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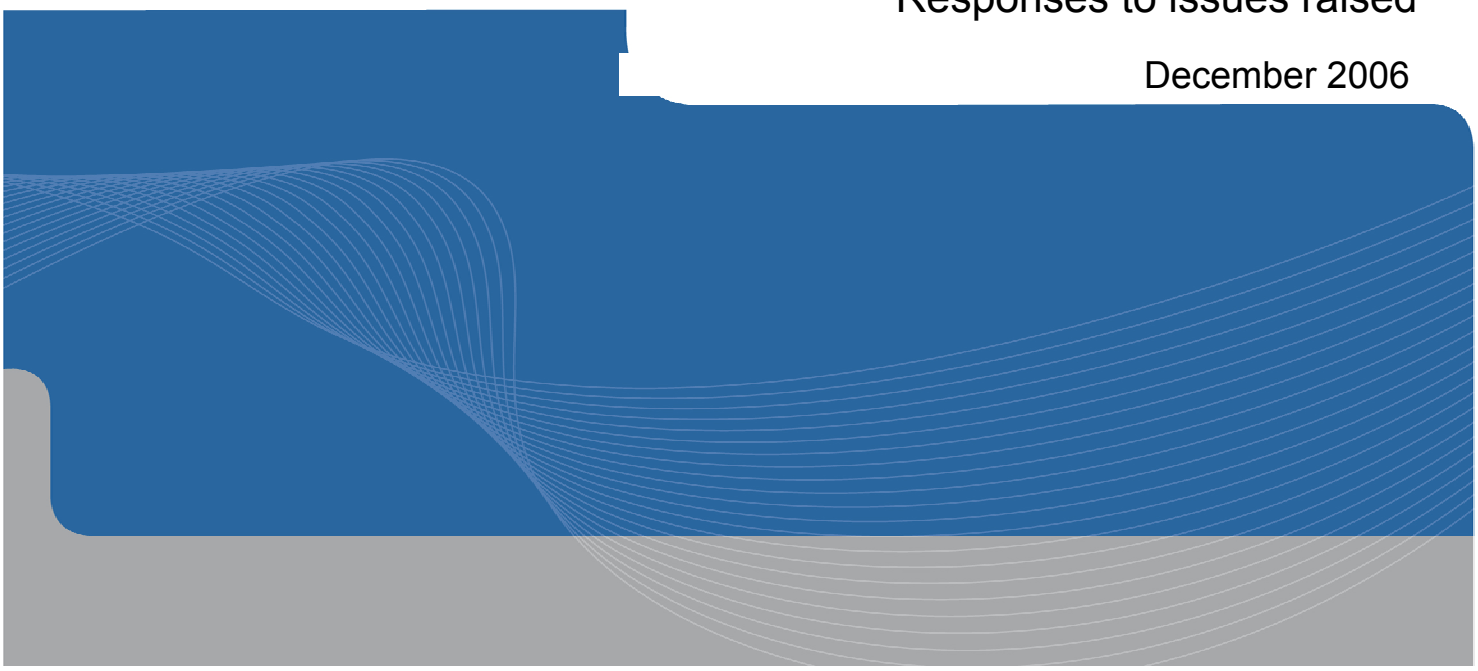
Dyno Nobel Ammonium Nitrate Plant

Supplementary Report for the proposed Moranbah Ammonium Nitrate Project

Responses to issues raised

December 2006



INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Executive Summary

This Supplementary Report relates to the Draft Environmental Impact Statement (EIS), October 2006, prepared for the Dyno Nobel (DN) Moranbah Ammonium Nitrate Project (AN Project). This report addresses the matters raised in submissions received from the community, stakeholders and State agencies as well as additional work and clarifications undertaken since the completion of the draft EIS.

The outcomes of the impact assessment studies documented in the draft EIS, including this Supplementary Report, will assist The Coordinator-General, Belyando Council and the Referral Agencies in the determination as to whether to accept, approve the project with conditions, carry out further studies or refuse the project.

It should be noted that due to the late inclusion of requests for additional studies resulting from interested parties this Supplementary Report does not include these issues in relation to Hazard and Risk nor in relation to impacts on underground coal mining that may come in close proximity to the site in future years. These will be included in an addendum to the Supplementary Report to follow.

Community Consultation

- Following the release of the draft EIS in October 2006, additional community engagement was undertaken, specifically;
  - A Community information Day on the 25th of October 2006;
  - Advertisements in the Morning Bulletin (Rockhampton) and the Daily Mercury (Mackay); and
  - Provision of a copy for public display in Moranbah.

Community Response

Over the public comment period, responses were received from 16 different respondents. Of these, 13 were received within the timeframe and three were received outside of this timeframe. All of the responses received have been addressed within this Supplementary Report.

Issues Raised

Key issues raised in the submissions include:

- Hazard and Risk;
- Transport and traffic;
- Noise and vibration;
- Air quality;
- Social and community impacts;
- Land tenure and land use; and
- Water and Waste;

Additional Studies

The following additional studies were undertaken to supplement the information provided in the draft EIS:

- Updated assessment in relation to the hazard and risk component of the EIS specifically as it relates to containerised storage.
- Inclusion of additional noise assessment report as it relates to noise generation impacts from the Enertrade Pty Ltd compressor station.

Summaries of the additional studies are provided in the report, along with full copies of the report in the document Appendices.

1. Introduction

This report details any changes made as a result of requests by interested parties or as a result of the responses to the EIS. This report also provides detailed responses to the comments made by stakeholder groups on the Moranbah Ammonium Nitrate Project EIS. This EIS has moved through the Public Notification phase in accordance with section 33 of the *State Development and Public Works Organisation Act 1973.*

The public notification stage entailed the publication of the EIS within a number of State and local newspapers, the provision of this EIS to State and local government agencies and the undertaking of community consultation on the EIS. Once this phase was completed, interested parties had the opportunity to make submissions to the Coordinator General in relation to the EIS for addressing the outcomes.

A number of comments were received as part of the public notification process for the EIS. These covered a range of different issues from a number of different respondents.

Comments on the EIS were received from:

- ORICA
- The Department of Main Roads
- The Department of Transport
- The Department of Education Training and the Arts
- The Department of Natural Resources and Water
- The Department of Mines and Energy
- The Environmental Protection Agency (EPA)
- The Department of Health
- The Department of Housing
- The Department of Primary Industries
- The Belyando Shire Council
- Emergency Management Queensland
- Anglo Coal Pty Ltd
- Enertrade Pty Ltd
- Robert Hutchinson (Consultant)
- A local resident

Each of the comments received were responded to. A reference table of the issues raised is summarised in Appendix A of this report. Each of the issues raised is addressed according to the environmental aspect.

1.1 Overview to EIS Process

The impact assessment process is a tool for the assessment of development proposals. It provides a framework for the identification of environmental, social and economic impacts, both beneficial and negative, and for the formal inclusion of community participation, as well as ensuring the rigour of investigations and reporting.

The first phase of the process is the preparation of Terms of Reference (ToR) for the Draft EIS. The ToR set the scope and degree of detail to be provided in the EIS document. The Draft ToR was refined through stakeholder and community comment to ensure appropriateness and comprehensiveness. The ToR was developed with input from a wide range of stakeholders and published on the Coordinator-Generals Website (www.coordinatorgeneral.qld.gov.au) in March 2006.

The draft EIS was prepared having regard to the ToR and documented the findings of a range of specialist investigations, including project viability and preferred options. The Final EIS is prepared through a Supplementary Report following public consultation on the Draft EIS and consideration of submissions received through the process.

This Supplementary Report documents the submissions received from the community, stakeholders and government agencies, provides a response to those submissions and makes recommendations to assist the Coordinator-General (CG) and Council with the decision making process.

1.2 Purpose of Supplementary Report

This Supplementary Report is intended to assist the CG to consider the potential impacts and proposed management measures for the Project. Any additional technical studies undertaken subsequent to the preparation of the draft EIS have also been included.

The outcomes of the impact assessment studies documented in the draft EIS, including this Supplementary Report, will assist Council and the CG in the determination as to whether to accept, reject or modify any of the proposed options, approve the project with conditions, carry out further studies or refuse the project.

1.3 Consultation

Following the release of the draft EIS in October 2006, additional community engagement was undertaken, specifically;

- A Community Information Day 25th of October 2006
- Advertisements in the Morning Bulletin (Rockhampton) and the Daily Mercury (Mackay)

A copy of the EIS was provided for public display in Moranbah. The Community Information Day had two attendees during the period from 3pm to 7pm. Both of the attendees received an information package on the project but did not provide any responses on the EIS submission.

1.4 Submissions

Submissions were made to the CG in response to the EIS and were received from a number of different stakeholders representing State, community and local government interests.

1.5 Changes to the project

Following submission of the EIS and the subsequent refinement of the project within the detailed design there have been changes to the project.

The land for the project has recently been purchased and converted across to freehold title. The details of the two separate parcels of land (one for the Ammonium Nitrate Plant (AN Plant) and one for the Construction Camp) are as follows:

- Lot 13, On SP 191679, (270.2 ha) County of Grosvenor, Parish of Broadmeadow, Belyando Shire;
- Lot 14, On SP 191699 (24.65 ha), County of Grosvenor, Parish of Broadmeadow, Belyando Shire.

The layout of the design of the AN storage has also been changed from bulk storage facilities of two 6,000 tonne storages, to containerised storage accommodating four separate stockpiles encompassing:

- Two 2,000 tonne containerised storage stockpiles; and
- Two 3,000 tonne containerised storage stockpiles.

This has not affected the overall layout of the site, as the footprint of the AN storage has remained effectively the same, albeit the storage volume has been decreased. There has also been an additional change in relation to the storage of AN Emulsion on the site. In the original EIS there were two 140 tonne tanks. This has been expanded to three 140 tonne tanks, which will be individually mounded to prevent projectile impact. To accommodate the reduction in AN storage the ammonium tank size has been increased to 5,000 tonnes and is fully refrigerated. These changes have been incorporated in the Updated Preliminary Risk Assessment (PRA) for the project, which is currently being prepared and will be provided to the respondents to the EIS in the near future.

The layout of the access road onto the site has also been adjusted to incorporate a curve to reduce the speed of vehicles accessing the plant site. A similar curve has also been incorporated into the access road for the construction camp.

Detailed design of the intersections for the access onto Goonyella Road for the AN Plant site and the construction Camp have been designed to the Department of Main Roads (DMR) specifications as provided in the response from the DMR dated 13 November 2006. Drawings detailing these changes are provided in Appendix C of this report.

Other minor changes include the construction workforce potentially working for a period of 7 days a week, as opposed to the 6 days a week as detailed within the EIS.

1.6 Analysis of Submissions

An assessment the submissions made was undertaken for the Supplementary Report. A general summary of the issues identified is provided in Appendix A (EIS Submission Register).

1.7 Key Issues

The key issues identified related to:

- Hazard and Risk:
  - Specifically in relation to the potential knock-on effects from the storage of AN Prill and AN emulsion.
  - Modelling assumptions used within the report in relation to hazard and risk modelling for impacts at the site.
  - Use of containerised AN storage.
  - Use of fully refrigerated ammonia tank.
  - Offsite impacts.
- Air Quality Assessment:
  - Modelling assumptions used within the report.
  - Impacts on adjacent infrastructure.
- Water and Waste:
  - Clarification of waste generation and water usage.
  - Clarification of impacts on Grosvenor Creek.
- Social and Community:
  - Clarification of water allocation to the town.
  - Clarification of management of the facility in relation to housing and community services.
- Coal Mining:
  - The footprint of the plant over deeper coal resources.
  - The impact of the plant on mining infrastructure and operation.

Other issues were also raised within the EIS submission register and have been addressed within this report for each of the submissions. A summary of the issues identified is provided in Appendix A of this report.

2. Response to Submissions

The responses to issues raised in the submissions have been grouped in categories and are listed in relation to each of the aspects identified within the submission. Where a number of issues have been raised in an individual submission, a response to each of the issues raised has been provided. Similarly, a number of responses may address a single issue. For example, if the issue raised was “the project will impact on a particular location”, the overall response may include individual responses addressing noise, air quality and traffic management in relation to each of those responses.

3. Additional Information Relating to Social Impacts

Section 3 provides additional information in relation to the respondents concerns in relation to the potential social and community impacts from the project. These concerns relate to housing, community services and water.

3.1 Resident

R5: The EIS did not provide details of a housing strategy including accommodation and childcare

Housing

A housing strategy has been provided within the EIS that relates to both the operational and the construction workforce for the project. This strategy has been developed to alleviate the potential housing impacts associated with the development of the facility. The strategy for management of accommodation for the workforce is provided in Section 3.2.6 and 3.5.6 of the EIS.

Dyno Nobel is working with Belyando Shire Council and local developers on the purchase of housing from new developments in the area and has in place options to purchase housing for the operational workforce of the AN Plant.

For the construction workforce, a construction camp will be provided adjacent to the AN Plant site. This facility will be in place for the construction of the facility and during commissioning of the AN Plant. Once this has been completed and the AN Plant is fully operational the construction camp will be no longer be required.

Childcare

Dyno Nobel will contribute in the development of solutions to address community issues. Dyno Nobel however, does not intend to build a child care facility within Moranbah. Childcare is an issue, which is affecting the broader community of Moranbah.

R10: - Responses to community and concerns are not adequate

Detailed in Table 1 are the issues recorded during the initial community consultation with updated responses in relation to the further development of the project from DN and GHD.

