Prepared for:

Weston Aluminium

PO Box 295
Kurri Kurri NSW 2327

Statement of Environmental Effects to Support Modification Applications for Aluminium Dross Recycling Facility

HLA-Envirosciences Pty Limited (HLA ENSR)

21 November 2007

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Distribution

Statement of Environmental Effects to Support Modification Applications for Aluminium Dross Recycling Facility

21 November 2007

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EXECUTIVE SUMMARY

Introduction

Weston Aluminium Pty Ltd (WA) operates an aluminium refining and recycling facility at Kurri Kurri, within the Cessnock Local Government Area. WA currently maintains several development consents for their operations on the site. WA is seeking to modify the development approved by two development consents, No. S00/00975 dated 20 September 2001 and No. 10397 of 1995, in order to provide greater efficiency in operations at the site. Additionally, WA seeks to modify the existing consents to achieve consistency of the conditions so that the auditing and compliance of the operations can be more easily achieved and managed.

Subject Site

The subject site is located on Lot 796 DP 39877 Mitchell Avenue, Kurri Kurri in the Hunter Valley. The plant is owned and operated by WA, which is majority owned by Watou Holdings and the balance by Asahi Seiren, a major secondary aluminium processor in the Japanese Aluminium industry.

The facility commenced operations as a pilot plant in 1998 with six employees and one furnace and has progressively grown. The current WA facility recovers aluminium from dross, a by-product of the aluminium smelting process. Dross can contain 30 – 75 percent metallic aluminium, which represents a significant loss of metal if not recovered. The plant also recycles scrap aluminium metal products and reprocesses the aluminium for use in various industries. The facility produces approximately 20,000 tonnes of alloyed aluminium per annum through the recycling of dross and scrap.

The plant is comprised of best available technology, and complies with stringent pollution limits. Site operations are carried out in compliance with the conditions of Environment Protection Licence (EPL No. 6423) issued by the NSW Environment Protection Authority (EPA) and an Environmental Management Plan (EMP) that identifies and outlines actions to minimise the potential environmental impacts from operations. The site EMP would be updated to incorporate the proposed modifications should consent be granted for the proposal.

Proposed Modification

The modification would involve the installation of a pre-processing facility within the western end of the existing ALDEX building. Eight dross storage bays would be constructed by extending the approved ALDEX buildings to the south by approximately six metres. This would allow trucks delivering dross to the storage bays to reverse into the building, and to dump directly into one of the eight bays.

WA also proposes to construct a new exhaust stack to vent combustion products from the existing reverbatory furnace. The stack would be located directly above the holding side of the furnace, approximately 10 m south and 10 m west of the north eastern corner of the Main Plant Building.

The modified development as proposed in this application would improve the efficiency and configuration of dross-handling and processing. The removal of a greater proportion of the non-metallic material within the dross by the pre-processing plant prior to feeding the material to the existing rotary furnaces for melting and metal recovery would result in significant savings in processing costs and energy usage. The proposed new dross receival area and pre-processing facility would also have significant operational advantages.

The installation of a new stack from the holding side of the reverbatory furnace would enable the total exhaust capacity of the current emission control system to be directed towards containing emissions from the remelt side of the reverbatory furnace. The increase in extraction rate from the remelt side will significantly mitigate the escape of fugitive emissions from this process.

A number of options are available to effectively control dust emissions associated with the proposed pre-processing plant and dross storage bays. Primary options being considered are as follows:

- Relocation of BH3, currently servicing the Raymond Mill, to ventilate and capture dust emissions from the dross storage bays. Dust emissions from the pre-processing plant to be serviced by a new baghouse, BH7; and
- Dust emissions generated at the dross storage bays and a portion of the pre-processing plant to be controlled by BH7. Dust emissions generated by remaining plant items are to be serviced by existing on-site baghouse systems (either BH3 or BH2). Depending on the capacity of BH2, BH3 may no longer be required and may be decommissioned.

WA is currently investigating the most suitable and cost effective option for ventilating the pre-processing plant and ALDEX building storage bays. The scenario assessed in this SEE is based on the first option described above, which is considered to be worst case with respect to air and noise emissions.

Impact Assessment – Key Impacts

Waste

The proposed pre-processing plant is designed to reduce the quantity of non-metallic dross constituents and fine dusts being ultimately fed to the rotary furnaces. This activity would effectively reduce the quantity of fine dust collected by the existing baghouses that service the dross processing plant (BH1 – 4). Nevertheless, the overall quantity of waste generated at the facility is expected to remain relatively unchanged. Waste material generated by the pre-processing plant would be similar in nature and quantity to that generated by the existing Raymond Mill and associated baghouse (BH3), estimated at 230 tonnes per month. There would not be any cumulative waste impacts as a result of the proposed modification.

Air Quality

While a number of pollutants are emitted from the WA facility, those affected by the proposed modification are coarse (TSP) and fine (PM_{10}) particulates and the products of natural gas combustion (sulfur dioxide, nitrogen dioxide, carbon monoxide and carbon dioxide).

Two separate Air Quality Impact Assessments (AQIA) were prepared by HLA ENSR to assess the potential changes in air quality resulting from the proposed plant modifications. The first AQIA investigated the implications of installing a new stack over the holding side of the reverbatory furnace to vent combustion products. This AQIA predicted ground level concentrations (glcs) of combustion products from the stack reconfiguration.

The second AQIA assessed the changes in ground level particulate concentrations resulting from the relocation of the existing baghouse and associated stack that currently service the Raymond Mill to the ALDEX storage area, and the addition of an approved but as yet unbuilt baghouse and stack to service the proposed pre-processing facility. This second assessment was prepared in accordance with the

DoP's requirements for the SEE, and investigated changes in particulate levels resulting from the proposed pre-processing plant.

Proposed Reverbatory Furnace Stack

All of the predicted cumulative pollutant concentrations for the additional reverbatory furnace stack were below the assessment criteria. As such, no adverse effects on air quality are anticipated as a result of the proposed modification to the reverbatory furnace.

The results of the dispersion modelling indicated that the ground level concentrations (glcs) of sulfur dioxide, nitrogen dioxide, fine particulates (PM_{10}) and carbon monoxide would be below the guideline criteria specified by the DECC (DEC, 2005). No adverse air quality impacts on residents are anticipated as a result of the construction of the new stack.

Proposed Pre-processing Facility

The glcs of particulates predicted by the dispersion modelling for the Proposed Pre-processing facility found that cumulative annual pollutant concentrations of PM_{10} and TSP were well below the assessment criteria. In contrast, the predicted maximum cumulative 24-hour PM_{10} concentration exceeded the criterion as a result of the elevated background PM_{10} level. This exceedance is noted to occur within the premises boundary and predicted ground level concentrations at residential areas were below the assessment criterion. The existing pattern and magnitude of emissions from the facility are not expected to change significantly following the proposed modifications. It should be noted that these technical exceedences occurring within the facility would only occur during times when the background PM_{10} concentration is at a maximum and the ground level PM_{10} concentration at that particular point was also at a maximum. In reality this would rarely occur.

Hazards

A preliminary hazard analysis (PHA) of the proposed additional dross storage in the ALDEX building was undertaken by Sinclair Knight Merz, in accordance with the NSW Department of Planning *Hazardous Industry Planning Advisory Paper (HIPAP) No.6, "Guidelines for Hazard Analysis"*.

Based on the analysis conducted in the PHA, the proposed modification to the facility does not exceed the risk criteria published in *HIPAP No.4, Risk Criteria for Land Use Safety Planning* and, the facility may be classified as "potentially hazardous" and not "hazardous", and is therefore permitted in the proposed land zoning. The proposed modification would not result in additional cumulative risks or hazards, as the proposal would not increase the amount of dross stored or handled on the site, as it only alters the location in which it is stored, moving it from the Plant building to the ALDEX building.

Noise

There is a potential for a 2 dB (A) exceedance of the construction noise criterion under the assessed conditions. The potential impacts of the construction noise criterion will be during day time only and short term in nature and are not expected to adversely impact on the acoustic amenity of receivers.

Based on the modelled conditions, during operation, noise from the entire site would increase marginally at some locations as a result of additional noise emissions from the pre-processing facility. However, the increase in noise would not result in the total received noise exceeding any of the Leq (15 min) noise criteria. There would, therefore, be no adverse noise impacts as a result of the operation of the facility.

There would be no additional traffic generated by the project and there would, therefore, not be any differences in the currently compliant traffic noise.

It is not expected that there would be potential sleep disturbance impacts as a result of the proposal as modified.

There would be no cumulative noise impacts as a result of the operation of the pre-processing facility along with the existing plant, in the existing acoustic environment.

Greenhouse Gas Emissions

The operation of the proposed pre-processing facility would result in a reduction in natural gas consumption of around 10 % over the existing scenario. As natural gas generates CO_2 during combustion, this reduction would lead to reduced greenhouse emissions from the processing activities.

The proposed pre-processing plant would be electrically powered, with consumption expected to be comparable to that of the existing Raymond Mill. The additional baghouse would require electricity to operate, as would the proposed conveyor.

It is considered that the overall energy saving anticipated from the pre-processing plant would compensate for the marginal increase in electricity consumption required for the proposed modifications.

Other Environmental Issues

Additionally, the following issues and impacts were assessed as part of the SEE:

- Surface water;
- Soils and topography;
- Flora and fauna;
- Community resources;
- Natural resources;
- Socio economic;
- Heritage and cultural;
- Land use;
- Transportation; and
- Visual.

It was generally found that the proposal would generate some minor short term impacts, particularly during construction, but the operation of the facility with the proposed modifications would result in similar impacts to the existing approved development.

A summary of the potential environmental impacts from the proposed modification is provided in tabular form in **Table 12** (**Section 8)**. **Table 12** also includes the approved development impact to highlight changes in impact between the approved development and the modified development. The proposed modifications would result in similar impacts to the existing development.

An assessment of the implications of the development under Section 79C of the EP&A Act has also been undertaken as part of this SEE and can be found in **Section 9**.

Conclusion

In conclusion, the proposed modifications are for the purpose of providing greater efficiency and improvement in the operations of the dross recycling facility. Modifications to the consents would also provide greater consistency between the consents and the EPL for the site and clarify the identification of the stacks and monitoring points on the site.

The modification is considered to be substantially the same development as that previously approved by the Minister for Urban Affairs and Planning. The construction of the works associated with the modification is likely to result in short term impacts during construction and once operational, the proposal as modified would not result in significant additional or cumulative impacts on the environment and surrounding properties.

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1.0 INTRODUCTION

1.1 Background

Weston Aluminium Pty Ltd (WA) operates an aluminium refining and recycling facility at Kurri Kurri, within the Cessnock Local Government Area. WA currently maintains several development consents for their operations on the site. Development consent was originally sought by Alumino (as WA was originally known) and obtained from the Minister for Planning (the Minister) in November 1994. Following a successful appeal against the proposal based on insufficient notification to residents of the project, the consent was declared ‘null and void’, and WA was required to resubmit a Development Application (DA) for the project. Due to the delay in the decision making process regarding the proposal, the proponent sought a merits hearing in the Land and Environment Court, and consent was subsequently issued on 30 August 1996 (No. 10397 of 1995). The facility commenced operations as a pilot plant in 1998.

Additions to the facility were approved by the Minister on 20 September 2001 (File No. S00/00975). These additions included the receival and reprocessing of scrap aluminium material, the production of solid alloyed aluminium and molten aluminium, an increase in the annual production of ALDEX (a fine-grained by-product of dross smelting that is used in the steel and cement industries), and the construction of three ALDEX storage buildings. An appeal was brought against this DA by Mr T Kelly. During the delay caused by the appeal, the proponent sought to obtain consent through Cessnock City Council for a modified project that consisted of a subset of the DA application to the Minister. Consent for the modified project was granted by Council on 20 December 2001 (DA No. 8/2001/1166/1), but became superfluous following the dismissal of the appeal by the Minister.

A further court order was issued by Orders of Justice Bignold on 4 April 2002 (No. 10397 of 1995), which replaced a number of conditions of the original consent issued by the Court and added two new conditions.

An Environmental Assessment Scoping Report (EASR) was prepared and provided to the Department of Planning (DoP) in February 2006 in order to determine whether the proposal represented a Major Project under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) (**Appendix A**). Correspondence was received from the DoP in March 2007 stating that the proposal should be assessed under Section 96(2) of the EP&A Act, and that both the Ministerial (2001) and Land and Environment Court (1996) consents would need to be modified to give effect to the proposal. This correspondence also provided the DoP’s requirements for the application (refer to **Appendix B**), which included the need for the preparation of a Statement of Environmental Effects (SEE).

This SEE accompanies applications to modify the following development consents:

- File No. S00/00975 issued by the Minister in 2001; and
- No. 10397 of 1995 in the Land and Environment Court issued in 1996.

1.2 Context of the Proposal

To facilitate the works and changes, amendments to two development consents are required and would be facilitated through applications for modification under Section 96 1(A) and Section 96(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The consent issued by the Minister in 2001 (File No. S00/00975) and the associated Environmental Impact Statement (EIS) prepared by URS describe the additions proposed to the existing development, which were:

- Construction of an open scrap storage and sorting pad and an enclosed scrap storage warehouse;
- Extension of the existing plant building to allow for ingot casting, molten aluminium handling and aluminium alloying;
- Construction of an ingot storage and loading facility;
- Construction of an enclosed Aldex storage and dispatch facility, incorporating a workshop area; and
- Extensions to the existing administration building, carpark and dross off-loading and sorting areas.

WA proposes to modify the development approved by this consent. The proposed modifications would involve:

- Including new works as part of the consent and amending conditions relating to these works; and
- Amending some conditions of the consent to rectify inconsistencies between conditions in this consent, current operational practices, the environmental protection licence (EPL) and previous consents.

The proposed modifications to this consent are outlined in detail in **Section 3.5** of this SEE.

In the Land and Environment Court No. 10397 of 1995 and the associated EIS prepared by Envirosciences Pty Limited describe the development for a dross recycling and alloying plant. This consent was for:

- The reprocessing of approximately 40,000 tonnes of dross and scrap aluminium annually, whilst producing approximately:
  - 24,000 tonnes per annum of solid, commercial quality aluminium in the form of 150 kg - 750 kg sows;
  - 3,000 tonnes per annum of ALDEX; and
  - 13,000 tonnes per annum of waste ash and dust.

WA propose to modify this consent by amending or changing some conditions to rectify inconsistencies between conditions in this consent, following consents and the EPL. The proposed modifications to this consent are outlined in detail in **Section 3.5** of this SEE.

1.3 The Proponent

The plant is owned and operated by WA, which is majority owned by Watou Holdings and the balance by Asahi Seiren, a major secondary aluminium processor in the Japanese Aluminium industry. Both shareholders have an established track record in the operation of aluminium refining and recycling facilities through the operation of the existing development in Kurri Kurri and a number of facilities in Japan.

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2.0 SUBJECT SITE

2.1 Site Description

The existing aluminium recycling and refining facility is located on Lot 796 DP 39877 Mitchell Avenue, Kurri Kurri in the Hunter Valley. The site is located within the Parish of Heddon, County of Northumberland, and City of Cessnock. The deed of sale is in the name of Weston Aluminium Pty Ltd. The location of the site is shown in **Figure 1**.

The site is approximately 40 km northwest of Newcastle and is located within a predominantly industrial area. Residential areas in Kurri Kurri and Weston are located to the south and west of the site respectively. The Hydro Aluminium Smelter is around 2 km north of the site; its buffer zone extends to WA's northern boundary.

2.2 Existing Development and Operations

The facility commenced operations as a pilot plant in 1998 with six employees and one rotary furnace and has progressively grown. The current development comprises that shown in **Figure 2**. **Figure 3** displays the development history on the site, giving an indication of what was approved under the two main consents that exist for the site and outlining the extent of the proposed modifications.

The current WA facility recovers aluminium from dross, a by-product of the aluminium smelting process, sourced from aluminium smelters across Australia and New Zealand. Dross is a dry metallic solid typically composed of aluminium, aluminium oxide, other metal oxides, traces of sodium aluminium fluoride (bath) and alloying metals. Dross can contain 30 – 75 percent metallic aluminium, which represents a significant loss of metal if not recovered. The plant also recycles scrap aluminium metal products and reprocesses the aluminium for use in various industries.

The facility produces approximately 20,000 tonnes of alloyed aluminium per annum through the recycling of dross and scrap. An overview of the reprocessing operations and associated waste generation is offered below.

The manufacturing process involves the receival and sorting of aluminium dross, which undergoes milling and sizing (i.e. pre-treatment) in the Raymond Mill prior to reprocessing in two rotary furnaces. The recovered molten metal is then tapped, moulded and stored for local and export distribution. A reverbatory furnace, commissioned in 2001, reprocesses various types of aluminium scrap and base metal (produced by the rotary furnaces), which is cast into either ingot or pyramidal 'pucks'. These Pucks are employed by the steel manufacturing industry as a deoxidant furnace additive and ingots are used by downstream users for in the remelt industry.

The refining and recycling process generates a by-product known as ALDEX, which is a fine ash material that can be used in the steel manufacturing and cement industries, although the majority of the by-product is currently disposed of to landfill. Approximately 10,000 tonnes of ALDEX are generated by the process per annum. This material is stored on site prior to disposal or distribution to customers.

Bulk dross is currently delivered by road to the site and stored in the southern portion of the existing main plant building. Trucks reverse into the building and dump the dross into one of six storage bays. The stored dross is recovered by front end loader for delivery either directly to the rotary furnaces or to the Raymond Mill. Approximately 15-20% of the material is removed in the Raymond Mill as fines through a baghouse, and the remaining coarser material is then delivered to the rotary furnaces. The agitation and high temperatures within the rotary furnaces liberates aluminium metal, which forms in a pool within the furnaces and is tipped into sows for solidification. The low metal ash produced from the rotary furnaces is transferred to the Metal Recovery Machine (MRM) where residual molten aluminium is recovered in a spinning action. The residual ash is then cooled in the rotary cooler and transferred to a

Ball Mill where it is further crushed to release any residual aluminium. Fines are extracted during this process and collected by a baghouse, with the residual coarser fraction being returned to the rotary furnaces for further processing.

The existing storage area is ventilated via Baghouse (BH) 2. The Raymond Mill is ventilated to BH3, with the MRM, Cooler and Ball Mill venting to BH4. Emissions from the rotary furnaces are vented to BH1, which is serviced by a lime injection wet/dry scrubbing system. This lime fed baghouse is used to remove gaseous fluorides liberated during the heating process. Emissions from the reverbatory furnace are vented to BH5, which is serviced by a dry lime injection scrubbing system.

2.2.1 Approved Development

WA has approval to extend its existing main building to the south to increase the undercover dross storage area and to facilitate processing of the contained dross (approved in 2001). WA decided to consider other alternatives (such as this proposal) rather than proceed with completing the approved extension at this time (refer to **Figure 2**).

2.2.2 Environmental Management

The plant is comprised of best available technology, and complies with stringent pollution limits. The advanced environmental features of the plant include:

- Salt-free, closed-loop process;
- Recycling of ALDEX in the steel and cement industries;
- Environmental monitoring of emissions by an independent contractor;
- Processing under negative pressure to reduce fugitive emissions;
- Dross tracking and inspection for quality control;
- Undercover handling of dross to reduce rainwater contact and potentially odorous emissions, as well as reducing contaminated stormwater generation;
- Gas fired heating to reduce sulphur dioxide and other air emissions;
- Lime scrubbing of the rotary and reverbatory furnaces to remove pollutants such as fluorides, acid gases, volatile organic compounds, dioxins and furans;
- A first flush stormwater system, including onsite effluent disposal via irrigation; and
- Environmental auditing of operations and compliance with approval conditions and the EPL.

Site operations are carried out in accordance with an Environmental Management Plan (EMP) that identifies and outlines actions to minimise the potential environmental impacts from operations.

2.2.3 Regulatory Controls

The facility holds EPL 6423 issued by the NSW EPA, administered by the Department of Environment and Climate Change (DECC); a copy of this licence is provided in **Appendix C**. The licence covers secondary aluminium production and its associated activities on the site.

WA also holds a Specific Immobilisation Approval (2005-S-13), issued by the NSW EPA administered by DECC under the *Protection of the Environment Operations (Waste) Regulation 2005* (**Appendix D**).

3.0 PROPOSED MODIFICATION

3.1 Overview of Proposal

The proposal involves applications to modify two development consents currently in place on the site. The modification to Consent File no. S00/00975 of 2001 is considered to be under Section 96 (2) of the EP&A Act and the modification to Consent No. 10397 of 1995 in the Land and Environment Court (as modified) is to be considered under Section 96 1(A) of the EP&A Act.

3.1.1 Consent File no. S00/00975 of 2001

WA proposes to modify the development approved by consent File No. S00/00975 issued by the Minister in 2001 by:

- Including new works as part of the consent and amending conditions relating to the development; and
- Amending some conditions of the consent to rectify inconsistencies between conditions in this consent, previous consents, current operating practices and the EPL.

The proposed changes to the wording of conditions are provided in **Section 3.5**. The new works to be included in the consent would be:

- Installation of a pre-processing facility within the western end of the existing approved ALDEX building;
- Construction of eight dross storage bays by extending a section of the approved ALDEX buildings to the south by approximately six metres to allow trucks delivering dross to the storage bays to reverse into the building and to dump directly into one of the eight bays;
- Construction and operation of a previously approved baghouse for collecting emissions from the pre-processing plant (referred to herein as Bag House 7 or BH7);
- Relocation of Bag House 3 (BH3); (which currently services the Raymond Mill) to an area adjacent to the new storage bays (external to the ALDEX building); and
- Construction of a new stack to vent the holding side of the reverbatory furnace to facilitate the Pollution Reduction Program required by the Department of Environment and Climate Change (DECC).

A plan of the proposed pre-processing facility modifications to the ALDEX building is shown in **Figure 3**. An elevation plan of the plant is provided in **Figure 4**. The locations of the existing and proposed stacks are shown schematically in **Figure F1**.

A number of options are available to effectively control dust emissions associated with the proposed pre-processing plant and dross storage bays. Primary options being considered are as follows:

1 Relocation of BH3 to ventilate and capture dust emissions from the dross storage bags. Dust emissions from the pre-processing plant to be serviced by BH7; and

2 Dust emissions generated at the dross storage bays and the pre-processing plant to be controlled by BH7. BH3 to remain in its current location and may be used in the future, subject to process requirements.

WA is currently investigating the most suitable and cost effective option for ventilating the pre-processing plant and ALDEX building storage bays. The scenario assessed in this SEE is based on the first option described above, which is considered to be worst case with respect to air and noise emissions, because of the proximity of BH3 in the proposed location to sensitive receptors (to the east).

The specialist studies undertaken to assess impacts to air quality and noise have assumed that option 1 would be implemented.

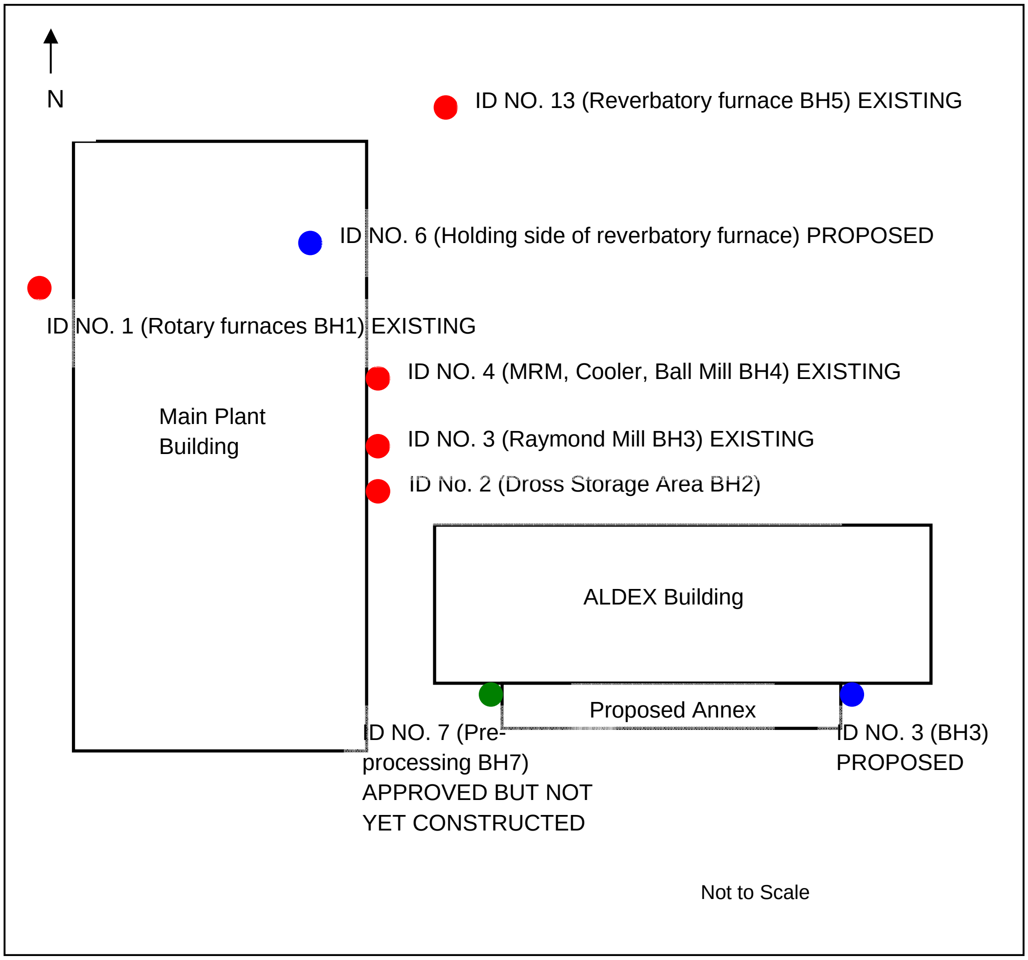

Figure F1: Stack Identification and Location Schematic

3.1.2 Consent No. 10397 of 1995 in the Land and Environment Court (as modified)

WA propose to modify the consent issued by the Land and Environment Court (No. 10397 of 1995) ordered on 30 August 1996 by amending some conditions to rectify inconsistencies between conditions in this consent, the EPL and consent File No. S00/00975. The proposed changes to the wording of conditions are provided in **Section 3.5**.

3.2 Need for the Proposal

3.2.1 Improved Efficiency and Safety

WA currently has approval to extend its main building to the south as shown in **Figure 3** to increase the undercover dross storage area. The approved extension, however, is likely to result in significant congestion from the various users, including vehicles delivering the dross, machinery used for pre-processing and recovering the dross for consumption within the rotary furnaces, employees moving between the existing plant and the administration area, and the total volume of dross storage area available. WA are, therefore, seeking to modify the development as proposed in this application to improve the efficiency and configuration of dross-handling and processing. This would be facilitated by moving the dross storage to the ALDEX building where it would be stored and pre-processed before being transferred to the main plant building by covered conveyor for processing.

3.2.2 Cost and Energy Savings

The removal of the non-metallic portion of the dross from the higher metallic content dross prior to feeding the material to the existing rotary furnaces for melting and metal recovery would result in significant savings in processing costs and energy usage. The proposed pre-processing plant is required as the existing Raymond Mill is not sufficiently sized to pre-process all of the dross received at WA, and is not capable of effectively separating the low-metallic and non-metallic dross from the higher metallic material.

3.2.3 Operational Advantages

The proposed new dross receival area and pre-processing facility would have major operational advantages. These would be:

- The pre-processing of the dross would remove non-metallic components, which currently pass through the entire recovery process. The existing operation consumes valuable equipment time and energy in the heating of the inert non-metallic material (which promotes inefficient melting of the metallic fraction), and requires additional labour to manage the movement of the residual material throughout the process; and
- The proposed pre-processing would also minimise additional materials handling in the facility.

3.2.4 Consistency in Consents

The proposed changes to the wording of some conditions of the consents are proposed so that the consent does not conflict with the requirements in the EPL issued by DECC and other consents for the site, and in order to clarify the identification of stacks and monitoring points on site and provide consistency in the monitoring requirements.

3.3 Consideration of Alternatives

WA currently receives dross from most aluminium smelters within Australia. Consideration was given to the off-site processing of the dross closer to the generation sources, such as constructing a facility in Gladstone to process the dross from the Boyne Smelter. The main limitation for this option is the need to ultimately dispose of the low-metal fines produced in the pre-processing operations. Options for the reuse of the fines in industry have not been finalised, and the fines produced from any off-site processing would, therefore, still require transport to the Weston facility at Kurri Kurri for treatment and disposal. The installation and operation of remote processing facilities also represents an unnecessary cost when the existing Kurri Kurri plant is available and can adequately undertake this activity.

WA also receives dross from the New Zealand aluminium smelting industry. Consideration was given to installing a complete dross recovery facility in New Zealand. Due to the critical power shortage currently being experienced and the relatively low volumes of dross supplied from the New Zealand industry, this option was also discounted.

There is also a significant aluminium industry within Tasmania and Victoria. The establishment of a dross recovery facility within the southern portions of Victoria to process dross from these smelters was also considered. As the dross from the Alcoa-owned facilities is currently being processed within the Alcoa plant and not available for a third party to process, the volume of dross available in Victoria is not sufficient to sustain such an activity.

3.4 Proposed Modification to Development

3.4.1 Form of Modification

The proposed modifications would take the form of adding an annex to the existing ALDEX building on site as shown in **Figure 4**. The annex would be consistent with the existing structures in terms of height and construction materials (colour bond steel sheet walls and roofs approximately 10 m). The area of the annex to the ALDEX building would be approximately 252 m^2. A concrete slab of the same size would be constructed. There would be no underground works associated with the construction.

The new exhaust stack to vent combustion products from the existing reverbatory furnace would be 18 m high. The stack will be located directly above the holding side of the furnace (approximately 10 m south and 10 m west of the north eastern corner of the Main Plant Building).

Civil works would include: the annex extension to the south of the building; construction of material receival bays within the building; the construction of a short external roadway to permit access by mobile equipment to the western end of the annex extension; and a concrete foundation to the west of the annex (to accommodate the new baghouse dust collection system). Trenching earthworks would also be undertaken for additional services to the building (compressed air, power and communications).

3.4.2 Method of Construction

The proposed pre-processing plant would be installed within the existing ALDEX building. The associated emission control systems and part of the conveyor would be located external to the building.

Construction equipment proposed for the civil works and plant equipment installation include:

- Cranes;
- A cherry picker;
- Cement trucks and pumps;
- Front-end loaders;
- A bobcat (with trench digger attachment); and
- Tip trucks.

The new stack on the reverbatory furnace would be installed at the northern end of the main plant building. The roof and existing ductwork would be removed and new flanges installed. The new stack would be constructed on-site and then installed with the use of a cherry picker and crane.

3.4.3 Program of Construction Works

The proposed works would take approximately 15 weeks to complete, with a maximum of 25 construction personnel required. Construction works would occur 8 hours per day, 5 days per week, between 8 am and 6 pm.

3.4.4 Modified Operations

Proposed Pre-Processing Facility

Dross would be recovered from one of the eight bays in the ALDEX building and delivered to the pre-processing facility by front end loader. Larger material in the dross would be separated and pre-processed in a rumbler to remove adhering bath material. The remaining dross would be delivered by front end loader to a grizzly before being transferred to crushers and finally a screen deck. This pre processing would achieve the removal of non-metallic dross constituents as well as fine particles that would otherwise oxidise in the furnace. Remelt material (that with the higher metallic content) would be transferred by covered conveyor to the storage bays within the main plant building prior to feeding to the rotary furnaces.

The dross storage bays and the pre-processing plant would be serviced by baghouse dust collectors. Fines collected by these systems, as well as undersized material separated by the screens, would be collected in 1 m^3 bulka bags. These bags would be stored in the eastern end of the ALDEX building prior to disposal to landfill. WA is also currently exploring reuse opportunities for all fine material by-products, which would ultimately divert this material from landfill disposal.

During the pre-processing period the dross would be reduced in weight by the amount of fine material collected either by the baghouses or directly from the screens immediately next to the storage bins. Approximately 30% of the original feed material is expected to be removed during the pre-processing operations.

Proposed Reverbatory Furnace Arrangement

The reverbatory furnace would continue to operate in the same manner, but with separation of emissions from the two sides of the furnace. Emissions from the holding side would be ducted to the new, dedicated stack (Stack 6) prior to discharge to atmosphere (with no further emission treatment required). Emissions from the remelt side would be ducted to the existing scrubber and baghouse system (ID No. 13 - BH5) for treatment prior to discharge to atmosphere.

3.4.5 Traffic Movements

Trucks would continue to enter the site via the existing entry, and travel via internal sealed roads to deliver the dross. Trucks would reverse into the ALDEX building and deliver the dross into one of the eight bays. During the delivery operation, ventilation would be applied to the receiving bay to extract any dust emissions created. The proposed operation would not generate any additional traffic movements to the current operation.

3.4.6 Staff

The operation of the new pre-processing facility would not require significant additional labour. Staff currently allocated to the existing Raymond Mill and to recovery of non-metallic dross from the rotary furnaces would be relocated to work the pre-processing plant. An additional person per shift may be required to support the overall activity.

3.5 Proposed Modification to Conditions of Consent

The following sections outline the proposed modifications to the wording of conditions of consent and provide justification for the changes.

