

ASSESSMENT REPORT

CONSTRUCTION AND OPERATION OF A WASTE GAS CLEANING PLANT TO REDUCE WASTE STACK GAS EMISSIONS FROM THE EXISTING SINTER PLANT ON THE BHP STEELWORKS, PORT KEMBLA



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REPORT ON THE ASSESSMENT OF A DEVELOPMENT APPLICATION PURSUANT TO SECTION 80 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

1 SUMMARY

A Development Application (DA) has been submitted to the Department by BHP Ltd, (the Applicant), for land within the existing BHP Steelworks at Port Kembla.

BHP Ltd, in consultation with the Environment Protection Authority (EPA), is currently working on the implementation of a Pollution Reduction Plan (PRP) at the steelworks. The plan has the aim of reducing waste stack gas emissions from the existing No. 3 Sinter Plant.

To achieve this aim, BHP proposes to construct and operate a downstream waste gas cleaning plant at the existing Sinter Plant, based upon a moving packed char (carbon) bed. The plant is to be located at the old No. 2 Sinter Plant site, between the existing No. 3 Sinter Plant and the No. 1 Products Berth, on the BHP Steelworks, Port Kembla.

Under the *Environmental Planning and Assessment Act 1979*, (EP&A Act), the proposed development is classified as State Significant, Integrated and Advertised development. The Minister for Urban Affairs and Planning is the consent authority for the DA.

The proposed development is an alteration to an existing development. The Department has assessed the proposal against the criteria in Part 2, Schedule 3 of the *Environmental Planning and Assessment Regulation 2000* (the Regulation), and does not believe that the proposed development would significantly increase the environmental impacts of the total development. In fact, it is likely to reduce these impacts. Consequently the Department recommends that the Minister determine that the proposed development is non-designated development.

The DA and supporting SEE were publicly exhibited from 15 February 2001 until 19 March 2001. A total of 315 submissions were received by the Department. Of these, 311 were from the public, including 308 in the form of a bulk community submission.

The remaining four submissions were from Wollongong City Council, Penrith City Council, the Environment Protection Authority and the Illawarra Area Health Service.

The bulk community submission, and another submission from a member of the public, raised direct objection to the proposed development on the basis that the community had not been adequately consulted with regard to the proposal. All other submissions expressed general support for the proposal on the grounds that it would improve the quality of air emissions from the Sinter Plant, but raised a number of concerns. These concerns primarily related to:

- the levels of dioxin and radionuclide emissions resulting from the proposed waste gas cleaning plant;
- the appropriate method for the disposal of non-liquid waste produced by the proposed development; and
- details regarding the pipeline used to transfer Sulphur Rich Gas (SRG) from the proposed development to the Incitec processing plant.

The Environment Protection Authority (EPA) has subsequently granted General Terms of Approval for the development proposal.

The Department has assessed the DA, the SEE and the submissions on the proposed development, and recommends that the Minister approve the DA, subject to the imposition of certain conditions.

2 PROPOSED SITE AND SURROUNDING LAND USE

The proposed site for the plant is immediately to the east of the existing No. 3 Sinter Plant, on the old No. 2 Sinter Plant site, adjacent to the No. 1 Products Berth. Immediately to the north and east of the site is the Inner Harbour, while to the south and west is BHP Company property. The proposed site is entirely within the existing BHP Steelworks. [Figure 1](#) on the following page shows the layout of the BHP Steelworks site, and the location of the proposed waste gas cleaning plant.

The proposed development would occupy a footprint area of approximately 6,000 m² (110m long by 54m wide). The tallest section of the waste gas cleaning plant would approach 65m, while the majority of the plant would be 55m tall. The discharge stack would be 100m high. [Figure 2](#) gives an artist's impression of the proposed plant.

3 THE PROPOSED DEVELOPMENT

3.1 Need for the proposal

The Sinter Plant is part of an extensive infrastructure servicing the Steelworks at Port Kembla. Producing approximately 5 million tonnes of sinter per year, it is central to the production of iron in the blast furnaces. Sinter and blended lump ore are the primary metalics fed to the blast furnaces in an agglomeration process which fuses fine iron ore, coke and fluxes. Sinter is important as an iron source and also aids the permeability of the blast furnace burden.

The Sinter Plant was commissioned in 1975. The existing plant and associated equipment currently being used are those installed during original commissioning. Research and investigations have shown that the current equipment is dated and the performance of the existing dry precipitators is not sufficient to remove the required level of dust and dioxins from the waste gas stream.

Pollution Reduction Program No. 53 (PRP 53), has been introduced by BHP, in consultation with the EPA in order to improve the environmental performance of the Sinter Plant. The PRP stipulates environmental outcomes for the operation of the plant. The purpose of the development proposal is to meet these environmental outcomes, and significantly reduce the impacts of the Sinter Plant on the surrounding environment. Specific objectives of the proposal include:

- the reduction of dust emissions from the Sinter Plant to less than 20 mg/Nm³;
- the reduction of dioxin emissions from the sinter plant to less than 0.3 ng ITEQ/Nm³, with a design limit of 0.1 ng ITEQ/Nm³;
- the reduction in emissions of sulphur oxides (SO_x) in excess of 750 tonnes per year from the Sinter Plant;
- the reduction in emissions of nitrogen oxides (NO_x) in excess of 320 tonnes per year 1 from the Sinter Plant; and
- the reduction in visual impacts of the gas plume from the stack, with the aim of no visible plume.

3.2 Outline of the proposal

3.2.1 The waste gas cleaning plant

Plant equipment associated with the operation of the No. 3 Sinter Plant would be unchanged with the addition of the new downstream waste gas cleaning plant. [Figure 3](#) is a flow diagram of the cleaning system within the proposed waste gas cleaning plant.

The existing ductwork from the Sinter Plant to the No. 3 stack would be re-directed to two new booster fans, capable of pushing the waste gas through the new gas cleaning equipment. The waste gas would pass from these fans into the absorbers. The char within the absorbers filters out dust particles and absorbs Volatile Organic Compounds (VOCs), dioxins and sulphur oxides. A secondary reaction that partially reduces nitrogen oxides also takes place within the bed. The cleaned gas passes out of the reactors and is discharged via a new 100m tall stack.

After filtering the gas, the char is discharged from the base of the absorbers and transferred to a regenerator. Dioxins collected by the char are decomposed in this environment and sulphur oxides and other acid gases are released and swept out of the regenerator, forming a Sulphur Rich Gas (SRG) stream. The SRG stream is cooled and cleaned in an on site washing system before being pumped off site for further processing. The preferred processing option is to pump the SRG via an underground pipeline to a neighbouring downstream processing plant owned by Incitec. This plant

would convert the SRG into sulphuric acid. The Applicant is currently negotiating with Incitec regarding the processing of the SRG.

3.2.2 Construction

Table 1 below, provides a summary of the major components of the construction works.

Table 1: Construction works for proposed Waste Gas Cleaning Plant

Plant Component	Description
Foundations	Excavation and installation using jack hammers, pile drivers, steel reinforcement cutting and welding equipment, mass concrete pours and finishing equipment.
Gas Cleaning Main Plant	Transport of equipment and materials to site (by ship and road), erection of steelwork by cranes, and installation of equipment.
Gas ducts from existing Sinter Plant to Gas Cleaning Plant	Transportation of prefabricated rolled steel plates to site, on site electrical welding of rolled plates into duct sections, installation of duct sections and support structures using cranes.
Main Stack	Transportation of prefabricated rolled steel plates to site, on site electrical welding of rolled plates into duct sections, erection of stack using cranes.
Sulphur Rich Gas Pipeline*	Transportation of support structures and pipe for portions of pipeline located on BHP and Incitec properties. Small excavator used to prepare trench for pipe sections on public land. Mobile cranes used to install pipe in trench.*

*Subject to an agreement being reached between the Applicant and Incitec.

Construction work would take from 7am to 6pm Monday to Fridays, and 7am to 1pm on Saturdays. The overall construction program would extend over a two-year period.

3.2.3 Commissioning and operation

Commissioning of the waste gas cleaning plant would take place over a period of several months and would be broken into several stages. Initial commissioning activities would address the operation of individual plant devices to ensure all items were operating as designed prior to the introduction of waste gas from the Sinter Plant. Once this stage was complete, the waste gas duct from the existing Sinter Plant main fans would be connected to the new waste gas cleaning plant.

Immediately after the introduction of waste gas, a series of tests would be undertaken to ensure the cleaning plant was functioning as specified. Approximately three months after the introduction of waste gases, and again after eighteen months, a series of

performance tests would be carried out to ensure that the criteria set out in the PRP were being met.

Operation of the waste gas cleaning plant is not expected to have any impact on existing sintering operations. The quantity of raw materials used and current methods for the handling of these materials would not change as a result of installing the waste gas cleaning system.

The cleaning plant would operate on a 24-hour basis, with planned shut-downs for maintenance work.

3.3 Employment and capital investment

At present, the Port Kembla Steelworks employs approximately 6,000 persons. The Sinter Plant employs approximately 50 persons, including staff, shift labour and maintenance personnel.

