Solid Sodium Cyanide Plant Upgrade

Australian Gold Reagents Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1186
July 2005

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
06/10/04	**Level of Assessment set (following any appeals upheld)**	
11/04/05	**Proponent Document Released for Public Comment**	**27**
9/05/05	**Public Comment Period Closed**	**4**
23/06/05	**Final Proponent response to the issues raised**	**7**
25/07/05	**EPA report to the Minister for the Environment**	**5**

ISBN. 0 7307 6826 0
ISSN. 1030 - 0120
Assessment No. 1541

Summary and recommendations

Australian Gold Reagents Pty Ltd (AGR) proposes to expand the capacity of its solid sodium cyanide manufacturing plant from 25 000 tonnes per annum (tpa) to 45 000 tpa. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit. This proposal has been assessed as a revised proposal. Section 46B of the *Environmental Protection Act 1986* allows for the amendment of the implementation conditions of the original proposal through assessment. Recommended changes to Ministerial Statement 668 to apply to the revised proposal are described in Appendix 4 of this report.

The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986.*

Relevant environmental factors and principles

The EPA decided that the following environmental factors relevant to the proposal required detailed evaluation in the report:

(a) Atmospheric emissions of ammonia and cyanides;

(b) Noise; and

(c) Wastewater.

There were a number of other factors which were very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

(a) The principle of intergenerational equity;

(b) Principles relating to improved valuation, pricing and incentive mechanisms; and

(c) The principle of waste minimization.

Conclusion

The EPA has considered the proposal by Australian Gold Reagents Pty Ltd (AGR), to expand the capacity of its solid sodium cyanide manufacturing plant from 25 000 tpa to 45 000 tpa.

The EPA notes that the proposed expansion of the solid sodium cyanide plant is expected to lead to an increase in emissions of ammonia and cyanides. Air quality modelling indicates that both in isolation and cumulatively with other sources the

proposed upgrade is unlikely to cause the exceedence of relevant health guidelines for ammonia or cyanide at the community receptor locations of Wells Park, Medina and East Rockingham.

The EPA notes that noise from the AGR/CSBP site meets the lowest assigned noise levels required by the *Environmental Protection (Noise) Regulations 1997* at residential areas. AGR/CSBP is still considered to be a contributing source to noise at Medina as its emission is not at least 5 dB(A) below the assigned level. The AGR plant and proposed upgrade, in isolation, will not be a significant contributor to noise received at Medina. The EPA considers that the proposed expansion will have a negligible impact on existing noise levels at the nearest residences. The proponent has committed to comply with the assigned levels applying at industrial boundaries within three years or within 12 months if the Regulations are amended.

The EPA notes that the nitrogen load in the wastewater discharge is expected to increase from a maximum of 14 kg per day to a maximum of 19 kg per day. Wastewater is discharged to the CSBP wastewater system. The proponent maintains the commitment that CSBP's average daily nitrogen loads to Cockburn Sound will be no higher than in the 2001 licensing period. CSBP has committed to commence discharging its wastewater to the Sepia Depression via the Water Corporation's Sepia Depression Ocean Outfall Line by the end of 2005.

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the changes to commitments and the recommended changes to conditions set out in Appendix 4, and summarized in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

(a) That the Minister notes that the proposal being assessed is for the upgrade of the solid sodium cyanide plant capacity from 25 000 to 45 000 tonnes per annum;

(b) That the Minister considers the report on the relevant environmental factors and principles as set out in Section 3;

(c) That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended changes to conditions of Ministerial Statement 668 set out in Appendix 4, and summarised in Section 4, including changes to the proponent's commitments.

(d) That the Minister imposes the changes to conditions recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has proposed an additional condition that the EPA recommends be imposed if the proposal by Australian Gold Reagents Pty Ltd (AGR), to expand the

capacity of its solid sodium cyanide manufacturing plant from 25 000 tpa to 45 000 tpa is approved for implementation.

This condition is presented in Appendix 4. The condition provides that:

(a) Within six months following the formal authority issued to the decision making authorities under Section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Noise Management Plan and that the plan should include:

1 (a) noise reduction measures to be implemented during the following 12 months for the purpose of complying with the *Environmental Protection (Noise) Regulations 1997* by 30 December 2008; or,
(b) noise reduction measures to be implemented for the purpose of complying with the amended Noise Regulations within 12 months following their gazettal;
2 the acoustical model of the plant;
3 best practicable measures to minimise noise emissions;
4 operating procedures to be adopted for particular activities to minimise noise impacts;
5 the noise monitoring program;
6 the complaint management procedure; and
7 the procedure for the annual review and updating of the Noise Management Plan.

(b) The Noise Management Plan shall be implemented and made publicly available.

Contents

Tables

Figures

Appendices

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors and principles relevant to the proposal by Australian Gold Reagents Pty Ltd (AGR), to expand the capacity of its solid sodium cyanide manufacturing plant from 25 000 tonnes per annum (tpa) to 45 000 tpa.

AGR is a joint venture between CSBP Limited (CSBP) and Coogee Chemicals Limited. AGR manufactures solid and liquid sodium cyanide to service the gold mining industry. AGR has Ministerial approval to produce 70 000 tpa of liquid sodium cyanide and 25 000 tpa of solid sodium cyanide (as briquettes) under Ministerial Statement 668.

The proposal was referred to the EPA on 5 October 2004, and on 6 October 2004 the level was set at Public Environmental Review (PER) under Section 38 of the *Environmental Protection Act 1986*. The PER document was made available for a public review period of 4 weeks commencing on 11 April 2005 and closing on 9 May 2005.

The EPA's decision to assess the proposal at the level of PER was based on two main environmental factors, namely, atmospheric emissions and noise. Wastewater is considered to be another relevant environmental factor. The proposal has been assessed as a revised proposal and changes to the implementation conditions contained in Ministerial Statement 668 are recommended in Appendix 4.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors and principles relevant to the proposal. The changes of Conditions and Commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by the EPA, Section 6 presents the EPA's conclusions and Section 7, the EPA's Recommendations.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

AGR's sodium cyanide facility is located in the south-east corner of the CSBP Industrial Complex in the Kwinana Industrial Area as shown in Figures 1 and 2. AGR's operations include two liquid sodium cyanide plants and a downstream solid sodium cyanide processing plant. The liquid sodium cyanide plants have a combined production capacity of 70 000 tpa sodium cyanide (at 100% solution) and the solid sodium cyanide processing plant has the capacity to produce 25 000 tpa of solid sodium cyanide briquettes.

AGR proposes to expand the capacity of its solid sodium cyanide plant to 45 000 tpa by installing new plant and debottlenecking existing plant.

The key characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 4 of the PER (AGR, 2005).

Table 1: Key characteristics for the proposed solid sodium cyanide plant upgrade compared with existing plant

Characteristic	Existing Facility	Description of Upgraded Facility
Location	Kwinana Beach Road – Kwinana Kwinana Industrial Area.	No change.
CSBP Kwinana Industrial Complex area	138ha	No change.
Sodium cyanide plant area	4.3ha	No change.
Land use	Solid sodium cyanide plant	No change.
Project life	30 years	No change.
Plant operating hours	Continuous	No change.
Plant facilities	Two batch evaporators, vacuum pump incorporating a scrubber, condensate tank, slurry tank, centrifuge, spin flash dryer incorporating scrubber system, powder screw and compacting machine.	Minor upgrades or replacements of existing equipment.
Production	25,000 tpa nominal.	Debottleneck existing – 30,000 tpa nominal. Upgrade existing – 45,000 tpa nominal.
Process Description	• The solids plant receives a continuous feed of sodium cyanide solution produced at the liquid sodium cyanide plants which will be directed to one of two batch evaporation units. • Following concentration by evaporation, the sodium cyanide crystals are centrifuged, dried and compressed into briquettes. • The briquettes are then packaged and transported.	No change.
Inputs	Up to 21 tonnes per hour of 30% sodium cyanide solution.	Up to 33.5 tonnes per hour of 30% sodium cyanide solution.
Outputs	Up to 3.2 tonnes per hour of briquettes containing >97% sodium cyanide.	Up to 5.1 tonnes per hour of briquettes containing >97% sodium cyanide.
Storage	Area designed to store a maximum of 3 000 tonnes solid sodium cyanide. Solid sodium cyanide will be stored in IBCs packed into sea containers or a warehouse. Small quantities may be stored in ISO-tainers (equipped to allow injection of water to dissolve the sodium cyanide at the mine site).	Maximum storage increased to 7 140 tonnes.

Characteristic	Existing Facility	Description of Upgraded Facility
Gaseous Emissions		
Total Airflow	12 500 kg/h nominal	19 800 kg/h nominal
Ammonia	0.60 g/s (approx 50 kg/d)	Approx 1.2g/s to a maximum of 1.5 g/s (approx 100 kg/d)
Total cyanide (hydrogen cyanide and particulates)	0.3 g/s (approx 26kg/d)	Maximum 0.58 g/s (approx 50kg/d)
Carbon dioxide equivalent	9 100 tonnes nominal	16 400 tonnes nominal
Liquid Effluent Discharges	Approx 10 m^3/hour wastewater, containing up to 14kg/day of nitrogen (to CSBP effluent system).	Approx 16 m^3/hour wastewater, containing up to 19 kg/day of nitrogen (to CSBP Effluent system).
Noise	Noise emissions from the Sodium Cyanide Manufacturing Facility in isolation currently comply with the *Environmental Protection (Noise) Regulations 1997* or subsequent Ministerial approvals, except at the boundary of Coogee Chemicals. Noise levels at this boundary range from 61 to 65.5 dB(A), plus 5dB (A) for tonality. Revisions to the noise regulations are currently being considered.	Upgrade estimated to add additional 0.7dB to noise levels at Coogee Chemicals boundary and between 0.1 and 0.6 dB at residential areas. AGR has made a new commitment to provide an annual noise management plan including actions for reduction each year to meet the current noise regulations within three years or new regulations within 12 months.

tpa tonnes per annum kg/h kilograms per hour
g/s grams per second m^3/hour cubic metres per hour

Since release of the PER, a modification to the proposal has been made by the proponent. This is:

- Making an additional commitment to provide an annual noise management plan including actions for reduction each year to meet the current noise regulations within three years or to meet the new regulations within 12 months of them coming into force.

The potential impacts of the proposal initially predicted by the proponent in the PER document (AGR, 2005) and their proposed management are summarised in Table 19 of the PER document (AGR, 2005).