3.5.1 Consent File no. S00/00975 of 2001

Schedule 1

Schedule 1 of this consent outlines the additions and extensions to the existing aluminium dross recycling plant. The wording needs to be modified to reflect the works covered by this modification application, therefore it is proposed that after e) the following be added:

f) *Installation of a pre-processing plant within the western end of the ALDEX storage and dispatch facility;*

g) *Construction of eight dross storage bays by extending a portion of the ALDEX storage and dispatch facility to the south by approximately six metres;*

h) Construction and operation of a previously approved baghouse for collecting emissions from the pre-processing plant;

i) Relocation of Baghouse 3 (which currently services the Raymond Mill) to an area adjacent to the new storage bays (external to the ALDEX building); and

j) *Construction of a new stack to vent the holding area of the reverbatory furnace ("the development").*

Condition 1.2

Condition 1.2 of this consent relates specifically to documentation which describes the development as approved by the consent issued in 2001. It is proposed that an amendment to this condition is required in order to allow the extension of the ALDEX building and the addition of pre-processing plant and a new stack for the reverbatory furnace.

This application seeks to modify condition 1.2 of consent S00/00975 by adding:

q) Application for modification of consent and Statement of Environmental Effects to support Modification Applications for Aluminium Dross Recycling Facility; and

r) the conditions of this consent.

In the event of an inconsistency between a condition of this consent and the documents listed under a) to q) above, the condition of consent shall prevail to the extent of the inconsistency.

Condition 3.2

Condition 3.2 of this consent describes the minimum stack height and diameter for various points of emission. As the works which are part of this application would result in additional and potentially modified stack locations, it is proposed that this condition be amended. In addition, it is proposed to modify the discharge point numbers and descriptions in order that they relate to the EPA identification numbers in the EPL (refer to **Figure F1**), and it is proposed to change the maximum stack diameter at discharge point 4 (ID No. 7) to 1.5 m which would result in improved performance for the fan operating in baghouse 7, resulting in better energy efficiency and reduced noise.

It is proposed the condition be amended as follows (specific changes are highlighted in bold type):

> *The Applicant shall ensure that each air monitoring/ air discharge point (stack) indicated in Table 1 is designed, constructed, operated and maintained generally in accordance with the parameters specified for the respective air monitoring/ air discharge point (stack).*

Table 1 - Stack Dimension Requirements

Identification No.	***Description***	***Minimum Stack Height (m)***	***Maximum Stack Exit Diameter (m)***
13	***Baghouse 5 Stack***	*30*	*1.5*
20	***Baghouse 6 Stack***	*30*	*1.5*
21	*Holding Furnace stack*	*18*	*0.25*
7	*ALDEX Stack* ***(Baghouse 7 Stack)***	*15*	***1.5***
3	***Relocated Baghouse 3 Stack***	***15***	***1.0***
6	***Stack 6 (from the holding side of the reverbatory furnace)***	***18***	***0.6***

Condition 3.5

Condition 3.5 of this consent prescribes emission parameters for the various stacks covered by the development application. This condition requires amending to reflect the changes to discharge points resulting from this modification application. Reference to oxygen has been removed from this condition as previous negotiations were made with the DECC to omit these requirements from the EPL, therefore changes to this condition are required in order that this is consistent with the EPL. Footnotes 2 and 3 of this condition have also been modified/added to provide consistency with the EPL.

Changes are also proposed to the volumetric flow rates at discharge points 1 and 2 (now known as 13 and 20). The requested change in volumetric flowrate for these points from 18 – 30 m^3/s is related to recent observations of elevated flow. This high flow is attributed to lower baghouse differential pressure (dP), which translates to greater air flux. WA believe that the lower dP observed is due to the less sticky and stable filter cake forming on the baghouse filters because WA are now processing better quality scrap (some scraps produce a lot of sooty fume, which creates a sticky filter cake, and hence a greater dP). The original limit of 18 m^3/s was imposed by the DoP to limit mass emission of air pollutants (e.g. Dioxins and Furans). The higher flow, in conjunction with the proposed construction of the new stack 6 (direct vent of holding side of reverb furnace to atmosphere), would improve environmental performance as the fugitive emission capture efficiencies from the feed side of the furnace will be dramatically improved. The mass emission of pollutants is unlikely to increase. The AQIA was developed on this basis to demonstrate acceptable emission performance.

The change to the volumetric flow rate at discharge point 4 (now known as identification no. 7) related to the proposed change in the stack diameter (condition 3.2). The increased volumetric flow rate for this stack would result in better dispersion and lower ground level concentrations (due to the higher stack velocities).

A change is also proposed to the solid particles limit at identification no. 7 (stack 7 or previously discharge point 4). Given the volumetric flowrate and the size of the baghouse it is believed that 15 mgm^{-3} is an appropriate limit for solid particles (75% of the group 6 limit from the Clean Air Regulation).

It is proposed that this condition be amended as follows (specific changes are highlighted in bold type):

> *The Applicant shall ensure that the maximum allowable discharge limit specified for each of the parameters/ pollutants in Table 2 is not exceeded at any time, at any of the discharge points specified for that parameter/ pollutant. Maximum allowable discharge limits shall be subject to the reference conditions and averaging period specified for that parameter/ pollutant and discharge point.*

Table 2 - Maximum Allowable Discharge Limits to Air

Parameter/Pollutant	***Limit***	***Reference Conditions***	***Averaging Period***	***Identification Number₁***
volumetric flowrate	***30*** *m^3s-1*	*dry, 273K, 101.3 kPa*	*rolling 1-hour average*	***13, 20***
volumetric flowrate	*0.3 m^3s-1*	*dry, 273K, 101.3 kPa*	*as per test method*	***21***
volumetric flowrate	***35*** *m^3s-1*	*dry, 273K, 101.3 kPa*	*as per test method*	***7***
hydrogen chloride	*10 mgm^{-3}*	*dry, 273K, 101.3 kPa*	*as per test method*	***13, 20***
nitrogen dioxide (NO_2) or nitric oxide (NO) or both	*100 mgm^{-3}*	*dry, 273K, 101.3 kPa*	*as per test method*	***13, 20, 21***
solid particles	*10 mgm^{-3}*	*dry, 273K, 101.3 kPa*	*as per test method*	***13, 20, 21***
solid particles	***15*** *mgm^{-3}*	*dry, 273K, 101.3 kPa*	*as per test method*	***7***

Parameter/Pollutant	***Limit***	***Reference Conditions***	***Averaging Period***	***Identification Number***[1]
poly-chlorinated dibenzo-p-dioxins and polychlorinated dibenzo-furans (PCDD and PCDF)[2]	*0.1 ngm^{-3}*	*dry, 273K, 101.3 kPa*	*rolling annual average*	***13, 20***
volatile organic compounds (VOC) as n-hexane [3]	*77 mgm^{-3}*	*dry, 273K, 101.3 kPa*	*rolling 1-hour average*	***13, 20***
carbon monoxide (CO)	*125 mgm^{-3}*	*dry, 273K, 101.3 kPa*	*rolling 1-hour average*	***13, 20***

[1] *Identification numbers as defined by condition 3.2 of this consent*
[2] *Limit value is a rolling annual average. Polychlorinated-dibenzo-p-dioxins (PCDD) and polychlorinated-dibenzofurans (PCDF) as 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) equivalent calculated in accordance with the procedures included in Part 4, Clause 29 of the Protection of the Environment Operations (Clean Air) Regulation 2002, (dry, 273 K, 101.3 kPa).*
[3] *Limit value is a rolling 1-hour average. VOC as n-hexane (dry, 273 K, 101.3 kPa).*

> *Note: Pollutant concentrations listed under condition 3.5 of this consent are maximum allowable concentration limits that must never be exceeded. The imposition of a maximum allowable concentration limit does not imply that the limit should be met, or approached, if the Applicant can reasonably operate the development to achieve lower discharge concentrations.*

Condition 4.3

Condition 4.3 specifies monitoring discharge points, methodology and frequency of monitoring. This condition needs to be modified to reflect the changes to discharge points as a result of this application. Changes to this condition are also proposed which reflect changes which have been made to the EPL via consultation with DECC in order that the conditions of consent are consistent with the EPL. Continuous monitoring is no longer required in the EPL so these requirements have been removed. In addition WA has established, in consultation with the DECC, that long-term continuous monitoring of VOC is not required as periodic monitoring of VOC has demonstrated that VOC emissions are well below the specified concentration limit.

It is also proposed to modify the frequency of monitoring of hydrogen chloride to annually, as these concentrations have been demonstrated to be well below limits.

It is proposed that this condition be amended as follows:

> [15]*The Applicant shall periodically monitor (by sampling and obtaining results by analysis) the pollutant concentrations and emission parameters specified in Table 4 below, at the discharge points indicated and employing the sampling and analysis method specified. All pollutant concentrations and emission parameters for each discharge point shall be determined after the commencement of commissioning the dross plant additions, at the frequency indicated in the table.*

Table 4 - Periodic Discharge Point Pollutant and Parameter Monitoring (Air)

Pollutant/ Parameter	***Identification Number***	***Method***	***Frequency***
hydrogen chloride (HCl)	***13, 20***	*TM-7 and TM-8*	***annually***
Nitrogen dioxide (NO_2) or nitric oxide (NO) or both	***13, 20, 21***	*TM-11*	*annually*
solid particles	***13, 20***	*TM-15*	*quarterly*
solid particles	***13, 7, 3***	*TM-15*	*annually*
polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-furans (PCDD and PCDF)	***13, 20***	*TM-18*	*quarterly*
volatile organic compounds (VOC)	***13, 20***	*OM-2*	*annually*
velocity	***13, 20***	*TM-2*	*quarterly*
Velocity	***13, 7, 3***	*TM-2*	*annually*
volumetric flow rate	***13, 20***	*TM-2*	*quarterly*
volumetric flow rate	***13, 7, 3***	*TM-2*	*annually*
temperature	***13, 20***	*TM-2*	*quarterly*
temperature	***13, 7, 3***	*TM-2*	*annually*
Moisture	***13, 20***	*TM-22*	*quarterly*
Moisture	***13, 7, 3***	*TM-22*	*annually*
dry gas density/ molecular weight of stack gases	***13, 20***	*TM-23*	*quarterly*
dry gas density/ molecular weight of stack gases	***13, 7, 3***	*TM-23*	*annually*
oxygen	***13, 20***	*TM-25*	*quarterly*
oxygen	***13***	*TM-25*	*annually*
selection of sampling positions	***13, 20, 21, 7, 3, 6***	*TM-1*	

Note: The applicant will be required to undertake post-commissioning monitoring of Identification Number 6 in accordance with the requirements of the Environment Pollution Licence for Point 13. Following a review of test findings, consultation with the DECC will be undertaken to negotiate requirements for future monitoring.

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[15] *EPA General Term of Approval*

> *Note: It is noted that the Applicant may not require long-term continuous monitoring of VOC emissions. Periodic monitoring of VOC emissions after the commencement of commissioning of the dross plant additions will be used to establish whether continuous or periodic monitoring of VOC's is required. In accordance with condition 4.4 of this consent, it is the Applicant's responsibility to obtain the EPA's agreement and the Director-General's approval to cease or vary the requirement for continuous monitoring of VOC emissions, should such a cessation or variation be appropriate in the context of the results of initial periodic VOC monitoring.*

3.5.2 Consent No. 10397 of 1995 in the Land and Environment Court as modified

It is proposed to modify Condition 10 of this consent (as modified in 2002) so that it is consistent with the requirements of WA's EPL. It is proposed that this condition be amended as follows:

> *The concentration of gaseous fluoride discharged to the atmosphere via any hot or high temperature stack must not exceed 1.4 mg/m^3 measured as a one hour average.*

It is proposed to modify Condition 15 of this consent (as modified in 2002) so that it is consistent with the requirements of WA's EPL. It is proposed that this condition be amended as follows:

> *If the plant or that section of the plant where the exceedance occurred ceases operation in accordance with Condition 14 of this consent, the Applicant shall within 24 hours advise the Director-General, the EPA and Council in writing that the plant or sections thereof have ceased operating, and advise of remedial measures carried out to ensure that when production recommences the prescribed emission level of 1.4mg/m^3 measured as a one hour average will not be exceeded.*

3.6 Environmental Controls

The site Operational EMP would be updated to incorporate the proposed modifications should consent be granted for the proposal.

3.6.1 Air Pollution Controls

Proposed Pre-Processing Facility

Effective air pollution control is fundamental to the operation of the pre-processing facility. A new (approved) baghouse dust collector (BH7) would be used to collect emissions from the pre-processing plant. Existing baghouse collection systems may also be employed to assist with dust collection where surplus capacity is available. Baghouse collection off-takes would be located at the rumbler, the grizzly screen, the screen decks and the crushers. Additionally, BH3, which currently services the Raymond Mill, may be relocated to capture emissions from the new dross storage area within the ALDEX building. An automated system would be installed to permit preferential exhaust to be applied to two of the eight bays, which would provide localised dust collection. Each of the bays would also be isolated by curtains to improve the collection efficiency of dust from the localised area. While experience within the existing dross receival area has shown that dust emissions from dross receival are minimal, the proposed controls should further enhance air quality within this work area.

Proposed Reverbatory Furnace Arrangement

Exhaust from the remelt and holding sides of the reverbatory furnace are currently consolidated and treated by a lime-fed scrubber and baghouse system (BH5) prior to discharge to atmosphere. Emissions from the holding side consist of the products of natural gas combustion, and are relatively clean and hot. Emissions from the remelt side, however, are at a lower temperature and consist of pollutants such as acid gases, fluoride, volatile organic compounds, particulates and dioxins and furans, and require treatment prior to discharge. WA proposes to install a new stack (ID No. 6) above the holding side of the reverbatory furnace to vent the combustion products. The installation of the proposed stack would enable the total exhaust capacity of the current emission control system to contain emissions from the remelt side of the reverbatory furnace. While no pollution reduction measures are proposed for this new stack, the relative increase in extraction rate from the remelt side will significantly mitigate the escape of fugitive emissions from the remelting process, resulting in air quality improvements.

3.7 Licences

A variation to EPL 6423 would be required to permit the new emission point (ID No. 7 - BH7). Similarly, a variation to the Specific Immobilisation Approval would be required for the management and disposal of the new waste stream from the pre-processing plant.

3.8 Cost

The proposed modification works are expected to cost approximately $2.75 million.

4.0 Statutory Planning

4.1 Local Matters

4.1.1 Cessnock Local Environmental Plan 1989 (LEP 1989)

The development site is zoned 4(a) Industrial under the *Cessnock Local Environmental Plan 1989* (LEP 1989). The relevant objectives of the zone are:

> *a) to encourage industrial development which will generate employment;*
>
> *c) to ensure that development will not:*
>
> > *i) cause permanent damage to the natural environment;*
> >
> > *ii) detract from the amenity of any residential or other urban area in the vicinity; or*
> >
> > *iii) create excessive demands on infrastructure and roads.*

The proposed modifications comply with the objectives of the plan. The proposed modifications are consistent with the existing approved industrial land use and do not substantially change the development.

The proposed modifications are not expected to cause any permanent damage to the natural environment. The site supports existing industrial activity and there will be no additional clearing of vegetation, or additional significant impacts on water quality or air quality.

There are some existing impacts on the amenity of the of nearby residential areas as a result of the existing development, included visual intrusion, noise and hazard. The proposed modifications do not increase the existing impacts on amenity and in some instances, ensure an improved and current monitoring regime.

The proposed modifications do not create additional demands on infrastructure and roads.

The LEP provides that the existing activity and proposed modifications are permissible with consent.

4.1.2 Cessnock Development Control Plan 2006

Cessnock Development Control Plan 2006 (DCP 2006) repeals, condenses and replaces a number of existing Development Control Plans as required to comply with Section 74C of the *Environmental Planning and Assessment Act 1979*, as amended. DCP 2006 complements the statutory provisions contained in LEP 1989 by providing detailed guidelines for development.

Chapter C.1 of DCP 2006 relates to parking and access. For industrial premises, one space is required per 75 m^2 of gross floor area, or one space per two employees, whichever is the greater. Section 1.3.2 provides provisions for extensions/additions to existing development and states that:

> "*where existing premises are being extended to create additional gross floor area, the additional parking requirement shall be calculated in accordance with the parking standards contained in this code on the basis of the increased floor space*".

The proposed modification does not increase the overall floor space of the approved industrial activity. The existing site car parking provision of 40 spaces, including 4 visitor spaces and 1 disabled space therefore meet the requirements of DCP 2006.

Part C.5 of DCP 2006 relates to waste management and minimisation. Council requires that all DAs (including sub-divisions and demolition) shall be accompanied by a waste management plan (WMP), requiring the applicant to specify waste, by type and volume, and to nominate reuse and recycling potential. For industrial developments, DCP 2006 requires that sections 2, 3 and 4 of the WMP be completed and submitted with a DA. A WMP has been completed and is found in **Appendix E**.

Part D.3 of DCP 2006 relates to industrial development and applies to all land that is zoned or developed for industrial purposes. These controls make provisions for the siting, design and amenity of buildings, parking and vehicular movements, and ancillary items such as fencing and drainage. The proposed building modifications are for the extension of an approved structure by some 6 metres for the installation of a pre-processing facility, and for the construction a new exhaust stack to vent combustion products from an existing furnace. These modifications do not significantly alter approved design elements and are consistent with the requirements of DCP 2006.

4.2 Regional Matters

The site comes under the provisions of the Hunter Regional Environmental Plan (REP) 1989. The relevant objectives of the Hunter REP in relation to industrial development are:

> *(a)* *to ensure that sufficient zoned and serviced industrial land is provided in locations appropriate to the needs of industry, while ensuring protection of the environment, and*
>
> *(b)* *to promote the distribution of employment in secondary industry in a manner compatible with the availability of services and distribution of population.*

The objective of Part 7 (Division 1) of the Hunter REP is to control development such that air, noise and water pollution are minimised.

As the modifications would not significantly increase pollution as discussed in **Section 6** and shown in **Table 12**, the proposal is considered to be consistent with the relevant objectives and principles of the Hunter REP.

4.3 State Matters

4.3.1 Environmental Planning and Assessment Act, 1979

Approval Process

Under Section 96 of the EP&A Act 1979 an applicant can seek to modify an approved development. There are three categories of modifications, namely:

- Modifications involving minor error, misdescription, or miscalculation [Section 96(1)];
- Modifications involving minimal environmental impact [Section 96(1A)]; and
- Other modifications [Section 96(2)].

Section 96(1) is not relevant to the WA proposal as the changes are not for the purpose of correcting a minor error, misdescription or miscalculation.

Section 96(1A) is for modifications involving minimal environmental impact. Section 96 (1A) states:

> *A consent authority may, on application being made by the applicant or any other person entitled to action a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:*
>
> *(a) it is satisfied that the proposed modification is of minimal environmental impact, and*
>
> *(b) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted and before that consent as originally granted was modified (if at all), and*
>
> *(c) it has notified the application in accordance with:*
>
> *(i) the regulations, if the regulations so require, or*
>
> *(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and*
>
> *(d) it has considered any submissions made concerning the proposed modification within any period prescribed by the regulations or provided by the development control plan, as the case may be.*
>
> *Subsections (1), (2) and (5) do not apply to such a modification.*

The proposed changes to development consent 10397 of 1995 would involve minor alterations to some conditions in order to make the consent consistent with the EPL for the operations of the facility and the other consents. The development resulting from changes to the consent is substantially the same as the original development described in this consent and the associated EIS and is of minor environmental impact given the changes relate only to minor adjustments to the monitoring regimes so as to be consistent with the licencing requirements.

Section 96(2) applies in cases where Sections 96(1) and 96(1A) do not. Section 96(2) states:

> *A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:*
>
> *(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and*
>
> *(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 5) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that*

Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and

(c) it has notified the application in accordance with:

(i) the regulations, if the regulations so require, or

(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and

(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

Subsections (1) and (1A) do not apply to such a modification.

The proposed modification to development consent S00/00975 is considered to be substantially the same development as that previously approved by the Minister for Urban Affairs and Planning. The proposed modification would not result in a change in the nature or scale of the approved development, but would allow for additional storage space for dross, add facilities to pre-process the dross and add a new stack. There would be no increase in the amount of dross processed at the facility as a result of the proposed modification, but would improve the efficiency and cost-effectiveness of the operations resulting in improved quality of products and reduced energy consumption.

The DECC was consulted regarding the proposed modification, and provided feedback for the purposes of the preparation of this application (**Appendix G**). DECC would be required to give their General Terms of Approval to the proposed modification.

4.3.2 Protection of the Environment Operations Act, 1997

The *Protection of the Environment Operations Act, 1997* prohibits any person from causing pollution of waters or air and provides for penalties for air, water and noise pollution offences. Schedule 1 of the POEO Act identifies ‘scheduled activities’ that are required to be licensed by the DECC. WA holds an EPL for the existing operations that permit secondary aluminium production (greater than 10,000 T); hazardous, industrial or group A waste generation or storage (greater than 500 T); and hazardous, industrial or group A or group B waste processing and scrap metal recovery. A copy of EPL 6423 is provided in **Appendix C**. The approval of the modification would require a variation to this licence under Section 58 of the POEO Act.

A variation to WA’s specific immobilisation approval (SIA) for waste (**Appendix D**) would also be required as a result of this application.

4.3.3 National Parks and Wildlife Act, 1974

The *National Parks and Wildlife Act 1974* (NP&W Act) governs the establishment, preservation and management of National Parks, historic sites and certain other areas, and the protection of certain fauna, native plants and Aboriginal relics.

Section 86 of the NP&W Act identifies offences relating to Aboriginal objects, including disturbing land to discover an artefact. Section 87(1) requires a permit to be obtained to remove any artefacts, while section 90(2) requires consent from the Director-General of the DECC to knowingly destroy, deface or damage or knowingly cause or permit the destruction or defacement of or damage to, a relic or Aboriginal place.

An area of approximately 252 m^2 would be required for the extension of the ALDEX building. As this area has previously been cleared and disturbed as part of the existing operations at the site, no approvals under the NP&W Act are required.

4.3.4 State Environmental Planning Policy (SEPP) No. 33 - Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) aims to ensure that the consent authority has sufficient information regarding a proposal to determine whether the development meets the criteria for hazardous or offensive development. Conditions to minimise or reduce adverse effects can then be imposed with any consent issued. SEPP 33 requires applications for potentially hazardous or offensive industry to be accompanied by a Preliminary Hazard Analysis (PHA). Applications to carry out hazardous or offensive development, or potentially hazardous or offensive development, are to be advertised for public comment.

Clause 3 of SEPP 33 defines a ‘potentially hazardous industry’ as follows:

> “*potentially hazardous industry means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property, or*
>
> *(b) to the biophysical environment,*
>
> *and includes a hazardous industry and a hazardous storage establishment.*”

Clause 3 of SEPP 33 defines a ‘hazardous industry’ as follows:

> “*hazardous industry means a development for the purposes of an industry which, when the development is in operation and when all measures proposed to reduce or minimise its impact on the locality have been employed (including, for example, measures to isolate the development from existing or likely future development on other land in the locality), would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property, or*
>
> *(b) to the biophysical environment.*”

The proposed modifications would not require any new or additional quantities of hazardous materials from the existing operation. A PHA was prepared for the proposed modification (**Appendix F**). The PHA determined that the development is considered to be a ‘potentially hazardous industry’ according to the SEPP, but would not be considered to be a ‘hazardous industry’ as the operations would not have significant off-site effects if the proposed safeguards were implemented. A summary of the PHA is provided in **Section 6.3**.

4.3.5 State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) aims to provide for a state-wide planning approach to the remediation of contaminated land. SEPP 55 requires that a consent authority must not consent to any development on land unless it has considered whether the land is contaminated and, in the case of contaminated land, whether it would be suitable either before or after remediation for the purposes of the proposed development.

Prior to its purchase by Alumino Australia Pty Limited the site was undeveloped (Envirosciences, 1994). There is no known contamination on the site, although no investigations have been undertaken to date. Minimal earthworks would be required for the proposed modifications, with the concrete slab from the existing ALDEX building extended to cover an area of approximately 252 m^2. This area has previously been cleared.

4.4 Commonwealth Matters

4.4.1 Environment Protection and Biodiversity Conservation Act, 1999 (as amended, 2006)

The requirement for approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is triggered by a proposal that has the potential to significantly affect matters of National Environmental Significance (NES) or to have a significant impact on the environment or Commonwealth land. In these circumstances, approval from the Commonwealth is required in addition to any approvals required under NSW legislation.

The EPBC Act also provides for the identification, conservation and protection of places of national heritage significance and provides for the management of Commonwealth heritage places. The Act additionally establishes the Australian Heritage Council.

The EPBC Act was amended to streamline the national environmental assessment and approvals process, protect Australian biodiversity and integrate management of important natural and cultural places. The EPBC Act lists seven matters of NES that must be addressed when assessing the impacts of a proposal.

The proposed modification is not expected to affect any matter of NES or other matters protected by the EPBC Act.

5.0 CONSULTATION

5.1 Statutory and other Relevant Authorities

The DoP's requirements were issued on 23 March 2007 (**Appendix B**), which detailed what must be included in the SEE. The DECC and Cessnock City Council were also consulted and provided their requirements for the assessment (**Appendices G** and **H** respectively). A summary of these requirements is provided in **Table 1**.

Table 1: Requirements for the Statement of Environmental Effects

Issue	SEE Section Reference/Comment
Department of Planning	
A detailed description of the: ▪ Existing and approved development on site; ▪ Current regulatory controls; and ▪ Likely staging of the development.	 **Section 2.2** **Section 2.2.3** **Section 3.4.3**
A detailed description of the proposed modifications including the: ▪ Need for the modifications; and ▪ The likely inter-relationship between the modifications and the existing or approved development on site.	 **Section 3.2** **Section 3**
Consideration of any relevant statutory provisions, in particular an assessment of the proposed modifications against the provisions of SEPP No. 33 – Hazardous and Offensive Development and SEPP No. 55 – Remediation of Land.	**Section 4**
A general overview of the environmental impacts of the proposed modification, identifying the key issues for further assessment, and taking into consideration the issues raised during consultation.	**Section 6** and **8**
A detailed assessment of the key issues specified below, and any other significant issues identified in the general overview of environmental impact: ▪ Waste management; ▪ Air quality; ▪ Hazards; ▪ Noise; and ▪ Greenhouse gas emissions.	 **Section 6.1** **Section 6.2** **Section 6.3** **Section 6.4** **Section 6.5**
A conclusion justifying the proposed modifications.	**Section 10**
Department of Environment and Climate Change	
Air quality – quantify predicted changes relative to existing impacts	**Section 6.2**

Issue	SEE Section Reference/Comment
Include an assessment of the likely impact of proposed changes on the classification of WA's wastes under the *Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes* (EPA, 1999).	**Section 6.1.2**
Cessnock City Council	
Kurri Sand Swamp Woodland Assessment of the need for a species impact statement under Division 2 of Part 6 of the Threatened Species Conservation Act 1995. The application will need to indicate the location of the Woodland to the proposal, if any of the Woodland is to be removed and if so what the impact will be and if there is to be any additional plantings.	**Section 7.1** The proposal would not require the removal of any vegetation.
Integrated Development The application is considered Integrated Development under Section 91 of the *Environmental Planning and Assessment Act* for the following: - ▪ Bushfire - Section 100B of the Rural Fires Act. The application may be considered Integrated Development under Section 91 of the *Environmental Planning and Assessment Act* for the following: - ▪ Environment Protection Licence - Sections 43(a), 47 and 55 of the *Protection of the Environment Operations Act* ▪ Aboriginal Artefacts or Relics - Section 90 of the *National Parks and Wildlife Act*	This is not relevant to the proposal. **Section 4.3**
Designated Development	This is not relevant to the proposal.
Environmental Planning Instruments The application will need to consider the following documents: - ▪ State Environmental Planning Policy No 34 - Major Employment Generating Industrial Development; ▪ State Environmental Planning Policy No 33 - Hazardous and Offensive Development. A preliminary hazard analysis will need to be undertaken.	SEPP 34 has been repealed. **Section 6.3**

Issue	SEE Section Reference/Comment
Fire Safety	The fire safety of the existing and modified buildings would be undertaken.
Car Parking	**Section 4.1.2**
Noise	**Section 6.4**

Letters and follow up telephone calls were made to businesses in the local area. None of those consulted had any specific comments or issues regarding the proposed modification to the development as shown in **Table 2**.

Table 2: Community Consultation Summary

Stakeholder	Issues Raised
Kurri Kurri Dog Pound	None
Wine Selectors	None
ITW Industrial Packaging	None
Alfabs Engineering Group	None

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6.0 ENVIRONMENTAL IMPACT ASSESSMENT – KEY ISSUES

The key issues for detailed assessment were based on consultation with the DoP and DECC and a knowledge and understanding of the existing facility, the proposed modifications and the likely impacts. The key issues were considered to be:

- Waste, particularly that generated in baghouses and changes to waste and waste management that might result from the pre-processing plant and new stack from the reverbatory furnace;
- Air emissions and air quality resulting from the pre-processing plant and reverbatory furnace stack;
- Hazards associated with the proposed modification;
- Noise resulting from construction, operation, traffic and cumulative noise; and
- Greenhouse gas emissions associated with the modification.

A summary and comparison of the environmental impacts of the existing development and the proposed modification to the development is found in **Section 8.0**.

6.1 Waste Management

6.1.1 Existing Environment

The dominant wastes generated by the operation of the existing facility are fines collected from each of the baghouse dust collectors (BH1 – 5). Other wastes generated on site include sewage, vehicle wash down waters (treated on-site by oil and solids/water separator; effluent disposal on-site via irrigation) and general office waste.

Some particulate matter is liberated during pre-treatment and furnace operations during the reprocessing cycle. The particulate matter is captured by five existing baghouses (BH1 - BH5). (Note: hydrated lime is also injected into the exhaust gas streams entering BH1 and BH5 to effect gaseous pollutant scrubbing.) The treated exhaust gases are discharged to atmosphere. Regular pneumatic pulses dislodge particulate matter accumulated on the filters within each baghouse, and this waste material is collected within 1 m^3 bulka bags.

The bulka bags of dust fines are transferred to the ALDEX Building for storage prior to disposal or reuse. Dust fine wastes in the order of 600 – 800 tonnes per month are currently generated.

The management, assessment and disposal of dust wastes is currently undertaken in accordance with WA's SIA (2005-S-13) issued by the DECC (**Appendix D**). This approval permits the classification and disposal of the waste material on the basis of the natural immobilisation of fluoride within the waste. Samples of the waste are routinely collected and analysed to demonstrate conformance with the requirements of the Approval. The majority of these wastes are currently disposed of to the SITA Waste Management Facility in Kemps Creek, NSW.

A portion of the dust by-product (ALDEX) is currently reused in the domestic steel foundry industry due to its aluminium content and refractory properties, and is thus diverted from landfill disposal. WA is actively pursuing other domestic and international reuse opportunities for the ALDEX within the steel making, cement and light weight aggregate manufacture and aluminium industries to improve the sustainability of operations and improve WA's environmental outcomes.

6.1.2 Proposed Modifications

Construction wastes would include concrete and corrugated wall sheeting. These wastes would be generated and managed as detailed in the WMP prepared (**Appendix E)**.

The proposed pre-processing plant is designed to reduce the quantity of non-metallic dross constituents and fine dusts being ultimately fed to the rotary furnaces. Such actions would effectively reduce the quantity of dust fines generated by BH1 – 4. Nevertheless, the overall quantity of waste generated at the Kurri Kurri facility is expected to remain relatively unchanged.

Additional sources of waste generation associated with the modified development include the collection of undersized material separated by the screen deck and dust fines collected by the proposed baghouses servicing the pre-processing plant and dross storage bays. Waste material generated by the pre-processing plant would be similar in nature and quantity to that generated by the Raymond Mill, estimated at 230 tonnes per month. These dusts would be collected directly into 1 m^3 bulka bags and stored in the ALDEX building awaiting ultimate disposal or reuse. A variation of WA's Specific Immobilisation Approval would be sought from the DECC to permit the management and disposal of the new waste stream. As identified above, WA's ultimate goal is to optimise by-product reuse opportunities and divert material from landfill disposal.

The modified development would generate waste fines with similar characteristics, and therefore would not affect the classification of waste under the *Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes* (EPA, 1999).

6.1.3 Cumulative Impacts

As no changes to the nature or scale of waste generation are expected, no cumulative impacts would result from the proposed modifications.

6.2 Air Quality

While a number of pollutants are emitted from the WA facility, those affected by the proposed modification are coarse (TSP) and fine (PM_{10}) particulates and the products of natural gas combustion (sulfur dioxide, nitrogen dioxide, carbon monoxide and carbon dioxide).

Two separate Air Quality Impact Assessments (AQIA) were prepared by HLA-Envirosciences Pty Limited (HLA ENSR) to assess the potential changes in air quality resulting from the proposed plant modifications. The first AQIA investigated the implications of installing a new stack over the holding side of the reverbatory furnace to vent combustion products (see **Appendix I**), and was conducted in accordance with the requirements of the DECC who requested the study as part of a Pollution Reduction Program (shown in the EPL contained in **Appendix C**). This AQIA predicted ground level concentrations (GLCs) of combustion products from the stack reconfiguration.

The second AQIA assessed the changes in ground level particulate concentrations resulting from the new reverbatory furnace stack, the relocation of the existing baghouse and associated stack that currently service the Raymond Mill to the ALDEX storage area, and the addition of an approved but as yet unbuilt baghouse and stack to service the proposed pre-processing facility (**Appendix J**). This second assessment was prepared in accordance with the DoP's requirements for the SEE, and investigated changes in particulate levels resulting from the proposed pre-processing plant.