During construction of the proposed waste gas cleaning plant, employment is predicted to peak at approximately 200 persons, with an average of 150 persons over the 18 month construction period. During operation of the proposed waste gas cleaning plant and the Sinter Plant, it is predicted that employment levels will remain unchanged, at 50 persons, including staff, shift labour and maintenance personnel.

The proposal has an estimated capital investment of \$80 million.

4 STATUTORY PLANNING FRAMEWORK

4.1 Environmental Planning and Assessment Act 1979

State Significant development

The proposal fits within the definition of ‘metals, minerals or extractive minerals processing’ in paragraph (b) of Schedule 1 of *State Environmental Planning Policy No. 34 – Major Employment Generating Industrial Development* (SEPP 34).

According to advice from the Applicant, the proposal will have a capital investment value of approximately \$80 million, and therefore satisfies paragraph (a) of Schedule 1 of the policy, as it is an extractive minerals processing operation with a capital value in excess of \$20 million.

Under the provisions of SEPP 34, the proposed development is therefore State Significant development and the Minister for Urban Affairs and Planning is the consent authority.

Integrated Development

The proposal is also integrated development. In addition to development consent, approval is required from the Environment Protection Authority (EPA) under Section 48 of the *Protection of the Environment Operations Act 1997*. The EPA has provided its General Terms of Approval (GTA’s) for the development proposal.

Non-designated, advertised development

The proposed development is an alteration to an existing development. The Department has assessed the proposal against the criteria in Part 2, Schedule 3 of *the Environmental Planning and Assessment Regulation 2000* (the Regulation), and does not believe that the proposed development would significantly increase the environmental impacts of the total development. In fact, it is likely to reduce these impacts. Consequently the Department recommends that the Minister determine that the proposed development is non-designated development.

The proposed development is advertised development, and has been advertised in accordance with the Regulation.

4.2 Relevant Planning Instruments

4.2.1 State Environmental Planning Policies

The relevant State Environmental Planning Policies applying to the development proposal are:

- State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33); and
- State Environmental Planning Policy No. 34 – Major Employment Generating Industrial Development (SEPP 34).

The Department considers that the development proposal is generally consistent with the provisions of these State Environmental Planning Policies. A detailed assessment of the proposal against the requirements of these policies is contained in the Section 79(C) consideration in [Appendix A](#).

4.2.2 Regional Environmental Plans

The relevant Regional Environmental Plans applying to the development proposal are:

- Illawarra Regional Environmental Plan No. 1.

The Department considers that the development proposal is generally consistent with the aims and objectives of this REP. An assessment of the proposal against the requirements of relevant regional planning instruments is contained in the Section 79(C) consideration in [Appendix A](#).

4.2.3 Local Environmental Plans

The relevant Local Environmental Plans applying to the development proposal are:

- City of Wollongong Local Environmental Plan 1990.

The Department considers that the development proposal is generally consistent with the aims and objectives of this LEP. An assessment of the proposal against the requirements of relevant local planning instruments is contained in the Section 79(C) consideration in [Appendix A](#).

5 ENVIRONMENTAL IMPACT STATEMENT AND PUBLIC CONSULTATION

5.1 Date of DA Lodgement

The DA and SEE were lodged with the Department of Urban Affairs and Planning on 7 February 2001.

5.2 Exhibition Dates and Venues

Public exhibition of the DA and supporting documents took place between 15 February and 19 March 2001. The DA and SEE were exhibited at the Department's Information Centre in Sydney, the Department's Wollongong Office, Wollongong City Council, and the Nature Conservation Council of NSW.

5.3 Notification

Advertisements regarding the proposed development were placed in the Illawarra Mercury. Community groups considered by the Department to be potentially affected by the proposed development were notified by mail regarding the public exhibition dates, locations, and the Department's contact officer. In addition, a number of signs displaying the details of the DA were placed on site during the public exhibition period.

5.4 Submissions Received

A summary of all submissions received is attached as [Appendix B](#).

5.4.1 Community Submissions

A total of 311 submissions were received from the community. Of these submissions, 308 were in the form of multiple copies of a single letter of objection, with each copy signed by a supporting resident.

In relation to the proposed development, the issues raised in this 'bulk submission' were:

- community consultation;
- emission levels of dioxins and radionuclides from the Sinter Plant as a result of the proposed waste gas cleaning plant; and
- monitoring of Sinter Plant emissions.

The primary issues raised in the other three submissions were:

- positive environmental impacts resulting from the proposal;
- limits imposed by the EPA for dioxin emissions;
- details regarding the pipeline used to transfer Sulphur Rich Gas (SRG) from the proposed development to the Incitec processing plant;
- arrangements for the disposal of non-liquid waste; and
- community consultation.

These issues are discussed further in Section 6 of this report.

5.4.2 Agency Submissions

Submissions were received from Wollongong City Council, Penrith City Council, the Environment Protection Authority and the Illawarra Area Health Service.

The key issues raised in these submissions were:

- positive environmental impacts resulting from the proposal;
- limits imposed by the EPA for dioxin emissions;
- details regarding the pipeline used to transfer SRG from the proposed development to the Incitec processing plant; and
- arrangements for the disposal of non-liquid waste.

These issues are discussed further in Section 6 of this report.

6 CONSIDERATION OF KEY ISSUES

6.1 Air Quality

Air quality issues associated with the proposed waste gas cleaning plant are addressed in Section 5.2 of the SEE.

Construction

The SEE states that air quality impacts related to the construction of the proposed waste gas cleaning plant are likely to be restricted to dust emissions generated during site preparation and associated earth works. However, due to the significant distance between the proposed site and the nearest residential dwellings (over 1.5km), dust impacts during construction are not expected to be significant.

A number of mitigation measures to minimise dust emissions during construction are outlined in the SEE including:

- covering all trucks transporting spoil to and from the site;
- directing traffic leaving the site through a truck wash;
- undertaking regular watering of disturbed areas, including on-site stockpiles; and
- minimising areas of exposed earth.

Operation

The SEE states that potential air quality impacts relating to the operation of the proposed waste gas cleaning plant may arise from the following sources:

The new waste gas stack

Installation of the new waste gas cleaning plant would reduce air emissions from the No. 3 Sinter Plant operation. Following cleaning, the waste gas currently being discharged to the atmosphere via the No. 3 stack would instead be discharged through a new 100m stack. The estimated reduction in waste gas components resulting from the operation of the waste gas cleaning plant is outlined in the SEE.

It is apparent that the installation of the waste gas cleaning plant will achieve the objectives of PRP53 and meet the requirements of the EPA in this respect. Operation of the plant is predicted to result in:

- a reduction in dust emissions from the Sinter Plant operation from 100 mg/Nm³ to approximately 20 mg/Nm³;
- a reduction in dioxin emissions from the Sinter Plant operation from 3.0 Ng TEQ/Nm³, to considerably less than 0.3 Ng TEQ/Nm³. Indications from pilot plant studies suggest that the waste gas cleaning plant would meet EPA requirements regarding reductions in dioxin levels in the waste gas;
- a reduction in sulphur dioxide emissions from the Sinter Plant operations by approximately 60% from the current 4100 tonnes per year to approximately 1200 tonnes per year;
- a reduction in nitrogen oxide emissions from the Sinter Plant operation by between 5-15% from the current 4000 tonnes per year to approximately 3700 tonnes per year;
- a reduction in hydrogen chloride emissions from the Sinter Plant operation by between 40-90% (depending on gas waste temperature);
- a reduction in ammonia emissions from the Sinter Plant operation by approximately 25%, even though ammonia is used in the waste gas cleaning process; and
- a reduction in mercury emissions from the Sinter Plant operation by approximately 50%.

The SEE expects that normal operations at the Sinter Plant would exist for 99% of plant operational time. However, during start-up periods it is possible that the requirements set out in PRP53 regarding dust emissions may not be met. Currently dust emissions during start-up can rise to 400 mg/Nm³. Indications from pilot plant studies suggest that the waste gas cleaning plant would reduce dust emissions during start-up to approximately 200 mg/Nm³, and these emissions would fall to normal operating levels approximately two hours after start-up. It is stated in the SEE that the Applicant intends to investigate changes to the Sinter Plant start-up method and operations of the new waste gas cleaning plant during these times to reduce emission levels to approximate current normal operations. The Department has incorporated this commitment as a requirement in the recommended conditions of consent for the proposal.

The SEE states that start-up periods will not significantly affect emission levels for dioxins, nitrogen oxide and sulphur dioxide.

The Sulphur Rich Gas stream

The regeneration process in the waste gas cleaning plant involves flushing the regenerator with nitrogen to maintain an inert atmosphere. This liberates a Sulphur Rich Gas (SRG) stream that, after scrubbing, can be further processed to form a useful by-product. It is proposed to direct the SRG through a pipeline to a gas processing plant on the Incitec site in Port Kembla for utilisation in the manufacture of sulphuric acid.