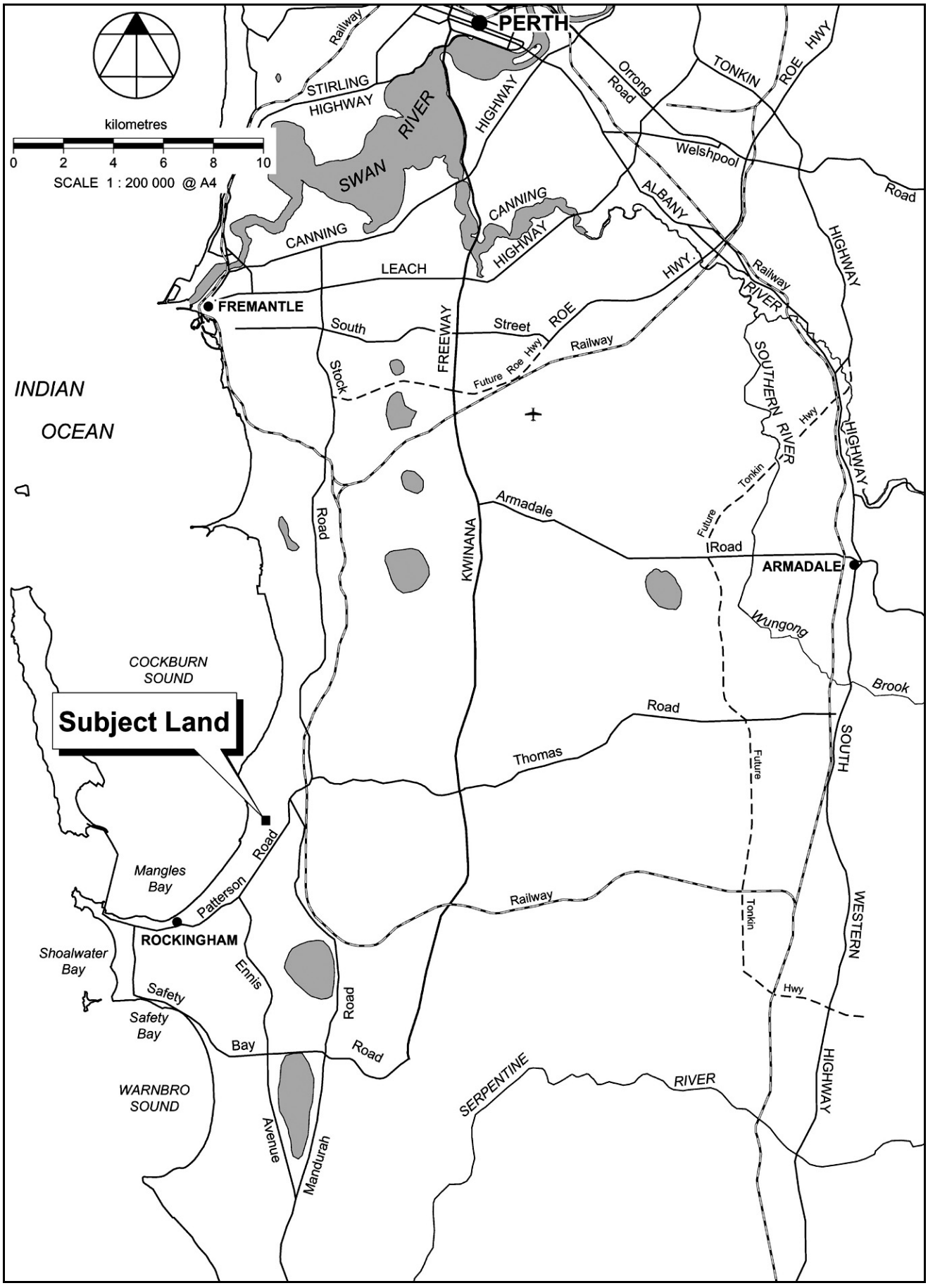

Figure 1: Regional Location (AGR, 2005)

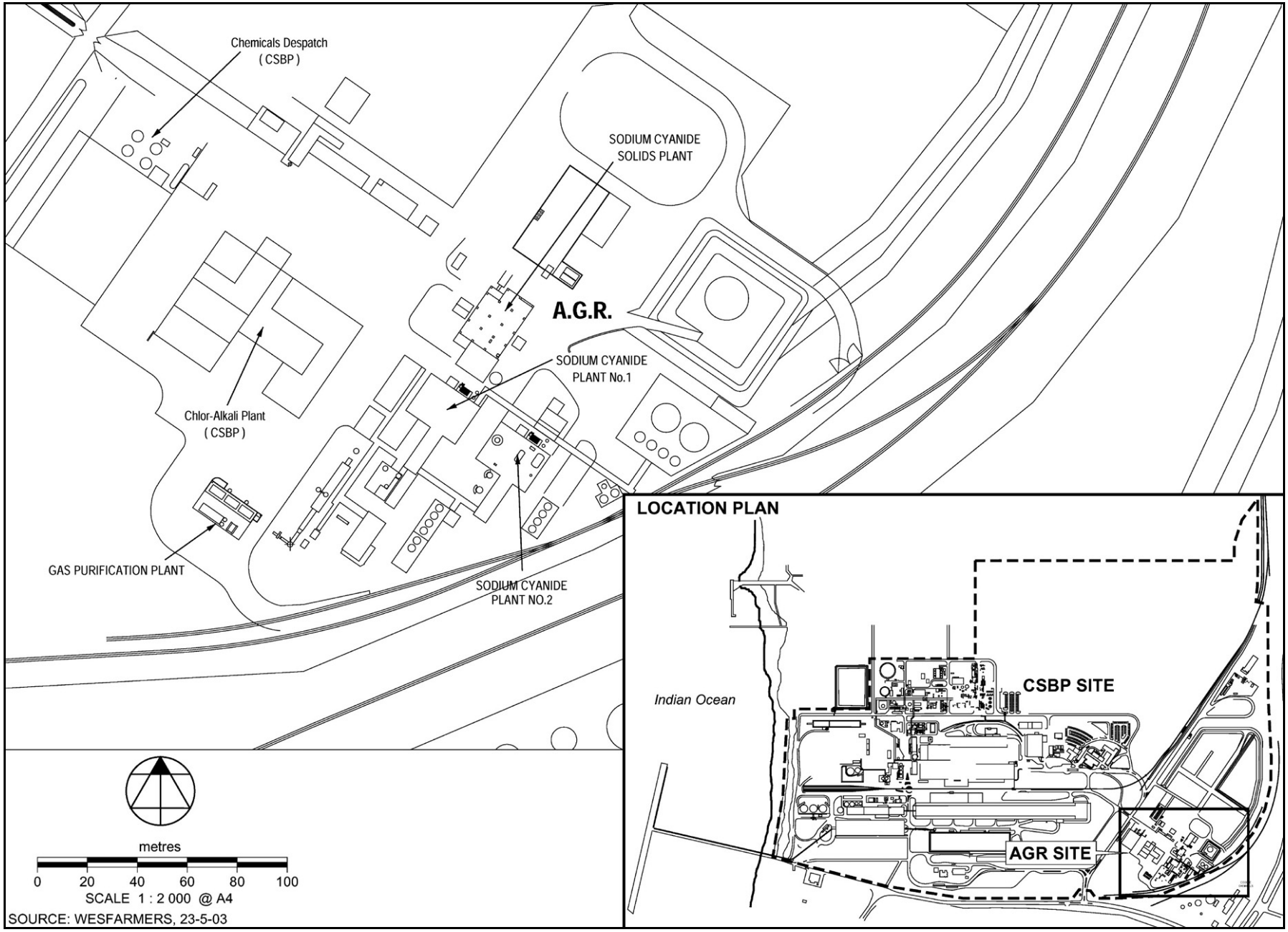

Figure 2: Site Layout (AGR, 2005)

3. Relevant environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the relevant factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as greenhouse gases, transport and public health and safety, are very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following environmental factors relevant to the proposal require detailed evaluation in this report:

a) Atmospheric emissions of ammonia and cyanides;

b) Noise; and

c) Wastewater.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the relevant environmental factors and their assessment are contained in Sections 3.1 - 3.3. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

3.1 Atmospheric Emissions of Ammonia and Cyanides

Description

The proposed upgrade of AGR's solid sodium cyanide plant will lead to an increase in the emissions of ammonia, hydrogen cyanide and sodium cyanide particulates as outlined in Table 2. No ambient air quality guidelines exist for sodium cyanide, so hydrogen cyanide and sodium cyanide emissions have been combined and compared to ambient guidelines for hydrogen cyanide. Occupational health guidelines for hydrogen cyanide are lower than occupational guidelines for sodium cyanide, indicating the ambient air guidelines for hydrogen cyanide would be lower than for sodium cyanide. Considering all emissions as hydrogen cyanide is, therefore, a conservative approach.

Table 2 Emissions of Ammonia and Cyanides

	Ammonia (mg/Nm^3)	Ammonia (g/s)	Ammonia (kg/a)	Cyanides (mg/Nm^3)	Cyanides (g/s)	Cyanides (kg/a)
Solids Plant (existing)	223.6	0.6	18 144	111.8	0.3	9 072
Solids Plant (upgraded)	281.6	1.2-1.5	27 216	136.1	0.58	16 330

mg/Nm^3 milligrams per normal cubic metre g/s - grams/second
kg/a kilograms/annum

The proponent commissioned Environ to undertake dispersion modelling to predict the potential impacts of the gaseous emissions under normal plant operating conditions (ENVIRON, 2005). The details of the study are provided in Sections 6.2 of the PER (AGR, 2005).

Ammonia
Emissions of ammonia were modelled from AGR in isolation to give predicted 1-hour average and annual average ground level concentrations and cumulatively with other sources to give an annual average ground level concentration at three selected community receptor locations of Wells Park, Medina and East Rockingham. The main additional source is a diffuse source to the south of the AGR plant. Only National Pollutant Inventory (NPI) figures were available for this source and due to assumptions in the modelling, results may be overly conservative. Health guidelines adopted by the United States EPA and the Californian Office of Environmental Health Hazard Assessment were used for comparison with maximum predicted ground level concentrations. The Department of Health has no objections to the use of these health guidelines.

The results of the air modelling indicated that in isolation AGR emissions of ammonia resulted in a maximum predicted 1-hour average ground level concentrations of not more than 5% of the relevant health guideline within 10 metres of the stack. A maximum predicted annual average ground level concentration of not more than 2% of the relevant health guideline is expected to occur on AGR, railway and Coogee Chemicals land.

The modelling of cumulative ammonia emissions in the area resulted in a maximum predicted annual average ground level concentration of approximately half the relevant health guideline at Wells Park, Kwinana Beach.

Cyanides
Emissions of cyanides from both the liquid and solids plants were modelled prior to the upgrade of the solids plant and post upgrade of the solids plant for normal operations. Liquid plant start-up conditions were not considered as these are managed under Part V of the *Environmental Protection Act 1986.* There are no other significant static sources of cyanides in the area listed in NPI reports.

The modelling resulted in a maximum predicted 1-hour average ground level concentrations of not more than 18% of the relevant health guideline, with the maximum concentration predicted to occur on the AGR site, railway land and industrial land. A maximum predicted annual average ground level concentration of not more than 8% of the relevant health guideline is expected to occur also on the AGR site, railway land and industrial land.

The proposed maximum emission is the current Department of Environment licence limit and the proponent has committed to improve the scrubber systems to keep emissions at or below 0.58g/s at the increased production rate.

