Transport of Sodium Cyanide Solution from Kwinana — Change to environmental conditions

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Australian Gold Reagents Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
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F/L

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Summary and recommendations

In 1987, the EPA assessed a proposal by Australia Gold Reagents Pty Ltd (AGR) to construct and operate a sodium cyanide plant in Kwinana and recommended that road transportation of sodium cyanide solution was unacceptable within a "defined area of concern", that is 50km of the Perth GPO and designated surface and groundwater catchment areas (EPA 1987a). This advice was accepted by the then Minister for the Environment and was reflected in the Environmental Conditions set on the proposal.

The proponent, AGR, is now seeking an amendment to the Environmental Conditions under Section 46 of the Environmental Protection Act 1986 to transport 30% sodium cyanide solution by road from Kwinana. In making this application, the proponent stated that rail is the preferred transport option and road is only used when necessary.

The Environmental Protection Authority has assessed the potential environmental impacts of the proposal, as described in the proposal document, and utilised additional information supplied by other state government agencies including the Department of Minerals and Energy (DOME), Water Authority of WA (WAWA), Health Department of WA, Department of Conservation and Land Management (CALM), Swan River Trust, Main Roads Department, and the WA Fire Brigades Board as well as the public and the proponent.

On the basis of the advice provided from the key government agencies, and the information provided by the proponent on public risk, potential ecological impacts and emergency response management, recent data on transport risk and consequences, and the proponent's environmental management performance since 1987, the EPA considers that the proponent has adequately addressed the issues associated with the transport of sodium cyanide solution along the proposed routes and that the proposal is acceptable on environmental grounds.

Accordingly, the EPA recommends that the environmental conditions could be changed in this regard.

The proponent has established an acceptable sodium cyanide solution handling and transport management system based on best industry practices, including continuous improvement and total quality management to Australian Standards AS 3902. This system is committed to managing the risk to an agreed acceptable level, and is acceptable to the EPA.

Before the commencement of transport of sodium cyanide solution on the proposed routes, the proponent should consult with relevant government authorities including the Department of Minerals and Energy, Western Australian Fire Brigades Board, the Water Authority, the Swan River Trust, the Health Department, and the Department of Conservation and Land Management to ensure that all specific requirements are fulfilled in the transport and emergency response procedures.

Future direction

The EPA, conscious of the need to protect the ecology of wetlands and rivers, considers that the issue of ecological risk assessment is important. The EPA has been advised that the Dangerous Goods Liaison Committee has been investigating the public safety aspects of the transport of dangerous goods (DOME 1993) and in the near future, will consider draft guidelines proposed by DOME for the selection of suitable road routes for dangerous goods (John Hanley, *pers comm*, DOME).

The EPA considers that route selection should also take into consideration potential ecological impacts for a wide range of dangerous goods that are carried in significant quantities. The Western Australian Advisory Committee on Hazardous Substances (WAACHS 1992) stated

"that spilled pollutants are normally directed into wetlands through the drainage routes designed to deal with stormwater" and recommended that:

> "Action be taken to identify and log (register) drainage routes and water assets that may be immediately threatened by the spillage of pollutant goods in transport, with a view to installing facilities for the separation of pollutants prior to them being dispersed. The data developed in this exercise should be incorporated into the WA Land Information System so it will become available for use by emergency responders. "

The EPA supports the implementation of this recommendation and believes that it is timely for government, through inter-departmental bodies such as WAACHS, to foster this philosophy and develop an approach or policy on ecological risk assessment for major transport routes for dangerous goods.

At present the risks associated with transport of dangerous goods, such as public safety and health, transport, and environmental risks are managed separately. The EPA believes that in the interest of forward road planning for Perth, it is timely to review the issue of integrated risks for public health and safety and environmental impacts. This would help to quantify and identify areas/routes of increasing risk and determine the need to put in place a more comprehensive risk management programme for the Perth metropolitan area.

This Bulletin is the Environmental Protection Authority's report and recommendations to the Minister for the Environment on the proposed amendment to existing Environmental Conditions to allow for road transport of sodium cyanide solution from Kwinana.

Recommendation Number	Summary of recommendations
1	**The EPA considers that the proponent has adequately addressed the issues associated with the transport of sodium cyanide solution along the proposed routes and that the proposal is acceptable on environmental grounds. Accordingly the EPA recommends that the environmental conditions could be changed in this regard.** **The proponent has established an acceptable sodium cyanide solution handling and transport management system based on best industry practices, including continuous improvement and total quality management to Australian Standards AS 3902. This system is committed to managing the risk to an agreed acceptable level, and is acceptable to the EPA.** **Before the commencement of transport of sodium cyanide solution on the proposed routes, the proponent should consult with relevant government authorities including the Department of Minerals and Energy, Western Australian Fire Brigades Board, the Water Authority, the Swan River Trust, the Health Department, and the Department of Conservation and Land Management to ensure that all specific requirements are fulfilled in the transport and emergency response procedures.**

1. Introduction and background

1.1 The purpose of this report

This report and recommendations provide the Environmental Protection Authority's (EPA) advice to the Minister for the Environment on the environmental acceptability of the proposed road transportation of sodium cyanide solution from Kwinana (Figure 1) to mine sites, applied under Section 46 of the Environmental Protection Act 1986.

1.2 The proposal

In 1987 the EPA assessed a proposal by Australian Gold Reagents Pty Ltd (AGR) to construct and operate a sodium cyanide plant in Kwinana and to transport the product (30% sodium cyanide solution) by road to mine sites for gold extraction. The EPA recommended that road transportation of sodium cyanide solution was unacceptable within a "defined area of concern" (Figure 2), which is 50km of the Perth GPO and designated surface and groundwater catchment areas (EPA 1987a). Subsequently, AGR proposed rail transport as the alternative. The proposal was accepted by the EPA and by the then Minister for the Environment, and Environmental Conditions reflected this.

AGR now seeks an amendment to the Environmental Conditions under Section 46 of the Environmental Protection Act to transport 30% sodium cyanide solution by road from Kwinana to mine sites when necessary.

1.3 Background information

AGR is a joint venture between CSBP (60% & are operators), Coogee Chemicals Pty Ltd (20%) and Australian Industry Development Corporation Ltd (AIDC) (20%), formed to manufacture and market sodium cyanide solution. The plant, commissioned in 1988, currently produces about 25,000 tpa of sodium cyanide.

CSBP distributes the product via a network of road and rail transport. Currently 20–tonne containers (isotainers) of solution are despatched from Kwinana by rail to Southern Cross, Kalgoorlie and Narngulu and then transported by road to mine sites.

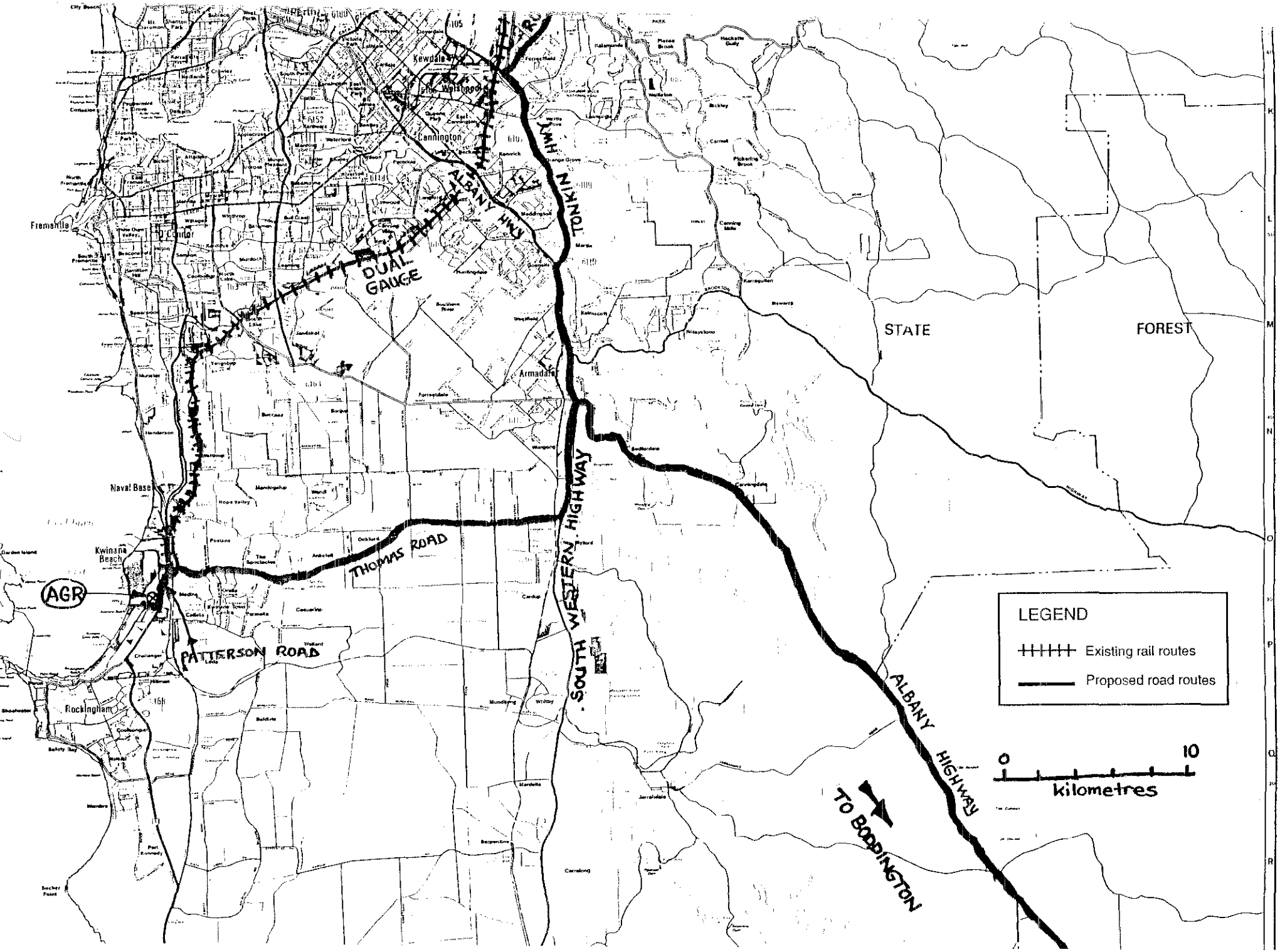
The total WA demand for sodium cyanide is about 50,000 tonnes per annum. The balance of the State's requirements is supplied from the Queensland or overseas.

Sodium cyanide is classified as a class 6.1 dangerous good (one of 101 substances in this class) in the Australian Code for the Transport of Dangerous Goods (ADG Code) and, as such, has to be handled and stored with full regard for its toxicity. This means that the transport containers have to meet the relevant codes for design and construction. The containers also have to be placarded with product and emergency information and procedures, and users of the product have to be aware of the dangers and precautions to be taken in handling the product.

The Explosives and Dangerous Goods Division of the Department of Minerals and Energy (DOME) controls the transport of dangerous goods in WA under the Explosives and Dangerous Goods Act and the Dangerous Goods Regulations 1992, including approval and in some cases, designation of transport routes.

The EPA recommended against road transport of sodium cyanide solution through the Authority's defined area of concern in 1987 for the following reasons (EPA 1987a):

- The EPA was concerned about the consequences to potable water supplies, wetlands and public safety in the case of an accident leading to a spill, even though the likelihood of such a spill was very low;


Fremantle
Kewdale
Welshpool
Cannington
ALBANY HWY
DUAL GAUGE
KWINANA FWY
TONKIN HIGHWAY
STATE
FOREST
Armadale
Naval Base
Kwinana Beach
AGR
THOMAS ROAD
PATERSON ROAD
Rockingham
SOUTH WESTERN HIGHWAY
ALBANY HIGHWAY
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Existing rail routes
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0
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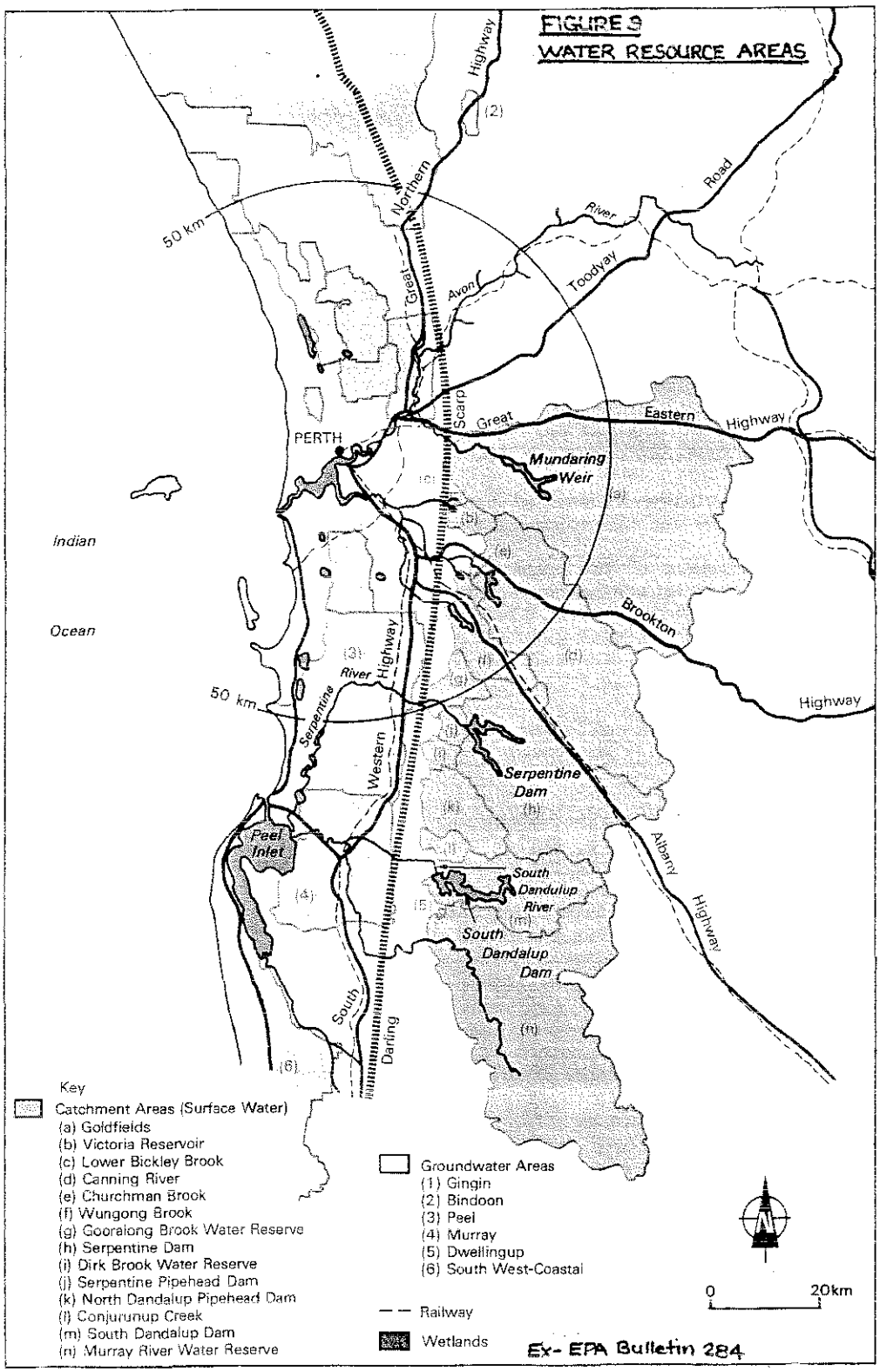


Figure 2. Defined area of concern by the EPA in 1987.

- The EPA's recommendation was supported by the results of the frequency estimates of a sodium cyanide spill event in Perth metropolitan area which indicated that rail was safer than road transport by a factor of 5,000 to 1 (Kinhill Engineers 1987). These conclusions used data from a study carried out for the Liquid Fuels Trust Board of New Zealand by the Netherlands Organisation for Applied Scientific Research (TNO, 1982) on accidents and release incidents for road and rail transport of liquid petroleum gas (LPG); and

- The EPA took a conservative position because of a lack of information on the transport of sodium cyanide solution in WA and in Australia in 1987.

Consistent with those findings, the EPA recommended approval of rail transport in the 50km area of concern (EPA 1987b). The then Minister for the Environment accepted the EPA's advice and set Environmental Conditions in 1987. Subsequently, a network of rail out of Kwinana to specified rail siding transfer points and then by road to mine sites was approved (Figure 3). Later, the concept of regional transport approvals was introduced by the EPA. The greater proportion of WA is now covered by such approvals from the EPA (Figure 4).

Notwithstanding the above approvals, sodium cyanide solution is the only Class 6.1 good which is not permitted to be transported through the defined area of concern. Other class 6 goods include isocyanates, mercaptans, tear gas, pesticides and solid sodium cyanide. Similarly, no such restriction is placed on common dangerous goods such as petrol, LPG, acids, alkalis which are transported in far greater quantities and frequencies than sodium cyanide solution.

AGR relies on the internationally accepted practice of just–in–time delivery to minimise the inventory costs to mines and itself. This means that the rail service has to be reliable. On several occasions in the last six years, scheduled services have been unreliable, requiring AGR to seek special exemptions from the Minister for the Environment to transport product by road from Kwinana for limited periods. Exemptions have been granted on several occasions.

Over the last 6 years Westrail has progressively rationalised its rail services and this has resulted in the withdrawal of the scheduled services to two of AGR's previous transfer points, namely Leonora and Kalannie. Mines previously serviced from those sidings are now serviced from two of the three remaining transfer locations, namely the Kalgoorlie and Narngulu sidings.

AGR has recently been advised by Westrail that scheduled transport to Narngulu, which services the Murchison goldmines, will terminate within the next 6 months leaving rail services confined to scheduled services on the standard gauge line to Kalgoorlie.

1.4 Assessment process

The proponent made an application under Section 46 of the Environmental Protection Act to the Minister for the Environment on 19 September 1994 for a change in Environmental Conditions to permit the above proposal. The Minister requested the EPA to consider the issue. The EPA decided to assess the proposal with full public review. AGR prepared the public review document (Brian O'Brien & Associates, December 1994) in accordance with guidelines issued by the EPA and DOME. During its assessment, the EPA utilised information supplied by government agencies, the public and the proponent.

1.5 Public involvement

AGR's proposal was released for public comment over a five week period, commencing 26 December 1994 and ending 30 January 1995.

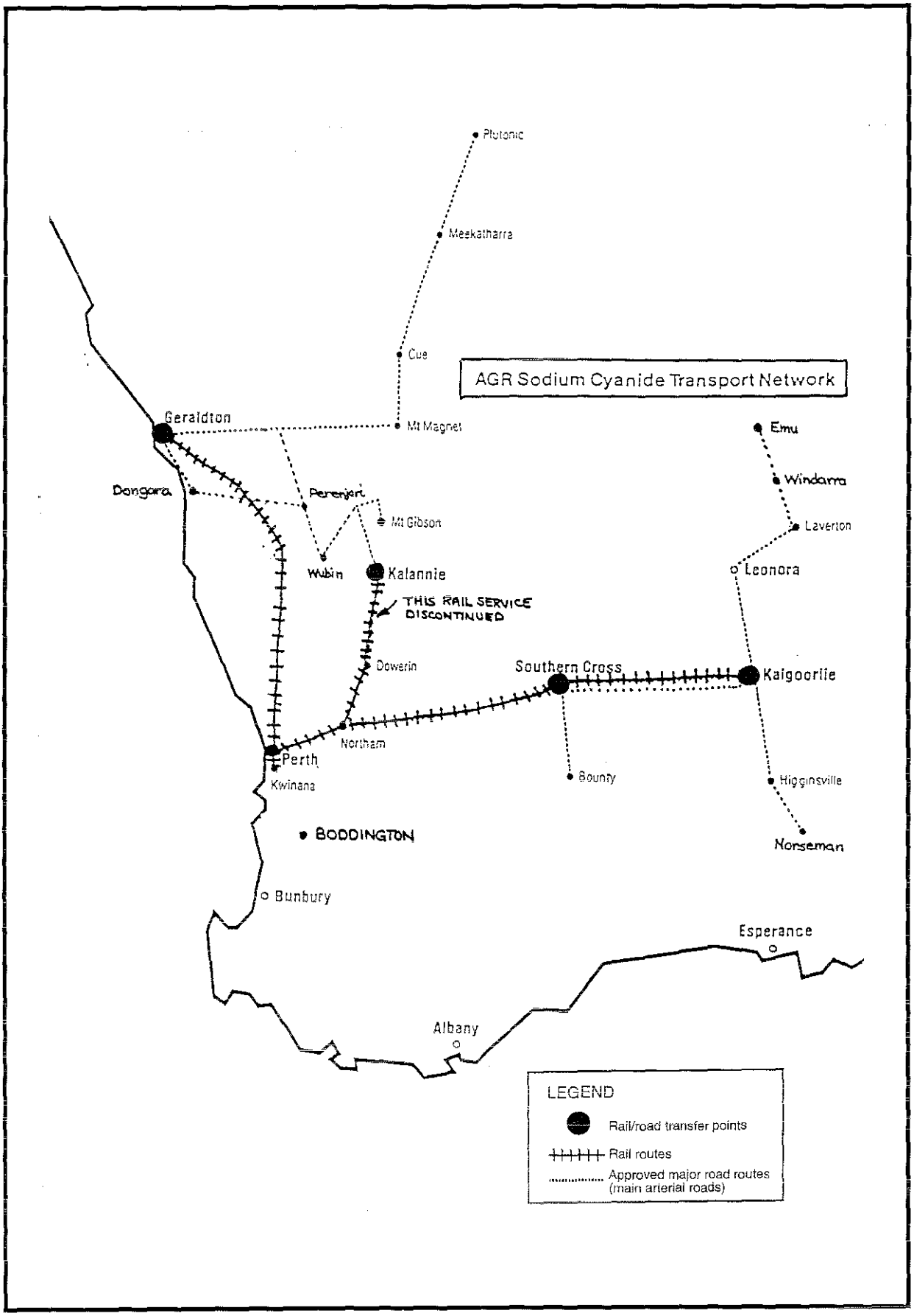


Figure 3. AGR's sodium cyanide transport network.

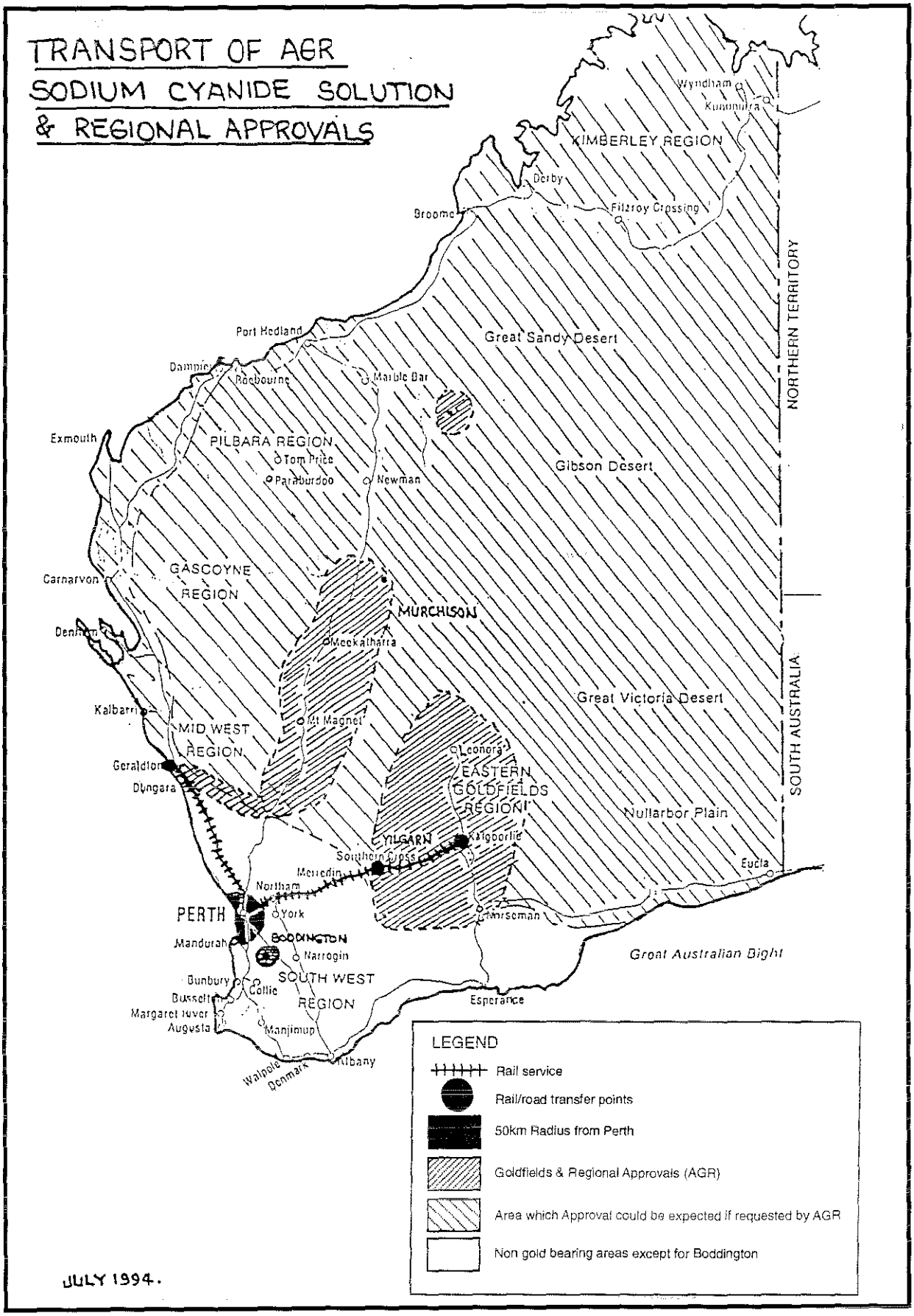


Figure 4. AGR regional approvals for transport of cyanide solution.

2. Summary description of proposal

2.1 Need for the proposal

The proponent believes that over the past six years the Environmental Conditions placed on its 1987 proposal has effectively restricted it from supplying some mine sites with product, and has made it difficult to supply other mines when rail services are interrupted or withdrawn. The proponent has been notified by Westrail that it is likely that the rail service to the Geraldton area could be further restricted in the near future. Accordingly, the proponent has requested a change of Environmental Conditions to permit transport of sodium cyanide solution from its Kwinana plant by road. It is not the intention of the proponent to transport the bulk of its product from Kwinana by road but rather to have the option when an efficient rail service is not available.

2.2 Technical bases for the proposal

The technical reason for why the EPA recommended against road transport of sodium cyanide solution through the Authority's defined area of concern (EPA 1987a) is given in section 1.3 above. At the time of the EPA's initial decision there had been no experience of carting liquid sodium cyanide by road in WA. The proponent has forwarded the technical argument based on:

- AGR's 6–year transport record – 335,000 tonnes of sodium cyanide solution have been transported in over 16,700 truck trips or 1.5 million truck kilometres, without incident;
- AGR's transport management systems are in place and proven, and to agreed Australian standards. They cover all facets of transport operations – contractor selection and training, systems auditing, transport equipment and standards, incident reporting and investigations, emergency response planning and capability, communications and community consultation. The systems are under continuous review and improvement;
- New and more extensive international data on relative risks of road versus rail transport demonstrate that generically the two modes of transport have comparable safety and where they differ, the difference is usually minor. The proponent believes that the concept of a defined area of concern of the EPA in 1987 was generically based. The proponent believes that the concept did not consider any particular risk or any particular route. Accordingly, the proponent concludes that the new international data support its proposal;
- The proponent believes that if a severe accident did occur, statistically it would be more likely in the country than in the defined area of concern;
- Even in the event of an accident, a spill of sodium cyanide is unlikely because of the structural integrity of the transport containers, which are identical for rail and road;
- No other Class 6 dangerous good is restricted in its movements like sodium cyanide solution;
- DOME, which is the government agency with the expertise in the management of the transport of dangerous goods, has informed the proponent that it has no objection to the proposal; and
- The proponent addressed the concern regarding contamination of water resources in the case of a spill by analysing a worst case scenario. The proponent concluded that in the very unlikely event of a spill, the scenario could be managed.