The SEE states that during normal operations when the SRG is piped to the Incitec downstream gas processing plant, there would be a significant reduction in sulphur dioxide emissions from the Sinter Plant stack.

In the event that Incitec cannot accept the SRG due to operational problems, the Applicant states that the SRG will be recirculated through the waste gas cleaning plant. It is expected that the Incitec plant would have greater than 80% availability, and that recirculation of SRG due to operational problems would last for between 4-24 hours.

A monitoring system would be installed to detect system problems in the pipeline transporting SRG between the Sinter Plant and the Incitec gas processing plant. When the system detects that gas cannot be accepted at the Incitec plant, the recirculation system would be initialised, and the SRG would be injected back into the waste gas cleaning plant.

If the option to recirculate the SRG is not available due to equipment problems, a 'bleed' of SRG would be sent to the main stack. This situation represents the worst case scenario for the management of SRG, where sulphur dioxide emissions would be expected to approach the same levels as currently recorded from the Sinter Plant stack. The SEE states that in this event it is likely that air quality would still be higher than at present due to the sulphur dioxide averaging effect of the waste gas cleaning process.

The ammonia handling system

The use of anhydrous ammonia within the waste gas cleaning process has the potential to generate ammonia emissions and related odours. However, minimal ammonia emissions are expected, as a scrubbing system is to be installed to address ammonia leaks. Remote sensors, including audible and visible alarms, would be installed to detect leaks in the storage and transfer system, and the ammonia storage facility would be covered by a deluge facility to reduce the immediate impact of larger leaks.

The SEE states that emissions should therefore be limited to a point source during refilling of the storage tank, which would occur approximately once a month. Given the distance of the Sinter Plant to the nearest residential areas (over 1.5km) it is not perceived that these emissions and odours would reach the community. The storage and handling of ammonia and associated hazard and risk are considered further in Section 6.14 of this report.

The dust collection system

To prevent fugitive dust emissions when loading char into the plant, the receiving hopper will incorporate a suction system, connected to a dust collection system. This system also has the potential to generate dust emissions during the emptying of the silo, which would occur approximately once every two days. The silo would therefore also operate under a suction system to prevent dust emissions whilst unloading.

Submissions

A review of submissions received by the Department highlighted the following issues with regard to impacts on air quality:

- waste gas stack emissions;
- adequacy of the dioxin emission limit imposed by the EPA;
- odour emissions from ammonia handling and storage; and
- ‘bleeding’ of Sulphur Rich Gas (SRG).

Consideration

Waste gas stack emissions

A ‘bulk submission’ from members of the Port Kembla community expressed concern regarding changes to levels of emissions of pollutants from the Sinter Plant, particularly dioxins and dust, after implementation of the proposed waste gas cleaning plant. The submission stated that the waste gas cleaning plant would result in increased emissions from the Sinter Plant stack, and pointed to the fact that dust emissions will remain above EPA limits during start-up.

As previously discussed in this report, the waste gas cleaning plant has been developed in consultation with the EPA to reduce waste stack gas emissions from the existing No. 3 Sinter Plant. As indicated in this report, the plant will result in significant improvements to air quality by reducing emissions of dust, dioxins, sulphur oxides, nitrogen oxides, hydrogen chloride, ammonia and mercury.

The EPA has provide General Terms of Approval (GTA’s) for the proposed waste gas cleaning plant, and these GTA’s have been incorporated into the recommended conditions of consent for the proposal. The GTA’s include the objectives and requirements specified in the Pollution Reduction Program (PRP) for dust and dioxin emission levels, and the EPA is satisfied that these objectives will be met following implementation of the waste gas cleaning plant.

It is recognised by the Department and the EPA that during start-up of the Sinter Plant, the waste gas cleaning plant may be unable to achieve EPA emission limits for dust, and the aim of no visible emissions from the waste gas stack. This is reflected in the EPA’s GTA’s for the proposal, which exclude the requirement of no visible emissions from the stack for the first two hours after start-up. The Applicant has expressed a commitment to investigate modifications to both Sinter Plant start-up methods, and operations of the waste gas cleaning plant, in order to reduce dust emissions during start-up to approximate normal operations. The Department has incorporated this commitment as a requirement in the recommended conditions of consent for the proposal.

Adequacy of dioxin emission limit imposed by the EPA

A community submission raised concern that the EPA requirement to reduce dioxin emissions to below 0.3 ng TEQ/Nm³ was not sufficient, and that dioxin emission limits should be set to the international best practice benchmark of 0.1 ng TEQ/Nm³.

In response to this, the EPA stated that the dioxin limit specified in the GTA's represents best available control technology. The EPA also stated that it had included the requirement in the GTA's that the waste gas cleaning plant must be designed and operated so that emissions from the Sinter Plant do not result in any adverse health or environmental impacts on the surrounding community.

The EPA's GTA's also include the requirement that the Applicant develop and implement a dioxin pathway-monitoring program, to provide an assessment of the efficiency of the waste gas cleaning plant in relation to dioxin destruction. Under this monitoring program, the Applicant is required to submit a report to the EPA outlining the findings of the program. After consideration of these findings, the EPA will be able to modify the limits imposed for dioxin emissions if considered necessary.

Odour emissions from ammonia handling and storage

A community submission raised concern regarding the potential for odour emissions to be generated from the ammonia handling system. As previously discussed in this report, the EPA has incorporated measures into its GTA's for the proposed waste gas cleaning plant that address this issue, including the requirement for the Applicant to install an ammonia leak sensor system, fitted with audible and visible alarms. The Department has incorporated these GTA's into the recommended conditions of consent for the proposal.

It is therefore expected that emissions will be limited to a point source during refilling of the storage tank, which would occur approximately once a month. Given the distance of the Sinter Plant to the nearest residential areas (over 1.5km) it is not perceived that these odours would reach the community. The Department is therefore satisfied that issues relating to the handling and storage of ammonia can be adequately managed by the recommended conditions of consent.

'Bleeding' of Sulphur Rich Gas (SRG)

One community submission expressed concern regarding the proposal to 'bleed' SRG to the atmosphere through the waste gas stack. This option is considered to be the worst case scenario for the management of SRG, and would occur only under circumstances where Incitec is unable to accept the SRG, and recirculation of the SRG through the waste gas cleaning plant is not possible.

The EPA has included a measure in its GTA's for the proposal that requires the Applicant to implement measures to minimise the potential for air pollution resulting from a 'bleed' of SRG to the atmosphere.

6.2 Low Level Radioactive Substances

Radioactivity issues associated with the proposed waste gas cleaning plant are addressed in Section 5.2 of the SEE.

Testing of dust emissions from the Sinter Plant found low levels of Polonium-210 and Lead-210, which are naturally occurring radioactive materials (NORMs). Modelling of the emission levels detected to determine community exposure indicated that the NORMs were not considered to represent significant health risk to the surrounding community. The estimated range of radiation dose for the existing Sinter Plant was found to be between 2 and 20 microsieverts per year, which is within the Australian and international limits of 1000 microsieverts per year above background levels.

Submissions

The issue of radionuclide emissions was raised in a number of community submissions. A 'bulk submission' from members of the Port Kembla community stated that the impacts of radionuclides had not been sufficiently considered, and that the proposed waste gas cleaning plant would result in elevated emission levels of radionuclides. Another community submission stated that previous health risk studies carried out for the Port Kembla area did not consider the impacts of radionuclide emissions on the surrounding community.

Consideration

The Applicant is currently holding discussions with the EPA and the Illawarra Area Health Service to address this issue. In addition, Healthy Cities Illawarra Inc. is chairing a community steering group to investigate the significance of radionuclide emissions from industrial sources at Port Kembla.

The Department considers that the estimated level of radioactivity of the NORMs, which between 2-20 microsieverts per year, is significantly less than the Australian and international limits of 1000 microsieverts per year above background levels. The EPA has specified GTA's for the proposed development to ensure that the waste gas cleaning facility is designed and operated to minimise emission levels of radionuclides. The GTA's also include the requirement that the Applicant develop and implement a radionuclide-monitoring program.

6.3 Greenhouse Gas Generation

Greenhouse gas emission issues associated with the proposed waste gas cleaning plant are addressed in Section 5.8 of the SEE.

The trend in greenhouse gas emissions from the Port Kembla Steelworks between 1993 and present indicates a decline in greenhouse gas emissions from a peak of 11.57 million tonnes per annum in 1998 to 11.07 million tonnes per annum in 2000. Emissions are expected to decline further over the next five years to approximately 10.01 million tonnes per annum in 2005.

The forecast emission estimates include expected contributions from planned future projects, including the Pulverised Coal Injection Facility, which is currently under construction.

Reductions in greenhouse gas emissions have in part resulted from the closure of the No. 2 and No. 4 Blast Furnaces and improved efficiencies with the No. 6 Blast Furnace at the Port Kembla site.