Particulate emissions will be mostly sodium cyanide. As the size distribution of the particulates has not been determined, the modelling conservatively assumed that all particulates were less than 25 microns in diameter. The emission of particulates will increase from 0.005 g/s (2.3 mg/m^3) to 0.007 g/s (3 mg/m^3). The maximum predicted 24-hour average ground level concentration is 0.6 micrograms (μg)/m^3, which is less than the National Environment Protection Measure recommended reporting standard of 25 $\mu g/m^3$ for less than 25 micron particles. The maximum ground level concentration occurs within 400m of the plant.

Submissions

Submissions considered that the cumulative impacts of the Ammonium Nitrate Production Facility expansion proposal and this proposal should be considered and noted that one hourly ground level ammonia concentrations have not been modelled. The cumulative modelling had not been presented as requested in the Department of Environment's *Air Quality and Air Pollution Modelling Guidance Notes (2000).*

Information was required on what discharge of ammonia from AGR would cause the cumulative impact of ammonia to exceed a health standard. Besides normal operating range of emissions, information on how often upsets could occur and emissions from these was also requested.

As building wake effects were being found for plumes, it was questioned if stacks were an adequate height. Information was requested on what modifications would be made to scrubbing systems to keep emission concentrations to current levels or, if concentrations were to increase, whether "best practicable measures" of reducing emissions were still being implemented.

It was considered important that hydrogen cyanide, sodium cyanide particulates and ammonia and other emissions are regularly monitored and that the results be made available to the community.

The Department of Health concurs with the conclusion that the predicted air emissions are unlikely to significantly contribute to adverse health effects.

The Department of Health considers that the mitigation and management strategies proposed by AGR are anticipated to adequately ensure that public health is protected.

Assessment

The area considered for assessment of this factor is the area affected by the emission of ammonia and cyanides.

The EPA's environmental objective for this factor is to:

(i) ensure that gaseous and particulate emissions, both individually and cumulatively, meet appropriate criteria and do not cause an environmental or human health problem; and

(ii) use all reasonable and practicable measures to minimise the discharge of gaseous and particulate emissions.

Ammonia

In response to submissions, the proponent has carried out further modelling work considering the one hour maximum ground level concentration for cumulative emissions of ammonia from area sources at three community receptor locations (Appendix 5). This modelling is, however, likely to be approximate only as emissions estimates were sourced from NPI data which is often derived from generic calculations and it was assumed that all emissions were volume sources at five metres height. Modelling of one-hourly average ground level concentrations of cumulative emissions from area sources and emissions from the AGR/CSBP site of zero, current emissions, double and triple the current emissions were undertaken. It is estimated that the ammonia emissions from the AGR/CSBP site with the upgrade to the solid cyanide plant and the ammonium nitrate production facility will be slightly less than twice the current emissions. The one-hourly modelling showed that the AGR/CSBP ammonia emissions, including at two or three times the current levels, had little impact on the predicted ground level concentrations at Wells Park, Medina or East Rockingham. The highest predicted level at the three sites was 51% of the health guideline at Wells Park. It was also predicted that the AGR/CSBP ammonia emissions would need to increase approximately 20 times to cause the annual average ground level concentration to exceed the relevant health guideline. Such an increase would not cause the one-hourly health guideline to be exceeded. The proposed emissions, therefore, meet the EPA's objective with regard to health impacts. Nevertheless, the proponent is encouraged to reduce emissions as far as practicable to meet the EPA's objective of minimising the discharge of gaseous and particulate emissions to the environment (EPA, 2003).

It is noted that building wake effects have been found to influence the dispersion of atmospheric emissions. As the ground level concentrations of pollutants are considerably below health guidelines and the plant is an existing plant, the heights of the stacks are considered to be sufficient. The EPA recommends that for new plants or where it is necessary to reduce ground level concentrations of emissions that stacks are of sufficient height to avoid building wake effects. Should future monitoring show that ground level ammonia concentrations need to be reduced, raising the stack height would be one option to reduce AGR's contribution.

Responses to other submissions can be found in Appendix 5.

Another potential environmental impact of ammonia emissions is odour. Ammonia can be detected by most people at a concentration of 5-25 parts per million (approximately 3 500-17 400 $\mu g/m^3$), although some people are able to detect

ammonia at lower levels. From the AGR plant in isolation, the highest predicted one-hourly average concentration of ammonia is 124 $\mu g/m^3$ and the highest concentration 500 metres from the plant is 50 $\mu g/m^3$. It not anticipated that the ammonia emissions from the solid sodium cyanide plant will result in detectable odour at any public or residential area. However, based on the modelling results, it is possible that cumulative short term peaks may result in detectable odour. Since there is no evidence of a current odour problem, it is possible that the area emissions are overestimated.

Cyanides

The EPA notes that the proponent has made a commitment to improve the scrubbers so that the concentration of emitted total cyanides remains at or below 0.58 g/s at a production rate of 45 000 tpa. This commitment has been added to the proponent's commitments (number 7, Schedule 2 of Appendix 4).

Summary

The EPA considers the issue of atmospheric emissions of ammonia and cyanides has been adequately addressed and can meet the EPA's objectives for this factor.

3.2 Noise

Description

The proposed upgrade will lead to a small increase in noise emissions from the sodium cyanide facility, mainly due to the addition of two cooling tower cells. The combined noise emissions from the AGR/CSBP complex pre- and post- both the cyanide plant and nitric acid plant upgrades are shown in Tables 3 and 4.

Table 3 Operational noise at residential premises, worst case single point calculations

Location	Existing L_{A10}	Upgrade L_{A10}
Medina Residence	30.8	31.0
Calista Residence	29.4	29.5
Leda Residence	26	26.4
Hillman Residence	22.0	22.2
North Rockingham (near CBH)	24.9	25.4
East Rockingham (coast)	19.5	20.1

Table 4 Predicted noise levels from the upgrade at the Coogee Chemicals nearest boundary

Location	Existing, L_{A10}	Upgrade, L_{A10}
Opposite Cooling Tower No.1	65.4	65.9
Opposite Cooing Tower No.2 (2 cell addition)	65.4	66.1

In residential areas noise modelling shows that emissions from the AGR site and also combined emissions from the AGR/CSBP site meet the lowest assigned levels in the *Environmental Protection (Noise) Regulations 1997* under "worst case" night weather conditions. It should be noted that noise contributions below 30 decibels (A-

weighted) [dB(A)] at residential areas are consider to not contribute significantly to noise being 5 dB(A) below the night time assigned level of 35 dB(A). Therefore noise from the AGR/CSBP site does not contribute significantly to noise at residential locations except at Medina. Noise from the site is not expected to be tonal at distances of greater than 2000 metres. AGR/CSBP's noise emissions are not expected to be audible at Medina given that its contribution is more than 15 dB(A) below the cumulative effect of all industry at this location (SVT, 2001). The AGR plant and proposed upgrade, in isolation, will not be a significant contributor to noise received at Medina.

The predicted noise emissions for current operations and for the upgrade under "worst case" daytime wind conditions do not meet the current Noise Regulations at the boundary with Coogee Chemicals. The assigned level for an industrial premise is 65 dB(A). The predicted levels attract a 5 dB(A) adjustment to the measured levels due to the tonality of the noise emission, making the levels 6 dB(A) over the assigned level. However, changes to the Noise Regulations have been proposed. AGR has undertaken to comply with any new regulations within 12 months of the Regulations coming into effect or to comply with existing Noise Regulations within three years.

Submissions

The City of Rockingham considered that the impacts of the proposal on the residents of North-east Rockingham and Hillman are of most concern. A KIC study found that North-east Rockingham experienced the worst cumulative noise exceedences in the region. The impact of the upgrade of the Sodium Cyanide Facility on North-east Rockingham and Hillman for cumulative noise should be modelled and reported.

It was unclear whether a Noise Management Plan (prepared in conjunction with the Department of Environment) currently exists for the CSBP Industrial Complex. If not, then such a management plan should be introduced as part of the Sodium Cyanide Facility upgrade.

It was suggested that as it was unknown when amendments to the Noise Regulations would be made, that AGR committed to complying with the Noise Regulations within 12 months of the issuing of the statement for the expansion of the solid sodium cyanide plant.

There was also concern that additional noise associated with construction and traffic (shipping in particular) will impact on Rockingham residents.

Assessment

The area considered for assessment of this factor is the surrounding residential areas and adjacent industrial premises.

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

The proponent's responses to submissions are supplied in Appendix 5. In response to suggestions for a Noise Management Plan and a target for when compliance with the Noise Regulations will be met at the adjoining industrial boundary, AGR has

committed to providing an annual Noise Management Plan including actions for reduction each year to meet the current Noise Regulations within three years or, if the new Regulations are released within this time, to meet the new Regulations within 12 months. This commitment has been included in the recommended changes to implementation conditions (condition 10, Appendix 4).

The EPA notes that noise from the AGR/CSBP site meets the lowest assigned noise levels at residential areas. AGR/CSBP is still considered to be a contributing source to noise at Medina as its emission is not at least 5 dB(A) below the assigned level. The AGR plant and proposed upgrade, in isolation, will not be a significant contributor to noise received at Medina. The EPA considers that the proposed expansion will have a negligible impact on existing noise levels at the nearest residences. While the current and predicted noise emissions do not meet the Noise Regulations at the boundary of the Coogee Chemicals site, this is mostly due to the tonality of the noise emission. The affected area of the Coogee Chemicals site is occupied by tanks and railway land.

Additional transport requirements for the increased production are expected to average 1-2 truck movements per day distributed evenly during the year which is small in the context of current traffic movements on Kwinana Beach Road and Paterson Road. The EPA notes that the upgrade will occur over time through phased implementation with the majority of the work taking place inside the contained solids plant building which will minimize noise emissions.

Summary

It is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided that recommended condition 10 (Appendix 4) is implemented by the proponent.

3.3 Wastewater

Description

Wastewater from the solid cyanide plant is treated to remove ammonia and cyanide. During the destruction of cyanide, hydrogen peroxide, sulphuric acid and copper sulphate are added to the wastewater.

The treated wastewater from AGR is held in batch tanks where it is monitored for copper, pH and cyanide prior to discharge to CSBP's containment ponds. Discharge of CSBP's wastewater to Cockburn Sound or to the Water Corporation's Sepia Depression Outfall Line is managed under licence by Part V of the *Environmental Protection Act 1986.*

The upgrade of the sodium cyanide plant will not have any impact on the concentration of copper or cyanide in the wastewater and the previous commitment (Commitment 3(6) of Statement 668) to concentrations of less than one part per million will continue to apply. However, it is expected that the nitrogen content of the wastewater will increase from a maximum level of 14 kg/day to 19 kg/day. The proponent has previously provided a commitment to ensure that the average daily nitrogen discharges (calculated once per month over a rolling three month period)

from CSBP to the marine environment will be no higher than 137 kg, which was the amount in the licensing period to June 2001, and will continue to meet this commitment after the solid cyanide plant upgrade.

The proponent is reviewing the cyanide destruction process and may change to treatment with sodium hypochlorite and chlorine. This change is not part of the upgrade proposal. The treated wastewater is discharged to CSBP and to the environment under provisions of Part V of the *Environmental Protection Act 1986*. Review of the wastewater treatment process should be considered in conjunction with the requirements of the CSBP licence.