Table 1 Key Issues Raised through the Community Consultation Strategy

Question/Issues	Response	
	Dyno Nobel	GHD (EIS)
What will happen if there is a fire on the site?	A Safety Management System (SMS) will be developed for the facility. Provision has been made for fire fighting and emergency response on site, which will be in coordination with the Rural	The likelihood of this occurring is discussed in the Hazard and Risk Assessment Report (Appendix 7.7 of the EIS). Dyno Nobel is required to have in place a consultation process with relevant stakeholders and the

Question/Issues	Response	
	Dyno Nobel	GHD (EIS)
	Fire Service. Refer to Section 5.1 of this report.	community and will liase with these stakeholders in developing the emergency response procedures for the AN Plant. Section 5.1 (BSC 8) of this report details DN's onsite capabilities for fire fighting.
What are the chances that the plant will explode?	Ammonium Nitrate is classified as an explosive in Queensland under the Explosives Regulation 2003. In other states it is classed as a 5.1 oxidising agent. Its security and storage is governed by Queensland regulation, specific to SSAN (Security Sensitive Ammonium Nitrate). AN will be handled in accordance with the regulations. The risk due to the possibility of explosion has been examined by risk analysis included in the EIS (Appendix 7.7).	The chance of the plant exploding has been addressed in the Hazard and Risk Report (Appendix 7.7 of the EIS). It is also included in the Updated Hazard and Risk Report that will be provided as an addendum to this report.
What will happen if the plant explodes?	AN will be handled in accordance with the applicable regulations (eg. SSAN licensing, Explosive Regulation 2003). The risk due to the possibility of explosion has been examined by risk analysis included in the EIS (Appendix 7.7) and within the updated Hazard and Risk Report that will be provided as an addendum to this report.	Whilst the probability of explosion is extremely low the consequence of the AN Plant exploding has been addressed in the updated risk assessment, which will be provided in the Addendum to this report. The Hazard and Risk report has been updated to assess containerised storages on site. Containerised storage will reduce the consequence of an explosion on site.
What will happen if one of the trucks carrying the AN explodes (Taroom example)?	AN will be handled in accordance with the relevant regulations for the storage and transport of ammonium nitrate. The risk due to the possibility of explosion has been examined in the Hazard and Risk Assessment Report.	The likelihood of a truck exploding is extremely remote. In the extremely unlikely event this were to occur the area of impact for a 20 ton container of AN Prill, if exploded at 32% NEQ would reach a distance of 118m at 21kPa (10% fatality).
Can DN make provision for transport around peak times on the Goonyella and Moranbah Access Road (e.g. when the school bus is on the road and shift changes)	Dyno Nobel has committed to minimising the impact of vehicles on the road and the broader community both during construction and operation.	Discussed in the Traffic Impact Assessment Report (Appendix 7.6 of the EIS).

Question/Issues	Response	
	Dyno Nobel	GHD (EIS)
	Once a transport contractor has been appointed for the transport of the products from the site Dyno Nobel will through contractual arrangements minimise the impacts on the existing traffic in Moranbah.	
What type of security will there be for the plant and for transporting the AN? Taking into consideration the increased terrorism risk of small and remote airfields.	Dyno Nobel is required to develop a Security Management Plan and will manage the Security Sensitive Ammonium Nitrate in accordance with state and federal requirements. Changes to the layout of the site have been incorporated to reduce the risk of terrorism including a curve in the access road to decrease speeds on the road (as shown in Appendix B of this report) and bunkering of AN emulsion.	See DN response
What is the possibility of transporting the AN by rail?	It is a future consideration. At this point rail does not provide a viable option for DN as it would require development of new rail infrastructure and a significant number of the mines are not currently accessed by rail. It may become a viable option in the in the future.	See DN response
Where will Dyno Nobel be transporting the AN to?	Initially customers (mining operations) in Queensland. This may be expanded interstate or exported.	See DN response
Will Dyno Nobel be transporting the AN over the Nebo Range?	No.	See DN response
Where is Dyno Nobel going to get water for the new housing?	Pressures on local infrastructure will be limited to the maximum extent practical. Water will be purchased via the private (Burdekin pipeline) and both AN plant and potable water will be provided for this facility. This includes water for the construction and operation, its workforce and their families (i.e.: water for the housing of the permanent workforce).	This is discussed in Section 3.5.3 of the EIS (Water Supply and Management).

Question/Issues	Response	
	Dyno Nobel	GHD (EIS)
Comments on the amount of water required by the plant in comparison to the amount the town already uses on restrictions	Dyno Nobel will minimise its impact on the town's resources through the provisions of water for its employees and their families during construction and operation. The water for the project has been obtained through agreements with SunWater and other stakeholders. This water will be accessed from the private (Burdekin) pipeline.	See DN response
How will Dyno Nobel balance the needs of the Moranbah community and Moranbah community/family values with the needs of the plant?	Pressures on local infrastructure will be limited to the maximum extent practical for the project. The operational workforce and their families will be part of the Moranbah community and Dyno Nobel will be a long-term member. Dyno Nobel's operations will balance its needs with the community in which it operates.	See DN response
How does Dyno Nobel propose to support the Moranbah community?	Dyno Nobel by providing its permanent workforce with housing within the town will be part of the community and not a transient workforce. This will provide opportunities for the staff and their families to actively participate within the community. Dyno Nobel has also implemented measures to prevent impacts on power and water provision within Moranbah (i.e. power supply for the AN Plant and a water supply for its workforce and their families).	See DN response
What community benefits does Dyno Nobel propose for Moranbah?	Dyno Nobel will be part of the community and as such, will encourage investment in and around Moranbah through the requirement for additional goods and services within the town. In addition as its permanent workforce will be located in Moranbah there are opportunities for community participation.	See DN response & refer to Section 2.1 of the EIS (volume 1)

Question/Issues	Response	
	Dyno Nobel	GHD (EIS)
What will the 'pollution' impacts be on Moranbah and surrounding areas? ◗ Air quality; ◗ Emissions; and ◗ Water pollution.		These issues have been addressed within the specialist studies provided as part of the EIS, including: ◗ Appendix 7.8 Air quality and emissions. ◗ Section 4.3 of the EIS.
Will Dyno Nobel have comparative wages and conditions (4x4x12 shifts) to the coalmines?	The wages and conditions for the project will be competitive with those within the surrounding mining operations and the general community.	See DN response
Dyno Nobel would like to accommodate its operational staff in Moranbah – where are they likely to be located, and will Dyno own the houses or will staff have to purchase their own?	The maximum number of personnel will be sourced from the local area. However, due to the scarcity of labour in the Moranbah area, most of the construction and operational workforce will need to be obtained outside the local area. Dyno Nobel has obtained options with developers in Moranbah for the purchase of housing for all of its operational staff should the AN Plant be approved.	See DN response

3.2 Department of Education Training and the Arts

DETA 1:- It is recommended that further analysis on the training opportunities that the Project may deliver be included in the environmental impact statement, including a detailed profile of skills requirements.

After approval, the project will move into the phase of construction. During the construction period skills required to operate the AN Plant will be identified and developed. These positions will be advertised and filled by suitably qualified individuals experienced in the chemical industry. All employees will undergo the training program through Dyno Nobel. Details can be obtained through the HR department of Dyno Nobel. Dyno Nobel will work with the Department of Education and the Arts regarding a profile of skill requirements.

3.3 The Department of Housing

DoH 1:-The Department expects the Supplementary Environmental Impact Statement to clarify and provide firm commitments to the proponent's accommodation strategy that will ensure no further pressure is placed on the housing markets in Moranbah.

Dyno Nobel has obtained options with developers in Moranbah for the purchase of housing for all of its operational staff should the AN Plant be approved. These developments are currently going through the approval process with Belyando Shire Council.

3.4 Belyando Shire Council

BSC5: - Water allocation for Moranbah: The EIS fails to acknowledge the multiplier effect of the economic stimulant of the proposal on generating additional water demand in the community. A sincere and unbiased appraisal of the total water demand needs to be undertaken. The process of allocating water directly to urban use in the residential corner ignores the boarder economic stimulant that will eventuate as a result of the proposal. Subordinate industries and residential functions will follow and will place greater pressure on the existing allocation of water to the community. By focusing solely upon the direct link between employers and their families and water consumption, the proposed allocation is deficient and will not meet the community needs and will result in greater pressure on existing users in an environment of constrained supply.

Water will be provided for the employees and their dependants who will move to Moranbah as part of the project. The economic stimulant effect from the project has not been considered within the EIS in relation to the allocation of water resources.

Any new operations that choose to move to Moranbah are not the responsibility of DN and will have to make provision for their own operations when determining the viability of these projects in Moranbah.

BSC6: - Social Impact: The EIS does not detail a multiplier effect for the proposal in terms of the stimulation of additional demand for housing and accommodation. Whilst consideration is given to direct links of the proposal which is commendable, the broader impacts are not detailed. In the constrained housing market at present the additional demand will result in greater pressure to provide temporary accommodation. This outcome is not a sustainable position for the community which has in excess of 21% of the population presently in a Single Persons Quarters.

The EIS needs to detail a commitment to delivering affordable housing for all the impacts associated with the project and not avoid the dire social consequences of a fractured community. The EIS needs to be amended to reflect the full impacts of the project within the local constraints of Moranbah. It is clearly unacceptable for additional pressure to continue to be applied to the local market. The social fabric of the community is under considerable duress and it is unsustainable for weekly rental costs for housing to exceed the gross incomes of general service industry workers within the community, or as in some cases more than the two combined gross incomes of young workers.

Dyno Nobel has undertaken a strategy to provide housing infrastructure for its workforce, both during construction and during operation. The multiplier effect on the broader community from the establishment of the AN Plant is an area that needs to be addressed by the broader community.

The restrictions on housing within Moranbah are a result of numerous pressures, including the location of the town itself, which is surrounded by and covers significant coal resources. This limits the available land for any housing to be established and with the recent economic boom further pressures are being encountered i.e.: the influx of construction and operational workforces for different projects.

In this constrained environment it is unlikely that the provision of additional housing within Moranbah will have any impact on the housing prices currently experienced. Dyno Nobel cannot be held responsible for the current housing environment within the town of Moranbah and the provision of additional housing for people not related to the project or moving into Moranbah is not an economically viable option for the development of this project.

BSC7: - Construction Camp: A construction camp is proposed to be located on adjacent site to the project construction site. The EIS position is supported by Council and represents a more defined and logical needs based approach to meeting accommodation demand other than the stimulation of further works camp outcomes within the residential township of Moranbah that go beyond the life of the project.

This response has been noted. Dyno Nobel aims to be part of the community within Moranbah as the facility will be a significant part of the town for the operational life of the AN Plant.

BSC 9: - The EIS does not clearly detail the maximum production capacity of the plant and the future growth and expansion of the facility to this level. The EIS should clearly detail the maximum capacity of the plant and the potential production capacities and how these volumes will affect waste discharges and all the impacts associated with the operation. It is clearly unacceptable to have an EIS not providing this vital information as the compounding of production growth impacts will be far reaching and need to be quantifiably described to allow a fair assessment of the project and the defined site for the development. It would be grossly deficient to have a plant installed and production capacity increase over time compounding impacts on the locality and community.

The operational size of the plant is as specified in the EIS. There is no further proposed expansion of the AN Plant and its operation. As provided in the Executive Summary of the EIS the proposed AN Plant will provide a capacity of 260,000 T per year of AN Prill (solid) and approximately 90,000 T per year of AN Emulsion (nominal 350,000 T per year).

4. Additional Information Relating to Air Quality Impacts

4.1 ENERTRADE Pty Ltd

E3: - The air quality assessment has not addressed emissions of some pollutants, even though these emissions are likely to occur (CO and ammonia).

With regards to potential emissions of CO, these are anticipated to be of sufficiently low magnitude, when compared to the corresponding Environmental Protection (Air) Policy 1997 (EPP(Air)), Air Quality goal, so as to preclude them from assessment through dispersion modelling.

Potential emissions to air of ammonia were taken into consideration in the Air Quality Assessment Report (Air Report), albeit implicitly, through the consideration of emissions to air of ammonium nitrate particulates (see Section 2.2.2 of the Air Report). It is also noteworthy that there exist no air quality goals for ammonia, in either the EPP(Air) nor the NEPM, and that no emissions of ammonia (except in the form of ammonium nitrate particulates) are expected to occur from the proposed facility.

E4: - Air dispersion modelling not prepared for upset conditions.

With regards to the issue of worst-case and upset conditions, this has been addressed by Sections 2.2.2 and 7.2.4 of the Air Report. The Air Report addressed these conditions on a qualitative basis via a comparison with safety factors. As stated in Section 7.2.4 of the Air Report:

> *"…for worst case atmospheric conditions, and inclusive of the maximum estimated background concentration from an area that will have poorer air quality than Moranbah, emissions of NO_2 from the project may be increased by 20% before the 4-hour average EPP(Air) air quality goal for biological integrity is exceeded. The magnitude of this safety factor is greater for all other relevant EPP(Air) air quality goals. See Table 7."*

This statement applies to the maximum predicted impact at the site boundary. At the nearest sensitive receptor (the temporary miners' accommodation (adjacent to the Blair Athol Rail Line)) the safety factor is closer to 250%. This safety factor provides a very conservative assessment in relation to the impacts associated with the air emissions form the AN Plant.

Dyno Nobel have also indicated to GHD that for the proposed facility:

> "Emissions will not be higher at start-up and shutdown than during operation."

Neither the EPP (Air) nor NEPM air quality goals are appropriate for the assessment of rare and irregular upset conditions (as indicated by the inclusion of long-term averaging times in the listed air quality goals).

It should be noted that the commissioning phase for the project will have a limited impact. The only facility in the immediate vicinity is the construction camp to the west. The workforce located at the construction camp for this period will be the commissioning personnel (approximately 50) for the project (not the construction workforce).