Operation of the proposed waste gas cleaning plant would result in greenhouse gas emissions of approximately 30,000 tonnes per year. The estimated total greenhouse gas emissions from the Port Kembla Steelworks for the year ending 2002 is 10.63 million tonnes per annum. On a local scale, the proposed waste gas cleaning plant is therefore expected to contribute less than 1% of the total greenhouse gas emissions from the Steelworks.

Submissions

One submission from a community group raised concern regarding the level of greenhouse gas emissions from the Port Kembla Steelworks and the impacts of these emissions on local air quality.

Consideration

The Department considers that the contribution to greenhouse gas emissions resulting from the proposed waste gas cleaning plant is minimal, particularly in light of the improvements to air quality resulting from the operation of the plant.

6.4 Waste Management

Waste management issues associated with the proposed waste gas cleaning plant are addressed in Section 5.6 of the SEE.

The SEE divides waste generated by the proposed waste gas cleaning plant into three categories:

- non-liquid waste;
- liquid waste; and
- gaseous waste.

Non-liquid waste

The SEE states that the proposed waste gas cleaning plant would generate a non-liquid waste stream of approximately 2000 tonnes per year. This would consist of approximately 50% spent carbon and 50% dust collected from the waste gas stream. The waste gas dust would consist of alkali halides, iron oxides, fluxes and some heavy metals. Although the solid waste stream consists mainly of carbon, it borders on being classified as industrial waste and hazardous waste due to the presence of heavy metals, principally lead.

The non-liquid waste collected as a result of the gas cleaning process would be transferred to a receiving silo. The silo would operate under a suction system to prevent dust emissions whilst unloading. Three options for the disposal of non-liquid waste are outlined in the SEE:

- disposal off-site – the non-liquid waste would be transported to a licensed industrial waste landfill at Kemps Creek in the Penrith local government area. The waste would be transferred into a sealed container owned by a service provider, who would treat the waste prior to final emplacement. It is estimated that 3-4 truckloads per week would be transported to Kemps Creek;
- interim on-site storage – the Applicant is investigating the possibility of recycling part of the non-liquid waste stream within the plant; and
- emplacement on-site – the non-liquid waste would be treated to immobilise particles prior to storage and emplacement on-site. This is considered to be a short-term option given the lifespan of the Sinter Plant operations.

The SEE states that the preferred option is for the off-site disposal of non-liquid waste. For the first 12 months of operation of the waste gas cleaning plant it is proposed to arrange for off-site disposal whilst the waste gas cleaning plant is optimised and work is carried out to assess the content of the non-liquid waste and its suitability for recycling within the steelworks. Given that treatment and storage on-site would be a short-term solution, the Applicant would continue to investigate treatment processes, disposal options and reuse of the waste after plant commissioning.

Gaseous waste

The regeneration process in the waste gas cleaning plant involves flushing the regenerator with nitrogen to maintain an inert atmosphere. This liberates a SRG stream that, after scrubbing, can be further processed to form a useful by-product. It is proposed to direct the SRG through a pipeline to a gas processing plant on the Incitec site in Port Kembla for utilisation in the manufacture of sulphuric acid. The SRG stream, estimated at 15 to 20% volume/volume sulphur dioxide (500kg/hr SO₂) would enter the Incitec plant via an underground pipeline.

The Incitec sulphuric acid plant is currently licensed to discharge a maximum of 2800 mg/Nm³ sulphur dioxide from the Spent Acid Recovery Plant (SARP) stack. It is intended that the SRG stream from the proposed waste gas cleaning plant be incorporated within the existing license concentration limit.

The SEE states that further discussions are planned between the Applicant and Incitec to finalise the details for the management of the SRG stream.

Liquid waste

Liquid waste is generated from the cooling and cleaning of the SRG. Approximately 1 m³/hr of liquid waste at 70°C would leave the SRG scrubbing system. The liquid waste would require further treatment prior to being discharged from the site. The SEE states that the Applicant is currently assessing methods for treating the liquid waste stream and the development of a Waste Water Treatment Plant (WWTP). Methods for treatment to reduce the concentration of ammonia and heavy metals may include:

- precipitating the heavy metals by elevating the pH to a level where they form insoluble hydroxides;
- stripping the ammonia from the water by using steam or air and then reclaiming it for use in the main project; and

- polishing using ion exchange where an exchange resin is used to collect the residual heavy metals if required as a future development.

These treatment methods would generate a heavy metal rich waste stream that may be classed as either industrial or hazardous under the current legislation. In this circumstance, the SEE states that the liquid waste would be treated in the same way as the non-liquid waste in order to immobilise particles.

The dioxin concentration in the discharge after treatment would be undetectable. It is stated that this discharge waste stream would be such that it allows the Applicant to continue to meet the license requirements of the existing discharge point at the Ironmaking East Drain, which currently discharges between 250-750 m³/hr.

Submissions

With regard to waste management, the following issues were raised in submissions received by the Department:

- final arrangements for the disposal of non-liquid waste;
- disposal of non-liquid waste at Kemps Creek;
- details for the management of liquid waste and the Waste Water Treatment Plant; and
- details for the proposed pipeline to transfer SRG to the Incitec site.

Consideration

Final arrangements for the disposal of non-liquid waste

A submission from Wollongong City Council, and a submission from the community raised concern regarding the lack of detail in the SEE for the disposal of non-liquid waste, and the need to finalise these details prior to construction of the proposed waste gas cleaning plant.

The EPA has included a requirement in its GTA's for the proposal that the Applicant produces a Non-Liquid Waste Minimisation Strategy which identifies options for the disposal of non-liquid waste and measures to reduce the amount of non-liquid waste requiring disposal. This requirement has been incorporated into the recommended conditions of consent for the proposal.

Disposal of non-liquid waste at Kemps Creek

A submission from Penrith City Council raised concern regarding the proposal to dispose of non-liquid waste at the Kemps Creek landfill. The submission stated that the Council consent for the landfill site, granted in 1989, was for the continued extraction of clay and rehabilitation of the resultant void with non-putrescible solid waste. This waste was defined as being non-toxic, natural excavated materials, demolition waste, and inert by-product waste from manufacturing.

Since granting of this consent, the EPA has expanded the range of wastes permitted by their licence to include newly defined wastes including 'industrial waste'. The non-liquid waste from the waste gas cleaning plant will be classed as industrial waste.

However, Council considers that the disposal of industrial waste to be inconsistent with the development consent for the site.

In response to this submission, the Applicant forwarded a letter to the Department stating that although it was not aware of all the development consents applying to the landfill site, it was aware that the licence for the site was varied by the EPA under Notice Number 010047 to allow landfilling of industrial waste at the site. The Applicant also stated that the non-liquid waste from the waste gas cleaning plant would be classified as industrial waste after immobilisation of heavy metals.

The EPA has included a requirement in its GTA's for the proposal that the Applicant produces a Non-Liquid Waste Minimisation Strategy which identifies options for the disposal of non-liquid waste and measures to reduce the amount of non-liquid waste requiring disposal. This requirement has been incorporated into the recommended conditions of consent for the proposal.

Details for the management of liquid waste and the Waste Water Treatment Plant

A submission from Wollongong City Council raised concern regarding the lack of detail in the SEE for the treatment of liquid waste and the Waste Water Treatment Plant (WWTP).

The Department has included a requirement in the recommended conditions of consent for the proposed waste gas cleaning plant for the Applicant to submit full details of the WWTP, including details of the finalised method for treatment of liquid waste, and the quality and composition of effluent to be discharged after treatment, to DUAP and the EPA for approval prior to the issue of a construction certificate for this aspect of the proposal.

SRG Pipeline

A submission from Wollongong City Council, and a submission from the community raised concern regarding the lack of detail in the SEE for the SRG pipeline. In particular the SEE did not display evidence of a deal between the Applicant and Incitec regarding the disposal of SRG at the Incitec site, or details regarding the size, specifications and location of the pipeline.

The Department has incorporated a requirement into the recommended conditions of consent for the proposed waste gas treatment plant, that within three months of the date of consent, or as otherwise agreed to by the Director-General, the Applicant must submit a Sulphur Rich Gas Management Plan for approval by the Department. This plan is to be prepared in consultation with the EPA, and must address the following matters:

- confirmation of an agreement between the Applicant and Incitec for the SRG from the waste gas cleaning plant to be piped to and processed at the Incitec Plant;
- details of the proposed pipeline from the waste gas cleaning plant to the Incitec site;
- the management and use of the SRG within the Incitec site; or

- should the proponent not be able to reach an agreement on the disposal of SRG at the Incitec site, the plan must outline what measures will be put in place to ensure the maximum practicable recovery of SRG for treatment and subsequent reuse.

This Sulphur Rich Gas Management Plan must be approved by the Department prior to the issue of a construction certificate for this stage of the development.

6.5 Contaminated Land Remediation

Soil and groundwater issues associated with the proposed development are addressed in Section 5.1 of the SEE.

The proposed site for the waste gas cleaning plant consists primarily of reclaimed land. Sand and alluvial material, dredged from adjacent harbour areas was used as reclamation material. The proposed site was filled with steel plant waste approximately 40 years ago. The site is characteristic of a heavy industrial area and a modified coastal environment.