Submissions

The question was asked whether nitrogen in discharged wastewater could be kept to a maximum of 14 kg/day, given that the current discharge is said to average 3.34 kg/d.

The opinion was expressed that any wastewater discharge into Cockburn Sound should be minimized and meet the requirements of the State Environmental (Cockburn Sound) Policy 2005 (and respective water quality guidelines). Wastewater discharged into the Sepia Depression Ocean Outfall Line (SDOOL) should meet the criteria and standards set for this outfall by the State Government

Confirmation was requested that monitoring of wastewater is undertaken prior to discharge into Cockburn Sound, as the use of some chemicals in the treatment process causes concern if there is an opportunity for these chemicals to be discharged with the wastewater.

Assessment

The area considered for assessment of this factor is the marine environment.

The EPA's environmental objective for this factor is to ensure that marine water quality in Cockburn Sound and the Sepia Depression is maintained or improved, so that existing and potential environmental values, including ecosystem maintenance, are protected.

The proponent's response to submissions can be found in Appendix 5. The proponent has answered that due to the variation in the load of nitrogen in the wastewater a maximum of 19 kg/day may be reached.

Wastewater from AGR is discharged to the CSBP wastewater system. Discharge of wastewater from CSBP to the environment is managed under the provisions of the CSBP licence under Part V of the *Environmental Protection Act 1986*. The EPA notes that licence conditions will remain unchanged despite the increase in nitrogen from the AGR load. CSBP is actively trying to reduce the load of nitrogen reaching the marine environment and is trialling a created wetland for nutrient stripping. CSBP has committed to commence, by the end of 2005, discharging its wastewater to the Sepia Depression via the Water Corporation's outfall line (EPA, 2005). The EPA notes that discharges via the Water Corporation's outfall will still be licensed under Part V of the *Environmental Protection Act 1986* and that monitoring of the discharge will be required.

Summary

It is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.4 Relevant environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the *Environmental Protection Act (1986).* Table 5 in Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit. The proposal has been assessed as a revised proposal and changes to the existing commitments and implementation conditions in Ministerial Statement 668, recommended in Appendix 4.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

The changes to the proponent's previous commitments contained in Ministerial Statement 668 should be made enforceable (Appendix 4). These commitments as described in the PER and subsequently modified include:

1 Commitment 3 (Water Management), number 6, changed from "emission of nitrogen to be no greater than 14 kg/day on monthly average" to "emission of nitrogen to be no greater than 19 kg/day on monthly average";
2 Commitments 7 and 8 (Noise Management) deleted and replaced by condition 10 (see 4.2); and
3 New commitment 7 (Atmospheric Emissions) added to "maintain emission rate of total cyanide (gaseous and particulate) at or below 0.58 grams per second".

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has proposed an additional condition that the EPA recommends be

imposed if the proposal by Australian Gold Reagents Pty Ltd (AGR), to expand the capacity of its solid sodium cyanide manufacturing plant from 25 000 tpa to 45 000 tpa is approved for implementation.

This condition is presented in Appendix 4. The condition provides that:

(a) Within six months following the formal authority issued to the decision making authorities under Section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Noise Management Plan and that the plan should include:

1. (a) noise reduction measures to be implemented during the following 12 months for the purpose of complying with the *Environmental Protection (Noise) Regulations 1997* by 30 December 2008; or,
   (b) noise reduction measures to be implemented for the purpose of complying with the amended Noise Regulations within 12 months following their gazettal;
2. the acoustical model of the plant;
3. best practicable measures to minimise noise emissions;
4. operating procedures to be adopted for particular activities to minimise noise impacts;
5. the noise monitoring program;
6. the complaint management procedure; and
7. the procedure for the annual review and updating of the Noise Management Plan.

(b) The Noise Management Plan shall be implemented and made publicly available.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Works approval and licensing under Part V of the *Environmental Protection Act 1986*;
- Licensing under the *Explosives and Dangerous Goods Act 1961*; and
- The *National Standard for the Control of Major Hazard Facilities*, which applies through the *Explosives and Dangerous Goods Act 1961*.

5. Other Advice

Background Air Quality (Air Toxics) Study

The Department of Environment (DoE) has commenced a 12 to 18 month study into the levels of hazardous air pollutants within the Perth metropolitan region. The original aim of the study was to establish baseline levels for the a range of air toxics, namely, volatile organic compounds, carbonyls, heavy metals and polycyclic aromatic compounds. However, the DoE advised that the study is now being extended to give a greater focus on the Kwinana and Rockingham areas and that monitoring will include ammonia (at Wells Park), NO_x and $PM_{2.5}$ particulates. This should assist in establishing actual ground level ammonia concentrations, although short term peaks will not be captured. The monitoring will provide an integrated 6 day concentration which could be compared to modelled 6 day averages. This will give indications as to whether it is likely that emissions have been over or under estimated.

6. Conclusions

The EPA has considered the proposal by Australian Gold Reagents Pty Ltd (AGR), to expand the capacity of its solid sodium cyanide manufacturing plant from 25 000 tpa to 45 000 tpa.

The EPA notes that the proposed expansion of the solid sodium cyanide plant is expected to lead to an increase in emissions of ammonia and cyanides. Air quality modelling indicates that both in isolation and cumulatively with other sources the proposed upgrade is unlikely to cause the exceedence of relevant health guidelines for ammonia or cyanide at the community receptor locations of Wells Park, Medina and East Rockingham.

The EPA notes that noise from the AGR/CSBP site meets the lowest assigned noise levels required by the *Environmental Protection (Noise) Regulations 1997* at residential areas. AGR/CSBP is still considered to be a contributing source to noise at Medina as its emission is not at least 5 dB(A) below the assigned level. The AGR plant and proposed upgrade, in isolation, will not be a significant contributor to noise received at Medina. The EPA considers that the proposed expansion will have a negligible impact on existing noise levels at the nearest residences. The proponent has committed to comply with the assigned levels applying at industrial boundaries within three years or within 12 months if the Regulations are amended.

The EPA notes that the nitrogen load in the wastewater discharge is expected to increase from a maximum of 14 kg per day to a maximum of 19 kg per day. Wastewater is discharged to the CSBP wastewater system. The proponent maintains the commitment that CSBP's average daily nitrogen loads to Cockburn Sound will be no higher than in the 2001 licensing period. CSBP has committed to commence discharging its wastewater to the Sepia Depression via the Water Corporation's Sepia Depression Ocean Outfall Line by the end of 2005.

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of their commitments and the recommended condition set out in Appendix 4, and summarized in Section 4.

7. Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for the upgrade of the solid sodium cyanide plant capacity from 25 000 to 45 000 tonnes per annum;
2. That the Minister considers the report on the relevant environmental factors and principles as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended changes to conditions of Ministerial Statement 668 set out in Appendix 4, and summarised in Section 4, including changes to the proponent's commitments.
4. That the Minister imposes the changes to conditions recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:

Department of Health

Fire and Emergency Services Authority

City of Rockingham

Appendix 2

References

AGR, 2005. *Proposed Solid Sodium Cyanide Plant Upgrade, Public Environmental Review*. Australian Gold Reagents Pty Ltd, April 2005.

EPA, 2003. *Final Guidance No. 55, Implementing Best Practice in proposals submitted to the Environmental Impact Assessment process.* Environmental Protection Authority. Perth, Western Australia, December 2003.

EPA, 2005. EPA Bulletin No. 1182. *Ammonium Nitrate Production Facility Expansion, Kwinana.* Environmental Protection Authority. Perth, Western Australia, June 2005.

SVT, 2001. *Cumulative Noise Model of the Kwinana Industrial Area for Kwinana Industries Council*. SVT Engineering Consultants, November 2001.

Appendix 3

Summary of identification of relevant environmental factors and principles

Table 5: Identification of Relevant Environmental Factors and Principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Marine Environment	Discharge of wastewater to Cockburn Sound or Sepia Depression via Water Corporation pipeline	• Any wastewater discharge into Cockburn Sound should be minimized and meet the requirements of the State Environmental (Cockburn Sound) Policy 2005 • Confirmation is requested that monitoring of wastewater is undertaken prior to discharge into Cockburn Sound, as the use of some chemicals in the treatment process causes concern if there is an opportunity for these chemicals to be discharged with the wastewater	Wastewater from this proposal is discharge to the CSBP water containment pond. Discharge of wastewater to the marine environment is managed under the CSBP licence. The quality of wastewater discharged to CSBP is considered to be a relevant environmental factor (see pollution factors).
POLLUTION			
Air Emissions Ammonia and cyanides	Emissions of ammonia will increase from 0.6 g/s (18 144 kg/a) to a maximum of 1.5 g/s (27 216 kg/a) Emissions of cyanides (hydrogen cyanide and sodium cyanide particulates) will increase from 0.3 g/s (9 072 kg/a) to 0.58 g/s (16 330 kg/a)	• One hourly ground level ammonia concentrations have not been modelled. Is this information available from any source? • The cumulative modelling has not been presented as requested in the Department of Environment's *Air Quality and Air Pollution Modelling Guidance Notes (2000)* • What discharge of ammonia from AGR would cause the cumulative impact of ammonia to exceed a health standard at the Kwinana Beach? • Besides normal operating range of emissions, information on how often upsets could occur and emissions from these is also requested. • If building wake effects are being found for plumes, are stacks at an adequate height? • It is important that hydrogen cyanide, sodium cyanide particulates and ammonia and other emissions are regularly monitored and that the results be made available to the community. • The cumulative impacts of the Ammonium Nitrate Production Facility expansion proposal and this proposal should be considered. • What modifications will be made to scrubbing systems to keep emission concentrations to current levels or, if concentrations are to	Air emissions is considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency Comments	Identification of Relevant Environmental Factors
		emission concentrations to current levels or, if concentrations are to increase, are "best practicable measures" of reducing emissions still being implemented.	
Oxides of nitrogen	No impact to start-up emissions from expansion. Small increase in normal operation due to increased power usage.	Given that there are very large emissions of NO_2 during start-up, this pollutant should have been discussed in the PER if only to be dismissed as insignificant for normal operations.	Start-up of the solid cyanide plant does not produce NO_2. Not considered to be a relevant factor.
Greenhouse Gases	The expansion will increase the amount of greenhouse gases generated from the solids plant from 9 146 tpa to 16 464 tpa (increase of 7 317 tpa)	Confirmation is sought that greenhouse gas emission levels meet appropriate EPA standards and will be regularly monitored and reported.	The increase in greenhouse gas production is small compared to the overall emissions of the sodium cyanide plants. The existing energy efficiency per tonne of product (and hence CO_2 efficiency) will be maintained for the upgrade. Greenhouse gases are not considered to be a significant relevant factor.
Wastewater Discharge	Total nitrogen discharge will increase from 4380 kg/a to 6935 kg/a.	• Currently TN discharged in wastewater is required to be less than 14kg/day. The PER predicts up to 19 kg/day. Can this be reduced to 14 kg/day, given that the current discharge is 3.34 kg/d?; • Any wastewater discharge into Cockburn Sound should be minimized and meet the requirements of the State Environmental (Cockburn Sound) Policy 2005 (and respective water quality guidelines). Wastewater discharged into the Sepia Depression Ocean Outfall Line (SDOOL) should meet the criteria and standards set for this outfall by the State Government; • Confirmation is requested that monitoring of wastewater is undertaken prior to discharge into Cockburn Sound, as the use of some chemicals in the treatment process causes concern if there is an opportunity for these chemicals to be discharged with the wastewater.	Wastewater discharge is considered to be a relevant environmental factor.
Noise	The proposal will slightly increase noise levels at residential areas, but these will	• The City of Rockingham considers that the impacts of the proposal on the residents of North-east Rockingham and Hillman are of most concern, A KIC study found that North-east Rockingham	Noise is considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency Comments	Identification of Relevant Environmental Factors
	remain below the *Environmental Protection (Noise) Regulations 1997* limits. The proposal will increase noise levels on the boundary with Coogee Chemicals, where the *Environmental Protection (Noise) Regulations 1997* limits are not met when including an allowance for tonality of 5 dB.	experienced the worst cumulative noise exceedances in the region. • The impact of the upgrade of the Sodium Cyanide Facility on North-east Rockingham and Hillman for cumulative noise should be modelled and reported. • It is unclear whether a Noise Management Plan (prepared in conjunction with the Department of Environment) currently exists for the CSBP Industrial Complex. If not, then such a management plan should be introduced as part of the Sodium Cyanide Facility upgrade. • There is also concern that additional noise associated with construction and traffic (shipping in particular) will impact on Rockingham residents.	
SOCIAL SURROUNDINGS			
Public Health and Safety	Risk to public health and safety from ammonia and cyanide emissions	• It is important that CSBP has strategies and actions in place to minimise any potential hazards associated with the operation and upgrade of the Sodium Cyanide Facility. • The City of Rockingham is an important stakeholder and as such, requests that CSBP fully inform the City of the strategies and actions being taken to minimize hazards associated with the expansion of the facility, and that it maintain a close liaison with the City's Fire and Emergency Administration Officer in this regard. • The Department of Health concurs with the conclusion that the predicted air emissions are unlikely to significantly contribute to adverse health effects. • The Department of Health considers that the mitigation and management strategies proposed be AGR are anticipated to adequately ensure that public health is protected. • FESA will work with the proponent and in association with DoIR and FRA as may be required in the preparation of a facility emergency response plan.	Health guidelines for ground level concentrations of ammonia and cyanide will not be exceeded due to the proposed expansion. The proposal will not impact the safety of off-site populations in an adverse manner. Individual risk criteria will still be met. Public health and safety is not consider to be a significant relevant factor.
Transport	Additional 1000 truck movements per year.	• Is the transport of NaCN likely to be evenly distributed over the year, or will there be short campaigns? If campaigns, what is the maximum number of trucks per day? • FESA will work with the proponent and in association with DoIR	Transport will be distributed evenly through the year. Currently there are approximately 700 traffic movements per day from CSBP.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency Comments	Identification of Relevant Environmental Factors
		and FRA as may be required in the preparation of the transport management plan and solids export emergency response plan.	The increase in solid cyanide export will not significantly increase traffic on surrounding roads. Transport will be managed under the current Transport Management Plan. Transport is therefore not considered to be a significant relevant factor.