E5: - Unable to assess air quality impacts on the Enertrade Pty Ltd (Enertrade) site.

The Enertrade site was within the domain covered by dispersion modelling undertaken as part of the air assessment provided within the EIS. Whilst the air quality impact upon the Enertrade site was not specifically discussed in the text of the report, the site was encompassed by the modelling study.

It should be noted that the Air Report demonstrates compliance with all relevant EPP(Air) and NEPM air quality goals for all locations (inclusive of Enertrade's site) outside the boundary of the proposed facility. In addition, it states that potential health impacts from PM10 and NO2 will be insignificant to sensitive receptors.

E6: - There is no predicted deposition rate of AN at the Enertrade Compressor station.

Section 2.2.2 of the Air Report states: "Prill Tower particulate emissions will consist of crystalline Ammonium Nitrate. A scrubbing system will be fitted to the Prill Tower, which, for all practical purposes, will abate the emission to air of particles above 10 micrometres in diameter." It is these particulate emissions that were modelled in order to assess the deposition of nitrogen associated with the proposed AN plant (note that particulate emissions from the electricity generators are not expected to contain Nitrogen).

Figure 17 of the Air Report shows the predicted annual Nitrogen deposition contours and was based on the fact that Ammonium Nitrate is 35% Nitrogen. Given that Figure 17 shows that the deposited Nitrogen at the Enertrade site should be significantly less than 0.05 g/m^2/year, the deposition of Ammonium Nitrate particulates should therefore be significantly less than 0.15 g/m^2/year.

E7: - Assumption of NO2 conversion that only 30% of NOx is converted to NO2. It is good modelling practice to assume that 100% is converted from NOx to NO2.

The assumption of NO_2/NO_X conversion ratio of 30% is conservative. A precedent has been set for the application of this assumption to air quality assessments in Queensland by Katestone Environmental, who adopted the same assumption for the air quality impact assessments of the Queensland Nitrates Moura Ammonium Nitrate Plant. Further to this, there are sound justifications for the adoption of this assumption:

- Equilibrium NO2/NOX ratios in the atmosphere, of greater than 30% generally require elevated background levels of hydrocarbons in the atmosphere, such as would be associated with bushfires or a high-density urban and industrial area. Such conditions are not representative of ambient air quality at Moranbah.
- Even if background hydrocarbon concentrations were to become elevated (which is unlikely), the time required for the photochemical conversion of NO to NO2 would allow for sufficient plume dispersion in order for ground level concentrations to remain well within the EPP(Air) and NEPM air quality goals.
- Stack measurements at a similar Ammonium Nitrate Plant have shown the NO2/NOX ratio to be between 5% and 10% at the point of release.
- Correspondence with manufacturers of similar engines to those proposed for the on-site power plant have indicated that a 30% NO2/NOX ratio at point of release is conservative.

E8: - Needs to quantify corrosive potential of AN particulates on the Enertrade site.

Cahoon (2002) conducted anodic polarisation studies on mild steel in urea ammonium nitrate (UAN) fertilizer solutions comprising 31 wt% urea ([NH2]2CO), 39 wt% ammonium nitrate (NH4NO3), and 30

wt% H2O, with a total N content of 28 wt% (UAN 28-0-0). This study found that mild steel can exhibit corrosion in this solution at 23°C with corrosion rates of ~2 mm/y for pH values in the range of 3 to 8.5 (rainwater pH falls within this range).

The concentration of ammonium nitrate for this study is millions of times more concentrated than the concentration of Ammonium Nitrate that will be deposited based on the deposition rate as calculated within this study. Corrosion rates caused from the quantity of particulates deposited on the site would therefore have an insignificant effect on any structures at the site.

9E: - Deposition and contamination of drinking water supplies of water collected in tanks on the Enertrade site.

The potential contamination of drinking water from the operation of the Ammonium Nitrate plant is considered to be very low. Based on average annual rainfall data and an estimated catchment area for the water (roofed area) the levels of nitrates expected falls far below the "Australian Drinking Water Guidelines 2004" trigger in relation to health risk which specifies 50 mg/l and 100 mg/l for children over 3 months of age and adults. The Australian Drinking Water Guidelines 2004 specifies:

> *Nitrate: Based on health considerations, the guideline value of 50 mg-NO_3/L (as nitrate) has been set to protect bottle-fed infants under 3 months of age. Up to 100 mg-NO_3/L can be safely consumed by adults and children over 3 months of age.*
>
> *Where a water supply has between 50 and 100 mg-NO_3/L nitrate, active measures are required to ensure that those caring for infants are aware of the need to use alternative water sources in making up bottle feeds for babies under 3 months of age.*

The guidelines also note "In major Australian reticulated supplies nitrate concentrations range up to 18 mg-NO_3/L, with typical concentrations usually less than 0.15 mg-NO3/L". The concentrations of nitrates contributed to the Enertrade facility based on deposition of particulates will be well within what is ordinarily expected in a reticulated drinking water supply and will not represent a health risk to the workforce at the facility. To provide for a conservative assessment of the nitrates deposited the conservative figure provided in the Air Report (0.15g/m^2/year) was adopted.

Annual contamination

Roofed area: 40 m^2 by 10 m^2 = 400 square metres

Deposition rate: 0.15g/m^2/year

Volume of material: 60g/ year total volume on roofed area.

Average annual rainfall: 603 mm per year.

0.603 metres * 400 square metres=241.4 m^3 (or 241400 litres)

60g /241400 litres= 0.000284g/litre or 0.28 mg/litre

Monthly basis contamination (low rainfall)

Using the average rainfall for Moranbah for the average driest month of September of 8 mm and applying the same calculation for a one-month period.

Deposition is: 0.0125g/m^2/month.

Volume for 400 square metres: 5g/month.

Volume of water (8 mm rainfall (0.008 metres)) 3.2 metres of water or 3,200 litres.

5 g /3,200 litres= 0.00156g/litre or 1.56 milligrams/litre.

8 mm of rainfall for whole year

No rainfall all year except for low rainfall in one month over the twelve-month period.

Volume of material: 60g/ year total volume on roofed area.

Volume of water (8 mm rainfall (0.008 metres)) 3.2 metres of water or 3,200 litres.

60g/3,200 litres= 0.01875g/litre or 18.75 mg/litre.

On the basis of this assessment the water collected in the rainwater tanks at the Enertrade Compressor station will be well within the concentrations specified in the Australian Drinking Water Guidelines.

4.2 The Environmental Protection Agency

EP2: - The report is checked and figure numbering in the text is corrected.

This has been noted.

EP3: - NOx rates for the AN Vent and reformer stack are not included.

Table 2 of the Air Report contains NO_2 emission rates for the AN vent and Reformer Furnace. These NO_2 emission rates were derived from the NOx emission rates displayed in Appendix A through the application of the methodology described in Section 2.2.2 of the Air Report. Note that Appendix A in the Air Report displays two different NOx emission rates for each source. In each instance, the higher of the two emission rates was used.

EP4: - Provide an explanation for the estimated PM10 emission rates in Table 2.

The PM_{10} emission rates for the Prill Tower were provided to GHD by DN after consultation with the technology provided (See Appendix A of the Air Report). Note that the conservative assumption was made that 100% of particulate emissions from the Prill Tower would be PM_{10} (given that a scrubbing system is to be fitted).

EP5: - Provide an explanation on how the NO2 emission rate for the NA vent in Table 2 was calculated.

The NA Vent and Reformer Furnace NO_X emission rates, provided to GHD by DN, were expressed as an *absolute* mass emission rate of NO_X. The power generator NOx emission rates, on the other hand, were provided to GHD by Caterpillar and were expressed as NO_X (as NO_2) (See Appendix A of the Air Report).

This difference in units necessitated different approaches to the application of the 30% NO_2/NO_X assumption (as described in Section 2.2.2). In order to determine the NO_2 emission rates for the NA Vent and Reformer Furnace, GHD simply multiplied the provided NO_X emission rates by 3/10. The resulting emission rates (0.834 g/s for the NA Vent, and 0.934 g/s for the Reformer Furnace) were applied to the dispersion model (See Appendix B of the Air Report).

Please note that the NO_2 emission rates for the NA Vent and Reformer furnace included in Table 2 of the main report were *incorrect* and were a carry-over from early versions of the report. These incorrect emission rates *were not used* in the modelling. The correct emission rates can be seen in the model output contained in Appendix B of the Air Report.

EP6: - Recommended the EPP (Air) is quoted without qualifying it which allows 9 exceedances per year.

This has been noted however this will not impact on the outcomes of the modelling undertaken for the EIS.

EP7: - (section 6.4.1) It is recommended that the report is amended to include Figure 10. (not included in original report).

This is noted and a copy of the site layout is included in the main report (see figure 9) that provides details of the proposed clearing on site. A copy of the updated layout has been provided in Appendix B which includes minor changes to the site layout.

EP8 Air Quality: - (Section 7.2.3) needs to provide an outline of the modelling methodology for the project.

With the exception of a number of model settings, the modelling methodology adopted for the deposition study was identical to that adopted for the remainder of the air quality assessment. The model settings that were unique to the deposition run were:

- Dry Deposition (Ausplume 5+)
- Dry Depletion
- 100% PM_{10} size (all 10µm in diameter)
- Density: 1.73 g/cm^3 (http://en.wikipedia.org/wiki/Ammonium_Nitrate)

EP9 Air Quality: - (Section 7.2.3) incorrectly abbreviates 'gm' to g.

Comment noted.

EP10 Air Quality: - (Section 7.2.8) In table 7 the first row 49.3+45=89.3. The table also includes the 9 exceedances per year.

Noted, a mistake was made in the report. The error in the report does not however change the conclusions. The first row of the table should read 49.3 µg/m^3 + 45 µg/m^3 = 94.3 µg/m^3 this value is still well under the air quality goal of 320 µg/m^3 as provided under the EPP (Air).

4.3 The Department of Health

H2 Air Quality: - There appears to be discrepancy in the air quality report. In Section 7.1 of Appendix 7.8 the report indicates that the 24 hour average offsite PM10 level during construction is expected to be a maximum of 75 µg/m3 above the estimated background of 45.3 µg/m3, however the contours on Figure 11 indicate that the 24 hour average offsite PM10 level will be a maximum of 50 µg/m3 above background. The former value could result in the ambient 24-hour average offsite PM10 level being approximately 120 µg/m3 which exceeds the National Environment Protection Measures health based standard of 50 µg/m3. Clarification is requested on why the information differs and if there will be any impacts on sensitive receptors.

The NEPM Airshed goals are designed for the assessment of existing ambient air quality via monitoring and are not directly applicable to the assessment of predicted air quality impacts from an individual industrial emitter (as stated in Section 3 of the Air Report). Therefore they (the NEPM Airshed goals) apply to ambient air not specifically to hot spots.

A more appropriate measure for short-term impacts is the application of the EPP (Air) air quality goal of 150 ug/m^3, which the worst-case impacts from the construction period have been assessed against. It should also be noted that a very high background level has been adopted for the modelling and applied across the whole of the period of construction not a variable background level that will fluctuate up to this level. Additionally the modelling does not take into account any management on site or any mitigation measures and assumes all of the equipment is in operation (mitigation measures are discussed in Section 5 of the EIS).

Section 7.1 of the Air Report states that:

> *"Further to the demonstrated compliance with EPP (Air) goals, it is noteworthy that the modelling of construction impacts is highly conservative and that there are no nearby sensitive receptors in the directions of maximum predicted off site impact (north and west of the site). The nearest sensitive receptors (temporary miner's accommodation) are shown to experience minimal impact from dust emissions during the construction phase. In addition, emissions from bulldozing and grading constitute 65% of the total inventory. Screening level emission factors have been applied to these activities. The application of emissions control measures described in Section 2.3.1 will substantially abate these dust emissions and so reduce localised impact just beyond the site boundary.*
>
> *Table 6 summarises the assessment of AUSPLUME predictions against the EPP (Air) air quality goals. Note that the short-term and transient nature of the construction phase renders comparison against NEPM (Air) goals inapplicable."*

With regards to the apparent discrepancy between the text in Section 7.1 and the contours in Figure 11. The text refers to the maximum predicted off-site 24-hour average PM_{10} concentration as being less than 75 µg/m^3 (during construction). However, the highest contour line shown by Figure 11 to extend outside the site boundary is for 50 µg/m^3. This seems to have caused some confusion. It should, therefore, be noted that the highest predicted impact occurs at site boundary (between the 50 µg/m^3 and 75 µg/m^3 contour lines), the maximum offsite impact is, therefore, between 50 µg/m^3 and 75 µg/m^3. For the sake of simplicity, the text states that the maximum offsite concentration is below 75 µg/m^3. A more exact figure could have been determined through additional modelling, however, since compliance was already demonstrated, there would have been little point to the exercise.

4.4 Belyando Shire Council

BSC12: - Cumulative effects of emissions and local atmospheric conditions: The EIS does not detail any potential of the Plant emissions (Nitrogen Oxide and Nitrogen Dioxide) reacting with local atmospheric compounds including dust which may produce a precipitate, cumulative impacts or photochemical wastes. There are significant amounts of Nitrogen compounds being discharged from the facility and the EIS needs to background the chemical reactions anticipated from the site wastes.

GHD has undertaken an assessment against the Air Quality Goals contained within the EPP (Air). The determination of these goals by Environmental Protection Agency took into consideration the likely atmospheric chemical reactions (including photochemistry) and the potential for cumulative impacts. By demonstrating compliance with these goals, the Air Report has indirectly addressed this issue.