2.3 The proposed road routes

All routes used for transport of dangerous goods have to be approved by DOME. It is the intention of the proponent to only use approved routes. Consequently, no route specific quantitative risk assessment was carried out by the proponent on the proposed routes. Instead the proponent used qualitative route selection criteria which included:

- road quality;
- public safety;
- emergency response considerations; and
- environmental factors such as water catchment areas.

The proposed road routes for transport of sodium cyanide solution from Kwinana to Boddington, Murchison and Eastern Goldfields regions are given below:

• Boddington

The location of the two Boddington mines with respect to the Albany Highway and the Town of Boddington is shown in Figure 5.

At present these mines are serviced by deliveries of solid sodium cyanide trucked from Fremantle via the Albany Highway to Bannister then via the Marradong-Bannister Road. Boddington Gold Mine is supplied by an access road branching off 2km before the township. But the Hedges Mine is serviced by going through the township on a dedicated route and then a further 27km to the mine.

The proposed route to Boddington from Kwinana is as follows (with length of each section indicated):

Kwinana Plant to Patterson Road (1km)

Patterson Road to Thomas Road (3km)

Thomas Road to Southwest Highway (27km)

Southwest Highway to Albany Highway (6km)

Albany Highway to Marradong-Bannister Road (81km)

Bannister Road to Old Soldiers Road (13km)

Old Soldiers Road to Boddington minesite (17km)

Boddington minesite to Hedges minesite (10km)

• Murchison and Eastern Goldfields

AGR's proposed route is to follow the DOME designated explosives route from Kwinana to Tonkin Highway and then via the relevant highway north or east (Figure 1), ie

Kwinana Plant to Patterson Road (1km)

Patterson Road to Thomas Road (3km)

Thomas Road to Southwest Highway (27km)

Southwest Highway to Albany Highway (6km)

Albany Highway to Tonkin Highway (8km)

and thence to the goldfields as follows:

For the Murchison

Tonkin Highway to Roe Highway (12km)

Roe Highway to Great Northern Highway (17km)

Great Northern Highway to the Murchison (40km to the 50km Perth radius, followed by several hundreds of kilometres to various mine sites).

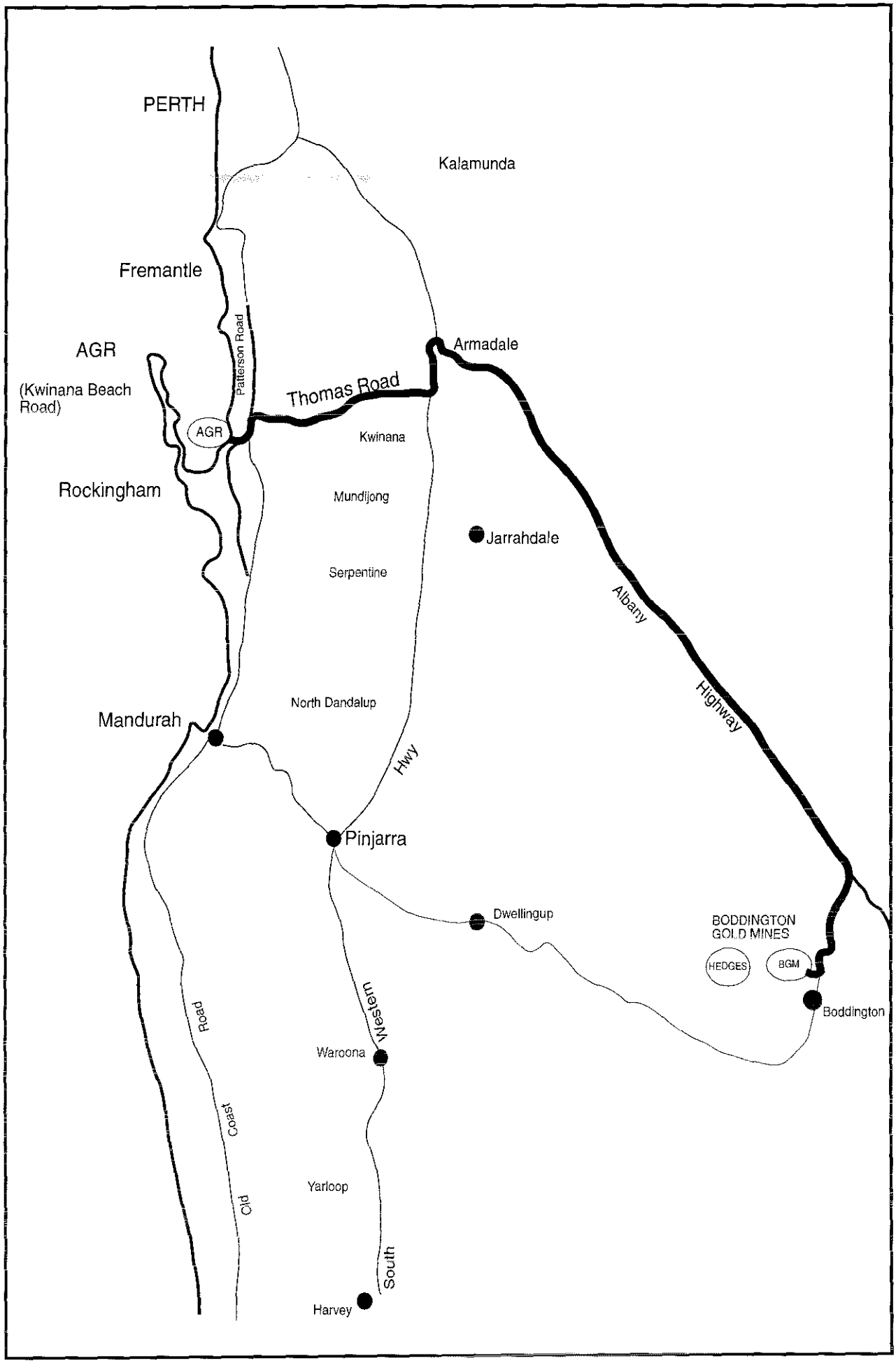


Figure 5. Proposed road route to Boddington.

For the Eastern Goldfields

Great Eastern Highway from the Tonkin Highway (24km)
Great Eastern Highway (38km to the 50km Perth radius, followed by various distances) to Southern Cross (using approved routes within the Shire of Southern Cross)
Great Eastern Highway to Kalgoorlie
Existing approved road routes from Kalgoorlie.

It is mainly within the Perth metropolitan area that the proposed road routes are through areas of relatively high density population, water catchments and conservation/protected wetlands in the Swan Coastal Plain.

3. Assessment method

3.1 General

Assessment process

The assessment for this proposal largely followed the *Environmental impact assessment administrative procedures 1993*, as shown in the flow chart in Appendix 1. The difference is that, for an application or a proposal under Section 46 of the Environmental Protection Act, there is no appeal provision on the level of assessment set. The summary of submissions and the proponent's response to those submissions appears in Appendix 2, and a list of submitters appears in Appendix 3.

Limitation

This evaluation has been undertaken using information currently available. The information has been provided by the proponent through preparation of the proposal document, by DEP officers utilising their own expertise and reference material, by utilising expertise and information from other State government agencies (Appendix 4) including the Water Authority of WA, DOME and Department of Conservation and Land Management (CALM), Swan River Trust, Main Roads Department 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.

3.2 Public submissions

Comments were sought on the proposal from the public, community groups and local and State Government Authorities. The proponent's public review document was available for public comment for a period of five weeks between 26 December 1994 and 30 January 1995.

There were 35 submissions received, within the following categories:

- 14 individual letter submissions;
- 8 submissions from groups and organisations; and
- 13 submissions from State, local and other government agencies.

Out of 35 submissions, there were 14 submissions supporting the proposal and 20 submissions against it.

The key issues of concern in the submissions include:

- the proponent's rationale for road transport;
- transport management to minimise risks;

- the proposed road routes with respect to public health and safety and environmental impacts ;
- potential impacts on public safety from a spill, particularly from evolution of hydrogen cyanide;
- potential impacts on public health from a spill into potable water supplies;
- potential impacts on the ecology of rivers and wetlands (flora & fauna); and
- emergency response management.

The submissions were primarily concerned with the consequences of a spill of sodium cyanide solution on public health and safety and on water courses, and emergency response time and neutralisation procedures. The majority of public submissions expressed concern with the choice of road instead of rail transport and the road routes selected for transport of sodium cyanide solution within the 50km zone. The public was concerned about a possible increase in accidents resulting from an increase in heavy haulage on Albany Highway and South Western Highway associated with the current road train trials by the Department of Transport, and the suitability of these roads for the transport of dangerous goods in general. Some submissions expressed that road transportation of sodium cyanide in the EPA's defined area of concern should be limited to solid sodium cyanide only.

The submissions of support indicated a general support based on the information contained in the proposal document, which included:

- new data showing road and rail have comparable safety;
- AGR's track record; and
- approvals in principle from the Water Authority of WA and Department of Minerals and Energy for road transport.

There was a recognition of the proponent's proven performance since 1987 in the submissions supporting the proposal as well as in the submissions against it.

The EPA has considered the submissions received and the proponent's response (Appendix 2) as part of the assessment of the proposal.

4. Evaluation of key issues of concern

The EPA has evaluated all the key issues identified in Section 3.2 of this report, based on existing information and advice from key government agencies.

4.1 Objective

The EPA's overall objective is to ensure that the transport of dangerous goods on Western Australia roads is carried out in a manner that risk to public and environmental health and safety is managed to an acceptable level.

4.2 Proponent's rationale for proposing road transport over the defined area of concern

Technical information

The rationale for this proposal is summarised in sections 1.3 and 2.2 above. In essence, the proponent believes that the information used by the EPA in 1987 to establish a generically

defined area of concern over which road transport of sodium cyanide solution should not occur, is outdated. The outdated data refer to a TNO risk study based on information from New Zealand (TNO, 1982).

A much more comprehensive report on hazard analysis and consequences by the Health and Safety Commission of the United Kingdom (HSC 1991) gives weight to the above argument as it concluded that, in general:

- for both rail and road transport, individual risks are negligible, and societal risks (risks to a numbers of people at any one time), which are predominant and more relevant in transport risks, are non-negligible but tolerable;

- "....one cannot say that road is generally safer than rail or vice versa. Much depends on the particular circumstances of each route, and the range of effect of the particular hazardous substance on the surrounding population (both fellow users of the rail or road route and those located alongside). While comparison of any particular pair of routes might suggest a choice in that case there is no justification for insisting on a general transfer, on safety grounds, from road to rail or vice versa.";

- "....Foremost is the importance of management in minimising risks by providing, promoting and maintaining safety systems and standards....".

The HSC 1991 study was limited, however, to two toxic substances: chlorine and ammonia, and two flammable substances: LPG and motor spirit. The study excluded damage to the environment, transport of radioactive substances, and all air and pipeline transport.

The EPA understands that a study on the transport of dangerous goods and the consequences of a spill in Canada (1988) came up with similar results to that in the HSC 1991 report. The Canadian study is particularly relevant to the Australian case as the population distribution and transport system in Australia are more similar to that in Canada than in Europe.

A Working Group of the Western Australian Dangerous Goods Liaison Committee (DOME 1993) found that the HSC 1991 findings and the results for the Canadian study (1988) could be applied to Western Australian situation.

Issues of concern and proponent's response

While some submissions supported the proposal for road transport of sodium cyanide solution, the majority expressed a belief that road transport is not as safe as rail transport. There was a concern that no formal risk assessment has been undertaken for the proposal since it appears erroneous to extrapolate any results from the HSC 1991 report to WA without any route specific quantification. The reasons for the concern are that not all components to the HSC 1991 study are relevant to Western Australian conditions (for example, in the study, the road route for chlorine transport by-passed towns but the rail line went through 3 large towns), and that it may not be appropriate to compare the risks associated with the transport of substances such as ammonia with sodium cyanide solution.

The proponent's response to this concern is given in Appendix 2. The proponent referred to the data presented in the proposal document to support its argument that both road and rail transport have comparable public safety. No formal risk assessment was carried out by the proponent on specific routes as it was not requested in the guidelines which were jointly prepared by DOME and DEP.

Advice from key government agencies

DOME is responsible for the management of, and public risks associated with, transport of dangerous goods in WA and it provided the following advice:

"DOME's philosophy on risks associated with the transport of dangerous goods is based on the findings of the Dangerous Goods Liaison Committee's "Report on the Public Safety Aspects of the Transport of Dangerous Goods in Bulk" ie conclusion 3, page 27 "the application in Western Australia of policies developed from risk analyses carried out in UK and North America using their local data, will result in relatively conservative policies for Western Australia. That is, policies which do not underestimate the level of risks" ".

DOME also advised that (John Hanley, *pers comm*, DOME) it does not believe that there is a need for AGR to carry out further route specific quantitative risk analyses, but it believes that emphasis should be placed on risk minimisation through management procedures, as outlined in the Dangerous Goods Regulations (1992), of the Explosives and Dangerous Goods Act (1961).

EPA's evaluation

Since the expertise and the management of public risks associated with transport of dangerous goods lies with DOME, the EPA accepts DOME's philosophy and its advice. As DOME finds the rationale for the proposal is based on reliable studies, the EPA accordingly considers that the rationale for reassessing the proposal is acceptable, and that route specific quantitative risk analyses is not required.

4.3 Public risks (Public health and safety)

Technical information

The proponent provided technical information on its performance and transport management procedures to manage risks in the proposal document. Public safety was also considered in proposing the road routes for transport of sodium cyanide.

DOME undertook a compliance audit of the proponents procedures and operations in February 1995 for the transport of sodium cyanide solution (Appendix 5). The audit concluded that the proponent not only complies with the requirements of the Dangerous Goods Regulations 1992, but also maintains a high level of safety standard with respect to risks minimisation.

The Chemistry Centre of Western Australia (CCWA 1989) investigated the possible effects of a spill of sodium cyanide solution during transportation and possible response strategies, and studied the rate of hydrogen cyanide emission from selected soils and natural waters following spillage of sodium cyanide solution (CCWA 1990). The CCWA studies included, under various conditions, the rate of evolution of hydrogen cyanide from neutral Bassendean sand and from various liquid surfaces and road bitumen, on which sodium cyanide solution was spilled. Results suggest that there would be no immediate danger to persons more than 50 metres away from a spill site. Within the 50 m danger zone, people could come into contact with the sodium cyanide solution which is highly caustic as well as poisonous, and/or be exposed to moderate (above 10 ppm) to dangerous (100ppm) levels of hydrogen cyanide gas evolving from the cyanide solution (the immediately fatal level of hydrogen cyanide is about 300ppm).

The proposal document presents a worst case spill scenario if an entire isotainer was spilled into a flowing stream feeding the Serpentine Reservoir when the water level was relatively low. Assuming a complete mixing with the entire reservoir, the proponent concluded that, through emergency response management, "there would be more than adequate time to shut off the reservoir before any contaminated water reached the outflow pipe(s) to community use", and even if there is a failure in emergency response actions, "by the time sodium cyanide solution reached the dam it would be so diluted as not to pose a threat to the people drinking water reticulated off the dam". Accordingly, any impact on public health as a result of a spill leading to contamination of potable water catchment would be minimal.

Issues of concern and proponent's response

The public was concerned about the consequences of a spill of sodium cyanide solution, including risks to the lives of other motorists, pedestrians and nearby residents from the evolution of hydrogen cyanide, and resultant health problems from the contamination of public and potable water supply catchments, particularly the Neerigen Brook. The concerns were related particularly to Albany Highway and South Western Highway near their intersection with Armadale road, which pass residential areas, schools and local potable water catchments, and have several accident potential points.

These concerns are quoted as follows:

> • "at the top of the hill, to its intersection with South Western Highway, Albany Highway is 8.5km of winding, mostly single lane road with steep gradients and minimum passing opportunities due to double line markings.....we remain extremely concerned as this section of highway has the potential for an even greater disaster than that which occurred at Greenmount.....Three primary level schools, Armadale Primary, Pioneer World and St Francis Xavier and one secondary level school, Armadale High are situated on the route. It is also the main access to Emmaus Primary/Secondary School by school buses and parents conveying children to school" (the "Greenmount " incident occurred over a year ago on Great Eastern Highway at the bottom of Greenmount hill, which involved a truck loosing speed control due to a brake failure, and resulted in multiple collisions and multiple injuries); and
>
> • "The Neerigen Brook runs parallel with Albany Highway. Bedfordale does not have access to scheme water, therefore residents living along Albany Highway are reliant upon the Brook for their source of water supply.....Should an accident occur, the Neerigen Brook would be contaminated by the contents of the tankers and also the solvents or detergents required to dispose of the pollutants".

The public submissions indicated a general belief that solid sodium cyanide is safer for road transport than sodium cyanide solution. The public was also concerned about the suitability of Albany Highway and South Western Highway for transport of dangerous goods in general.

Concern was expressed about the possible increase in road accidents from increased heavy haulage along South Western Highway and Albany Highway associated with the current road train trials by the Department of Transport. The road train trials in the metropolitan area were introduced in November 1994 and will be completed in April 1995 (John Foster, *pers comm*, Main Roads WA). It is understood that as a result of the community's concern about the road train trials, a WA Government Select Committee (chaired by the Hon. Fred Tubby, the member for Roleystone) was formed in August 1994 to investigate heavy haulage and road trains in the metropolitan area. The Select Committee will report the result of its investigation in October 1995.

The proponent's response to the above concerns (Appendix 2) can be summarised as follows:

- the immediate effects of a cyanide spill are short range (50 metre radius danger zone from a spill site) and the effects of a spill into water resources are short term (a few days to 1-2 weeks) in comparison with other dangerous goods such as liquid petroleum products or pesticides;
- according to the WA Dangerous Goods Transport Accident Summary Reports (from DOME), there have been 11 transport incidents involving solid sodium cyanide in WA between 1987 and 1993 with one involving spillage. There has been only one incident involving sodium cyanide solution with no spillage in WA since 1988;
- impacts of a spill on public safety and health are manageable through the proponent's existing emergency response plans;

- the proponent's focus is on risk minimisation procedures;
- the routes proposed take into account road quality, public safety, emergency response and environmental factors;
- the proponent's operation would only add a maximum of 2% to the current heavy haulage volume, and that the drivers will generally clear the metropolitan area before significant traffic build-up occurs; and
- public safety was considered by the proponent as the most important consideration in the route selection. The proposed routes are Category 1 or 2 roads under the Main Roads Department hierarchy of road categorisation as recommended by DOME to maximise public safety (see DOME 's advice below. The road hierarchy system developed by the MRD categories Primary Distributor roads as Category 1 and District Distributors as Category 2 roads. Primary Distributor roads are freeways, highways, main roads and major arterial roads. District distributors include the lesser arterial roads).
- In terms of road quality and traffic safety (ie passing lanes), Albany Highway was considered to be safer and more direct than alternative route to Boddington Gold Mines, via Pinjarra and Dwellingup. The alternative route across the scarp is narrow and winding over a great deal of the journey.

Comments from key government agencies

The Water Authority of WA (WAWA) and DOME had no objection in principle to road transport from Kwinana to Boddington through the 50km zone along the routes proposed.

DOME has prepared and provided the following comments regarding the public risk on the routes proposed:

> "WAACHS in its report entitled "Feasibility of Setting Routes for the Road Transport of Dangerous Goods" recommended that route setting not be prescribed. Proposed guidelines for route selection will suggest that dangerous goods vehicles should select Category 1 & 2 roads as listed in the Main Roads Department's Hierarchical Road Systems as the preferred route for transport". (The "proposed guidelines" are referred to DOME's draft guidelines for the selection of road route for road transportation of dangerous goods).

DOME also provided the following advice with respect to the proponent's transport management:

- "The audit has confirmed that AGR has effective systems in place to meet all the commitments made in its proposal and in all cases seen, those commitments were being met.

  The transport of cyanide solution by road in the manner proposed is as safe as reasonably practicable and presents no intolerable risks to the public of Western Australia.";
- "...the undertakings and commitments given by AGR in support of its application to vary the conditions of its original EPA approval to operate will, if they continued to be applied in the manner observed and verified during the audit, not conflict with the requirements of the Dangerous Goods Regulations 1992"; and
- "...the Company has demonstrated that it operates safely and there is no fundamental reason in the context of the public safety requirements of the Explosives and Dangerous Goods Act why it should not continue to do so in any area of the State".

The Health Department of WA advised that road transport should be as short as possible and directed away from high population area to minimise the number of people likely to be exposed to hydrogen cyanide from a spill:

> "From a public health perspective we believe rail transport of sodium cyanide solution should be the main mode of transport. We agree there needs to be an option to use road transport where necessary and this should be in accordance with procedures outlined in the document. However routes for road transport should be as short as possible and

directed away from high population areas. Road transport should also not be used, as the main mode of transport in preference to rail where rail transport is feasible".

On the health risk of an impact from a spill on potable water supplies in the worst case spill scenario, the Health Department commented as follows:

> "The assessment of health risk as a consequence of a water body being contaminated appears reasonable".

The Water Authority of WA provided the following advice:

- " ...the Water Authority has no objections to the proposed routes for the transportation of on page 27 and Figure 6 of the AGR Report"; and
- "...that the driver be in constant communication with the operational base at all times while sodium cyanide solution is being moved through water catchments. If the communication system fails, the movement shall cease until communication are restored".

Main Roads Western Australia provided comments as follows:

> "If transporters comply with all conditions and commitments as per Part D of the report, there are no objections from a traffic point of view. The proposed routes in the metropolitan area are acceptable.".

EPA's evaluation

Since DOME is the regulatory authority for the management of transport of dangerous goods in WA, the EPA accepts DOME's findings and advice that the proponent satisfactorily meets the requirements of the Dangerous Goods Regulations 1992 for safe transport procedures for sodium cyanide solution on the proposed road routes.

The results of the Chemistry Centre studies indicate that the effects of sodium cyanide solution and its associated hydrogen cyanide gas evolution are short range. The EPA understands that all potential impacts on public safety, including road users, in the event of a spill of sodium cyanide solution during transport have been taken into consideration by DOME in determining that the proposed road routes are acceptable. Hence the EPA considers that these impacts are manageable and can be minimised through transport and emergency management procedures audited by DOME.

On advice from WAWA and the Health Department, the EPA considers that the likelihood of a spill of sodium cyanide solution causing risk to the public is low. The EPA accepts the advice from WAWA and the Health Department that, if a spill were to occur, the potential impacts on public health and potable water catchments can be managed through a properly planned and coordinated emergency response system. From the current information and the information provided by the proponent during its rail transport assessment in 1987, the EPA is satisfied that the consequences of such a spill would be of short term duration since sodium cyanide is not a persistent pollutant even though it is highly toxic.

In conclusion, on the basis of advice from the key government agencies and taking into consideration the proponent's proven performance, the EPA considers that the proposal is acceptable in terms of public safety. However, the EPA notes the Health Department position, in terms of public health aspects, that where there is a choice between rail and road transport, rail transport should be the preferred option for transport for sodium cyanide solution. The EPA also considers that the concerns about traffic safety (such as the likelihood of another "Greenmount incident") and the road train trials and associated potential impacts should be addressed by the Department of Transport and the Main Roads WA.

4.4 Ecological risks

Technical information

The Western Australian Advisory Committee on Hazardous Substances (WAACHS) coordinates government agencies in the management and control of hazardous substances. WAACHS is made up of representatives from the Department of Occupational Health Safety & Welfare, Health Department of WA, Department of Environmental Protection (DEP), DOME, Department of Agriculture, WA Fire Brigades Board, and the WA Police Department.

A Working Party was set up under WAACHS to investigate and make recommendations on the feasibility of prescribing routes for the road transport of dangerous goods so as to protect the environment amongst other things. The report (WAACHS 1992) considered the environmental aspects of the road transport of petroleum products and solid sodium cyanide only in the metropolitan area. The transport of other dangerous goods, such as sodium cyanide solution, was not considered.

WAACHS 1992 recommended that "The Main Road Department (MRD) category 1 and 2 routes be endorsed as the preferred routes for dangerous goods vehicles". Even though sodium cyanide solution was not considered in the WAACHS 1992 report, the proposed routes are in accordance with this recommendation .

The proponent provided some information on the potential ecological impacts of a spill of sodium cyanide solution into wetlands in its proposal document. In response to questions raised during pubic submissions, the proponent also undertook further research on the potential environmental impacts of sodium cyanide in the case of a spill (Appendix 2).

Issues of concern and proponent's response

The public was concerned about the short term and long term effects of sodium cyanide and its neutralising agents on wetlands, rivers and groundwaters resulting from a spill.

The proponent's response (Appendix 2) is summarised as follows:

- "Under aerobic conditions in near surface soils, cyanide will decompose to ammonia, nitrogen or even nitrate and to carbon dioxide. Under anaerobic conditions, cyanide will be decomposed to ammonium ion, nitrogen, thiocyanate and carbon dioxide";

- "The rate of breakdown of cyanide will depend on factors such as pH, aeration, dilution, sunlight and temperature. The breakdown mechanism include volatilization, oxidation, biodegradation and photodecomposition. The degradation rates noted in the literature vary from hours to days to months depending on the above factors";

- "The ecological impact of a spill into a stream or river will be severe in the immediate area of the spill. In the vicinity where the concentration is greater than the lethal dose there would be a total kill of aquatic animals. There could also be short term detrimental effects on plant life. Details are complex and many examples are given in several dozen scientific papers which AGR lists in a bibliography at the end of the questions.

  However, cyanide oxidises and breaks down rapidly by a variety of mechanisms and is not persistent in the environment.

  Downstream of the spill there may be a small nutrient effect for a short time.

  On the subject of long term effects of low concentrations of cyanide on aquatic life, AGR has undertaken a literature search. Copies of papers received to date generally indicate no long term effects below 0.05ppm. Further papers have been called for to clarify or confirm the current general understanding that there are not any long term effects".

The proponents has also indicated that:

> "..if data are located which may suggest a change in approach to our emergency response actions to even further minimise impact on flora and fauna, then AGR would act accordingly".

The proponent emphasised that the impact of any other toxic dangerous goods may have similar or more damaging effects than sodium cyanide solution: "A large pesticide spill for instance would have a longer term effect than sodium cyanide".

Comments from key government agencies

The Swan River Trust which has responsibility for the welfare of the Swan and Canning Rivers advised that:

> "there is no problem with the routes proposed by AGR for the road transport of sodium cyanide solution".

CALM which has responsibility for managing portions of the conservation estate advised that:

> "CALM will not be making a submission to the EPA on this proposal. There are other agencies (DOME, WA Fire Brigade, WAWA, State Emergency Services and the Pollution Prevention Division of DEP) that are much better placed to provide expert comment on this project.".

EPA's evaluation

The proposal

EPA has inferred from the advice from the Swan River Trust and CALM that these agencies have not identified any significant problem or unmanageable issue with the proposal in terms of potential ecological impacts.