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, Consideration**
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In application of this precautionary principle, decisions should be guided by –* *(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *(b) an assessment of the risk-weighted consequences of various options.*		
	No	
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*		
	Yes	The proposal seeks to use energy efficient technology and make good use of best practice to prevent pollution. The proposal does not deplete non-renewable resources significantly.
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*		
	No	

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, Consideration**
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.*		
	Yes	The proponent will be responsible for the costs of containment, avoidance and abatement for pollution and waste generated directly by their process.
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.*		
	Yes	The proposal seeks to follow the waste hierarchy and manage any waste produced.

Appendix 4

Recommended Changes to Environmental Conditions and Proponent's Consolidated Commitments

RECOMMENDED ENVIRONMENTAL CONDITIONS AND PROCEDURES

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

SODIUM CYANIDE PLANTS (LIQUID AND SOLID) AT KWINANA AND TRANSPORT OF SODIUM CYANIDE BY ROAD AND RAIL, KWINANA

Proponent: Australian Gold Reagents Pty Ltd

Proponent Address: PO Box 345, Kwinana WA 6167

Assessment Number: 1541

Previous Assessments: 113, 197, 300, 300-1, 846, 908, 1390, 1422 and 1497

Previous Statements: Statement No. 006 published on 15 October 1987,
Statement No. 073 published on 24 August 1989,
Statement No. 099 published on 1 June 1990,
Statement No. 129 published on 15 March 1991,
Statement No. 347 published on 17 March 1994,
Statement No. 384 published on 12 May 1995,
Statement No. 579 published on 6 December 2001, and
Statement No. 602 published on 2 August 2002.
Statement No. 668 published on 11 November 2004

Report of the Environmental Protection Authority: Bulletin 1186

Previous Reports of the Environmental Protection Authority: Bulletins 274, 284, 387, 427, 450, 727, 772, 1028, 1047 and 1132.

The implementation of the proposals to which the above reports of the Environmental Protection Authority relate is subject to the following changes to conditions and procedures in Ministerial Statement 668:

Replacement conditions

1 Implementation

1-1 The proponent shall implement the proposals referred to above and described collectively within schedule 1 of this statement subject to the conditions of this statement.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.

Additional condition

10 Noise Management

10-1 Within six months following the formal authority issued to the decision making authorities under Section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Noise Management Plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Plan shall include:

1 (a) noise reduction measures to be implemented during the following 12 months for the purpose of complying with the *Environmental Protection (Noise) Regulations 1997* by 30 December 2008; or,
(b) noise reduction measures to be implemented for the purpose of complying with the amended Noise Regulations within 12 months following their gazettal;

2 the acoustical model of the plant;

3 best practicable measures to minimise noise emissions;

4 operating procedures to be adopted for particular activities to minimise noise impacts;

5 the noise monitoring program;

6 the complaint management procedure; and

7 the procedure for the annual review and updating of the Noise Management Plan.

10-2 The proponent shall implement the Noise Management Plan required by condition 10-1.

10-3 The proponent shall make the Noise Management Plan required by condition 10-1 publicly available.

Schedule 1

The Proposals (Assessment No. 1541)

Changes to main characteristics of the proposals are summarised in Table 1 below.

Table 1 – Changes to Key Proposal Characteristics

Characteristic	Description
General	
Solid Sodium Cyanide Plant	
Plant Commissioned	2002
Plant Facilities	Two or three batch evaporators, vacuum pump incorporating a scrubber, condensate tank, slurry tank, centrifuge, spin flash dryer incorporating scrubber system, powder hopper and compacting machine.
Process Description	• The solids plant receives a continuous feed of sodium cyanide solution produced at the liquid sodium cyanide plants which will be directed to one of two or three batch evaporation units. • Following concentration by evaporation, the sodium cyanide crystals are centrifuged, dried and compressed into briquettes. • The briquettes are then packaged and transported.
Production Capacity	Nominal 45,000 tpa
Inputs	30% sodium cyanide solution
Outputs	Briquettes containing >97% sodium cyanide.
Storage	Area designed to store a maximum of 7 140 tonnes solid sodium cyanide. Solid sodium cyanide will be stored in IBCs packed into sea containers or a warehouse. Small quantities may be stored in ISO-tainers (equipped to allow injection of water to dissolve the sodium cyanide at the mine site).
Gaseous Emissions	• Ammonia to a maximum of 1.5 grams per second. • Hydrogen cyanide and sodium cyanide (combined) to a maximum of 0.58 grams per second.
Liquid Effluent Discharges	• 16 m^3/hour wastewater, containing up to 19 kg/day of nitrogen. • All liquid effluent is treated and then pumped to CSBP's effluent pond.

Key
kg/day – kilograms per day
m^3 – cubic metres
m^3/hr – cubic metres per hour
tpa – tonnes per annum

Schedule 2

SODIUM CYANIDE PLANTS (LIQUID AND SOLID) AND TRANSPORT OF SODIUM CYANIDE BY ROAD AND RAIL, KWINANA (ASSESSMENT NO. 1541)

CHANGES TO COMMITMENTS July 2005

Note: The term "commitment" as used in this schedule includes the entire row of the table and its six separate parts as follows:

- a commitment number;
- a commitment topic;
- the 'action' to be undertaken by the proponent;
- the objective of the commitment;
- the timing requirements of the commitment; and
- the body/agency to provide technical advice to the Department of Environment.

NO.	TOPIC	ACTION	OBJECTIVE/S	TIMING	ADVICE
Manufacture and Storage of Sodium Cyanide					
3	Water Management	Have in place a Water (Surface and Waste) Management Plan, which details procedures for the management of water discharge from the site. This plan includes the following: 1. Management of contaminated stormwater; 2. Management of liquid spills and washdown water; 3. Liquid waste storage requirements; 4. Process and storage area sealing and bunding requirements; 5. Requirements for monitoring/testing prior to disposal; 6. Discharge requirements including concentration of cyanide and copper each to be less than 1 ppm and emission of nitrogen to be no greater than ***19 kg/day*** on monthly average; 7. Contingency/emergency procedures; and 8. Reporting requirements.	To protect marine flora and fauna and groundwater.	Implemented and on-going.	

DELETED COMMITMENTS

NO.	TOPIC	ACTION	OBJECTIVE/S	TIMING	ADVICE
7	Noise Management	Develop a Noise Reduction Management Plan for the site. This Plan will be comprehensive and will specify the noise reduction measures and the timeframe for implementation of the measures. This Plan will also include: 1. The acoustical model of the plant; 2. Best practicable measures to minimise noise emissions; 3. Operating procedures to be adopted for particular activities to minimise noise impacts; 4. The noise monitoring program; and 5. The complaint management procedure.	To achieve compliance with the *Environmental Protection (Noise) Regulations 1997* or to reduce noise emissions to as low as reasonably practicable.	Within 6 months after the review of the Noise Regulations.	Town of Kwinana
8	Noise Management	Implement the Noise Reduction Management Plan referred to in Commitment 7 if required. (See Commitment 7 – "Timing").	To ensure compliance with prescribed standards and minimise where practicable noise impacts.	As soon as the Noise Reduction Management Plan is approved by the EPA.	

ADDITIONAL COMMITMENT

NO.	TOPIC	ACTION	OBJECTIVE/S	TIMING	ADVICE
7	Atmospheric Emissions	Maintain emission rate of total cyanide (gaseous and particulate) at or below 0.58 grams per second.	To minimise discharge of waste to the environment.	Implemented and on-going	

Abbreviations:

DoIR Department of Industry and Resources
KIMA Kwinana Industries Mutual Aid
ppm parts per million

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions

SODIUM CYANIDE SOLIDS PLANT UPGRADE
Responses to Submissions

EPA ASSESSMENT NUMBER 1541

June 2005

1. INTRODUCTION

Australian Gold Reagents Pty Ltd (AGR) owned by CSBP Limited (75%) and Coogee Chemicals Limited (25%) is the manager of the joint venture between these companies and was formed to manufacture and distribute sodium cyanide. AGR currently operates two liquid sodium cyanide plants and a downstream solid sodium cyanide processing plant, which are collectively referred to as the Sodium Cyanide Manufacturing Facility. The Sodium Cyanide Manufacturing Facility is located within the CSBP Kwinana Industrial Complex in the Kwinana Industrial Area.