BSC13: - The EIS provides information on the discharges of Nitrogen oxide and Nitrogen dioxide from the plant, however provides no details on cumulative effects of the safe exposure levels for the materials and the concentrations anticipated at ground level inside the site and at the boundary. With Nitrogen Oxide being a relatively reactive compound additional detail needs to be spelt out on the concentrations and exposure levels anticipated.

EPP (Air) and NEPM air quality goals are not applicable to locations inside the site boundary of a proposed facility. For such locations, Worksafe Standards Australia has produced Exposure Standards for Atmospheric Contaminants in the Occupational Environment (1995).

These standards are generally one or two orders of magnitude less stringent than the EPP (Air) and NEPM air quality goals. Whilst occupational exposure to airborne contaminants is an occupational health and safety issue, rather than an environmental issue, the dispersion modelling performed for the Air Report indicates that ground level pollutant concentrations on-site should be compliant with the relevant Worksafe standards (note that concentrations within building envelopes cannot be determined through the modelling used for the Air Report and are, therefore, excluded from the previous statement).

For workplace exposure the Toxicity Limit Value (TLV) is 3 ppm for continued workplace exposure with no adverse effect to Nitrogen Dioxide.

BSC14:- A full detailed description of the Ausplume modelling for the project needs to be provided for referencing. The EIS needs to clearly detail all the modelling data to allow a full disclosure of the inherent risks to plant workers and the community.

The Air Report contains all information used in the dispersion modelling that may be expressed in a practical manner (with the exception of information used for the modelling of particulate deposition, which has now been provided in the response to query EP8, above). Please see Sections 2.2.2, 3, 5 and 6, and Appendix B of the Air Report. Any modelling information not included in the report can be provided upon request (i.e. the meteorological data file, all model outputs, model configuration files, etc.).

4.5 Local resident

R1 A: - There was insufficient detail on baseline data of level of existing pollutants. Therefore the predicted air quality levels by modelling would be inaccurate.

As explained in Section 4.3 of GHD's Air Quality Assessment (August 2006):

> *"There are currently no known records of air quality for the Moranbah area. However, in order to produce a conservative estimate of existing air quality, data from areas that are more urbanised and industrially intensive than Moranbah have been used.*
>
> *The 2005 EPA Queensland annual summary of ambient air quality monitoring contains ambient air quality data recorded at a number of Queensland locations. NO_2 data from three different locations in urban Brisbane were utilised, whereas, PM_{10} data were taken from a monitoring station located in West Mackay. For both NO_2 and PM_{10}, the maximum documented values are conservatively assumed to be representative of typical conditions at Moranbah."*

In other words, we acknowledge that there is a lack of available background air quality data for Moranbah. However, we have accommodated for this by adopting background concentration estimates that are likely to be *significantly higher* than would be expected to occur in or around Moranbah. By opting to do this, we have ensured that GHD's air quality assessment represents a worst-case scenario in terms of background concentrations.

In terms of how the adoption of these estimates is likely to influence model accuracy, background estimates were not incorporated directly into the modelling. Instead, fixed peak background levels were taken into consideration *in addition* to the predicted results. Modelling accuracy is, therefore, independent of the background estimates.

Because the background estimates are higher than would be expected to occur in Moranbah, when the model output is added to the background estimates, the resulting ground level concentrations are also higher than would be expected. This is a cautious approach to an air assessment and represents a worst-case scenario.

R1 B: - The EIS did not adequately address the potential human health risk of the air pollution created by the proposed project appropriately.

The chemicals/constituents predicted to be emitted from the proposed AN plant, that are considered significant, are PM_{10} and NO_X. These are within a subset of chemicals that the World Health Organisation (WHO) refers to as "Classical Pollutants" i.e. pollutants that are present everywhere in the airshed due to industry and motor vehicle use. Airborne particulates may also arise from bush fires. The guideline values nominated in the Queensland EPP (Air) are protective of human health, and take into consideration the known practicality of reducing background concentrations from industrial locations. Health risk estimates are generally not quantified for these chemicals, but rather compared directly to the Air Quality Goals in Schedule 1 for the EPP (Air).

Chemicals known as "toxicants" are chemicals that are not in the Classical Pollutants list and have known toxicological effects (e.g. carcinogenic and non-carcinogenic). These chemicals are assessed by quantifying exposure and risk. There are to be no significant emissions of toxicant chemicals from the plant, therefore, this quantification process has not been conducted.

In summary, human health risk issues for "Classical Pollutants" can be adequately addressed through the comparison of predicted ground level concentrations against relevant EPP (Air) Air Quality Goals (which are largely human health risk based). This comparison was undertaken by GHD, as documented in Section 7.3 of GHD's Air Report, and showed that all predicted ground level concentrations, inclusive of background, were within the relevant air quality goals.

R1 C: - The EIS did not address worst case and upset conditions and did not incorporate all factors in air quality monitoring, therefore not demonstration it achieves all EPP (Air), NEPM 1997 and National Guidelines for Control of Emissions from Stationary Sources 1985 air quality standards.

As noted in Section 3 of GHD's Air Report, the NHMRC National Guidelines for Control of Emissions from Stationary Sources (1985) were rescinded by the NHMRC in February 2000 and are, therefore, no longer applicable to the assessment of new stationary sources. A comparison against the NHMRC guidelines was, however, conducted and is described in Section 8 of the air quality assessment. The proposed facility was found to be compliant.

With regards to the issue of worst-case and upset conditions, this has been addressed by Sections 2.2.2 and 7.2.4 of the Air Quality Assessment. As explained in these sections, the Air Quality Assessment addressed these conditions on a qualitative basis via a comparison with safety factors. As stated in Section 7.2.4 of the report:

> *"…for worst case atmospheric conditions, and inclusive of the maximum estimated background concentration from an area that will have poorer air quality than Moranbah, emissions of NO_2 from the project may be increased by 20% before the 4-hour average EPP(Air) air quality goal for biological integrity is exceeded. The magnitude of this safety factor is greater for all other relevant EPP(Air) air quality goals. See Table 7."*

Note that this statement applies to the maximum predicted impact at the site boundary. At the nearest sensitive receptor (the temporary miners accommodation) the safety factor is closer to 250%.

Further to this, DN have indicated to GHD that for the AN plant:

> *"Emissions will not be higher at start-up and shutdown than during operation."*

The risk associated with plant breakdown and malfunction has addressed as part of the Hazard and Risk Report contained within the EIS. This document forms part of the EIS for the proposed facility.

Further, neither the EPP(Air) nor NEPM air quality goals are appropriate for assessment against rare and irregular upset conditions (as indicated by the inclusion of long-term averaging times in the listed air quality goals), and the rescinded NHMRC guidelines state in Paragraph 11 of the Introduction that they are applicable to normal operating conditions.

It has, therefore, been demonstrated that compliance with all relevant EPP(Air), NEPM (and NHMRC) criteria has been achieved.

R1 D: There did not appear to be any information on any continuous air quality monitoring if plant is approved eg when the plant is operational.

Please refer to Section 8 of the Air Quality Assessment:

"GHD recommends that emissions to air from the project discharge points be tested in accordance with the Queensland EPA Air Quality Sampling manual (2005). Emission tests should be conducted upon commissioning and thereafter at a frequency denoted in the terms and conditions within the development approval documentation (this may be in the order of every twelve months). All emission testing and sample analysis should be conducted by National Association of Testing Authorities (NATA) accredited laboratories and consultants. Comparison of recorded emissions shall be made against the in-stack concentrations listed in Table 8 below. These concentrations were based on information provided by DN and Caterpillar (See Appendix A of the Air Report)."

Note that the NO_2/NO_x ratio estimate for the proposed power generation units (0.3) was determined through correspondence with manufacturers of similar engines to those proposed. Note that the *specific* requirements of ongoing emissions monitoring are to be determined by the Environmental Protection Agency as part of the development approval and licensing process for the proposed facility

.

5. Additional Information Relating to Hazard and Risk

5.1 Belyando Shire Council

BSC1: - The EIS provides some comment on the possibility of chemical and gas discharges; however the EIS does not clearly annunciate the strategies proposed to maintain the safety and well being of the residents of Moranbah and inform the community of events which pose a danger to health and safety. The EIS does not propose a method of informing the community as a whole and this is clearly an opportunity missed. It would be most beneficial if the proponent would commit to a regular forum of communication with the community to allow the fostering of mutual understanding and cooperation in the community.

Major Hazard Facilities are regulated under the *Dangerous Goods Safety Management Act 2001*. This legislation requires the fulfilling of a number of key obligations one of which requires community consultation. This process provides for communication between the community and DN in relation to the Major Hazard Facility and provides a process by which DN can provide information and accept feedback from the community.

Dyno Nobel will fulfil its obligations under the *Dangerous Goods Safety Management Act 2001* and implement a consultation process with the key stakeholders including the Council and the local community.

BSC8: - Emergency response: A detailed response to the issue of impacts on emergency services is missing from the EIS and needs to be addressed as the potential for a combination of emergency responses needs to be quantified and a response formulated. The EIS does not acknowledge the incomplete service provision to Moranbah of Police and the Fire and Rescue services. A clear needs analysis of the proposal should be included in the EIS and the implications worked through at a local level to ensure that the service provision to Moranbah is not compromised or reduced from the current standard.

As part of the EIS one on one interviews were undertaken with key community stakeholders. These stakeholders are listed in Appendix C of the Social Impact Assessment Report (SIA) and included:

- The Officer in Charge for the Queensland Police;
- Dr Joanne Shultz (local doctor); and
- Dr Graham Rowles (local doctor).

Emergency Response

Dyno Nobel will during both construction and operation of the AN Plant, actively work with emergency service providers to ensure a quick and appropriate response to an emergency if one were to occur and will as part of the Consultation for the Major Hazard facility work with emergency services in the development of their Safety Management System.

Based on the consultations undertaken with the community stakeholders (including those listed above) the impacts on emergency services from the construction of the AN Plant will be limited (Refer to section 7.2.18 of the Appendix 7.4 SIA).

Health Care

Section 7.2.10 of the SIA discusses the potential impacts on health care in Moranbah. Based on consultations with two doctors from Moranbah the impact from the proposed construction will be limited. This is based on the demographics of the construction workforce, i.e. healthy people in the 15-54 year old age cohort, which would only be receiving medical services for work place injuries, acute sickness and required work place medical checks (including mine associated medicals).

The SIA undertaken identified that should the operational workforce for the project chose to bring their dependent families into Moranbah there will be a need to;

> *"attract another doctor because of the change in medical services required. Both doctors explained that the medical service provision needed to be viewed in a regional context; there is a shortage of doctors in the region so Moranbah will be in competition not only for other regional towns but also major coastal centers for doctors".*

This is an issue for the broader regional community within Central Queensland and the associated difficulty with attracting doctors to regional communities. The growth of projects in and around Moranbah and the expansion of the mining operations in the area will also generate an impact for Moranbah. Dyno Nobel will be part of the community and will work with the community to find a solution to service the increased demand for health services.

Fire and Rescue services

The fire services in Moranbah are provided via an auxiliary fire station, which is only manned during training nights and during an incident. The facility is run by auxiliary fire fighters numbering approximately 18 fire fighting staff (depending on shifts) who receive 2 hours training per week. The auxiliary fire station relies on a workforce being available to mobilise in the event of a fire. The auxiliary fire station in Moranbah has some HAZMAT fire fighting capability.

Due to the operation of the facility and the requirements under the *Dangerous Goods Management Act 2001* DN has in place a number of significant fire fighting capabilities for the AN Plant including:

- There will be three fire pumps, i.e. two electric (one operating, one standby), and a diesel driven pump with fuel supply.
- A fire ring main around the plant.
- Fire hydrants every hundred meters.
- Fire monitors around the ammonia tank.
- A deluge system in the ammonia plant area.
- A firewater reservoir, which holds 2 mega litres of water and is fed from the main water supply for the plant. This system provides for approximately 4 hours of fire fighting.

Dyno Nobel will also provide fire-fighting training for its staff and work with the fire services to ensure that this capability meets the needs for the project. On approval of the facility and as part of the process of becoming a Major Hazard Facility DN will liase with medical services, local government and emergency services to fulfil its obligations to the community.

Police Services

Dyno Nobel will during both construction and operation of the AN Plant, actively work with the available Police Services in Moranbah to ensure common understanding and management approach to potential emergency situations. To do this, the Police Services will be a key stakeholder in the development of the Safety Management System for the facility. During the consultation process for the project, the Officer in Charge at the Moranbah Police Station was consulted. Crime statistics for the years 2000 to 2003 were also assessed. The provision of police services was not highlighted as an issue by the stakeholders consulted (Section 5.3 of the Appendix 7.4 SIA). Based on the consultations undertaken with the community stakeholders (including those listed above) the impacts on police services (as a subset of emergency services) from the construction of the AN Plant will be negligible (Refer to section 7.2.18 of the Appendix 7.4 SIA).

BSC16 :- Site Security: The EIS document does not provide any clear links to maintaining a secure boundary to the plant on the property / allotment boundary. It is acknowledged that the need for vegetation management will see grazing of the site as a preferred option. However the security of the plant will be compromised by the close proximity of the security fence at the rear of the site. A closer management regime needs to be put in place to guarantee safety and deliver an uncompromised outcome for both functions on the site.

The operation of the AN Plant at Moranbah will comply with the guidelines for the storage and transportation of Security Sensitive Ammonium Nitrate (SSAN) in addition to the other requirements for the management of this type of Ammonium Nitrate.

5.2 ENERTRADE Pty Ltd

1E: - EIS does not recognise the Enertrade Compressor Station or the High Pressure gas pipeline that encumbers the site of the AN Plant.