The AUSPLUME dispersion model (version 6.0) was used for both AQIAs, with the assessments conducted in accordance with guidance provided in the Department of Environment and Climate Change's (DECC) *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005).

6.2.1 Existing Environment

Ambient Air Quality

The WA facility is located in an industrial area. Local sources of pollutants include the Hydro Aluminium smelter, coal mines and motor vehicle exhaust. Emissions from the power stations in the Upper Hunter Valley also affect air quality in the area.

The DECC operates an ambient monitoring station at Beresfield, which is approximately 16 km east of the WA facility. The Beresfield station monitors levels of sulfur dioxide, nitrogen dioxide and particulate matter (PM_{10}). Holmes Air Sciences (Holmes, 2006) recently prepared an AQIA that reported particulate levels measured at Kurri Kurri Hospital, which is located less than two kilometres from the WA site. These data were utilised in the assessment rather than the DECC data as they were considered to be more representative of the local conditions. The closest station recording carbon monoxide levels is at Newcastle. A summary of the ambient monitoring results is shown in **Table 3**.

Table 3: Ambient Air Quality Data, 2006

Pollutant	Averaging Period	Maximum Measured Concentration ($\mu g/m^3$)	Assessment Criteria ($\mu g/m^3$)
Sulfur dioxide	1 hour	107	570
	24 hours	26	228
Nitrogen dioxide	1 hour	68	246
Particulates (PM_{10})	24 hours	28.7	50
	Annual	5.9	30
Total suspended particulates (TSP)*	Annual	14.8	90
Carbon monoxide	1 hour	3 335	30 000
	8 hours	2 530	10 000
* Calculated from ratio of TSP: PM_{10} in the Hunter Valley reported in Minerals Council (2000)			

6.2.2 Proposed Modifications

Existing Point Sources

Emissions from the rotary furnaces are vented to Baghouse No. 1, which is serviced by a lime injection wet/dry scrubbing system. The existing storage area in the main building is ventilated via Baghouse No. 2. The Raymond Mill is ventilated to Baghouse No. 3, with the MRM, Rotary Cooler and Ball Mill venting to Baghouse No. 4. The reverbatory furnace is serviced by Baghouse No. 5, which is fitted with a lime scrubbing system.

Proposed Pre-processing Facility

WA has approval (Consent File No. S00/00975) to install another baghouse and stack (Stack 7) adjacent to the ALDEX building; this baghouse would collect emissions from the pre-processing plant. Furthermore, as the proposed pre-processing facility would replace the functions of the Raymond Mill, the existing Baghouse No. 3 and Stack 3 that currently service the Raymond Mill may be relocated to the ALDEX building to preferentially exhaust two of the eight dross storage bays. For the purposes of the AQIA this is the scenario that has been modelled. However as detailed in **Section 3.1.1**, WA is considering a number of options for the control of dust emissions from this area of the plant.

Proposed Reverbatory Arrangement

WA proposes to separate emissions from the reverbatory furnace by installing a new stack (Stack 6) directly above the holding side of the furnace that would vent the natural gas combustion products from the furnace directly to atmosphere. The DECC has indicated that they are satisfied with results of this assessment and the construction of this stack as part of the Pollution Reduction Program for the site (**Appendix C**).

6.2.3 Impact Assessment Methodology

Proposed Pre-processing Facility

Emissions from the pre-processing facility were assessed by assuming a concentration equal to 75% of the maximum permitted Group 6 particulate limit. The volumetric flow rate was assumed to be 30 m^3/s based on approximately double the flow rate of BH3. This flow rate was assumed due to the baghouse being approximately twice the size of baghouse and servicing a larger airshed. Emissions from the relocated baghouse 3 were assumed to be the same as those from the current baghouse 3.

Modelling Scenarios

Two scenarios were utilised in the assessment of emissions from the pre-processing facility:

- Scenario 1, representing existing particulate emissions from the facility.
- Scenario 2, representing particulate emissions following the proposed modifications to the facility that consist of:
    - relocation of Baghouse 3 from the Raymond Mill (which will cease to operate) to the pre-processing facility bays;
    - the addition of Stack 6 (that will vent small quantities of natural gas derived particulates generated from the combustion of natural gas in the reverbatory furnace); and
    - the addition of Stack 7.

The assessment assumed operations occur 24 hours per day, 7 days a week over 365 days a year. This was a conservative assumption that did not account for plant shut downs and normal operating variations.

Proposed Reverbatory Arrangement

Conservative assumptions were used in the modelling, including:

- A higher than expected volumetric flow rate for the proposed additional stack (Stack 6);

- Continuous emissions from the reverbatory furnace; and
- Investigation of a worst-case scenario whereby emissions from the proposed Stack 6 were added to the existing emissions from Stacks 5 and 6 (in reality, the combustion products vented through Stack 6 would be removed from the Stack 5 emissions).

Emissions from Stacks 1 and 5 were determined from stack emission testing conducted by HLA ENSR between 2004 and 2006. Emissions from the proposed stack were estimated using The Combustion Database (v. 2.4 Aug 04) developed by EPA (Vic) for use with reporting for the National Pollutant Inventory.

6.2.4 Cumulative Impacts

Proposed Pre-processing Facility

The maximum glcs of particulates predicted by the dispersion modelling, and the cumulative concentrations, are shown in **Table 4**. The cumulative concentrations represent the sum of the existing maximum ambient pollutant levels with the maximum predicted levels from the dispersion modelling for Scenario 2, which are then assessed against the guideline criteria.

Table 4: Maximum Predicted Ground Level Concentrations

Pollutant	Averaging Period	Predicted GLCs ($\mu g/m^3$)		Ambient Concentration ($\mu g/m^3$) Scenario 2 (proposed)	Cumulative Concentration (Scenario 2) ($\mu g/m^3$)	Criteria ($\mu g/m^3$)
		Scenario 1 (existing)	Scenario 2 (proposed)			
PM_{10}	24 hours	24.1	35.8	28.7	64.5	50
	Annual	2.8	4.5	5.9	10.4	30
TSP	Annual	3.8	8.7	14.8	23.5	90

As indicated in **Table 4**, the cumulative annual pollutant concentrations of PM_{10} and TSP were well below the assessment criteria. In contrast, the predicted maximum cumulative 24-hour PM_{10} concentration exceeded the criterion as a result of the elevated background PM_{10} level. This exceedance is noted to occur within the premises boundary and predicted ground level concentrations at residential areas were below the assessment criterion. The existing pattern and magnitude of emissions from the facility are not expected to change significantly following the proposed modifications. It should be noted that these technical exceedences occurring within the facility would only occur during times when the background PM_{10} concentration is at a maximum and the ground level PM_{10} concentration at that particular point was also at a maximum. In reality this would rarely occur.

Proposed Reverbatory Arrangement

The predicted cumulative pollutant concentrations for the additional reverbatory furnace stack are shown in **Table 5**.

Table 5: Maximum Cumulative Pollutant Concentrations

Pollutant	Averaging Period	Ambient Concentration (μg/m³)	Cumulative Concentration (μg/m³)	Assessment Criteria (μg/m³)
Sulfur dioxide	1 hour	107	112	570
	24 hours	26	28	228
Nitrogen dioxide	1 hour	68	149	246
Particulates (PM_{10})	24 hour	29	37	50
Carbon monoxide	1 hour	3 335	3442	30 000
	8 hour	2 530	2756	10 000

The results of the dispersion modelling indicated that the glcs of sulfur dioxide, nitrogen dioxide, particulates (PM_{10}) and carbon monoxide would be below the guideline criteria specified by the DECC (DEC, 2005). No adverse air quality impacts on residents are anticipated as a result of the addition of the new stack to the reverbatory furnace.

6.2.5 Mitigation/Management/Monitoring/Offset Measures

Monitoring of emission sources would be undertaken in accordance with the requirements of the conditions of development consent (as modified) and the EPL.

6.3 Hazards

A preliminary hazard analysis (PHA) of the proposed additional dross storage in the ALDEX building was undertaken by Sinclair Knight Merz in accordance with the NSW Department of Planning Hazardous Industry Planning Advisory Paper (HIPAP) No.6, Guidelines for Hazard Analysis. The PHA is attached in **Appendix F** and is summarised in the sections below.

A level 2 Partial Quantitative Analysis using hazard identification and the focused quantification of key potential offsite risks was selected as the most appropriate level of assessment for the site. This decision was based on previous assessment undertaken, the potential for hazardous gas generation and the separation from sensitive receptors.

6.3.1 Existing Environment

The existing risks and hazards on the site are the same as those which would result from the proposed modification and are related to dross storage and handling. Aluminium dross is classified by the Australian Dangerous Goods Code as a Class 4.3 Dangerous Good. This classification indicates that there is a potential for the release of gas when dross is mixed with water. In the event of a mix of dross and water, water and aluminium nitride would primarily form ammonia gas; small quantities of acetylene and methane would also be produced. Acetylene and methane are produced from aluminium carbide in the dross. The dross stored at WA has, on average, less than 1% aluminium carbide content.

The Materials Safety Data Sheet (MSDS) for dross indicates that dross is not acutely toxic or combustible. While chronic exposure to dross dust could result in adverse health effects, the MSDS does not indicate that such exposure would result in fatalities.

In the current operations, bulk dross is delivered by road to the site and is stored in the southern portion of the existing main building. Trucks enter the site from Mitchell Avenue via a driveway and onsite road. The trucks position adjacent to the dross storage area, reverse into the building and dump the dross into one of six storage bays.

Hazard and risk assessments previously conducted for the site did not identify any incidents that could result in an offsite impact above the published risk criteria [*Hazardous Industry Planning Advisory paper No.4, Risk Criteria for Land Use Safety Planning* (PlanningNSW, 1992) (HIPAP No. 4)]. In addition, WA is located in an industrial area with sensitive land users well clear of the site, the closest residential area being over 600m to the southeast. Detailed technical and management safeguards have been proven to accomplish positive results at the WA site.

6.3.2 Proposed Modifications

The proposed modification would move the location of dross storage and pre-processing facilities to the ALDEX building, but otherwise the risks and hazards associated with the storage and handling of dross would be the same as the existing operations.

6.3.3 Hazard Analysis

A hazard identification table was developed (Appendix A of **Appendix F**) to review the potential hazards at the site and it was identified that the main hazards that could result in offsite impact were dust release and water contact with dross. A review of the dust containment systems at the site identified that risk of dust release beyond the ALDEX building, and impact to offsite areas, was low. However, it was identified that in the event of a storm, the roof to the building could be damaged and water could ingress the dross storage area. This could lead to water dross mixing and the generation of toxic/flammable gas. This incident was carried forward for consequence analysis.

Ammonia Release from Dross and Water Mix

A chemical analysis of water dross mixing was conducted and it was identified that ammonia, methane and acetylene gases could be generated. A conservative incident was postulated whereby storm damage to the roof of the storage occurred and water ingressed to the dross material. The postulated incident considered the continuing storm for 1 hour, and then a calm period for a further hour.

The assessed flammable gas generated (methane/acetylene) by the postulated incident indicated that there was insufficient gas in the ALDEX building to reach the lower flammable limit of the gas/air mixture. Hence, there was no potential for explosion in this case.

The mass of ammonia released during the postulated storm was calculated to be 359 kg ammonia/hour. This hourly release would occur during the rain period and would continue whilst the rain falls. However, as ammonia is hygroscopic (i.e. is readily absorbed by water), the majority of ammonia will be absorbed into the falling rain, reducing the quantity of ammonia released over the rainfall period. However, in previous studies conducted at the site, a more conservative incident was assessed, being:

- a severe wind and rainstorm occurring, damaging the roof and exposing the full contents of the dross to the rain;
- the rain ceasing after 1 hour; and
- the dross water reaction continued for a further hour after the rain ceased.

In previous PHA studies conducted this incident scenario was agreed with the then Department of Urban Affairs and Planning (DUAP) to represent the worst case event and would yield a conservative result. Hence, this incident scenario was also assessed in the current study of dross storage in the ALDEX building. The postulated incident results in a release over a two hour period. In this analysis, for the sake of conservatism, the heating effect from the exothermic reaction of dross and water was ignored, along with the potential for water to be absorbed by the rain. The release rate of 0.05kg/s was used to model the downwind dispersion of evolved gas.

Downwind Dispersion of Evolved Gas

The dispersion of the gas downwind was assessed using a computer model (BP Cirrus Consequence Modelling Software).

The selected wind/weather conditions for the analysis were based on a set of values that represent a broad range of climatic conditions, which may occur during the release incident. This range of conditions represents high and low wind speeds combined with bright sun to dense cloud. The results give a good correlation of the expected dispersion impact over a broad range of climate conditions.

The assumption was made that the release occurs at the top of the ALDEX building over the full storage area. This would yield conservative results as the building walls would prevent direct release of the ammonia to the atmosphere, which in turn reduces the downwind concentration.

The values selected for the analysis are shown in **Table 6**.

Table 6: Selected Wind Weather Conditions for the Dispersion Analysis

Wind/Weather Category	Description
B3, B5	Bright sunlight, breezy conditions
C3, C5	Partially cloudy condition, light to moderate breeze
D3, D5, D9	Cloudy conditions with some sun, very light to strong breeze
E2	Complete cloud, light breezy conditions
F1.5	Complete cloud, inversion conditions, light to no breeze

The criteria selected for ammonia impact to people is split into three categories, these are presented in **Table 7**.

Table 7: Ammonia Impact/Effects on People

Category	Concentration		Description of Impact or Effects
	ppm	mg/m^3	
3	500	348	Immediate danger to life and health*
2	100	69.6	Injurious effects to the most sensitive receptor after prolonged exposure 30-60 minutes*
1	25	17.4	Odour (Time Weighted Average *)

* *Worksafe Australia Exposure Standards for Atmospheric Contaminant in the Occupational Environment, Guidance Note: NOHSC:3008* (1995), National Exposure Standard NOHSC:1003 (1995).

For the application of this model, to the Weston ALDEX building, the following data was used:

- Release rate = 0.00009 kg/s/m^2
- Area of Release = 543 m^2
- Release height = 12 m (noting that the ALDEX building is 12m high and the release occurs at roof height.)

Application of the values in **Table 7** to the Cirrus area release model resulted in the distance to the various ammonia concentrations shown in **Table 8**.

Table 8: Summary of Concentrations and Distances for Ammonia Release from the Proposed Dross Storage at Weston Aluminium

Wind Weather Category	Maximum Downwind Concentration (ppm)	Distance to Max. Concentration (m)
B3	14	70
B3	8.3	65
C3	13.7	105
C5	8.2	210
D3	12	200
D5	7.2	185
D9	4	190
E2	16.1	280
F1.5	18.6	500

The results of the model found that the concentration of ammonia at ground level would not exceed the lowest selected criteria of 25ppm published by the National Occupational Health and Safety Commission (NOHSC). Therefore, there would be no offsite impacts as a result of a storm incident, roof damage and water ingress into the dross storage.

Other Gases Released

The evolution of other gases, such as acetylene, methane and hydrogen fluoride would be limited due to the alkaline nature of the dross water mix (i.e. aluminium hydroxide formation).

The dross contains only trace amounts of fluoride compounds, and the generation of hydrogen fluoride would be minimal. Hydrogen fluoride is not an acute toxic gas. Nonetheless, continued releases would result in chronic effects offsite. However, as the postulated incident in this is a rare event, there would be an insufficient number of incidents to cause chronic effects both on or offsite. Therefore further consideration of hydrogen fluoride release was not considered.

In some cases high humidity can affect dross and release toxic and flammable gases. The high humidity can cause a slow reaction at the surface of the dross releasing ammonia, acetylene, methane, hydrogen cyanide and hydrogen fluoride. The reaction would occur at the surface only, releasing insignificant quantities of gas. Nevertheless over a period of time, these gases can build up in confined spaces leading to dangerous and flammable atmospheres. The current WA dross storage area is fully vented with draft fans drawing air from the storage space through dust collection units thus preventing build up of gas in the storage area. This vent system would be increased to include the proposed storage expansion.

Fresh air is currently drawn into the storage area as air is removed from the space by the fans. The fans operate on a 24 hour basis, reducing the likelihood of gas build up in the building. The slow release rate of gas and the vent fans result in a low risk of toxic or flammable gas build up at this facility.

Flammability of Acetylene Released

The lower flammable limit (LEL) of acetylene in air is 2.2%. The quantity of acetylene released over 2 hours in the postulated storm damage incident scenario would not be enough to reach the LEL. Therefore, this incident was not carried forward for further analysis.

Flammability of Methane Released

The lower flammable limit (LEL) of methane is 5% of methane in air. Based on the analysis undertaken in the PHA, the methane released as a result of the postulated storm damage incident would not reach LEL. Hence, this incident was not carried forward for further analysis.

Based on the analysis conducted in the PHA, the proposed modification to the facility does not exceed the risk criteria published in HIPAP No.4 and, the facility may be classified as “potentially hazardous” and not “hazardous”, and is therefore permitted in the proposed land zoning.

6.3.4 Cumulative Impacts

The proposed modification would not result in additional cumulative risks or hazards, as the proposal would not increase the amount of dross stored or handled on the site, as it only alters the location in which it is stored, moving it from the Plant building to the ALDEX building.

6.3.5 Mitigation/Management/Monitoring/Offset Measures

The PHA recommended that the existing WA site emergency plan be updated to include the new operations proposed in the ALDEX building.

6.4 Noise

A noise impact assessment of the proposed modifications to the WA facility was undertaken in accordance with the *NSW Industrial Noise Policy* (INP) and the *Environmental Noise Control Manual* (ENCM) by Spectrum Acoustics. The Noise Impact Assessment is attached in **Appendix G** and is summarised in the sections below.

6.4.1 Existing Environment

The existing facility is located within a heavily trafficked industrial area, which is subject to a variety of noise sources. The nearest residence is over 600m away from the site. The site operates under EPL 6423 which provides noise limits for protecting the amenity of residential areas. These limits are detailed in **Table 9** below.

Table 9: Weston Aluminium Noise Limits

Location	Daytime (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night Time (10 pm to 7 am)
Residences at the corner of Government and 10th Streets	48 dB(A) Leq (15min)	48 dB(A) Leq (15 min) 40 dB(A) Leq (evening)	47 dB(A) Leq (15 min) 35 dB(A) Leq (night) 57dB(A) L1(1 minute)
Residences on Northcote Street	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min) 40 dB(A) Leq (night) 57dB(A) L1 (1 minute)
Residences in the Light Industrial Zone on Mitchell Avenue and Railway Avenue	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min) 41 dB(A) Leq (night) 55 dB(A) L1 (1 minute)

Annual noise monitoring conducted for WA has determined that the plant currently operates within the licence limits. Compliance with the noise limits has been achieved through the installation of attenuators on the baghouse reverse pulse system and enclosing the external baghouse fan motors.

6.4.2 Noise Criteria

Construction Noise

Recommended construction criteria vary depending on construction time, as outlined in Section 171 of the EPA *Environmental Noise Control Manual* (ENCM 1992). The total construction time for the proposed modification is anticipated to be approximately 15 weeks and therefore the criterion of 'background + 10dB(A)' will apply, resulting in a construction noise planning level of **53 dB(A) L10** in Government Street, **49 dB(A) L10** in Northcote Street and **48 dB(A) L10** in Mitchell and Railway Avenues.

Plant Operations

The INP devotes a section to applying the policy to existing industrial premises. This section is, strictly speaking, not applicable to the current project as regular noise monitoring has shown it is operating within its existing noise goals and it is, therefore, not exceeding any reasonable expectations of the local community.

As a result it is not possible to accurately determine a set of project specific noise goals for the site as per procedures in the INP. In addition, the application of the INP to existing premises is generally aimed at maintaining the acoustic amenity of any potentially affected receivers.

The existing noise goals for the WA site were determined from noise levels measured in 2001. It is considered unlikely that the background noise levels in the area would have decreased in the interim. The approach taken in this assessment was to adopt the existing project specific noise goals for the site (as determined previously through procedures in the INP) and ensure that noise emissions from the proposed modifications do not add significantly to the total noise emissions from the entire site.

Sleep Disturbance

The L1 (1 min) sleep disturbance criteria for the site are detailed in **Table 9** for the various potentially affected receiver areas.

Vehicle Noise

In NSW, noise from vehicle movements associated with an industrial source is assessed in terms of the INP if the vehicles are not on a public road. If the vehicles are on a public road, the *NSW Environmental Criteria for Road Traffic Noise* (ECRTN) applies. Noise from the proposal must, therefore, be assessed against the project specific noise goals of the INP and also the criteria in the ECRTN.

Access to the site would remain unchanged by the proposed modifications. Trucks delivering dross would travel around the existing main building to the ALDEX building. This transport route is currently used by other vehicles travelling on the site. The operation of the pre-processing facility would not create additional traffic to, or on site and, therefore, there would be no significant difference in vehicle noise emissions as a result of the pre-processing facility.

Road Traffic Noise

The ECRTN recommends various criteria based on the functional categories of roads applied by the Roads and Traffic Authority (RTA).

Table 10 below shows the noise criteria relevant to traffic on various road types extracted from Table 1 of the ECRTN. For the assessment of traffic noise, the day time period is from 7am to 10pm, whilst night is from 10pm to 7am.

Table 10: Road Traffic Noise Criteria

Situation	Recommended Criteria	
	Day (7am to 10pm)	Night (10pm to 7am)
8. Landuse developments with potential to create additional traffic on a collector road	Leq (1hr) 60	Leq (1hr) 55

The ECRTN also advises that, where criteria are already exceeded:

> *"In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB."*

6.4.3 Construction Noise

Construction noise levels would vary throughout individual days and also throughout the length of the overall works. The noise level at individual receivers would also be dependant upon the location of the various works, relative to those receivers, at various times.

To determine potential noise impacts, a sample calculation was carried out of a typical construction scenario of a concrete pump and concrete vibrator working in close proximity. The results show that there is a potential for a 2 dB(A) exceedance of the construction noise criterion under the assessed conditions. It must be noted, however, that the calculation of construction noise impacts, is simple in that it takes into account only attenuation due to hemispherical spreading (distance loss). There is no allowance for partial screening effects of intervening structures or topography, or atmospheric absorption. More importantly, there is no allowance for attenuation due to ground absorption. At distances beyond a few hundred metres such attenuation can be significant. As a consequence the results will likely overestimate received noise by several decibels.

These impacts would only occur in the early stages of construction during the laying of concrete slabs etc. After that the majority of noise generation would occur inside the ALDEX building and noise emissions would be significantly reduced.

As such the potential impacts of the construction noise criterion will be day time only and short term in nature and are not expected to adversely impact on the acoustic amenity of receivers

6.4.4 Proposed Modifications

The proposed development involves the installation of additional noise-generating plant, including the rumbler, the vertical hammermill and the vertical impact flinger, and the relocation of a baghouse. These plant have the potential to generate noise and, in the case of the rumbler, vibrations, that may potentially affect sensitive receptors. Noise is also anticipated during the construction period.

Noise modelling was undertaken to assess the likely impacts of the proposed modifications, the significant meteorological conditions were considered with respect to noise propagation from the site and the following atmospheric scenarios were used in the noise modelling:

- ***Scenario 1*** - SE Wind – 20^{o}C, 70% R.H., 3 m/sec wind from SE.
- ***Scenario 2*** - NW Wind – 20^{o}C, 70% R.H., 3 m/sec wind from NW.
- ***Scenario 3*** - 10^{o}C, 70% R.H., +3^{o} C/100m positive temperature gradient (temp. inversion).

Plant Operations

Assessment of operational noise was conducted using RTA Technologies Environmental Noise Model (ENM) v3.06. Noise levels for the plant items to be used in the proposed pre-processing facility were sourced from measurements made at a similar facility operating under similar conditions. The measurements were taken when all plant items were operating at maximum production rate over a full 15 minute period.

Current noise emissions from WA were modelled using noise levels for all existing sources on the site operating at typical full capacity. To determine additional noise impacts from the modified facility the model was then run again with the extra noise sources included. For assessment of the worst case scenario, it was assumed that the pre-processing facility was at full capacity over an entire 15 minute period. The assessment considered the worst case 15 minute intervals when the plant (existing and proposed) is at full production and the results were compared to the Leq (15 min) criteria to determine compliance.

Noise levels were modelled using ENM for each of the atmospheric scenarios detailed above. Contours of equal sound pressure level were generated out to the 30 dB(A) level. Figures 9, 10 and 11 in **Appendix G** show noise contours for the total combined noise from the existing and proposed operations (i.e. existing operations plus pre-processing facility) compared with the existing operations. These contours represent the noise levels “before” and “after” the introduction of the operation of the pre-processing facility (the modification).

It should be noted that the ENM model takes into account ground topography and includes the effects of all large buildings on the WA site. The influence of other buildings in the industrial area around the WA site has not been included in the model.

The noise contours in Figures 9, 10 and 11 of **Appendix G** show that, under the modelled conditions, noise from the entire site would increase marginally at some locations as a result of additional noise emissions from the pre-processing facility. However, the increase in noise would not result in the total received noise exceeding any of the Leq (15 min) noise criteria detailed in **Table 9**. There would, therefore, be no adverse noise impacts as a result of the operation of the facility.

Sleep Disturbance

The modelled results show that the worst case received noise as a result of typical operations of the pre-processing facility would be less than 35 dB(A) at the nearest receiver to the site in Mitchell Avenue. This is based on a modelled sound power level of 110 dB(A). Based on the sleep disturbance criteria detailed in **Table 9** (i.e. 57 dB(A) L1 (1 min)) this would indicate that L1 (1 min) noise levels of >130 dB(A) would be required in order to have the potential to create sleep disturbance impacts at any residential receivers. Noise of this magnitude from activities on the site would not be expected to occur.

Road Traffic Noise

There would be no additional traffic generated by the project and there would, therefore, not be any differences in the currently compliant traffic noise. Truck movements are limited to the day time hours of 7 am to 7 pm, although for logistic reasons this is usually limited to 7 am to 4 pm.

6.4.5 Cumulative Impacts

Existing ambient noise levels were measured in the area in July 2007 at 15 minute statistical intervals using two environmental noise loggers. These loggers were located on the verandas of number 42 Northcote Street and number 8 Tenth Street.

The noise from the combined emissions of the pre-processing facility and the operation of the existing operations at WA are shown in Figures 9, 10 and 11 of **Appendix G**. These figures show that the maximum predicted Leq noise level in Tenth Street will be approximately 30 dB(A) Leq (15 min) under the assessed south east wind. This is 5 dB(A) below the lowest measured background noise level (day time) in the area. It is 17 dB(A) below the measured Leq noise level.

The worst case predicted noise in Northcote Street would be 40 dB(A) Leq (15 min) under the assessed north west wind. Again this is 5 dB(A) below the lowest measured background noise level (night time) in the area. It is 16 dB(A) below the measured Leq noise level in the area.

There would be, therefore, no cumulative noise impacts as a result of the operation of the pre-processing facility along with the existing plant, in the existing acoustic environment.

6.4.6 Mitigation/Management/Monitoring/Offset Measures

As no adverse noise impacts are predicted for the proposed modification, no noise mitigation measures are required.

6.5 Greenhouse Gas Emissions

The primary greenhouse gases are water vapour, carbon dioxide (CO_2), nitrous oxide (N_20), methane (CH_4) and ozone (O_3). These gases absorb infrared radiation emitted from the Earth's surface and atmosphere. The increasing levels of these greenhouse gases in the upper atmosphere is believed to be responsible for changing the average temperature of the Earth, known as climate change. International efforts are underway to minimise climate change caused by anthropogenic sources of greenhouse gases.

The NSW Greenhouse Plan was developed to limit emissions of greenhouse gases in NSW. The NSW Government has committed to a long-term target to reduce greenhouse emissions by 60% from 1990 levels by 2050, with a short-term target to return to year 2000 emissions by 2025.

6.5.1 Existing Environment

In 2005, greenhouse gas emissions were 158.2 million tonnes compared to the 1990 level of 156 million tonnes. More than half (75.7 million tonnes) of the total greenhouse gas emissions in NSW are released by stationary energy sources such as power stations. Other major sources are transport (14 %) and agriculture (12 %). Emissions from industrial processes, including metal production, accounted for approximately 13 million tonnes of greenhouse gases in 2005 (http://www.greenhouse.nsw.gov.au/test_squiz/emissions_nsw; accessed 2 October 2007).

The EIS prepared by URS for the existing development predicted that the total carbon dioxide emissions from all the furnaces would be 21,000 tonnes per year.

6.5.2 Proposed Modifications

The Greenhouse Challenge Plus Reporting Guidelines developed by the Australian Greenhouse Office (2007) outline three different categories of greenhouse gas emissions:

b) Direct emissions (produced from sources within the boundary of an organisation and by the organisation's activities);

c) Energy indirect emissions (for WA, this primarily relates to electricity consumption);

d) Other indirect emissions (including upstream emissions generated in extraction and production of fossil fuels, waste disposal emissions, product transport emissions and contracted/outsourced activities).

These categories were used to identify the changes in greenhouse gas emissions resulting from the proposed modifications to the WA facility.

Direct Emissions

Direct emissions from the facility result from production and vehicle emissions. The proposed modifications would not affect the total amount of material processed at the facility; the efficiency of metal recovery, however, is expected to increase, which would lead to greater metal production. This efficiency increase is expected to result in greenhouse gas savings as illustrated in **Table 11,** which compares the number of furnace loads (charges) required for different scenarios for a 100 tonne delivery of aluminium dross.

Table 11: Efficiency Comparison

Scenario	Dross Delivered (tonnes)	Dross Charged to Furnace (tonnes)	Number of charges (based on 4 tonne charges)
No pre-processing	100	100	25
Raymond Mill (existing)	100	85	21.25
Pre-processing facility (proposed)	100	75	18.75

The existing Raymond Mill can only handle the finer fraction of aluminium dross, which leads to significant amounts of non-metallic material being heated in the rotary furnace and, thus, a low efficiency of metal production. In contrast, the proposed pre-processing facility would be capable of processing all incoming dross, which would result in greater removal of non-metallic material from the dross and a more enriched feed for the furnace.

The Raymond Mill achieves a 15 % reduction in the number of charges (and associated 15 % reduction in natural gas consumption) compared with the baseline scenario (no pre-processing). The operation of the proposed pre-processing facility, however, would achieve an additional 10 % reduction in the number of charges, which would conservatively result in a reduction in natural gas consumption of around 10 % over the existing scenario. As natural gas generates CO_2 during combustion, this reduction would lead to reduced greenhouse emissions from the processing activities.

Vehicles are the other source of direct emissions at the WA facility. The proposed modifications would not affect onsite mobile equipment movements as pre-processed dross would be transferred between the buildings by conveyor. Trucks currently deliver dross to the main building, but would deliver the dross to the ALDEX building following the modification. This slight increase in distance (approximately 300 m) is considered to be insignificant. The number of truck movements to and from the site is not expected to increase despite the increased production efficiencies.

As such, the proposed modifications are expected to reduce direct emissions of greenhouse gases from the facility.

Scope 2 – Energy Indirect Emissions (consumption of electricity)

The proposed pre-processing plant would be electrically powered, with consumption expected to be comparable to that of the existing Raymond Mill. The additional baghouse would require electricity to operate, as would the proposed pre-processing plant and associated conveyor.

Scope 3 – Other Indirect Emissions

No changes in other indirect emissions of greenhouse gases are anticipated.

6.5.3 Cumulative Impacts

It is considered that the overall energy saving resulting from the pre-processing plant would compensate for the marginal increase in electricity consumption required for the proposed modifications.

6.5.4 Mitigation/Management/Monitoring/Offset Measures

Monitoring of the proposed new emission sources is expected to occur in accordance with the other emission points at the facility, which is conducted in accordance with the EPL. Management actions include maintaining the new baghouses and pre-processing equipment to ensure they operate efficiently, and including the new plant in the environmental audits of the facility required by the development consents. No mitigation or offset measures are considered necessary.

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7.0 ENVIRONMENTAL IMPACT ASSESSMENT – OTHER ISSUES

7.1 Biological Effects

The developed area of the site has been previously cleared under the existing development consents. No additional clearing would be required, and no adverse effects are expected to be associated with the proposal.

7.1.1 Surface Water

A stormwater control system has been specifically designed for the site that segregates off-site stormwater entering the site, uncontaminated on-site stormwater and potentially contaminated on-site stormwater. Potentially contaminated water is fed through a constructed wetland to remove contaminants, and the resulting clean water is irrigated on site from the main pond storage, which holds the water from the wetland system and also acts as a first flush containment facility for the development.

Uncontaminated on-site stormwater is directed to a swale pond, allowed to settle, and then discharged directly to the wetland. Off-site stormwater entering the site is directed to a grass swale catch drain and directly discharged into Swamp Creek.

Rainfall event stormwater quality monitoring (for impending offsite discharge events) for aluminium, fluoride, oil and grease, total suspended solids and pH is undertaken by WA as required by the EPL for the site (EPL 6423). Results are reported annually to the DECC. In the past, this monitoring has indicated some elevated concentrations of fluoride and aluminium. Effluent captured in the wetland disposed of on site via irrigation; there has not been offsite discharges of wetland waters for approximately two years. The irrigation and reticulation system has been upgraded in 2007 to ensure that offsite discharge of potentially contaminated storm waters will not occur. A recent study (HLA, December 2006) has also demonstrated the sustainability of the on-site irrigation activity.