The SEE states that given the nature and history of the site, contaminated soil and groundwater may be encountered during excavation for the proposed waste gas cleaning plant, but that this was unlikely for the area. The SEE proposed to test areas to be excavated for contamination of soil and groundwater. If contaminated land was uncovered, the material would be contained on site and treated as required by the EPA.

Consideration

The issue of contaminated land was not raised in any submissions received by the Department. Notwithstanding this, the Department did not feel that the SEE adequately addressed potential soil contamination issues associated with the site for the proposed waste gas cleaning plant, and requested that the Applicant submit a report to the Department incorporating an assessment of the contamination of any soils to be excavated in preparation of the site for the waste gas cleaning plant. The Applicant is currently undertaking this work.

The Department has therefore also included a recommended condition of consent for the proposal, that should the assessment indicate that remediation of contaminated soils is required, the Applicant must, prior to the issue of a construction certificate for the proposal, remediate the contaminated soils, and submit a Remedial Action Plan for approval by the Department, which describes in detail the remediation works to be undertaken.

6.6 Water Quality

Water quality issues associated with the proposed waste gas cleaning plant are addressed in Section 5.4 of the SEE.

Groundwater

Current groundwater regimes below the site of the proposed waste gas cleaning plant will remain unchanged. Current infiltration levels will be reduced as the site for the waste gas cleaning plant will have a sealed ground surface with the same runoff characteristics to that of a sealed road.

Surface Water

The Steelworks, including the Sinter Plant and the site for the proposed waste gas cleaning plant incorporates a comprehensive surface water management system to catch and treat surface water runoff. Surface water runoff from the waste gas cleaning plant site would be integrated with the existing system.

Stormwater at the Steelworks is managed in accordance with principles developed in consultation with the EPA. For a paved area, being essentially where 'first flush' effects occur, runoff from a storm event is to be treated, or retained and treated up to a 1 in 10 return interval ten minute rainfall event.

The SEE states that should a retention basin be required it would be designed to meet the criteria as specified by the EPA. The stormwater treatment pond would have a total capacity of approximately 160m³, and would be designed to allow for the removal of first flush coarse particulates. The collected water would then be pumped into the existing storm water collection system at a controlled rate. In a storm event, should the ponds retention capacity be exceeded, then water would flow into the existing storm water system.

The existing storm water system collects water in the effluent station which then pumps water to the No. 4 Blast Furnace Thickener. The thickener has the capacity to treat this additional water if required as it was originally designed for a capacity of 800m³/hr when the No. 4 Blast Furnace was operating, but is presently only treating 150m³/hr.

All solids collected from the stormwater system prior to entering the No. 4 Blast Furnace Thickener would be analysed to assess the possibility of recycling. The No. 4 Blast Furnace Thickener then overflows into the Ironmaking East Drain that discharges directly to the Inner Harbour.

Waste Water

As discussed in Section 6.3 of this report, liquid waste is generated from the cooling and cleaning of the SRG. Approximately 1 m³/hr of liquid waste at 70°C would leave the SRG scrubbing system. The liquid waste would require further treatment prior to being discharged from the site. The SEE states that the Applicant is currently assessing methods for treating the liquid waste stream and the development of a Waste Water Treatment Plant (WWTP).

Consideration

The Department considers that the measures proposed for the management of surface and groundwater quality on the site for the proposed waste gas cleaning plant are adequate. The Department has incorporated the requirement that the Applicant prepares a Soil and Water Management Plan for the proposal, which addresses water quality management issues associated with the waste gas cleaning plant.

With regard to waste water, the Department has included a requirement in the recommended conditions of consent for the proposed waste gas cleaning plant for the Applicant to submit full details of the WWTP, including details of the finalised method for treatment of liquid waste, and the quality and composition of effluent to be discharged after treatment, to DUAP and the EPA for approval prior to the issue of a construction certificate for this aspect of the proposal.

6.7 Traffic Generation and Access

Traffic issues associated with the proposed waste gas cleaning plant are addressed in Section 5.7 of the SEE. [Figure 4](#) shows the layout of the road network servicing the Port Kembla Steelworks.

At present, approximately 1.8 million tonnes per year of raw materials are brought onto the Steelworks site by road. This represents approximately 51,000 vehicle movements per year, the majority of which enter the Steelworks via the 21 Area gate on Springhill Road.

Construction

The SEE states that two options for delivery of materials are under consideration, the final choice being determined by the construction contractor:

- sea and road – with this option, sections of equipment would be delivered to the grain terminal by trucks, ([see Figure 4 for the location of the grain terminal](#)), and larger sections would then be ferried across the inner harbour and landed directly onto the Steelworks; and
- road – with this option all construction traffic would be directed through the Sinter Plant Gate off Flinders Street. ([See Figure 4](#)). Should all segments be delivered by road then it is expected that the total truck movements may exceed 2000 during the 18-month construction period. This equates to approximately 4 truck movements a day.

The delivery of equipment and construction vehicles to the site would be staggered throughout the length of the construction period.

Operation

Operation of the waste gas cleaning plant is predicted to generate one return tanker movement per month for the delivery of anhydrous ammonia to the site. Other truck movements associated with the operation of the proposed waste gas cleaning plant include two deliveries of char per month and the removal of dust collected by the plant every second day. In total, the proposed waste gas cleaning plant is estimated to generate approximately 250 truck movements per year.

Access

Access arrangements for the waste gas cleaning plant would be the same as those currently adopted for the existing Sinter Plant.

The Port Kembla Steelworks is well serviced by the arterial road network. Major components in the vicinity of the Steelworks are Springhill Road, Five Islands Road and Masters Road. Traffic would approach the site using these roads, and as previously discussed, would then access the Sinter Plant via the Sinter Plant Gate of Flinders Street. The proposed access route is illustrated in [Figure 4](#).

Consideration

Issues relating to traffic generation and access were not raised in any of the submissions received by the Department.

It is considered that traffic generated by construction (2000 vehicle movements over 18 months) and operation (250 vehicle movements per year), can be accommodated by the existing road network, and is not significant within the context of existing traffic movements for the Port Kembla Steelworks, which equates to 51,000 vehicle movements per year.

The Department also considers that access arrangements for the Sinter Plant site, which will remain unchanged for the proposed waste gas cleaning plant, can accommodate traffic associated with the construction and operation of the proposed plant.

6.8 Noise

Noise issues associated with the proposed waste gas cleaning plant are addressing in Section 5.3 of the SEE.

Construction

During construction of the proposed waste gas cleaning plant activities identified as potential sources of noise generation include pile driving, jack picking and excavation. The SEE states that given the industrial nature of the steelworks and the proximity of the nearest residences, it is likely that most construction work, other than piling and similar high intensity sounds, would not be discernible at nearby residences during daytime periods.

In order to minimise disturbance, noisy construction activities as identified by the EPA, will be restricted to the hours of 7 am to 6 pm Monday to Friday, and between 7 am and 1 pm on Saturdays.

Operation

During operation, the SEE identifies the main noise sources associated with the proposal as being the two booster fans and one hot gas recirculating fan within the waste gas cleaning plant.

Acoustic noise modelling for the fans operating under adverse meteorological conditions showed an L_{Aeq} noise level of 42 dB(A) at the nearest residential boundary. This noise level is 7 dB(A) below night-time ambient background noise levels of 49 dB(A) and assumes no acoustic control measures on the fans. It is therefore considered that the predicted noise emissions from the waste gas cleaning plant would comply with the EPA noise limits for the proposal.

Traffic Noise

Operation of the waste gas cleaning plant is predicted to generate one return tanker movement per month for the delivery of anhydrous ammonia to the site. Other truck movements associated with the operation of the proposed waste gas cleaning plant include the two deliveries of char per month and the removal of dust collected by the plant every second day. It is considered that an increase in traffic of this order is unlikely to have a significant impact on traffic related noise from the Steelworks site.

Consideration

Submissions received by the Department did not raise noise emissions from the proposed waste gas cleaning plant as an issue of concern.

The EPA has included measures in its GTA's for the proposal to minimise noise emissions during construction and operation, including limits to the hours of operation for construction activities, and noise limits during operation. The EPA has also included the requirement for the Applicant to prepare a noise management document and a noise monitoring program, to ensure compliance with noise limits for operation of the waste gas cleaning plant.

The Department has incorporated the GTA's provided by the EPA into the recommended conditions of consent for the proposal, and considers that noise issues associated with the construction and operation of the waste gas cleaning plant can be effectively managed by these conditions.

6.9 Community Consultation

Community consultation issues associated with the proposed waste gas cleaning plant are addressed in Section 1.5 of the SEE.

The SEE states that the Applicant participates in monthly meetings with two separate community groups:

- Port Kembla Community Meeting, which has been running for approximately 17 years and is chaired by Wollongong City Council; and
- Cringila Community Group, which has been running for approximately 3 years.