The EPA acknowledges the proponent's commitment to upgrade its emergency response actions in accordance with any new data to further minimise impacts on flora and fauna.

On the basis of advice from the above government agencies, the information provided by the proponent, and the proponent's commitment, and taking into consideration that other dangerous goods are currently allowed to be transported on the same routes as the proposed routes (e.g. concentrated acids, alkalis, petroleum hydrocarbons, solid sodium cyanide), the EPA considers that the potential ecological impacts of the proposal are manageable.

Future direction

The EPA, conscious of the need to protect the ecology of wetlands and rivers, considers that the issue of ecological risk assessment is important. The EPA has been advised that the Dangerous Goods Liaison Committee has been investigating the public safety aspects of the transport of dangerous goods (DOME 1993) and in the near future, will consider draft guidelines proposed by DOME for the selection of suitable road routes for dangerous goods (John Hanley, *pers comm*, DOME).

The EPA also believes that it is timely for Government instrumentalities such as WAACHS to foster an approach or policy on ecological risk assessment for transport routes.

The EPA considers that route selection should also take into consideration potential ecological impacts for a wide range of dangerous goods that are carried in significant quantities as WAACHS (1992) stated that "*spilled pollutants are normally directed into wetlands through the drainage routes designed to deal with stormwater*". WAACHS (1992) recommended that:

> "Action be taken to identify and log drainage routes and water assets that may be immediately threatened by the spillage of pollutant goods in transport, with a view to installing facilities for the separation of pollutants prior to them being dispersed. The

data developed in this exercise should be incorporated into the WA Land Information System so it will become available for use by emergency responders".

The Authority supports the implementation of this recommendation and suggests that WAACHS identify specific measures and resources required for implementing the above recommendation.

4.5 Emergency response management

Technical information

The proponent addressed emergency response management system in detail in its proposal document.

The proponent's Emergency Response Plan was approved by the EPA in 1988.

Issues of concern and proponent's response

The public submissions expressed a need for timely and effective emergency response actions in a sodium cyanide solution spill. The public was concerned about response time being too long, the location and storage of neutralising agents along the proposed routes, the effectiveness of neutralisation and clean-up procedures and monitoring the effects of a spill.

The proponent's response to these concerns are detailed in Appendix 2. In addressing these concerns, the proponent has made a commitment that it will liaise with Local Government Authorities and counter-disaster groups before transport commences along the approved transport routes, to address local emergency response issues/procedures and the appropriate siting of neutralising chemicals, in order to ensure timely and effective emergency response actions in a spill incident.

Comments from key government agencies

The EPA sought advice from the Western Australian Fire Brigades Board (WAFBB) and the Western Australian Hazardous Materials Emergency Management Scheme (WAHMEMS) Coordinating Committee. The WA Fire Brigades Board is the lead combat authority under the WA Hazardous Materials Emergency Scheme and the Scheme provides a mechanism to coordinate agencies that have a role in dealing with hazardous materials incidents which may occur within WA.

The WA Fire Brigades Board indicated that it would not have any objection to the proposal under a number of specified conditions.

The WA Hazardous Materials Emergency Scheme Coordinating Committee advised as follows:

- "On the basis of the published Report by AGR of 16th December 1994, the presentation by Mr Rob Keogh and Mr Vic Williams and their replies to questions, the WAHMEMS Coordinating Committee resolved that the WAHMEMS arrangements that are currently in place appears to be satisfactory to deal with an emergency resultant from a release of sodium cyanide solution during transport within the 50km radius area of concern"; and
- "The current arrangements with AGR relating to the transport of liquid cyanide outside of the 50km exclusive zone are deemed to meet the requirements of the WAHMEMS Annex H (attached), which lays out the roles and responsibilities of a Consignor/Prime Contractor".

The Water Authority provided the following comments in its submission :

> "In the case of transport to the Eastern Goldfields, the route along Great Eastern Highway passes through the Mundaring Weir Catchment which is the sole source of supply to the Goldfields and Agricultural Water Supply Scheme. The most vulnerable locations are creek crossings on Middle Brook and Emu Brook. Contingency plans would need to address the timely containment/neutralisation of any spillage in these locations".

The Water Authority advised that stringent contingency plans should also be applied to the route to Boddington Gold Mines.

EPA's evaluation

On advice from WA Fire Brigades Board and WA Hazardous Materials Emergency Management Scheme Coordinating Committee, the EPA considers that the proponent, in conjunction with relevant combat authorities, can provide and implement an emergency response system to adequately deal with sodium cyanide solution spillage incidents on the proposed routes.

Before commencing transport of sodium cyanide solution on the proposed routes, the proponent will be required to consult with the relevant authorities, including WA Fire Brigades Board, Water Authority and relevant local councils on emergency response plans to ensure that all specific and local emergency response issues are adequately addressed.

4.6 Public consultation

Information

During the assessment in 1988, there was considerable level of public concern along the proposed routes to Boddington. The EPA considers that public consultation is an essential component to be addressed in the proposal.

The proponent outlined its commitment to public consultation and the process that took place on pages 20 to 22 of the proposal document. The proponent further submitted a report on its public consultation process up to 13 February 1995 (Appendix 6), and made a commitment that it "will consult with the relevant local government authorities and emergency services before commencing road transport operations from Kwinana". The consultation program "will include addressing local issues and in particular working with the emergency response groups in setting up emergency plans and providing training in the properties and handling of sodium cyanide solution".

EPA's evaluation

The EPA recognises the proponent's on going commitment to public consultation, and considers that the proponent has and will carry out adequate public consultation in accordance with its indicated commitment.

5. Conclusions and recommendations

In assessing AGR's proposed change to environmental conditions sought under Section 46 of the Environmental Protection Act, to allow for transport of sodium cyanide solution by road over the "defined area of concern" as nominated by EPA in 1987, the EPA has considered the following issues:

- rationale for reassessing the road transport option over the defined area of concern;
- public risks;
- potential environmental impacts;
- emergency response management; and
- public consultation.

The EPA has taken into consideration all advice given by the key government agencies on the above issues and the proponent's environmental management performance since 1987, and made the following recommendation:

Recommendation 1

On the basis of the advice provided from the key government agencies, and the information provided by the proponent on public risk, potential ecological impacts and emergency response management, recent data on transport risk and consequences, and the proponent's environmental management performance since 1987, the EPA considers that the proponent has adequately addressed the issues associated with the transport of sodium cyanide solution along the proposed routes and that the proposal is acceptable on environmental grounds.

Accordingly, the EPA recommends that the environmental conditions could be changed in this regard.

The proponent has established an acceptable sodium cyanide solution handling and transport management system based on best industry practices, including continuous improvement and total quality management to Australian Standards AS 3902. This system is committed to managing the risk to an agreed acceptable level, and is acceptable to the EPA.

Before the commencement of transport of sodium cyanide solution on the proposed routes, the proponent should consult with relevant government authorities including the Department of Minerals and Energy, Western Australian Fire Brigades Board, the Water Authority, the Swan River Trust, the Health Department, and the Department of Conservation and Land Management to ensure that all specific requirements are fulfilled in the transport and emergency response procedures.

Future direction

The EPA, conscious of the need to protect the ecology of wetlands and rivers, considers that the issue of ecological risk assessment is important. The EPA has been advised that the Dangerous Goods Liaison Committee has been investigating the public safety aspects of the transport of dangerous goods (DOME 1993) and in the near future, will consider draft guidelines proposed by DOME for the selection of suitable road routes for dangerous goods (John Hanley, *pers comm*, DOME).

The EPA considers that route selection should also take into consideration potential ecological impacts for a wide range of dangerous goods that are carried in significant quantities. The Western Australian Advisory Committee on Hazardous Substances (WAACHS 1992) stated *"that spilled pollutants are normally directed into wetlands through the drainage routes designed to deal with stormwater"* and recommended that:

> "Action be taken to identify and log (register) drainage routes and water assets that may be immediately threatened by the spillage of pollutant goods in transport, with a view to installing facilities for the separation of pollutants prior to them being dispersed. The data developed in this exercise should be incorporated into the WA Land Information System so it will become available for use by emergency responders. "

The EPA supports the implementation of this recommendation and believes that it is timely for government, through inter-departmental bodies such as WAACHS, to foster this philosophy and develop an approach or policy on ecological risk assessment for major transport routes for dangerous goods.

At present the risks associated with transport of dangerous goods, such as public safety and health, transport, and environmental risks are managed separately. The EPA believes that in the interest of forward road planning for Perth, it is timely to review the issue of integrated risks for public health and safety and environmental impacts. This would help to quantify and identify areas/routes of increasing risk and determine the need to put in place a more comprehensive risk management programme for the Perth metropolitan area.

6. Recommended additional environmental conditions applicable to road transport

Based on the assessment of this project and recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate. These conditions address the road transport issues only. The proponent should endeavour to use rail transport as the preferred option where there is a choice between road and rail transport. In addition, the proponent has made commitments relevant to the management of the road transport of sodium cyanide solution. The Minister for the Environment may issue a consolidated statement or statements of conditions applicable to all elements of the proposal, including the sodium cyanide plant at Kwinana and the transport of sodium cyanide solution by road and rail.

1 Proponent Commitments

The proponent has made a number of management commitments in order to minimise risks to the public and the environment .

1-1 In implementing the proposal, including the transport of sodium cyanide by road reported on in EPA Bulletin 772, the proponent shall fulfil the commitments made in the document "Transport of Sodium Cyanide Solution from Kwinana, December 1994" and in the Public Environmental Report (1986) and Notice of Intent (1987), and in response to issues raised following public submissions; provided that the commitments are not inconsistent with the conditions or procedures contained in this statement.

A schedule of management commitments arising from the document "Transport of Sodium Cyanide Solution from Kwinana, December 1994" which will be audited 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. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material 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 Time Limit on Approval

The environmental approval for the proposal is limited.

4-1 If the proponent has not substantially commenced the modified project within five years of the date of this statement then the approval to implement the modified proposal shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project 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 by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

5 Compliance Auditing

To help determine environmental performance, periodic reports on progress in implementation of the proposal are required.

5-1 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 proponent's transport management systems, including transport procedures and operations, will be audited by the Department of Minerals and Energy, at least on an annual basis.

4 The Department of Minerals and Energy will report to the Department of Environmental Protection on incidents, cases of exceptions and non-compliance.

Note

The attention of the proponent is drawn to Section 47 (1) of the Environmental Protection Act which states:
"A proponent on whom a statement has been served under section 45 (5) and who does not ensure that any implementation of the proposal to which the statement relates is carried out in accordance with any conditions and procedures set out in the statement commits an offence."

SCHEDULE OF MANAGEMENT COMMITMENTS

Communications and Emergency Equipment

1 Vehicles shall be equipped with means of communicating quickly, efficiently and reliably with an operational base, eg by means of 2–way radios, and shall be fitted with equipment and materials in accordance with the approved emergency plan.

2 A procedure will be maintained for communications with the transport operations base as each vehicle travels along a transport route to a mine and until that vehicle logs off.

Emergency Back-up

3 Emergency response back–up from CSBP's Kwinana works will be available at all times when road transport is taking place.

Times of Transport

4 Each driver will maintain a log which includes time of departure from the Kwinana area, and a general goal will be to clear the metropolitan area before significant traffic build–ups occur.

Emergency Response Plans/Procedures

5 The proponent will change emergency response procedures for spillages during transport in accordance with any new data available to minimise ecological impacts.

6 The proponent will liaise with Local Government Authorities, relevant government departments and counter-disaster groups before transport commences along approved transport routes, to address local and specific issues, including setting up emergency plans and training programmes.

Auditing

7 In addition to any required audits by a regulatory body, the proponent will continue to perform its own audits.

8 The proponent is committed to and will abide by the principles of Responsible Care which include in the Australian Chemical Industry Council's (ACIC), now the Plastics and Chemical Industries Association (PACIA) Code of Practice for the transport of chemicals.

Transport Management

9 The proponent will conform to all standards and requirements set by the Department of Minerals and Energy.

10 The proponent will report all aspects of transport operations, including incident reporting and investigation to the Department of Minerals and Energy.

11 The proponent is committed to the transport management systems contained in the proposal.

7. References

Brian O'Brien & Associates (December 1994): Transport of sodium cyanide solution from Kwinana - Report by Australian Gold Reagents Pty Ltd to the Minister for the Environment.

Chemistry Centre of WA (CCWA) (1989): A Preliminary Investigation into the Effect of Spillage during Transportation of Sodium Cyanide Solution and Possible Response Strategies. Prepared for CSBP & Farmers Ltd.

Chemistry Centre of WA (CCWA) (1990): A Study of the Rate of Emission of Hydrogen Cyanide from selected soils and natural waters following spillage of 30% sodium cyanide solution. Prepared for CSBP & Farmers Ltd.

CSBP & Farmers Ltd and Kinhill Engineers Pty Ltd (1988): Sodium Cyanide Solution Bulk Transport - Spill Incident Contingency Plan.

DOME (1993): Dangerous Goods Liaison Committee "Report on Public Safety Aspects of the Transport of Dangerous Goods in Bulk" .

Environmental Protection Authority (1987a): Proposed Sodium Cyanide Plant - Report and Recommendations.

Environmental Protection Authority (1987b): Proposed Transport of Sodium Cyanide Solution by Rail - Report and Recommendations.

Health and Safety Commission (HSC) (1991): Advisory Committee on Dangerous Substances. Major hazard aspects of the transport of dangerous substances. HMSO. London.

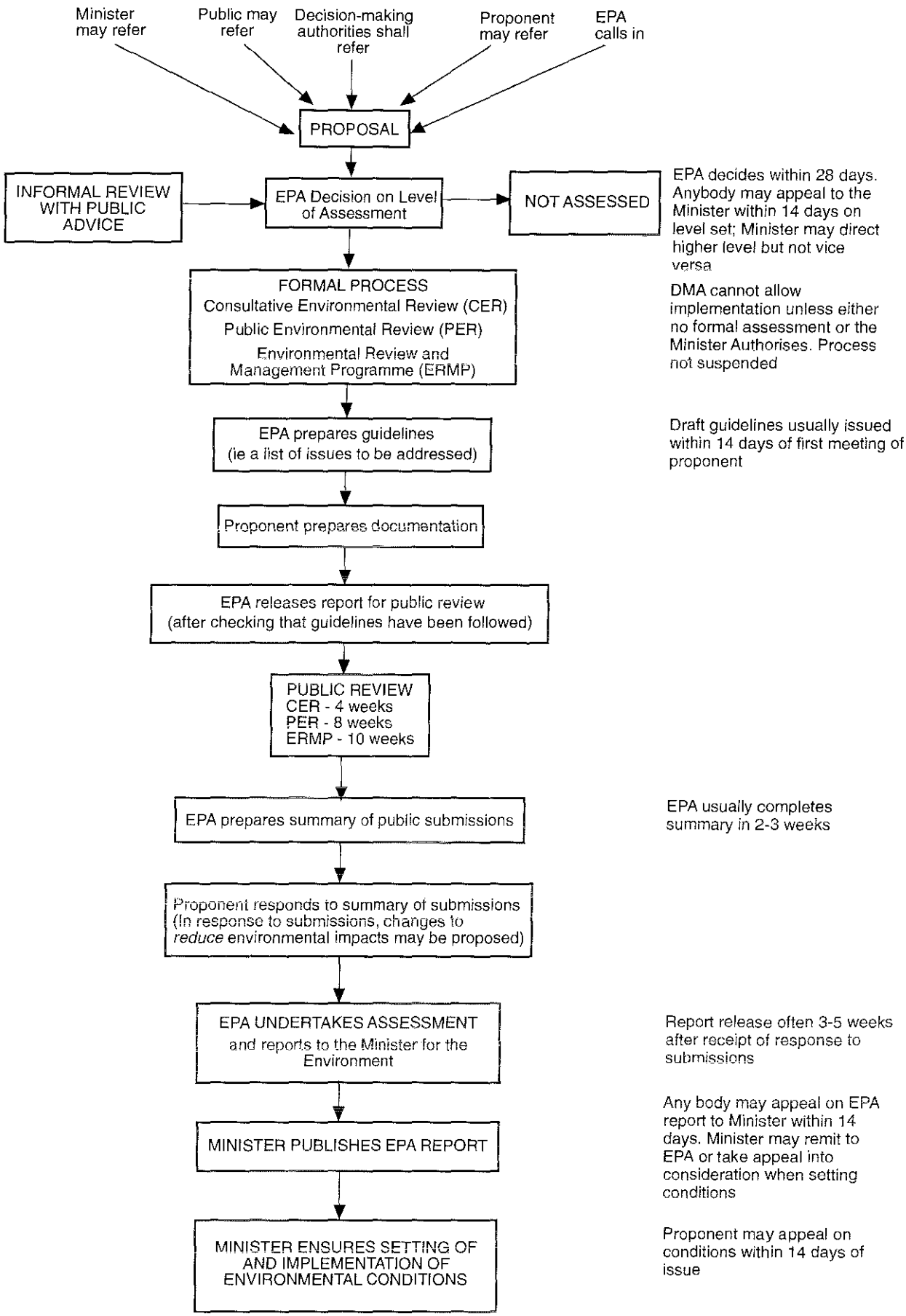
Kinhill Engineers (1987): Proposed Sodium Cyanide Plant - Supporting Document on the Use of Rail Transport. Prepared for CSBP & Farmers Ltd, Coogee Chemicals Pty Ltd and the Australian Industry Development Corporation.

Kinhill Engineers (1988): Emergency Response Plan.

Western Australian Advisory Committee on Hazardous Substances (WAACHS) (1992): "Report on the Feasibility of Setting Routes for the Road Transport of Dangerous Goods" .

Appendix 1

Environmental impact assessment flow chart


Minister may refer
Public may refer
Decision-making authorities shall refer
Proponent may refer
EPA calls in
PROPOSAL
INFORMAL REVIEW WITH PUBLIC ADVICE
EPA Decision on Level of Assessment
NOT ASSESSED
EPA decides within 28 days. Anybody may appeal to the Minister within 14 days on level set; Minister may direct higher level but not vice versa
FORMAL PROCESS
Consultative Environmental Review (CER)
Public Environmental Review (PER)
Environmental Review and Management Programme (ERMP)
DMA cannot allow implementation unless either no formal assessment or the Minister Authorises. Process not suspended
EPA prepares guidelines (ie a list of issues to be addressed)
Draft guidelines usually issued within 14 days of first meeting of proponent
Proponent prepares documentation
EPA releases report for public review (after checking that guidelines have been followed)
PUBLIC REVIEW
CER - 4 weeks
PER - 8 weeks
ERMP - 10 weeks
EPA prepares summary of public submissions
EPA usually completes summary in 2-3 weeks
Proponent responds to summary of submissions (In response to submissions, changes to *reduce* environmental impacts may be proposed)
EPA UNDERTAKES ASSESSMENT and reports to the Minister for the Environment
Report release often 3-5 weeks after receipt of response to submissions
MINISTER PUBLISHES EPA REPORT
Any body may appeal on EPA report to Minister within 14 days. Minister may remit to EPA or take appeal into consideration when setting conditions
MINISTER ENSURES SETTING OF AND IMPLEMENTATION OF ENVIRONMENTAL CONDITIONS
Proponent may appeal on conditions within 14 days of issue

Appendix 2

Summary of submissions and proponent's response to questions

AUSTRALIAN GOLD REAGENTS PTY LTD

ACN 009 140 121

APPENDIX 1

APPLICATION FOR A CHANGE IN CONDITIONS ROAD TRANSPORT OF SODIUM CYANIDE SOLUTION

QUESTIONS AND ISSUES RAISED IN SUBMISSION PERIOD

26 DECEMBER 1994 TO 30 JANUARY 1995

AND

AGR RESPONSES

February 1995

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ROAD TRANSPORT OF SODIUM CYANIDE SOLUTION

INTRODUCTION

At EPA request, AGR made available a Report in support of its application to the Minister for the Environment for a Section 46(1) change in Ministerial Conditions for the Transport of Sodium Cyanide Solution from Kwinana.

This 93-page document, referred to in the following as the Report, is in addition to many other reports prepared by or for AGR during the course of this project.

Officers of the Department of Environmental Protection (DEP) compiled a list of 63 questions and issues raised during the period the Report was advertised for public review (26 December, 1994 to 30 January 1995). The sources of the original questions and issues are not known to AGR. No attempt was made by AGR to correct or highlight editorial or related errors in the questions supplied. Question numbers are those allocated by DEP, and items are grouped into issues for convenience of a reader.

In addition, Departmental officers requested responses from AGR to three submissions received from the City of Armadale, Bedfordale Residents Association and the ARTAG (Against Road Trains Action Group). These action groups were established and opposed all heavy haulage on Bedfordale Hill before the AGR proposal was made. Therefore their opposition is broadly a matter for all transport, including petrol, rather than only the AGR proposal.

AGR draws attention to the fact that it has been invited to comment only on submissions that raised a concern. There are several submissions by professional and community groups including the Town of Kwinana, which support the proposal but whose views are not contained in the following. AGR has also provided comment on several submissions received after the close of the comment period on 30 January.

AGR has been safely transporting sodium cyanide solution by road throughout much of the State for over six years. The proposed change of Ministerial Conditions will remove the current inequity.

GENERAL SUBMISSIONS

RISKS

Q.1. In assessing public risks inside a 50km radius from Perth GPO (Sect 9.3), did AGR examine/consider the characteristic of the roads chosen, such as population densities on roads, particularly at nodal points (eg intersections) and winding portions where accidents are more frequent ?

AGR has considered the characteristics of the proposed road routes within the 50km "zone of concern". The general criteria for selection of the road routes within that area is given on page 23, Section 8.1 of the AGR Report. Specifically, AGR physically examined the Kwinana-Boddington route, reporting its findings on pages 37 to 39, Section 9.4.2, and Figure 6.

DOME has the decision-making role for transport of dangerous goods on main roads and will also have applied these and other criteria in approving AGR's proposed routes.

Q.2. The quote from the HSC report clearly states that "Much depends on the particular circumstances of each route'. This AGR report then goes on to argue that 'the generic figures rather than specific figures for particular routes, are the important factor in the requested change in Ministerial conditions.' Why?

The AGR argument that the generic figures (rather than specific figures) for particular routes are the important factors in the requested change in Ministerial Conditions is explained on page 30 of the AGR Report (new overseas data on rail and road transport, Section 9.1).

First, road and rail have about the same general safety.

Second, even though comparison of specific routes may favour road over rail or vice versa, the relative magnitude of the difference is of order 5 or so, a factor generally accepted as being the same as the range of accuracy of risk determination.

Q.3. The AGR Report has inferred "comparable safety" between road and rail, based on the HSC study. The HSC report, in para 240 (Section 11 "Overview and Conclusion", page 50) qualifies this conclusion by stating that " The lower likelihood of events such as derailment, compared with the corresponding road events, seems offset by higher conditional likelihood of container puncture subsequent to derailment - and also the likely higher urban component of a railway route. The balance of safety therefore depends upon the specific circumstances of the local geography of the traffic routes studied.....". It appears erroneous to extrapolate any results from the HSC report to WA without any route specific quantification. Please comment.

The WA Dangerous Goods Liaison Committee (Working Party) decided in 1993 that "the application in WA of policies developed from risk analysis in the UK and North American will result in relatively conservative policies which do not under estimate the level of risks". This is discussed on page 32 of the AGR Report and Appendix 1 - 8, Item 4.

Relevant conclusions by the Working Party included:

- **public safety issues associated with setting of routes for dangerous goods vehicles in Western Australia are not significantly different from the public safety issues identified elsewhere in Australia, UK, USA and Canada;**

- **the application of the transport of dangerous goods regulatory program to bulk vehicles in Western Australia is as good or better than similar programs in the UK and North America; and**

- **the application in Western Australia of policies developed from risk analyses carried out in UK and North America using their local data, will result in relatively conservative policies for Western Australia. That is, policies which do not underestimate the level of risks.**

In other words, taking account of road quality, population density and the WA environment, the Dangerous Goods Liaison Committee believed that the application of risk study results from the UK to WA would be a conservative position to take.

Consequently, AGR was not required by the DEP/DOME guidelines to carry out further detailed or route specific comparative analyses. AGR did consult with risk experts and concluded that detailed comparative analysis of the particular road versus rail routes would not provide significantly new technical information (page 30, AGR Report). This conclusion was based on factors including the length of the transport route, multiple handling of the transport containers and the standard of the rolling stock and the narrow-gauge rail track.

The issue of importance is whether rail and road have comparable safety within the nominal accuracy of 5 to 1 or whether it is more nearly 5000 to 1. The HSC report paragraph 240 referenced stated in bold at the beginning and end of that paragraph its finding of comparability.

The Western Australia Advisory Committee on Hazardous Substances (WAACHS) recommended in March 1992 that routes not be prescribed by regulation for vehicles carrying dangerous goods, but that proposed routes were MRD Categories 1 and 2 (see section 8 of AGR Report).

Q.4. The HSC report concludes from the UK road/rail transport study that, in general: (i) individual risks are negligible, using an individual risk criteria of 1 per million/year (same as in WA); and (ii) societal risks (risks to a numbers of people at any one time, expressed as FN curves), which are predominant and more relevant in transport risks, are non-negligible but tolerable, (ie require ALARP principle). In WA, the EPA or DOME has not set criteria for societal risks, how can the conclusion on "tolerable societal risks" be applied in WA?

The UK societal risks refer to rail and truck routes with much larger tonnages being transported over a much smaller area but along more urbanised and much more densely populated routes (see Report page 35). It would seem unlikely for Western Australian societal risks criteria to be set so far above UK values as to counterbalance such a large comparative factor.

In addition, it must be remembered that AGR is requesting a change of Conditions which originally were set based on relative risks of road versus rail generic studies, TNO - LPG, New Zealand.

As the Report (Section 9) shows, the HSC and the later TNO report show the two types of transport are comparable.

The question seems academic, since the WA individual risk criterion was also found acceptable in the HSC report and its conclusions.

These comments are also covered by the fact (Report page 3) that the Western Australian Dangerous Goods Liaison Committee (WA DGLC) accepted that application of the UK and Canadian findings would result in conservative policies for WA.

Q.55. It is not appropriate to assess the risk from this proposal by comparing risks as determined by the HSC study (1991). There are various components to the HSC study which are not relevant to WA conditions, and it is not appropriate to compare the risks associated with the transport of substances such as ammonia and LPG with sodium cyanide.

The WA Government advisory body has already examined the relevance to WA conditions (see Report Section 9.2). The Report also contains a letter from DOME as to relevance (Att.2). The issue relating to changing Conditions is one of relative risks of road versus rail transport.

This is explained in that "the far-field effects of sodium cyanide solution do not exist as they do for chlorine, ammonia and LPG" (Appendix 1-5).

Therefore this is a further conservative comparison and not likely to underestimate the relative risks of road versus rail for sodium cyanide solution.

Q.56. pp 32, S 9.1: where is it in the report which demostated that "the risks of a road accident are about the same as the risks of a rail accident" wrt to the proposed routes ? What about the road users, the residents and the schoolchilden along the routes ? rail transport would not have the volume of traffic ahead, behind or alongside this dangerous chemical.

- **Refer Appendix 1 and Figures 7 and 8 of Report.**

- **Refer answer to Question 2 above.**

- **The UK HSC study did take account of the population density, traffic density and other factors such as the greater momentum and impacts involved in rail transport accidents. The AGR Report (Section 9.2) discussed its relevance to W.A, as did a letter from DOME (Att. 2).**

Q.57 The Dutch consultants NTO, whose 1982 study generate the figure of 5000:1 against road, showing in a subsequent report, 1984, that rail and road have comparable safety ? what are the factors affecting the change ? for whom were these report commissioned? and what are the Terms of Reference ?