The proposed modifications are not expected to negatively affect water quality on site or in the surrounding area. The pre-processing may serve to remove greater concentrations of contaminants from the dross material, and may therefore be captured prior to discharge to the atmosphere. This may result in improvements to stormwater quality. Additional stormwater would not be generated in excess of what has already been approved for on the site.

Construction activities would be managed to ensure sediment is controlled to avoid contamination of waters.

7.1.2 Soils and Topography

The soils on site are classified as belonging to the Neath Soil Landscape (URS, 2001). A small area of the site would be disturbed for the construction of the extension to the ALDEX building. This area has previously been cleared. Erosion control measures such as sediment fences would be installed during construction to minimise soil erosion.

There is no known soil contamination on site. Management measures used on site to prevent the potential for contamination include:

- Unloading, storage and processing of dross within building structures.
- Sweeping of hardstand areas twice daily to minimise accumulation of dross materials in open areas.

- Maintenance of the integrity of the diesel bund. There is no evidence of surface contamination around this facility.
- Storage of materials, such as oils, hydraulic/transmission fluids and solvents, within buildings or bunded storage structures.

A study undertaken by HLA ENSR in 2001 has shown that irrigation of wetland effluent actually improves the soil quality, and adequately immobilises contaminants such as aluminium and fluoride.

7.2 Resource Implications

As the consolidation of the approvals for the facility would not affect community, natural or transportation resources, only the resource implications of the modifications are addressed here.

7.2.1 Community Resources

The proposed works to the ALDEX buildings and the addition of the pre-processing facilities would require the use of public roads for the delivery of equipment and waste removal. These activities would be limited to the construction period, and would not significantly affect the local road network. Additionally, any potential social and aesthetic effects would be limited to the site and its immediate surroundings, which are industrial in nature. The proposed works would not result in significant use of community resources.

7.2.2 Natural

The following natural resources would be used in the construction of the proposed modifications:

- Concrete (approximately 760 m^3);
- Gravel (in the order of hundreds of tonnes); and
- Diesel fuel for use in mobile equipment (approximately 1000 – 1500 litres).

These amounts are not considered to be significant.

The proposed modifications would require the use of additional electricity for operation. As the installation of the pre-processing equipment should remove the need to operate the Raymond Mill, the increase in electricity usage is not expected to be significant. No other natural resources would be affected by the proposed modifications.

7.3 Community Effects

7.3.1 Socio-Economic

Construction of the modifications will take approximately 15 weeks, and would require up to 25 personnel during construction. WA would encourage the use of local contractors for works where possible.

Once operational, the new plant may require one additional employee per shift as existing labour would be redistributed. Maintenance visits for the pre-processing plant may also be required.

7.3.2 Heritage and Cultural

An Archaeological survey was undertaken for the initial development in 1994 (URS, 2001). The developed area of the site has been previously cleared and utilised under existing approvals. No additional clearing would be required, and no adverse effects to items or places of heritage or cultural significance are expected to be associated with the proposal.

7.3.3 Land Use

Land use at the site revolves around the infrastructure associated with secondary aluminium production. The proposed modifications represent minor changes in the existing site operations that do not affect the existing site use or the potential uses of adjacent lands, and as such would not affect the land use of the site.

7.3.4 Transportation

Access to the site from Mitchell Avenue would remain unchanged by the proposed modifications, although some changes to internal access would result, as the trucks delivering dross would travel around the existing main building to the ALDEX buildings. This represents a minor change as this transport route is currently used by other vehicles on site.

Traffic increases to the site would occur during construction, and would include:

- Delivery of raw materials;
- Vehicles associated with construction activities such as excavation; and
- Construction employee vehicles.

The effects of the proposal on transport would be minimal and primarily limited to the site, with a temporary increase in traffic entering and exiting the site during construction. A maximum of 25 construction staff expected during peak construction periods. The road network is considered to have sufficient capacity to accommodate these additional vehicles without affecting the amenity of other road users. Deliveries and other vehicle movements would occur within the construction hours of 8 am to 6 pm. Construction would take an estimated 15 weeks to complete. No additional traffic movements are anticipated as a result of operation of the modified proposal.

7.3.5 Visual

The development as modified would result in a new stack from the reverbatory furnace which would be 18 metres in height. This stack may be visible from residential areas in Kurri Kurri. However, the impact would be minor compared to the existing impact, and less than what has been approved on site, though undeveloped.

7.4 Ecologically Sustainable Development

Schedule 2 of the EP&A Regulation establishes four primary principles of ecologically sustainable development (ESD): the Precautionary Principle, intergenerational equity, biological diversity and ecological integrity, and valuation and pricing of environmental resources. The four principles are interrelated. For instance, inter-generational equity can only be achieved in many instances if biodiversity is conserved for the use and enrichment of future generations.

The EPBC Act specifies a fifth principle for consideration, which involves decision-making processes. The application of these principles to the assessment of the proposed development is discussed below.

7.4.1 Precautionary Principle

The precautionary principle outlines the need to prevent environmental degradation whether a risk to the environment has been scientifically demonstrated or not. The environmental assessment undertaken for this application demonstrates that the proposed modification, which includes measures to minimise pollution will be substantially the same development as that already approved, with similar impacts. The environmental assessment has not indicated that there would be threats of serious or irreversible environmental damage associated with the proposed modifications to the development.

7.4.2 Intergenerational Equity

The principle of intergenerational equity puts an onus on society to ensure that the health, diversity and productivity of the environment are maintained, if not enhanced, for the benefit of future generations. The most significant aspect of this concept is that future generations should not inherit a degraded environment.

The proposed modification has been designed to minimise pollution and is considered to have similar impacts as the existing approved development and would be managed and operated in such a way as to ensure the surrounding environment is not degraded for existing or future generations.

7.4.3 Biological Diversity and Ecological Integrity

This principle requires the maintenance and conservation of a full and diverse range of plant and animal species. The area where the ALDEX building would be extended is a previously cleared, disturbed area. The proposed modification would not have an adverse impact on flora or fauna and would not result in the diminution of biological diversity or ecological integrity.

7.4.4 Valuation and Pricing of Environmental Resources

The *Intergovernmental Agreement on the Environment* (IGAE) and POEO Act require improved valuation, pricing and incentive mechanisms to be included in policy making and program implementation. In the context of environmental assessment and management, this would translate to environmental factors being considered in the valuation of assets and services.

Integration of environmental and economic goals is a key principle of ESD, which can be measured undertaking a cost-benefit analysis, that is, by measuring the costs of proceeding with a project against the benefits arising from the project.

Given the different values placed on the environment, and the various components of an environment, it is difficult to assign a monetary value against the environmental costs and benefits associated with the project. Given this, the approach adopted for this project is the management of environmental impacts through appropriate safeguards, and to include the cost of implementing recommended safeguards, in the total cost of the project.

Relevant to the consideration of the valuation and pricing of environmental resources are the impact assessment and alternative options which have been developed during planning. The value of the environment is also managed through the legislative process by imposing financial penalties or requirements to rehabilitate on persons responsible for polluting the environment.

The environmental safeguards included in this proposal would ensure that environmental impacts of the proposal are minimised.

7.4.5 Decision-Making Process

Under the EPBC Act, decision-making processes need to include economic, environmental, social and equitable considerations in the short and long term. This SEE has provided an assessment of the proposed modification in terms of these considerations, which will be considered by the DoP in determining approval for the proposed modification, and by the DECC in determining any variation to the EPL that will be required for operation of the modified development.

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8.0 COMPARISON OF ENVIRONMENTAL EFFECTS

A summary of the potential environmental impacts from the proposed modification is provided in **Table 12** below. The table also includes the existing development impact to highlight changes in impact between the approved development and the modified development.

Table 12: Comparison of Environmental Impact - Existing and Proposed Modified Development

Matter	Impact of Existing Development	Modified Development Impact	Comment
Waste	**Operation** - 3,000 T /year waste ash/dust from baghouses	**Operation** - 2760 T/year from baghouse at pre-processing facility. 0 T /month from Raymond Mill baghouse	No change.
Air	**Construction** – Exhaust emissions, dust emissions which would be managed by CEMP. **Operation** - Current particulate GLCs from the facility: PM_{10} : 24 hrs – 24 $\mu g/m^3$ Annual – 2.8 $\mu g/m^3$ TSP: Annual – 3.8 $\mu g/m^3$	**Construction** – Exhaust emissions, dust emissions which would be short term and managed. **Operation** – Estimated worst case particulate GLCs from the facility: PM_{10} : 24 hrs – 31.5 $\mu g/m^3$ Annual – 4.0 $\mu g/m^3$ TSP: Annual – 6.9 $\mu g/m^3$ **Cumulative emissions** - PM_{10} : 24 hrs – 60.2 $\mu g/m^3$ Annual – 9.9 $\mu g/m^3$ TSP: Annual – 6.9 $\mu g/m^3$	Particulate levels are higher than existing because of conservative assumptions used in modelling.
Hazards	**Operation** – Water ingress into dross storage Adjacent property exposed to ammonia concentrations in category 2 (injury) Closest residence exposed to ammonia concentrations in category 1 (detectable odour) in adverse climatic conditions	**Operation** – Water ingress into dross storage No offsite impacts from ammonia release concentrations lower than category 1 (odour).	Reduced impact

Matter	Impact of Existing Development	Modified Development Impact	Comment
Noise	**Construction** – within guideline levels **Road Traffic Noise** – increase by 2 dBA north of White Bridge Rd, increase by 1 dBA at Mitchell Rd. **Operation** – less than background level	**Construction** - 2 dBA exceedance of criteria **Road Traffic Noise** – no impact **Operation** – Would not exceed Leq (15min) criteria at residences.	Short term impact during construction. Slight increase in noise.
Greenhouse Gases	CO_2 Emissions from two 40 tonne (reverbatory furnace) and holding furnace total 21,000 tonnes pa.	Reduction in natural gas consumption of 10% over existing operations.	Reduced natural gas consumption and improved efficiency of process. Slight increase in electricity use.
Biological Effects:			
Surface Water	**Construction** – Exposure of 5 700m^2 of soils to potential erosion. Increased stormwater flow rates on site. **Operation** – Increase in stormwater treated by wetland; Additional sewage 3000 L per day; Small increase in potential contaminated runoff from vehicles; Generation of contaminated runoff from scrap handling areas to oil and grease trap.	**Construction** – Minor construction impacts. **Operation** – Potential for improvements to surface water runoff.	Reduced impact from existing development.
Soils and Topography	**Construction** - Loss of soils, managed by Sediment and erosion control plan.	**Construction** - Potential for small loss of soil, managed by Sediment and erosion control measures.	Less impact during construction than original development.

Matter	Impact of Existing Development	Modified Development Impact	Comment
Flora and Fauna	Removal of area of Stringybark/Grey Gum community	None	No impact
Resource Implications:			
Community Resources	**Construction** - Use of public roads	**Construction** – Use of public roads	No change
Natural Resources	Not assessed	**Construction** – Concrete, gravel, diesel fuel. **Operation** - Electricity	Reduced impact compared to existing plant.
Community Effects:			
Socio Economic	**Construction** – 30 jobs **Operation** – 40 jobs	**Construction** – 25 jobs **Operation** – 1 job per shift	Fewer jobs created
Heritage and Cultural	None	None	No change
Land use	No change	No change	No change
Transportation	**Construction** – 4 vehicle movements at start and finish of construction, plus staff vehicle movements. **Operation** – 40 to 46 movements of trucks per day 36 movements of light vehicles per day	**Construction** – similar amount of construction traffic. **Operation** - No increase.	Similar impact during construction. No change during operation.
Visual	**Construction** – Limited clearing **Operation** – Increased roof area visible from Kurri Kurri residential areas.	**Construction** – No clearing **Operation** - One new 18 m stack.	Reduced impact. Additional impacts resulting from new stack.

Table 12 shows that the proposed modifications would result in similar impacts to the existing development. Individual impacts of the proposed modifications are not expected to be significant and the impact of the total development will not result in a significant or serious environmental degradation or an increased accumulation of environmental problems.

The proposed modifications would not introduce a new environmental risk to the site.

It is concluded that the proposed modifications would not have a significant environmental impact and the proposed changes would not result in a significant increase in the environmental impact of the total development of the site. They also offer an opportunity to improve the efficiency of the facility that will also deliver beneficial environmental outcomes.

9.0 MATTERS FOR CONSIDERATION

Under Section 96(3) of the EP&A Act in determining an application for modification of consent the consent authority must take into consideration such of the matters referred to in section 79C (1) as are of relevance to the development the subject of the application. **Table 13** provides these matters and provides comment on how these have been addressed in this assessment.

Table 13: Implications of Development under Section 79C

Section 79C Matter	Where Addressed
(i) any environmental planning instrument	The provisions of relevant EPIs have been considered in **Section 5**. The Minister for Planning is the consent authority for the proposed modification. In Summary, the relevant EPIs are • Cessnock LEP 1989; and • Hunter REP 1989. • SEPP 33 The Cessnock LEP identifies the development to be within the Industrial 4(a) zone and is permissible with consent. The proposed modifications are consistent with the zone objectives for industrial development in both the Cessnock LEP and Hunter REP. A preliminary hazard analysis has been undertaken for the proposal and included in **Appendix G**. The development is potentially hazardous but unlikely to cause any significant impact provided safeguards are implemented.
(ii) any draft environmental planning instrument that is or has been placed on public exhibition and details of which have been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the draft instrument has been deferred indefinitely or has not been approved), and	There are no draft EPIs relating to the proposal.
(iii) any development control plan, and	The relevant provisions of Cessnock DCP 2006 have been addressed in **Section 4.1.2**. As the proposed modifications to development do not increase overall floorspace, are consistent with the existing approved development in relation to use, design and amenity, and do not require clearing of land or significant environmental impact, the proposal is compliant with the controls of the DCP 2006.

Section 79C Matter	Where Addressed
(iiia) any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F, and	No planning agreements or draft planning agreements relating to the proposal have been made under section 93F.
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), that apply to the land to which the development application relates,	The relevant requirements of the EP&A Regulations in relation to the making of an application for modification to a development consent, clauses 115 and 116, have been complied with.
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,	The likely impacts of the development have been assessed and are addressed in relevant sections of this SEE. These included: • Waste management **(Section 6.1)** • Air Quality (**Section 6.2**) • Hazards (section (**Section 6.3**) • Noise (**Section 6.4**) • Greenhouse gas emissions (**Section 6.5**) • Water (**Section 7.1.1**) • Soils & Topography (**Section 7.1.2)** • Visual amenity **(Section 7.3.5**) • Resource Implications (**Section 7.2**) • Socio-economic (**Section 7.3**) Overall, the impacts of the proposal are similar to those of the existing development and in some instances reduce impacts. The summary of environmental effects is detailed in **Table 12.**

Section 79C Matter	Where Addressed
(c) the suitability of the site for the development,	The site is considered suitable for the modified development, the site is zoned Industrial 4(a) under the provisions of Cessnock LEP 1989 The objectives of this zone include the facilitation of employment generating industrial development and opportunities to support industrial land use. As the proposed modification would be a modification to the existing building and plant, the site is considered suitable for the development. There are no existing site constraints that limit or impact upon the proposed modification. The land is currently cleared and other industrial structures are in place.
(d) any submissions made in accordance with this Act or the regulations,	No public submissions have as yet been received. The SEE may be exhibited by DoP as part of the assessment process and this would provide the community with additional opportunities to make submissions on the proposal.
(e) the public interest.	The proposed modifications to Weston Aluminium are considered to be in the public interest, as they would not significantly increase risks or impacts from the site, and would improve the efficiency of the approved operation which would ultimately result in benefits to the environment and the community.
(i) any environmental planning instrument	The provisions of relevant EPIs have been considered in Section 5 and the proposed modification is considered to be consistent with these provisions. The Minister for Planning is the consent authority for the proposed modification.
(ii) any draft environmental planning instrument that is or has been placed on public exhibition and details of which have been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the draft instrument has been deferred indefinitely or has not been approved), and	There are no draft EPIs relating to the proposal.
(iii) any development control plan, and	The relevant provisions of DCP 2006 have been addressed in **Section 4.1.2**.

Section 79C Matter	Where Addressed
(iiia) any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F, and	No planning agreements or draft planning agreements relating to the proposal have been made under section 93F.
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), that apply to the land to which the development application relates,	The relevant requirements of the EP&A Regulations have been met.
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,	The likely impacts of the development have been assessed and are addressed in relevant sections of this SEE. Overall, the impacts of the proposal are similar to those of the existing development.
(c) the suitability of the site for the development,	The site is considered suitable for the development, the site is zoned industrial. The objectives of this zone include the facilitation of employment generating industrial development and opportunities to support industrial land use. As the proposed modification would be a modification to the existing building and plant, the site is considered suitable for the development.
(d) any submissions made in accordance with this Act or the regulations,	No public submissions have as yet been received. The SEE may be exhibited by DoP as part of the assessment process and this would provide the community with additional opportunities to make submissions on the proposal.
(e) the public interest.	The proposed modifications to Weston Aluminium are considered to be in the public interest, as they would not significantly increase risks or impacts from the site, and would improve the efficiency of the operation which would ultimately result in benefits to the environment and the community.

10.0 CONCLUSIONS

The proposed modifications are for the purpose of providing greater efficiency and improvement in the operations of the dross recycling facility by the provision of the pre-processing plant. There is expected to be at least a 10 percent reduction in natural gas consumption as a result of the use of the pre-processing plant when compared with the existing operations. The modification would also result in benefits to managers at the facility and regulatory bodies (DECC and DoP) by modifying the consents so that the consents and EPL are more consistent with each other and the EPL. This should help to clarify the identification of the stacks and monitoring points on the site and provide consistency in the monitoring requirements between the consents and EPL.

The addition of a stack to the reverbatory furnace would separate the emissions from this area and constitute part of the PRP which has been developed in consensus with DECC.

The modification does not propose to increase the amount of dross processed at the plant, it would involve an increase in the footprint of the development of 252 m^2 for the annex to the ALDEX building, although this increase does not exceed that which has already been approved (but undeveloped) on the site. It would add pre-processing as part of the process occurring on the site, add a new stack, potentially move an existing stack and commence operation of a stack that had previously been approved. The proposal is considered to be substantially the same development as that which is currently approved on the site.

The construction of the works associated with the modification is likely to result in short term impacts during construction and once operational, the proposal as modified would not result in significant additional or cumulative impacts on the environment and surrounding properties. It is noted that the modelling for the AQIA resulted in an exceedance of the predicted maximum cumulative 24-hour PM_{10} concentration criterion within the premises boundary because of elevated background PM_{10} levels, however, predicted ground level concentrations at residential areas were below the assessment criterion.

The facility is a permissible use within the 4(a) Industrial zone and the site is located in an industrial area, therefore the development represents an appropriate and efficient use of the land.

The proposed modification meets the objects of the EP&A Act by providing for the orderly and economic use of land without harm to the environment whilst promoting the social and economic welfare of the community and a better environment.

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11.0 REFERENCES

Environment Protection Authority (1992) *Environmental Noise Control Manual* (ENCM)

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Environment Protection Authority (2000) New South Wales Industrial Noise Policy

HLA ENSR (2007) *Air Quality Impact Assessment Proposed Reverbatory Furnace Modifications*, 29 August 2007.

HLA ENSR (2006) *Pollution Study and Reduction Program Condition U2.1 Irrigation Sustainability Assessment, Weston Aluminium, Kurri Kurri, 1 December 2006.*

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Figures

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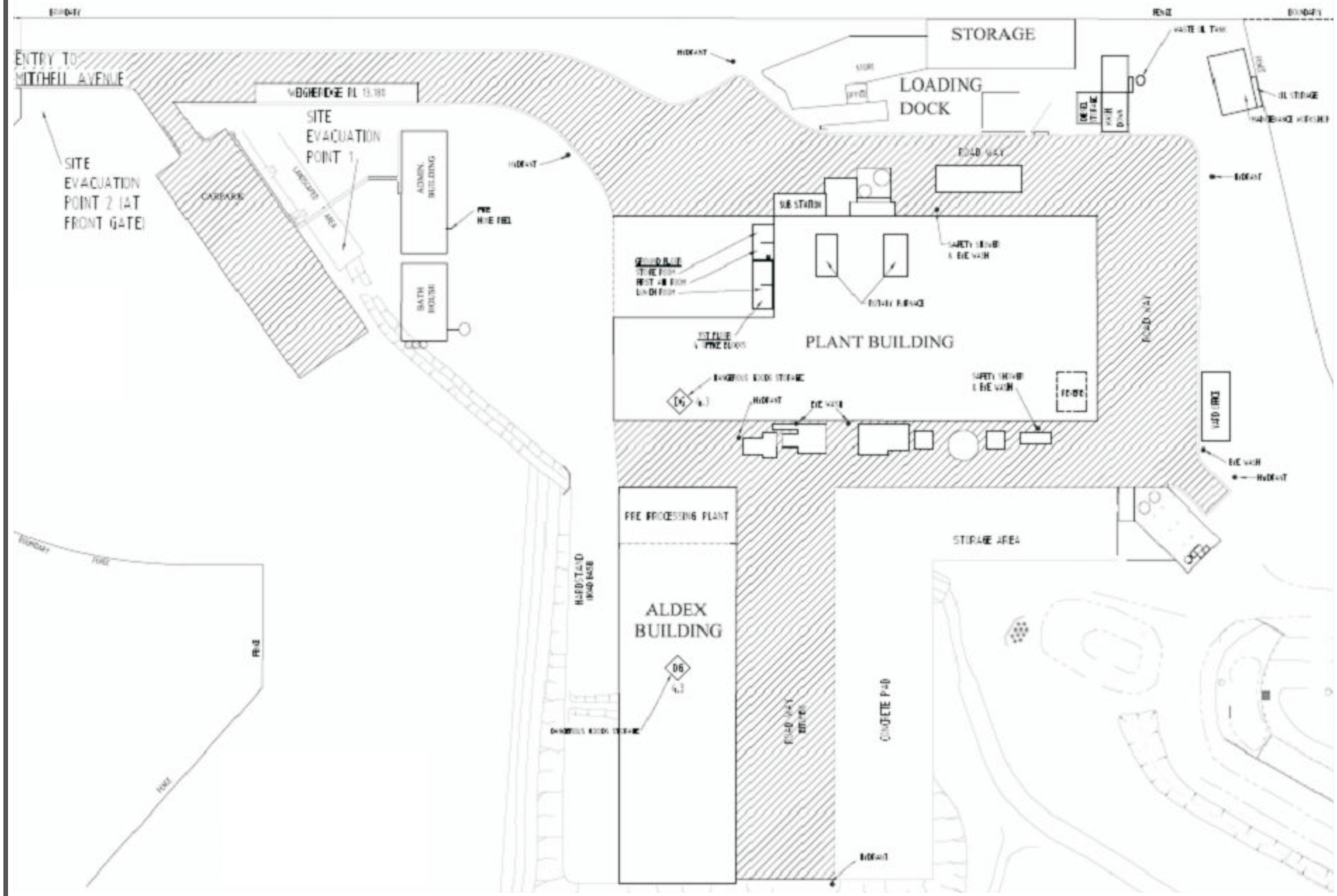
HLA

Site Location
Weston Aluminium
Statement of Environmental Effects
to Support Modification Application
for Pre-Processing Facility

0 250m
Approximate

FIGURE
1

PROJECT-FILE NAME **N5009629** DATE **10 October 2007** DRAWN **TO** APPROVED



PROJECT-FILE NAME	**N5009629**
DATE	**31 August 2007**
DRAWN	
APPROVED	

Existing Site Layout
Weston Aluminium
Statement of Environmental Effects
to Support Modification Application
for Pre-Processing Facility

HLA

Not to Scale

FIGURE
2

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PROJECT-FILE NAME	N5009629
DATE	2 October 2007
DRAWN	TO
APPROVED	

🟦 Land and Environment Court Consent (1996)
🟨 Minister Consent (2001)
🟩 Proposed modifications

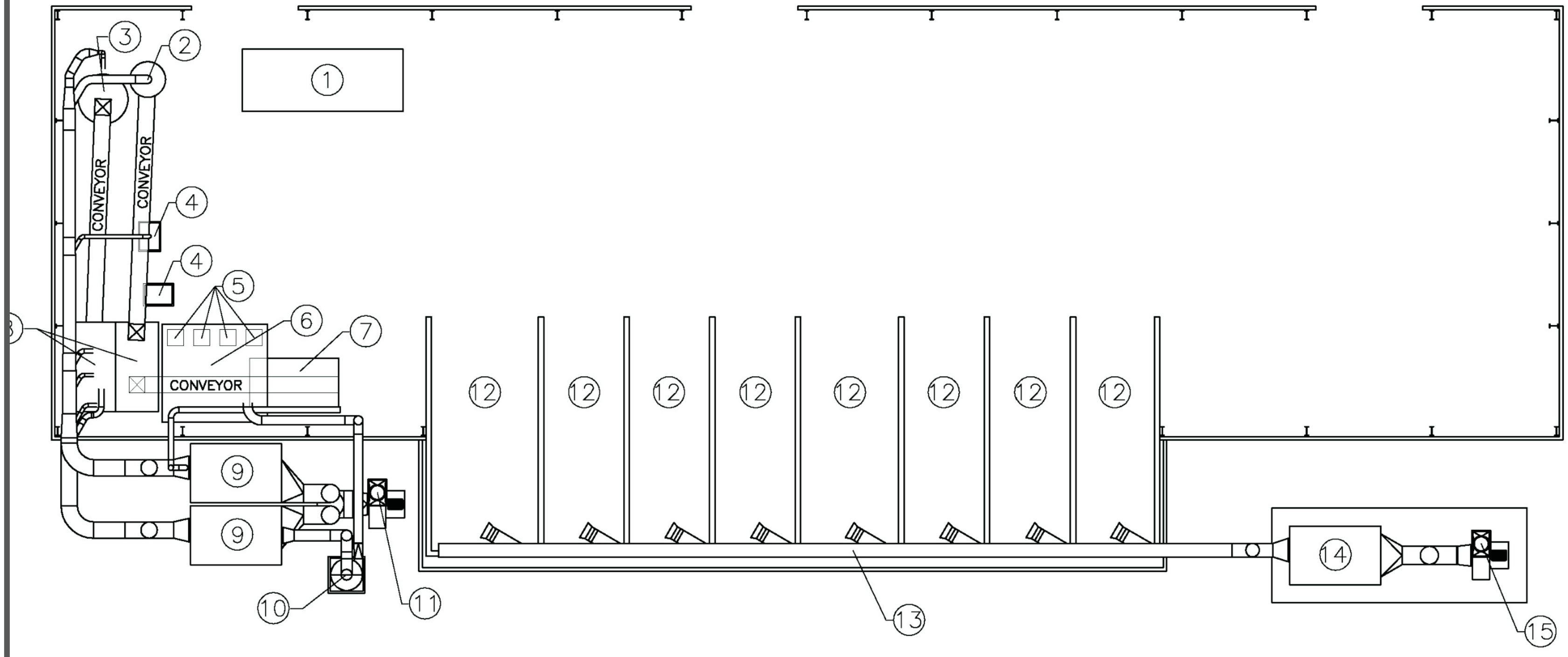
Site Development Summary
Weston Aluminium

Statement of Environmental Effects
to Support Modification Application
for Pre-Processing Facility

HLA

Not to Scale

FIGURE
3



1	RUMBLER
2	BARMAC CRUSHER
3	TOLLEMACHE CRUSHER
4	2 off MATERIAL BIN (OVERSIZE)
5	4 off MATERIAL BIN (UNDERSIZE)
6	SCREEN DECK
7	GRIZZLEY
8	HOPPER BINS
9	EXISTING DUST COLLECTOR
10	CYCLONE
11	EXTRACTION FAN & EXHAUST STACK
12	DROSS RECEIVAL BAYS
13	EXTRACTION SYSTEM FOR THE DROSS RECEIVAL BAYS
14	DUST COLLECTOR (RE–LOCATE BH3)
15	EXTRACTION FAN & EXHAUST STACK (RE–LOCATE BH3)
16	

PROJECT-FILE NAME	**N5009629**
DATE	**31 August 2007**
DRAWN	
APPROVED	

Proposed Aldex Building Layout
Weston Aluminium
Statement of Environmental Effects
to Support Modification Application
for Pre-Processing Facility

Not to Scale

FIGURE
4

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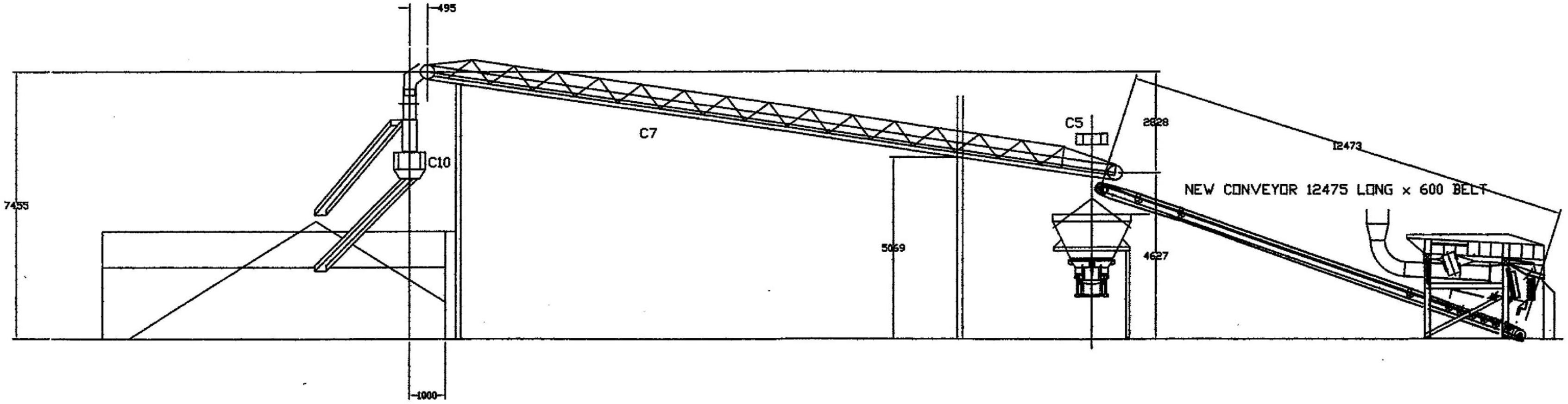

PROJECT-FILE NAME	**N5009629**
DATE	**25 September 2007**
DRAWN	
APPROVED	

Vertical Section of Pre-Processing Plant
Weston Aluminium
Statement of Environmental Effects
to Support Modification Application
for Pre-Processing Facility

FIGURE

5

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Appendix A: Environmental Assessment Scoping Paper

Environmental Assessment Scoping Report
Consolidation of Consents and Modifications to Existing Dross Recycling Facility

31 January 2006

Prepared for:
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Kurri Kurri NSW 2327

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DISTRIBUTION

Environmental Assessment Scoping Report
Consolidation of Consents and Modifications to Existing Dross Recycling Facility
31 January 2006

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1	**Scott Jeffries** **Senior Environmental Planner** Department of Infrastructure, Planning and Natural Resources GPO Box 3927 Sydney NSW 2001	1	**Tony Temelkovski** **Plant Manager** Weston Aluminium PO Box 295 Kurri Kurri NSW 2327
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This document was prepared for the sole use of Weston Aluminium Pty Limited and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of HLA-Envirosciences Pty Limited and Weston Aluminium Pty Limited.

By

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Holly Marlin

Holly Marlin
Environmental Scientist

Peer Review:	Date:
	31/01/06
Graham Taylor **Manager, Hunter Operations**	

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

Weston Aluminium Pty Ltd (WA) operates an aluminium refining and recycling facility at Kurri Kurri, within the Cessnock Local Government Area. WA is proposing to consolidate the development consent conditions issued for various projects within the facility and also wishes to make modifications to the current approved activities on site, including modifications to the dross recycling facility, that will provide greater efficiency in operations at the site.

A number of the conditions of consent are no longer relevant to operations at the site due to changes in operation and environmental legislation. Consolidation of the consents will lead to one approval that will provide more certainty for both the Department of Planning and WA.

In order to achieve greater efficiency in its operations, WA is proposing modifications to the existing and approved buildings on site, together with the installation of new pre-processing equipment. The consolidation of previous development consents and the new works collectively comprise the proposed project.

1.2 Project Context

1.2.1 Consent Consolidation

Development consent was originally sought by Alumino (as WA was originally known) and obtained from the Minister in November 1994. Following a successful appeal by a resident against the proposal based on insufficient notification to residents of the project, the consent was declared ‘null and void’, and WA was required to resubmit a Development Application (DA) for the project. Due to the delay in the decision making process regarding the proposal, the proponent sought a merits hearing in the Land and Environment Court, and consent was subsequently issued on 30 August 1996 (No. 10397 of 1995).

A DA was then submitted in April 2001 for additions to the development that included the receival and reprocessing of scrap aluminium material, the production of solid alloyed aluminium and molten aluminium, and an increase in the annual production of aldex (a fine-grained by-product of dross smelting that is used in the steel and cement industries). The construction of two aldex storage buildings was also approved. Consent for these additions was issued by the Minister on 20 September 2001 (File No. S00/00975), but subject to an appeal. During the delay caused by the appeal, the proponent sought to obtain consent through Cessnock City Council for a modified project and approval was granted for the proposal on 20 December 2001 (DA No. 8/2001/1166/1).