The purpose of the community meetings is to discuss the environmental performance and planned operational improvements for the Steelworks and to identify areas of concern within the community as a result of these operations. The SEE states that representatives from the local community, Environment Protection Authority, Sydney

Water, Port Kembla Ports Authority, Incitec, and Port Kembla Copper are invited to these meetings.

The Applicant organised a press release to appear in the Illawarra Mercury on 6 June 2000, informing the community of the proposal to construct and operate a waste gas cleaning plant at the existing No. 3 Sinter Plant, and the related environmental issues.

In addition to this, as discussed in Section 6.2 of this report, a community-based committee chaired by Healthy Cities Illawarra Inc. has been established to investigate the issue of Naturally Occurring Radioactive Materials (NORMs) within the Sinter Plant emissions.

The Department has publicly exhibited the Development Application (DA) for the proposed waste gas cleaning plant in accordance with the requirements of the *Environmental Planning and Assessment Regulation 2000*. The DA was placed on public exhibition from 15 February to 19 March 2001. The DA and SEE were exhibited at the Department's Information Centre in Sydney, the Department's Wollongong Office, Wollongong City Council, and the Nature Conservation Council of NSW.

Advertisements regarding the proposed development were placed in the Illawarra Mercury, and community groups considered by the Department to be potentially affected by the proposed development were notified by mail regarding the public exhibition dates, locations, and the Department's contact officer. In addition, a number of signs displaying the details of the DA were placed on site during the public exhibition period.

Submissions

A 'bulk submission' from members of the Port Kembla community stated that the Applicant and the Department had not carried out community consultation with regard to the proposed DA.

Consideration

It is considered that the Department has carried out adequate community consultation in accordance with the *Environmental Planning and Assessment Regulation 2000*, through the public exhibition of the DA.

The Applicant is continuing to participate in monthly community meetings to discuss the environmental impacts and outcomes of the proposed waste gas cleaning plant. The Department has included a recommended condition of consent for the proposal requiring the Applicant to establish a complaints hotline in order to address any issues of concern raised by the public with regard to the Sinter Plant and proposed waste gas cleaning plant.

6.10 Socioeconomic Impacts

Social impacts associated with the proposed waste gas cleaning plant are addressed in Section 5.11 of the SEE.

Health

During operation, the proposed waste gas cleaning plant would significantly reduce the environmental impacts of the Sinter Plant on the surrounding community. The key benefits of the proposal relate to the reduction in emissions of dust, dioxins, sulphur oxides, nitrogen oxides, and plume visibility. These reductions are expected to have a beneficial impact on the social environment.

As discussed in Section 6.1 of this report, the concentration of dioxin emissions from the Sinter Plant waste gas stack are expected to be reduced by approximately 90% following the installation of the proposed waste gas cleaning plant. This reduction would have beneficial impacts for the community in terms of reduced health risk.

The SEE states that the predicted chemical contribution to the carcinogenic health risk for the Maximum Exposed Individual is expected to fall from 2.6×10^{-6} to 0.3×10^{-6} as a result of the operation of the proposed waste gas cleaning plant. This is within the acceptable level of 1.0×10^{-6} and is expected to reduce the total carcinogenic health risk associated with the operation of the Sinter Plant.

As indicated in Section 6.2 of this report, radionuclides present in dust emissions from the Sinter Plant are expected to be removed at a rate of 90 – 95% of the rate of dust removal. This would result in a health risk indistinguishable from the health risk associated with background levels.

Employment

At present, the Port Kembla Steelworks employs approximately 6,000 persons. The Sinter Plant employs approximately 50 persons, including staff, shift labour and maintenance personnel.

During construction of the proposed waste gas cleaning plant, employment is predicted to peak at approximately 200 persons, with an average of 150 persons over the 18 month construction period. During operation of the proposed waste gas cleaning plant and the Sinter Plant, it is predicted that employment levels will remain unchanged, at 50 persons, including staff, shift labour and maintenance personnel.

Consideration

The beneficial socioeconomic impacts associated with the proposed waste gas cleaning plant are therefore considered to be the reduced health risk to the community associated with the operation of the Sinter Plant, the provision of employment opportunities during construction of the plant, and the maintenance of 50 jobs associated with the operation of the Sinter Plant.

6.11 Visual Impacts

Issues associated with the visual impacts of the proposed waste gas cleaning plant are addressed in Section 5.9 of the SEE.

The visual character of the site for the proposed waste gas cleaning plant is heavy industrial, comprising large warehouses and buildings. The existing No. 3 Sinter Plant is approximately 48 m tall, standing adjacent to the electrostatic precipitators and the 100 m tall waste gas stack. [Figure 5](#) provides a view of the proposed waste gas cleaning plant within the Port Kembla Steelworks.

Construction

During construction, cranes and construction materials would be present on site. The SEE states that the visual impact of construction activities is not expected to be significant, as the presence of such material is typical of the site and would only be experienced for a limited period.

Operation

The proposed waste gas cleaning plant would be located within the existing heavy industrial complex in close proximity to other major structures including the existing No. 3 Sinter Plant. The position of the new plant, between the Sinter Plant and the Port Kembla Inner Harbour, would mean that the majority of the proposed structures would be screened from the view of surrounding residential areas. Whilst some structures, such as the elevator and the return conveyor, would be visible above the roofline of the Sinter Plant, they would be consistent with the existing structures of the Steelworks and the industrial skyline.

At present, the plume of the Sinter Plant stack, which contains particulate matter, has an adverse visual impact on the surrounding community. One of the objectives of the proposed waste gas cleaning plant is to reduce dust emissions from the Sinter Plant, with the aim of no visible emissions from the plume. Therefore, operation of the proposed waste gas cleaning plant will improve the visual impacts of the Sinter Plant on the surrounding community.

Consideration

Visual impacts relating to the proposed waste gas cleaning plant was not raised as an issue in any submissions received by the Department.

The proposed waste gas cleaning plant is in character with the surrounding industrial environment of the Steelworks, and will improve the visual impacts associated with the existing waste gas stack plume from the No. 3 Sinter Plant. The Department therefore considers that visual impacts associated with the proposed waste gas cleaning plant are minimal.

6.12 Flora and Fauna

Flora and Fauna issues associated with the proposed waste gas cleaning plant are addressed in Section 5.13 of the SEE.

The Port Kembla Steelworks has previously been cleared of vegetation to allow for extensive industrial development. The proposed waste gas cleaning plant would be constructed on the site formerly occupied by the old No. 2 Sinter Plant. The SEE states that there are no threatened fauna or flora species on the site.

As discussed in Section 6.6 of this report, there would be no untreated waste water or process water discharges from the waste gas cleaning plant to the stormwater systems leading to the Inner Harbour, and therefore impacts on aquatic ecosystems within the harbour are expected to be minimal.

Consideration

The Department concurs with the findings presented in the SEE, and is of the opinion that the impacts of the proposed waste gas cleaning plant upon flora and fauna are minimal.

6.13 Aboriginal and European Heritage

Aboriginal and European Heritage issues associated with the proposed waste gas cleaning plant are addressed in Section 5.12 of the SEE.

The proposed site is within a heavy industrial area, formerly occupied by the No. 2 Sinter Plant. Given the disturbed nature of the site, and its past use, it is considered that impacts upon indigenous heritage items would be unlikely.

No buildings within the vicinity of the proposed waste gas cleaning plant are older than 50 years, and no equipment operating at the site is considered to be of heritage value.

Consideration

It is considered that no heritage items would be impacted upon by the proposed development.

6.14 Hazards and Risk Impacts

Hazard issues associated with the proposed waste gas cleaning plant are addressed in Section 5.14 of the SEE.

The proposed development has been identified as potentially hazardous, and as such a Preliminary Hazard Analysis (PHA) has been prepared in accordance with the provisions of *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development*. Classification of the proposal as potentially hazardous is based on the

storage and/ or handling of toxic gases at the development, in particular anhydrous ammonia and sulfur dioxide (a component of the sulfur rich gas stream). The PHA considers the potential toxic effects of ammonia and sulfur dioxide releases in a number of scenarios, including leaks, catastrophic pipe/ vessel failures and tankers on-site. There is also some consideration of the combustion incidents involving ammonia, and the potential for knock-on events (with the proposed development as initiating and affected process).

Ammonia - Fatality Risk

Ammonia is to be stored on the site in a pressurised vessel, up to 25 tonnes, in an anhydrous form (although up to 0.2% by mass of water may be present with the ammonia to minimise corrosion potential). The ammonia will be transported to the development in tankers with capacities of 30 to 35 tonnes (ie B-double), at an estimated frequency of once every 20 to 30 days. The Applicant highlights that the ammonia will remain at ambient temperature at all times (under normal circumstances) during transport and storage and that the ammonia will be kept as a liquid through applied pressure only.

Modelling has been undertaken on behalf of the Applicant to demonstrate the potential risk impacts resulting from various releases of ammonia from the development. The PHA identifies that the single greatest contributor to fatality risk in relation to ammonia is a rupture in the unloading line hose between a road tanker and the development's storage vessel. Other significant events involve liquid releases of ammonia from the storage vessel and liquid line feeding the vaporiser. It is suggested in the PHA that release of ammonia gas (in the event of the liquid ammonia being depressurised before release) contributes minimal risk in comparison to liquid ammonia releases.