AGR attempted to determine the reason for the change in the conclusions of the TNO report on LPG transport in New Zealand but could not obtain an answer. The 1984 TNO report was its summary report to its client and AGR therefore gave it higher credibility. AGR included in its Report (Fig.4) typical data from the 1984 TNO report so that readers can see how the two transport forms have comparable safety.

The TNO studies were commissioned by the Liquid Fuels Trust Board, Wellington, New Zealand and were titled "Risk analysis of the railway and road transport of LPG through four cities in New Zealand", October 1982, and May 1984.

CONSEQUENCE OF A SPILL

Q.5. Long term effect of a major spillage where the liquid can soak into the surrounding soil and emerge latter into the water catchments by leaching.

It is not in AGR's interest to have a long term residual effect from any possible incidents involving a spillage of sodium cyanide.

Any incident, even complete loss of the contents of an isotainer is manageable and the recovery and treatment of cyanide contamination is documented and proven.

This issue was addressed previously in the 1987 report by CSBP, Coogee Chemicals and the AIDC, titled "Proposed sodium cyanide plant, Supporting document on the use of rail transport", Section 4.3.3, Spillage onto soil (referenced in current report) and in the current Report, Appendix 3.

The 1987 report was accepted by the EPA and allowed them to recommend project approval.

In principle, clean-up action involves an assessment of the spillage area to determine the permeability of the soil, the use of any groundwater in the area and the quantity of sodium cyanide spilled.

Action taken then would involve in-situ neutralisation or removal of the soil and subsequent treatment.

If groundwater is likely to be affected any pumping from bores would be stopped and then action taken which could include:

- **monitoring of water quality**
- **water abstraction and treatment and reinjection back into the aquifer**
- **direct injection of neutralising agents**
- **injection of air or oxygen to oxidise the cyanide**
- **combinations of the above.**

A spillage into a heavily wooded catchment area would be combated as follows:

- **limit the spread by bunding**
- **apply ferrous sulphate, water it in to neutralise the cyanide solution in the soil**
- **excavate and remove the neutralised soil**
- **replace the excavated areas with clean soil.**

Until the spill is neutralised, the high alkalinity may be detrimental to the roots of the adjacent trees.

These actions plus the fact that cyanide is not persistent in the environment, would remove any long term effects. There is a wide variety of mechanisms of geochemical and biogeochemical processes that remove any environmentally active cyanide (Rouse & Pyrih, Proceedings of the Symposium on Environmental Management for the 1990s, Society of Mining Engineers, AIME, USA 1991).

It must be remembered that AGR is not seeking a licence to continuously discharge cyanide into the surrounding environment. The above considerations apply to the extremely unlikely possibility of a spill.

Q.6. Ecological and human health effects of sodium cyanide, and its neutralising agents in wetlands, groundwater and resevoirs.

This has been covered in Sections 9.4.2 to 9.4.4 of the AGR Report. Further, AGR is committed to minimising the risks from the transport of sodium cyanide solution including the risk of a spill.

Hence its focus on management programs (particularly driver training, operating procedures, auditing and continuous improvement) and equipment integrity.

DOME agrees that AGR is at the low risk end of the scale in the transport of sodium cyanide.

In 1987, the EPA found that rail transport within 35 metres of the Avon River and over a section of the Jandakot Mound was environmentally acceptable.

The ecological impact of a spill into a stream or river will be severe in the immediate area of the spill. In the vicinity where the concentration is greater than the lethal dose there would be a total kill of aquatic animals. There could also be short term detrimental effects on plant life. Details are complex and many examples are given in several dozen scientific papers which AGR lists in a bibliography at the end of the questions.

However, cyanide oxidises and breaks down rapidly by a variety of mechanisms and is not persistent in the environment.

Downstream of the spill there may be a small nutrient effect for a short time.

On the subject of long term effects of low concentrations of cyanide on aquatic life, AGR has performed a literature search. Copies of papers received to date generally indicate no long term effects below 0.05ppm. Further papers have been called for to clarify or confirm the current general understanding that there are not any long term effects.

AGR is not sure what impact any new ecological information will have on the management of its transport operations and emergency response procedures which are its major focus. That is, AGR wants to concentrate on preventing a spill in the first place. However, if data are located which may suggest a change in approach to our emergency response actions to even further minimise impact on flora and fauna, then AGR would act accordingly.

It must be emphasised that the impact of any other toxic dangerous good may have similar or more damaging effects. A large pesticide spill for instance would have a longer term effect than sodium cyanide.

Q.7. Impacts on water resources (Section 9.4), does a "worst case scenario" referred to a "worst case **credible** scenario" ? The report states that complete mixing of an isotainer contents with the entire reservoir is not realistic, and then goes on to discuss that very situation! Did AGR examine all other credible spill scenarios along the proposed routes, especially the Kwinana - Boddington route ? If yes, please provide the information.

AGR does not believe the scenario of a complete loss of a cyanide isotainer into a reservoir is credible for reasons outlined in Sections 9.4.2 and 9.4.3 pages 37 to 39 of the AGR Report. It would require a whole set of unlikely events all to occur in one incident and one particular location.

However, because the tendency of the regulatory authorities is to focus on consequence rather than the likelihood of an accident, AGR felt obliged to address the unlikely event referred to, as being the most extreme in affecting the

greatest volume of water, but ignoring all the attenuation factors such as the 12km travel to the dam (see p. 38 of the Report).

AGR examined the threat to the water catchments along the Kwinana-Boddington route after consultation with the Water Authority. As mentioned above, these are discussed fully in the Report (see also answers to question 8 & 26). Minor spill scenarios were not considered as they would be easily managed by the driver.

Q.8. What are the consequences of a spill into Nerigeen Brook ? the water is drawn from the brook for watering orchards and domestic purposes.

This issue was raised by the City of Armadale at AGR's first meeting and discussed fully at a subsequent meeting of councillors and officers at which AGR proposed a worst case scenario and the appropriate emergency response to minimise ecological and human health effects.

The effect or consequence of a spill into the Neerigen Brook, which is drawn upon for irrigation and drinking, applies not only to sodium cyanide transport, but (as outlined in the A.R.T.A.G. submission to the Select Committee on Heavy Haulage in the Metropolitan Area) it also applies to spills involving chemicals (eg pesticides), petrol etc.

AGR believes that from an analysis of the Brook and its usage, emergency actions can be implemented rapidly to minimise consequences.

These are:

- **alert the emergency services and keep the public clear**
- **cut pump suction lines from the Neerigen Brook**
- **contain spillage as much as possible**
- **monitor cyanide level in Brook**
- **treat Stage 2 lake by sodium hypochlorite injection**
- **continue the above until all clear given by the Authorities**

Although this proposed action has been discussed with Council, AGR is committed to finalising this action plan before transportation begins.

The consequences on aquatic life would be severe but short-term because of the reactivity and breakdown of cyanide due to natural processes and neutralisation with sodium hypochlorite.

The rate of breakdown of cyanide will depend on factors such as pH, aeration, dilution, sunlight and temperature. The breakdown mechanisms include volatilisation, oxidation, biodegradation and photodecomposition.

The degraduation rates noted in the literature vary from hours to days to months depending on the above factors. (Refer Kinhill, 1987, "Proposed sodium cyanide plant, supporting document on the use of rail transport", Sang M. Kung et al, "Degradation of cyanide by a bacterial mixture composed of new types of cyanide - degrading bacteria", Biotechnology Letters, Vol 15, No 2, 201-206, 1993).

Turning now to concentrated cyanide solutions and solids:

(i) One of AGR's competitors refers to the rate of breakdown of a thin layer (less than 1.0mm) of solid sodium cyanide exposed to the air. *The rate of decomposition is quite rapid - most will have decomposed within 24-48 hours and almost most certainly all will have disappeared within 1 to 2 weeks.*

(ii) AGR also has data on 30% sodium cyanide solutions. At 70^{0}C, degradation is rapid even within a closed tank with half the strength dissipating in 10 days. Out in the open, the degradation would be at a much faster rate (see also response to Q.28).

Sodium cyanide has been used as a fertiliser at low application rates on aerobic soils (280 kg/ha) with no hazardous effect (Fuller 1984 and Sarkar (1990)). So if contaminated Brook water was sprayed onto orchards, there should be no long term effect (depending on the concentration of cyanide in the brook) and, irrespective the situation would be closely monitored by AGR/CSBP and the appropriate authorities.

AGR has been pleased to discuss this issue with the City of Armadale. However, it is unaware whether other companies have likewise addressed impacts of spills of their products being transported through the same area on the same road.

Q.9. Lives of other motorists, pedestians and nearby residents would be at risk, and the surrounding soil and groundwater would be poisoned if liquid cyanide is allowed to be transported via Thomas Rd, South West Hwy, Bedfordale Hill and Albany Hwy.

AGR does not agree with this unsubstantiated statement, which does not give a technical reference or rebuttal to AGR's 93-page Report. AGR has a comprehensive risk minimisation and emergency response management system in place for sodium cyanide transport as outlined in Sections 5 and 6 of the Report.

Furthermore, DOME has acknowledged that, because of these systems and AGR's involvement in the road transport operation, AGR is at the low end of the risk scale for sodium cyanide transport.

Q.24 pp 40, para 4&5: how "insoluble" and how "low toxicity" are the complex ferro cyanides? what are the determining factors for the toxicity of cyanide to disappear once spilt into wetlands/rivers ?

The complex ferrocyanides ie Prussian Blue or ferric-ferrocyanide, are completely insoluble in water.

The addition of ferrous sulphate, properly mixed, will convert sodium cyanide to ferric-ferrocyanide, Fe_4 $(Fe(CN)_6)_3$, Prussian Blue.

Intermediates such as sodium ferricyanide or sodium ferrocyanide may form, but their toxicity is several hundred times less than that of sodium cyanide.

Prussian Blue is several thousand times less toxic than sodium cyanide. Compare the *LD_{50} for rats

Cyanide ion	**6.6 mg/kg**
Ferrocyanide	**500-5000 mg/kg**
Prussian blue	**15,000 mg/kg**

The determining factors for the breakdown of cyanide in the environment are given on page 40 of the Report, ie light, pH, temperature, dissolved oxygen, salinity and other ions present in solution. Cyanide is rapidly broken down to carbon dioxide and nitrogen gas by strong oxidising agents such as chlorine, sodium hypochlorite and calcium hypochlorite.

Natural mechanisms which remove cyanide from the environment include sorption on mineral surfaces or organic detritus, precipitation of insoluble metal cyanide complexes, alteration by biological mechanisms and metabolisation by plants. Under aerobic conditions in near surface soils, cyanide will decompose to ammonia, nitrogen or even nitrate and to carbon dioxide. Under anaerobic conditions, cyanide will be decomposed to ammonium ion, nitrogen, thiocyanate and carbon dioxide (reference Rouse et al).

Q.25 In the event of cyanide solution being spilt onto hot ground, what are the dangers to a motorist who happens to be nearby ? what if the motorist is unaware of the dangerous situation and attemps to assist ?

There is no danger to a motorist who happens to be near a spill of sodium cyanide provided the motorist does not come in contact with the solution. However, should the motorist be exposed to the low but potentially toxic levels of hydrogen cyanide right at the spill site (ie directly above the spilled solution) he or she would, depending on the concentration and exposure time, start to exhibit warning symptoms such headache, dizziness and perhaps nausea. Provided the motorist immediately took heed of these warning signs and cleared the area, he or she would not be in any further danger.

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* Lethal Dose to 50% of the rat population

More importantly, from the outset, the motorist would be discouraged from entering the spill area (or encouraged into leaving the area) by the strong smell of ammonia associated with AGR's sodium cyanide solution, thereby minimising his or her exposure to the low concentrations of hydrogen cyanide.

Irrespective of all the above, the AGR truck driver who is trained in emergency response procedures would take immediate action in such a situation to keep people at least 50 metres away from the spill. This is the safe isolation distance.

Finally, the isotainers are clearly marked to identify the product as sodium cyanide solution. Most people have heard of cyanide and know that it is toxic. It is reasonable to assume, therefore, that most people would keep clear of a cyanide spill.

Refer page 41 of the Report, and the relevant references, for further discussion on this.

Q.26 What are the public health & environmental mpacts on the Wungong river if the river is contaminated from a truck spillage ?

The Wungong Brook is downstream from the Wungong dam so there is no impact on drinking water quality.

In the unlikely event of a spill into the Brook, there would be an immediate short term impact on aquatic life. The downstream environmental impact would be minimised by AGR's emergency response procedures including the addition of sodium hypochlorite to neutralise the cyanide at some appropriate point downstream (i.e. after substantial dilution has occurred).

Q.27 What are the impacts of a spill of liquid cyanide comparing with that of solid cyanide onto ground and into a water body ?

A spill of sodium cyanide solution or solid into a water body has the same impact.

A spill of either material onto the ground would require a similar emergency response procedure, especially if the ground is wet or if it is raining.

In some circumstances handling of spilled solid sodium cyanide may be easier than sodium cyanide solution. However, in dry conditions it requires care to avoid dust generation/inhalation so similar personnel protection is required. In wet conditions, the sodium cyanide solution has an additional safety margin because of its greater caustic content.

Q.28 Qualitative ecological risk such as acute or chronic lethal concentrations to the aquatic animals in the event of a spill has not been adequately adressed. No toxicity data for its short/long term impact on the ecosystem have been provide for comment.

AGR's objective is to minimise risk in the transport of sodium cyanide solution. DOME have accepted that AGR is at the low risk end of the scale in this respect.

The consequence of a spill during rail transport was accepted by the EPA in 1987 as being the same as that from road (Bulletin 284, P11, "should a spill occur in such an area, the consequences would be the same as it is were a road accident").

AGR accepts that in the unlikely event of a spill, the consequences would be severe to aquatic life in the immediate area of the spill.

However, the cyanide would breakdown rapidly by a variety of mechanisms including volatilisation, oxidation, photodecomposition and biodegradation and would not persist in the environment.

Downstream from the spill site there may be some nutrient enrichment for a short period.

These impacts would be the same for a spill of any water soluble toxic chemicals.

Page 40 of the AGR Report provides data on acute toxicological effects of cyanide on some aquatic animals.

Raymond et al. (Canadian J. Fish Aquatic Science, Vol 43, 1986, 2017-2024) studied the biotransformation of hydrogen cyanide into thiocyanate in rainbow trout for periods of up to 20 days.

Zeman compared collected data from the Similkameen River with published water quality criteria pertaining to the protection of freshwater aquatic life. (Zeeman, L., "Water Quality Criteria for cyanide in the Similkameen River, British Columbia", Proceedings of the 1990 Conference Irrigation and Drainage, Environment Canada).

The literature indicates that the medium lethal threshold concentrations of free cyanide to freshwater fish are between 0.02 and 0.30 mg/l. Sublethal effects of free cyanide above 0.001 mg/l can be harmful to some fish, especially at low temperatures. Continuous exposure to levels above 0.025 mg/l has been found to impair the growth of most species of fish.

The paper notes that there is no approved method for measuring free cyanide and therefore total cyanide is measured which includes all the cyanides including non-toxic metallocyanide complexes. (see also answer to Q.6).

The bibliography research is appended to this report (see also response to Q.6.)

Q.29 While the report mentioned that cyanide is not a persistent pollutant and will degrade to nitrogen compounds over time, it is unclear at what rate and the time frame ?, given that the lower depth of the river system is affected by factors such as salinity, temperature and dissolved oxygen.

The degradation rates of cyanide in the environment have been reported in the literature and were referenced in the report by Kinhill (1987) "Proposed Sodium Cyanide Plant, Supporting Document on the use of Rail Transport".

Degradation rates have been reported varying from hours to days or longer;

- **Shiraraman et al. (1985) looked at the microbial degradation of thiocyanate, phenol and cyanide in a completely mixed aeration system. Cyanide removal was around 99.9% after 10 $\pm$ 2 hours in a bioreactor.**

- **Milligan (1987) studied the natural degradation of cyanide in heap leach piles over an 18 month period and found 85% of the cyanide had been removed by natural processes.**

- **Sang Mao Kang et al. (1993) studied the degradation of cyanide by a bacterial mixture compound of new types of cyanide - degrading bacteria. They were able to degrade concentrations of 100 mg/l cyanide to undetectable levels within 8 hours using a mixed culture.**

- **Zagorc-Koncan et al. (1992) studied a laboratory river model for self-purification inhibition in a stream containing toxic substances. They examined the DO profiles in organically polluted surface water with and without the addition of cyanide.**

  They concluded that the bacterial toxicity in river water can be accurately estimated using a laboratory river model technique.

- **Church et al. (1990) studied the cyanide residuals at an historically significant site in South Carolina. Preliminary conclusions indicate the cyanide associated with this waste site has degraded or stabilised within this waste site.**

- **Rouse et al. (1991) studied the geochemical alteration and natural biodegradation of cyanide compounds in the subsurface. A wide variety of mechanisms was found which degrade cyanide very effectively.**

Q.30 The ANZECC (1992) specifies that the concentration of free cyanide in fresh and marine waters for protection of aquatic ecosystems should not exceed 5ug/L, and pH will greatly modify the toxicity of metallocyanide complexes (Leduc et al. 1982 - cited in ANZECC). What happens under anoxic condition ?

AGR is not sure of the relevance of this question, but assumes that it is related to conditions that may occur as in Q.29.

Under anoxic conditions, cyanide not bound with metals as insoluble metallocyanides would most likely degrade via microbial activity.

If aeration of spill sites in a small creek was required this could be readily achieved with air hoses. (see also Q.24).

Q.31 WA has been transporting goods by rail and by road for many years. Why such emphasis on the UK, NZ, and the Netherlands ? The temperatures in WA woul be far greater than than in these countries, and hence present a greater risk of hydrogen cyanide gas evolving.

AGR has not placed undue emphasis on the UK, NZ and the Netherlands.

In 1987 the then EPA based its belief that rail transport was 5000 times safer than road transport on a 1982 transport study in New Zealand by Dutch consultants. This led to the current constraints placed on AGR.

AGR has simply used a later (1984) report by those same consultants for the same client to show that the figure of 5000 to 1 was grossly in error (see Fig. 4 in the AGR Report). AGR has backed this up with the extremely extensive and highly regarded UK study of the relative risk of road versus rail transport which show that risks are comparable.

These studies were major undertakings by recognised risk consultants and there are no comparable studies for Australia.

The issue of temperatures is irrelevant to the question of relative risk of road vs rail.

The Report also contains (Att.2) a letter from the Chief Inspector, Explosives and Dangerous Goods Division, which addresses the issue of relevance of overseas findings to Western Australia.

Q.32 While the proposal is based on the low risk associated with the proposed transport arragement, the report does not focus heavily on the likely severe consequences of a major spill.

The Report focuses on the risk minimisation and emergency response systems AGR has in place for safe transport of sodium cyanide. These are the systems that have enabled AGR to have an incident free track record over the last 6 years.

Contrary to the question, the Report has also reviewed the consequences of a spill onto soil or into water catchment (pages 36 to 42 and Appendix 3).

Q.33 Can the proponent provide details on any known instances of spills which may have occured around the world in recent years and use of neutralising agents or emergency treatments ? and the subsequnces of these spills?

1. **AGR in over 6 years of operation has not had any spill incidents. AGR sells only into the W.A. market.**

2. **An inspection of the annual WA Dangerous Goods Transport Accident Summary Reports (sourced from DOME) revealed that there have been only 11 transport incidents involving solid sodium cyanide in WA between 1987 and 1993. That is 11 incidents over 7 years out of a total 189 dangerous goods transport incidents.**

   There were five sodium cyanide incidents in 1987, one in 1988, two in 1989, three in 1990 and nil in 1991, 1992 and 1993. Only one incident, near Boulder, involved spillage. Four drums ruptured. The spillage was collected and delivered to a gold mine. The spillage area "was rendered safe".

   The 1994 report is not yet available. However, AGR is aware of a solid sodium cyanide transport incident near Chittering in late 1994. Two seatainers were involved. One container was badly damaged but no spillage resulted.

3. **AGR does not have access to similar records from the other states of Australia. However, discussions with manufacturers and distributors in those states, have revealed that there are isolated accidents involving solid sodium cyanide but few if any involve spillage. The Queensland manufacturers (ICI and Minproc) produce both solid and solution sodium cyanide. To our knowledge, neither company has experienced any transport incidents which have resulted in spills of sodium cyanide solution.**

   The most significant solid sodium cyanide transport incident in Australia of which AGR is aware, is the Condobolin incident in NSW which occurred on July 21, 1992. A truck carrying grain collided with a train at a level crossing. Rail wagons carrying four 20 tonne containers of

solid sodium cyanide were derailed and 6 tonnes of cyanide briquettes were released. The cleanup took 10 days and residual cyanide was "neutralised" by sodium hypochlorite solution. No one was affected by the cyanide. The grain truck driver and his passenger were killed by the impact itself.

4. **In several recent conversations with overseas cyanide manufacturers (eg Dupont, FMC), AGR has established similar records exist overseas. Whilst there are occasional incidents involving the transport of solid sodium cyanide, few if any result in spillage.**

   FMC Corporation and Cyanco transport 30% sodium cyanide solution in the USA. From discussions that AGR has had with FMC, it appears that there have not been any spill incidents involving 30% sodium cyanide solution in the last 4 years.

5. **Generally, the treatment of chemicals used interstate and overseas are confined to one or more of the following; ferrous sulphate, lime or sodium hypochlorite. FMC Corporation uses hydrated lime which stabilises but does not neutralise cyanide. FMC then excavates the affected area and removes the contaminated material from the site. Others use ferrous sulphate as AGR currently does. Sodium hypochlorite has been used to treat residue from a solid spill.**

Q.34 The major intersection at Armadale (the juction of Armadale Rd, Albany Hwy and South Western Hwy) is a potential traffic hazard and an accident here would lead to contamination of the Neerigen Brook which flows into the Southern River and eventually the Canning River, what are the environmental & health consequences ?

This is a controlled intersection where AGR trucks would be slowing down and/or stopping to turn from the South West Highway into Albany Highway, and therefore the risks of an accident are very low.

An accident leading to a spill is even less likely for several reasons, including the integrity of the isotainers, the special low-bed trailers AGR is required to use and the special training and certification of truck drivers (see Sections 5.10, 5.11, pages 14 and 15 of AGR Report).

The consequences of a spill into the Neerigen Brook have been addressed in the response to Q.8. More details have been provided to the City of Armadale on this matter.

EMERGENCY MANAGEMENT

Q.10 Has AGR got assurances from WAHMEMS Coordinating Committee that the sheme can in fact response to liquid cyanide spill incidents in a timely and effective manner ?

WAHMEMS has the responsibility and capability statewide to respond quickly to all incidents involving dangerous goods. AGR's confidence in the scheme and the Committee's was reaffirmed after a meeting with the Committee on Thursday January 26, convened to discuss AGR's proposal to transport sodium cyanide solution by road from Kwinana.

Q.11 Section 5.2 - Does AGR make a commitment to meet AS 3902 system ?

Wesfarmers CSBP is the operator and sales agent for AGR. It is AS 3902 accredited in Chlor Alkali and Ammonium Nitrate manufacture and has a continuing program to achieve quality accreditation for most of its operations. It is intended to include cyanide manufacture and transport.

AGR's sodium cyanide manufacturing operations have to conform to an extensive Total Hazard Control Plan (THCP) which is audited annually for conformance by the Dangerous Goods and Explosives Division of the Department of Minerals and Energy (DOME). This management plan covers every aspect of the operation including personnel selection, training, operating procedures, emergency procedures, control of emissions, security, maintenance, construction and so on.

AGR also conforms to the PACIA code of conduct for manufacturing and transportation operations. This includes "Duty of Care" and the Community Right to Know.

Further AGR's current transport contractors are either evaluating or proceeding toward AS 3902 certification.

Q.12 Section 5.5 - How often are ISRS audits carried out, and who does them? What is the Company's current ISRS star rating (cf Commitment 7.3 in the Ministerial Conditions)?

Internal ISRS audits are performed every 4 months and an additional annual audit is performed by a trained auditor qualified by the DNV-Technica organisation.

The current rating of the Wesfarmers CSBP Chemicals operations, which includes the operation of the sodium cyanide plant, is level 8 out of the level 10 maximum rating. (Since the writing of the AGR Report, the rating has changed from a star system (standard or advanced) to a level system. Level 8 puts the chemicals operations (and the rest of the Kwinana site) into the top percentage of performers, on an international basis.

The AGR transport operation was rated as part of the Wesfarmers CSBP Commercial Division which achieved a level 9 rating.

Q.13 Section 6.1.5 - For road transport, EIPs are required for the end of the isotainer as well as on both sides. This issue was aired extensively at the EPA inquiry into a TDI spillage on the Nullarbor Plain in 1989.

An EIP is displayed at the back of the trailers on which AGR's isotainers are secured. EIPs are permanently affixed to both sides of the isotainers. This meets the requirements of the WA Dangerous Goods Regulations 1992.

Q.14 Section 6.2 - What is the nature of the "desk top exercises" and how often are these "routinely conducted".

Desk top exercises are conducted every quarter to test the Management of Emergencies procedures. The senior management and site teams respond to either simulated or desk top on-site or off-site scenarios. The most recent simulated scenario was conducted under the auspices of WAHMEMS and code-named "Exercise Eric". "Eric" involved a simulated nitric acid spill from a tanker. Police, Fire Brigade and other Emergency services as well as CSBP's emergency response team took part. (Note that basic combat actions are similar for all liquid spills).

Q.42 Would AGR commit to implementing the following requirements from WAWA:

(a) " - that the driver be in contant communication with the operational base at all times while sodium cyanide solution is being moved through water catchments. If the communication system fails, movement shall cease until communications are restored;

(b) - as part of the commitment from AGR/CSBP to provide emergency backup in the event of an incident involving its cyanide solution, AGR should also commit to respond within set response times; and

(c) - both WAWA and WAHMEMS should be contacted in the event of an incident involving liquid cyanide." ?

(a) **AGR's contractors are in continual communication with their vehicle operators whilst they are transporting sodium cyanide solution. Operators have to report in at various stages of the delivery cycle depending on their distance from base. If a driver fails to check in, then action is initiated to determine the location of the vehicle and the reason for the communication failure.**

Further, in recent discussions with a senior WAWA officer AGR agreed with the suggestion that the vehicle operator checks-in just prior to entering any locations of potential poor radio transmission and immediately the vehicle leaves those locations. The same follow-up procedure would then be initiated if the operator fails to report in.

AGR would not hesitate to commit to this check-in requirement. However, AGR is reluctant to give an unqualified commitment not to move the vehicle if communication fails as this may create a traffic hazard. It would however agree that the vehicle would not initiate its next laden journey until communication was restored. As already discussed above, failure of the operator to communicate would initiate action to locate his whereabouts. The vehicle sent to investigate could escort the laden vehicle to its destination if the communication system has failed.

To reduce the possibility of communication equipment failure whilst transporting cyanide along the route to Boddington, AGR will write into the contract the requirement for the cyanide vehicle to have two independent means of communication.

(b) AGR is committed to responding immediately to an incident involving its sodium cyanide solution. The time taken to assemble the off-site team and depart from the Kwinana Works will vary depending on the time of day. Most times, however, the team (or at least a forward team) could be despatched within 30 minutes. Travelling time, of course, would depend on the distance of the incident from the works and traffic conditions.

The important initial response, involving the securing of the immediate area, would be performed by AGR's vehicle operator or by the local emergency service (usually the Fire Brigade) whose response times would be faster than AGR emergency response vehicle because of the drivers and/or the Fire Brigade's location closer to the scene.