Following the dismissal of the appeal against the DA submitted to the Minister, the consent issued by Cessnock City Council was no longer required as the works contained within the determination were a subset of the Minister’s Development Consent. WA proposes to surrender the Cessnock City Council consent and operate under the conditions issued by the Minister on 20 September 2001.

A further court order was issued by Orders of Justice Bignold on 4 April 2002 (No. 10397 of 1995), which replaced a number of conditions of the original consent issued by the Court and added two new conditions.

Many conditions of consent are now outdated or have been superseded. This situation is problematic for both WA and the statutory authorities, as it is difficult to understand the statutory requirements of the operation and assess compliance with those requirements. It is therefore proposed that the consent conditions are reviewed for relevance, and consolidated into the one document.

1.2.2 Modifications

The WA facility at Kurri Kurri recovers aluminium from dross, a by-product of the aluminium smelting process, sourced from aluminium smelters across Australia and New Zealand. Dross is a dry metallic solid typically composed of aluminium, aluminium oxide, other metal oxides, traces of aluminium fluoride and alloying metals. Dross can contain 30 – 75 percent metallic aluminium, which represents a significant loss of metal if not recovered. The plant also recycles scrap aluminium metal products and reprocesses the aluminium for use in various industries.

The facility currently processes some 26,000 tonnes per annum of solid, alloyed aluminium, and approximately 10,000 tonnes per annum of molten aluminium through the recycling of dross. The refining and recycling process generates a by-product known as aldex, which is a fine ash material that is used in the steel manufacturing and cement industries. This material is stored on site prior to distribution to customers.

In order to increase the efficiency of the existing operation, WA proposes to add annexes to the existing and approved aldex buildings that will be used for storage of dross material, and to add additional pre-processing facilities that will be located within Aldex Building No. 1 as shown in **Figures 1** and **2**. The proposed modifications will not result in additional production at the site; rather they represent improved operations that will result in higher quality products and expected reductions in energy consumption.

The existing plant is conservatively valued at approximately $32 million. The proposed additional works are expected to cost approximately $2.75 million, resulting in a combined value of $34.75 million. The proposed modifications will take around five months to construct.

The proposed project (consolidation and modifications) is potentially a major project under Part 3A of the Environmental Planning and Assessment Act (EP&A Act) (1979). Under Part 3A of the EP&A Act, a proponent needs to submit a preliminary project application to the Department of Planning if a proposed project is likely to meet the criteria for a major project as outlined in State Environmental Planning Policy – Major Projects 2005.

1.3 Location

The existing aluminium recycling and refining facility is located on Mitchell Avenue, Kurri Kurri in the Hunter Valley. The site is approximately 40 km north-west of Newcastle.

1.4 Approval Regime

The proposed consolidation of existing consents and modifications to the existing facility meet the criteria for declaration as a major project under Schedule 1, clause 9 of State Environmental Planning Policy 2005 (SEPP 2005), being development that has a capital investment value of more than $30 million for the purpose of metal refining or smelting; metal recycling or recovery.

The proposal is therefore eligible for consideration by the Minister as a major project under Part 3A of the EP&A Act, with the Minister being the decision-making authority.

1.5 Purpose of this Report

The purpose of this scoping report is to provide sufficient information about the proposal to the Minister for Planning to determine whether the development represents a major project under the EP&A Act. Following this determination, the level of environmental assessment required for the project and the scope of the Director General's Environmental Assessment Requirements for the environmental assessment can then be established.

1.6 Structure of Report

This scoping report has been structured to provide information on broad areas as follows:

- Section 1 provides a background to the project, including information about the proponent;
- Section 2 outlines a description of the existing and proposed operations;
- Section 3 describes the planning context, including the approvals required;
- Section 4 reports on the environmental implications in terms of physical, including the baseline situation and anticipated impacts;
- Section 5 outlines the potential biological effects of the project;
- Section 6 examines the likely impacts of the project on resources (community, natural and transport);
- Section 7 outlines the potential community effects, including the social, heritage and cultural, and economic implications; and
- Section 8 presents a summary of the findings and recommendations.

1.7 The Proponent

The plant is owned and operated by WA, which is majority owned by Watou Holdings and the balance by Asahi Seiren, a major secondary aluminium processor in the Japanese Aluminium industry. Both shareholders have an established track record in the operation of aluminium refining and recycling facilities through the operation of the existing development in Kurri Kurri and a number of facilities in Japan.

2 PROJECT OUTLINE

2.1 Existing Operations

The existing operations are illustrated in **Figure 3**. Bulk dross is currently delivered by road to the Kurri Kurri site. Dross is currently stored in the southern portion of the existing main building. Trucks reverse into the building and dump the dross into one of six storage bays. The existing dross area is relatively constrained. This limits WA's ability to adequately segregate dross from different smelters. Additionally, the ability to pre-process larger lump material from the bulk dross before aluminium recovery occurs is also limited.

Dross from the storage bays is recovered by front end loader for delivery either directly to the rotary furnace or to the Raymond Mill. Approximately 30% of the material is removed in the Raymond Mill as fines through a baghouse, and the remaining coarser material is then delivered to the rotary furnace. The agitation in the rotary furnace coupled with the high temperatures liberates aluminium metal, which forms in a pool within the furnace and is tipped into sows for solidification. The low metal ash produced from the rotary furnace is transferred to the Metal Recovery Machine (MRM) where residual molten aluminium is recovered in a spinning action. The residual ash is then cooled in the dross cooler and transferred to a Ball Mill where it is further crushed to release any residual aluminium. During this process fines are extracted for collection in a baghouse, with the residual coarser fraction being returned to the rotary furnace for further processing.

The existing storage area is ventilated via Baghouse No. 2. The Raymond Mill is ventilated to Baghouse No. 3, with the Ball Mill and the existing air separator venting to Baghouse No. 4. Emissions from the rotary furnace are vented to Baghouse No. 1, which is serviced by a lime injection wet/dry scrubbing system. This lime fed baghouse is used to remove gaseous fluorides liberated during the heating process in the Rotary Furnace.

WA has approval to extend its existing main building to the south to increase storage area and to facilitate processing of the contained dross.

2.2 Project Objectives

The project consists of two parts, each with its own specific objective:

1. Consolidation of the existing development consents to provide more certainty for the proponent and the Department of Planning in terms of operational requirements of the facility; and

2. Modifications to the approved aldex buildings and the addition of pre-processing equipment to improve operating efficiency and product quality.

2.3 Alternative Proposals

As discussed previously, WA currently has approval to extend its main building to the south as shown in **Figure 3** to increase under-cover dross storage area. Detailed consideration of this area, based on an understanding of the demands of dross processing, has concluded that it is insufficient to facilitate the running of an efficient dross-handling and processing facility. Significant congestion is likely to occur from the various users, including vehicles delivering the dross, machinery used for pre-processing and recovering the dross for consumption within the rotary furnace, employees moving between the existing plant and the administration area, and the total volume of dross storage area available. WA has therefore decided to consider other alternatives rather than proceed with this extension.

WA currently receives dross from most aluminium smelters within Australia. Consideration was given to the off-site processing of the dross closer to the generation sources, such as constructing a facility in Gladstone to process the dross from the Boyne Smelter. The main limitation for this option is the need to ultimately dispose of the low-metal fines produced in the pre-processing operations. Options for the reuse of the fines in industry have not been finalised, and the fines produced from any off-site processing would therefore still require transport to the Weston facility at Kurri Kurri for treatment and disposal. The installation and operation of remote processing facilities also represents an unnecessary cost when the existing Kurri Kurri plant is available and can adequately undertake this activity.

WA also receives dross from the New Zealand aluminium smelting industry. Consideration was given to installing a complete dross recovery facility within New Zealand. Due to the critical power shortage currently being experienced and the relatively low volumes of dross supplied from the New Zealand industry, this option was also discounted.

There is also a significant aluminium industry within Tasmania and Victoria. The establishment of a dross recovery facility within the southern portions of Victoria to process dross from these smelters was also considered. As the dross from the Alcoa-owned facilities is currently being processed within the Alcoa plant and therefore not available for a third party to process, the volume of dross available in Victoria is not sufficient to sustain such an activity.

2.4 Proposed Dross Pre-processing Facility

A detailed evaluation of the existing processing plant has revealed that there are significant savings to be made in processing costs and energy usage by removing the non-metallic portion of the dross from the higher metallic content dross prior to feeding the material to the existing rotary furnace for melting and metal recovery. Some pre-processing of dross occurs within the existing facility, with some dross fed through the Raymond Mill to recover non-metallic material prior to processing of the residual material in the rotary furnace. The existing Raymond Mill, however, is not sufficiently sized to pre-process all of the dross received at WA, and is also not capable of effectively separating the low-metallic dross from the higher metallic material.

WA therefore wishes to install a pre-processing facility within the western end of the existing approved Aldex building. A plan of the proposed facility is shown in **Figure 1**, with a vertical section of the plant detailed in **Figure 2**. As also detailed in **Figure 1**, eight dross storage bays are to be constructed by extending the approved aldex buildings to the south by approximately six metres. This will allow trucks delivering dross to the storage bays to reverse into the building, and to dump directly into one of the eight bays.

Trucks will continue to enter the Weston facility via the existing entry, and travel via internal sealed roads to deliver the dross. Trucks will reverse through open sliding doors in the new aldex buildings and deliver the dross into one of the eight bays. During the delivery operation, sliding doors will be closed and ventilation will be applied to the receiving bay to extract any dust emissions created.

Large lump material contained within the delivered dross will be manually removed and stored for separate pre-processing. This will involve cleaning in a rumbler where adhering bath material will be removed. The fines generated will be extracted to Baghouse No.2, and the coarse material will be delivered to the pre-processing facility.
Dross will be recovered from one of the eight bays and delivered to the pre-processing facility by front end loader. The dross will first pass over a grizzly to remove any -fine material before being transferred to a screen deck where ultra fine material will be removed. The remaining

material will then pass through a mill where further size reduction and removal of adhering bath material will occur till residual material is sufficient for final remelt. Remelt material will be transferred by covered conveyor to the storage bays within the main plant building. The higher metallic residual material will be stored within these bays for ultimate recovery through feeding to the existing rotary furnace.

During the pre-processing period the dross will be reduced in weight by the amount of fine material collected either by the baghouses or directly from the screens immediately next to the storage bins. It is estimated that approximately 30% of the original feed material will be removed during the pre-processing operation.

Effective air pollution control is fundamental to the operation of this pre-processing facility. The existing Baghouse No. 2 that currently vents the dross receival area will be used to collect emissions from the pre-processing plant. Baghouse collection off-takes will be located at the grizzly screen, the screen decks prior to the two storage bins, the mill and associated screens. This baghouse will also collect residual dust generated from the delivery of the aluminium-rich dross to the existing dross storage area. As the pre-processing facility will replace the existing Raymond Mill, Baghouse No. 3, which currently services the Raymond Mill, will be relocated to an area adjacent to the new storage bays, external to the new aldex building. An automated system will be installed to Baghouse No: 3 in its relocated position that will permit preferential exhaust to be applied to two of the eight bays, which will provide localised dust collection. Each of the bays will also be isolated by curtains to improve the collection efficiency of dust from the localised area. It is expected that up to 20 air changes per hour will be achieved by the operation of this baghouse. While experience within the existing dross receival area has shown that dust emissions from dross receival are minimal, this action for the new dross receival area should further enhance air quality within this work area.

The proposed new dross receival area and pre-processing facility will have major operational advantages. These include:

- The ability to separately store dross from individual suppliers, improving the traceability of that particular dross through the entire process. It is feasible to consider that dross from one smelter can be stored and processed as a single batch. Issues such as specific metallic additives within the metal can therefore be established and managed without the dilution effect of metals from other sources;
- The pre-processing of the dross will remove non-metallic components, which currently pass through the entire recovery process. The existing operation consumes valuable equipment time and energy in the heating and temperature reduction of the inert material, and requires additional labour to manage the movement of the residual material throughout the process. The proposed pre-processing will minimise additional materials handling in the facility; and
- The removal of potentially fluoride-containing inert material from the rotary furnace processing will reduce gaseous fluoride emissions generated during this operation. This should reduce the load on the existing lime-injected scrubber and associated baghouse, further enhancing the environmental performance of the facility.

The operation of the new pre-processing facility will not require significant additional labour. It is contemplated that labour currently allocated to the existing Raymond Mill and to recover non-metallic dross from the rotary furnace can be relocated to work the pre-processing plant. An additional person per shift may be required to support the overall activity.

2.5 Site Information

The existing development is located on Lot 796 DP 39877, Mitchell Avenue, Kurri Kurri. The site is located within the Parish of Heddon, County of Northumberland, City of Cessnock. The deed of sale is in the name of Weston Aluminium Pty Ltd.

2.6 Physical Form

The proposed modifications would take the form of additions to the existing Aldex Building No. 1 and Aldex Building No. 2 on site as shown in **Figure 1**. The additions to the buildings would be consistent with the existing structures in terms of height and construction materials (colour bond steel sheet walls and roofs approximately 10 m).

2.7 Environmental Controls

The plant is comprised of best available technology, and complies with stringent pollution limits. The advanced environmental features of the plant include:

- Salt-free, closed-loop process;
- Recycling of aldex in the steel and cement industries;
- Baghouses that ensure no visible emissions;
- Environmental monitoring of emissions by independent contractor;
- Processing under negative pressure to reduce fugitive emissions;
- Dross tracking and inspection for quality control;
- Undercover handling of dross to reduce rainwater contact and potentially odorous emissions, as well as reducing contaminated stormwater generation;
- Gas heating to reduce sulfur dioxide and other air emissions;
- Lime scrubbing of the Remelt Furnace to remove pollutants such as fluorides, acid gases, volatile organic compounds, dioxins and furans;
- A first flush stormwater system; and
- Environmental auditing of operations and compliance with approval conditions and the Environment Protection Licence.

Site operations are carried out in compliance with an Environmental Management Plan (EMP) that identifies and outlines actions to minimise the potential environmental impacts from operations. The EMP will be updated to incorporate the proposed modifications should consent be granted for the proposal.

2.8 Access

Trucks will still continue to enter the Weston facility via the existing entry, and travel via internal sealed roads to the existing aldex building.

2.9 Program of Works

The proposed works would take approximately 15 weeks to complete, with a maximum of 25 construction personnel required. Construction works will occur eight hours per day, five days per week, between 8 am and 6 pm.

2.10 Outline of Construction Methods

The site has been previously cleared under existing approvals. Fill will be added where necessary, and compacted using standard self-propelled vibrating rollers to provide an adequate base for construction. The proposed annexes will consist of steel sheet walls and roofs, approximately 10 m high, matching the construction of the existing plant building.

3 STATUTORY PLANNING

3.1 Local Matters

The development site is zoned 4(a) Industrial under the Cessnock Local Environmental Plan 1989 (LEP). The objectives of the LEP are:

> *a) to encourage industrial development which will generate employment;*
> *b) to provide opportunities for other activities which will support industrial land use, or which are reasonable located within an industrial zone; and*
> *c) to ensure that development will not:*
> *i) cause permanent damage to the natural environment;*
> *ii) detract from the amenity of any residential or other urban area in the vicinity; or*
> *iii) create excessive demands on infrastructure and roads.*

The proposed modifications comply with the objectives of the plan as the modifications will support an existing industrial land use, will not cause additional environmental damage or detract from the amenity of adjacent areas, and will not increase existing demands on infrastructure or roads. The proposed project is not a type of development listed as prohibited under the LEP, and is therefore permissible with the approval of the decision-making authority (in this case the Minister).

3.2 Regional Matters

The Regional Environmental Plan (REP) of relevance to the subject site is Hunter REP 1989. The aims of the Hunter REP are:

> *(a) to promote the balanced development of the region, the improvement of its urban and rural environments and the orderly and economic development and optimum use of its land and other resources, consistent with conservation of natural and man made features and so as to meet the needs and aspirations of the community,*
> *(b) to co-ordinate activities related to development in the region so there is optimum social and economic benefit to the community, and*
> *(c) to continue a regional planning process that will serve as a framework for identifying priorities for further investigations to be carried out by the Department and other agencies.*

The objectives of the Hunter REP in relation to industrial development are:

> *(a) to ensure that sufficient zoned and serviced industrial land is provided in locations appropriate to the needs of industry, while ensuring protection of the environment, and*
> *(b) to promote the distribution of employment in secondary industry in a manner compatible with the availability of services and distribution of population.*

The objective of Part 7 (Division 1) of the Hunter REP is to control development such that air, noise and water pollution are minimised.

As the modifications will not significantly increase pollution as discussed in **Section 4**, the proposal is considered to be consistent with the relevant objectives and principles of the Hunter REP.

3.3 State Matters

3.3.1 State Environmental Planning Policy (SEPP) 2005 – Major Projects

State Environmental Planning Policy (Major Projects) 2005 (SEPP 2005) was gazetted on 25 May 2005. It replaces all provisions related to former 'State significant development' in planning instruments, directions and declarations.

The primary aim of SEPP 2005 is:

> *to identify development of economic, social or environmental significance to the State or regions of the State so as to provide a consistent and comprehensive assessment and decision making process for that development.*

Schedule 1 of the SEPP identifies classes of development that are classified as major development. This includes development for the purpose of a metal, mineral or extractive material processing facility that:

> *has a capital investment value of more than $30 million or employs 100 or more people for any of the following purposes:*
>
> *(a) metal or mineral refining or smelting; metal founding, rolling, drawing, extruding, coating, fabricating or manufacturing works; metal or mineral recycling or recovery.*

The proposed consolidation of existing consents and modifications to the existing dross recycling facility meets the criteria for classification as a major project under clause 9 of Schedule 1 to SEPP 2005 as:

- it involves a capital investment value of more than $30 million. The proposed consolidation of consents involves a facility with a conservative replacement value of $32 million and the proposed modifications have a capital investment value of $2.75 million, giving a total capital investment value for the proposal of $34.75 million; and
- is for the purpose of metal or mineral refining and smelting and the recycling and recovery of metal.

Therefore, under the provisions of clause 9 of Schedule 1 to SEPP 2005, the proposed project meets the criteria for classification as major development, with the Minister being the approval authority.

3.3.2 State Environmental Planning Policy (SEPP) No. 33 - Hazardous and Offensive Development

State Environmental Planning Policy No. 33 (SEPP 33) aims to ensure that the consent authority has sufficient information regarding a proposal to determine whether the development meets the criteria for hazardous or offensive development. Conditions to minimise or reduce adverse effects can then be imposed with any consent issued. SEPP 33 requires applications for potentially hazardous or offensive industry to be accompanied by a Preliminary Hazard Analysis (PHA). Applications to carry out hazardous or offensive development, or potentially hazardous or offensive development, are to be advertised for public comment.

Assessments of the hazards and risks were conducted for the original development. These assessments determined that the operations would not have off-site effects if the proposed safeguards were implemented. No new hazardous materials will be used or generated by the proposed modifications. It is therefore expected that the proposed modifications do not represent potentially hazardous or offensive development and that the risk profile of the facility will not change.

3.4 Commonwealth Matters

The Environment Protection and Biodiversity Conservation (EPBC) Act 1999 came into effect in July 2000. Under this Act, the approval of the Commonwealth Minister for the Environment and Heritage is required for actions that may significantly affect matters of National Environmental Significance (NES). Approval from the Commonwealth is in addition to any approvals required under NSW legislation.

The EPBC Act lists eight matters of NES that must be addressed when assessing the potential effects of a proposal. Based upon preliminary assessment, the proposal is not expected to affect matters of NES. The EPBC Act is therefore not triggered, and referral to and approval from the Commonwealth Minister for Environment and Heritage is not required.

A search of the Department of Heritage databases did not identify any heritage items that might be affected by the proposed modifications.

3.5 Other Authorities Required

The subject site operates under conditions specified in Environment Protection Licence (EPL) 6243 issued under the Protection of the Environment Operations Act 1997 (POEO). The licence covers secondary aluminium production and its associated activities on the site. A variation to this licence may be required to reflect changes in the operations on site and the location of Baghouse No. 3.

The site has been previously cleared under existing approvals, and the proposed modifications will not increase the development area or encroach on vegetation. It is expected that no additional permits or approvals will be required.

4 PHYSICAL AND POLLUTION EFFECTS

The consolidation of the approvals for the facility will not result in physical or pollution effects. As such, only the effects of the proposed modifications are considered here.

4.1 Air Quality

The existing facility is located within an industrial area that includes the Hydro Aluminium Smelter, a large source of fluoride emissions. The area is within the air shed that is dominated by emissions from the power stations and coal mines in the Upper Hunter Valley.

The EPL specifies stack emission levels that will maintain acceptable air quality levels. Emission monitoring for the facility indicates that the current emissions are well below the licence limits. Increases in emission levels from the site are not expected as a result of the proposed development, and some reductions in emissions for particulates and fluoride may occur.

4.2 Noise and Vibration

The existing facility is located within a heavily trafficked industrial area, which is subject to a variety of noise sources. Noise limits for WA's operations are provided in the EPL, and are detailed in **Table 1**.

Table 1: Weston Aluminium Noise Limits

Location	Daytime (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night Time (10 pm to 7 am)
Residences at the corner of Government and 10th Streets	48 dB(A) Leq (15min)	48 dB(A) Leq (15 min) 40 dB(A) Leq (evening)	47 dB(A) Leq (15 min) 35 dB(A) Leq (night) 57dB(A) Leq (1 minute)
Residences on Northcote Street	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min) 40 dB(A) Leq (night) 57dB(A) Leq (1 minute)
Residences in the Light Industrial Zone on Mitchell Avenue and Railway Avenue	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min) 41 dB(A) Leq (night) 55 dB(A) Leq (1 minute)

Annual noise monitoring conducted for WA has determined that the plant currently operates within the licence limits. Compliance with the noise limits has been achieved through the installation of attenuators on the baghouse reverse pulse system and enclosing the external baghouse fan motors.

The proposed development involves the installation of additional noise-generating plant, including the rumbler, the vertical hammermill and the vertical impact flinger, and the relocation of a baghouse. These plant have the potential to generate noise and, in the case of the rumbler, vibrations, that may potentially affect sensitive receptors. Noise is also anticipated during the construction period.

4.3 Water

No liquid by-products or effluent are generated by dross processing. Sanitary and sewage water generated on-site is disposed of to sewer. The main water management issue on the site is therefore stormwater control. A stormwater control system has been specifically designed for the site that segregates off-site stormwater entering the site, uncontaminated on-site stormwater and potentially contaminated on-site stormwater. Potentially contaminated water is fed through a constructed wetland to remove contaminants, and the resulting clean water is irrigated on site from the main pond storage, which holds the water from the wetland system and also acts as a first flush containment facility for the development.

Uncontaminated on-site stormwater is directed to a swale pond, allowed to settle, and then discharged directly to the wetland. Off-site stormwater entering the site is directed to a grass swale catch drain and directly discharged into Swamp Creek.

Quarterly and rainfall event stormwater quality monitoring for aluminium, fluoride, oil and grease, total suspended solids and pH is undertaken by WA as required by the Environment Protection Licence (EPL) for the site (EPL 6423). Results are reported annually to the Department of Environment and Conservation. This monitoring has indicated some elevated concentrations of fluoride and aluminium.

The proposed modifications are not expected to negatively affect water quality on site or in the surrounding area. The pre-processing may serve to remove greater concentrations of contaminants from the dross material, and may therefore be captured prior to discharge to the atmosphere. This may result in improvements in water quality.

5 BIOLOGICAL EFFECTS

The developed area of the site has been previously cleared under the existing development consents. No additional clearing will be required, and no adverse effects are expected to be associated with the proposal.

6 RESOURCE IMPLICATIONS

6.1 Introduction

As the consolidation of the approvals for the facility will not affect community, natural or transportation resources, only the resource implications of the modifications are addressed here.

6.2 Community

The proposed modifications to the approved aldex buildings and the addition of the pre-processing facilities will require the use of public roads for the delivery of equipment and waste removal. These effects will be limited to the construction period, and would not significantly affect the local road network. Additionally, any potential social and aesthetic effects would be limited to the site and its immediate surroundings, which are industrial in nature. The proposed works will not result in significant use of community resources.

6.3 Natural

The following natural resources will be used in the construction of the proposed modifications:

- Concrete (approximately 760 m^3);
- Gravel (in the order of hundreds of tonnes); and
- Diesel fuel for use in mobile equipment (approximately 1000 – 1500 litres).

These amounts are not considered to be significant.

The proposed modifications will require the use of additional electricity for operation. As the installation of the pre-processing equipment should remove the need to operate the Raymond Mill, the increase in electricity usage is not expected to be significant. Not other natural resources would be affected by the proposed modifications.

6.4 Transportation

The site access is not considered to be in a sensitive location in relation to traffic and transport. Effects of the proposal on transport will be minimal and limited to the site, with a temporary increase in traffic to the site during construction. The road network and existing access to the site are considered to be sufficient to accommodate the additional vehicles required during the construction phase. No additional movements are anticipated as a result of operation of the proposed modifications.

7 COMMUNITY EFFECTS

7.1 Socio-Economic

The modifications are associated with direct and indirect employment. Construction of the modifications will take approximately four months, and WA encourages the use of local contractors for such works where possible.

Once operational, the modifications are unlikely to require additional employees at the site as existing labour can be redistributed. One additional employee per shift may be required. Maintenance visits may also be required.

7.2 Heritage and Cultural

The developed area of the site has been previously cleared and utilised under existing approvals. No additional clearing will be required, and no adverse effects are expected to be associated with the proposal.

7.3 Land Use

Land use at the site revolves around the infrastructure associated with secondary aluminium production. The proposed modifications represent minor changes in the existing site operations that do not affect the existing site use or the potential uses of adjacent lands, and as such will not affect the land use of the site.

7.4 Transportation

Access to the site will remain unchanged by the proposed modifications, although some changes to internal access will result, as the trucks delivering dross will travel around the existing main building to the new aldex buildings. This represents a minor change as this transport route is currently used by other vehicles on site.

Traffic increases to the site will occur during construction, and will include:

- Delivery of raw materials;
- Vehicles associated with construction activities such as excavation; and
- Construction employee vehicles.

These increases are expected to be minimal, with a maximum of 25 construction staff expected during peak construction periods. The road network is considered to have sufficient capacity to accommodate these additional vehicles without affecting the amenity of other road users. Deliveries and other vehicle movements will occur within the construction hours of 8 am to 6 pm. Construction will take an estimated 15 weeks to complete.

8 FINDINGS

The environmental assessment for the proposed modifications would focus on the key impacts addressed in **Sections 4 - 6**. This scoping report has identified the key environmental issues as being air quality and noise.

8.1 Air Quality

The operation of the pre-processing facility is not expected to generate air emissions greater than current levels. Temporary effects on air quality during construction are expected to be minimal.

An Air Quality Impact Assessment (AQIA) will be conducted as part of the environmental assessment to determine the nature and extent of the likely effects.

8.2 Noise

The installation of the pre-processing plant and the relocation of Baghouse No. 3 may result in noise levels greater than those currently generated on site. A noise assessment would be conducted as part of the environmental assessment to determine the likely noise effects of the proposed development. It is also suggested that a post-commissioning noise assessment be conducted to determine actual noise levels, with this information then being used to develop specific mitigation measures if required.

Noise control measures should be implemented during construction to enable the work to be conducted within the levels specified in the Environment Protection Authority's Environmental Noise Control Manual. As the construction period will be greater than four weeks but less than 26 weeks in duration, the LA10 noise level due to the construction site should not exceed the existing LA90 background noise level by more than 10 dB. Additionally, audible work should be restricted to the following time periods:

- Monday to Friday - 7:00 am to 6:00 pm;
- Saturday - 7:00 am to 1:00 pm if inaudible on residential premises, otherwise 8:00 am to 1:00 pm; and
- No construction work to take place on Sundays or Public Holidays.

8.3 Other Environmental Issues

As the proposed modifications are to occur on a previously cleared and utilised area of the site, additional environmental effects are not anticipated. The environmental assessment would, however, be required to address the following issues:

- Traffic and transport;
- Ecology;
- Landscape and visual character; and
- Cultural heritage.

Appropriate mitigation measures would be identified in the Statement of Environmental Commitment to ensure effects of the development are minimised and properly managed.

8.4 Level of Assessment

An initial appraisal of the potential effects of the development has been undertaken in this scoping report, which has identified two key environmental issues:

- Air quality; and
- Noise.

These two issues would be considered in detail in the environmental assessment undertaken for the proposed development.

Part 2 of Schedule 3 of the EP&A Regulation (which does not apply to this project) allows for alterations and additions to existing facilities to be exempted from the need to prepare a high level assessment if the proposed alterations and additions do not result in a significant increase in the environmental effects of the total development compared with the existing or approved development. In a similar fashion, this preliminary scoping assessment has identified that a high level environmental assessment is not required for this project.

8.5 Approvals Process

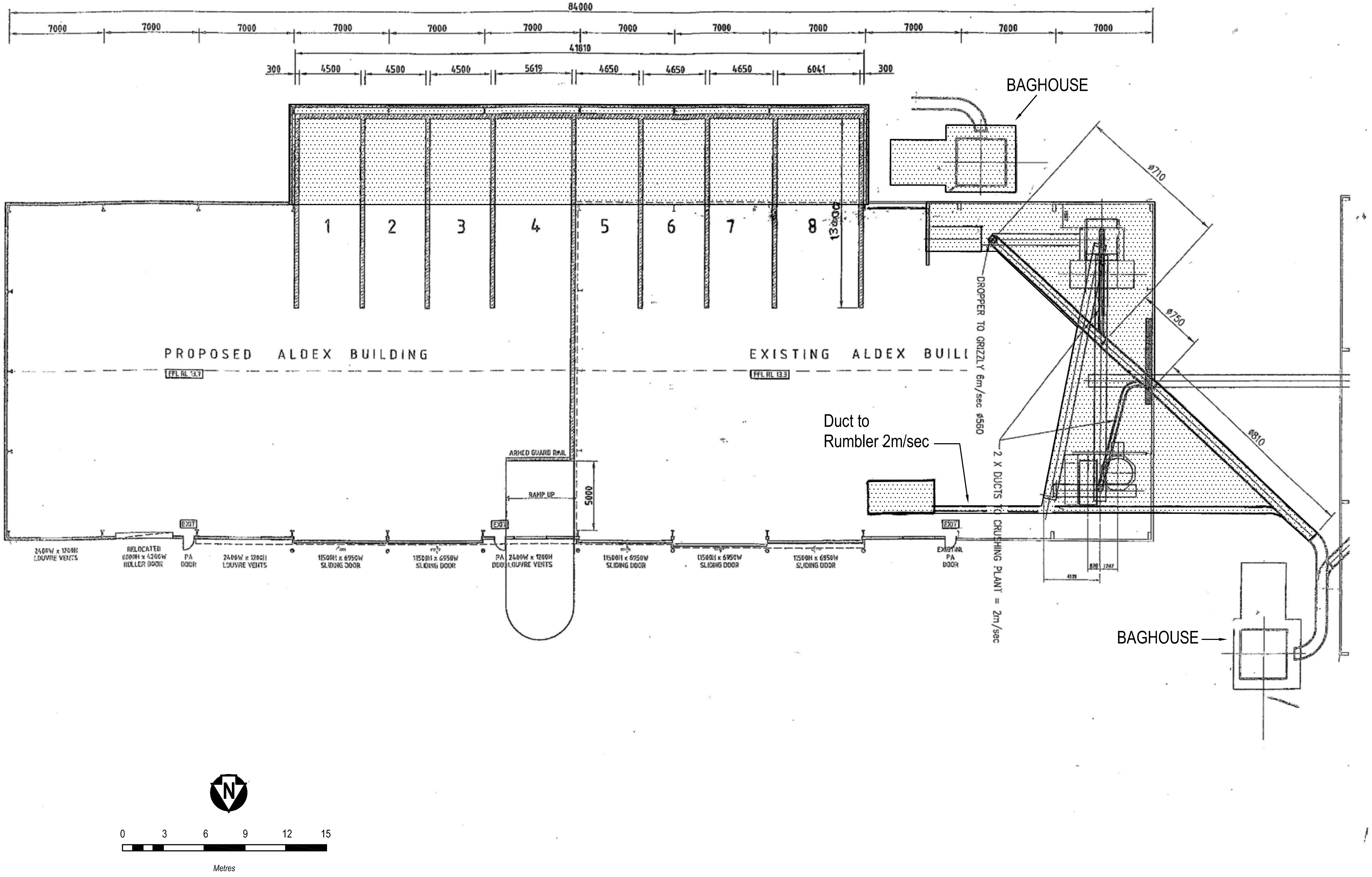
As discussed in **Section 3.3.1**, the proposed consolidation of consents and modifications to the existing dross recycling facility meet the criteria for classification as major development under SEPP 2005, and is therefore eligible for declaration by the Minister as a major project under the provisions of Part 3A of the Environmental Planning and Assessment Act.

Approval for the proposed project would be required from the Minster.