AGR is proposing to increase its existing solid sodium cyanide production through debottlenecking and installation of new equipment. The proposed increase in the production capacity of solid sodium cyanide is driven by opportunities for increased sales in overseas markets

In accordance with the Environmental Protection Act, a Public Environmental Review (PER) was prepared which described this proposal and its likely effects on the environment. The PER was available for a public review period of 4 weeks from 11th April 2005 closing on 9th May 2005.

Submissions received from government agencies and the public and the responses from the proponent will help the EPA to prepare an assessment report in which it will make recommendations to government.

This report provides a summary of the submissions received by the EPA, and the proponent's responses to each of the issues raised.

2. Submission and Proponent Responses

2.1 NOISE

Submission 1

In relation to noise, the City considers that the impacts of the proposal on the residents of North-east Rockingham and Hillman are of most concern. The Kwinana Industries Council (KIC) produced the report 'Cumulative Noise Model of the Kwinana Industrial Area' which modelled the cumulative noise levels from the existing industries at Kwinana in 2001. That study indicated that the cumulative noise at North-east Rockingham exceeded the allowed levels between 8% and 30% of time at night-time, depending on season (winter being the worst).

Cumulative modeling for noise impacts was undertaken as part of the PER for the upgrade of the Sodium Cyanide Manufacturing Facility for the suburbs of Medina and Calista, but not for North-east Rockingham or Hillman. This is because the former areas are marginally closer to CSBP's plant. This doesn't take into account the findings of the KIC study which demonstrated that North-east Rockingham experienced the worst cumulative noise exceedances in the region. The impact of the upgrade of the Sodium Cyanide Facility on North-east Rockingham and Hillman for cumulative noise should be modeled and reported.

Proponent Response

The initial KIC study was based on noise levels from the CSBP site in 2001. There have been significant reductions in noise levels since this time through noise control on the ammonia plant and other modifications across site.

KIC is currently redoing this modelling work with the current industrial noise levels for 2005 and the study is expected to be released in the latter half of this year.

Herring Storer Acoustics, when undertaking the noise emission study for the proposed expansion, modelled all relevant residential locations including North Rockingham and Hillman (Table 3 Appendix 3, Table 13 of PER). The results of the single point calculations of residential noise at all relevant residential locations indicated that Medina, with an emission of 31$L_{A10,}$ contributes to the assigned level of 35 $L_{A10.}$ Therefore the noise contributors were analysed further

which demonstrated that the AGR upgrade is not a significant contributor to the noise received at that Medina residential area. In addition, the 31.0L_{A10} is more than 5 dB(A) less than the overall noise level (based on KIC measured/predicted levels) and unlikely to be audible.

Submission 2

Further, it is unclear whether a Noise Management Plan (prepared in conjunction with the Department of Environment) currently exists for the CSBP Industrial Complex. If not, then such a management plan should be introduced as part of the Sodium Cyanide Facility upgrade.

Proponent Response'

There is currently no Noise Management Plan for the CSBP Kwinana industrial complex (which includes AGR), as CSBP and AGR has dealt with issues as they are identified. AGR has proposed to the EPA that we develop a noise management plan in response to submission number 3.

Submission 3

As we do not know when the changes to the noise regulations will be approved and AGR cannot continue to exceed the regs indefinitely, it is suggested that AGR commits to complying with the Noise Regs within 12 months of the issuing of the statement for the expansion;

Proponent Response

AGR is committed to reducing noise emissions and implementing initiatives to manage and reduce current noise levels. Noise emissions from the CSBP / AGR site have been systematically reduced over the past five years. The attenuation measures have been focused on the high sound power noise sources and include significant noise sources which were elevated relative to the surrounding topography and buildings. In recent times, AGR's noise reduction initiatives have included lagging and attenuation of a fan AGR continues to purchase equipment in accord with guidelines which include consideration of noise and ensuring that engineering and acoustic design of new plant minimises noise emissions at design. Furthermore AGR is committed to the KIC cumulative noise study through CSBP. The noise modelling indicates that AGR exceeds the current noise regulations at the industry boundary with Coogee Chemicals by virtue of tonal noise characteristics. Both existing and predicted noise emissions are expected to comply with the proposed Regulation Review level of 70L_{A10} which is being pursued by the Department of Environment. Noise emissions for the proposed AGR upgrade comply with the regulation requirements at the nearest residential receiver locations.

AGR would like to propose the formalisation of its noise reduction commitment through an annual noise management plan including actions each year to meet the current noise regulations within 3 years or if the new regulations are released within this time we will meet the regulations within 12 months. The action plan will demonstrate our commitment to reducing noise and reflect the initiatives that we undertake.

Submission 4

There is also concern that additional noise associated with construction and traffic (shipping in particular) will impact on Rockingham residents.

Proponent Response

AGR has detailed both expected construction, and expected operational traffic movements from this proposal in the PER. All are well within the capacity of the road system, and in reality most of the traffic will move to and from AGR to the north, apart from workers who may live in Rockingham or points south, and contractors/suppliers who operate from Rockingham. The upgrade to the solid sodium cyanide plant will not impact on shipping from the Kwinana wharf as exported product is transported to and shipped from Fremantle (once the Fremantle Outer Harbour container port is developed this destination may change but it will still be to the north of AGR).

The upgrade will occur over time through phased implementation predominantly through the installation of new pieces of equipment to debottleneck the plant. The majority of the work will take place inside the contained solids plant building which will minimize noise emissions.

2.2 Transport

Submission 5

Is the transport of NaCN likely to be evenly distributed over the year, or will there be short campaigns? If campaigns, what is the maximum number of trucks per day?

Proponent Response

The transport of the product will be distributed evenly during the year. Whilst the despatch of product has been seasonal in nature, due to the impact of weather on access to some mines, this has been reduced and continues to do so due to the improvement in roads.

There are approximately 700 road traffic movements per (usual business) day from the CSBP Kwinana Industrial Complex at present. The potential ongoing

traffic increase resulting from this proposal is likely to be 500 loads per annum (1-2 per day), which is insignificant in the context of current traffic movements on Kwinana Beach Road and Paterson Road

We have an existing commitment to review the transport management plan every two years and AGR remains committed to this.

2.3 Water Management

Submission 6

Any wastewater discharge into Cockburn Sound should be minimized and meet the requirements of the State Environmental (Cockburn Sound) Policy 2005 (and respective water quality guidelines). Wastewater discharged into the Sepia Depression Ocean Outfall Line (SDOOL) should meet the criteria and standards set for this outfall by the State Government. The City also requests confirmation that monitoring of wastewater is undertaken prior to discharge into Cockburn Sound, as the use of some chemicals in the treatment process causes concern if there is an opportunity for these chemicals to be discharged with the wastewater.

Proponent Response

The comments are noted, and AGR agrees. The EP Act License and agreement with WAWC to discharge effluent to SDOOL (including the Ministerial approval for this) set conditions associated with discharge. AGR's internal processes will ensure that these conditions are met. Monitoring is undertaken prior to discharge to Cockburn Sound and discharges to SDOOL will continue to be monitored.

Submission 7

The concentration of Cu in wastewater should be less than 1ppm and therefore this does not need to be changed in commitment 3;

Proponent Response

Yes this is correct.

Submission 8

Commitment 3 requires TN in wastewater to be less than 14kg/day. The PER predicts up to 19 kg/day. Can this be reduced to 14 kg/day, given that page 70 says the current discharge is 3.34 kg/d?

Proponent Response

No, this cannot be reduced as the load can vary and the 19kg was calculated based on design estimates. However, CSBP's overall nitrogen discharge (where the nitrogen actually is discharged to the environment) will continue to comply with existing commitments.

Submission 9

Is there the possibility of ammonia reacting with chlorine to form chloramines and for these to be discharged to the marine environment (not included as part of this proposal);

Proponent Response

The modifications to the wastewater system have been reviewed with the Department of Environment in Kwinana and have been included in this project to reflect transparency. There is potential for chloramines to be produced under certain conditions. Process controls including pH and chlorine monitors and trip set points prevent these conditions occurring.

2.4 Accident and Emergency Response

Submission 10

FESA has reviewed the Public Environmental Review (April 2005 No 2004/215) with respect to its role and responsibilities as an emergency service.

There are no issues of concern and FESA will work with the proponent and in association with DoIR and FPA as may be required in the preparation of a facility emergency response plan (commitment 9 p.87), the transport management plan (commitment 10 p.88) and the solids export emergency response (commitment 11 p. 89)

Proponent Response

AGR values its relationship with FESA and will continue to work with FESA to manage and continuously improve emergency management of our site and operations.

Submission 11

Given the nature of CSBP's industrial complex and the various chemicals stored on site, it is important that CSBP has strategies and actions in place to minimise any potential hazards associated with the operation and upgrade of the Sodium Cyanide Facility. The City of Rockingham is an important stakeholder and as such, requests that CSBP fully inform the City of the strategies and actions being

taken to minimize hazards associated with the expansion of the facility, and that it maintain a close liaison with the City's Fire and Emergency Administration Officer in this regard.

Proponent Response

AGR, as detailed in the PER, adopts a progressive approach to public safety, and the relevant regulators. CSBP, on behalf of AGR, operates its Major Hazard Facilities under Safety Cases, and Safety Management Systems endorsed by DoIR, and maintains a strong and positive relationship with FESA.

AGR will arrange for the City of Rockingham to receive the briefing requested, while at the same time maintaining our existing links to the Rockingham Local Emergency Management Committee.

2.5 Greenhouse Gases

Submission 12

*The City notes that the statement in the PER that additional greenhouse gases emitted due to the expansion of the Sodium Cyanide Manufacturing Facility will be relatively minor. The City seeks confirmation that these emission levels meet appropriate EPA standards and will be regularly monitored and reported***.**

Proponent Response

AGR regularly monitors both carbon dioxide and nitrous oxide and reports our greenhouse emissions as part of our commitment to the Greenhouse Challenge. Information on emissions is also included in the Wesfarmers Annual Social Responsibility Report.

AGR as a business is a net generator of power through waste heat (and heat of reaction) capture. AGR is continually seeking to improve the efficiency of these operations and generates sufficient electricity to power the entire AGR business including the expanded solids plant.

The State and the EPA are currently developing policy statements and standards in regards to greenhouse emissions and AGR will remain up to date on the progress in this area.

2.6 Cumulative Effects of the upgrade of the Sodium Cyanide Facility and the expansion of the Ammonium Nitrate Production Facility

Submission 13

It is important that the EPA consider the cumulative impacts of the two expansion proposals to the CSBP facility. For instance, what are the cumulative effects of the two proposals for air emissions and noise? Might the combined effects contribute to an exceedance of EPA guidelines and regulations?