On arrival, AGR's emergency response team would be at the disposal of the emergency services for on-the-spot specialist advice, control and clean-up operations (as specified under WAHMEMS).

(c) It is AGR's understanding that only the Police or the Fire Brigade decide whether to initiate a WAHMEMS response. AGR would certainly, however, suggest such action to the officer-in-charge should it be warranted.

AGR's management of emergencies procedures include checklists which ensure that the appropriate authorities are advised in an emergency. This would include WAWA if water supplies could potentially be affected.

WAHMEMS, of course, would have already initiated these contacts on receipt of the appropriate information from the scene.

Q.43 How can the storage of ferrous sulphate located along the proposed route(s) be protected from vandals ? Could it create a problem if falls into the wrong hands?

AGR's ferrous sulphate stocks are stored in padlocked seatainers or in locked Shire sheds. The material's common name is sulphate of iron. It is used as a trace element fertiliser and as an additive to stock feed. To date there have not been any problems and as it has low toxicity it would not "create a problem if it fell into the wrong hands."

Currently, AGR has 18 stockpiles of ferrous sulphate located along the transport routes. (These were shown in Figure 5 in AGR's Report). Keys to the padlocked containers are carried by the vehicle operators, various AGR and CSBP personnel and the Police, Shire Councils, Westrail and/or Fire Brigades as appropriate at each location.

AGR would locate additional stockpiles along any approved new transport route.

Q.44 How can AGR ensure that the emergency response team members don't turn off their communication service after hours ?

Members of the Emergency Response Teams are strongly motivated individuals and as such would not ignore call outs. The off-site team for instance train for half a day each month and have always responded to an "emergency".

There are three response teams involved in an off-site emergency;

1. **The senior management team**

2. **The site team emergency control team**

3. **The off-site response team - the combat team.**

The senior management team; oversees the emergency, maintains contact with the site emergency control team, interfaces with the media and local government authorities, families of employees and so on.

The emergency control team; maintains contact with the off-site team. The control team provides technical backup, arranges additional resources if required and generally exercises control over AGR's direct involvement in the emergency.

The off-site team; which is at the disposal of the emergency services, provides on the spot technical advice and assists in control and clean-up activities. The members of each team are on 24 hour call and are provided with pagers. The paging (communication) company continues to page the team members until the page is acknowledged.

Personnel involved in the three-tier team system would number up to 20 and include general managers, operations managers and experienced operators, trades people and technical people.

Response of members to the paging system is checked monthly and their pagers' batteries are replaced at the same interval.

It is inconceivable that a proper response would not be forthcoming from such a spectrum of dedicated and qualified personnel.

Q.45 How does AGR ensure that the stringent safeguards in place is maintained and that emergency response is vigilant ?

The means by which AGR's stringent safeguards are maintained was explained in its Report, pages 7-22, for example;

- **maintenance of vehicles and isotainers to the required standards**
- **selection, certification and retraining of drivers at regular intervals**
- **membership of the Plastics and Chemicals Industries Association (PACIA) through AGR's operating agent CSBP and compliance with its codes of practice.**
- **government inspections and audits**
- **consultation with the relevant government agencies and communities**
- **routine safety checks and inspections of the isotainers before and after each transport event.**
- **field inspections and consultation with transport contractors**
- **internal management, audits and incident reporting and follow up action**
- **maintenance of a fully equipped off-site emergency response vehicle**
- **regular emergency response exercises including the interfacing with government emergency authorities.**
- **maintenance of an involved emergency response management system including the training of response personnel and all levels within the organisation. (A fully trained off-site emergency combat team is available on 24 hour call).**

Refer to AGR's Report for further detail if required.

Q.46 Is ferrous sulphate the only selected neutralising agent used for offsite spills? If it is, has the quantity of material required been considered?. The stoichiometric amount of solid ferrous sulfate heptahydrate per isotainer of liquid cyanide is 14 tonnes. In practice it is desirable to have 20 tonnes per location. Has AGR considers the transport and application problems associated with such large quantity of material ?

Ferrous sulphate is the preferred agent for off-site spills. Sodium hypochlorite can be used on spills once they are diluted to less than 1%.

AGR has recently replaced most of its original heptahydrate stockpiles with ferrous sulphate monohydrate, which is more concentrated and less susceptible to caking.

The Chemistry Centre (Staunton, Formby & Shultz, 88M2956) reported that 660 grams of ferrous sulphate heptahydrate were necessary to convert 1 litre of 30% sodium cyanide to insoluble Prussian Blue. This is equivalent to 11.4 tonnes of hepta per isotainer (17,300 litres). For the monohydrate, only 7.0 tonnes is required. In most of the 18 stockpile locations, between 10 tonnes and 20 tonnes of the monohydrate are stored. The total quantity stockpiled is over 250 tonnes.

The bagged and palletised ferrous sulphate stockpiles are stored in seatainers or in shire sheds. A side lifter can be used to pick up a 20 tonne seatainer of the chemical and transfer it directly to site. Alternatively, the 1 tonne pallets could be removed from the container and forklifted onto a semi trailer.

So there is not any problem with moving large quantities of ferrous sulphate to the spill site.

The monohydrate is free flowing and easy to apply from 50kg bags.

Q.47 If sodium hypochorite is used to neutralise the cyanide offsite, then considerations should be given to its degradation with time (hence the effectiveness diminishes) , and that it reacts very viguorously with 30% sodium cyanide (the manual handling and containment of this reaction needs to be considered). There should also be procedures in place to deal with a large scale spill of sodium hypochlorite . .

As already discussed above, sodium hypochlorite is not held in long term "stockpiles" along the routes and would only be used to treat dilute solutions for which fresh stocks would be transported to the location of the spill. Ferrous sulphate would be used to treat concentrated spills.

Q.48 What are the proposed locations, nature and number of the neutralising agent stockpiles along the proposed routes, easpecially along the route to Boddington ?

The location of the current 18 stockpiles is shown by Figure 5 in AGR's Report.

Proposed locations for additional stockpiles along new routes are decided in consultation with the local government authorities and the state and local emergency services.

For the Boddington route, AGR would envisage the provision of two 20 tonne stockpiles. Subject to approval, one would be near Armadale and the other near Boddington.

A further 20 tonnes is already stored at CSBP's Kwinana works.

Q.49 What are the procedures to be followed in the event of a spill ? And has AGR performed a large scale test to determine the procedures to be used to neutralised a spill ?

The procedures were outlined in the Report (Section 6 and Appendix 3).

The general procedure to be followed in a spill is that for any release of a dangerous good, namely;

- **secure and control the area (keep people away)**
- **call emergency services (which would activate a WAHMEMS response)**
- **contain the spill (use appropriate personal protection equipment)**
- **recover or neutralise the spill**
- **remove the neutralised material/earth to an appropriate disposal site (eg. gold extraction processing plant)**
- **authorities to give all clear.**

AGR's vehicle operators are trained in first stage response, ie. secure, communicate and, if safe to do so, contain. The emergency response authorities and AGR/CSBP's emergency response team are trained in all aspects of the response.

Simulated off-site exercises have been performed without actually applying the neutralising agent.

However, CSBP's emergency response team has performed a large scale test using ferrous sulphate on its Kwinana site in a bunded area. A similar exercise was performed on a minesite.

Q.50 What are the procedures to ensure that the neutralising agent is rapidly tranported to the spillage site ?

The procedure for transporting neutralising agent to the spill site has been given in the answer to Q.46, triggered by a decision to begin clean-up procedures (see Report Section 6.1.6 and Appendix 3).

Q.51 What is the maximun expected time interval between the occasion of a spill at critical locations such as Armadale and the application of neutralising agent ?

From the receipt of the alert, the emergency response vehicle could be mobilised within 30 minutes and be at the spill within a further 30 minutes depending on traffic. 1 tonne of ferrous sulphate would be aboard the vehicle. Supplies of the neutralising chemical would also be available nearby (subject to City approval). Hence ferrous sulphate could be applied within 15 to 30 minutes.

The major and immediate issue however, is not so much neutralisation but containment. Emergency services, once they have secured the area, could dam the spill to minimise its spread. The CSBP emergency response team with its fully equipped vehicle may in fact be able to recover some or most of the spillage. Ferrous sulphate would then be applied to the soil to neutralise any residual spillage. Clean-up procedures would then follow.

The local emergency services (particularly the Fire Brigade) could be on site within 10-15 minutes, thereby assisting the driver to swiftly secure the site and to commence containing the spill.

Q.52 What are the intructions for the use of neutralising agents and who would be provided with copies of these instructions? Has AGR considered how the material would be applied once at the site and effects such as mixing, generation of HCN and heat ?

Ferrous sulphate monohydrate is a free-flowing powder which is applied by shovel and watered in if necessary. The CSBP emergency response team knows how to and has applied the material in simulated emergency situations. Prior to transporting sodium cyanide along any new route, AGR would consult with both the local government and emergency response authorities on matters such as the application of ferrous sulphate to spill.

There is an initial small liberation of hydrogen cyanide when ferrous sulphate is first applied. However, this soon dissipates as the cyanide is converted to the insoluble Prussian Blue. Field trials have demonstrated that there is not significant heat liberation. Mixing using shovels and application of water ensures good conversion to Prussian Blue.

Q.53 Has the proposed treatment of contaminated materials resulting from a spill, such as water, soil, ect., been clearly documented in the cleanup procedures ?

Procedures for the treatment of contaminated materials have been discussed in Appendix 3. These form part of AGR's Emergency Response Plan which originated in 1988 and was approved by the authorities.

Q.54 Who is going to monitor the effects of a spill ? If it is the Chemistry Centre, then has the arragement been formalised to ensure that the Chemistry Centre's resources can be mobilised at a short notice in a spill incident ?

CSBP, AGR's operating agent, has a fully equipped NATA registered laboratory, managed by senior chemists. Monitoring of the spill would be conducted by CSBP laboratory staff experienced in cyanide analysis.

Q.63 Would AGR commit to the following requirements from the Western Australian Fire Brigades Board.

1. The product shall be transported and specially designed and dedicated isotainers on low bed trailers as currently used.

2. Designated road routes are selected and adhered to at all times.

3. Transportation times to be agreed upon by the competent authority.

4. A comprehensive emergency response plan be developed, with the WAHMEMS Coordinating Committee and AGR maintained and practised on a regular basis.

5. The drivers' of vehicles receive special training as certified by the competent authority.

6. AGR shall consult with DOME, the Western Australian Fire Brigades Board and Police Department when amending its transport emergency response plans to accommodate any special conditions which may prevail along designated routes.

7. Stocks of neutralising agents be strategically located on the designated transport routes.

The use of ferrous sulphate is seen by the Western Australian Fire Brigades as the preferred neutralising agent for a liquid sodium cyanide spillage.

These are findings made in a report by the chemical centre entitled "A Preliminary Investigation in the Effects of Spillage During Transportation of Sodium Cyanide Solution and Possible Response Strategies (W P Staunton, S Formby and R S Shulz).

8. The Western Australian Fire Brigades Board would require involvement in the planning and distribution of neutralising agents and the associated response planning.

9. AGR shall provide training in the correct use and application of neutralising agents to Western Australian Fire Brigades Board staff.

10 The cost of any additional response units, including protective clothing, etc., required by the WAFBB (as the competent authority) as a consequence of the decision to transport by road, be borne by AGR.

1. **Agreed. AGR has already demonstrated (via current use and by the contents of its Report) that it is committed to using low bed trailers and its ruggedised isotainers for direct road transport from Kwinana. These low bed trailers have been in use since transport commenced in 1988.**

2. **Agreed. It has been AGR's practice since the plant was commissioned and transport commenced in November 1988 to transport only along routes approved by the Department of Minerals and Energy (Division of Explosives and Dangerous Goods). This practice will continue.**

3. **AGR on page 46 of its Public Report suggested the following additional Ministerial condition "New Condition 4. Times of Transport. Each driver will maintain a log which includes time of departure from the Kwinana area and a general goal will be to clear the metropolitan area before significant traffic buildup occurs."**

   This will be AGR's general goal. Occasionally, there may be a need to service a client urgently which may require despatching a truck during peak traffic. However, AGR feels that these occasions would be very infrequent.

4. **This was one of the initial conditions of project approval and has been met.**

   A comprehensive emergency response plan was developed with the authorities including the Fire Brigade back in 1988 before the plant was commissioned. AGR is committed to working with WAHMEMS and its constituent emergency services to further develop and/or upgrade AGR's current response plan. Of particular interest to AGR is the mutual development of response plans and the testing of them for specific situations such as AGR's preliminary response plans for combating a spill into the Neerigen Brook.

   AGR's operating agent, Wesfarmers CSBP, already maintains a fully equipped emergency response vehicle and a well-trained emergency response team and has done so for many years. CSBP has been involved in combined exercises under WAHMEMS, "Exercise Eric" held in late 1994 being the latest.

5. Agreed. This is already done as required under the Dangerous Goods Act and Regulations. AGR/CSBP however has, from the outset, gone beyond this. Every driver of a sodium cyanide transportation vehicle has to be certificated by AGR/CSBP. This involves an intensive driver training course which includes: properties of sodium cyanide, emergency procedures, unloading procedures, approved transport routes and emergency response scenarios. The drivers require a mark of 90% or above to pass the written paper and 100% to pass the practical. Drivers also have to attend annual refresher programs which have recently concentrated on desk top emergency exercises.

6. AGR has co-operated, and will always be ready to co-operate, with Emergency Services in matters such as these.

7. Agreed. AGR is committed to providing stocks of ferrous sulphate strategically located on the new transport routes.

8. Agreed. AGR would be very pleased to work with the WAFBB in the planning and distribution of ferrous sulphate along the new routes and in the associated response planning.

9. Agreed. AGR is committed to provide WAFBB staff with the requisite training in the use and application of ferrous sulphate (and other neutralising agents where applicable). AGR would like to go further and provide refresher training similar to that provided to the Geraldton branch of the WAFBB on January 31, 1995. That program involved the revisiting of the product's properties and a sharing of the appropriate responses to a desk top emergency exercise. AGR found the session very rewarding and was impressed with the dedication and the knowledge demonstrated by Ted Coxon and his crew when performing the exercise. The seminar was also shared in other sessions with the Police, some SES personnel, Westrail personnel and CSBP's Emergency Response Team. AGR was also impressed with the interest and knowledge of all the Emergency Personnel who attended.

10. AGR does not believe that there would be any requirement for additional resources including protective clothing as a consequence of AGR's requirement to have the option to transport by road from Kwinana. AGR already transports by road from rail sidings at Geraldton, Southern Cross and Kalgoorlie. Further, the product is already transported by rail within the metropolitan area. Back in 1987 it was agreed that a response to an emergency on rail would be substantially the same as a response to one on road. Also, the protective equipment for a spill involving sodium cyanide solution would be the same as for other dangerous goods such as chlorine, ammonia, petrol, solid sodium cyanide, acids and alkalies i.e. full body protection and self contained breathing apparatus.

If it is shown from the mutual (i.e. AGR and WAFBB) development of emergency response plans that special equipment pertaining only to sodium cyanide solution is required, then AGR would give favourable consideration to providing that equipment.

ROUTE SELECTION

Q.20 Given that Albany Highway includes a steep and winding portion ascending the Bedfordale Hill, and its proximity to Neerigen Brook, any spillage resulting from an accident could have the most serious consequences. Did AGR consider this in its route selection ?

Whilst this is a very unlikely event, AGR has considered the consequences of a spill into the Neerigen Brook as discussed in the response to Question 8.

This was not considered to be a significant risk to the extent that alternative routes should be considered. It must be remembered that when AGR trucks are full they will be going up the hill, not down it, and there are several special "overtaking zones." Furthermore, AGR has pledged as a general goal to clear the metro area before traffic buildup occurs, thereby further reducing the already low risk of a spillage collision.

Other factors considered in selecting a route are discussed in Section 8 of the AGR Report, pages 23 to 28.

General control of routes for dangerous goods transport is by the Chief Inspector, Department of Minerals and Energy.

AGR vehicles would be in radio communication with their base and will be required to make prescribed radio checks at certain points along the transport route. (refer response to Q.42).

Q.21 Section 6.1.3 - Please clarify the 'agreed routes' - what routes, who agreed to them and what is the status of such an 'agreement'?

The agreed routes are the transport routes proposed by AGR and accepted by competent officers of DOME and WAWA, and confirmed in writing (see Report Attachments 2 & 3).

Q.22 Section 8.3.2 - Please clarify the 'previously approved routes' - in what circumstances and by whom?

Despite the fact that DOME and EPA guidelines do not specify QRA study, the reasons given for not doing a route specific risk study seem to equally imply good reasons for actually doing a study.

The "previously approved routes" are the road transport routes approved by DOME for road transport of sodium cyanide in circumstances where rail transport has not been available, eg industrial disputes, rail washaways, derailments. Approvals have been issued by the Chief Inspector, DOME (see also Report, Att.2).

Prior to the 1987 project approval, the Water Authority had also approved similar transport routes (refer "Proposal Sodium Cyanide Plant PER Volume 2, 1986, and also the 1994 Report Att.3).

The DOME and EPA guidelines have been met in respect of relevant studies on risk and hazard of road versus rail transportation (see also response to Question 3).

Q.23 The report has not clearly demonstrated how the route selection criteria stated in Section 8.1 are applied & met in the proposed routes in Section 8.3.

The criteria considered in Section 8.1 are variously applied by AGR and the regulatory authority DOME in considering suitable transport routes.

- **Road quality is an important criterion and the routes selected should be Category 1 or 2 roads under the MRD hierarchy of road categorisation. The proposed routes meet this criterion.**

- **Public safety is considered by both DOME and AGR. For example transport consignments will be timed to avoid peak hour traffic.**

- **Emergency response was considered in terms of the specific sensitivities of the routes proposed (eg Neerigen Brook and the Serpentine and Wungong Catchments) and response time of the State's emergency services and AGR's emergency response resources to any part of the transport route. The worst case scenario and emergency response measures have been developed and will receive further discussion with the local emergency response groups particularly WAFBB. They are discussed further in the answer to Question 8 and as suggested could apply to the transport of other dangerous goods.**

- **Environmental factors were considered in terms of water catchments (see Section 9 of the Report). The Water Authority also considered the risks to the Water catchments and found the Kwinana-Boddington route acceptable (see Att.3).**

Q.35 pp 40, para 1: the statement that " While major roads tend to avoid wetland areas ..." is not true, as major roads are invariably sited through wetlands (such as the Kwinana Freeway extension).

Major roads tend to avoid wetland areas for reasons of conservation, engineering considerations and costs. Clearly on the Swan Coastal Plain there are difficulties because wetlands are a dominant natural feature. However, the March 1992 report by WAACHS found that "threats to water resources and wetlands may be minimised by keeping vehicles to the higher category roads in the MRD hierarchy wherever possible. The proposed AGR routes follow that guideline.

Q.36 pp 25, S 8.3.1&2: AGR considers it important to avoid transport through Boddington town itself (with a small population), why isn't the same consideration be given to the City of Armadale with a larger population ? For transport to Boddington, wouldn't Kwinana, south via Pinjarra, Dwellingup and across to Boddington be a safer route ?

The consideration given to the route through Boddington to service the two mines is discussed in Section 8.3. The question invalidly assumes that AGR has decided either that it is 'important' to avoid Boddington or that such a preference was based on safety considerations. AGR is confident it can transport safely through Boddington. However, by supplying the Hedges mine via the connecting mine road between the BGM mine and Hedges, it is possible reduce transport distance (hence reducing exposure times and costs) considerably, (refer AGR's Report Figure 6).

If the connecting mine road is not available then Hedges mine would be accessed via the town.

Where possible AGR seeks to minimise possible risk or inconvenience to the public from its transport organisation. So if suitable bypass roads exist, such as the one at Boddington, it will be utilised. If the bypass road is a Shire road, approval would be sought from the local government authority.

The route suggested in the question to Boddington via Pinjarra etc was considered. However, the Albany Highway route was considered a safer route with passing lanes. Comparative disadvantages of the Pinjarra route include, distance from Kwinana and the roundabout nature of the route to service the larger mine BGM.

Q.37 The EPA (1987) developed the concept of " area of concern" being that part of the state within 50 km of the Perth GPO, plus designated surface and groundwater catchment areas, doesn't AGR recognise the need to protect surface and groundwater ares as being paramount ?

AGR does recognise the importance of protection of surface and groundwater areas. This is why AGR consults with the Water Authority and DOME before deciding transport routes, and why the EPA requires AGR to have approved emergency response plans in place to counter any incident.

In many cases there are no alternative routes, the risks of spillage are minimal because of the quality of the transport routes and the Water Authority is satisfied that contingency measures and clean-up measures can be implemented and that there is no threat to water supplies or public health.

Q.38 How can AGR justify the proposed transport of liquid cyanide through the residential area of Bedfordale along the Albany Hwy ? This is a dangerous narrow winding road, about 8 km in lenght of steep hill, already congested with traffic which builds up behind slow moving heavy haulage vehicles and road trains. Added to which a further 2000 vehicles are expected on this highway when the Churchman's Brook Village is developed. There are 2 schools at the base of the hill- the Armadale Primary School and the Pioneer World Village School.

The Albany Highway through Bedfordale is currently used quite safely by vehicles transporting various dangerous goods including petrol, LPG and solid sodium cyanide. This is a main highway. Laden AGR trucks will go only up the hill, not down it, and there are several designated overtaking lanes.

Further, AGR has committed to a general goal of clearing the metroplitan area before significant traffic build-ups (page 46 AGR Report).

Transport safety is of paramount importance to AGR as discussed in Section 5 of the Report.

AGR is confident that sodium cyanide solution can be safely transported through this section of the Highway without any risk to other road users on the adjacent areas. AGR believes it has given more care and planned its emergency responses to a higher degree of responsibility and detail than is known to apply to the routine transport of other dangerous and explosive goods.

Q.39 In selecting the proposed routes, did AGR examine several road routes as well as road vs rail routes to determine which route has the greater potential for exposure by bystanders ? Even though studies suggest that there would be no immediate danger to persons more than 50 km away from the site, did AGR take into consideration that railway tend to have greater buffer zones to residential properties than roads, and that a spill from rail transport or road transport through a built-up area is likely to endanger a considerable number of people ? If the answers are "yes", can AGR provide the supporting documents ?

The studies indicated that there would be no immediate danger to persons more than 50 <u>metres</u> away from the site <u>not</u> 50<u>km</u> as is quoted in the question.

All of the issues raised here were considered in the UK HSC study (see section 9 of the AGR Report) which found that the relative risks of road versus rail were comparable.

Refer also to answers to questions 1 to 4.

Q.40 Can AGR comment on the DOME's Summary of Accident Report for 1992 and 1993 which shows that all transport accident involving dangerius goods were the result of road transport ?

The 1992 and 1993 Summary Reports for Dangerous Goods Transport show 27 accidents in 1992 and 27 accidents in 1993. None involved sodium cyanide transport but in each year 25% involved fuel tankers, mainly petrol.

Q.41 Does AGR agree that, from a public risk perspective, while there needs to be an option to use road where necessary, road transport should not be used, as the main mode of transport in preference to rail where rail transport is feasible ?

Rail transport will be used by AGR where it is reliable, economic and timely to meet our customer requirements. This is expected to be the case for about 85% of AGR's sodium cyanide transported currently and for the foreseeable future.

However, AGR disagrees with the above statement. The AGR Report presents comprehensive information which establishes the comparable safety of road and rail transport.

AGR's and CSBP's safety record in various dangerous goods transport shows that road transport is safe and public risk is low, provided that risk minimisation and transport management systems are used as outlined in Section 5 of the Report are used. In this regard AGR is following the recommendations and principles of the very extensive inquiry by the HSC of the UK and all relevant statutory requirements in Western Australia.

TRANSPORT MANAGEMENT

Q.58 How can AGR ensure that the road tankers will adhere to the designated road routes at all time?

The vehicle operators know that they are confined to approved routes. These routes are specified in the vehicle operator's handbook provided by AGR. The importance of conformance to this requirement is stressed at the vehicle operator training and retraining programs.

AGR's vehicles and operators are continually audited both announced and unannounced. To date AGR is not aware of any nonconformances to approved routes.

Q.59 Has AGR got any comparison data on the likelihood of an accident leading to a spill from:

- a derailment vs a road accident carrying isotainers as described in the Report, and from

- a truck carrying solid cyanide in sea-tainers vs a truck carrying liquid cyanide in an isotainer

AGR has used the extensive general data given in the UK's Health and Safety Commission Report to demonstrate that road and rail transport risks are comparable. AGR does not produce sodium cyanide solid and so it is not relevant for AGR to pursue such data. However, in over 6 years of operation, AGR has not had any spill incidents. There have been spill incidents involving solid sodium cyanide, the largest of which was the Condobolin derailment in NSW a few years ago.

GENERAL

Q.17 How much sodium cyanide is transported along each of the principal routes, in tonnages, number of isotainers, in rail/road trips per week/month/year, for say the past 12 months and projected figures for the future?

AGR transports approximately 83,000 tonnes of 30% sodium cyanide solution per annum, which is equivalent to approximately 25,000 tonnes of sodium cyanide content. About 80%-85% is transported to the Eastern Goldfields and the balance to the Murchison. This equates to about 4,200 isotainer loads per annum (about 80 per week).

AGR is not prepared to foreshadow its expansion plans for commercial reasons. Suffice for it to say that AGR has approval to expand its current plant to 35,000 tpa (as 100%).

If the cyanide requirements of the Boddington mines were serviced entirely by AGR, approximately 2 isotainers per day would be necessary. The net effect would be an increase of less than 2% in the heavy haulage travelling along the Albany Highway.

Q.18 In the EPA Bulletin 274 (1987), the company, in answer to questions from the EPA, stated that "It is anticipated that Roehm (the technology supplier) will develop the necessary solids technology by 1988, however at this stage an appropriate technology is not readily available.". What is the current status of Roehm solids technology for production of solid sodium cyanide?

It is not AGR's intention to install a solid plant. With respect to the Rohm technology, AGR is constrained from commenting because of its confidentiality agreement with Rohm.

Q.19 Section 3.2 - Are other Class 6.1 Dangerous goods transported in bulk in WA ?

There are 101 chemicals listed under class 6.1 in the Australian Code for the Transport of Dangerous Goods by Road and Rail. They include;

- **Arsenic compounds**
- **Disinfectants**
- **Nicotine compounds**
- **Tear gas substances**
- **Thallium compounds**
- **Mercury compounds**
- **Isocyanates**
- **Lead compounds**
- **Cadmium compounds**
- **Mercaptans**
- **Pesticides (including organophosphorus type).**

Some would be carted in bulk but most would be transported in drums. Not all would be transported within WA. Toluene Di Isocyanate (TDI) is, occasionally. The additional ruggedisation possible with an isotainer compared to many individual drums, plus focussed safety measures, speed and safety of discharge at minesites and avoidance of handling and dissolving, are all factors which add to the safety of routine day-after-day use of isotainers in the large quantities of sodium cyanide needed by the WA gold mining industry.

Q.60 What are the reasons for AGR for not using solid cyanide for transport by road ? Is it to do with cost or technology ?

AGR does not produce sodium cyanide solid. The plant produces 30% sodium cyanide solution which is the preferred form for use by gold mines. The packaging used for solid cyanide has to be disposed of whereas with solution, there is not packaging to dispose of (see also response to Q.52).

Q.61 Is solid cyanide in powder form ? who are the suppliers of the solid cyanide for WA mining industry ? who does supply cyanide to Boddington and in what form ?

Most solid sodium cyanide is in the form of small briquettes. Some lower quality imported materials have been in the form of powder but this form is now rarely seen in Australia.