The impacts of ground shock from an explosion are discussed within the amended Hazard and Risk Report (see Section 5.4). The analytical model used in the assessment looked at the peak particle velocity (mm/s) from a worst-case explosion of AN Prill on site to the Enertrade natural gas pipeline. The calculated peak particle velocity at the pipeline modelled for this event was 17 mm/s.

2E: - There is no consideration for the effect on the integrity of this pipeline during the operation of the site. Or on the Enertrade compressor facility.

GHD has been liasing with Enertrade Pty Ltd and Sunwater in relation to the design required to protect the pipeline infrastructure from damage from road traffic in the accesses to the AN Plant and the Accommodation Camp. The design of the road access over the site protects the pipeline infrastructure from damage. The operation of the facility outside of the use of heavy vehicles does not generate any significant vibration that would impact on the surrounding infrastructure including the Enertrade natural gas pipeline.

5.3 Emergency Management Queensland (CHEM Services)

EM1: - The impact on the adjacent mine workings from an explosion event at the facility should be explored. This study should consider the potential for collapse of underground workings from ground vibration. Additionally, potential impacts from the mining operations including extraction caving practices on the AN plant, particularly as the mine develops toward the AN plant site, should be identified and considered in the design of the plant.

The impacts of ground shock from an explosion are discussed within the amended Hazard and Risk Report (see Section 5.4). Modelling was undertaken of surface vibration from a worst case on site explosion to a distance of 1230 metres. This assessment modelled surface vibration out to the proposed Goonyella Middle (GM) seam underground mine workings. Surface vibration at this distance equated to 4mm/s.

EM2: - Measures to reduce the potential for knock-on events (through both missile impact and overpressure) between Ammonium Nitrate (including Ammonium Nitrate Emulsion) explosion events and the Ammonia storage tank, should be considered and implemented where practicable.

Containerised storage has been developed for the project as initially discussed with the Explosives Inspectorate. The site now has four containerised storage stockpiles the largest of which holds 3,000 tonnes of AN Prill. The AN Emulsion tanks have been increased to three 140 tonne tanks which are in a mounded storage area.

Based on the new operation of the plant the blast over pressures where remodelled This now means that the 21 kpa overpressure contour is completely contained on site for a 3,000 tonne AN Prill explosion (worst case).

> HIPAP states that "framless, self-framing steel panel buildings demolished" at the 21kPa overpressure (10% fatality envelope).

At this pressure the whole plant including the ammonia tank, could be impaired. The worst-case event onsite is then the ammonia tank rupturing as a result of this explosion and since the public can only be impact once, this is the potential knock effect impact zone.

The ammonia storage tank has been updated to hold 5,000 tonnes of ammonia gas in a refrigerated double walled storage tank to minimise potential leaks and ruptures. Summaries of the ammonia tank release frequencies are provided in Table 40 and 41 of the report. Consequence analysis is discussed in Appendix C and the offsite Location Specific Individual Risk is discussed in Section 7 of the report.

EM3: - Measures to protect the control room and administration building, where the majority of site personnel will be located, from overpressure effects should be implemented to ensure the risk is as low as reasonably practicable.

In regards to site protection of control room and administration buildings, Dyno Nobel will use Best Practices as at the date of design and as a minimum the same as is applied at Moura QNP operation. The control room building and administration building have not yet been designed.

EM4: - CHEM Services support the Explosives Inspectorate's view on the siting of the construction camp. CHEM Services recommend that the construction camp is located outside of the 1x10^-6 per year LSIR contour.

The construction camp will be sited outside of contour. An updated layout of the construction camp is attached in Appendix B. The construction camp is now located approximately 400 metres from the boundary to the AN Plant site.

EM5: - Consideration should be given to locating administration staff and other non-operational staff off-site. The risk to non-operational staff from the hazards the plant presents may be effectively eliminated by locating them off-site. A number of Major Hazard Facilities in Queensland are planning to, or are currently relocating non-operational staff to offices off-site.

Dyno Nobel does not intend to have offices in Moranbah. Main office functions are normally done in Sydney with minimal site personnel.

EM6: - The ERPG values as published in The American Industrial Hygiene Association (AIHA), Emergency Response Planning Guideline values and Workplace Environmental Exposure Level Guides Handbook, Fairfax , VA , 2005 for ammonia are; ERPG-1: 25 ppm, ERPG-2: 150 ppm and ERPG-3: 750ppm. These levels should be adopted in place of the values documented in the Hazard and Risk Assessment report.

ERPG values for Ammonia have been updated in the report to reflect the 2005 data.

5.4 Department of Mines and Energy (Explosives Inspectorate)

DME1: - Siting of the plant. Issues of communication (explosive) between ammonium nitrate and ammonium nitrate emulsions for both storage and manufacture (in all those combinations between products and activities) was discussed and needs to be understood. This applies to donors and receptors from the initiating event. I believe that the influence of ANE as donor was discussed/highlighted with respect to AN as the receptor during the meeting of 27 October 2006 for the knock on effects.

Knock on impacts of communication between AN Prill, AN Emulsion and the ammonia tank where considered within the report. Section 5.2 of the report looks at the knock on effects from an explosion on site which is further discussed in Appendix C in the Consequence Analysis.

The storage of AN emulsion is now provided within a mounded storage to mitigate the impacts from an explosion from the emulsion tanks (see Section 3.5.2).

DME3: - Security Threat. Security Sensitive Ammonium Nitrate (SSAN) has been declared an explosive and regulated under national guidelines for SSAN. The terrorist threat (i.e. other than industrial accident) should also be included in the scenarios for the risk analysis. This will include consequence and impact based upon the scenarios and also the frequency which should be influenced by the control measures in place. As explained at the meeting, this scenario is now a credible scenario and should be put into the risk analysis and assessment of risk.

Security Vulnerability Analysis was included in the study (see Section 6.3.2) and the relevant frequencies were updated in the model. The storage and handling of SSAN will be undertaken in relation to the licensing requirements for the facility and within the relevant guidelines as provided by COAG.

DME4: - PRA and SRA. The issue of conducting the SRA at the concluding phase of the project was discussed during the meeting. It is essential to get the issues of separation distances for items of plant resolved as soon as possible rather than identifying the issues when it difficult to resolve the matter

This was a general comment made during the meeting. The PRA has been updated to address the separation distances to minimise knock on effects from the AN emulsion and the AN Prill.

DME5: - Technical Information for ammonium nitrate. In order to effectively set the separation distances and storage quantities, more information on industrial (explosive) grade ammonium nitrate was needed for the hazard and risk assessment It was noted that agricultural grade AN rather than industrial (explosive) grade AN has been quoted and referenced and used in the basis and discussion in the report. The behaviour of the agricultural (higher density) can be different and this needed to be understood in the findings and conclusions of the report. The likely differences and impacts need to be understood. We understand that Ian Smith undertook at the meeting on 27 October 2006 to approach TNO with respect to these matters. I understood that these findings would be added to the report

AN Prill shipping container sizes and storage area sizes have been agreed with DME and the report has been updated to reflect these changes. The containerised storages are two 2,000 tonne storages and two 3,000 tonne storages (see Section 3 of the report). The differences between agricultural grade and industrial grade where included within the report (see Section 3.5.1).

DME6 - Off site Critical Infrastructure. Have the impacts of an explosion on other critical infrastructure, both on site and off site, been evaluated. Off site impacts I am referring to include the proposed power stations and other adjacent proposed developments.

Offsite impact to other industries as per HIPAP Land use Planning criteria (50-in-a-million) has been calculated not to leave the site. Sensitive works (Protected works Class A & B and vulnerable facilities) are considered in the report (see Table 16).

The assessment in relation to adjacent facilities has also been considered in relation to the proposed Anglo Coal underground mine, the Enertrade compressor facility and associated natural gas pipeline infrastructure. Other offsite impacts have also been considered with regards to the potential impacts from the development of the AN Plant and an explosion or other event occurring on site.

DME7: - Construction Camp. While the construction camp may fall outside the 1 x 10-6 risk contour, this risk contour is not believed to be reflecting the risk during commissioning of the plant but rather for a fully operational plant. It appears that the siting may not be optimal from a risk perspective and needs to be reviewed to see if there is acceptable risk during commissioning to fully understand the exposure to risk during commissioning which is a higher risk activity. To this end, a construction safety study as per one of the HIPAPs from the NSW Department of Urban Affairs and Planning would be useful for the project particularly in the commissioning phase.

The commissioning of the AN Plant will be undertaken after the completion of the construction. The staff involved in the commissioning will be the only staff at the construction camp during commissioning of the project. This has not been assessed as part of the PRA.

DME8: - Transport. Transport of ammonium nitrate and ammonium nitrate emulsions through built up/ populated areas of Moranbah. If it did occur, whether route selection of alternative routes of lower risk had been addressed.

There are only currently two routes into and out of Moranbah. The worst-case scenario in relation to an explosion of AN Prill in a containerised storage would be 20 tonnes (1 container of AN Prill exploding).

Modelling indicates that in the unlikely event of an explosion impacts during transport of a 20 ton AN Prill container, if exploded at 32% NEQ would reach a distance of 118m at 21kPa (10% fatality).

DME9 - Storage. During the meeting of 27 October 2006, Mr Ian Smith undertook to consider alternative storage arrangements. These alternative storage requirements for ammonium nitrate could include storage in shipping containers in lieu of the two 6000 tonne bulk stores.

AN Prill shipping container sizes and storage area sizes have been discussed with DME and the Hazard and Risk Report has been updated to reflect these changes (See Appendix F).

NOTES:

DME Point 1 - There has been a lack of consistency of recognition of the role and application of the Explosives Act 1999 for ammonium nitrate and ammonium nitrate emulsions within the EIS and hazard and risk assessment. For example, on page 4 of the hazard and risk assessment, prilled ammonium nitrate is quoted as being under the Queensland Workplace Health and Safety Act 1995.

DME Point 2 - Chemical Spill Management Guidelines in Section 4.12 of the EIS. Dyno Nobel already has processes in place for these issues eg ammonium nitrate and ammonium nitrate emulsions, yet reference is made to developing these from the MSDS. The problem is that there is no information in the MSDS to effectively develop emergency response and spill clean up plans.

DME Point 3 - There is conflict between the information in the MSDS and that quoted in the EIS and HARA. Eg melting point of ammonium nitrate

DME Point 4 - Hazards identified in the body of the EIS and hazard and risk assessment are not consistent with those in the MSDS.

DME Point 5 - The report states that "the sensitivity of ammonium nitrate to detonation is largely dependent on three variables present namely high temperature, confinement and contamination. Without any of these three being present, ammonium nitrate requires a strong initiation charge (an example being high explosives) to detonate.". This is inaccurate and overly simplistic. The 3 variables are not essential for ammonium nitrate to detonate.

5.5 Robert Hutchison

RH1. The assessment makes no distinction between Fertilizer Grade AN (FGAN) and Technical Grade AN (TGAN). The plant will produce TGAN, which is more sensitive to explosion than is FGAN. TGAN has a lower density, which makes it more susceptible to explosion. This is a necessary property of AN that is designed to be used as an explosive precursor but is not a requirement of FGAN. The main implication of the report not making the distinction is that the report applies FGAN explosion history and FGAN recommended methodologies to a plant making the more sensitive TGAN.

AN consequence analysis has shown that for entire storage quantities at conservative NEQ of 32% have negligible offsite impact, therefore sensitivity of FGAN to TGAN does not come into the assessment. The issue of FGAN / TGAN sensitivity is something more appropriate to be explored in the risk process for the detailed design, than in a land us planning preliminary risk assessment.

RH2. The assessment is not clear on what were the modelled explosion scenarios. The assessment identifies the storage scenarios as being based on 2 x 6000 tonne stockpiles. It is not clear whether these stockpiles are of bulk prill or of FIBC (bulka bags). The report identifies

various involvement fractions (10% of stockpile, 100% of stockpile) and TNT equivalence factors (32%, 55%) but is not explicit what is being modelled. This lack of clarity makes a review more difficult to undertake but can be easily overcome through the regulator asking questions of the applicant.

The storage arrangement for the site has been substantially amended since the original analysis. The term “base case” has been used to further clarify the explosions modeled.

The revised arrangement for AN Prill Storage will include 2 x 2,000 tonne and 2 x 3,000 tonne designated storage areas, in which the AN will be stored in 20 tonne shipping containers. Though there is minimal potential for the entire storage area to explode (due the physical protection and separation of shipping containers), For the purpose of the land-use planning preliminary risk assessment, a highly conservative scenario was used to calculate the greatest explosion consequence distance. This states that the base case for AN prill explosions will incorporate the entire storage areas (i.e. 3000 tonne is the worst-case scenario). As stated in the previous report revision, an NEQ of 32% was used to model these consequences.

RH3. The report considers the potential for the entire stockpile to be contaminated and rightly states that this is an extremely unlikely scenario. However, the following more likely scenario is not identified or assessed. The scenario is developed from the Cherokee accident, which is discussed in the report. A vehicle accident near the stockpile (say involving a front end loader) could cause a small portion of the stockpile (say 2 tonnes) to be contaminated by fuel from the vehicle. If the accident also causes a fire, as occurred during the Cherokee accident, it is credible that the contaminated small portion of the stockpile could explode. This also happened at Cherokee. However, the report does not identify the scenario where the explosion of 2 tonnes of contaminated ammonium nitrate could propagate to involve the rest of the stockpile. Recent work by Kersten, et al. [RJA Kersten, EIV van den Hengel and AC van der Steen 2006, Safety testing of ammonium nitrate products, International fertiliser society, Proceedings 580, 6 April, 2006, London.] has shown that uncontaminated, non-confined and non-heated AN can be exploded by a large nearby booster charge. I suggest that the explosion of 2 tonnes of contaminated ammonium nitrate would be a sufficiently large booster charge to cause explosion of the main stockpile. In the Cherokee accident, the main stockpile did not explode but to use this fact to suggest that it could not happen in a similar accident is not accurate without detailed justification.