Figures

A3

PROJECT-FILE NAME	**N5009613**
DATE	**December 2005**
DRAWN	**amt**
APPROVED	**HM**



Legend

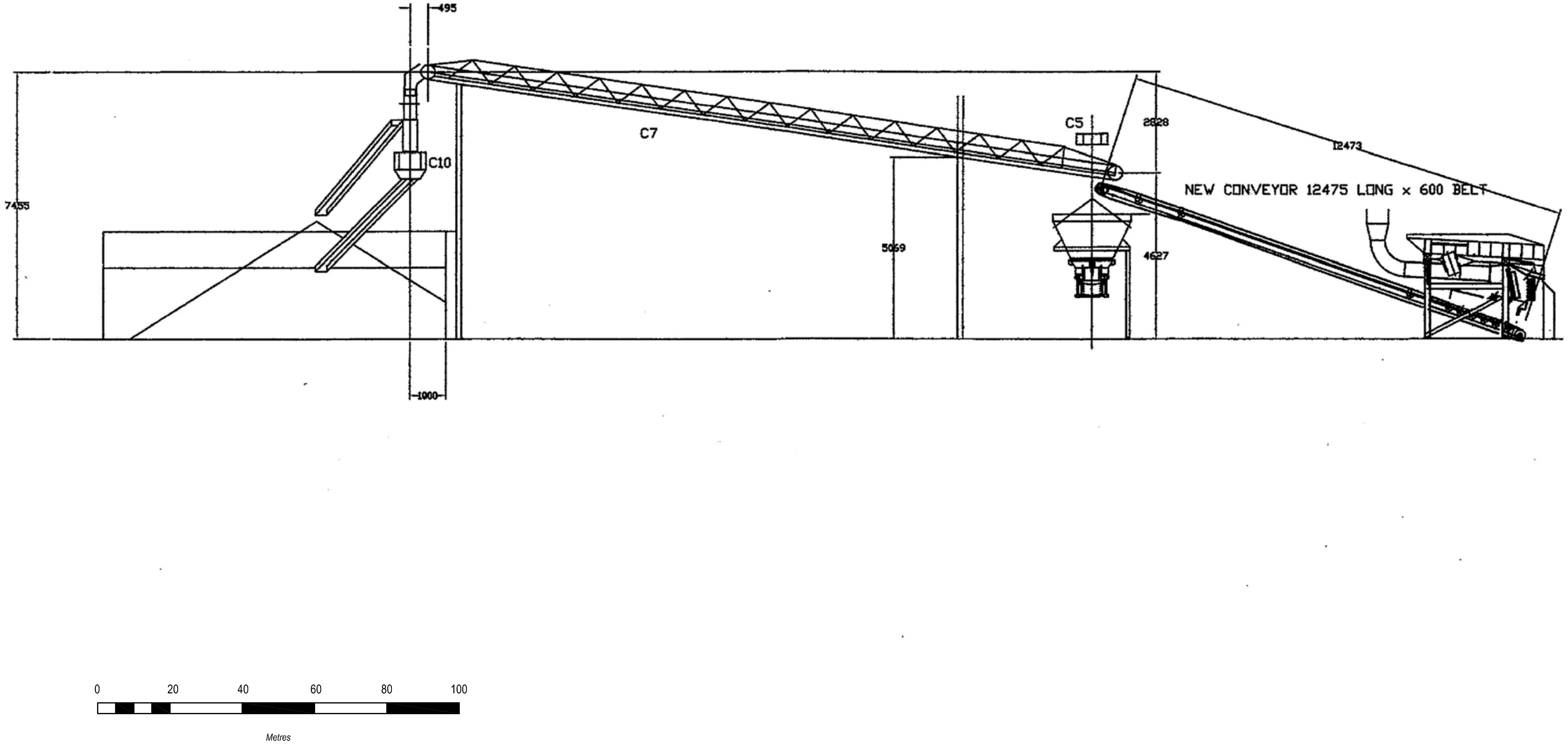
▨ Alterations and Additions

PROPOSED ADDITIONS TO
ALDEX BUILDINGS - FLOOR PLAN
Weston Aluminium
Environmental Assessment Scoping Report
Mitchell Avenue, Kurri Kurri

HLA

FIGURE
1

A3



PROJECT-FILE NAME **N5009613**
DATE **December 2005**
DRAWN **amt**
APPROVED **HM**

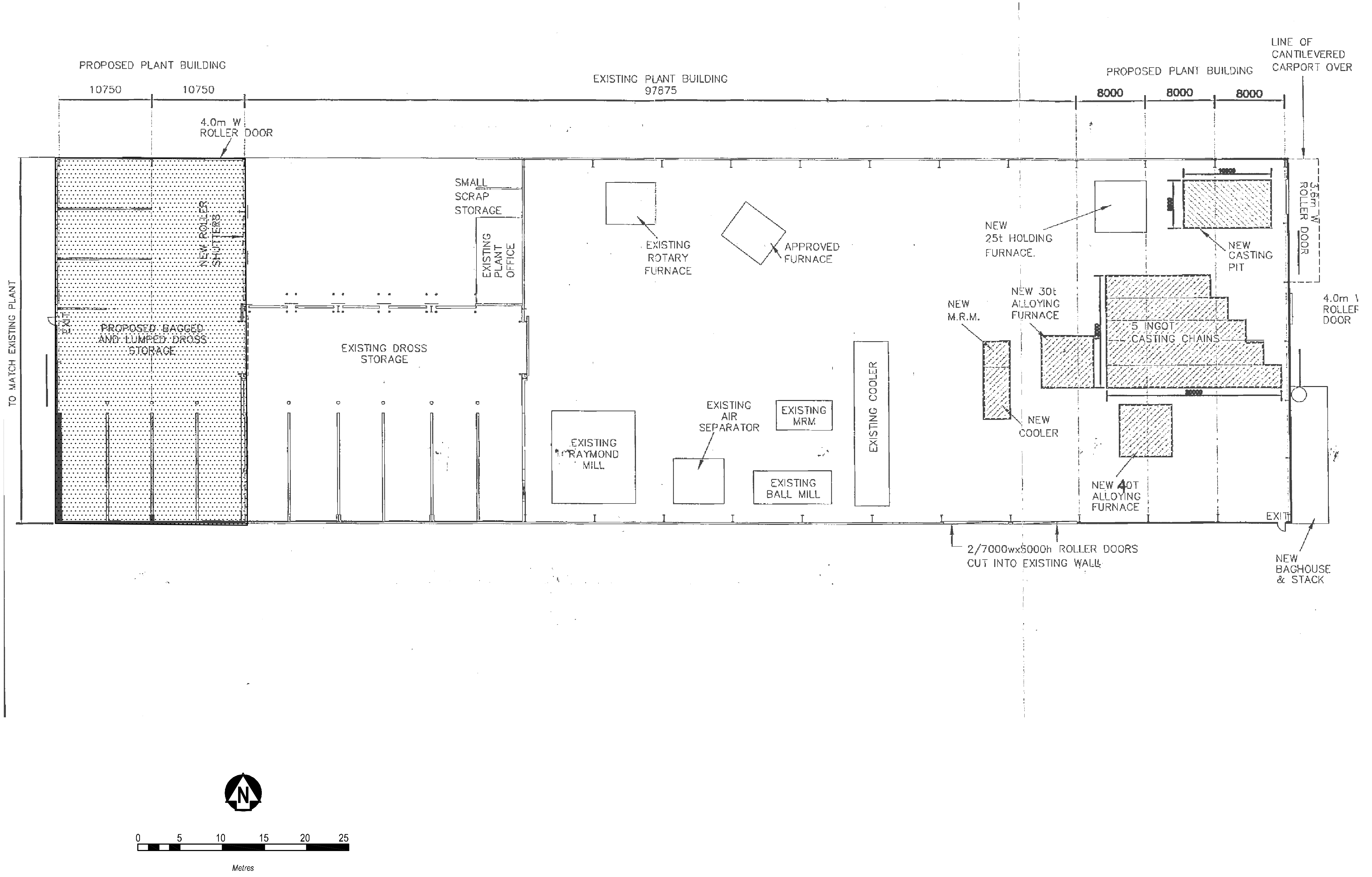
PROPOSED ADDITIONS TO
ALDEX BUILDINGS - ELEVATIONS
Weston Aluminium
Environmental Assessment Scoping Report
Mitchell Avenue, Kurri Kurri

HLA

FIGURE

2

A3



PROJECT-FILE NAME	**N5009613**
DATE	**December 2005**
DRAWN	**amt**
APPROVED	**HM**

Note:-

▨ Shaded area represents approved extension that has not been constructed

EXISTING MAIN PROCESSING BUILDING

Weston Aluminium

Environmental Assessment Scoping Report
Mitchell Avenue, Kurri Kurri

HLA

FIGURE

3

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Appendix B: Department of Planning Requirements

NSW GOVERNMENT
Department of Planning

Major Development Assessment
Phone: (02) 9228 6487
Fax: (02) 9228 6466
Email: david.kitto@dipnr.nsw.gov.au
Level 4 Western Gallery
23-33 Bridge Street
GPO Box 39
SYDNEY NSW 2001

Mr Michael England
National Practice Leader Environmental Planning
HLA-Envirosciences
Level 5, 828 Pacific Highway
GORDON NSW 2072

Dear Mr England

Proposed Modifications
Weston Aluminium Dross Plant

I refer to your letter to me, dated 7 November 2006, requesting the Department's requirements for the proposed modifications to the Weston Aluminium dross plant at Kurri Kurri.

The Department believes the proposal should be assessed under Section 96(2) of the *Environmental Planning & Assessment Act 1979* (EP&A Act), and notes that both the Court and Ministerial consents would need to be modified to give effect to the proposal.

These applications should be accompanied by a single Statement of Environmental Effects (SEE), which must include:

- a detailed description of the existing and approved development on site, the current regulatory controls, and the likely staging of any approved (but undeveloped) development;
- a detailed description of the proposed modifications including the:
  - need for these modifications; and
  - the likely inter-relationship between these modifications and the existing or approved development on site;
- consideration of any relevant statutory provisions, but in particular an assessment of the proposed modifications against the provisions of *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and *SEPP No. 55 – Remediation of Land*;
- a general overview of the environmental impacts of the proposed modifications, identifying the key issues for further assessment, and taking into consideration the issues raised during consultation;
- a detailed assessment of the key issues specified below, and any other significant issues identified in the general overview of environmental impacts of the proposed modifications (see above), which includes a description of the existing environment, an assessment of the potential impacts of the proposed modifications, including any potential cumulative impacts, and a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage and/or monitor the impacts of the proposed modifications:

  - **Waste management**;
  - **Air quality**, in accordance with the relevant air quality legislation and the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* guideline;
  - **Hazards**, in accordance with the Department's Major Hazards Advisory papers;
  - **Noise**, both construction and operational, in accordance with the Environmental Noise Control Manual and NSW Industrial Noise Policy; and
  - **Greenhouse gas** emissions; and
- a conclusion justifying the proposed modifications, taking into consideration the environmental impacts of the proposed modifications, the suitability of the site and the benefits of the proposed modifications.

During the preparation of the SEE, you should undertake an appropriate level of consultation with any relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners. However, you must consult with the Department of Environment and Conservation and Cessnock City Council.

When you lodge your applications for the proposal, you must include:
- at least 10 hard copies and 20 CD copies of the SEE;
- an executive summary of the SEE suitable for display on the Department's website; and
- a cheque for the modification fee and advertising (see Clauses 246 & 258 of the Regulation), made payable to the Department.

If you have any enquiries about these requirements, please contact me.

Yours sincerely

DKitto 23/3/07

David Kitto
Director
Major Development Assessment

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Appendix C: Environment Protection Licence No. 6423

Section 55 Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 6423

Department of **Environment & Climate Change** NSW

Licence Details	
Number:	6423
Anniversary Date:	19-December
Review Due Date:	21-Feb-2011

Licensee

WESTON ALUMINIUM PTY LIMITED
PO BOX 5523
WEST CHATSWOOD NSW 1515

Licence Type

Premises

Premises

WESTON ALUMINIUM PTY LTD
129 MITCHELL AVENUE
KURRI KURRI NSW 2327

Scheduled Activity

Mineral Processing or Metallurgical
Waste Activities
Waste Facilities - HIGAB processing

Fee Based Activity	**Scale**
Secondary Aluminium Production (58)	> 10000 - T produced
Hazardous, Industrial or Group A Waste Generation or Storage (73)	> 500 - T
Hazardous, Industrial or Group A or Group B Waste Processing (75)	0 - All
Scrap Metal Recovery (62)	0 - 100000 T processed

Region

North East - Hunter
Ground Floor, NSW Govt Offices, 117 Bull Street
NEWCASTLE WEST NSW 2302
Phone: 02 49086800
Fax: 02 49086810

PO Box 488G NEWCASTLE
NSW 2300

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

The EPA publication "A Guide to Licensing" contains information about how to calculate your licence fees.

The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

WESTON ALUMINIUM PTY LIMITED
PO BOX 5523
WEST CHATSWOOD NSW 1515

subject to the conditions which follow.

1 Administrative conditions

A1 What the licence authorises and regulates

A1.1 Not applicable.

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity
Mineral Processing or Metallurgical
Waste Activities
Waste Facilities - HIGAB processing

Fee Based Activity	Scale
Secondary Aluminium Production (58)	> 10000 - T produced
Hazardous, Industrial or Group A Waste Generation or Storage (73)	> 500 - T
Hazardous, Industrial or Group A or Group B Waste Processing (75)	0 - All
Scrap Metal Recovery (62)	0 - 100000 T processed

A1.3 Not applicable.

A2 Premises to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
WESTON ALUMINIUM PTY LTD
129 MITCHELL AVENUE
KURRI KURRI
NSW
2327
LOT 796 DP39877

A3 Other activities

A3.1 Not applicable.

A4 Information supplied to the EPA

A4.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

(a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and

(b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to air and water and applications to land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA Identi-fication no.	Type of Monitoring Point	Type of Discharge Point	Description of Location
1	Air emissions monitoring Discharge to air	Air emissions monitoring Discharge to air	Baghouse GCI01 labelled "Stack 1" on drawing titled "Mechanical Arrangement Plan" submitted to the EPA with Licence Information Form dated 22 October 1999.
2	Air emissions monitoring Discharge to air	Air emissions monitoring Discharge to air	Baghouse FA01 labelled "Stack 2" on drawing titled "Mechanical Arrangement Plan" submitted to the EPA with Licence Information Form dated 22 October 1999.
3	Air emissions monitoring Discharge to air	Air emissions monitoring Discharge to air	Baghouse FB01 labelled "Stack 3" on drawing titled "Mechanical Arrangement Plan" submitted to the EPA with Licence Information Form dated 22 October 1999.
4	Air emissions monitoring Discharge to air	Air emissions monitoring Discharge to air	Baghouse FDE01 labelled "Stack 4" on drawing titled "Mechanical Arrangement Plan" submitted to the EPA with Licence Information Form dated 22 October 1999.
13	Air emissions monitoring Discharge to air	Air emissions monitoring Discharge to air	Emissions stack serving alloy furnace No.1 labelled BH5 on drawing titled "Location of Discharge Points" submitted to the EPA dated 31/7/02

P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

P1.3 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

Water and land

EPA identi-fication no.	Type of monitoring point	Type of discharge point	Description of location
12	Stormwater quality monitoring		Main pond on drawing "Figure 1 First Flush Stormwater Irrigation Plan" in "Pollution Study and Reduction Program Condition U2.1 Irrigation Sustainability Assessment Weston Aluminium, Kurri Kurri" preapred by HLA - Envirosciences Pty Ltd dated 1/12/06.

3 Limit conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Load limits

L2.1 The actual load of an assessable pollutant discharged from the premises during the reporting period must not exceed the load limit specified for the assessable pollutant in the table below.

Note: An assessable pollutant is a pollutant which affects the licence fee payable for the licence.

L2.2 The actual load of an assessable pollutant must be calculated in accordance with the relevant load calculation protocol.

Assessable Pollutant	Load limit (kg)
Coarse Particulates (Air)	3234
Fine Particulates (Air)	9220
Fluoride (Air)	1544
Nitrogen Oxides (Air)	22803
Sulfur Oxides (Air)	14935
Volatile organic compounds (Air)	3984

L3 Concentration limits

L3.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L3.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L3.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

Air

POINT 1

Pollutant	Units of measure	100 percentile concentration limit
Nitrogen Oxides	grams per cubic metre	2.5
Hydrogen chloride	milligrams per cubic metre	400
Solid Particles	milligrams per cubic metre	25
Sulfuric acid mist and sulfur trioxide (as SO3)	milligrams per cubic metre	100
Carbon monoxide	parts per million	100
Gaseous fluoride	milligrams per cubic metre	2
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	10

POINT 2

Pollutant	Units of measure	100 percentile concentration limit
Solid Particles	milligrams per cubic metre	35

POINT 3

Pollutant	Units of measure	100 percentile concentration limit
Solid Particles	milligrams per cubic metre	50

POINT 4

Pollutant	Units of measure	100 percentile concentration limit
Solid Particles	milligrams per cubic metre	24

POINT 13

Pollutant	Units of measure	100 percentile concentration limit
Nitrogen Oxides	milligrams per cubic metre	100
Volatile organic compounds	milligrams per cubic metre	77 Note 1
Dioxins & Furans	nanograms per cubic metre	0.1 Note 2
Hydrogen chloride	milligrams per cubic metre	10
Solid Particles	milligrams per cubic metre	10
Sulfuric acid mist and sulfur trioxide (as SO3)	milligrams per cubic metre	100
Carbon monoxide	milligrams per cubic metre	125 Note 3
Volumetric flowrate	normalised metres per second	18 Note 3
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	5

Note 1: Limit value is a rolling 1-hour average. VOC as n-hexane (dry, 273 K, 101.3 kPa).

Note 2: Limit value is a rolling annual average. Polychlorinated-dibenzo-p-dioxins (PCDD) and polychlorinated-dibenzofurans (PCDF) as 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) equivalent calculated in accordance with the procedures included in Part 4, Clause 29 of the Protection of the Environment Operations (Clean Air) Regulation 2002, (dry, 273 K, 101.3 kPa).

Note 3: Limit value is a rolling 1 hour average.

L3.4 The concentration of gaseous fluoride emitted to the atmosphere from Point 1 must not exceed 1.4 milligrams per cubic metre of fluoride, measured as a one hour average.

L3.5 Total plant gaseous fluoride emissions must not exceed 0.25kg/hr.

L3.6 Total plant particulate emissions must not exceed 5.43 kg/hour.

L4 Volume and mass limits

L4.1 Not applicable.

L5 Waste

L5.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

L5.2 This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if it requires an environment protection licence.

L5.3 Except as provided by any other condition of this licence, only the hazardous and/or industrial waste listed below may be generated and/or stored at the premises.

Aluminium dross wastes

L5.4 The quantity of hazardous and/or industrial waste generated and/or stored on the premises must not exceed 5000 tonnes at any one time.

L5.5 Except as provided by any other condition of this licence, only hazardous and/or industrial waste listed below may be treated, processed or reprocessed at the premises.

Aluminium dross wastes

L5.6 The quantity of hazardous and/or industrial waste treated, processed, reprocessed at the premises must not exceed 40,000 tonnes per year.

L6 Noise Limits

L6.1 To restrict noise impacts, truck movements to and from the premise must be limited to between the hours of 7am and 10pm.

L6.2 Noise from the premises must not exceed the noise limits presented in the table below:

Location	Daytime (7am to 6pm, Monday to Saturday, 8am to 6pm Sundays and public holidays)	Evening (6pm to 10pm)	Night time (10pm to 7am, Monday to Saturday, 10pm to 8am Sundays and public holidays)
Residences at the corner of Government and 10th Streets	$L_{Aeq(15\ minute)}$ 48 dB(A)	$L_{Aeq(15\ minute)}$ 48 dB(A) $L_{Aeq(evening)}$ 40 dB(A)	$L_{Aeq(15\ minute)}$ 47 dB(A) $L_{Aeq(night)}$ 35 dB(A) $L_{Aeq(1\ minute)}$ 57 dB(A)
Residences on Northcote Street	$L_{Aeq(15\ minute)}$ 44 dB(A)	$L_{Aeq(15\ minute)}$ 44 dB(A)	$L_{Aeq(15\ minute)}$ 44 dB(A) $L_{Aeq(night)}$ 40 dB(A) $L_{Aeq(1\ minute)}$ 57 dB(A)
Residences in the light Industrial Zone on Mitchell Avenue and Railway Avenue	$L_{Aeq(15\ minute)}$ 43 dB(A)	$L_{Aeq(15\ minute)}$ 43 dB(A)	$L_{Aeq(15\ minute)}$ 43 dB(A) $L_{Aeq(night)}$ 41 dB(A) $L_{Aeq(1\ minute)}$ 55 dB(A)

Note: Where amenity noise levels are lower than intrusive noise levels, both levels are in the licence conditions in order to ensure that intrusive noise impacts are controlled at all times.

The noise limits presented in the table apply under winds up to 3 m/s (at 10 metres height) and Pasquill Stability Categories A to F.

L7 Polychlorinated Biphenyls (PCBs)

Note: The licensee must comply with the conditions as specified in this licence or where no specific conditions are outlined in this licence, the licensee must comply with the "Chemical Control Order in Relation to Materials and Wastes Containing Polychlorinated Biphenyl, 1997".

L8 Asbestos

Note: The licensee must comply with the conditions as specified in this licence or where no specific conditions are outlined in this licence, the licensee must comply with the Protection of the Environment Operations (Waste) Regulation 1996.

L9 Potentially offensive odour

L9.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

4 Operating conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:
(a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
(b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
(a) must be maintained in a proper and efficient condition; and
(b) must be operated in a proper and efficient manner.

O3 Processes and management

O3.1 The licensee must ensure that any liquid and/or non-liquid waste generated and/or stored and/or treated and/or processed and/or reprocessed and/or disposed at the premises is assessed and classified in accordance with the EPA Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes, in force as at 1 July 1999.

O3.2 The licensee must ensure that waste identified for recycling is stored separately from other waste.

O3.3 All above ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment system in-place.

O3.4 The licensee must ensure that suitable measures (e.g. high/low alarms, control valves with interlock control, one way valves) are installed on all tanks, ponds or clarifiers and associated pipes and hoses to prevent the spillage of waste.

O4 Dust Control

O4.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O5 Waste - Operating conditions

O5.1 The licensee must ensure that the loading and unloading of hazardous or industrial waste on and off vehicles, within the controlled waste facility is carried out in a suitable enclosed area.

The enclosed area must effectively contain any spillage of hazardous or industrial waste and prevent the ingress of water.

Notwithstanding this precautionary measure the licensee must co-operate with the transporter to ensure that loading and unloading operations are carried out in such a way as to prevent the spillage of waste and prevent the ingress of water into the loading and unloading area.

O6 Air - Operating conditions

O6.1 The continuous fluoride emission monitoring system must activate visible and audible alarms in the event that the concentration of fluoride emitted to atmosphere exceeds the limit value of 1.4 milligrams per cubic metre.

O6.2 If the 1 hour average concentration of gaseous fluoride emitted to atmosphere exceeds 1.4 milligrams per cubic metre at Point 1 then the plant or section of the plant where the exceedence occurs must cease operating until the licensee is able to ensure compliance with the emission limits specified in this licence.

5 Monitoring and recording conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
- (a) in a legible form, or in a form that can readily be reduced to a legible form;
- (b) kept for at least 4 years after the monitoring or event to which they relate took place; and
- (c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:

(a) the date(s) on which the sample was taken;
(b) the time(s) at which the sample was collected;
(c) the point at which the sample was taken; and
(d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Carbon monoxide	parts per million	Yearly	OM-1
Gaseous fluoride	milligrams per cubic metre	Continuous	In line instrumentation
Hydrogen chloride	milligrams per cubic metre	Yearly	TM-7 & TM-8
Nitrogen Oxides	milligrams per cubic metre	Yearly	TM-11
Solid Particles	milligrams per cubic metre	Yearly	TM-15
Sulfuric acid mist and sulfur trioxide (as SO3)	milligrams per cubic metre	Yearly	TM-3
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	Yearly	TM-12, TM-13 & TM-14

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Solid Particles	milligrams per cubic metre	Yearly	TM-15

POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
Solid Particles	milligrams per cubic metre	Yearly	TM-15

POINT 4

Pollutant	Units of measure	Frequency	Sampling Method
Solid Particles	milligrams per cubic metre	Yearly	TM-15

POINT 12

Pollutant	Units of measure	Frequency	Sampling Method
Aluminium	milligrams per litre	Yearly	Grab sample
Conductivity	microsiemens per centimetre	Yearly	Grab sample
Fluoride	milligrams per litre	Yearly	Grab sample
Total suspended solids	milligrams per litre	Yearly	Grab sample
pH	pH	Yearly	Grab sample

POINT 13

Pollutant	Units of measure	Frequency	Sampling Method
Dioxins & Furans	nanograms per cubic metre	Quarterly	TM-18
Fluorides	milligrams per cubic metre	Yearly	TM-10
Hydrogen chloride	milligrams per cubic metre	Quarterly	TM-7 & TM-8
Nitrogen Oxides	milligrams per cubic metre	Yearly	TM-11
Solid Particles	milligrams per cubic metre	Quarterly	TM-15
Sulfuric acid mist and sulfur trioxide (as SO3)	milligrams per cubic metre	Yearly	TM-3
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	Yearly	TM-12, TM-13 & TM-14
Volatile organic compounds	milligrams per cubic metre	Quarterly	OM-2

M2.2 *Air*

POINT 13

Parameter	Units of measure	Frequency	Sampling Method
Velocity	m/s	Quarterly	TM-2
Volumetric flow rate	Nm³/s	Quarterly	TM-2
Dry gas density	kg/m³	Quarterly	TM-23
Moisture content in stack gases	%	Quarterly	TM-22
Temperature	°C	Quarterly	TM-2
Oxygen in stack gases	%	Quarterly	TM-25

POINT 13 – Reference Conditions

Pollutant / Parameter	Units of measure	Reference Conditions
Volatile organic compounds (VOC)[1]	mg/m³	Dry, 273 K 101.3 kPa
Volumetric flow rate	Nm³/s	Dry, 273 K, 101.3 kPa
Hydrogen Chloride	mg/m³	Dry, 273 K 101.3 kPa
Nitrogen dioxide (NO_2) or nitric oxide (NO) or both	mg/m³	Dry, 273 K 101.3 kPa
Solid Particles	mg/m³	Dry, 273 K 101.3 kPa
PCDD and PCDF[2]	ng/ m³	Dry, 273 K 101.3 kPa
Carbon monoxide (CO)	mg/m³	Dry, 273 K 101.3 kPa

Note 1: VOC as n-hexane (dry, 273 K, 101.3 kPa).

Note 2: Polychlorinated-dibenzo-p-dioxins (PCDD) and polychlorinated-dibenzofurans (PCDF) as 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) equivalent calculated in accordance with the procedures included in Part 4, Clause 29 of the Protection of the Environment Operations (Clean Air) Regulation 2002, (dry, 273 K, 101.3 kPa).

M2.3 The selection of sampling positions must be carried out in accordance with test method TM-1.

M2.4 For the purposes of the Fluoride monitoring required for Point 1 in-line instrumentation means a continuous gaseous fluoride monitor.

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:

(a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or

(b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or

(c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The Protection of the Environment Operations (Clean Air) Regulation 2002 requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

Note: Testing methods - load limit

Note: Clause 18 (1) and (2) of the Protection of the Environment Operations (General) Regulation 1998 requires that monitoring of actual loads of assessable pollutants listed in L2.1 must be carried out in accordance with the testing method set out in the relevant load calculation protocol for the fee-based activity classification listed in condition A1.2.

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:
(a) the date and time of the complaint;
(b) the method by which the complaint was made;
(c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
(d) the nature of the complaint;
(e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
(f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 Conditions M5.1 and M5.2 do not apply until 3 months after:
(a) the date of the issue of this licence or
(b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

M6 Requirement to monitor volume or mass

M6.1 Not applicable.

6 Reporting conditions

R1 Annual return documents

What documents must an Annual Return contain?

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
(a) a Statement of Compliance; and
(b) a Monitoring and Complaints Summary.
A copy of the form in which the Annual Return must be supplied to the EPA accompanies this licence. Before the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

Period covered by Annual Return

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:

(a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
(b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
(a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
(b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

Deadline for Annual Return

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

Notification where actual load can not be calculated

R1.6 Where the licensee is unable to complete a part of the Annual Return by the due date because the licensee was unable to calculate the actual load of a pollutant due to circumstances beyond the licensee's control, the licensee must notify the EPA in writing as soon as practicable, and in any event not later than the due date. The notification must specify:

(a) the assessable pollutants for which the actual load could not be calculated; and
(b) the relevant circumstances that were beyond the control of the licensee.

Licensee must retain copy of Annual Return

R1.7 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

Certifying of Statement of Compliance and signing of Monitoring and Complaints Summary

R1.8 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
(a) the licence holder; or
(b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.9 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R2 Notification of environmental harm

Note: The licensee or its employees must notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.1 Notifications must be made by telephoning the EPA's Pollution Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:

(a) where this licence applies to premises, an event has occurred at the premises; or

(b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,

and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:

(a) the cause, time and duration of the event;

(b) the type, volume and concentration of every pollutant discharged as a result of the event;

(c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;

(d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;

(e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;

(f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and

(g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

Noise Monitoring

R3.5 An noise compliance assessment report shall be prepared every two years and submitted to EPA with the Annual Return. The report shall be prepared by an accredited acoustical consultant and shall provide an assessment of compliance with Condition L6.

R3.6 The full stack emission test results for each quarterly monitoring period for Point 13 must be submitted with the Annual Return.

General conditions

G1 Copy of licence kept at the premises

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Pollution studies and reduction programs

Dioxin Emission Capture and Emission Control

Objective

The objective of PRP condition U1 is to identify and implement control measures that will ensure by 1 October 2007:

- Fugitive dioxin emissions are minimised; and
- Dioxin emissions from Discharge Point 13 are less than 0.1 ng/m^3 (dry, 273K, 101.3kPa)

U1 Identification of Secondary Air Emission Control Measures

U1.1 Optimisation of lime fed baghouse scrubber

Objective

To optimise the lime fed baghouse scrubber for the removal of dioxins and furans from the exhaust gas.

U1.1.1 **Optimisation of Baghouse Operation**

On or before 1 March 2008 the licensee must submit in writing to the Regional Manager, Hunter PO Box 488G Newcastle, a Baghouse Operation Optimisation report. The report must include but not be limited to the following:

- Results of the review of gas flow and lime feed distribution rates to each individual baghouse cell;
- The actions implemented as a result of the gas flow and lime feed distribution rates review to ensure an even distribution of lime coating the baghouses;
- Optimal lime addition rate for the control of dioxin and furan emissions from baghouse no. 5. As a minimum, the following must be undertaken to determine the optimal lime addition rate:
    - Identification of the consistency of charges fed to Rotary Furnace No.5 using historical process control information;
    - Identification of the charge with the highest potential for dioxin and furan formation (worst case charge).
    - A series of dioxin and furan sampling results when melting the worst case charge. The series must correspond to the current lime addition rate and incremental changes to the lime addition rate to improve control of dioxins and furans.
    - Identification of the lime addition rate which resulted in the greatest control of dioxins and furans when melting the worst case charge.

U1.2 Activated Carbon Trials for Scrubbing System

By 31 May 2008 the licensee must submit in writing to the Regional Manager, Hunter, PO Box 488G Newcastle 2300, a report on the results of the scrubbing system activated carbon trials. The report must include, but not be limited to, the following:

- assessment of the performance of the lime/activated carbon feed versus lime only feed; and
- identification of the most effective scrubbing media.

U1.3 Investigation into Catalytic Coated Filter Bags

By 31 May 2008 the licensee must submit in writing to the Regional Manager, Hunter, PO Box 488G Newcastle 2300, a report on catalytic coated fabric filter bags. The report must include, but not be limited to, the following:

- detailed description of the technology options for catalytic coated fabric filter bags;
- quantitative evaluation of the potential reduction in the emission concentration and rate of all pollutants associated with each technology option;
- an evaluation of the practicability of each technology option; and
- identification of the preferred option.

U2 Continuous Improvement and Performance Benchmarking – Fugitive Emission Capture

The objective of this condition is to ensure complete capture of fugitive emissions from the reverberatory furnace. The licensee must complete the following works, monitoring and reporting requirements until the objective is achieved:

U2.1 <u>Stage 1 – Emission Capture Reconfiguration.</u>

The licensee must modify the emissions capture configuration serving the reverberatory furnace as described in Section 3.1.1 of the document "*Pollution Study and Reduction Program Condition U1.1 Sealed Feeding System and Heat Recovery Weston Aluminium, Kurri Kurri*" prepared by HLA-Envirosciences Pty Ltd and dated 25 November 2006 and in accordance with the document "*Air Quality Impact Assessment Proposed Reverberatory Furnace Modifications*" prepared by HLA-Envirosciences Pty Limited and dated 29 August 2007.

Date for Completion: 30 November 2007

U2.2 **Stage 2 – Demonstrate complete fugitive emissions capture**

The licensee must rigorously demonstrate, using tracer gas studies with multiple point sampling and analysis (and/or other methods approved by the EPA prior to sampling and analysis being undertaken) that implementation of Stage 1 works have achieved complete capture of fugitive emissions from the reverberatory furnace.

The licensee must submit to the EPA for approval details of the methodology to be used to demonstrate complete fugitive emissions capture **by no later than 30 November 2007**.

If the licensee is unable to demonstrate complete capture of fugitive emissions Stage 3 must be implemented.

The licensee must submit a report to the Regional Manager Hunter which details the results of tracer gas and/or other studies **by no later than 1 March 2008**

The report submitted must describe the conditions under which the sampling/analysis was performed (roller doors open/shut, access doors open/shut, movement of loading vehicles in vicinity of furnace etc) and whether these conditions are typical of 'normal' operations.