The principal suppliers into WA are AGR, Minproc/Dupont and ICI. Some overseas suppliers do supply a small quantity, eg. Degussa. Currently Boddington is mainly supplied by the Eastern States manufacturers.

Q.62 By requesting road transportation of liquid cyanide, is AGR deliberately placing its own convenience above public safety and environmental protection?

In its extensive public consultations over more than six years, AGR has never been asked such a question.

AGR has made it abundantly clear in its public Report, pages 16-27 that it is seeking the option of road transport from its Kwinana plant for three situations:

- **when there is a temporary halt to rail services**
- **when Westrail withdraws a scheduled service**
- **when direct road transport is the only economic service is not any viable rail link directly with Boddington.**

This is not a matter of "convenience" just a commonsense approach to service its current and future customers, so that the WA gold mining industry can be internationally competitive (something which AGR's competitors and other suppliers of dangerous goods can do without any public consultation).

AGR has demonstrated its commitment to public and environmental safety by its risk minimisation program (described in the Report) and provision of emergency response services in the most unlikely event of a spill. Its transport record of 6 years free from spill incidents is evidence of AGR's and its road transport contractor's dedication to safe operation.

It must also be said that AGR does not accept the inference by non-experts that the transport of solid sodium cyanide as practised in WA is safer than the transport of sodium cyanide solution by AGR.

COMMUNITY CONSULTATION

Q.15 Section 3.3 - Could AGR comment on the level of community concern amongst all LGAs on the routes to Boddington in 1987 ?

The level of community concern along the proposed rotes to Boddington in 1987 was much the same as those for other communities along other routes. They were interested to understand the issues in general and those specific to their area. Additionally, communities on proposed long and indirect routes to Boddington had additional concerns at the illogical pressure for AGR to transport on such routes.

One particular feature of the concern of country communities was the belief that in 1987 the higher EPA concern for the area within 50km of the Perth GPO implied that country people were second-class citizens. The AGR Report (Section 9.3.2) deals with statistics on such matters.

In any event, there is hard quantitative data on the low level of public concern in 1987 about AGR's proposal. There were 35 submissions to the EPA in 1987, with 11 from government agencies. Only 3 raised the issue of transportation, and one of those was from one of AGR's competitors. More submissions were made in 1994-95 because disinformation was widespread before the Report was available.

Q.16 For delivery to Boddington, is consultation with affected LGAs prior to transport a commitment by the Company ?

AGR has made the commitment on pages 22 and 49 of its Report that "AGR will liaise with Local Government Authorities and counter-disaster groups before transport commences along any new DOME approved transport routes". This has been AGR's usual practice in the past when several dozen other LGAs were consulted before transporation began.

CITY OF ARMADALE

CITY OF ARMADALE SUBMISSION

AGR'S RESPONSE

General

AGR appreciates the opportunity for consultation with the Armadale City Council. However, it is clear that discussion of the AGR issues has become confused with broader issues of traffic management that apply to the whole role of the Albany Highway.

ROAD VS RAIL SAFETY

Issues

- The City of Armadale (COA) opened with a statement that it "does not accept that road transport is safer than rail."

Response

- **AGR did not suggest that this was generally the case. On the basis of a 5 year, several million dollar study by the Health & Safety Commission (HSC) in the UK, the HSC concluded that the risks between the two modes of transport were comparable. In some cases road was safer than rail and in others, the reverse.**

- **The magnitude of the differences was, however, roughly within the degree of accuracy of the determinations, about 5 to 1 or less.**

- **The 1987 misconception that rail was 5000 times safer than road was derived from a report prepared by the Dutch consultancy, TNO, in 1982.**

- **In a later, summary report in 1984, that same consultancy provided data showing that both modes had similar safety. AGR reproduced an example in its Figure 4.**

  In 1991, the HSC also concluded that the safety was comparable.

- **In 1993, the WA Dangerous Goods Liaison Committee concluded that the HSC findings could be conservatively applied in WA.**

- **Hence, scientific evidence has been presented by AGR to demonstrate that the two modes are comparable in safety, thereby removing the original premise for the 1987 EPA Area of Concern (refer pp. 29-36, and Appendix 1 in AGR's report)**

ACCIDENT RISKS AND CONSEQUENCES

Issues

- COA proposes that irrespective of AGR's dedication to safety, the potential for a serious collision is always present no matter how low that probability may be.

- COA believes:

  - there is a potential for a Greenmount Hill type of accident along the Bedfordale Hill which will involve an AGR cyanide truck

  - that the road surface is deteriorating because of the increased heavy haulage.

  - that the chance of a collision has increased because of increased traffic.

- All these factors, COA concludes, will increase the chance of a severe accident resulting in spillage which could enter the Neerigen Brook.

Response

- **AGR recognises that risks of an accident cannot be entirely eliminated in any human enterprise. AGR does, however, reiterate that because of its attention to safety and other risk minimisation procedures, that risk is extremely low. It is inappropriate to focus on the consequence of a very low probability event. The overall risk is very low and AGR has demonstrated its preparedness for such unlikely events by having approved emergency response plans in place, dedicated emergency response equipment and resources on call 24 hours and a rapid response technical advice service.**

  Furthermore, AGR has conferred with the State emergency services and local emergency service groups in training personnel and developing appropriate response plans.

  Every activity in life involves some risk. The imposed risk from the transport of AGR's sodium cyanide, whether on rail or road is small and has to be balanced against the benefits to the State and the wider community of employment, use of local resources (natural gas, caustic soda, ammonia and power). AGR is following the recommendations and principles of the very extensive enquiry by the Health and Safety Commission of the UK and all relevant statutory requirements in WA to minimise risk from its transport operations.

- **AGR has given the commitment (New condition 4, Times of Transport) on page 46 of its Report that "... a general goal will be to clear the metropolitan area before significant traffic buildups occur". Hence this commitment together with AGR's current risk minimisation procedures (presented in the Report) reduces even further the risk of a severe accident resulting in spillage.**

- For many years a wide range of dangerous goods has been transported along the highway. Not all are being transported under the scrutiny that is being given to the AGR proposal, which would amount to less than 2% of the heavy haulage traffic or fewer than 1 truck in every 50 (refer Attachment 1 at the end of the Bedfordale response). One could conclude that the potential of spillage into the brook from other more numerous dangerous goods is far greater than that from AGR's robust isotainers. Perhaps equal if not greater attention should be given to the transporters of these goods and to emergency response plans to combat any of their spillages. In fact, community opposition to such haulage was in place before AGR made its proposal and we can only conclude that the bulk of community concern is, in fact, not directed at this project.

- In AGR's report it has been stated that a severe collision at just the right locations would be required to fracture the container and cause a spill into the Brook. If this did occur and our vehicle operator (driver) was not seriously injured he could immediately secure the area (with the help of bystanders) and raise the alarm. Since AGR has given the commitment that it would consult with both the City and the local emergency services before it commenced transport along the new route, the local emergency services would be on the scene in 10-15 minutes and would know the priority action required. For instance, cutting the suction lines to all the irrigation pumps downstream of the spill would be considered a priority unless another less destructive but just as effective means of curtailing pumping could be devised. Clearly, such an extreme move would only be taken if a real emergency arises. This would minimise any impact on the users of the brook and any damage to livestock, orchards and vegetable plots.

- So provided this action was taken quickly and people were kept clear of the spill and the brook downstream, human risk would be minimised.

- AGR would be prepared to institute increased radio contact with the driver as he drove up the Bedfordale Hill.

Whilst there could be short term impact on vegetation and aquatic life in and along the brook, the cyanide would soon dissipate with the aid of natural flushing, aeration and the addition of neutralising chemicals such as sodium hypochlorite (see later discussion).

On December 22 AGR discussed a preliminary emergency response plan with members of Council and Council officers. The plan, whilst only preliminary, outlined a means by which the cyanide in the water could be neutralised as it left the stage one lake and prior to the water flow entering the stage two lake. This scheme would be further developed in consultation with Council's technical staff and with the emergency services personnel. Irrespective of whether or not AGR transports sodium cyanide up the Bedfordale hill, Council may wish to consider the possibility of applying AGR's preliminary plan to other dangerous good spills which may enter the Brook.

Presuming AGR's emergency response plan is effective, the supermarket "downstream" of the Stage 2 lake would not be affected.

Further, presuming the cessation of pumping was rapid the effect on the orchardists' fruit trees and vines would be minimal. Cyanide has been used as a fertiliser viz Fuller (1984) p.40, "simple cyanides have been applied at the rate of 280KgN/ha to aerobic soils as fertilisers with no hazardous effects." This rate is equivalent to approximately one tonne of actual sodium cyanide per hectare or 3.3 tonnes of 30% sodium cyanide solution per hectare.

Higher rates than the above may be toxic to soil animals such as earth worms and micro-organisms.

So the effect of irrigating orchards and vegetable gardens with brook water contaminated with cyanide may or may not be short term detrimental depending on the concentration and the application rate. Reducing the time that the application is taking place, of course, would be important - hence the priority of curtailing pumping.

As part of the cleanup operation of course, the orchards would be checked out by AGR/CSBP's chemists and agronomists with reference to authorities such as the Health Department and Department of Agriculture to give the all clear.

Issue

COA suggested that gas may be liberated from a solution spill thereby endangering motorists and residents.

Response

The Chemistry Centre of WA studied spillages into puddles and onto various soils and the resulting liberation of hydrogen cyanide. The results indicated that concentrations would be down to less than 10 ppm (the TLV ie the concentration tolerable without ill-effects for continuous 8 hour daily exposure) at 30-50 metres from the spill. Whilst the dilution in the brook would reduce the pH of the alkaline 30% solution from 13.0, it would require a dilution factor of 100 (ie down to pH 11.0) before the stable cyanide form in solution begins to convert into dissolved molecular hydrogen cyanide. By that time, the strength is down to 0.3% sodium cyanide which has a very low vapour pressure. So again, provided bystanders are kept 50 metres away from the spill or the brook, there will not be any danger to human life. With wind velocities of 1.0 to 1.5 m/s, the safe distance reduces to 20 to 25 metres. However, the conservative distance of 50 metres would be maintained during the emergency.

A very important fact is that motorists and residents would be automatically discouraged from venturing too close because of the smell of ammonia. AGR's sodium cyanide solution contains 0.3% by weight of ammonia (detergents such as "cloudy ammonia," "Handy Andy with ammonia" and some "smelling salts" contain this chemical). Whilst few people can either detect or recognise the odour of

hydrogen cyanide, most if not all people will detect the smell of ammonia. So the ammonia smell warns all people that they are too close to the spill site. Hence it would be and is a natural reaction for people to move away until they can no longer smell ammonia.

Issue

COA states that motorists will put themselves at risk because under the Traffic Act they are obliged to render assistance at the scene of an accident.

Response

This obligation is true, but it is also clearly spelt out in the WA Road Rules Handbook available from the Police Licensing Branch that motorists apply the "DRABC" philosophy. The 'D' is the first priority. It stands for Danger. The motorist is advised not to put himself in danger and should ensure it is safe before attending to the injured.

EMERGENCY RESPONSE

Issue

COA is concerned about possible delays in emergency response services reaching the spill site thereby exposing human life to the chemical.

Response

It has already been stated above that if the driver is uninjured, he would keep people away and raise the alarm. If he fails to report in along the 5-8km of concern, the alarm would be raised. In the latter case, the local emergency services would be on the scene within 10-15 minutes. The priority of action required to minimise the impact of the spill has already been discussed above.

The main function of the first response unit is to secure the area and wait for the backup personnel including AGR/CSBP's emergency personnel. All necessary personnel could be assembled within approximately 1 hour of the alert to commence the cleanup operation although application of the neutralising could be commenced earlier. Again, the major issue is to initially isolate the area. Containing the spill is also a priority providing it can be performed safely.

Issue

COA is concerned that ferrous sulphate would not be effective as the cyanide solution would penetrate the soil and that the ferrous sulphate would sit on top. Further that the addition of the neutralising chemical would liberate cyanide gas.

Response

Firstly, only trained and properly protected personnel would apply the ferrous sulphate.

Secondly, there is a small liberation of hydrogen cyanide when the material is applied. However, this ceases quickly as the cyanide is converted to the insoluble Prussian blue or intermediate iron cyanide complexes. Water is applied to ensure the ferrous sulphate reacts effectively with the sodium cyanide.

Thirdly, the soil is turned over with shovels to ensure good contact and neutralisation.

Last, the neutralised soil is removed from the site and disposed of appropriately.

Issue

COA stated that sodium hypochlorite (household bleach or "liquid" pool chlorine) cannot be used as a neutralising agent because the reaction is too violent.

Response

This is only true when it is applied to concentrated solutions of sodium cyanide solution. AGR would only use ferrous sulphate on road or soil spills. However, AGR may wish to use sodium hypochlorite as a final touch-up on ferrous sulphate neutralised soils. The main use for sodium hypochlorite however, is for the treatment of *any* dilute solutions which would result well downstream from spillage into a waterway.

The cleanup operation may take 24 hours, a few days or several weeks depending on the magnitude of the spill and the areas affected. The important factor to remember is that the chemical is not persistent and once removed or neutralised few effects, if any, would persist.

In any cleanup operation requiring more than a few days, much of the activity would revolve around precautionary monitoring of the site and removal of neutralised soil.

Again it is emphasised that before AGR commenced transport operations it would meet with and cooperate with Council technical staff and the emergency services to reasonably address the local issues, and agree to appropriate emergency response procedures and the siting of neutralising chemical.

Although AGR is fully prepared to implement emergency plans, it must not be forgotten that the probability of an accident is very small, and the probability of a spill much smaller again.

ALTERNATIVES

Issue

COA has suggested several alternative routes and the production of cyanide nearer to the goldfields.

Response

AGR does not have the final say on the transport route. The Explosives and Dangerous Goods Division of the Department of Minerals and Energy (via the Chief Inspector) makes that final decision. The criteria considered in route selection were detailed in AGR's report (pages 23-28).

COA's suggestion of using Jarrahdale Road is not entirely satisfactory. Albany Highway is a major (Category 1) road with passing lanes whereas the Jarrahdale Road is narrower and more undulating, and we believe that it is not a Category 1 road.

In 1987/88 and again in 1993, AGR investigated the "piggyback" option of railing cyanide on the Alcoa train to Jarrahdale. It proved not to be an option because the trains were loaded to capacity and could not accommodate our additional payloads.

COA's suggestion of moving our $40 million production plant to the goldfields is totally impractical.

Presuming that it was a serious suggestion, made in good faith, AGR responds as follows:

(i) **The $40 million plant exists, and has been operating for 6 years producing sodium cyanide solution which has been distributed to 30 mines throughout the State without negative impact on communities at the point of manufacture or along the transport routes.**

(ii) **During site selection in 1986/87, criteria such as access to raw materials (ammonia, natural gas, caustic soda), proximity to a port (for imported raw materials), proximity to the market, access to reliable transport, availability of qualified process operators and other staff, access to the state power grid were considered. The Kwinana site won convincingly. The Goldfields scored relatively poorly in just about all aspects other than proximity to that market.**

(iii) **If we were to resite the plant in Kalgoorlie, we would need to transport liquid ammonia, liquid natural gas and 50% caustic soda solution from Kwinana to the Goldfields (natural gas will be provided direct in the next few years of course). These pressurised liquids (ie ammonia and natural gas) are more hazardous to transport than AGR's stable 30% sodium cyanide solution.**

SUMMING UP

AGR believes that it has the management procedures in place to minimise the risk of a spillage incident.

It has transported sodium cyanide solution by road and rail for 6 years since commissioning without a single spill incident.

AGR is prepared, however, for the very unlikely event of a spillage. Through its operator, CSBP, AGR has a well-equipped emergency response vehicle and a well trained response team available on 24 hour call to assist the emergency services with technical advice, control and site clean up.

AGR, as it has in the past, is prepared to consult with all local government authorities along the new routes before it commences transporting its product.

Similarly, it will also consult with the local emergency response authorities at each location, take into account local concerns and develop mutually accepted emergency response plans.

AGR will provide stocks of neutralising chemical at appropriate locations.

AGR will only transport its product along DOME approved routes.

AGR has attempted to address, in detail, the submitted concerns of the City of Armadale, and will be pleased to have further discussions as appropriate.

Australians are well-known for their sense of fair play. Much of the COA concern is directed to any of the chemicals being routinely trucked through the vicinity. AGR is proud to say that the integrity of its isotainers, its safety management and the preliminary emergency response plans it has drawn up for the Neerigen Brook are of such high quality that the AGR proposal might well be supported by COA to set a standard for the transport of other dangerous goods.

AGAINST ROAD TRAINS ACTION GROUP

RESPONSE TO ARTAG
(Against Road Trains Action Group)

1 SUMMARY OF ARTAG SUBMISSION

a. Insufficient detail re Emergency Response.

b. Response time would be too long to prevent exposure to accident victims, public, school kids and Neerigen Brook Users.

c. "Introduction" of the cartage of solution in place of solid not warranted even if more economic because of risk peculiar to solution.

d. Irrespective AGR's good record and management accidents/spillages could happen.

e. South Western Highway and Albany Highway are substandard for major highways (inference being - unsuitable for cartage of dangerous goods)

f. An accident involving cyanide spillage would have the same disastrous consequences as the Bhopal Disaster (December 2, 1984, India).

AGR RESPONSE

a. "Insufficient Emergency Response Detail"

AGR's Emergency Response Plans were approved by the Authorities in 1988 prior to plant commissioning and product transport. These plans were voluminous and contained responses to generic scenarios - eg spillage into water ways, and soils etc.

To have included all this data in AGR's Report would have been impractical as it was already about 100 pages in length.

AGR pledged (page 22 of its Report) to brief the relevant LGA's and their local Emergency Response Groups before transport commenced. At these meetings, AGR would address specific issues raised by each community, including its specific local emergency response issues.

b. "Response time too long"

First response is to "secure the area" i.e. keep the public away. AGR's Emergency Response Vehicle and team are not necessary for this initial action. Our vehicle operators (drivers) are trained to perform this function immediately after any accident. Should the driver be injured, this essential initial action would be performed by the local emergency

groups. In the case of Armadale, these would be the Fire Brigade or the Police would be on site within 10-15 minutes of the alarm being raised. Should the authorities believe that the magnitude of the emergency warrant it, the "WAHMEMS" (Western Australian Hazardous Materials Emergency Management Scheme) would be activated. This would then involve other authorities such as the Department of Minerals and Energy (Explosives and Dangerous Goods Division), the Health Department, the Department of Environmental Protection (DEP), WAWA and so on. In all situations, AGR/CSBP would be expected to be called upon to provide specialist advice and to participate in cleanup operations. AGR/CSBP are well equipped for cleanup operations and maintain a fully trained off-site emergency response team (refer section 6 pages 16-19 in the Report).

AGR, wherever possible, and subject to agreement with local and emergency response authorities, would schedule its laden journeys outside of school starting, finishing and lunchtimes.

c. "Introduction of solution cartage"

AGR has been transporting solution by road and by rail since November 1988. Road transport is not just now being introduced.

Economics do not come into it. Our product is 30% sodium cyanide solution. We do not produce solid. We have transported 350,000 tonnes of the solution by road and rail over 6 years without any spillage incidents. Solution is transported safely in Australia (WA and Queensland) and overseas (particularly in the USA).

d. "Accidents/spillages do happen"

This is so. However, the chances of an accident of sufficient severity to fracture an AGR isotainer is remote. As detailed in AGR's Report (page 11) the containers are very robust and designed to resist rollover, side on and end-on collisions.

In over 6 years of operation there has not been any spill incident. The only severe collision on record was one which occurred on rail. During a derailment the wheels of another wagon slammed into one of AGR's isotainers. The force of the collision creased but did not fracture the container's shell. No solution was lost.

In addition to the robustness of the containers, AGR's management systems are of paramount importance. AGR is committed to continuing with and continuously improving these systems to perpetuate its safe transport record.

e. "South Western and Albany Highways Unsuitable"

Final route approval will be in the province of the Explosives and Dangerous Goods Division of the Department of Minerals and Energy. These highways are major roads designed for and used by heavy haulage (including the transport of large quantities of dangerous goods) to access industry and agricultural and industrial areas south of Perth. Any upgrading, of course, would only enhance safe operation.

Based on figures provided by the Main Roads Department, AGR's movements would increase the total heavy haulage volume by a maximum of only 2%, less if AGR only wins 50% of the Boddington business.

f. "Spillage Consequences like the Bhopal Disaster"

It is most disappointing that ARTAG has resorted to such tactics. Comparing a cyanide spillage with a completely unrelated and more volatile chemical such as methyl isocyanate is inappropriate, technically unsound, misleading and alarmist. The Bhopal chemical boils at 39°C (sodium cyanide solution at 109°C) and exerts a high vapour pressure at much lower temperatures. The tolerance to methyl isocyanate in air is only 0.02ppm compared with 10ppm (for 8 hours exposure) for cyanide gas (ie the tolerance to cyanide is 500 times higher than methyl isocyanate).

In the Bhopal incident in India which involved a chemical release from a factory and not from a transport incident, 200,000 people were affected over an area of 65 square kilometres.

Effects of sodium cyanide solution spillages would usually be limited to an area of a radius 50 metres or less.

2 SPECIFIC QUESTIONS RAISED BY ARTAG

2.1 Is public risk more important than the economics of transporting solution instead of solid?

- **Overall, AGR does not accept the inference that solid is safer than solution. AGR does not have the option to transport solid. AGR is a Western Australian company which produces only 30% sodium cyanide solution. AGR's solution is transported to its clients in 18kl robust isotainers. All the clients are in Western Australia.**

- **Sodium cyanide solution is the preferred product in Western Australia. AGR has a 50% market share of the 50,000 to 55,000 tonnes/annum WA demand.**

- **The product has been safely transported by AGR over the past 6 years since the plant was commissioned in November 1988. AGR has transported over 350,000 tonnes of solution in that period, covering over 3,000,000 road miles in 17,000 road trips without any spill incident.**

- **Interstate and overseas, 30% sodium cyanide solution is transported safely. Cyanco (part-owned by Degassa) and FMC Corporation in the USA have had a spill-free record carting 30% solution.**

- **AGR's attention to detail, particularly through its risk minimisation/transport management procedures (refer pp.7-27 AGR's public report), demonstrates that it is dedicated to minimising risk to the public and to the environment.**

2.2 Is the risk of contaminating the Neerigen Brook and its subsequent effects more important than the economics of transporting solution instead of solid?

- **AGR's response to this question is as per that to Q.2.1 above with the following additional comments.**

  The City of Armadale through its Technical Services Committee raised the issue of the risk of contaminating Neerigen Brook with AGR in late November. On the 22nd of December, AGR addressed the issue at a meeting attended by a small complement of Councillors and Officers. AGR stressed at that meeting that the risk was very low for all the reasons given above and in pages 7-27 in AGR's Report. However, AGR presented a proposed emergency response action plan which would minimise any impact on the Brook. This specific and localised plan would of course be fully developed with Council and the professional Emergency Services before transport commenced. AGR has always consulted with local government authorities and emergency groups before transportation of its produce through their areas. Specific local issues raised at those consultations are addressed at that time.

  AGR would be interested to know if ARTAG and the City of Armadale have expressed their concerns about spillage of other dangerous goods into the Brook with the manufacturers/transporters of those goods. Do the local emergency services have an action plan for spillages of petrol, acids and alkalies into the Brook? If so, our proposed plan could possibly be dove-tailed into the existing response plan.

2.3 What is the response time for the Emergency Response Action to spillage at the intersection.

[The response to this question also addresses the issues raised in question 2.4. These questions are very similar and hence will be addressed together].

From the receipt of the alert, the AGR/CSBP emergency response vehicle and team could be mobilised within 30 minutes and be at the scene within a further 30 minutes or so, depending on the traffic and weather conditions.

First or immediate response would be provided by the local emergency services (police and Fire Brigade) who would normally be at the scene within 10-15 minutes.

The all-important and essential first response involves securing the area, that is, simply keeping people away. AGR's vehicle operator if uninjured, would take on the role immediately after the accident. He is trained in this primary stage emergency response.

2.4 What is the response time for the Emergency Response Services (police etc.)?

[See 2.3 above].

2.5 What effect will the time lapse have on people in the area?

The time lapse would not be more than 10-15 minutes. Providing people do not come into contact with the solution, they will not be at risk. Further, sodium cyanide solution has a strong odour of ammonia. It is most unlikely that the public would remain close to or immediately downwind of the spill because of this odour. Thus their exposure to the small vapour pressure of hydrogen cyanide above the solution would be minimal.

Our vehicle operators are trained to cordon off the spill site for a radius of 50 metres (with the help of bystanders). As an additional safeguard, they would increase that radius (usually downwind) until they cannot smell ammonia.

Hence the odour of ammonia is an important indicator of the adequacy of the quarantined area.

2.6 What response time is involved in notifying Brook users to cease pumping from Brook.

This issue was briefly discussed during the meeting of December 22, 1994. It was proposed that in order to minimise extraction of any contaminated water from the brook, the emergency services would quickly cut the pump suction lines downstream of the spill rather than attempting to notify the users. This approach, which would only be contemplated in an emergency, would need to be discussed in detail with the local authorities and Emergency Response Services before the response plan was formalised. The cutting of the lines could be effected very quickly, probably within 20 minutes of the arrival of the emergency services.

2.7 Who will be responsible for compensating residents reliant on the Brook for water supply.

AGR has marine (transit) insurance covering its isotainers and their contents. This insurance covers the cost of the immediate clean up. Consequential damages are covered by public and product liability insurance (PPL). AGR maintains an extensive PPL cover as do AGR's transport contractors (the latter being large, well-known companies, namely Brambles-Manford and Gascoyne Specialised Transport Services). Payment of compensation under this type of policy is dependent on the proof of negligence.

3 RECOMMENDATIONS BY ARTAG

ARTAG made the following subsidiary recommendations supporting its major recommendation to the Minister not to favourably consider AGR's application.

3.1 "Resources should be dedicated to the investigation of the production of sodium cyanide solution on site at the appropriate gold mining complexes."

3.2 "Until this is accomplished, cyanide should only be transported by road in solid form only."

These recommendations are impractical, unrealistic and perhaps reflect a lack of understanding of commercial reality and the gold mining industry.

1 **AGR's $40 million world scale plant produces only 30% solution. It has been operating since November 1988. It was the first sodium cyanide plant in Australia and is fully Australian-owned. It now services over 30 gold mines and provides 50% of the demand for the chemical in WA. Prior to AGR's plant coming on line, all the cyanide consumed by WA and in fact by Australian gold mines was imported from overseas.**

The gold mining industry in WA turns over $3 billion per annum. AGR's product has replaced over $A30 million of imported cyanide which is good for WA's balance of payments.

2 **The plant was sited at Kwinana after carefully assessing alternative locations such as Kalgoorlie. Selection criteria included proximity to: raw materials supply, transport, port facilities, skilled labour, support industries. Also factors such as proximity to the market and availability of power from the State grid were considered.**

The Kalgoorlie option scored poorly on most points other than proximity to the market.

If the plant or a multitude of smaller uneconomic plants had been sited in the goldfields, all the raw materials would need to have been transported from Kwinana or another port or industrial centre. The raw materials are natural gas, ammonia and caustic soda.

The natural gas and ammonia would have been transported as pressured liquids which are more hazardous to transport than sodium cyanide solution.

3 **AGR has been safely transporting sodium cyanide solution by road (and rail) for over 6 years. The solution is also safely transported within the USA and other countries without mishap.**

AGR does not accept that the transport of solids is, overall, any safer than the transport of solution. Nor does it accept that rail is safer than road. AGR's Report clearly shows that road and rail safety are about the same.