Revised storage inside shipping containers is unlikely to cause a knock effect to neighbouring shipping containers. A conservative view was taken and the worst-case credible event was calculated as the entire storage area being exposed to detonation (3,000 tonnes). In the case of shipping containers, it is identified that a fire related to the forklift or crane maybe the initiating event. Further frequency analysis was not undertaken for the shipping containers, as the conservative worst-case scenario offsite impacts were negligible.

RH4. The report states that “The UK HSE specifies 25% efficiency and 55% TNT equivalency (NEQ 13.75%) for the determination of an overall TNT equivalence however these are primarily based on small scale stockpiling facilities with potentially less robust quality control mechanisms to prevent contamination.” (p25). The reference was not given in the reference list,

so I could not check exactly where the information came from. However, I suspect that it came from HSE 2002, Explosions in warehouses, Extract from HSE document SRAG – Chemical Warehouses Version 6, 26 June 2002, which states:

"The consensus of opinion on ammonium nitrate hazards is that, in the event of a large fire at an fertiliser store, a pool of liquid ammonium nitrate will be formed at the side of the stack that is nearest to the fire. If this pool is struck by a high speed missile (e.g. something falling or part of a drum that has exploded) then a local explosion will occur sending a shock wave into the main fertiliser stack that has not melted. If this stack contains just less than 300 tonnes it will not support a detonation but will deflagrate and, in doing so, will release an amount of energy equivalent to 41 tonnes of TNT. This figure is calculated on the basis of a TNT equivalence of AN of 55% and an efficiency of 25%."

The quotation given above suggests that a stockpile containing greater than 300 tonnes may support a detonation, which may cause the efficiency of the reaction to be greater than 25%. This implication of the HSE is not reflected in the risk assessment report. In addition, there are no reasons given for the 25% efficiency figure.

Furthermore, other HSE documents suggest other equivalence values. The 2002 HID Safety Report Assessment Guide – Chemical Warehouses Criteria recommended the TNT equivalence of ammonium nitrate to be 14% but gave no other details. The 1990 Port Risks in Great Britain from Marine Transport of Dangerous Goods in Bulk: A Risk Assessment, for The UK Health and Safety Executive, advised that for bulk piles above 2 m high, 80% would contribute to the explosion.

The report gives undue authority to the values given in a single UK HSE document. In addition, the quotation suggests that a large scale stockpile would have a lower explosion potential due to the more robust mechanisms to prevent contamination. This incorrectly suggests that contamination of the stockpile is a dominant factor affecting the efficiency of explosion.

UK HSE data was used as a comparative tool. The lack of definitive agreed data to support NEQ values means that information available is to be used in an indicative way. These values were not used as the overall NEQ and were purely used as a sensitivity, therefore not impacting the overall H&RA integrity, in which a highly conservative 32% NEQ was used, which complied with LUSP criteria.

RH5. The report uses an overpressure correlation that produces lesser effect distances for an explosion. I suggest that this correlation is not conservative but is optimistic. Other correlations give significantly greater effect distances.

Bulson (1997) model is a contemporary explosion model relevant to explosions associated with solid material, white it is acknowledged that there are other TNT equivalency models that give higher results (Kingery and Bulmash (1984) model or other), the Bulson Model is a newer study. It should also be noted that the level of conservatism in the model (including 32% NEQ and worst case scenario of an entire storage area exploding) is very conservative and overall, the study takes a conservative approach.

RH6. The report does not consider recent publications by Kersten et al, TNO and the French government, which are less optimistic than earlier publications and reports. As these recent publications report on significant changes in thinking on the potential for explosion of ammonium nitrate, it is important that they be considered.

While this would be appropriate to consider for the design risk assessment process, for a land use planning exercise, the current approach provides sufficient information for a robust decision-making study.

RH7. The estimation of the number of fragments produced by an explosion is stated to be conservatively assumed to be three (p.41). This number of fragments is consistent with the number of fragments produced by typical BLEVE incidents but not from explosions involving ammonium nitrate. The Port Neal explosions produced 569 identified pieces of shrapnel of various sizes. The Texas City explosions of the ships High Flyer and Grand Camp produced a large number of pieces of shrapnel and a number of these were large and travelled great distances. It is not accurate to use a shrapnel model developed for BLEVEs for ammonium nitrate explosions.

This number is considered as the number of fragments, which would be sufficiently large enough to cause a rupture of a double skinned ammonia tank.

Once again limited technical data for the shrapnel produced from AN Prill explosion has meant that comparable historical data was required for this analysis.

RH8. The report states "A worst-case scenario for the AN facilities has been identified as the detonation of 10% of an entire 6,000 tonne stockpile." (p 87) This is not correct as in point 3 above a credible scenario is developed that could result in the detonation of virtually the entire stockpile.

This typo has been amended.

5.6 Orica

OR1 - "Ammonia Storage & Handling Operation - Contradictory Assumptions: There are a number of contradictory assumptions relating to ammonia storage, within the Hazard and Risk Assessment (H&RA) and the main EIS document. In Section 4, Table 7, of the H&RA it states that there will be storage of anhydrous ammonia of up to 1,300 te. In Section 6, Table 6.1, the maximum inventory of the ammonia storage tank also appears to be 1,300 te. In Section 3.3.1 of the EIS it is described as a 2,000 te refrigerated tank. In Section 3.4.1, Table 12 (Chemical Storage) of the EIS it is also twice stated in the same table that it is a 2,000 te storage, but there is also "1 tank 60% concentrate". In Section 6.3 (p41) it states that the ammonia storage tank has a diameter of 50m. However, based on an assumed volumetric size of 2,000 cubic metres, this would mean that it is approx 1 metre in height. It is essential for valid modelling to use the correct inventories, otherwise the consequence distances of toxic releases involving the full inventory will almost certainly be understated."

Dyno Nobel has recently changed the ammonia tank storage size and operating conditions. The double skinned tank will now hold up to 5,000 tonnes of ammonia at –33C and atmospheric pressure. The dimensions of the tank are 22m diameter and 25.2m height – the missile calculations and consequence modelling have been updated to reflect this change. Section 5.3 details that "The probability of a 5-metre

section of I-beam steel impact following an explosion is therefore calculated to be in the order of less than 3%, based on the maximum estimated exposed surface area vulnerable to missile impact."

OR2 - "Off-site Injury & Irritation: There are contradictory assumptions concerning the toxicity criteria associated with ammonia which could have a significant effect on the toxic gas dispersion distances from the site for specified reference concentrations. The published 2006 AIHA values are 150 ppm for ERPG- 2 and 750 ppm for ERPG-3. The ERPG-3 probit basis for ammonia basis is variously described in the H&RA as being 750ppm (the current value) and 1000ppm (an out-of-date value). In Table 21, Appendix C (p82) the ERPG-3 value is correctly stated as 750ppm (and is attributed to the TNO Purple Book CPR 18E Guidelines, 1999). In Table 22, Appendix C (p83) the ERPG values that are used in the risk assessment are documented, and attributed to the American Industrial Hygiene Association. The ERPG-2 and ERPG-3 are quoted as the obsolete values of 200 ppm and 1,000 ppm respectively. These superseded ERPG-2 and ERPG-3 values are also referenced in the footnotes to Table 14 in Section 6.1 (p 33). All the toxic gas dispersion calculations for ammonia conducted for the ammonia release scenarios summarized in Appendix A (Hazard Register) are therefore based on the outdated values of both the ERPG-2 and the ERPG-3. Table 18 (Appendix A) (p58) indicates that the toxic consequences of a rupture of the product accumulator (based on ERPG-3 of 1,000 ppm) extend up to 840m. For the ammonia tank leak or rupture scenario (p59), ERPG-3 concentrations of 1,000 ppm reach "distances up to 4 km". Toxic gas leaks from the ammonia evaporator and connecting pipework are also described as being based on 1,000 ppm ERPG-3 "concentrations. ERPG-2 values based on the incorrect value of 200 ppm are calculated as extending as far as 40 km for a 300 mm liquid leak from the ammonia tank. The risk assessment avoids the quantitative use of modelling and hence the determination of risk contours for injury and irritation, based on the fact that the ERPG-3 value (using the incorrect concentration of 1,000ppm) does not reach the local township. If the correct value of 750ppm was used, the township could be affected at the ERPG-3 value. All the quoted distances would be greater using the correct ERPG-3 and ERPG-2 values. Hence, any conclusions drawn from the quoted maximum effect distances for the various release cases may therefore be incorrect and, contrary to the finding made in the H&RA, there may in fact be a need to determine the injury and irritation risk contours."

GHD recognises that the 2005 data should be used in preference. ERPG 2 and 3 have been updated to the current values as per 2005 data. GHD recognises the implications of this change and have updated the relevant sections that are affected. The consequences distance increase to a certain degree, though all land use planning criteria is still met for the site, and therefore the findings and conclusions of the PRA are unchanged.

OR3 - Choice Of ERPG Criteria for Injury & Irritation: The risk assessment states that it uses the NSW HIPAP 4 as the basis for assessing toxic Injury and Irritation risk. The H&RA selects the ERPG-3 value to designate Injury, and the ERPG-2 value to designate Irritation. However, at a Public Inquiry in Sydney in 2002, the then Department of Planning had objected to the use of the ERPG-3/ERPG-2 combination of values. Orica was obligated to change to ERPG-2 for Injury and ERPG-1 for Irritation. If ERPG-2 and ERPG-1 (25ppm) values were to be used instead of ERPG-3 and ERPG-2 respectively, then the offsite injury and irritation risks are likely to extend significant distances from the site. The selection of these values makes a large difference to the area which

is potentially affected. However, it is suggested that this choice is not adequately justified in the H&RA, given the public concerns raised by the NSW Department of Planning in 2002. Choosing ERPG-1 and ERPG-2 would also drive the design further towards toxic event risk reduction. At present there is little evidence in the H&RA of any efforts made to reduce the toxic risks.

The Queensland Regulations (Hazardous Industry Planning for Safety) states that:

"Within Australia, the New South Wales Department of Urban Affairs and Planning, has defined risk criteria for land use safety planning. These criteria have been based on internationally accepted criteria and on the level of risk that people are exposed to on a daily basis from normal, everyday activities. Queensland has adopted these criteria, as recommended by the Australia and New Zealand Hazardous Industry Planning Taskforce." As such, the ERPG-2 and ERPG-3 values were used in the assessment as per HIPAP requirements.

Ongoing discussions with DME have not challenged this criterion, therefore these values will be used to discuss the injury and irritation risk to the community.

This report does not include a review of the detailed design of the plant. Its purpose is to determine the suitability of the location of the plant from a Land Use planning perspective. Risk reduction measures should be considered during the detailed design of the plant and included into the final quantitative risk analysis.

OR4 - Ammonia Storage - Risk Minimisation: The offsite consequence distances for ammonia release scenarios are strongly influenced by the 1,300 te ammonia storage conditions of 8 bar & 4 degC (Table 14, p34). The inventory in the ammonia product accumulator (19.3 te) is at 4 degC and 793 kPa (refer Table 18, p 58). Using a fully refrigerated ammonia storage (at atmospheric pressure, liquefied ammonia is at a temperature of minus 33 degC), as is the case at Orica's Yarwun Plant, substantially lessens the offsite impact of toxic gases from a major process equipment failure leading to a rapid loss of containment. In the case of the fully refrigerated vessel the mechanism of toxic vapour generation (apart from an initial burst release) is essentially from ammonia evaporation from a liquefied pool which greatly reduces consequence distances compared to similar pressurised storage releases. An obvious risk reduction option not discussed in the H&RA is therefore to refrigerate the ammonia storage so that it is liquid at atmospheric pressure.

Dyno Nobel have recently revised the majority of the design and layout of the site, including the change from a 2,000 tonne pressurised ammonia tank, to a 5,000 tonne refrigerated tank (-33C and atm pressure), thus reducing the potential toxic impact of a leak from the tank. The 5,000 tonne ammonia tank has been modelled as double skinned and therefore is designed to minimise releases of ammonia from occurring.

OR5 - Transport of Ammonia: In Section 3.4.1 of the EIS it states that, in addition to the outputs during the commissioning phase, that there "may be up to 20,000 te of ammonia transported from Moranbah to Gladstone over a period of 6 months." Loading and unloading pressurised toxic liquids from vehicles needs to be done in a suitably designed system with adequate safeguards, such as driveaway protection. There is no discussion of any of the risks associated with these

operations in the H&RA. Nor are the risks associated with the transport of this ammonia addressed.

Discussions with Dyno Nobel have advised that 3 x 100 tonne tank deliveries will occur during the commissioning stages. The H&RA covers the risks associated with the site during operation and therefore the 3 x 100 tonne of ammonia will be considered and managed during the Dangerous Goods licensing – transportation compliance.

OR6 - "Contradictory Assumptions: The risk analysis presents a set of Assumptions (Appendix B) and describes the basis of the Consequence Analysis (Appendix C). Both of these sections imply that GHD intended to use an Explosives TNT Equivalence of 32% in combination with a Yield (Efficiency) of 10%, giving

an overall TNT ""coefficient"" of 3.2%. But having stated their approach, they do not apply it. Instead they use an overall 32% TNT coefficient. Having conflicting assumptions presented in the risk assessment results in confusion and potentially undermines the validity of the risk assessment methodology."