Proponent Response

Noise modelling for the sodium cyanide solids plant upgrade included emissions from the proposed ammonium nitrate upgrade. Noise emissions from the CSBP / AGR Sodium Cyanide Manufacturing Facility site have been systematically reduced over the past five years. The attenuation measures have been focused on the high sound power noise sources and include significant noise sources which were elevated relative to the surrounding topography and buildings. As a consequence of the high noise emissions experienced during commissioning of the new Ammonia Plant in late 2000, CSBP has placed a strong emphasis on ensuring that the engineering / acoustic design of new plant minimizes noise emissions at design. The proposed upgrades of 2005 reflect the CSBP commitment to minimizing environmental noise emissions.

In addition, CSBP contributes to the Kwinana Industries Council (KIC) noise studies as described earlier. Table 4 (Appendix 3 Table 14 of PER) outlines that CSBP's contribution to noise levels has reduced significantly from 38.9 (2001) to 29.5 (2005) at Calista for example. Therefore our contributing source ranking from the KIC 2001 report has changed from 1st ranked contributor to 5th ranked contributor. The cumulative noise from the entire CSBP site will be further reviewed through the KIC noise study which is due to be completed in the latter half of 2005.

Cumulative modelling for ammonia (CSBP and AGR) has shown that emissions from CSBP (including AGR) would need to increase approximately 20 fold to cause the annual average ammonia ground level concentration to approach the USEPA guideline level, taking cumulative impacts from other sources into account.

Submission 14

Further, in respect to the cumulative emission of Greenhouse Gases, advice is sought as to whether CSBP is currently engaged in any Greenhouse Gas mitigation strategies and, if not, whether this should be considered as part of these expansion proposals.

Proponent Response

CSBP is a member of the Greenhouse Challenge Program. AGR is 75% owned and wholly operated by CSBP Limited and hence AGR is also part of the Greenhouse Challenge Program, in which CSBP / AGR measure and report on greenhouse emissions. This information is also included in the Wesfarmers annual Social Responsibility Report to which CSBP contributes.

Under the expanded scenario, it is anticipated that greenhouse emissions from the Sodium Cyanide Manufacturing Facility will increase by 3.6% compared to current approved operations. The solids plant contribution to the facility greenhouse gas emissions will increase from 5% to 8%. This is predominantly related to the amount of power generated and consumed. CSBP has a site power management system to manage power distribution, and will where possible continue to favour the utilisation of off peak times when additional power is required for discretionary work.

The solids plant emissions will constitute approximately 1.2% of the total greenhouse gas emissions inventory for CSBP business units. CSBP emissions as a whole will increase by approximately 0.5% after the upgrade. The main contributor of greenhouse emissions from CSBP's operations (including AGR) is the generation of nitrous oxides from our nitric acid plant. CSBP continue to monitor these emissions and have outlined a management approach in the PER (2005) for the proposed upgrade of the nitric acid and prilling plant.

2.7 Air Emissions

Submission 15

The overall approach adopted is considered conservative and unlikely to result in an under-estimation of potential health risks. Concerns held by the DOH with respect to the air quality screening assessment are minor and are not considered to affect the validity of the conclusions made. Notably, the DOH concurs with the conclusion that the predicted air emissions are unlikely to significantly contribute to adverse health effects. Remaining matters of concern to public health are also considered to have been appropriately investigated. The mitigation and

management strategies proposed by AGR are anticipated to adequately ensure that public health is protected.

Proponent Response

AGR set out to be conservative in the modeling and assessment of health risks to ensure we managed emissions and risks appropriately. AGR appreciates DOH's comments.

Submission 16

Other airborne emissions, such as hydrogen cyanide, sodium cyanide particulates and ammonia are also of concern to the City given the proximity to residential areas. The City notes the findings of the PER that the emission levels for these gases are to be within acceptable levels. It is important that these and other emissions are regularly monitored and that the results be made available to the community.

Proponent Response

The emissions from the solids plant are monitored on a regular basis from the associated stack which is required as part of the EP Act Part V licence. The monitoring information, like the licence requiring it, is available publicly through the DoE, although AGR can provide it on request. Further information regarding ambient concentrations of certain elements will be obtained from the results of the Department of Environment Air Toxics Study which is due to be concluded in late 2006. This study includes monitoring and review of nitrous oxides and ammonia (currently at Wells Park and only from July 2005 – CSBP as part of this PER and the ammonium nitrate expansion will seek support from the KIC to expand ambient ammonia monitoring to two further locations).

Submission 17

Could AGR please supply the concentration of emissions of ammonia and cyanide in Table 5 of the PER.

Proponent Response

The table below outlines the concentration of emissions.

		25000tpa	**30000tpa**	**45000tpa**
Ammonia	**mg/Nm3 (dry)**	**223.6**	**253.4**	**281.6**
Total cyanide	**mg/Nm3 (dry)**	**111.8**	**126.7**	**136.1**

Submission 18

Could AGR explain what modifications will be made to scrubbing systems to keep emission concentrations to current levels or, if concentrations are to increase, that they are still implementing "best practicable measures" of reducing emissions.

Proponent Response

The solid sodium cyanide plant is being upgraded gradually through a phased process. The plant is currently capable of producing more than 25,000 tonnes per year. At each further increase that occurs over time, there will be an assessment of emissions and more broadly plant efficiencies. The scrubber will be upgraded in response to emission results to ensure emissions remain as low as practicable and within DoE requirements. The scrubber system is also a critical plant item and when not operating at desired settings the plant will shut down.

The solid sodium cyanide process is designed to recirculate dust for reprocessing with small amounts being discharged through the stack. The scrubber system consists of two wet scrubbers with demisters for removal of dust and hydrogen cyanide gas. The stack is tested regularly. Modelling conducted, which included data of particulates from testing, has predicted ground level concentrations to be less than 3% of the NEPM standard for $PM_{2.5.}$ This indicates that the scrubber is effectively removing particulates. The modelling also assumed all particles were $PM_{2.5.}$ which provides a conservative estimate of impacts since the health risk of particulates tends to decrease with increasing particle size. Testing on a regular basis and process controls will be used to demonstrate the performance of the scrubbers during the upgrade. Should the emissions increase close to the proposed and modelled amount of 0.58g/s hydrogen cyanide, which has been confirmed to be below health and environmental protection guidelines, modifications to the scrubber to improve performance will be implemented. The regular testing process will ensure AGR has good data on scrubber performance as plant rate is increased.

The chilled water stripper is used for removal of ammonia. We proposed an increase to 1.2g/s with potential for short peaks of 1.5g/s of ammonia. The modelling has indicated that 1.5g/s is below health and ambient air guidelines. At this stage it is not determined what modification will be required to maintain ammonia emissions to these limits. As mentioned above, as the plant capacity is gradually increased the performance of the ammonia stripper will be closely monitored to ensure compliance with these commitments which will become licence limits.

As AGR progresses through the expansion related processes, any upgrades to the scrubber unit will be in accord with DoE licence requirements and will also be

discussed with the DoE as part of AGR's ongoing licence management processes.

Submission 19

Table 9 does not relate ground level concentration to an emission rate.

Proponent Response

The ground level concentration in Table 9 utilises the emissions rate from Table 8.

The paragraph below on page 52 states;

"The results presented in Table 9 indicate that if ammonia and cyanide are emitted at the current or proposed licence limit emissions rates the resultant ground level concentrations would be significantly lower than relevant ambient air guidelines"

The proposed emission rates from Table 8 are 0.58g/s for cyanide emissions and 1.2-1.5g/s for ammonia with 1.5g/s being modelled.

Submission 20

Could AGR please supply the normal operating range of discharges for the purpose of setting emission targets.

Proponent Response

From current records based on monthly stack tests the normal operating range is 0.1g/s to 0.8g/s of ammonia with an average of 0.4g/s, and 0.065g/s to 0.49g/s with an average of 0.2g/s of hydrogen cyanide.

Submission 21

Besides normal operating range of emissions, information on how often upsets could occur and emissions from these is also required.

Proponent Response

Plant upsets can and do occur, however their input to emissions is of a minor nature as process control mechanisms ensure that significant deviations from normal operation will lead to a plant shutdown. Monthly testing provides a representative indication of emission results and as mentioned an automatic plant shutdown will result if the scrubbing system is not operating effectively, which will act to prevent increases in emissions during this period.

Submission 22

What discharge of ammonia from AGR would cause the cumulative impact of ammonia to exceed a health standard at the Kwinana Beach?

Proponent Response

The modelling predicts that the CSBP contribution to the maximum 1 hr average ammonia ground level concentration is relatively insignificant and the maximum 1 hr average ground level concentration is dominated by adjacent sources in the model domain. Cumulative modelling for ammonia (CSBP and AGR) has shown that emissions from CSBP (including AGR) would need to increase approximately 20 fold to cause the annual average ammonia ground level concentration to approach the USEPA guideline level, taking cumulative impacts from other sources into account. Such an increase in emissions is not predicted to cause a significant increase in the 1 hr ground level concentration which would remain at approximately half the OEHHA guideline level (California Office of Environment Health Hazard Assessment - 3200ug/L).

(see Environ Memorandum (9th June 2005) Response to Questions arising from Cyanide and Prilling Plant Upgrade)

Submission 23

Given that there are very large emissions of NO_2 during start-up, this pollutant should have been discussed in the PER if only to be dismissed as insignificant for normal operations.

Proponent Response

Emissions of NOx occur during the start up of the sodium cyanide liquids plant. Start up of the solids plant does not produce NOx emissions. The upgrade to the solids plant has no impact on the start up of the liquids plant which is addressed through an existing EP Act Part 5 Licence, hence it was not mentioned in this solids expansion PER (it has been previously when the liquids plants have been assessed).

Submission 24

If building wake effects are being found for plumes, are stacks at an adequate height?

Proponent Response

The stack heights influence dispersion characteristics. The current heights were utilised in the modelling which determined the impact of emissions from the upgraded sodium cyanide solids plant. The modelling determined that the ground level concentrations for both ammonia and hydrogen cyanide are expected to be below ambient air quality criteria. The maximum predicted 1 hour average ground level concentration for ammonia is 155ug/m^3 (based on 1.5g/s scenario and is 5% of the guideline) and for cyanide is 60ug/m^3 (18% of guideline).

This indicates that the dispersion profile from the emissions accounting for building wake effects is adequate and therefore stack heights are adequate.

Submission 25

There is no information presented on short term (1-hour concentrations) of ammonia from the other source and hence no cumulative short term ammonia concentrations modelled. Is this information available from any source?

Proponent Response

Additional modelling indicated that CSBP's contribution to 1 hr maximum ammonia ground level concentrations is not significant and the total emissions from the site could be increased 3 fold with negligible impact.

The short term cumulative impact of CSBP emission increases has been modelled based on NPI data from premises in the area and assuming each is a volume source. These assumptions are likely to lead to significant errors and these errors will be greater for short term averaging. The presence of ambient monitoring data would enable better understanding of the cumulative impact of increasing emissions, however in the absence of such data the modelling provides an indication of short term cumulative impacts.

