenarios appearing in this document.

Reports of the collision from whatever source will trigger the Gangue Residue Transport Emergency Plan and all routines set down for other incidents are to be followed with the addition of warning local hospitals and the ambulance service of probable casualties.

1.1 Arrival of the ERTat the Scene

The EC, on arrival at the scene , is to report to the Incident Commander and ascertain the extent of the casualties and the present location of any that have been evacuated. The EC should contact the hospital or other location where casualties are being held and enquire if they need assistance with radiation monitoring. Should hospitals require such assistance the Radiation Safety Officer is to be despatch to that location immediately taking with him or her suitable radiation monitors. NOTE: It is extremely unlikely that any casualty has suffered a serious level of radiation.

In the Radiation Safety Officers absence (if sent to a hospital) the EC should assume that officers duties as per action at the other incidents described.

Where the Ambulance Service has established a Triage Area the EC should verify that they have sufficient stock of film badges and offer any other assistance possible.

1.2 When casualties have been removed

Casualties will be taken to the Triage Area, treated as necessary and removed by casevac to local hospitals. Severely injured patients may be flow to Perth under arrangements made by the Ambulance Service.

When all injured persons have been removed the clean-up should start using the same method outlined earlier in this document.

1.3 Where casualty clearing may take longer

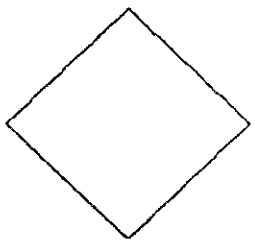
Depending on the location of the incident clearing casualties may be very time consuming. If this is the case the EC is to discuss with the Incident Commander if it is feasible for the ERT to start containment work, checking for dispersed gangue etc. With the Commanders agreement , such work should start as soon as possible to minimise the spread of gangue (if the containers have opened allowing bags to be released)

NOTE: This scenario will be developed further after discussion with the relevant Emergency Services and will be incorporated into the body of the plan at a later date. Items for discussion include decontamination of casualties, nursing personnel that have been in contact with gangue whilst treating injured persons and the decontamination of ambulance equipment.

EMERGENCY PROCEDURE GUIDE

RHÔNE-POULENC CHIMIE PTY LTD

RADIOACTIVE MATERIAL



Affix correct Category Label Here

SHIPPING NAME: Radioactive Material, Low Specific Activity,N.O.S.

TRADE NAME: Gangue (contains 12% thorium and 4% uranium in clay-like mixture)

UN N$^{O:}$ **2912** **HAZCHEM:** **3X**

EMERGENCY CONTACTS

ORGANISATION:	LOCATION:	TELEPHONE:	ASK FOR:
RHÔNE POULENC CHIMIE PTY LTD	PINJARRA	09 531 7200	DUTY OPERATOR

HAZARDS

FIRE	Substance will not burn. Does not emit toxic vapour when heated
HEALTH	Emits very low level of radiation. No danger on short (less than 2 hrs) close exposure. No danger if kept more than 10 metres away
OTHER	Dust hazard if material dries out and is broken up

EMERGENCY PROCEDURES

IF THIS HAPPENS	DO THIS
FOR ALL EMERGENCIES	Switch off engine and electrical equipment. Take fire precautions. Move spectators at least 10 metres away in all directions. Send messenger to notify Police or Company. Tell Police nature of load and quantity, location and drivers name. Do not move vehicle if moving will allow bags to fall out or containers to fall.
SPILL OR LEAK	Carry out tasks above . Prevent lumps entering waterways or drains. DO NOT HANDLE MATERIAL WITHOUT PROTECTIVE CLOTHING INCLUDING GLOVES.

Please ensure that you read other side of this sheet

EMERGENCY PROCEDURES

IF THIS HAPPENS	DO THIS
FIRE *(If minor vehicle fire not affecting containers refer to Vehicle Fire EPG)*	Carry out actions under FOR ALL EMERGENCIES For minor fire use vehicle extinguishers. For major fire evacuate area up to 40 metres. If water available hose containers to keep cool. Stay away from container doors. Send messenger to call Fire Brigade, advise Brigade of UN No. and quantity, Hazchem Code, location and drivers name.

FIRST AID

INHALED	Not likely event. Material is clay-like . If loose from bag may dry out, if then broken up produces fine dusts. Use dust mask. If affected move person to clear air area and rest.
EYES	See above. If dusts enter eye flush with clean water for at least 15 minutes. If pain persists seek medical attention
SKIN	Avoid handling material without full protective clothing incl. gloves. If material on skin wash thoroughly with soap and water for 20 minutes. Report to Radiation Safety Officer for checking.
INGESTED	Not considered likely. If accidently ingested or dust is swallowed seek medical attention as soon as possible. Advise Doctor that radioactive dusts with low specific activity were swallowed.
BURNS	Flush area of burn with clean water for 10 — 15 minutes. Cover lightly with sterile dressing. Treat for shock if required. Seek medical attention.

Please ensure that you read the other side of this sheet