The Toulouse event was studied in order to develop a “real-life” scenario and have a general understanding of the impact of an AN explosion. This was referenced from Dechy, N & Mouilleau, Y; Damages of the Toulouse Disaster, 21st Sept 2001, Loss Prevention and Safety Promotion in the Process Industries, 11th International Symposium, which back calculates the efficiency of the AN explosion to be 10%.

For the purpose of this H&RA, based on LUSP criteria, GHD used the NEQ of 32% as stated in the COAG guidelines and referenced by the Queensland Guidance Note No. 4 for separation distances to explosive substances. This conservative value was used to determine the consequence distances from an explosion, and since the results produced show that the separation of the storage areas from the site boundary are sufficient, no further sensitivities or investigation into rationale behind use of other NEQs was required.

Prior to detailed design and commissioning, additional quantitative work maybe required, which is not warranted at this early stage of design.

OR7 - Difference Between Fertiliser & Technical Grade Sensitivity: In their risk assessment GHD don't consider high density Fertiliser grade ammonium nitrate (FGAN) could have a significantly lower TNT equivalence to low density, porous ammonium nitrate prill (TGAN). The risk assessment does not reference any of the latest technical assessment of detonations, conducted by TNO, which were published at several conferences during 2006 (IFS Conference in the UK; AFA Technical Symposium in Lithuania; and the ANNA Conference in Canada). Nor is there any reference to the French Governments post-Toulouse land use planning guidelines. All of these sources indicate that there are significant differences in equivalence between FGAN and TGAN. For fertiliser grade AN (FGAN), TNO states that an overall TNT equivalence of 10-20% "appears appropriate". For Technical Grade AN (TGAN) they recommend values in the range 20-25%. The French Govt (in 2002) applied 10% overall TNT equivalent for technical grade AN for land use planning purposes and an overall 3% TNT equivalent for fertilizer grade AN.

For the purpose of this H&RA, based on LUSP criteria, GHD used the NEQ of 32% as stated in the COAG guidelines and referenced by the Queensland Guidance Note No. 4 for separation distances to explosive substances. This conservative value was used to determine the consequence distances from an AN explosion, and since the results produced show that the separation of the storage areas from the site boundary are sufficient, no further sensitivities or investigation into rationale behind use of other NEQs was required.

Prior to detailed design and commissioning, additional quantitative work maybe required, which is not warranted at this early stage of design.

OR8 - "Claim of Conservative Risk Methodology:

They appear to have proceeded on the basis of 32% overall TNT equivalence as a "base case" (using the Ammonium Nitrate Guidance Note No. 4: Siting of New Facilities which specifies the use of a NEQ of 32% for prill with 100% yield). This approach is presented as being conservative. However, this conservatism is contradicted by the nonconservative assumptions made:

(a) how much inventory is involved;

(b) their explosion overpressure modelling;

(c) their consequence probit values.

These issues are addressed separately below."

See comments below…

OR9 - "AN Storage Mass: The EIS and the H&RA both contain various statements as to what they have used as the AN prill total bulk mass. In the Introduction of the H&RA (Section 1, p4) the ammonium nitrate storage is claimed to be up to 14,000 te of AN distributed between bulk prill stockpiles, prill Bulka Bags and emulsion tanks. Section 3.3.5 (Prill Storage) of the EIS states that the storage facility will contain 9,000 te of AN prill. It also states that a number of layout options were being investigated, including 2 x 6,000 te or 6 x 1500 te plus a small area for off-specification product. The distance to the 21 kPa overpressure is based on various AN quantity values, including 11,000 te, which is used in Table 18 of Appendix A (p66) and referred to as the "100%" quantity of the stockpile. Using a variety of storage values means it is difficult to determine whether the case selected for modelling does in fact represent the most conservative storage option possible. "

In recent weeks Dyno Nobel has changed the storage profile for the Moranbah site. The revised arrangement for AN Prill Storage will include 2 x 2,000 tonne and 2 x 3,000 tonne designated storage areas, which will store 20 tonne shipping containers. Though there is minimal potential for the entire storage area to explode (due the physical protection and separation of shipping containers), Dyno Nobel has decided to take the conservative approach, stating that the base case for AN prill explosions will incorporate the entire storage areas (i.e. 3000 tonne is the worst-case scenario) in order to determine if the site is appropriate under the LUSP criteria.

OR10 - Basis of Risk Assessment: The risk analysis for AN storage is based on an overall TNT equivalence of 32% (100% yield) for one (i.e. not both) of the representative 6,000te AN piles. As stated in (9), the total storage is a range of amounts between 9,000te and 14,000te. There is no clear reason given for the arbitrary selection of a single AN storage pile for the basis of the risk assessment. While there is some indication that a 6m earthen mound ("an option of a 6 metre wide earth-filled wall or the equivalent") may be used, no details of the degree of robustness of the separation can be provided at this stage. Hence there is no assurance that that the piles are truly independent piles and are not potentially subject to sympathetic detonations. If both piles were close enough to explode simultaneously, then the consequence distances quoted would be too low. The AN piles were to be separated only in accordance with AS 4326 (The Storage and Handling of Oxidising Agents). Evaluating the risk of the AN piles as two independent sources for the purposes of the likelihood analysis, or allowing the total mass of the AN storage to be included in the NEQ calculation, would have been more consistent with the conservative approach that the H&RA claims to have adopted.

The current separation between 2,000 tonne and 3,000 tonne stockpiles has adequate horizontal separation between (minimum of 25m as per layout drawing), as agreed to by DME (Geoff Downs) and supported by a recent confidential TNO report calculating required separations for similar AN facilities.

OR11 - Overpressure Modelling: In the risk assessment it is stated that they use an overpressure calculation algorithm, which "has proven to be a robust method of explosives consequence prediction", which was adopted by the US Army (p 90). In fact the equation used does not give conservative results compared to the highly regarded Kingery and Bulmash (US Army Ballistic Research Laboratory) correlation (refer F P Lees "Loss Prevention in the Process Industries, 2rd Edn, pp 17/130-134). There is also a good correspondence for the normally referenced explosion overpressure levels with the correlations provided in the draft IB53 document. The consequence distances are thus understated by at least 15% and in some cases up to 23% compared to the Kingery & Bulmash correlation. Section 6.2 Table 15: "Explosion Consequence and Likelihood" (Page 39) provides Distance to Overpressure Envelope in metres. Using these figures against the Kingery and Bulmash correlation gives:

		Distance to (m)				
Mass of AN	Overall TNT Coeff.	70kPa	35kPa	21kPa	14kPa	7kPa
6000 tonnes	32% (H&RA)	414	583	792	1,057	1,919
As above	32% (K&B)	478	703	973	1,295	2,216
	Difference (m)	64	120	181	238	297
	% Difference	15	21	23	23	15

"In Section 11, "Recommendations" of the H&RA (p 50) the largest explosive consequence due to 6,000te of prill is 21 kPa at 792m. The table above demonstrates the difference between the GHD calculated values and the Kingery and Bulmash correlation. It is evident that the GHD values understate the distance to the key explosion overpressure values by as much as 23%. If the real total of 12,000 tonnes of AN was used, then the distances would further increase to:

• 21 kPa (3% fatality in the open; 18% in a building) becomes 1,226 m.

• 14 kPa (1% fatality in the open; 8% in a building) becomes 1,630 m.

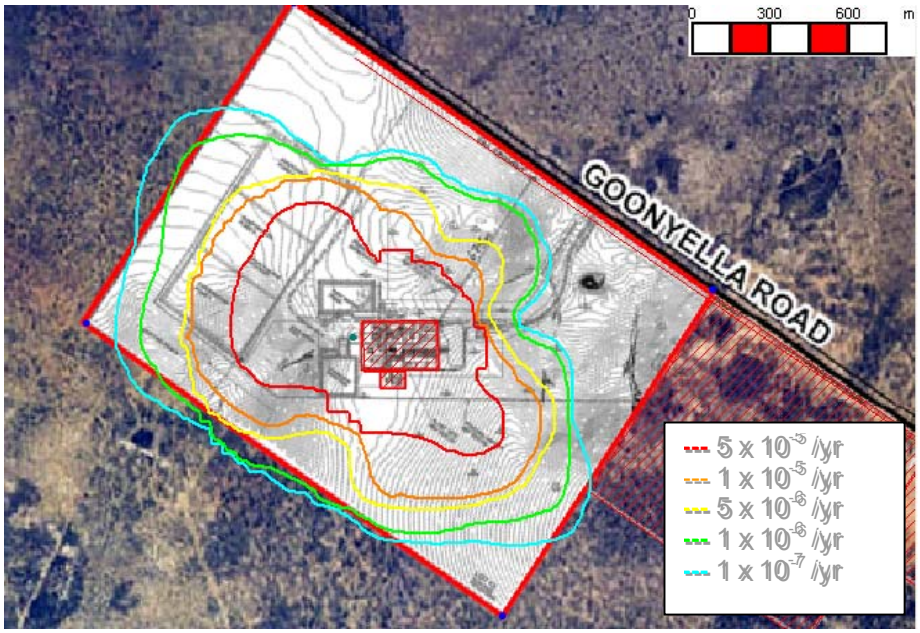
• 7 kPa (0.1% fatality in the open; 2% in a building) becomes 2,792 m. Note that in Appendix A, the Hazard Register, (Page 66), GHD refer to the ""100% stockpile"" which they state is 11,000 te; while the 25% stockpile is 2750 te. But the overpressure calculations in Appendix A are all based on 10% Efficiency (i.e. they are based on 10% of the quantity cited which conflicts with the approach used in the main section of the H&RA report)."

Bulson (1997) model is a contemporary explosion model relevant to explosions associated with solid material, while it is acknowledged that there are other TNT equivalency models that give higher results (Kingery and Bulmash (1984) model or other), the Bulson Model is a newer study. It should also be noted that the level of conservatism in the model (including 32% NEQ and worst case scenario of an entire storage area exploding) is very conservative and overall, the study takes a conservative approach.

OR12 - Fatality Probit Basis: The fatality limit for overpressure was set at 21kPa, which corresponds to 10% chance of fatality. In QRAs involving fatality analysis we would normally use the 1% fatality probit distance as a cut-off, and its use would undoubtedly result in larger risk contours. In fact there is a significant difference in the fatality probit that applies to "within buildings" compared with "in the open". However, GHD used 21kPa overpressure to screen out the lesser fatality events (ie on the assumption less than 21kPa at the boundary equalled "no offsite fatalities"). This is far too optimistic, particularly where off-site effects could be on people within buildings, and it could have an effect on the risk contours (which could currently be significantly underestimated).

Considering the 1% outdoor fatality rate at 14kPa – the distance of impact from the explosion (3,000 tonne at 32% NEQ) is 840m, compared to 21kPa (10% fatality), which reaches 630m. The site boundary is 640m away from the 3,000 tonne storage facility.

A typical industry frequency for an AN Prill explosion from a shipping container is in the order of 1×10^{-6}/yr, therefore the risk at 840m is 1×10^{-8}/yr and at 630m it is $1x\ 10^{-7}$/yr. This will have negligible impact on the risk contour below. Therefore, the current criteria for overpressure contours will be maintained.



OR13 - Quantities and Locations of AN Bag and Container Storages: It is difficult to get a clear picture from the EIS about whether the Moranbah AN plant will produce bagged AN along with their bulk AN prill (total of 285k te/yr). At several places in the document they refer to AN Bagged material (e.g. in Section 1, p4); but there is no description of a bagged store as such. Figure 12 of the EIS shows the site layout and it is apparent that there will also be storage of full containers and a 2,000 te container storage area. The risks associated with container storage inventory (and bagged storage if any) appear to not have been considered in the H&RA. If there is going to be bagged or containerized storage, then layout and gap separation distances between stacks and containers of AN are crucial to prevent sympathetic detonations. In any case, explosion in bag and container storages may have potential offsite effects and these have not been evaluated.

Dyno Nobel have ruled that no bagging AN operations will occur on the Moranbah site, therefore no further calculation required for H&RA.

OR14 - Knock-On Events: The focus of Section 6.3 is the probability of an AN storage event (6,000 te AN prill) impacting upon the ammonia storage tank (Missile Generation and Strike, p41). This appears to be the only knock-on scenario considered in detail. There is discussion of the potential effects of AN solutions on stored AN solid, but these are not the only knock-on scenarios which need to be considered. The AN emulsion scenarios are not included in the off-site effects, due to the 10% fatality cut-off (based on the fatality probability of a person in the open). But there is the possibility that AN emulsion storage explosions could generate 'knock-on' impacts on the AN storages or other plant areas on the site such as the ammonia tank AN emulsion has 70% overall TNT equivalence, so the equivalent TNT value is significant for the two 140 cubic metre storage vessels.

AN solution tanks could also explode and affect ammonia storages and/or detonate the Emulsion tanks. Details of the assumptions made in the missile generation study are said to be provided in Appendix 1, but this Appendix does not exist. We believe that they are referring to Appendix B (pp73-74), where the focus is on the number of projectiles and the distance likely to be covered by them (up to 600 m), based on the incident at Toulouse in 2001. This does not involve a consideration of projectiles emanating from the plant and impacting upon the AN storage. A recently published paper from the IFS (Shah, 2006) states that high velocity projectiles (such as those which may be produced in an explosion) can detonate stored AN. These scenarios have not been considered.

The AN Emulsion tanks (3 x 140 tonne) will be provided with a concrete wall on three sides of the tanks. Each tank will be separated by 6m (dirt filled), to prevent any potential knock-on effects. The concrete walls reach a height of 1m above the emulsion tanks. Any knock-on effect and potential missile impact have therefore been ruled out on this basis.