Hence the recommendations made by ARTAG are technically and economically unsound and increase rather than decrease transport risk.

ARTAG's prime concern is increased heavy haulage (namely road trains) and not the perceived risks of AGR's proposal to transport sodium cyanide solution.

Notwithstanding the above, AGR has in good faith addressed all the issues raised.

BEDFORDALE RESIDENTS ASSOCIATION

RESPONSE TO SUBMISSION FROM BEDFORDALE RESIDENTS ASSOCIATION

Issue

The Bedfordale Residents Association (BRA) is concerned about the increase in heavy haulage along the Bedfordale Hill section of the Albany Highway, particularly road trains.

Response

The issue of road trains travelling through Armadale is an issue outside the scope of the AGR proposal. AGR proposes to use single trailer trucks.

AGR's analysis (Attachment 1) demonstrates that AGR's operations would only add 2% to the current heavy haulage volume, i.e. only a net 1.5 round trips per day on average. This is a very small increase. AGR's calculations are based on AGR supplying all the cyanide requirements for the Boddington gold mines. If AGR succeeded in supplying only 50%, then the average net increase in the number of round trips per day drops to less than one.

Issue

The BRA are concerned about increased risks of near misses and increased possibility of a collision and its consequences on the community due to the projected increase in all types of vehicular traffic.

Response

The issue of near misses due to impatient road users is a matter for the Police and the Main Roads Department.

AGR's small impact on the traffic volume has already been discussed. AGR in its Report presented its 6-year record of spill-free transport operations. This has been due to a wide range of management procedures including the employment of superior, well-trained, tested and audited drivers and well-maintained and regularly inspected up-to-date equipment.

AGR's selection of transport operators is particularly thorough (refer pages 14-15 AGR Report) as is the transport operator's selection of drivers. AGR's drivers are expected to obey the rules of the road and the Dangerous Goods Transport regulations at all times. AGR through its unannounced audits, through informal discussions with the traffic police and shire officers can report with pride that its drivers have a good name throughout AGR's delivery area. In fact, AGR was delighted and appreciative to receive a letter from the Shire of Perenjori last year commending AGR's drivers for the considerate manner in which they drove through the town.

AGR firmly believes that its risk minimisation procedures will continue to be instrumental in reducing the risk of a collision of sufficient magnitude to produce a spill.

Additionally, AGR has already made the commitment in its submission to the Minister and also on page 46 of its Report that "... a general goal will be to clear the metropolitan area before significant traffic buildups occur". Hence AGR could time its 1 or 2 deliveries per day to clear the peak traffic in the morning and if necessary return to pick up the second load (if applicable) before midday each day. This would also avoid the starting times of schools in the area, which addresses another concern of the Association.

The return journeys involve empty isotainers and constitute an infinitesimal spillage risk. Hence at worst, a truck carrying an empty isotainer may pass through the area during school finishing time.

AGR believes that the combination of its risk minimisation program ruggedised isotainers and the general goal of avoiding peak traffic and school starting and finishing times should greatly alleviate the BRA's concerns that a laden cyanide truck would be involved in an accident, that caused a spill.

Issue

The Association expressed concern that an accident involving a chemical, oil, petrol or gas tanker could contaminate the brook.

Response

AGR has emphasised in its public paper that a severe accident would be required to damage one of its isotainers such that leakage occurred. (AGR cannot comment in detail on the likelihood of spillage from the other tankers to which the Association refers. However, AGR *assumes* that, *in equity and fairness*, the Association is pursuing similar safety assurances from those companies already involved in transporting dangerous goods through Bedfordale).

AGR believes that the BRA focus only on the consequence of a very low probability event such as spillage is inappropriate because it must be balanced with an understanding of the professional and expert preventative measures.

It has approved emergency procedures in place (including dedicated emergency response resources on 24 hour call, and a rapid technical advice service) to minimise the impact of any spillage on the environment and the public.

A brief outline of emergency action including some of AGR's commitments is as follows:

1. **AGR's vehicle operators (drivers) are trained in primary emergency response. They know to:**

   (a) **secure the area (keep people away, usually with the assistance of bystanders)**

   (b) **alert* the emergency authorities by dialling (000)**

   (c) **alert* AGR (008 093 333)**

   (d) **contain the leak if it can be performed safely.**

2. **If the driver is injured, the local emergency services, once alerted, could be on the scene within 10-15 minutes to perform the primary and most important response role of securing the area.**

3. **Within 30 minutes, AGR's response team would be mobilised and on its way from Kwinana.**

4. **Prior to transporting along any new routes, AGR consults with the local government authorities and the emergency services along the route to:**

   (a) **brief them on the properties of the chemical and AGR's transportation and emergency response procedures.**

   (b) **decide on the location for stockpiles of neutralising chemicals.**

   (c) **address any local issues including specific local emergency response matters (eg in the case of Armadale, the concern for Neerigen Brook).**

   (d) **provide whatever specific training is required for the state and local emergency response personnel.**

So before transportation commences, the local government authorities, the emergency response groups and AGR will be clear on their respective duties to minimise the impact of a spillage incident in the area.

AGR, at the request of the City of Armadale's Technical Services Committee, prepared a preliminary emergency response plan for a scenario involving a spill into the Neerigen brook. If and when it is confirmed that AGR has approval to transport through Armadale, AGR offers to work with Council and the emergency services to refine the preliminary plan so that it can be executed efficiently and without delay.

---

* **AGR's vehicles are fitted with radio communication**

Similarly, AGR suggests that the City of Armadale may wish to consider the preparation of emergency plans in conjunction with the manufacturers and transporters of all the dangerous goods (including petrol) which are currently carted through the City.

CONCLUDING COMMENTS

AGR has fully responded to a very detailed submission lodged by the City of Armadale. It is suggested that the Association may wish to obtain a copy of AGR's response from the Council. Because of the similarity of the basic concerns raised by both bodies, (and that of ARTAG) AGR believes that its response to the City's questions addresses all the principal concerns of the Association directly related to the transport of AGR's product.

The concerns that the Association has raised in regard to additional traffic involved with housing developments are outside AGR's control. Similarly, so is the upgrading of the Highway, the latter however, is acknowledged as being of benefit to all road users. AGR reiterates that its contribution to heavy haulage traffic would only be about 2%, and most of AGR's transport would be performed outside peak times.

AGR has a risk minimisation program and a responsive emergency service for any incident involving its product and transport vehicles. The probability of a spill incident is very low but AGR and the State's emergency services are prepared to respond in that very unlikely event.

AGR has already offered to brief the Association. Should approval be granted to transport through Armadale, AGR would be pleased to honour its briefing commitment.

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BIBLIOGRAPHY

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Attachment 1

HEAVY VEHICLE VOLUME

BEDFORDALE HILL (ALBANY HIGHWAY SOUTH)

6/5/92

3700 total vehicles — 12 hours 7am - 7pm

128 semis — 12 hours 7am - 7pm

December 1994

4700 total vehicles — 24 hours

Hence $\frac{4700}{3700} \times 128 = 168$ semis per day

Present Time NaCN solid Use 4000 tpa = 200 semis/annum

$= \frac{200 \times 2}{312} = 1.2$ semis/day

Proposed NaCN solution Use $\frac{4000 \text{ tpa}}{6.25} = 640$ semis/annum

$= \frac{640 \times 2}{312} = 4.2$ semis/day

Net Increase $= 4.2 - 1.2 = 3.0$ semis/day $= \frac{3}{163} \times \frac{100\%}{1}$

$= 1.8\%$

i.e. Net increase in heavy haulage traffic would be less than 2% if AGR supplied all Boddington's requirements.

Important Note: The movements in "semis/day" refers to total movements, i.e. "up" plus "down". Hence, for instance, the net increase of 3 semis per day is equivalent to 1.5 round trips per day (ie 1.5 trips up loaded and 1.5 trips back unloaded.

Appendix 3

List of submitters

1. Mr E H Serls
2. Water Authority of WA
3. Mr/Mrs O'Grady
4. Mr M Jeffs
5. Mrs E D Wheeler
6. Swan River Trust
7. Avon Valley Environmental inc.
8. Chemistry Centre
9. Mrs N Wilcockson
10. Mr P Norris
11. Mrs P McGann
12. Chamber of Commerce and Industry of WA
13. Mr/Mrs Chaplyn
14. Mr/Mrs H Pate
15. WAHMEMS Coordinating Committe
16. Conservation Council of WA inc.
17. Town of Kwinana
18. Mr G Smith
19. Department of Transport
20. Mr/Mrs Borlace
21. Main Roads WA
22. Mr/Mrs Brabury
23. The Royal Australian Chemical Institute, WA Branch
24. The Country Women's Association of WA (inc.)
25. Department of Minerals and Energy
26. WA Fire Brigades Board
27. Shire of Serpentine-Jarrahdale
28. Ms L Green
29. Health Department of WA
30. City of Armadale
32. Bedfordale Residents Association inc.
33. A.R.T.A.G (Against Road Trains Action Group)
34. Department of Conservation and Land Management
35. Chamber of Mines and Energy of WA inc.

Appendix 4

Copy of letters of advice from relevant government agencies

DEPARTMENT OF MINERALS AND ENERGY, WESTERN AUSTRALIA
EXPLOSIVES AND DANGEROUS GOODS DIVISION
100 Plain Street, East Perth WA 6004 Tel - (09) 222 3333 Fax - (09) 222 3525

FAX TRANSMISSION

TO	Company	DEPARTMENT OF ENVIRONMENTAL PROTECTION	
	Name	XUAN NGUYEN	
FROM	JOHN HANLEY MANAGER DANGEROUS GOODS TRANSPORT		
DATE	13 FEB 1995		PAGES = 1

XUAN : In response to your fax of 01 Feb.

(i) Risk Management :DME's philosophy on risks associated with the transport of dangerous goods is based on the findings of the Dangerous Goods Liaison Committee's, "Report on the Public Safety Aspects of the Transport of Dangerous Goods in Bulk" ie conclusion 3. page 27 "the application in Western Australia of policies developed from risk analyses carried out in UK and North America using their local data, will result in relatively conservative policies for Western Australia. That is, policies which do not underestimate the level of risks".

(ii) Audit of compliance : You should now be in possession of the audit report covering the operation of AGR and its Sub - contractors.

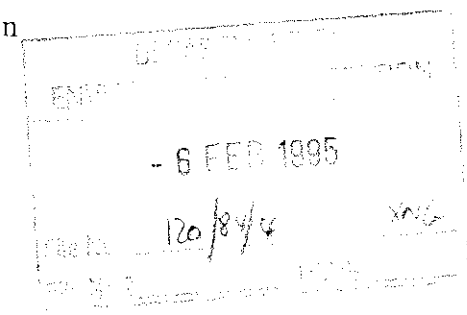
(iii) Assessment of the route proposed. The WAACHS report "Feasibility of Setting Routes for the Road transport of Dangerous Goods" recommended that route setting not be prescribed. Proposed guide-lines for route selection will suggest that dangerous goods vehicles should select Category 1 & 2 roads as listed in the Main Roads Department's Hierarchical Roads Systems as the preferred route for transport.

□□□ IF TRANSMISSION IS FAULTY, PLEASE PHONE (09) 222-3385 □□□

Western Australia
Health Department of Western Australia
Environmental Health Branch

Your Ref
Our Ref
Enquiries Stan Goodchild

Department of Environmental Protection
Westralia Square
141 St Georges Terrace
PERTH WA 6000



Attention: Ms Xuan Nguyen

Thank you for your fax of 13 January 1995 and documents concerning Proposed Transport of Sodium Cyanide Solution by Road by Australian Gold Reagents Pty Ltd.

Officers from my Branch have examined the documents and our comments are as follows:-

The main issue with this proposal is whether or not rail is safer than road transport. Also of concern is whether more people are exposed (in case of accident) if transport is by road than by rail particularly within a 50 km radius of the GPO. The road routes appear to have been chosen so that the minimum number of people would be exposed. However, railways tend to have a greater buffer zone to residential properties than roads. The data presented would need to be examined to determine which route has the greater potential for exposure of bystanders.

Should an accident occur, the main public health risk to people in the immediate vicinity would be from the generation of HCN. Studies suggest that there would be no immediate danger to persons more than 50 ~~kilo~~metres away from the site. Treatment with slaked lime and ferrous sulphate and sodium carbonate reduce the emission of HCN. Accidental spillage from rail transport or road transport through a built up area is likely to endanger a considerable number of people.

It should be noted that the Department of Minerals and Energy Summary of Accident Reports for 1992 and 1993 show that all transport accidents involving dangerous goods were the result of road transport.

The assessment of the health risk as a consequence of a water body being contaminated appears reasonable.

Thus whether or not Sodium Cyanide Solution should be transported by road is determined by the relative safety of road versus rail transport.

From a Public Health perspective we believe rail transport of Sodium Cyanide Solution should be the main mode of transport. We agree there needs to be an option to use road transport where necessary and this should be in accordance with procedures outlined in the document. However routes for road transport should be as short as possible and directed away from high population areas. Road transport should also not be used, as the main mode of transport in preference to rail where rail transport is feasible.

Please do not hesitate to contact Mr Stan Goodchild on 222 4920 should you have any queries concerning the above.

Brian Devine
A/DIRECTOR ENVIRONMENTAL HEALTH
30 January 1995

5127GS1A.LET

YOUR REF
OUR REF E 2237
ENQUIRIES MR K CADEE
DIRECT TEL 420 2518

Water
AUTHORITY

Water Authority of
Western Australia
629 Newcastle Street
Leederville 6007
Western Australia
PO Box 100
Leederville WA 6902
Tel (09) 420 2420
Fax (09) 420 3200

Environmental Protection Authority
Westralia Square
141 St George's Terrace
PERTH W AUST 6000

ATTENTION: MS XUAN NGUYEN

- 9 FEB 1995

120/94 XNG 6

REPORT BY AGR ON THE TRANSPORT OF SODIUM CYANIDE SOLUTION FROM KWINANA

Further to our letter of January 12th 1995, I confirm that the Water Authority has no objections to the proposed routes for the transport of sodium cyanide from Kwinana, to Boddington, Murchison and Eastern Goldfields as described on page 27 and Figure 6 of the AGR Report.

In the case of transport to the Eastern Goldfields, the route along Great Eastern Highway passes through the Mundaring Weir Catchment which is the sole source of supply to the Goldfields and Agricultural Water Supply Scheme. The most vulnerable locations are creek crossings on Middle Brook and Emu Brook. Contingency plans would need to address the timely containment/neutralisation of any spillage in these locations.

Yours faithfully,

K. Cadee

K CADEE
A/PRINCIPAL ENGINEER, SOURCE OPERATIONS
BULK WATER & WASTEWATER DIVISION

January 31st 1995 *KC:DCH*

(ht-w-173)

83389 INFO

MRWA 498A

FACSIMILE TRANSMISSION

In reply please transmit to facsimile number (09) 323 4629

MRD

MAIN ROADS
Western Australia

Don Aitken Centre
Waterloo Crescent
East Perth WA 6004

TO: Ms Xuan Nguyen
Department of Environmental Protection

FROM: Brett Loney
Environmental Services Section

FACSIMILE NUMBER: 322 1598

TELEPHONE NUMBER: 323 4130

NUMBER OF PAGES: 1
(Including this one)

DATE: January 30 1995

YOUR REFERENCE:

OUR REFERENCE: 72-394-182

SUBJECT: AGR REPORT: TRANSPORT OF SODIUM CYANIDE SOLUTION FROM KWINANA

MESSAGE:

Comments on the above report by Main Roads Western Australia are as follows:

- If transportors comply with all conditions and commitments as per Part D of the report, there are no objections from a traffic point of view. The proposed routes in the Metropolitan Area are acceptable.
- When rail services are not available, there is no other alternative to road transport. The extent on size of an incident could be *minimised* by constraints on the quantity carried by a vehicle.

Aside from these issues, there is no further comment.

ENVIRONMENTAL OFFICER

SIGNATURE: .....

83081

WARNING

Facsimiles on thermal paper will deteriorate quickly. Important documents should be photocopied if they need to be kept for any period of time.

WATERWAYS COMMISSION

PROTECTING OUR WATERWAYS

URGENT

Facsimile Transmission

TO: XUAN NGUYEN

AT: DEP FAX No: 322 1598

FROM: BRUCE HAMILTON

DATE: 15/2/95 PAGES INCLUDING COVER: 1

SUBJECT: TRANSPORT OF SODIUM CYANIDE BY ROAD FROM KWINANA.

On behalf of the Swan River Trust I can advise that there is no problem with the routes proposed by AGR on pages 25 to 27 of the report enclosed.

Transport issue } We would ask for assurance that care be taken on the section of Albany Highway from Armadale where steep grades exist.

Please contact us on 327 9777 if fax is illegible or incomplete. Thank you.

16th Floor, London House, 216 St George's Terrace, Perth, Western Australia 6000
Telephone: (09) 327 9777 Fax: (09) 327 9770
Box 7248, P.O. Cloisters Square, Perth, Western Australia 6850

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

HEAD OFFICE
HACKETT DRIVE CRAWLEY
WESTERN AUSTRALIA
Phone (09) 442 0300
Facsimile (09) 386 1578

STATE OPERATIONS HEADQUARTERS
50 HAYMAN ROAD COMO
WESTERN AUSTRALIA
Phone (09) 334 0333
Facsimile (09) 334 0466
Teletype (09) 334 0546

Please address all correspondence to Executive Director, P.O. Box 104, COMO W.A. 6152

Your Ref:
Our Ref: fb:am:w057
Enquiries: Mr Batini
Phone: 334 068

Dr Bryan Jenkins
Chief Executive Officer
Department Environmental Protection
141 St Georges Terrace
PERTH WA 6000

Dear Bryan

PROPOSED TRANSPORT OF SODIUM CYANIDE SOLUTION BY ROAD FROM KWINANA AGR PTY LTD

As discussed this morning on the telephone, I wish to advise that the Department of Conservation and Land management will not be making a submission to the EPA on this proposal. There are other agencies (DOME, WA Fire Brigade, WAWA, SES and the Pollution Prevention Division of DEP) that are much better placed to provide expert comment on this project.

Yours sincerely

Frank Batini
for Syd Shea
EXECUTIVE DIRECTOR

21 February 1995

83738

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. KWC:PO 1449 Your Ref.

Phone Enquiries: 323-9400

31 January, 1995

Environmental Protection Authority
Westralia Square
141 St Georges Terrace
PERTH WA 6000

- 3 FEB 1995

Dear Sir,

I am writing regarding the invitation by Australian Gold Reagents Pty. Ltd., (AGR) to make a submission on the proposal for the change in conditions to cover the road transportation of sodium cyanide solution.

On the basis of the information provided in the report, the Western Australian Fire Brigades Board (WAFBB) as the lead combat authority under the Western Australian Hazardous Materials Emergency Management Scheme (WAHMEMS) would not have any major objection to the proposal providing the following conditions could be accommodated:

1. The product shall be transported and specially designed and dedicated isotainers on low bed trailers as currently used.

2. Designated road routes are selected and adhered to at all times.

3. Transportation times to be agreed upon by the competent authority.

4. A comprehensive emergency response plan be developed, with the WAHMEMS Coordinating Committee and AGR maintained and practised on a regular basis.

5. The drivers' of vehicles receive special training as certified by the competent authority.

6. AGR shall consult with DOME, the Western Australian Fire Brigades Board and Police Department when amending its transport emergency response plans to accommodate any special conditions which may prevail along designated routes.

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. KWC:DH 1449 Your Ref.

Phone Enquiries: 323-9400

31 January, 1995

Department of Environmental Protection
Westralia Square
141 St Georges Terrace
PERTH WA 6000

ATTENTION: Ms Xuan Nguyen

Dear Xuan,

I am writing in response to your request for the West Australian Hazardous Materials Management Scheme Coordinating Committee to comment on the Report by Australian Gold Reagents Pty Ltd (AGR) which proposes amendments to the Ministerial Conditions for the transportation of liquid cyanide.

An extraordinary meeting of the Western Australian Hazardous Materials Emergency Management Scheme (WAHMEMS) Coordinating Committee was convened on Friday, 27th January 1995, to consider the proposal by Australian Gold Reagents (AGR) to transport sodium cyanide solution by road from Kwinana. A presentation on the proposal was made to the meeting by Mr. Rob Keogh, of CSBP, and Mr. Vic Williams of AGR. The Committee members then asked questions of Mr. Keogh and Mr. Williams and were given responses.

On the basis of the published Report by AGR, of 16th December 1994, the presentation by Mr. Rob Keogh and Mr. Vic Williams and their replies to questions, the WAHMEMS Coordinating Committee resolved that the WAHMEMS arrangements that are currently in place appear to be satisfactory to deal with an emergency resultant from a release of sodium cyanide solution during transport within the 50km radium area of concern.

Thank you for giving the Coordinating Committee an opportunity to comment on the report.

Yours faithfully,

K.W. CUNEO
CHAIRMAN
WAHMEMS COORDINATING COMMITTEE

Appendix 5

DOME's Report on Audit Compliance

DEPARTMENT OF
MINERALS AND ENERGY
WESTERN AUSTRALIA

EXPLOSIVES AND
DANGEROUS GOODS
DIVISION

MINERAL HOUSE
100 PLAIN STREET (CNR ADELAIDE TCE)
EAST PERTH
WESTERN AUSTRALIA 6004

TELEPHONE (09) 222 3333
FACSIMILE (09) 222 3525

Your Ref:
Our Ref: RL:MS: 8/95
Enquiries to: R Leckie
Telephone: (09)222 3403

Department of Environmental Protection
Westralia Square
141 St Georges Terrace
PERTH WA 6000

Attention Xuan Nguyen

AUSTRALIAN GOLD REAGENTS PTY LTD - DANGEROUS GOODS REGULATIONS COMPLIANCE AUDIT

A copy of the report of the compliance audit examining procedures and operations for the transport of sodium cyanide solutions is enclosed.

The conclusions indicate that the undertakings and commitments given by AGR in support of its application to vary the conditions of its original EPA approval to operate will, if they continue to be applied in the manner observed and verified during the audit, not conflict with the requirements of the Dangerous Goods Regulations 1992.

It is my opinion that the Company has demonstrated that it operates safely and there is no fundamental reason in the context of the public safety requirements of the Explosives and Dangerous Goods Act why it should not continue to do so in any area of the State.

K Price
CHIEF INSPECTOR

9 February 1995

Encl.

DEPARTMENT OF MINERALS AND ENERGY, WESTERN AUSTRALIA

EXPLOSIVES AND DANGEROUS GOODS DIVISION

DANGEROUS GOODS TRANSPORT BRANCH

100 Plain Street, East Perth WA 6004 Tel - (09) 222 3333 Fax - (09) 222 3525

AUDIT REPORT

ON THE

TRANSPORT OF SODIUM CYANIDE SOLUTIONS

BY

AUSTRALIAN GOLD REAGENTS PTY LTD

February 1995

ROAD TRANSPORT OF SODIUM CYANIDE SOLUTION - AUSTRALIAN GOLD REAGENTS, KWINANA

1.0 Overview

This audit examines the current road transport of sodium cyanide solutions and makes comment on the veracity of stated claims made by Australian Gold Reagents (AGR) in support of its application to transport cyanide solution by road within 50km from the Perth GPO. The company is currently prohibited from transporting cyanid solution within this area by a condition made by the Minister for the Environment. AGR are now seeking a relaxation from this condition to allow for the road transport of cyanide solution to the Boddington gold mines and to allow for the road transport of cyanide solution on occassions when rail services are disrupted or withdrawn.

Exemption from this condition allowing the road transport from Kwinana has been granted on four occasions to cater for the circumstances where rail services have been disrupted.

AGR produce sodium cyanide solution at their Kwinana works for distribution to gold mining centres in the Murchison and Eastern goldfields. Transport of the cyanide solution is by rail ex Kwinana to railheads at Narngulu, Southern Cross and Kalgoorlie at which point the bulk containers containing the solution (isotainers) are transferred to road vehicles for the journey to the various minesites.

AGR bases its application for a change to the ministerial conditions for the transport of sodium cyanide solution from Kwinana on its track record over the last six years of manufacturing and consigning sodium cyanide solution and on stated procedures and safeguards which are in place to ensure that the transport of cyanide solution presents minimal risk to public safety.

2.0 The Audit Process

AGR as a consignor of dangerous goods is required by the Dangerous Goods Regulations 1992 to comply with the relevant parts of the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code) as they apply to the consignor. This confers on AGR the obligations to correctly pack and label the dangerous goods for transport, to provide documentation and the relevant Emergency Procedure Guides for the load and to provide a telephone contact and specialist advice in the event of a transport emergency.

AGR also have a general duty of care under the ADG Code to take all practical steps to ensure that vehicles transporting sodium cyanide solution comply with requirements of the Code.

AGR's report was examined and stated commitments and procedures were identified to allow for subsequent assessment of AGR's ability to meet their commitments both at Kwinana and during field inspections at minesites and at the railheads. This audit identifies such undertakings by AGR and comments on their validity. All page references are to the "Report by Australian Gold Reagents in support of its application to the Minister for the Environment for a Section 46(1) Change in Ministerial Condition for the Transport of Sodium Cyanide Solution from Kwinana" prepared by Brian J O'Brien & Associates Pty Ltd and dated December 16, 1994.

2.1 Kwinana Operations

A review of the isotainers, loading and consigment procedures, maintenance of isotainers, emergency response capability and training was conducted at AGR's plant at Kwinana on 13 January 1995.

2.1.1 Equipment - Standards and Maintenance (page 9, 10)

2.1.1.1 Commitment

"Vessels (isotainers) shall be constructed so as to comply with:

- *Australian Code for the Transport of Dangerous Goods by Road and Rail (ACTDG)*

- *ANZ Manual of Standards and Recommended Practice for Rolling Stock (ANZR)*

- *International Maritime Dangerous Goods Code (IMO) for the transport of dangerous goods*

- *Dangerous Goods Regulations 1992"*

Observation

The Dangerous Goods Regulations of 1992 require that bulk containers for the transport of cyanide solutions be constructed in accordance with the ADG Code. The ADG Code requires portable tanks to be approved by the relevant Competent Authority, in this case DME and allows for the construction of tanks to current I.M.O. approvals.

The isotainers for transporting sodium cyanide solution from AGR Kwinana have been designed to the IMDG Code as I.M.O. Type I containers.

Design drawings for these tanks were examined by DME officers prior to the commencement of cyanide shipments and were approved as bulk containers for cyanide solutions.

As the tanks are discharged using air pressure, the tanks are also approved by the Department of Ocupational Health Safety and Welfare as pressure vessels. Inspection of the isotainers at the loading gantry verified that the tanks used were approved for this purpose.

Conclusion: AGR is meeting this commitment. The bulk containers utilized for the transport of sodium cyanide solution comply with the requirements of the Dangerous Goods Regulations 1992.

2.1.1.2 Commitment

Isotainers shall be externally examined by loading and transport personnel on each and every journey and any necessary maintenance performed.

Observation

On the day of inspection each isotainer which returned to Kwinana was accompanied by a checklist completed by the driver from the previous journey. The checklist was retrieved by the loading personnel and checked for observed deficiencies. No deficiencies were evident at the time of inspection. Procedures were in place to rectify any deficiencies with the isotainers prior to the container being reloaded. Loading personnel completed their own checklist prior to reconsigning the isotainer, certifying that the condition of the isotainer was sound and uncontaminated.

Conclusion: AGR was observed to be meeting this commitment. Examination of the isotainers was verified to occur.