U2.3 **Stage 3 – Extraction Hood Canopy Extension**

The licensee must extend the extraction hood canopy serving the scrap feed/remelt side of the reverberatory furnace to improve emission capture efficiencies. The licensee must also increase exhaust fan speeds to maintain adequate extraction velocities from the emission collection area.

Date for Completion: 1 July 2008

U2.4 **Stage 4 - Demonstrate complete fugitive Emissions Capture**

The licensee must rigorously demonstrate, using tracer gas studies with multiple point sampling and analysis (and/or other methods approved by the EPA prior to sampling and analysis) that implementation of Stage 3 works have achieved complete capture of fugitive emissions from the reverberatory furnace.

The tracer gas and/or other assessments used must describe the conditions under which the test was performed (roller doors open/shut, access doors open/shut, movement of loading vehicles in vicinity of furnace etc) and which are typical of 'normal operations.

If the licensee is unable to demonstrate complete capture of fugitive emissions Stage 5 must be implemented.

The licensee must submit a report to the Regional Manager Hunter which details the results of tracer gas and/or other studies **by no later than 1 October 2008**

U2.5 **Stage 5 – Physically Enclosed Feeding System.**

The licensee must complete works to physically enclose the remelt side of the reverberatory furnace consistent with the preliminary designs presented in the Figures 1 and 2 of the document "*Pollution Study and reduction Program Condition U1.1 Sealed Feeding System and Heat Recovery Weston Aluminium, Kurri Kurri*" prepared by HLA-Envirosciences Pty Ltd and dated 25 November 2006.

Date for Completion: 1 January 2009

Special conditions

E1 Compliance audit

E1.1 The licensee must conduct an independent compliance audit no less than once every three (3) years to assess and report on compliance with the conditions of this licence, including the adequacy of the documentation required by this licence. A report containing the audit findings must be submitted with the Annual Return.

Dictionary

General Dictionary

In this licence, unless the contrary is indicated, the terms below have the following meanings:

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*

	Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 1998.
flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
industrial waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
inert waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances

Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
reprocessing of waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
treatment of waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste code	Means the waste codes listed in Appendix 5 of the EPA document A Guide to Licensing Part B.
waste type	Means Group A, Group B, Group C, inert, solid, industrial or hazardous waste

Mr Bernie Weir

Environment Protection Authority

(By Delegation)

Date of this edition - 01-Nov-2007

End Notes

1	Licence varied by notice 1013185, issued on 28-Nov-2001, which came into effect on 23-Dec-2001.
2	Licence varied by notice 1014219, issued on 15-Apr-2002, which came into effect on 10-May-2002.
3	Licence varied by notice 1017402, issued on 30-Aug-2002, which came into effect on 24-Sep-2002.
4	Licence varied by notice 1026798, issued on 14-Aug-2003, which came into effect on 08-Sep-2003.
5	Licence varied by notice 1036624, issued on 02-Sep-2004, which came into effect on 27-Sep-2004.
6	Licence varied by notice 1051350, issued on 21-Feb-2006, which came into effect on 18-Mar-2006.
7	Licence varied by notice 1059849, issued on 14-Sep-2006, which came into effect on 14-Sep-2006.
8	Licence varied by notice 1068022, issued on 03-May-2007, which came into effect on 03-May-2007.
9	Licence varied by notice 1075595, issued on 04-Sep-2007, which came into effect on 04-Sep-2007.
10	Licence varied by notice 1079692, issued on 01-Nov-2007, which came into effect on 01-Nov-2007.

Appendix D: Specific Immobilisation Approval

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SPECIFIC APPROVAL OF THE IMMOBILISATION OF CONTAMINANTS IN WASTE

Pursuant to the provisions in Clause 28 of the *Protection of the Environment Operations (Waste) Regulation 1996* (Waste Regulation), the New South Wales Environment Protection Authority (EPA) has authorised the following specific approval of the immobilisation of contaminants in waste:

A) APPROVAL NUMBER

2005-S-13

B) PERIOD OF VALIDITY

This approval is valid from the date of issue until 30 June 2009.

C) SPECIFICATION OF WASTE STREAM

This approval applies to fluoride contaminated baghouse dust ("naturally immobilised waste") which is generated at Weston Aluminium Pty Limited, Mitchell Ave, Weston NSW 2326. See condition 6 for restrictions applying to the types of baghouse dust covered by this approval.

D) CONTAMINANTS APPROVED AS IMMOBILISED

The following contaminants are covered by this Immobilisation Approval:

- fluoride

All other contaminants must be assessed in accordance with the procedures specified in the Waste Guidelines.

E) RESPONSIBLE PERSON

The responsible person under clause 28(8) of the Waste Regulation is Weston Aluminium Pty Limited, ACN 075 245 108, PO Box 5523, West Chatswood NSW 1515.

F) CONDITIONS OF APPROVAL

The responsible person may only use this approval to classify naturally immobilised waste for disposal if all of the conditions of the approval have been satisfied.

1. *Quality Assurance / Quality Control*

    1.1. The responsible person must implement a quality control program to ensure compliance with the conditions of this approval. The program must include:

        1.1.1. a statistically valid sampling program appropriate to the quantity of naturally immobilised waste which is consistent with the acceptance/rejection procedures adopted for the naturally immobilised waste;

        1.1.2. a testing plan which complies with Condition 2 of this approval; and

        1.1.3. acceptance/rejection procedures which ensure that only naturally immobilised waste which satisfies all of the requirements of this approval is disposed of off-site to landfill.

        NOTE: The sampling program will depend on a number of factors including the quantity and variability of material to be tested.

    1.2. All testing must be undertaken by analytical laboratories accredited by the National Association of Testing Authorities to perform the particular test.

    1.3. The following parameters must be monitored as part of the testing plan:

        1.3.1. total concentration of fluoride in the naturally immobilised waste; and

        1.3.2. leachable concentration of fluoride in the naturally immobilised waste.

    1.4. The quality control program must also include testing necessary to ensure compliance with Condition 6 of this approval.

2. *Sampling and test methods*

2.1. The total concentration of fluoride must be measured as Specific Contaminant Concentration (SCC) in accordance with the method specified in the Waste Guidelines.

2.2. The leachable concentration of fluoride must be measured using the Toxicity Characteristics Leaching Procedure (TCLP) as specified in the Waste Guidelines. Leachate from the landfill at which the waste will be disposed of may be used for measuring TCLP.

2.3. SCC and TCLP test results used for assessing compliance with the conditions of this approval must be at the 95% upper confidence limit (UCL).

3. *Waste Assessment Requirements*

Note: Refer to Technical Appendices 1 and 2 of the Waste Guidelines for more information about waste classification including SCC and TCLP limit values for fluoride.

3.1. The total concentration (SCC) limits for fluoride do not apply to the classification of the naturally immobilised waste provided that the waste complies with all of the conditions of this Approval.

3.2. With respect to fluoride, naturally immobilised waste which complies with all of the conditions of this Approval may be classified according to the leachable concentration (TCLP) value alone.

3.3. All other contaminants in the naturally immobilised waste must be assessed in accordance with the procedure in Technical Appendix 1 of the Waste Guidelines, namely that both total concentrations and leachable concentrations (where specified) apply.

4. *Disposal Restrictions*

4.1. Naturally immobilised waste subject to this approval must not be co-disposed with putrescible waste.

4.2. Naturally immobilised waste subject to this approval that satisfies the requirements of the Waste Guidelines for classification as inert waste or solid waste may only be disposed of at a solid waste landfill or an industrial waste landfill which has currently operating leachate management systems and which is licensed by the EPA to accept that particular type of waste.

4.3. Naturally immobilised waste subject to this approval that satisfies the requirements of the Waste Guidelines for classification as industrial waste may only be disposed of at an industrial waste landfill which has currently operating leachate management systems and which is licensed by the EPA to accept that particular type of waste.

4.4. A landfill receiving the naturally immobilised waste:

4.4.1. must have licence conditions to receive waste subject to immobilisation approvals with this type of disposal restriction; and

4.4.2. must monitor landfill leachate and groundwater for fluoride.

4.5. The responsible person must advise the disposal facility in writing that the naturally immobilised waste to be disposed of has been classified in accordance with the conditions of this approval.

5. *Notification and record keeping requirements*

5.1. For naturally immobilised waste disposed of under this approval, the responsible person is required to keep all test results and disposal documentation for a period of at least 3 years from the date on which the waste is disposed of off site.

5.2. The responsible person is required to notify the EPA within 48 hours of receiving any test result which shows that the naturally immobilised waste does not meet the requirements for disposal under this approval.

6. *Special Conditions*

6.1. Only waste which is not classified as Dangerous Goods under the Australian Dangerous Goods Code is covered by this approval.

6.2. Only the following types of baghouse dust may be classified and disposed of under this approval:

6.2.1. Dust generated in the caustic scrubber treating off-gases from the rotary furnace, provided that all fluoride contamination in the dust is present as calcium fluoride (dust collected in baghouse 1); or

6.2.2. Dust collected in baghouses 2, 3 and 4, provided that:

6.2.2.1. the material being processed by the plant when the dust was collected originated from Tomago Aluminium, NZAS, Hydro Aluminium or Comalco's Bell Bay smelter; and

6.2.2.2. fluoride is present in the dust in the chemical form(s) described in the analytical report from James Cook University Advanced Analytical Centre attached to the letter from HLA-Environmental Pty Limited dated 22 August 2005 (reference N5009608_LTR_22Aug05); or

6.2.3. Dust collected in baghouses 2, 3 and 4 where the material being processed by the plant when the dust was collected did not originate from Tomago Aluminium, NZAS, Hydro Aluminium or Comalco's Bell Bay smelter, provided that:

6.2.3.1. a report has been submitted to the EPA which demonstrates the chemical form(s) of fluoride in that waste; and

6.2.3.2. written approval has been given by the EPA to classify and dispose of this baghouse dust waste under this approval.

6.2.4. Dust collected in baghouse 5 provided that this dust is not subject to the *Chemical Control Order in relation to dioxin-contaminated waste materials 1986*.

6.3. For the first three loads of dust collected in baghouse 5:

6.3.1. SCC and TCLP tests results for each load must be provided to the EPA; and

6.3.2. prior written approval must be obtained from the EPA before disposing of each load of the naturally immobilised waste offsite.

7. *Waste Tracking Requirements*

7.1. Naturally immobilised waste must, when transported, be tracked in accordance with Part 3 of the *Protection of the Environment Operations (Waste) Regulation 2005*.

7.2. If the naturally immobilised waste is being tracked using the DEC's online waste tracking system, the Notes section of the transport certificate should include a statement that the waste is being disposed of in accordance with Specific Immobilisation Approval 2005-S-13.

7.3. Prior written approval must be obtained from the EPA if the naturally immobilised waste is not to be tracked using the DEC's online waste tracking system.

H) NOTIFICATION

Notifications or reports as required by this approval must be sent to:

Manager, Hazardous Waste Regulation Unit
Environment Protection Authority
PO Box A290
SYDNEY SOUTH NSW 1232

I) DEFINITIONS

application - the application comprises the letter and attached application dated 30 June 2005 and entitled "Application for Natural Waste Immobilisation Approval Weston Aluminium - Baghouse Waste" and subsequent correspondence related to this waste.

SCC - Specific Contaminant Concentration, see Waste Guidelines for details.

TCLP - Leachable Concentration assessed by the Toxicity Characteristics Leaching Procedure, see Waste Guidelines for details.

Waste Guidelines - *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes*

NOTES

The responsible person must comply with the conditions to which the approval is subject [clause 28 [11] of the Waste Regulation]. Maximum penalty for a corporation is 200 penalty units and for individuals 100 penalty units.

This approval may be amended or revoked by the EPA by way of written notice given to the responsible person.

The responsible person must also ensure that all other legislative requirements are complied with including, for example, the use of a licensed waste transporter in circumstances where one must be used.

Environment Protection Authority
Per: Tony Hodgson
Manager Hazardous Waste Regulation
By Delegation

26 March 2007

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Appendix E: Waste Management Plan

WASTE MANAGEMENT PLAN

SECTION TWO – CONSTRUCTION STAGE

Materials on Site		Destination		
Expected Waste Materials	Est. Volume m^3	**Reuse and Recycling**		**Disposal**
		ON SITE ***specify** proposed reuse or on site recycling methods * see page 19 or suggestions	**OFF-SITE** *see page 19 for suggestions * specify contractor and recycling outlet * see Appendix 5 for outlets	* specify contractor and landfill site * see appendix 5 for contacts
Excavation Material	10	Fill emplacement	-	-
Green Waste	nil	-	-	-
Bricks	-	-	-	-
concrete	20	-	Remainder to Concrush, Teralba works.	-
Timber – Please specify: • Oregon • Pine • Particle Board • Finishes Plasterboard	-	-	-	-
Metals – Please specify: - Copper - Aluminium	Steel corrugated wall sheeting – approx. 50 kg	-	To Thiess Services for reuse.	
Other - Please specify: Plastics	-	-	-	-

SECTION THREE – USE OF PREMISES

Type of Waste To Be Generated	Expected Volume Per Week	Proposed on Site Storage and Treatment Facilities	Destination
Please specify. For example: glass, paper, food, waste, offcuts, etc.	- Litres or m ² - See Appendix 2 for estimates	For example: - Waste storage and recycling area - Garbage chute - Onsite composting Compaction equipment	- Recycling - Disposal - See Appendix 5 for contacts - Specify contractor
Recyclables:			
1. Office/retail paper and cardboard.	-		
2. Glass, aluminium & plastic (bottles).	-		
3. Timber pallets.	-		
4. Electrical fittings	-		
5. Reject trade –ins	By-product. Approx. 230 tonnes per month	Waste to be stored in Aldex Building No. 2 awaiting either disposal or reuse.	SITA, Kemps Creek
Non-Recyclables:			
1. Foodscraps etc.	-	-	-
2. Other plastics (e.g. wrapping).	-	-	-
3. Unrecyclable retail waste.	-	-	-

SECTION FOUR – ON – GOING MANAGEMENT

Weston Aluminium has an existing Environmental Management Plan which is in general accordance with ISO 14000. This EMP is regularly updated and includes waste management measures. Waste Management measures adopted by Weston Aluminium include:

- Segregation of ‘General’ and ‘Metal’ wastes (bins clearly labelled). General wastes are disposed of to local landfill; metal wastes are recovered regularly by waste contractor for recycling;
- Routine inspections and audits of segregated wastes;
- Bulk dross receival – no packaging wastes are permitted;
- Ongoing opportunities for ash/baghouse dust reuse/recycling are investigated in attempt to divert waste disposal to landfill;
- Operators responsible for general plant housekeeping;
- All staff responsible for minimising waste generation. Continuous improvement is encouraged.

Appendix F: Preliminary Hazard Analysis

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Weston Aluminium Limited
Dross Processing Facility
Preliminary Hazard Analysis

- ND00033-RPTFinal(Rev0)-7Sep07
- 7 September 2007

Weston Aluminium Limited
Dross Processing Facility
Preliminary Hazard Analysis

- ND00033-RPTFinal(Rev0)- 7Sep07
- 7 September 2007

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Contents

List of Holds

Section 5.4 – reference for rainfall data

ABBREVIATIONS

Abbreviation	**Description**
DoP	Department of Planning
DUAP	Department of Urban Affairs & Planning
HIPAP	Hazardous Industry Planning Advisory Paper
Kg	kilograms
kg/hr	kjlograms per hour
kg/s	kilograms per second
$kg/s/m^2$	kilograms per second per square metre
LEL	Lower Explosive Limit
m	Metres
M^2	square metres
M^3	cubic metres
M^3/kg	cubic metres per kilograms
mm	Millimetres
MSDS	Materials Safety Data Sheet
NOHSC	National Occupational Health and Safety Commission
Pa	Pascals
PHA	Preliminary Hazard Analysis
ppm	parts per million
QRA	Quantitative Risk Assessment
SEPP	State Environmental Planning Policy
SKM	Sinclair Knight Merz
STP	Standard Temperature & Pressure

EXECUTIVE SUMMARY

Introduction, Objectives & Scope

Weston Aluminium Limited (Weston) proposes to modify the existing Aldex building to cater for additional storage and pre-processing of dross. As part of the development conditions of consent the changes to the site require assessment of the hazards and risks and Weston has commissioned Sinclair Knight Merz to prepare a preliminary hazard analysis (PHA) study for the proposed site changes.

The objectives of the study are to prepare a PHA study in accordance with Hazardous industry planning advisory Paper (HIPAP) No.6, "Guidelines for Hazard Analysis"(Ref.1) and to report on the findings of the study. The scope of work is for a PHA study of the proposed dross storage and pre-processing facilities in the Aldex building and does not include the assessment of any other facilities at the site.

Methodology

The methodology selected for the study was that approach prescribed in HIPAP No.6 (Ref.1). The approach identified the hazards associated with the storage and pre-processing of dross and then determine the risk impacts to surrounding land uses.

Brief Description of the Proposed Storage and Handling of Dross

The Weston site is located in an area Zoned Industrial 4a, and the proposed facility is permitted in this zoning provided the operation can be proven to be only potentially hazardous and not actually hazardous.

Weston proposes to install a pre-processing facility within the western end of the existing approved Aldex building. The existing building will be extended to the south by 6m to accommodate 8 dross storage bays. Trucks delivering dross to the storage bays will reverse into the building, and to dump directly into one of the eight bays.

Dross will be stored within the existing Aldex building prior to recovery from one of the eight bays and delivered to the pre-processing facility by front end loader. The dross will first pass over a grizzly to remove any large material before being crushed and finally transferred to a screen deck where ultra fine material will be removed. Oversized material will be transferred by covered conveyor to the storage bays within the main plant building (i.e. where dross is currently received). The higher metallic residual material will be stored within these bays for ultimate recovery through feeding to the existing rotary furnace.

To provide effective air pollution control a new (approved) baghouse dust collector will be used to collect emissions from the pre-processing plant. The existing baghouse dust collector currently servicing the Raymond Mill will also be relocated to facilitate ventilation of the dross storage bays.

Hazard Identification

Aluminium dross is classified by the Australian Dangerous Goods Code (Ref.5) as a Class 4.3 Dangerous Good. This classification indicates that there is a potential for the release of gas when dross is mixed with water. A hazard identification table was developed (Appendix A) to review the potential hazards at the site and it was identified that the main hazards that could result in offsite impact were dust release and water contact with dross. A review of the dust containment systems at the site identified that risk of dust release and beyond the Aldex building, and impact to offsite areas, was low. However, it was identified that in the event of a storm, the roof to the building could be damaged and water could ingress the dross storage area. This could lead to water dross mixing and the generation of toxic/flammable gas. This incident was carried forward for consequence analysis.

Consequence Analysis

A chemical analysis of water dross mixing was conducted and it was identified that ammonia, methane and acetylene gases could be generated. A conservative incident was postulated whereby storm damage the roof of the storage occurred and water ingressed to the dross material. The postulated incident considered the continuing storm for 1 hour, and then a calm period for a further hour.

The assessed flammable gas generated (methane/acetylene) by the postulated incident indicated that there was insufficient gas in the Aldex building to reach the lower flammable limit of the gas/air mixture. Hence, there was no potential for explosion in this case.

The assessed toxic gas generated (ammonia), by the postulated incident, resulted in an ammonia release rate of 0.05kg/s. The dispersion of the gas downwind was assessed using a computer model. The release was modelled to occur at the building roof (12m) and the results indicated that the maximum concentration of ammonia, downwind, was 18.6 parts per million at 500m.

The toxicity of ammonia was reviewed and it was identified that the maximum permissible constant dose, over an 8 hour period (known as the Time Weighted Average or TWA), was 25ppm (Ref.8). Hence, the assessed impact is below the TWA value and therefore the risk is negligible.

Conclusions and Recommendations

The hazard analysis identified one scenario that had the potential to develop incident consequences that could adversely impact offsite. This incident was storm damage to the Aldex building resulting in roof damage, water ingress and ammoni/acetylene/methane development.

The results of the analysis identified that the ammonia concentrations were below the impact levels published by NOHSC (Ref.8) and the flammable gases generated as a result of the postulated incident did not reach the lower flammable limits within the dross storage.

Based on the analysis conducted in this study, the proposed Weston aluminium facility does not exceed the risk criteria published by the NSW DoP in HIPAP No.4 (Ref.4) and, hence, the facility may be classified as potentially hazardous and not hazardous and would therefore be permitted in the proposed land zoning.

Notwithstanding the above analysis, it is recommended that the existing Weston Aluminium site emergency plan be updated to include the new operations proposed in the Aldex building.

1. INTRODUCTION

1.1 Background

In 1998, Weston Aluminium Limited (Weston) commenced operating a Dross Processing Plant at Weston, Kurri Kurri, NSW. Dross is a by-product of aluminium smelting which contains a significant amount of aluminium that can be recovered in a re-heat and extraction process. In 2000, permission was granted for Weston to expand the dross processing facility to include a larger dross storage and the storage of Aldex, a by product of the dross process.

The potential for enhanced process operations has led Weston to review its current storage and handling of dross and the company proposes to modify the existing Aldex storage to contain additional dross storage and pre-processing equipment. The changes to the site dross storage and handling requires assessment of the hazards and risks and Weston as commissioned Sinclair Knight Merz (SKM) to prepare a Preliminary Hazard Analysis (PHA) of the proposed site changes.

This report outlines the PHA for the proposed dross storage and handling facilities in the Aldex storage area of the site.

1.2 Objectives

The objectives of the study have been based on the Department of Planning (DoP) requirements (Ref.11). These requirements state that the proposed facility must be assessed against the requirements of *State Environmental Planning Policy No.33 – Hazardous and Offensive Development* (SEPP 33). A review of the application guidelines associated with this SEPP (Ref.3) indicates that the site may be hazardous and/or offensive, hence, it is necessary to prepare a Preliminary Hazard Analysis (PHA) for the proposed project. The objectives are, therefore:

- to conduct a preliminary hazard analysis of the proposed additional dross storage, at the Weston site, in accordance with the NSW Department of Planning Hazardous Industry Planning Advisory Paper (HIPAP) No.6, “Guidelines for Hazard Analysis” (Ref.1); and
- prepare a study report on the findings and recommendations for submission in support of the development application.

1.3 Scope of Work

The scope of work is for the additional dross storage and handling facilities only, including the storage bays in the Aldex building and the pre-processing plant in the Aldex building. The scope does not include the assessment of any existing facilities that have already been reviewed as part of previous PHA studies.

2. METHODOLOGY

2.1 General Approach

The NSW DoP Multi Level Risk Assessment (Ref.2) approach was used for this study. The approach considered the development in context of its location and its technical and safety management control. The Multi Level Risk Assessment Guidelines are intended to assist industry, consultants and the consent authorities to carry out and evaluate risk assessments at an appropriate level for the facility being studied.

The Multi Level Risk Assessment approach is summarised in **Figure 2.1**. There are three levels of assessment, depending on the outcome of preliminary screening. These are:

- **Level 1 – Qualitative Analysis**, primarily based on the hazard identification techniques and qualitative risk assessment of consequences, frequency and risk;
- **Level 2 – Partially Quantitative Analysis**, using hazard identification and the focused quantification of key potential offsite risks; and
- **Level 3 – Quantitative Risk Analysis (QRA)**, based on the full detailed quantification of risks, consistent with Hazardous Industry Planning Advisory paper No.6 – Guidelines for Hazard Analysis.

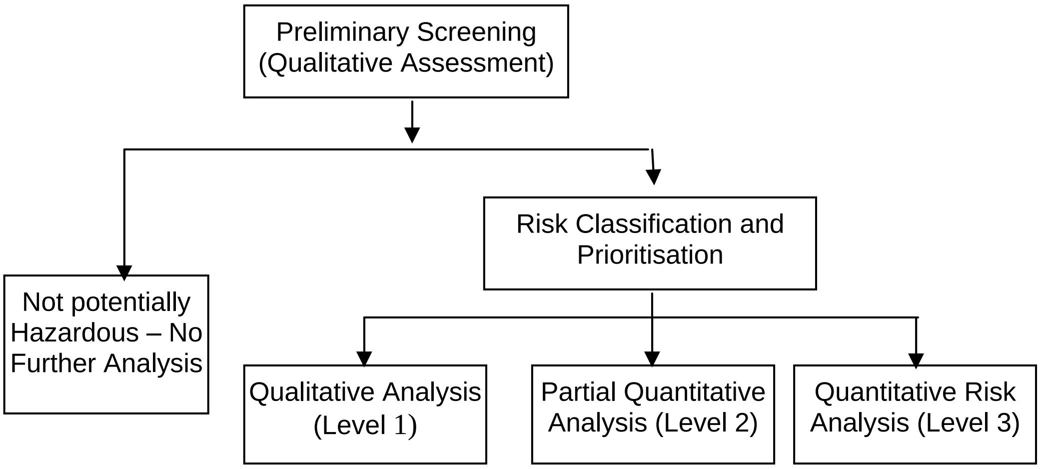


FIGURE 2.1
THE MULTI LEVEL RISK ASSESSMENT APPROACH

The document "Applying SEPP 33" (Ref.3) guideline may also be used to assist in the selection of the appropriate level of assessment. This guideline states the following:

"It is considered that a qualitative PHA may be sufficient in the following circumstances:

- *where materials are relatively non-hazardous (for example corrosive substances and some classes of flammables);*
- *where the quantity of materials used are relatively small;*
- *where the technical and management safeguards are self-evident and readily implemented; and*
- *where the surrounding land uses are relatively non-sensitive.*

In these cases, it may be appropriate for a PHA to be relatively simple. Such a PHA should:

- *identify the types and quantities of all dangerous goods to be stored and used;*
- *describe the storage/processing activities that will involve these materials;*
- *identify accident scenarios and hazardous incidents that could occur (in some cases, it would also be appropriate to include consequence distances for hazardous events);*
- *consider surrounding land uses (identify any nearby uses of particular sensitivity); and*
- *identify safeguards that can be adopted (including technical, operational and organisational), and assess their adequacy (having regards to the above matters).*

A sound qualitative PHA which addresses the above matters could, for some proposals, provide the consent authority with sufficient information to form a judgement about the level of risk involved in a particular proposal".

The proposed additional dross storage and pre-processing facilities will be the same as the existing storage and handling facilities assessed for previous studies, but located in the Aldex building. The hazard and risk assessments previously conducted for the site did not identify any incidents that could result in an offsite impact above the published risk criteria (Ref.4). In addition, the Weston Aluminium site is located in an industrial area with sensitive land users well clear of the site, the closest residential area being over 600m to the south east. Detailed technical and management safeguards are proven at the Weston Aluminium site and, hence, under these circumstances, a qualitative assessment may be considered for the project. However, it is noted that in the event dross and water come into contact there is a potential for ammonia, methane and acetylene to be produced. Based on the existing assessments, the potential for hazardous gas generation and the separation from sensitive receptors, a level 2 analysis has been selected as the most appropriate level of assessment for the site.

2.2 Detailed Approach

The detailed study approach follows that recommended in HIPAP No.6, "Hazard Analysis Guidelines"(Ref.1). The approach is summarised below.

2.2.1 Hazard Analysis

A detailed hazard identification was conducted for the dross storage and processing facilities described in **Section 3**. Where an incident was identified to have potential off site impact, it was included in the recorded hazard identification table (**Appendix A**). The hazard identification table lists incident type, causes, consequences and safeguards. This was performed using the format suggested in HIPAP No.6 (Ref.1). Each postulated hazardous incident was assessed qualitatively in light of proposed safeguards (technical and management controls). Where a potential offsite impact was identified, the incident was carried into the main report for further analysis. Where the qualitative review in the main report determined that the safeguards were adequate to control the hazard, or that the consequence would obviously have no offsite impact, no further analysis was performed.

The hazard analysis and safety systems review was conducted in discussion with the Weston operations and management team.

2.2.2 Consequence Analysis

For those incidents qualitatively identified in the hazard analysis to have a potential offsite impact, a detailed consequence analysis was conducted. The analysis modelled the various postulated hazardous incidents and determined impact distances from the incident source. The results were compared to the consequence criteria listed in HIPAP No.4 (Ref.4). Where an incident was identified to result in offsite effect, it was carried forward for frequency analysis. Where an incident was identified to have an offsite effect, and a simple solution was evident (i.e. move the proposed equipment further away from the site boundary), the solution was recommended and no further analysis was performed.

2.2.3 Frequency Analysis

In the event a simple solution for managing consequence impacts was not evident, each incident identified to have potential offsite impact would be subjected to a frequency analysis. The analysis would consider the initiating event and probability of failure of the safeguards (both hardware and software). The results of the frequency analysis, would be carried forward to the risk assessment for combining with the consequence analysis results.

2.2.4 Risk Assessment

As the selected approach for this analysis was a Level 2 assessment (Ref.2), where incidents were identified to impact offsite and where a consequence and frequency analysis was conducted, the consequence and frequency analysis for each incident would be combined and compared to the risk criteria published in HIPAP No.4 (Ref.4). Where the criteria were exceeded, a review of the major risk contributors would be performed. Recommendations would then be made regarding risk reduction measures.

3. BRIEF DESCRIPTION OF THE DROSS STORAGE AND PRE-PROCESSING FACILITY

3.1 Surrounding Land Uses

The Weston facility is located on about 22 hectares of land on the northern side of Mitchell Avenue, Kurri Kurri, NSW. The regional and site locations are shown at **Figure 3.1** and **3.2**. The current site layout is shown in **Figure 3.3**.

The site is located in an area zoned 4(a) industrial. There are currently only three major industrial facilities in the vicinity of the dross processing plant site, two are steel fabrication industries and are over 200m from the plant, and Hydro Aluminium, which is located over 2km to the north of the site.

The closest residential land to the site is located about 600m to the south east. The closest residence is located on land zoned rural, about 270m to the north (in the Hydro Aluminium Smelter buffer zone). The closest public place (the footpath passing the property) is at Mitchell Avenue, about 150m from the plant building.

FIGURE 3.1

WESTON ALUMINIUM DROSS PROCESSING FACILITY - REGIONAL LOCATION

FIGURE 3.2
WESTON ALUMINIUM DROSS PROCESSING FACILITY - AREA LOCATION

3.2 General Site Description - Operations

The existing site layout is shown in **Figure 3.3**. Bulk dross is currently delivered by road to the Kurri Kurri site and is stored in the southern portion of the existing main building. Trucks enter the site from Mitchell Avenue, via a driveway and onsite road. The trucks position adjacent to the dross storage area, reverse into the building and dump the dross into one of six storage bays. The existing dross area is relatively constrained, which limits Weston's ability to adequately segregate dross from different smelters. Additionally, the ability to pre-process larger lump material from the bulk dross, before aluminium recovery occurs, is also limited.

Dross from the storage bays is recovered by front end loader, and scoop-mounted forklift, for delivery either directly to the rotary furnace or to the Raymond Mill. Approximately 30% of the material is removed in the Raymond Mill, as fines through a baghouse, and the remaining coarser material is then delivered to the rotary furnace. The agitation in the rotary furnace coupled with the high temperatures liberates aluminium metal, which forms in a pool within the furnace, which is tipped into sows for solidification.

The low metal ash produced from the rotary furnace is transferred to the Metal Recovery Machine (MRM) where residual molten aluminium is recovered in a spinning action. The residual ash is then cooled in the dross cooler and transferred to a Ball Mill where it is further crushed to release any residual aluminium. During this process fines are extracted for collection in a baghouse, with the residual coarser fraction being returned to the rotary furnace for further processing.

The existing storage area is ventilated via Baghouse No. 2. The Raymond Mill is ventilated to Baghouse No. 3, with the Ball Mill and the existing air separator venting to Baghouse No. 4. Emissions from the rotary furnaces are vented to Baghouse No. 1, which is serviced by a lime injection wet/dry scrubbing system. This lime fed baghouse is used to remove gaseous fluorides liberated during the heating process in the Rotary Furnaces. Weston has approval to extend its existing main building to the south to increase storage area and to facilitate processing of the contained dross.

3.3 Proposed Additional Dross Storage and Pre-Processing Area

A detailed evaluation of the existing processing plant (Ref.12) has revealed that there are significant savings to be made in processing costs and energy usage by removing the non-metallic portion and fine particulate fraction of the dross from the higher metallic content dross prior to feeding the material to the existing rotary furnaces for melting and metal recovery. Some pre-processing of dross occurs within the existing facility, with some dross fed through the Raymond Mill to recover non-metallic material prior to processing of the residual material in the rotary furnaces. The existing Raymond Mill, however, is not sufficiently sized to pre-process all of the dross received at Weston, and is also not capable of effectively separating the low-metallic dross from the higher metallic material.

Weston therefore proposes to install a pre-processing facility within the western end of the existing approved Aldex building. A plan of the proposed facility is shown in **Figure 3.4**, with an elevation of the plant detailed in **Figure 3.5**. As also detailed in **Figure 3.4** is eight dross storage bays that are to be constructed by extending the approved Aldex building to the south by approximately six metres. This will allow trucks delivering dross to the storage bays to reverse into the building, and to dump directly into one of the eight bays

Trucks will continue to enter the Weston facility via the existing entry (Mitchell Avenue), and travel via internal sealed roads to deliver the dross. Trucks will reverse through open sliding doors in the existing Aldex buildings and deliver the dross into one of the eight bays. The proposed storage area will be constructed with extraction units, incorporating a baghouse (relocation of existing BH3), that will be used to extract any dust emissions created.

Large lump material contained within the delivered dross will be manually removed and stored for separate pre-processing. This will involve cleaning in a rumbler where adhering bath material will be removed. The fines generated will be extracted to Baghouse No.3, and the coarse material will be delivered to the pre-processing facility.