KIC is contributing to the Air Toxics Study which the Department of Environment is conducting. This study will further contribute to assessing cumulative effects of emissions through developing specific contaminant data at sensitive premises and in AGR/CSBP's view this is the most appropriate way to identify any health or environment issues in the air shed.

Cumulative modelling for ammonia (CSBP and AGR) has shown that emissions from CSBP (including AGR) would need to increase approximately 20 fold to cause the annual average ammonia ground level concentration to approach the USEPA guideline level, taking cumulative impacts from other sources into account.

Submission 26

The cumulative modelling has not been presented as requested in the Department of Environment's Air Quality and Air Pollution Modelling Guidance Notes (2000)

Proponent Response

The additional cumulative modelling report conducted by Environ is presented as outlined in the *Department of Environment's Air Quality and Air Pollution Modelling Guidance Notes (2000).*

Submission 27

The licence condition for ammonia emissions will need changing.

Proponent Response

Yes, this can be addressed through EP Act Part V licence condition amendments.

ENVIRON

Memorandum

To: Cameron Schuster, CSBP Ltd

From: ENVIRON
Date: 9 June 2005

SUBJECT Response to Questions Arising from Cyanide and Prilling Plant Upgrade PER's

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Introduction

CSBP Ltd and Australian Gold Reagents (collectively referred to as CSBP in this document) have recently submitted Public Environmental Review (PER) referral documents to the Environmental Protection Authority (EPA) for assessment. These referrals are related to upgrades to the prilling, nitric acid and cyanide plants at the CSBP Kwinana premises.

As part of the PER, ENVIRON undertook air dispersion modelling to predict impacts resulting from the upgrades, including the impact of increasing ammonia emissions that will result from the prilling plant and cyanide plant upgrades. Reports on these studies are included in the respective PER documents.

Following submission, questions have arisen regarding cumulative impacts of emissions, namely:

- What is the short term (1-hr average) cumulative impact of ammonia emissions, including from other nearby sources; and
- What emission of ammonia from CSBP would cause the cumulative impact health standards at Kwinana Beach?

This memorandum has been prepared to provide a response to these questions, and will be relevant to the assessment of both PER documents.

Study Design and Limitations

The information presented in this memorandum is an extension of a previous cumulative impact study conducted by ENVIRON, the report of which was referenced in the original PER documentation (ENVIRON, 2005), and which supplemented rigorous modelling undertaken to assess the impacts of the project in isolation.

To summarise the study presented in the original report, National Pollutant Inventory (NPI) data was obtained for each of the industries in the Kwinana area that emit significant quantities of ammonia and oxides of nitrogen. In the absence of adequate information regarding stack release parameters for sites other than CSBP, all sources were treated as volume sources, with release heights of 5m and 60m. The ISC3 Prime air dispersion model was then used to predict annual average ground level concentrations of the pollutants at various receptor sites in the region.

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Modelling was originally used only to predict annual average concentrations due to the inherent errors associated with the study, which included:

- The use of NPI data for emission estimates, which is often derived from generic calculations rather than source monitoring;
- The assumption that all emissions were volume sources at 5m height rather than stack emissions; and
- Lack of inclusion of smaller point and area sources of the pollutants.

These errors are less significant for long averaging periods used in the original study, due to statistical smoothing effects. However, the magnitude of errors increases with shorter averaging periods. ENVIRON therefore considers that the study design would only be appropriate for predicting short-term cumulative impacts if the errors listed above are addressed by the inclusion of more reliable and accurate model inputs.

Notwithstanding this, the original model was re-run to predict maximum 1-hr average ground level concentrations of ammonia upon request by the EPA.

Model Parameters

The additional modelling was undertaken using ISC3 Prime with the same meteorological data set (1980 Hope Valley) and volume source characteristics. However, only those sources with ammonia emissions were included, as summarised in Table 1.

Table 1
Volume Source Parameters

Facility	Part	Location AMG		Length (m)	NH_3 Emission (g/s)
		(mE)	(mN)		
CSBP	A	383,341	6,432,455	486	Various[1]
CSBP	B	383,827	6,432,455	486	Various[1]
CSBP	C	384,318	6,432,455	491	Various[1]
Alcoa	-	384,754	6,437,554	653	0.6
BP Refinery	-	383,523	6,433,679	900	0.1
Western Power	-	384,572	6,436,771	558	0.1
WMC Resources	-	383,739	6,431,191	761	53.7

Notes: 1. The model was run for the CSBP NH_3 emission scenarios of 0, 2.8, 5.6 and 8.4 g/s (from each of three modelled parts of the facility), representing CSBP NH_3 emissions of 0, 1, 2 and 3 times the current levels respectively. No differentiation was made as to whether the variations to emissions were occurring on Parts A, B or C of the site.

The model was run for four CSBP emission scenarios, these being:

- Zero ammonia emissions from the site;
- Current ammonia emissions from the site (based upon NPI reported data);
- Double the current ammonia emissions from the site; and
- Triple the current ammonia emissions from the site.

Both 1-hr and annual average ground level concentrations were predicted for each scenario.

Receptor Sites

Ground level concentrations at three receptor sites were predicted. These were also included in the original modelling study, and a map showing their precise locations is included in the previous report (ENVIRON, 2005). The receptor sites were in the suburbs of Kwinana Beach, Medina and East Rockingham.

Ambient Air Quality Criterion

There are no local ambient air quality guideline values for ammonia, however the Californian Office of Environmental Health Hazard Assessment (OEHHA) has set a 1-hr average guideline value of 3,200 µg/m^3 (OEHHA, 2000), and the United States Environmental Protection Agency (USEPA) has set an annual average guideline value of 100 µg/m^3 (USEPA, 2004). These criteria have been used in this assessment.

Modelling Results

The maximum predicted 1-hr ammonia ground level concentration at each of the receptor sites for each of the modelled scenarios is presented in Table 2.

Table 2
Predicted Ground Level Concentrations at Receptor Locations

Scenario	Maximum Predicted 1-hr Average GLC (µg/m^3)		
	Kwinana Beach	Medina	East Rockingham
No CSBP NH_3 Emissions	1640	747	614
Current CSBP NH_3 Emissions	1640	750	616
2x Current CSBP NH_3 Emissions	1640	753	619
3x Current CSBP NH_3 Emissions	1640	757	622

The data presented in Table 2 indicate that the CSBP contribution to 1-hr maximum NH_3 ground level concentrations is not significant, and that the total emissions from the site could be increased 3-fold with negligible impact. This is further demonstrated in Figure 1, which shows the predicted impact of increasing ammonia emissions from the CSBP site on ground level concentrations, expressed as a percentage of the OEHHA guideline. The data presented in Figure 1 applies to predicted cumulative ground level concentrations from each of the sources presented in Table 1.

Figure 1

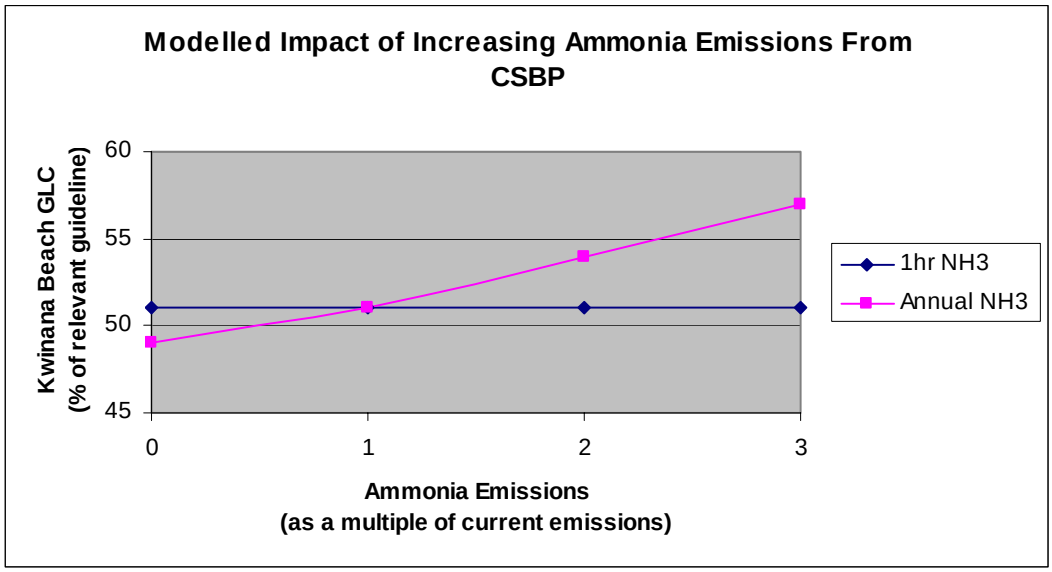

Figure 1 shows that increasing ammonia emissions at the CSBP site is predicted to have a greater impact on annual average Kwinana Beach ground level concentrations than 1-hr average concentrations. There is predicted to be a linear relationship between the magnitude of emissions from the CSBP site and ground level concentrations at Kwinana Beach. Assuming this relationship holds for higher emission rates, ammonia emissions from the CSBP site would have to increase approximately 20-fold to approach the OEHHA guideline level. The proposed upgrades will not involve emission increases of this magnitude.

Summary of Conclusions

ENVIRON undertook air dispersion modelling for CSBP to predict air quality impacts of upgrades to the prilling and cyanide plants. Upon request by the EPA, additional modelling has been undertaken to address questions that have been subsequently raised.

The short-term cumulative impact of CSBP emission increases has been modelled, based on NPI data from premises in the area, and assuming that each is a volume source. These assumptions are likely to lead to significant errors, and these errors will be greater for short-term averaging time predictions. The modelling results would be improved with the inclusion of more reliably accurate emission and source parameter data. The presence of ambient monitoring data would also enable a better understanding of the cumulative impact of increasing CSBP emissions. However, the additional modelling undertaken by ENVIRON has been conducted in the absence of such data at the request of the EPA, and may provide an indication of short-term cumulative impacts.

The modelling predicts that the CSBP contribution to maximum 1-hr average NH_3 ground level concentrations is relatively insignificant, and that the maximum 1-hr average NH_3 ground level concentration at Kwinana Beach is dominated by adjacent sources in the model domain.

The modelling also predicts that emissions from the total CSBP site would need to increase approximately 20-fold to cause the annual average NH_3 ground level concentration to approach the USEPA guideline level, taking cumulative impacts from other sources into account. Such an increase in emissions is not predicted to cause a significant increase in the 1-hr average ground level concentration, which would remain at approximately half the OEHHA guideline level.

References

ENVIRON (2005). *Kwinana Industry Screening Assessment from NPI Data – Ammonia and Oxides of Nitrogen Emissions*. Report for CSBP by ENVIRON, April 2005.

OEHHA (2000) *All Acute Reference Exposure Levels Adopted by the OEHHA as of May 2000*. Office of Environmental Health Hazard Assessment, Sacremento, 2000

USEPA (2004) *Integrated Risk Information System*. Downloadable database, October 4 2004 version.

* * * *

I trust this memorandum presents sufficient information for your current purposes. Should you have any queries please do not hesitate to contact us.

Brian Bell
Principal