2.1.1.3 Commitment

Detailed bi-annual internal and external inspections of isotainers shall be conducted in line with AS3788 (1992), "Boiler and Pressure Vessel In-Service Inspection"

Observation

Procedures exist to identify isotainers ready for inspection and remove them from circulation prior to decontamination and subsequent maintenance in accordance with AS 3788.

Conclusion: Evidence indicates AGR is meeting this commitment. Records of isotainer maintenance were observed as current.

2.1.1.4 Commitment

Rail wagons shall be maintained by Westrail to the "Railways of Australia Codes of Practice and Conditions for the Carriage of Dangerous Goods"

Observation

Westrail are obligated to maintain their rolling stock in accordance with this Code as a requirment of the ADG Code. AGR have procedures in place to notify Westrail of any maintenance required to their wagons.

Conclusion: The maintenance of rail wagons is outside of AGR's control and not part of their obligations under the ADG Code. AGR's proposal will remove any uncertainty with respect to the condition of rail wagons or the responsibility for their maintenance.

2.1.1.5 Commitment

AGR shall require transport contractors to ensure that equipment and operations conform to all statutory requirements and to standards agreed to during the carrier selection process.

Observation

AGR utilize two carriers for the road transport of sodium cyanide solution, Brambles Manford and Gascoyne Trading. These carriers were selected after attaining high scores from the AGR'S "Carrier Selection Criteria". This regime identifies companies which have in place systems and procedures of a sufficient standard to allow them to proceed towards AS 3902 quality assurance standards. Compliance with statutory requirements is a contractual obligation and periodic audits conducted by AGR management verify that relevant licences and permits are maintained. This auditing was subsequently verified during the field inspections.

Conclusion: AGR was observed to have effective systems in place to meet this commitment. AGR's carrier selection process in conjunction with their audit procedures and contractual requirements assists in ensuring statutory requirements are observed.

2.1.1.6 Commitment

Road transport drivers shall have all the necessary licences including dangerous goods transport from the Department of Minerals and Energy, Explosives and Dangerous Goods Division and the AGR/CSBP certification for the transport of sodium cyanide solution.

Observation

AGR maintain a database of drivers who are employed by their carriers to drive vehicles transporting cyanide solutions. Additional to the statutory requirements, drivers are trained and certified by AGR particularly in respect of the properties of cyanide and driver responsibility under the ADG Code. AGR's commitment in this regard exceeds the requirements of the ADG Code.

Conclusion: AGR was observed to have effective systems in place to meet this commitment. Certification and training of drivers by AGR is in excess of statutory requirements.

2.1.1.7 Commitment

Drivers shall be trained and retrained in the handling of sodium cyanide solution and in emergency procedures for initial (holding) response to a transport incident.

Observation

Drivers are retrained annually to ensure that procedures remain current. A register of their training and retraining is maintained. Spot audits conducted by AGR ensure certified drivers are used. These spot audits were observed in the field and are elaborated on in sections 2.2 and 2.3.

Conclusion: Retraining of drivers is in excess of statutory requirements.

2.1.2 Emergency Response (page 10)

2.1.2.1 Commitment

AGR's operating agent, CSBP shall provide a fully equipped emergency response vehicle and trained personnel on a 24 hour basis to respond to any transport incident involving AGR's sodium cyanide solution.

Observation

CSBP as consignors of dangerous goods by road are required by the ADG Code to maintain a 24 hour emergency response telephone number to enable specialist advice to be provided in the event of a transport emergency. CSBP utilize Link Communications to notify senior management in the event of such an emergency.

Procedures are in place to enable Link Communications to effectively interrogate the caller on the nature of the emergency and then communicate this information to CSBP's emergency controller. Upon receiving this advice, the emergency controller mobilises management and coordinates their response. A Management Response Team is convened, the composition of which is dependent on the level of response required. If cyanide solution was involved in the emergency then the emergency controller would alert AGR personnel to comprise part of this team.

Procedures for implementing this response and coordinating the response team were verified. The response vehicle was viewed in the company of the response team and found to be suitable for the purpose.

Independent of this audit, DME inspectors participated in CSBP's training exercise denoted "ERIC" conducted in spring of 1994 and CSBP's response capabilities in attending an emergency situation were observed and verified to be appropriate.

Conclusion: The proponent is meeting this commitment.

2.1.3 Procedures (page 10)

2.1.3.1 Commitment

Procedures are in place to ensure conformance to the set standards. These include;

- *Loading of containers*
- *Journey by journey inspections of transport equipment and checklists.*
- *Bi annual, detailed isotainer inspections*
- *First order emergency response*
- *Comprehensive Emergency Response*
- *Driver reporting of hazards, faults, incidents and potential incidents.*

Observation

Written procedures were observed to be in place to cover all aspects of the transport of the isotainers including loading, maintenance, emergency response and hazard reporting. Elaboration of these procedures will be dealt with in sections 2.2 and 2.3 of this audit.

It was observed that on receival of the isotainer at the loading gantry, the inspection report from the previous journey is retrieved from its holder on the isotainer. This checklist, completed by the driver detailed any readily apparent defects with the isotainer as well as documenting its condition on receival and return to the railhead.

On verifying the integrity of the container, the gantry operators were observed to refill the container according to written procedures. Copies of these procedures are visible at the gantry and within the loading office. On completion of the filling, a checklist on the container was completed to verify that it was suitable to be reconsigned. Concurrent with this, the wagon card was completed certifying that the isotainer and wagon were free from contamination.

Conclusion: Procedures relevant to the Kwinana operations and pertaining to the consigment of sodium cyanide solution were observed to be followed. AGR was observed to be meeting this commitment.

2.1.4 Auditing (page 11)

2.1.4.1 Commitment

At the production and loading site, procedures are subjected to regular ISRS ("International Safety Rating System") audits.

Conclusion: The procedures for ISRS auditing were verified to be in place. AGR was observed to be meeting this commitment.

2.2 Eastern Goldfields

Transport of the isotainers from the Southern Cross siding was inspected in the company of AGR management on Monday 16 January 1995. AGR contract Gascoyne Trading to transport the isotainers to minesites in the eastern goldfields. Inspection of the siding was coincident with container loading utilizing Gascoyne's sidelifter. No container lifting gantry is available at Southern Cross and to load a container onto the rear trailer of the road train, the container must be lifted twice. From Southern Cross, the vehicle was accompanied to the discharge point at Copperhead Goldmine, Bullfinch.

2.2.1 Equipment, Maintenance and Training (page 10)

2.2.1.1 Commitment

Isotainers shall be transported on dedicated low-bed road trailers or dedicated Westrail wagons and secured by corner twist locks on either mode of transport.

Observation

Low-bed trailers were utilized to transport the isotainers and the rail wagons were observed to be marked as dedicated for cyanide transport. The trailers utilized were suitable for moving containerised cargo and were dedicated for cyanide transport in that no other goods were transported with the cyanide. The trailers were equipped with twistlocks to secure the containers.

The requirement to use low bed trailers stems from ensuring that the load remains stable for the purposes of road transport. This is a contractual arrangement between the carrier and AGR.

Conclusion: Gascoyne Trading were observed to meet their contractual oblications with respect to AGR's commitment.

2.2.1.2 Commitment

Road prime-movers and low-bed trailers shall be maintained to manufacturers' specifications and be subjected to annual roadworthiness checks.

Observation

In respect of the road transport of cyanide solutions, the vehicles transporting the isotainers are subject to an annual inspection by police vehicle examiners as a prerequisite to the issue or renewal of a licence to transport dangerous goods. Certificates of roadworthiness are maintained by DME for each vehicle licenced to transport cyanide solutions. Maintenance to manufacturer's specifications was not audited.

The vehicles were observed to be licenced for the transport of dangerous goods. Roadworthiness is a prerequisite for this licence.

Conclusion: Gascoynes were observed to be meeting their contractual obligations in respect of AGR's commitment.

2.2.1.3 Commitment

AGR shall require transport contractors to ensure that equipment and operations conform to all statutory requirements and to standards agreed during the carrier selection process.

Observation

Gascoyne's vehicles were inspected and observed to comply with the Dangerous Goods Regulations 1992. Gascoyne's Kalgoorlie fleet was inspected in November 1994 and the vehicles inspected at Southern Cross were typical of those previously inspected.

Vehicles utilized by Gascoyne trading for the transport of cyanide solutions were observed to comply with the Dangerous Goods Regulations on this occasion. Gascoyne Trading have provided written acknowledgement of deficiencies observed during the November round of inspections with an undertaking to prevent their recurrence.

Conclusion: Gascoyne Trading were observed to largely comply with their statutory requirements in respect of AGR's commitment.

2.2.1.4 Commitment

Road transport drivers shall have all the necessary licences including dangerous goods transport from the Department of Minerals and Energy, Explosives and Dangerous Goods Division and AGR/CSBP certification for the transport of sodium cyanide solution.

Observation

It was confirmed that the driver held a current licence to drive a vehicle transporting dangerous goods in bulk. AGR's certification was additional to the statutory requirement and was verifed as issued.

Conclusion: AGR appear to have systems in place to effectively meet this committment. Licencing and certification of the drivers was observed to be in place.

2.2.1.5 Commitment

AGR will only transport its product along routes approved by the Chief Inspector of Explosives, Department of Minerals and Energy.

Observation

The route from the Southern Cross siding to Copperhead Mine is a Main Roads Department approved route for road trains and as such is approved for the transport of cyanide solution.

There is no additional approval required for the transport route for cyanide solutions.

Conclusion: AGR is meeting this commitment.

2.2.2 Auditing (page 11)

2.2.2.1 Commitment

For the transport and unloading operations, spot audits are performed by the regulatory Authorities (DOME, Police and Department of Transport), the transport company and AGR.

Observation

Inspection of operations at Southern Cross was coincident with a spot audit conducted by AGR. Independent of this, the movement of cyanide solution was monitored at West Kalgoorlie Freight Terminal during November 1994 and infringement notices were issued to Gascoyne Trading for breaches of the Dangerous Goods Regulations 1992 in respect of their transport of cyanide solutions. Prosecution of these breaches is being initiated.

AGR's commitment to conduct spot audits was observed to occur. The nature of this audit confirmed that requirements of the Dangerous Goods Regulations were being met.

Conclusion: AGR is meeting this commitment.

2.3 Murchison Goldfields

Inspection of the Mount Gibson Goldmine and the Geraldton (Narngulu) rail head was made on 17,18 January 1995. Transfer of the cyanide solution from the rail wagons utilizes Westrail's gantry at Narngulu. The transport of cyanide solutions by Brambles Manford from Narngulu to the Murchison goldmines was reviewed.

2.3.1 Equipment, Maintenance and Training (page 10)

2.3.1.1 Commitment

Isotainers shall be transported on dedicated low-bed road trailers or dedicated Westrail wagons and secured by corner twistlocks on either mode of transport.

Observation

Two road trains were inspected and observed to comprise low-bed trailers. The rail wagons were confirmed to be dedicated for cyanide transport. On all vehicles, the isotainers were secured by corner twistlocks. The road vehicles were dedicated for cyanide transport in that no other goods were transported with the cyanide.

Brambles were observed to meet their contractual obligations with respect to AGR's commitment.

2.3.1.2 Commitment

Road prime-movers and low-bed trailers shall be maintained to manufacturer's specifications and be subject to annual roadworthiness checks.

Observation

Maintenance of vehicles is to required standards. Certificates of roadworthiness are maintained by DME for each vehicle licenced to transport cyanide solution. Maintenance to manufacturers' specifications was not audited.

Vehicles utilized by Brambles were observed to be licenced to transport dangerous goods. Roadworthiness is a prerequisite for this licence.

Conclusion: Brambles were observed to be meeting their contractual obligations with respect to AGR's commitment.

2.3.1.3 Commitment

AGR shall require transport contractors to ensure that equipment and operations conform to all statutory requirements and to standards agreed during the carrier selection process.

Observation

Two road trains for transporting cyanide were inspected and found to comply with the provisions of the Dangerous Goods Regulations 1992. All vehicles were licenced to transport cyanide solutions and the licences were carried in the driver's cab. Additional to this, a despatch checklist was completed prior to the commencement of the road journey from Narngulu. This checklist confirmed that all safety items and documentation required by the ADG Code were provided and also required that a log of the journey and radio communications with base be recorded.

Vehicles utilized for the transport of cyanide solutions were observed to comply with the dangerous goods regulations.

Conclusion: Brambles were observed to meet their contractual obligations with respect to AGR's commitment.

2.3.1.4 Commitment

Road transport drivers shall have all the necessary licences including dangerous goods transport from the Department of Minerals and Energy, Explosives and Dangerous Goods Division and AGR certification for the transport of sodium cyanide solution.

Observation

It was confirmed that the drivers held a current licence to drive a vehicle transporting dangerous goods in bulk and were certified by AGR.

Conclusion: AGR appear to have systems in place to effectively meet this commitment. Licencing and certification of drivers was observed to be in place.

2.3.1.5 Commitment

AGR will only transport its product along routes approved by the Chief Inspector of Explosives, Department of Minerals and Energy.

Observation

The routes used for cyanide transport out of Narngulu are approved road train routes and as such are approved for the transport of cyanide solution.

Conclusion: AGR is meeting this commitment.

2.3.2 Auditing (page 11)

2.3.2.1 Commitment

For the transport and unloading operations, spot audits are performed by the Regulatory Authorities (DOME, Police and Department of Transport), the transport company and AGR.

Observation

Inspection of Brambles' road trains at Mt Gibson and Narngulu was coincident with audits conducted by AGR management. Independent of this, Brambles' vehicles are routinely inspected by DME inspectors and generally found to be maintained to a high standard.

AGR's commitment to conduct spot audits was observed to occur. The nature of these audits confirms that the requirements of the Dangerous Goods Regulations were being met.

Conclusion: AGR is meeting this commitment.

3.0 Conclusions

(1) AGR's consigment of sodium cyanide solutions has been examined and the transport of cyanide solutions from the railhead to the various minesites was observed to comply with the requirements of the Dangerous Goods Regulations 1992.

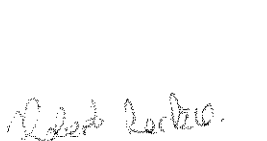
(2) AGR's commitment to the safe transport of cyanide solution is high and procedures have been observed to be in place to allow this commitment to continue.

While the road transport of cyanide solutions is outside of AGR's area of responsibility, contractual arrangements with the transporters of cyanide solution have extended AGR's involvement in this area such that AGR has taken additional care for the movement of its product beyond the responsibilities conferred on it by the Dangerous Goods Regulations 1992. The transport of sodium cyanide solution from despatch to the customer and to the subsequent return of the isotainer is controlled by detailed procedures instituted by AGR. In addition, ongoing audits by AGR on these procedures assist in maintaining compliance with the ADG Code.

(3) Progression towards AS 3902 standards by the nominated transport companies will assist in maintaining the high level of safety currently observed for the movement of sodium cyanide solutions.

(4) This audit has confirmed that AGR has effective systems in place to meet all the commitments made in its proposal and in all cases seen, those commitments were being met.

(5) The transport of cyanide solutions by road in the manner proposed is as safe as reasonably practicable and presents no intolerable risks to the public of Western Australia.



Robert Leckie
Inspector of Explosives and Dangerous Goods
Auditing Officer

John Hanley
Manager Transport Branch

Appendix 6

Proponent's Report on Public Consultation

AUSTRALIAN GOLD REAGENTS Pty Ltd

TRANSPORT OF SODIUM CYANIDE SOLUTION FROM KWINANA

STATUS OF PUBLIC CONSULTATION PROGRAM AS AT FEBRUARY 13, 1995

1. Initial Project Consultation

- In August 1985, the project partners distributed 3000 copies of a public information brochure on the proposed plant.

- A meeting with the Conservation Council of WA on July 25, 1985 was well received. Other consultation is given in the Report (Section 7)

- The plant was commissioned in November 1988 and transport commenced.

2. Subsequent Consultation

- Prior to transport along any proposed new route, AGR has, since 1987, consulted with the local government authorities (LGAs) and emergency response personnel concerned. About 25 LGAs and the corresponding emergency groups have been consulted. The purpose of these consultations was (and still is) to address any community concerns, explain the nature of the product and AGR's safe transportation management program and to address emergency response procedures with the local groups. The emergency response vehicle is usually displayed at the latter meetings.

- One of the most recent consultation programmes of this nature was conducted in August/September 1993. A more direct road route from Narngulu to the Mt Gibson mine (between Wubin and Paynes Find) was explored with the Shires of Perenjori, Mingenew, Morowa and Dongara. All the shires and their emergency groups accepted our transport operations. In fact, Perenjori Shire has since written to AGR commending AGR's contractors for the considerate manner in which they drive through the town.

- AGR, through its operating agent, Wesfarmers CSBP, has had open days during which the public is invited to inspect the cyanide plant (April 1992, March 1994). CSBP's Emergency Response facilities were also inspected on those days.

  The emergency response vehicle and its equipment have been on display at the Kwinana Expos.

- CSBP is represented on the Kwinana Industries Council and its subcommittees and co-ordinates the Kwinana Community Advisory Panel (KCAP). The latter provides a forum to keep the public informed on a wide range of industrial issues.

- In March 1992, AGR produced a public information video on its operations and transport in conjunction with Westrail.

3. Consultation: Direct Road Transport

The status at December 1994 and the proposed consultation program for the current project was given on page 22 of AGR's Report (the bulk of the above consultation information was given on pages 20-21).

In AGR's submission to the Minister, AGR pledged that once Ministerial approval was given, AGR would consult with all relevant Local Authorities before actual transport began.

The consultation process proposed, was and still is:

- Initial briefing of executive Council officers in Committee, including the showing of AGR's transport video.

- Inspection of AGR's Kwinana production plant and cyanide loading facilities and transport equipment by council officers and councillors.

- Full briefing of councils at regular council meetings open to the public.

As a matter of routine, AGR, as it has since 1987, will then meet with the appropriate State and local professional and volunteer emergency response groups to brief them on emergency response actions in the event of an incident.

This policy of continuing community information arises:

- as a part of corporate policy of AGR through its sales and operating agent CSBP

- as a consequence of membership by CSBP of PACIA.

However, during and just prior to the public review period (finishing 30 January 1995), AGR decided to respond to media enquiries and subsequently met with interested groups.

- September 8, 1994

  EPA members and DEP officers inspected the Kwinana plant and were briefed on the proposal.

- November/December 1994

  AGR through KCAP announced its intention to expand the cyanide plant and also that it was seeking approval for the option to transport its product by road from Kwinana. (KCAP has community representation).

- November 28, 1994

  AGR met with the City of Armadale's Technical Services Committee and gave a preliminary briefing.

- December 22, 1994

  A followup briefing of a small informal committee of Armadale councillors and council officers was performed, primarily to address issues raised at the previous meeting, particularly local emergency response issues (refer agenda, Appendix 1).

- December 23, 1994

  AGR distributed its public report to the list of recipients provided by the DEP (see Appendix 3). The Town of Kwinana and the Local Government Authorities along the proposed route to Boddington were also provided with copies of AGR's transportation video and its information booklets.

  In total approximately 130 copies were distributed. Of those, approximately seven were sold directly to private individuals.

  Recipients, other than those specified by the DEP or the private individuals referred to above were:

  - The Hon Mrs Kay Hallahan, MLA
  - Dames & Moore
  - Kinhill Engineering
  - Additional 12 copies to the DEP (some to WAHMEMS)
  - Bedfordale Residents Association
  - Main Roads Department (further 2 copies)
  - "Consultant", Kalamunda Road, Guildford
  - Chamber of Mines and Energy
  - Dr Ivan Botica, Department of Health
  - Armadale branch of the Chamber of Commerce and Industry
  - Brambles Manford
  - Gascoyne Specialised Transport Services.

- December 30, 1994

  AGR wrote to the Mayor of the City of Armadale detailing what AGR understood to be the City's concerns, principally the general increases in heavy haulage through the City, the condition of the roads and the consequences of the unlikely event of spillage into the Neerigen Brook.

- January 13 and January 16-17, 1995

  Inspector from the Explosives and Dangerous Goods Division of DOME audited AGR's on-site and off-site operations.

- January 17, 1995

  AGR responded in writing to an enquiry from the Bedfordale Residents Association. A short summary of AGR's proposal, the reasons for it, our track record and management program were presented. A copy of AGR's public paper, a labelled photograph of an isotainer and an AGR booklet were included in the parcel. AGR offered to answer any questions or to meet with the Association either at Armadale or at the Kwinana Works.

- January 18, 1995

  AGR met with Armadale branch of the Chamber of Commerce and Industry to brief the Committee and to respond to any questions. Jack Collier, who is experienced with dangerous goods transport was present at the meeting. He had been invited by the CCI to act as its technical adviser.

- January 19, 1995

  AGR briefed the Select Committee on Heavy Transport at the Kwinana works. The Committee inspected AGR bulk cyanide containers (isotainers) and the road transport vehicles. The Committee also discussed some of the issues with AGR during the inspection.

- January 24, 1995

  The DEP officer assessing AGR's section 46 amendment proposal, Ms Xuan Nguyen, inspected the plant, the despatch facilities and the Emergency Response Centre. Shortly, the officer will inspect AGR's field operations (transport, transhipment and unloading operators).

- January 25, 1995

  A complement of six officers and councillors from the Town of Kwinana met with AGR at Kwinana Works to discuss AGR's proposal and to inspect its facilities including the plant, despatch and emergency response.

- January 26, 1995

  AGR addressed the WAHMEMS Coordinating Committee and the Chamber of Mines and responded to the issues raised.

- January 31, 1995 to February 02, 1995

  As part of its ongoing consultation program, AGR held refresher cyanide emergency response seminars with the emergency services, Westrail and the CSBP emergency squad in Geraldton. (The Murchison goldfields are currently serviced from the Narngulu rail siding).

The seminar program is attached (Appendix 1). The emergency groups along the proposed new road routes will receive similar training but in more depth and will include specific local response issues.

In addition to the above, AGR has taken part in several radio interviews and responded to Newspaper enquiries with press statements. AGR's proposal has received media attention since late October 1994.

AGR briefed several Ministers, their assistants and members of the Opposition before its Report was released.

4. Concluding Comments

AGR has already consulted with a spectrum of interested parties since AGR's request for a change in Ministerial Conditions was submitted to the Minister on September 19, 1994.

AGR has pledged from the outset that once its receives Ministerial approval to transport its product by road from Kwinana and DOME approve or designate the road routes, AGR will consult with the relevant local government authorities and emergency services before commencing road transport operations from Kwinana. [AGR has been performing this consultation process since 1987].

The consultation program will include addressing local issues and in particular working with the emergency response groups in setting up emergency plans and providing training in the properties and handling of sodium cyanide solution.

MEETING WITH CITY OF ARMADALE OFFICERS
Thursday December 22 1994

RE: ROAD TRANSPORT OF SODIUM CYANIDE SOLUTION

A G E N D A

1.	Introduction	VAW	2 min
2.	Video (if required) (FF Any repetitive Sections)	VAW	8 min
3.	Properties of Sodium Cyanide	VAW	2 min
4.	Emergency Response	VAW	7 min
5.	Transport	ACW	7 min
6.	Incident Prevention	SRF	7 min
7.	Public Consultation	SRF	3 min
8.	DEP/EPA Process	SRF	3 min
9.	Summing Up	VAW or SRF	2 min

Approximately 40 minutes plus question time throughout the presentation

SJD:VAW
C:\VAW94\VAW356A

31 January 1995

PROGRAMME

CYANIDE & EMERGENCY RESPONSE REFAMILIARISATION

GERALDTON AREA

1. Tuesday January 31 1995

Time	Personnel	Venue
1000-1200	Westrail *Noel Lee - Area Manager*	Westrail Station
1600-1815	Police *Sergeant Les Walters* *Officer responsible for* *Dangerous Good Emergencies*	SES Training Room
1830-2100	Fire Brigade *Ted Coxon - Officer in Charge*	Fire Station
Approx 1500	Mike LeRoy arrives by rapid transport Air Charter	

2. Wednesday February 01 1995

0800-1530	CSBP Geraldton *Emergency Squad*	CSBP Geraldton Works

3. Thursday February 02 1995

0900-1115	Police (Shift 1) + SES Reps	SES Training Room
1600-1815	Police (Shift 2) + SES Reps	SES Training Room

AGR

SODIUM CYANIDE SEMINAR

(FIRE BRIGADE AND POLICE)

PURPOSE

TO ENSURE THAT THE EMERGENCY SERVICES UNDERSTAND THE PROPERTIES OF THE CHEMICAL AND THEIR PROBABLE INVOLVEMENT (WITH AGR/CSBP) IN THE VERY UNLIKELY EVENT OF A SPILL.

PRESENTERS

BERT WALLISS - Distribution Co-ordinator
ANDREW JENNER - Emergency Response Co-ordinator
MIKE LeROY - Manager Envirnmental Health & Safety
VIC WILLIAMS - Manager AGR P/L

AGR

SODIUM CYANIDE REFRESHER SEMINAR

(CSBP GERALDTON EMERGENCY SQUAD)

PURPOSE

TO REFRESH THE EMERGENCY SQUAD'S UNDERSTANDING OF THE CHEMICAL'S PROPERTIES AND THE SQUAD'S FIRST RESPONSE EMERGENCY PROCEDURES (THEORETICAL AND PRACTICAL) IN THE VERY UNLIKELY EVENT OF A SPILL.

PRESENTERS

BERT WALLISS - Distribution Co-ordinator
ANDREW JENNER - Emergency Response Co-ordinator
VIC WILLIAMS - Manager AGR P/L

31 January 1995

FIRE BRIGADE PRESENTATION

		Presenter	Approx Time
1.	INTRODUCTION	VAW	2
2.	PROPERTIES OF CYANIDE	VAW	20
3.	FIRST AID	VAW	8
4.	TRANSPORT	ACW	10
	4.1 Container ruggedness		
	4.2 UN Number		
	4.3 Checklists		
	4.4 EPG's and EIP		
	4.5 Driver training including emergency response		
5.	VIDEO	ACW	14
6.	BREAK (incl VEHICLE INSPECTION)	ARJ	10
7.	EMERGENCY RESPONSE	ARJ	70
	7.1 008 093 333 (5)		
	7.2 Rapid Transport (5)	MLeR	
	7.3 Desk Top Exercise (Scenario) (40)		
	7.4 * Fire Brigade Response (15)		
	7.5 Decanting Leaking container (5)		
8.	ACCREDITATION EXAM	ACW	30
	8.1 Attendees attempt paper (20)		
	8.2 Answer session/discussion (10)		

* Feedback from fire brigade as far as how they would operate when on the scene in force.

31 January 1995

FIRE BRIGADE PRESENTATION

		Presenter	Approx Time
1.	INTRODUCTION	VAW	2
2.	PROPERTIES OF CYANIDE	VAW	20
3.	FIRST AID	VAW	8
4.	TRANSPORT	ACW	10
	4.1 Container ruggedness 4.2 UN Number 4.3 Checklists 4.4 EPG's and EIP 4.5 Driver training including emergency response		
5.	VIDEO	ACW	14
6.	BREAK (incl VEHICLE INSPECTION)	ARJ	10
7.	EMERGENCY RESPONSE	ARJ	70
	7.1 008 093 333 (5) 7.2 Rapid Transport (5) 7.3 Desk Top Exercise (Scenario) (40) 7.4 * Fire Brigade Response (15) 7.5 Decanting Leaking container (5)	MLeR	
8.	ACCREDITATION EXAM	ACW	30
	8.1 Attendees attempt paper (20) 8.2 Answer session/discussion (10)		

* Feedback from fire brigade as far as how they would operate when on the scene in force.