Knock-on effects from the AN explosion are considered for the entire site, though the worst-case scenario provides the largest consequence distance (this is the Ammonia tank rupture). This covers the largest consequence impact footprint and since the knock-on effect of one AN prill explosion to another has been ruled out due to separation distance, the escalation of an explosion event is not deemed credible.

6. Additional Information Relating to Noise and Vibration Impacts

6.1 Belyando Shire Council

BSC 2: The EIS does not provide a clear time line assessment of the noise impacts of the proposal for the expansion of the existing compressor station. The EIS should clearly specify the background noise levels prior to the development commencing on the site and examine the cumulative effects of subsequent expansions of the compressor station to the first baseline data. Without the rigorous assessment of the noise levels to the baseline data the noise levels are affected by bracket creep and will result in unsatisfactory environmental impacts in the locality. The EIS should be amended and have supplementary details to provide updated information on these outstanding points.

The noise and vibration impacts were based on the construction and operation of the AN Plant taking into account the existing background noise conditions. The EIS did not assess the impacts from the proposed expansion of the Enertrade Compressor facility. This was due to the fact that the operation of the compressor station is the responsibility of the proponent for that expansion. An assessment was however undertaken in relation to the current operation of the existing Enertrade Compressor Station.

Figure 1 provides the noise contours modelled from the operation of the compressor station back towards the AN Plant and towards Moranbah. This was undertaken as part of a siting assessment in relation to the proposed construction camp for the construction of the AN Plant. It should be noted that the AN Plant site has expanded further to the west from the position marked in Figure 1 however the modelling does provide a clear indication of the noise generated from the operation of the Enertrade compressor station.

The Qld *EPA Planning for Noise Control Guidelines* recommends a 52 dB(A) level for minimisation of impacts from noise impacts causing sleep disturbance. From the contours provided (the 52 dB(A) line is marked in red) the current noise levels from the compressor station impacts just past the Blair Athol railway line.

CadnaA noise prediction software considers topography, weather conditions, site sources and the location of proposed receiver areas to predict received noise levels from the operating Enertrade gas compressor site. The location of the noise sources within the Enertrade site was modeled with reference to site sketches taken during a field visit. The model also took into account a noise barrier located on the eastern side of the Enertrade site, which may potentially have an effect on reflectivity of noise. Specific details of the noise barrier were sourced from the David Moore & Associates noise report (January 2003) and from observations undertaken during the site visit.

The assessment undertaken as part of the EIS assessed the impact from the operation of the AN Plant and the proposed power generation facility (on site). The assessment undertaken demonstrates the noise levels expected at distances from the source (operation of the AN Plant).

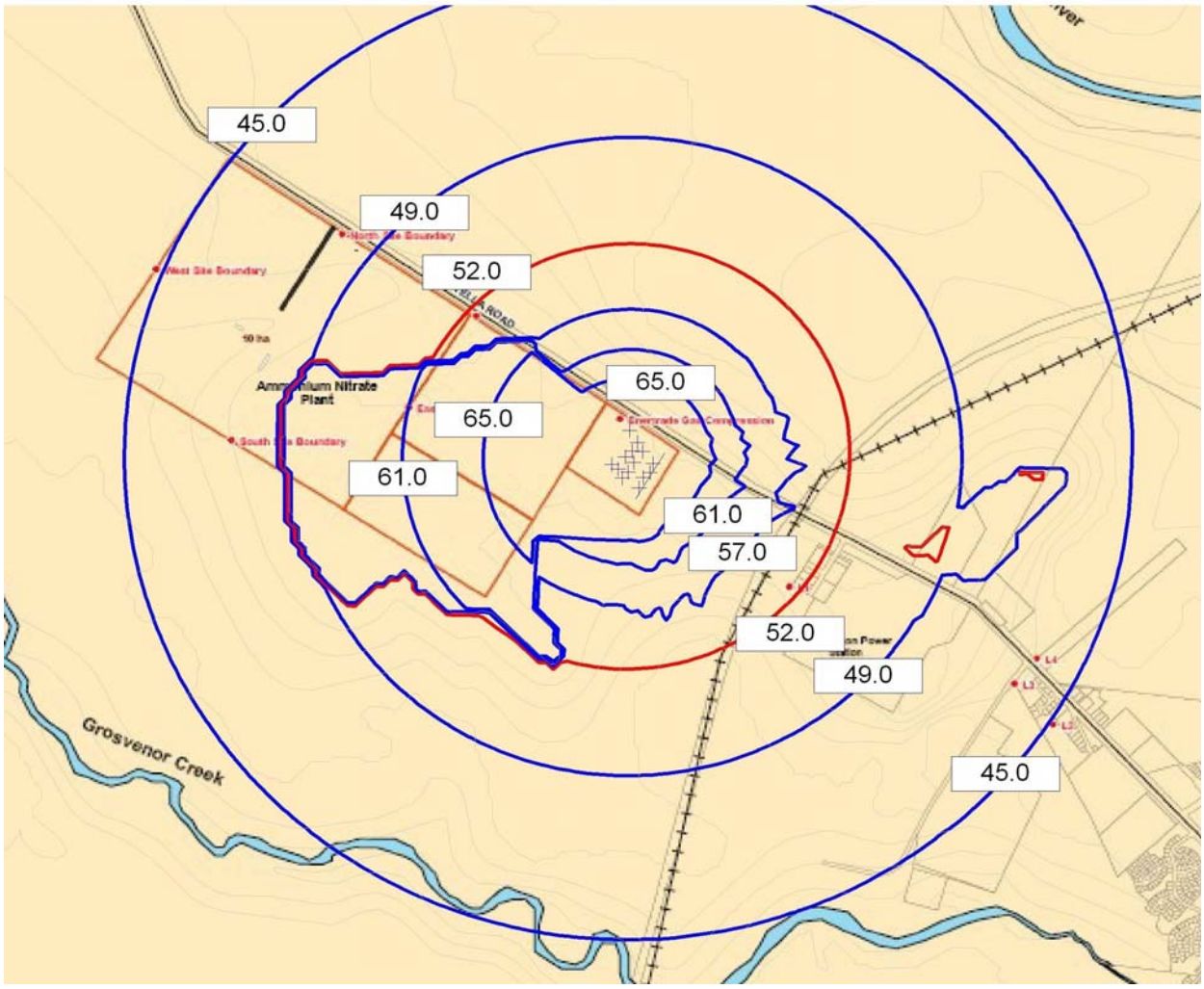


Figure 1 Noise Contours Enertrade Compressor Station (neutral weather conditions)

The modelled noise levels for the existing Enertrade Compressor Station and proposed AN Plant can be seen in Figure 1 and Figure 2 respectively.

When two sounds are added that are a very different level, say 42 dB (approximate modelled noise level the AN Plant will have at the Enertrade Compressor Station – refer Figure 2) and 65 dB (noise at the property boundary of the compressor station), the energy at 65 dB is so much more than at the 45 dB that the smaller sound becomes inaudible and insignificant (Scannell, 2006). As a general rule, if the difference between two sound pressure levels is more than 10dB, the contribution from the quietest source can be discarded (Bruel and Kjaer, 2001).

Based on the noise assessment undertaken by GHD, the noise impacts from the operation of the AN Plant will not contribute to bracket creep resulting in unsatisfactory noise impacts in the locality and the noise levels will not add to the noise levels generated from the operation of the compressor station.

It is the responsibility of the proponent of the compressor station expansion to undertake appropriate measures to assess and minimise the noise impacts from their operation.

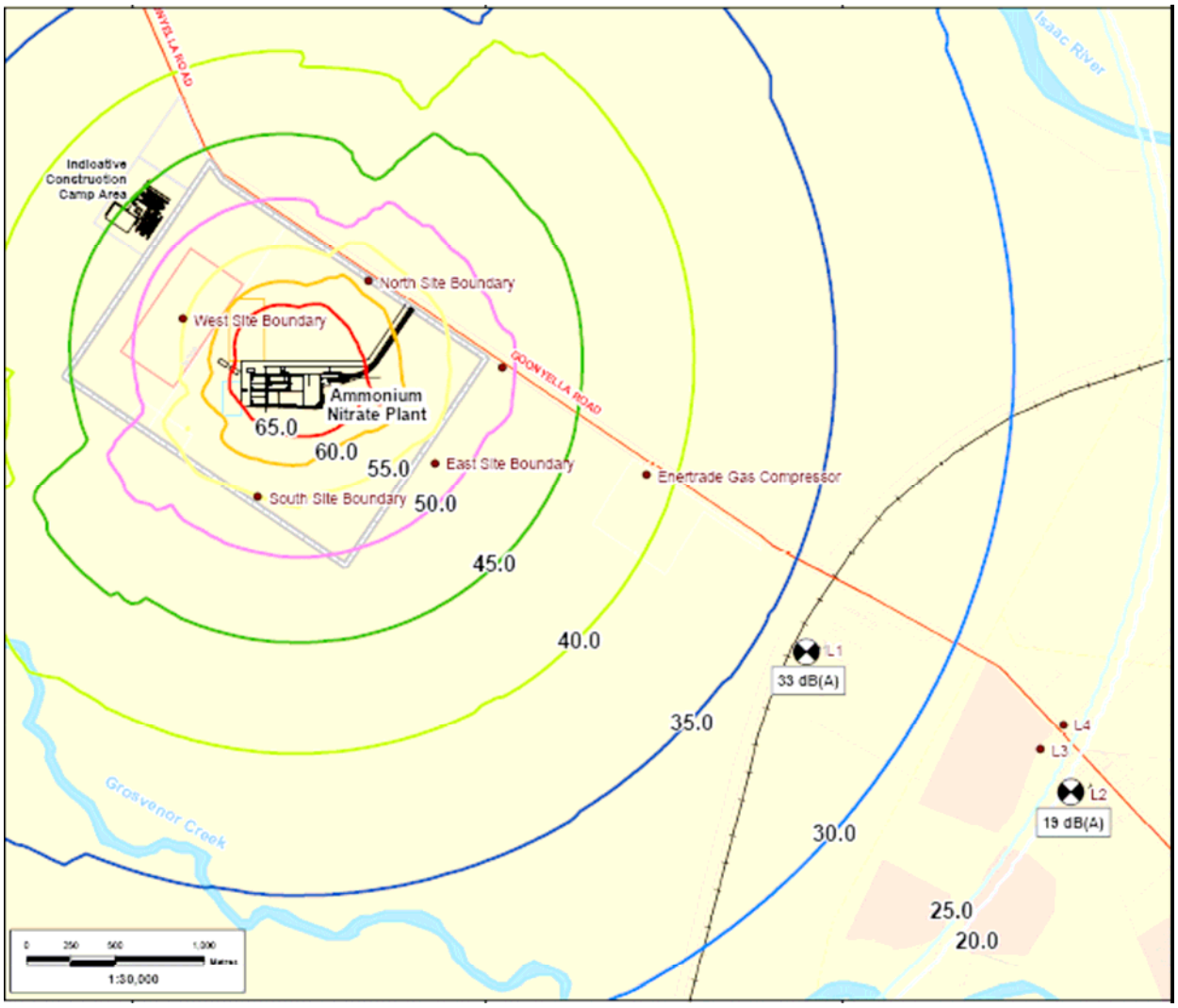


Figure 2 Noise Contours f-class inversion (2m/sec) (worst case noise conditions)

7. Additional Information Relating to Transport Infrastructure

7.1 Department of Main Roads

MR 1: - Transport: Moranbah Access Road intersection with Peak Downs Highway (section 4.11.2) Main Roads believes that the findings of the traffic analysis understate the impact of the project traffic on the Moranbah Access road.

The Traffic Impact Assessment undertaken did not look at the associated impacts that may occur from the development of a fertilizer facility in parallel with the operation of the AN Plant. The development of a fertiliser manufacturing facility on site although potentially viable has not been included in the EIS. If this does become a viable alternative for the project this will then be the subject of a separate submission for this aspect of the project.

DMR as part of its response in the correspondence dated 13 November 2006, recommends a specific intersection design for the upgrade of the Moranbah Access Road and the Peak Downs Highway Intersection.

This particular intersection currently has a number of major facilities utilising its operation. Additional expansions to coal mining operations in the area and the commencement of other projects will further increase the traffic volume through this intersection. Dyno Nobel as a new operation to the area is prepared to contribute to the upgrade of the intersection as part of the broader community encompassing the other operations, which utilise this intersection.

MR 2: - Pavement Impact Assessment (Appendix 7.6 of the EIS)

Part A Completion of the Road Impact Assessment (RIA) Report

As part of the approval process for the project DN will complete the Pavement Impact Assessment report on the nominated haul routes as specified within the EIS prior to commissioning the operation of the AN Plant.

Dyno Nobel will undertake the Pavement Impact Assessment in accordance with the DMR publication “Guidelines for Assessment of Road Impacts of Development Proposals”. Once this has been completed DN will pay contributions to the DMR for the use and management of the State-controlled road network.

Dyno Nobel will review the option to develop an Infrastructure Agreement with DMR to formalise the payments to DMR prior to commissioning of the AN Plant.

Part B & C Fifth Year Review & Variation of Project Operation

Dyno Nobel will work with the DMR to fulfil its obligations in relation to communication and review of pavement impacts on the haul routes in use at that time in accordance with the recommended conditions detailed within the DMR correspondence dated 13 November 2006.

MR 3: - Transport / Traffic Management Plan (Section 5.8 of the EIS):

The Road Use Management Plan (RUMP) as provided by the DMR (Emerald Office) Will be included as part of the contractual obligations between the successful transport contractor and DN for completion within 6 weeks of appointment of the transport contractor.