Results of the risk modelling for ammonia indicate that the Department's recommended maximum industrial fatality risk of 50×10^{-6} per year is not exceeded outside the boundary of the proposed development site. Further, the recommended residential fatality risk of 1×10^{-6} per year is not exceeded at greater than 250 metres from the development site. The Applicant highlights that the development will be located approximately 1.5 kilometres from the nearest residence, and therefore the recommended residential fatality risk criterion is not exceeded. The Applicant argues that the results of the ammonia modelling are conservative because mitigating measures have not been taken into account. It is proposed that fog sprays (water) will be employed in the event of an ammonia leak (ammonia is readily dissolves in water) with ammonia leaks being detected by alarmed ammonia sensors. Excess flow valves will be installed on liquid outlets from the storage vessel and tankers to minimise the potential for releases from these points.

With respect to the possible ignition of ammonia, the Applicant notes that ammonia has a relatively high ignition energy and a high auto-ignition temperature compared with most hydrocarbons. Therefore, it is unlikely that ammonia would ignite unless it came into contact with a significant energy source (high temperature or spark, for example). Combined with this is ammonia's narrow flammability range, which further restricts the conditions under which a fire/ explosion is feasible. The Applicant believes therefore that ammonia fires and explosions can be adequately

mitigated through the provisions of relevant Australian Standards alone, without the need for additional measures.

Sulfur Dioxide - Fatality Risk

The Applicant does not intend to store sulfur dioxide at the development, but rather pipe sulfur rich gas (containing 20% sulfur dioxide) to the adjacent Incitec site for conversion to sulfuric acid. There may be occasions on which Incitec is unable to accept the sulfur rich gas, in which case the Applicant proposes to vent the gas to atmosphere as is currently done at the existing sinter plant (this is considered a rare, worst-case situation).

As the sulfur rich gas pipeline is to be located underground, the Applicant suggests that the likelihood of leaks from the pipe are very low. However, there remains the possibility of risk impacts associated with a leak from the pipe between the waste gas cleaning plant and the point it becomes subterranean. The PHA presents modelling results to illustrate that leaks or failures of the pipeline in this area did not produce off-site fatality risk impacts that exceed 50×10^{-6} per year in an industrial area not owned by BHP, or 1×10^{-6} in a residential area. Significant fatality risk posed by sulfur dioxide is generally contained within the vicinity of the sulfur rich gas pipeline. The Applicant highlights that with appropriate selection of a route for the pipeline (restricted to BHP where possible, below ground etc), the fatality risk posed by a release of sulfur dioxide is effectively minimised.

Injury/ Irritation Risk

It is recognised that ammonia and sulfur dioxide can be fatal if experience at sufficiently high concentrations. In addition to fatality risk, both compounds are also capable of producing an injury or irritation response at concentrations below that likely to cause death. For ammonia, the PHA considers the irritation effects produced by exposure to 150 ppm (parts per million) of ammonia for up to one hour, and the injury effects of 750 ppm for the same period. Similarly for sulfur dioxide, irritation effects are considered at 2 ppm and injury effects at 15ppm for up to an hour.

Results of the injury/ irritation modelling presented in the Preliminary Hazard Analysis indicate that no residential area will experience injury risk at greater than 10×10^{-6} per year, or irritation risk at greater than 50×10^{-6} per year. The Applicant highlights that these values correspond to the Department's injury and irritation criteria over a short duration. As the concentration exposure limits considered as part of the modelling apply to exposure intervals of up to one hour, the Applicant argues that the results of the injury/ irritation modelling are conservative.

Societal Risk

While individual risk considers the possibility of fatality, injury or irritation of a particular person at a specified location, societal risk takes into consideration the actual population of the locality and the risk impacts on that actual population. It is argued in the PHA that modelling of individual risk impacts indicates that all significant risk will be contained within the boundaries of the Port Kembla Steelworks. As there is no existing population on the Steelworks (in this case, population is considered in the context of residential development in which people

may be assumed to be located 24 hours a day), the Applicant argues that there is little value in fully quantifying societal risk impacts.

Other Potential Hazards

In relation to health risk impacts, the Statement of Environmental Effects for the proposed development provides comment on the emission of polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzo-furans (PCDF), which are recognised as carcinogens. A Health Risk Assessment of the sinter plant was undertaken in January 2000, which concluded that the cancer risk posed to local residents as a result of the sinter plant (without the proposed gas cleaning plant) is 3×10^{-6} during a human lifetime. This value is a cumulative risk, taking into account PCDD and PCDF impacts, as well as other likely carcinogens including polycyclic aromatic hydrocarbons, benzene and heavy metals. The health risk impact from the sinter plant (without the gas cleaning facility) compares favourable with the EPA's advocated "unacceptable lifetime cancer risk" of 1×10^{-4} . The Applicant estimates that the emission of PCDDs and PCDFs will decrease by approximately 90% with the operation of the proposed gas cleaning facility, and accordingly the human health impact risk (cancer- and non cancer-causing) is also significantly decreased to 0.3×10^{-6} per human lifetime.

The Applicant also notes that the handling of materials on the site containing radionuclides. It is stated in the EIS that the radiation dose for the existing sinter plant lies in the range 2 and 20 microsieverts per year, which is 2 to 3 orders of magnitude below Australian and international standards. It is noted that because radioactivity is not dependent on the chemical nature of materials (ie the electronic configuration, oxidation state), the proposed development will not alter the level of radioactivity through chemical reaction.

In relation to the storage and handling of dangerous goods on the development site, the Applicant has indicated that it will comply with relevant Australian standards.

Submissions

All of the 311 public submissions (308 of which were identical) received in response to the exhibition of the subject development application raised human health impacts from the sinter plant as being of concern. The public is generally supportive of the proposed development, although submissions highlight that there is a consensus that reductions in compounds such as dioxins are not enough and that there remains a degree of residual health risk. Only one public submission raises environmental impacts associated with the toxic gases ammonia and sulfur dioxide. However, only the odorous effects of these compounds, and their broader environmental effects (acid rain and photochemical smog precursors) were stated as the basis for community concern. The Department has assumed that the public's concern in relation to human health impacts from the proposed development extends to fatality risk posed by ammonia and sulfur dioxide, although not explicitly stated.

In its submission to the Department, Council highlights its concern with regard to both the storage and handling of anhydrous ammonia, and the proposed sulfur rich gas pipeline from the proposed development to Incitec. Council indicates in its submissions that details of bunding and storage arrangements for the anhydrous ammonia would need to be submitted to the EPA and Council prior to a construction certificated being issued for the development. Council recommends that the Department include a condition of consent that requires all anhydrous ammonia storage to be undertaken in accordance with Australian Standard AS 23022-1983 *Anhydrous Ammonia - Storage and Handling*. Council has also recommended that a condition of consent also be included requiring all bunding to be at least 110% of the volume of the largest stored volume within the bund.

In relation to the sulfur rich gas pipeline, Council highlights this component of the development as being of concern particularly during times that Incitec is unable to accept the gas. The Department has assumed that Council's concern in this regard is based on the environmental impacts associated with venting sulfur rich gas to atmosphere, including the potential for increased risk impacts during such times.

Council has requested that hazards studies, namely a Project Risk Assessment, Hazard and Operability Study, Fire Safety Study, Emergency Plan, Safety Management System and Storage of Hazardous Substances Study be prepared and implemented in accordance with the Department's *Hazardous Industry Planning Advisory Paper* guidelines, prior to the commissioning of the gas cleaning facility.

The EPA's General Terms of Approval (GTA's) focus on hazards and risk issues in a direct manner in a limited number of instances. There are however, a number of GTA's that address precursors to risk impacts or act to mitigate risk although the specific GTA is provided for the primary purpose of mitigating a separate impact. For example, the EPA has imposed emission limits on ammonia and reduction targets for sulfur dioxide. These GTA's are first and foremost aimed at air quality impacts (odour, photochemical smog etc), but also act as a daily risk management measure. That is, the risk posed by normal daily operations is limited to the impact of the permissible emission concentrations of the relevant compounds. Health risk impacts have been incorporated into GTA's requiring monitoring of dioxins/ furans and radionuclides.

The EPA has also required bunding to a volume no less than 110% of the greatest stored volume within the bund. This bunding must be impervious and meet the requirements of the EPA's bunding and spill management guidelines. A specific spill response mechanism is required.

Consideration

The Department considers that the Applicant has provided adequate detail in the Preliminary Hazard Analysis (PHA) for the proposed development to permit an appropriate level of assessment of the risk impacts of the proposal. Further, it is noted that the format and content of the PHA complies with the guidelines provided in the Department's Hazardous Industry Planning Advisory Papers. Despite this, the Department is concerned that although the risk impacts associated with the sulfur rich gas pipeline between BHP and Incitec have been considered, the potential for the

configuration of the pipeline to alter (and change the potential risk impacts) has not been completely ruled out.

Ideally the Department would have liked to have seen evidence of a commitment to the final route and management practices for the pipeline included in the Environmental Impact Statement, through an agreement between BHP and Incitec for example. The Applicant has indicated that it is not able to finalise an agreement with Incitec at this early stage in the project, although positive discussions have been held between the parties. The Department generally accepts this constraint but recognises that it is not appropriate for an "open-ended" consent to be drafted that may permit development to continue that has not undergone an appropriate level of assessment. As such, the draft instrument of consent includes a requirement for a management plan to be submitted to the Director-General within three months of the date of the consent. The management plan is to provide details of the sulfur rich gas pipeline.

In the event that an agreement with Incitec, or the process of detailed design alters the configuration of the pipeline in such a way as to vary the possible risk impacts of the development, the Applicant is required to demonstrate that this risk impact is not unacceptable through a Final Hazard Analysis. The Final Hazard Analysis will also address any change to risk impacts associated with other components of the proposal. The Department considers that the management plan for the sulfur rich gas pipeline and the Final Hazard Analysis provide the Applicant with design flexibility within the scope of the development application, while maintaining adequate constraints on the development's environmental impacts (particularly risk).

The Applicant has adequately demonstrated that the risk impacts associated with the proposal are not unacceptably high. Fatality, injury and irritation risk impacts are well within recognised land use planning limits for industrial and residential areas. In relation to the potential for the development to be involved in a "domino scenario", the Department supports the Applicant's observation that it is unlikely the proposal will initiate hazards in other areas of the Steelworks. This is because the major risks associated with the development involve the release of toxic gases, which although they have implications for human health, will not affect the operation of inanimate objects (through fire, explosion etc). However, it is possible for a fire or explosion elsewhere at the Steelworks to initiate a release of toxic gas from the proposed waste gas cleaning facility. To address this issue, the Applicant has indicated that the development has been designed and situated to maximise the separation distance between it and potentially hazardous areas of the Steelworks. The Department has included a requirement for the preparation of Fire Safety Study in the recommended instrument of consent to ensure that adequate fire fighting measures are in place, whether the fire starts at the proposed development or elsewhere in the Steelworks. Further to this, the Applicant must update the Emergency Plan and Safety Management System for the Steelworks to reflect the new plant.

The Department considers that these reports are effective means of ensuring that appropriate hazards minimising processes/ procedures are in place prior to the operation of the development. To address possible hazardous interaction between the Steelworks and the development site during construction of the gas cleaning facility, the instrument of consent includes a condition requiring the preparation of a Construction Safety Study.

It is noted that risk impacts have been considered in the PHA based on the storage of up to 25 tonnes of anhydrous ammonia (pressurised) and delivery of ammonia in tankers of capacity 30 to 35 tonnes. To ensure that the development operates within the "environmental impact envelope" considered in the Statement of Environmental Effects, the Department has specified aforementioned storage and transport quantities as operating limits in the instrument of consent. In addition, the consent specifies that no sulfur dioxide (sulfur rich gas) is to be stored on the site, other than to ensure process continuity. Sulfur dioxide storage was not considered in the SEE or PHA, and is not considered to be necessary within the scope of the development.

The impacts of PCDDs, PCDFs, radionuclides and other materials with serious health effects have been demonstrated in the SEE to be within the tolerable impact limits for off-site receptors. However, the Department considers that it is important for these materials to be considered in the context of those people who will be working or, or in the vicinity of the proposed development. On-site safety and health matters lies within the statutory responsibilities of WorkCover NSW. To ensure that the Applicant complies with relevant requirements in relation to occupational health and safety, the recommended instrument of consent specifies that all matters identified by WorkCover must be addressed to the satisfaction of WorkCover. This extends to the storage of dangerous goods on the site, which may require a new or amended licence from that agency under the Dangerous Goods Act. Transport of dangerous goods to the site is covered by a Transport of Hazardous Materials Study required to be prepared by the Applicant under the recommended consent.

Both the EPA and Council have recommended General Terms of Approval/ conditions related to the provision of bunding for dangerous goods storage. While the Department supports the installation of bunding, the scope of the EPA's and Council's bunding requirements seems internally inconsistent and perhaps ignorant of the nature of anhydrous ammonia. In the event of a leak of anhydrous ammonia, there will be a sudden pressure decrease (from the pressurised storage vessel to atmospheric pressure). A fraction of the ammonia will vaporise, forming ammonia gas and absorbing energy equivalent to the heat of vaporisation of that quantity of ammonia. Absorption of this heat will initially cool part of the escaping ammonia, forcing it to remain in the liquid phase until it has absorbed sufficient heat from its surroundings to vaporise also. This phenomenon, referred to as a "flash" results in there being two phases (liquid and gas) resulting from the escape of a pressurised gas. The Department recognises that containment measures will be required for the liquid phase, but given that some of the ammonia will be lost as gas (anywhere from a small quantity to all of the leak), the imposition of bunding to 110% of the volume of ammonia storage is seen as a little excessive. Therefore, the recommended instrument of consent has been drafted to only require 110% volume bunding for dangerous goods other than anhydrous ammonia. This bunding is also required to comply with the EPA's guidelines for bunding and spill management and relevant Australian Standards. To avoid internal inconsistencies in a case where Australian Standards, the EPA's guidelines or the 110% volume requirement conflict, the instrument specifies that the most stringent requirement shall prevail. In the case of anhydrous ammonia, the instrument only requires that the Applicant store and handle the ammonia in accordance with the relevant Australian Standard.

To ensure that hazards management is maintained through the life of the development, the Applicant is required to commission an independent Hazard Audit every three years. The Department recognises that this is an effective means of identifying hazardous practices and situations that may develop over time.

In summary, the Department considers that the risk impacts posed by the development are within acceptable limits. Through the recommended instrument of consent, the Department is satisfied that all conceivable hazardous events can be adequately managed and the consequent risk impacts mitigated.

7 SECTION 79(C) CONSIDERATIONS

The Department has evaluated the DA in accordance with the matters for consideration listed under Section 79(C) of the EP&A Act. Based on this evaluation, attached as [Appendix A](#), it is considered that the merits of the proposal warrant the granting of development consent, subject to the recommended conditions of consent.

8 CONDITIONS OF CONSENT

The recommended conditions of consent for the proposed development are at Schedule 2 of the Instrument of Consent. These conditions contain the General Terms of Approval (GTA's) provided by the Environment Protection Authority and take into account the issues raised in submissions received from the community, Wollongong City Council, Penrith City Council, and the Illawarra Area Health Service. The Department has consulted with the Applicant with regard to the draft conditions, and the Applicant has agreed with the draft conditions as proposed.

The conditions of consent have been drafted with the aim of controlling and monitoring the future environmental performance of the proposed development. The GTA's provided by the EPA relating to the requirements of an Environmental Protection Licence (EPL) have been incorporated into the recommended conditions of consent in order to limit emission levels of dust, dioxins, sulphur oxides and nitrogen oxides from the waste gas cleaning plant. Key issues covered by the conditions of consent include:

- **Air quality impacts** – to limit and monitor emissions from the waste gas cleaning plant, including dust, dioxins, sulphur oxides and nitrogen oxides;
- **Sulphur rich gas** – to control and manage the emission and re-use of sulphur rich gas;
- **Radionuclides** – to monitor and minimise the emissions of radionuclides from the waste gas cleaning plant;
- **Waste** – to manage the disposal of non-liquid, liquid and gaseous waste from the waste gas cleaning plant;
- **Noise** – mitigation of construction noise, and monitoring of noise impacts;
- **Stormwater management** – on-going stormwater management in and around the waste gas cleaning plant facility; and
- **Environmental monitoring** – annual reporting of environmental monitoring results to allow assessment of compliance with environmental goals.

9 CONCLUSION

The waste gas cleaning plant has been proposed in order to meet the requirements of a Pollution Reduction Program (PRP) developed by the Applicant in consultation with the EPA. The waste gas cleaning plant is expected to significantly reduce emissions of dust, dioxins, sulphur oxides and nitrogen oxides from the existing Sinter Plant. As such, the Department considers that the proposed waste gas cleaning plant will have a beneficial impact on the surrounding environment.

The Department is of the opinion that the proposed waste gas cleaning plant is consistent with State and regional planning objectives relating to environmental management, sustainable economic development and employment generation. It is further considered that the essential environmental issues relating to the proposal can be suitably managed such that they do not preclude the granting of development consent. It is therefore concluded that the proposal should be approved, subject to the conditions of consent designed to control and mitigate potential environmental impacts.

10 RECOMMENDATION

It is RECOMMENDED that the Minister:

- (1) consider the contents of this report;
- (2) grant development consent to the Development Application in accordance with section 80 of the *Environmental Planning and Assessment Act 1979* subject to the conditions set out in Schedule 2 of the Instrument of Consent (tagged 'A');
- (3) sign the Instrument of Consent (tagged 'A').

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