Dross will be recovered from one of the eight bays and delivered to the pre-processing facility by front end loader. The dross will first pass over a grizzly to remove any large material before being crushed and finally transferred to a screen deck where ultra fine material will be removed. Oversized material will be transferred by covered conveyor to the storage bays within the main plant building (i.e. where dross is currently received). The higher metallic residual material will be stored within these bays for ultimate recovery through feeding to the existing rotary furnace.

During the pre-processing period the dross will be reduced in weight by the amount of fine material collected either by the baghouses or directly from the screens immediately next to the storage bins. It is estimated that approximately 30% of the original feed material will be removed during the pre-processing operation.

Effective air pollution control is fundamental to the operation of this pre-processing facility. The new (approved) baghouse dust collector will be used to collect emissions from the pre-processing plant. Baghouse collection off-takes will be located at the rumbler, the grizzly screen, the screen decks prior to the two storage bins, and the crushers. This baghouse will also collect residual dust generated from the delivery of the aluminium-rich dross to the existing dross storage area. As the pre-processing facility will replace the existing Raymond Mill, Baghouse No. 3, which currently services the Raymond Mill, will be relocated to an area adjacent to the new storage bays, external to the Aldex building (to the east). An automated system will be installed to Baghouse No.3 that will permit preferential exhaust to be applied to specific/selected bays of the eight bays, which will provide localised dust collection. Each of the bays will also be isolated by curtains to improve the collection efficiency of dust from the localised area. It is expected that up to 20 air changes per hour will be achieved by the operation of these baghouses. While experience within the existing dross receival area has shown that dust emissions from dross receival are minimal, this action for the new dross receival area should further enhance air quality within this work area.

The proposed new dross receival area and pre-processing facility will have major operational advantages. These include:

- The ability to separately store dross from individual suppliers, improving the traceability of that particular dross through the entire process. It is feasible to consider that dross from one smelter can be stored and processed as a single batch. Issues such as specific metallic additives within the metal can therefore be established and managed without the dilution effect of metals from other sources;

- The pre-processing of the dross will remove non-metallic components, and fine particulate matter, which currently pass through the entire recovery process. The existing operation consumes valuable equipment time and energy in the heating and temperature reduction of the inert material, and requires additional labour to manage the movement of the residual material throughout the process. The proposed pre-processing will minimise additional materials handling in the facility; and

- The removal of potentially fluoride-containing inert material from the rotary furnace processing will reduce gaseous fluoride emissions generated during this operation. This should reduce the load on the existing lime-injected scrubber and associated baghouse, further enhancing the environmental performance of the facility.

The operation of the new pre-processing facility will not require significant additional labour. It is contemplated that labour currently allocated to the existing Raymond Mill and to recover non-metallic dross from the rotary furnaces can be relocated to work the pre-processing plant. An additional person per shift may be required to support the overall activity.

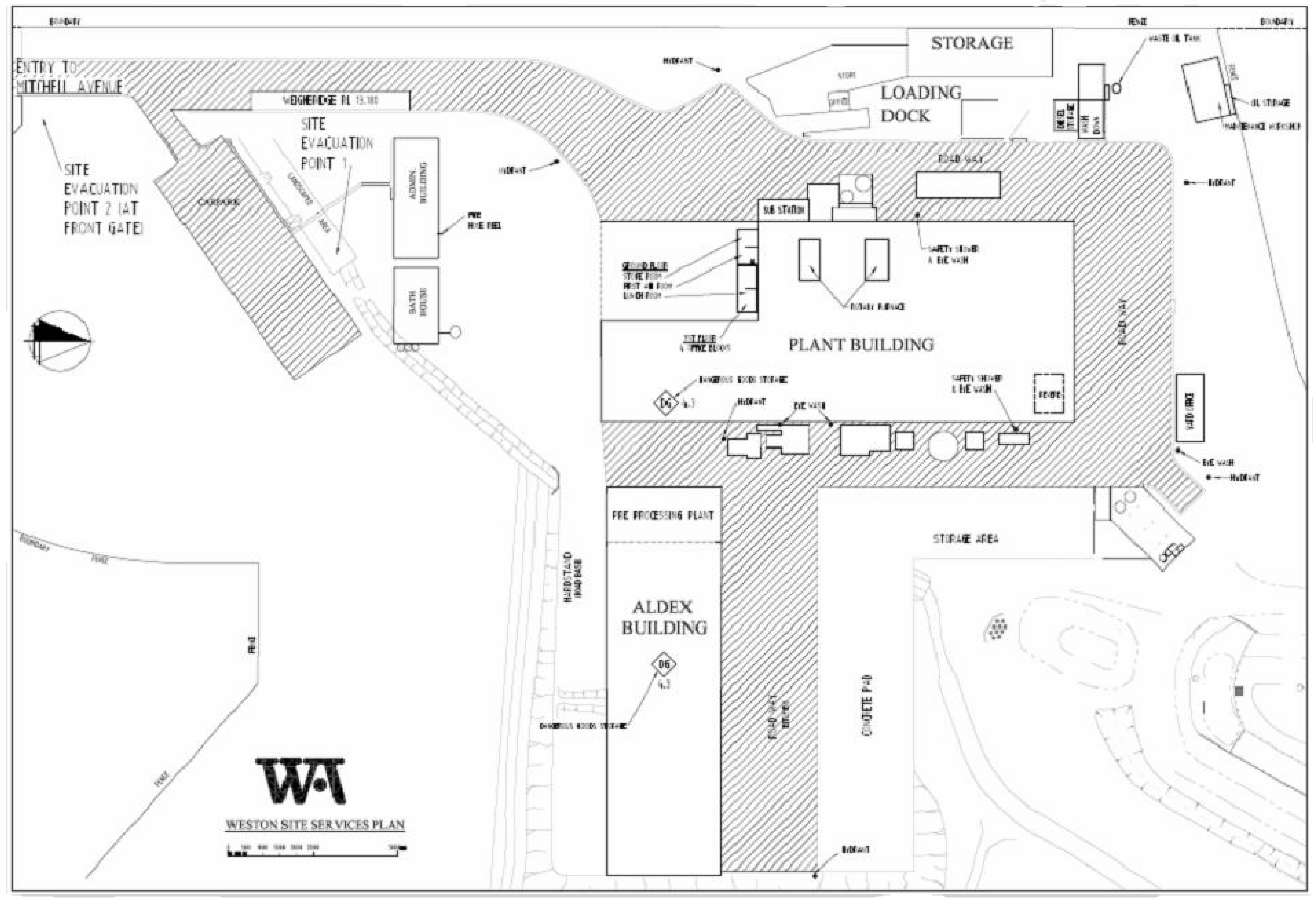
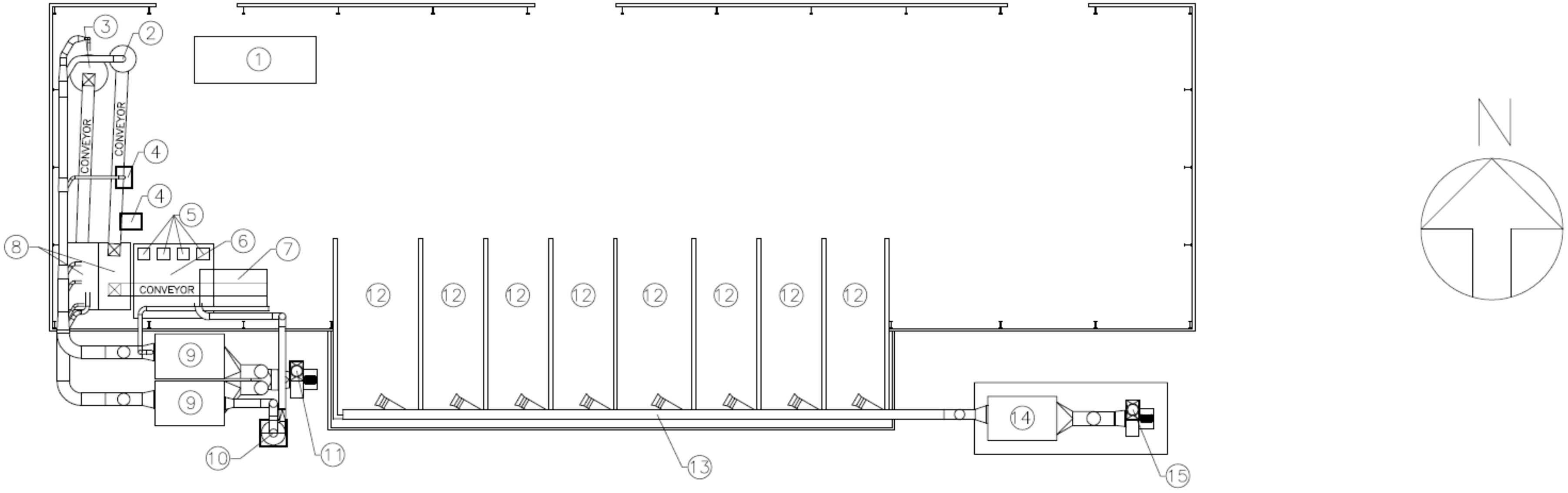


FIGURE 3.3

WESTON ALUMINIUM – EXISTING SITE LAYOUT



PLAN - ALDEX BUILDING

PARTS LIST	
ITEM	DESCRIPTION
1	RUMBLER
2	BARMAC CRUSHER
3	TOLLEMACHE CRUSHER
4	2 off MATERIAL BIN (OVERSIZE)
5	4 off MATERIAL BIN (UNDERSIZE)
6	SCREEN DECK
7	GRIZZLEY
8	HOPPER BINS
9	EXISTING DUST COLLECTOR
10	CYCLONE
11	EXTRACTION FAN & EXHAUST STACK
12	DROSS RECEIVAL BAYS
13	EXTRACTION SYSTEM FOR THE DROSS RECEIVAL BAYS
14	DUST COLLECTOR (RE-LOCATE BH3)
15	EXTRACTION FAN & EXHAUST STACK (RE-LOCATE BH3)
16	

FIGURE 3.4

WESTON ALUMINIUM – PROPOSED DROSS STORAGE LAYOUT

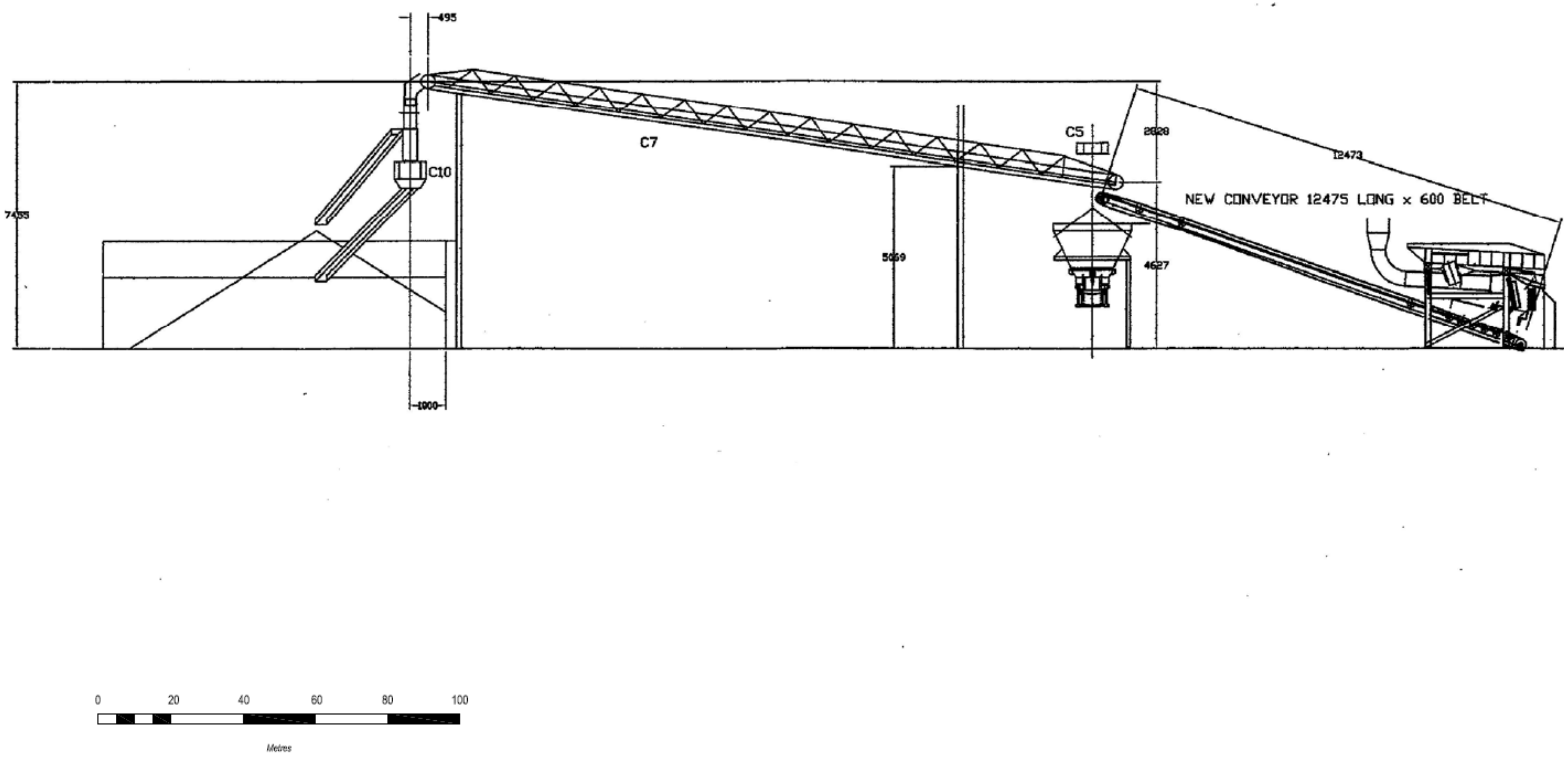


FIGURE 3.5

WESTON ALUMINIUM – ELEVATION OF PRE-PROCESSING PLANT

3.4 Safeguards Installed as Part of the Proposed Facilities

The proposed dross storage facility and process equipment would be fitted with a number of safety features to minimise the potential hazards associated with the storage and processing of dross. The following safeguards would be installed:

- Dust extraction system (ductwork) installed throughout the Aldex building;
- Dedicated extraction ducts installed over the dross storage bays;
- Dust extraction baghouse (relocated BH3) installed for the general dust extraction in the Aldex building;
- Dedicated baghouse dust collection system for the pre-processing plant and the new (approved) stack;
- Bag failure detection in the baghouses, including alarms;
- Curtains installed across the front of the dross storage bunkers to minimise dust escape into the general building;
- Truck access doors across the entrance to the building to prevent dust escape whilst tipping dross; and
- Fully sealed and bunded building to prevent water ingress and impact of water on dross.

4. HAZARD ANALYSIS

A review of the proposed process indicates that the only hazardous/dangerous material that can result in a major offsite impact is dross. Hence, the analysis in this section is centred on the storage and handling of dross and the potential hazards posed by this material. Where a hazard is identified to have a potential offsite impact, in excess of the published risk criteria in HIPAP No.4 (Ref.4), the incident is carried forward for consequence analysis. Where no offsite impact is identified, no further analysis is conducted.

4.1 Hazardous Properties of Dross

Aluminium metal is formed by the electrolytic reduction of alumina (aluminium oxide, Al_2O_3). The process involves passing an electric current through molten alumina. The reduction (loss of oxygen) occurs at the cathode or negative electrode, which is located in the base of the reaction container. This loss of oxygen converts the molten alumina into aluminium, which forms a pool in the bottom of the reaction container. Anodes, or positive electrodes, create oxidation, which occurs at the top of the reaction container. Cathodes and anodes are usually made from carbon, which is consumed during the aluminium production process. Fluxes are added to the process to reduce melting temperatures and to increase electrolytic properties. The main process flux is cryolite, which comprises sodium fluoride and aluminium fluoride. The electrolytic process forms many by-products that are removed from the process as waste. The waste product is known as dross. The reaction of alumina, cathodes/anodes (carbon) and fluxes can result in a dross mix containing the following:

- Aluminium carbide (Al_4C_3);
- Aluminium nitride (AlN); and
- Compounds of Fluorides.

Aluminium dross is classified by the Australian Dangerous Goods Code (Ref.5) as a Class 4.3 Dangerous Good. This classification indicates that there is a potential for the release of gas when dross is mixed with water.

On contact with water, dross hydrolyses to form a number of gases. The quantity of gas released is dependent on the dross make up. The dross currently processed at the Weston Aluminium facility is sourced in Australia (i.e. from Australian Smelters) and overseas (New Zealand). The dross comprises about 65% aluminium and less than 10% aluminium nitride, with smaller quantities of aluminium carbide and aluminium fluoride, with smaller quantities of cryolite (a flux used in the smelting of aluminium). In the event of a mix of dross and water the following gases would be evolved:

- Water and Aluminium Nitride would form Ammonia - released as the predominant gas (1kg of aluminium nitride and 1.3kg of water would yield about 0.41kg of ammonia);
- acetylene, methane, and hydrogen fluoride in small quantities only.

The reaction takes place according to the equation:

$$AlN + 3(H_2O) \rightarrow NH_3 + Al(OH)_3.$$

This calculation assumes the full 1.3kg of water is available for reaction with 1kg of AIN (in 10kg of dross, assuming 10% nitride content of AIN in dross). However, this is not usually the case in water dross mixes. In reality, other reactions take place in conjunction with the aluminium nitride/water reaction above. One important reaction is:

$$2\ AlN + 3\ (H_2O) \rightarrow 2NH_3 + Al_2O_3$$

This reaction creates significant heat, liberating water in the form of vapour and steam. Hence, not all the water is available for reaction.

The evolution of other gases, such as acetylene, methane and hydrogen fluoride would be limited due to the alkaline nature of the dross water mix (i.e. aluminium hydroxide formation).

Acetylene and methane are produced from aluminium carbide in the dross. The dross stored at Weston has, on average less than 1% aluminium carbide content. Aluminium carbide comes in two forms, Al_2C_3 and Al_4C_6. When mixed with water, the former produces acetylene, the latter methane. Assuming that these two forms of carbide are available in equal quantities, then less than 1% of the total storage of dross would be available for reacting with water to produce acetylene and methane.

A review of the MSDS for dross indicates that dross is not acutely toxic or combustible. Chronic exposure to dross dust could result in adverse health effects. However, the MSDS does not indicate that fatality would result from chronic exposure.

4.2 Dust Generation During Delivery

Dross is delivered to site in truck and tipped into the loading bays for processing in the plant. A hazard may occur if the delivered dross generates significant quantities of dust. The dust may escape the building through doors and opening, being released to the environment. However, the Aldex building is fitted with large sliding doors that open to allow truck within the building and then closed to contain any dust generation. Further, each bay is fitted with curtain that contains any generated dust within the bay itself and the dust exhaust system then extracts the dust and removes it within the baghouse.

Hence, during delivery, as the building doors are closed, the curtains contain the dust in the bay and the dust extraction system removes the dust and extracts it (baghouse), there is no potential for dust release from the building. This incident has not been carried forward for further analysis.

4.3 Hole in Equipment and or Ductwork

The processing of dross in the Aldex building will be performed using screens, conveyors and crushers. The potential for dust generation occurs where the dross is agitated as part of the process (e.g. screens and crushers). This equipment is covered and any dust generated is contained within the equipment itself. However, in the event of casing wear there is a potential for release of dross dust from the equipment into the Aldex building.

Dross released into the Aldex building will be contained within the building confines as the structure is fitted with doors that will be closed during plant operation and/or dross deliveries and there will be no release beyond the Aldex building. In the unlikely event of a dust release within the building, the released dust will be managed by the dust extraction system. This will collect the dust and deliver it to the baghouse, where the dust will be extracted prior to the exhaust stream, discharge to the atmosphere.

As there will be no release from the building in the event of an equipment failure (hole), this incident has not been carried forward for further analysis.

4.4 Baghouse Failure

The incidents assessed in **Sections 4.2** & **4.3** assumes that the baghouses work effectively and the dust is extracted by the bag sets. However, in the event of a failure of a bag (i.e. bag split or hole), the dust would be passed through the failed bag and escape via the stack to the atmosphere. The quantity released through a single bag would be small and there would be minimal impact beyond the immediate release zone.

Notwithstanding this, baghouses will be fitted with a differential pressure alarm system so that in the event of a bag failure (split or hole) the pressure across the bags reduces, which is detected by a pressure switch. The pressure switch activates an alarm indicating bag failure. The baghouse contains a number of cells and the cell, containing the failed bag, can be isolated and the bag changed.

Based on the low quantity of dust released in the event of a bag failure, the bag alarm system and the low acute impact of the dust, there is a negligible risk that this incident would impact beyond the site. Hence, this incident has not been carried forward for further analysis.

4.5 Minor Holes in Aldex Building Roof

Over time, there is a potential that minor holes may occur in the roof of the building. This could lead to water ingress via the holes during rain. As noted in **Section 4.1**, water and dross contact could result in the development of toxic and/or flammable gases. However, the quantity of gas generated is directly proportional to the quantity of water contacting the dross.

The quantity of water entering the building via small holes would be negligible and water entering via this route would be insufficient to generate significant quantities of gas. Further, the building is sealed and the dust extraction system would extract any vapours generated by the small quantity of water, discharging this via the dust removal system stack. The large volumes of air drawn into this system would significantly dilute the gas and the discharged air stream would be well below impact levels. There would be no potential for the lower flammable limit (LEL) to be reached, for acetylene and methane, from small water ingress incidents.

Based on the above analysis, this incident has not been carried forward for further analysis.

4.6 Major Storm Damage to Aldex Building

In the event of a major storm, there is a potential for the Ardex building to be damaged, resulting in roof panels being blown-off, exposing the dross storage to rain. Water (rain) could then enter the building via the damaged roof panel, impacting the dross, evolving the toxic and flammable gases.

A major storm could deposit over 50mm of water on the building in an hour, which spread over an open panel area could be a significant water volume. This could result in the release of toxic/flammable gas, which could escape the building via the damaged roof, impacting areas offsite. Hence, this incident has been carried forward for further analysis.

5. CONSEQUENCE ANALYSIS

5.1 Incidents Carried Forward for Further Analysis

Only one incident was identified to have a potential to impact offsite, storm damage to the Aldex building roof resulting in:

- water ingress to the building;
- water dross mixing;
- toxic/flammable gas release; and
- potential for flammable gas explosion or toxic gas release.

This incident has been assessed in detail below.

5.2 Dross Stored and Handled at the Weston Aluminium Site

The dross currently processed at the Weston Aluminium facility comprises about 65% aluminium, less than 10% aluminium nitride with smaller quantities of aluminium carbide (less than 1%). Trace quantities of aluminium fluoride may also be found this dross. In mixing water with the dross, ammonia would be released as the predominant gas with smaller amounts of acetylene, methane and hydrogen fluoride.

The analysis in this section is performed to determine the release quantities of the various gases from a dross water mix and to determine the downwind effects at the adjacent land uses to the Weston Aluminium site.

5.3 Dross and Water Mix – Chemical Reactions

The mixing of water and dross results in a reaction that takes place according to the equation:

$$AlN + 3(H_2O) \rightarrow NH_3 + Al(OH)_3.$$

This calculation assumes that all water mixing with dross is available for reaction. However, this is not usually the case in water dross mixes. In reality, other reactions take place in conjunction with the aluminium nitride/water reaction above. One important reaction is:

$$2\ AlN + 3\ (H_2O) \rightarrow 2NH_3 + Al_2O_3$$

This reaction creates significant heat, liberating water in the form of vapour and steam. Hence, not all the water is available for reaction.

5.4 Ammonia Release from Dross & Water Mix

The proposed dross storage in the Aldex building is shown in **Figure 3.4**. The dross will be stored in 8 storage bays, with a total storage dimension of 42m x 13.5m, which gives a total storage area of 567m^2.

In the event a storm occurs, there is a potential for the roof to be completely blown off the building, exposing the dross storage to rain. The average rainfall in the wettest month of the year in the Kurri Kurri district is 96.5mm for the full month of March (Ref.6). Assuming, conservatively, that 25% falls within a 12 hour period, the average hourly rainfall entering the building and falling on the dross pile is thus:

Mass of water = rainfall depth over 1 hour x dross surface area x density of water

= (0.25 x 0.0965/12) m x 567m^2 x 1000kg/m^3

= 1,140 kg or 1.14 tonnes/hour

A stoichiometric mixture of 1 mole of AlN (41kg) and 3 moles of H_2O (54kg) gives 1 mole of NH_3 (17kg). Therefore the mass of ammonia released per tonne of water is given by:

$$\text{Mass of ammonia produced/tonne of water} = \frac{1000\text{kg } H_2O}{54\text{kg } H_2O} \times 17 \text{ kg } NH_3$$

$$= 315 \text{ kg ammonia/tonne of water}$$

Hence, the mass of ammonia released during the postulated storm is:

$$\text{Mass of ammonia released} = 315\text{kg } NH_3\text{/tonne of water} \times 1.14\text{tonnes of } H_2O\text{/hour}$$

$$= 359 \text{ kg ammonia/hour.}$$

This hourly release will occur during the rain period and will continue whilst the rain falls. However, as ammonia is hygroscopic (i.e. is readily absorbed by water), the majority of ammonia will be absorbed into the falling rain, reducing the quantity of ammonia released over the rainfall period. However, in previous studies conducted at the site, a conservative incident was assessed, being:

- a severe wind and rainstorm occurring, damaging the roof and exposing the full contents of the dross to the rain;

- the rain ceasing after 1 hour; and
- the dross water reaction continued for a further hour after the rain ceased.

The previous PHA study, conducted for the site, noted that this incident scenario was agreed with the then Department of Urban Affairs and Planning (DUAP) to represent the worst case event and would yield a conservative result. Hence, this postulated incident scenario has also been used in the assessment of the proposed dross storage in the Aldex building.

The postulated incident results in a release over a two hour period. The mass rate of release (per second) of ammonia is calculated by:

$$\text{Mass rate of release} = \frac{359\ \text{kg/hr}}{2\ \text{hrs} \times 3600\ \text{sec/hr}}$$

$$= 0.05\ \text{kg/s}$$

In this analysis, for the sake of conservatism, the heating effect from the exothermic reaction of dross and water has been ignored, along with the potential for water to be absorbed by the rain. Hence, the release rate of 0.05kg/s has been used to model the downwind dispersion of evolved gas.

5.5 Nature and Properties of Evolved Ammonia Releases

It is important at this stage to discuss the nature and properties of ammonia that are critical in understanding the behaviour of the gas after it has been released. Anhydrous ammonia (or liquid ammonia) is stored at 840kPa(abs.) at ambient temperature (20^oC). Hence, when anhydrous ammonia is released it immediately commences to vaporise, absorbing heat from the surroundings. This causes a reduction in temperature of the released gas/liquid which increases the gas density, making it heavier than air in the immediate area of the release point. Further, as the gas in this form is highly saturated, it is highly hygroscopic, and is therefore absorbed by the water vapour in the air resulting in an ammonia water molecule that is also heavier than air. In general, a release of anhydrous ammonia acts as a dense gas, although the gas molecule itself is lighter than air.

However, the gas release due to water/dross mix is not anhydrous. The gas is formed as a result of a chemical reaction between the water and aluminium nitrides in the dross. This reaction is exothermic, hence the gas is released at above ambient temperature and does not cool during the release period. The gas in this form is less hygroscopic and tends to remain as a gas (i.e. does not mix with water vapour) during and after the release. Under these circumstances, the gas is buoyant, as the molecular weight of ammonia (17) is much lighter than air (≈28) and, hence, the gas is dispersed more effectively in this case.

5.6 Downwind Dispersion of Evolved Gas

To model the downwind dispersion of ammonia gas for the postulated incident described in **Section 5.4**, the Cirrus computer model has been used (Ref.7). The model uses a Gaussian analysis to determine the downwind dispersion of gas from a release source. The Cirrus model uses the Degadis and Hegadas models as a basis for the calculations. Both models were developed for use by the US Coast Guard in the 1990's. The models account for the effectiveness of the dispersion by directly relating the wind/weather conditions to the dispersion. The most effective dispersion occurring in bright sunny conditions with strong wind, and the least effective dispersion occurring when the wind is very light during the evening.

The selected wind/weather conditions for the analysis are based on a set of values that represent a broad range of climatic conditions, which may occur during the release incident. This range of conditions represents high and low wind speeds combined with bright sun to dense cloud. The results give a good correlation of the expected dispersion impact over a broad range of climate conditions.

The assumption in this study is that the release occurs at the top of the Aldex building (12m high) over the full storage area (567m^2). This will yield conservative results as the building walls will prevent direct release of the ammonia to the atmosphere, which in turn reduces the downwind concentration.

The values selected for the analysis are shown in **Table 5.1**.

TABLE 5.1

SELECTED WIND WEATHER CONDITIONS FOR THE DISPERSION ANALYSIS

Wind/Weather Category	Description
B3, B5	Bright sunlight, breezy conditions
C3, C5	Partially Cloudy Condition, Light to moderate breeze
D3, D5, D9	Cloudy conditions with some sun, very light to strong breeze
E2	Complete cloud, light breezy conditions
F1.5	Complete cloud, inversion conditions, light to no breeze

The criteria selected for ammonia impact to people is split into three categories, these are presented in **Table 5.2**.

TABLE 5.2
AMMONIA IMPACT/EFFECTS ON PEOPLE

Category	Concentration		Description of Impact or Effects
	ppm	mg/m^3	
3	500	348	Immediate danger to Life and Health (Ref.8)
2	100	69.6	Injurious effects to the most sensitive receptor after prolonged exposure 30-60 minutes (Ref.8)
1	25	17.4	Odour (Time Weighted Average -Ref.8)

The Cirrus consequence analysis model selected for this assessment, using the area release application, whereby the gas is released over an area source. For the application of this model, to the Weston Aldex building, the following data was used:

- Release rate = 0.00009kg/s/m^2
- Area of Release = 567m^2
- Release height = 12m (noting that the Aldex building is 12m high and the release occurs at roof height.)

Application of the above values to the Cirrus area release model results in the distance to the various ammonia concentrations shown in **Table 5.3**.

TABLE 5.3
SUMMARY OF CONCENTRATIONS AND DISTANCES FOR AMMONIA RELEASE FROM THE PROPOSED DROSS STORAGE AT WESTON ALUMINIUM

Wind Weather Category	Maximum Downwind Concentration (ppm)	Distance to Max. Conc. (m)
B3	**14**	**70**
B3	**8.3**	**65**
C3	**13.7**	**105**
C5	**8.2**	**210**
D3	**12**	**200**
D5	**7.2**	**185**
D9	**4**	**190**
E2	**16.1**	**280**
F1.5	**18.6**	**500**

It can be seen from this analysis that the concentration of ammonia at ground level does not exceed the lowest selected criteria of 25ppm. Hence, there would be no impact at the surrounding land uses as a result of a storm incident, roof damage and water ingress into the dross storage.

Two important points to note, regarding the analysis conducted above:

- the ammonia gas release occurs at a height of 12m, well above ground level. Hence, dispersion is aided by the release at this height; and
- the ammonia generated, as a result of the storm incident and water ingress to the dross, is not anhydrous and therefore the gas is buoyant and disperses more readily than the heavier dense gas.

5.7 Other Gases Released from Dross and Water Mixing

5.7.1 Other Gases Formed

The evolution of other gases, such as acetylene, methane and hydrogen fluoride would be limited due to the alkaline nature of the dross water mix (i.e. aluminium hydroxide formation).

Acetylene and methane are produced from aluminium carbide in the dross. The dross stored at the Weston facility has, on average less than 1% aluminium carbide content. Aluminium carbide comes in two forms, Al_2C_6 and Al_4C_3. When mixed with water, the former produces acetylene, the latter methane. Assuming that these two forms of carbide are available in equal quantities, then 1% of the total storage of dross would be available for reacting with water to produce acetylene and methane.

The dross contains only trace amounts of fluoride compounds, and the generation of hydrogen fluoride would be minimal. Hydrogen fluoride is not an acute toxic gas. Nonetheless, continued releases would result in chronic effects offsite. However, as the postulated incident in this analysis is a rare event, there would be an insufficient number of incidents to cause chronic effects both on or offsite. Based on this analysis, there is no further consideration of hydrogen fluoride release.

In some cases high humidity can affect dross and release toxic and flammable gases. The high humidity can cause a slow reaction at the surface of the dross releasing ammonia, acetylene, methane and hydrogen fluoride. The reaction would occur at the surface only, releasing insignificant quantities of gas. Nevertheless over a period of time, these gases can build up in confined spaces leading to dangerous and flammable atmospheres. The current Weston Aluminium dross storage area is fully vented with draft fans drawing air from the storage space through dust collection units thus preventing build up of gas in the storage area. This vent system will be increased to include the proposed storage expansion.

Fresh air is currently drawn into the storage area as air is removed from the space by the fans. The fans operate on a 24 hour basis, reducing the likelihood of gas build up in the building. The slow release rate of gas and the vent fans result in a low risk of toxic or flammable gas build up at this facility.

5.7.2 Chemical Reactions

The dross produced in smelters in Australia has, on average, less than 1% aluminium carbide content (compared with less than 10% aluminium nitride). Therefore if the amount of water entering the stockpile (1.14 tonnes calculated in Section 5.4) evenly mixes with the dross then about 10% of this water (i.e. 1 to 10 aluminium carbide to aluminium nitride ratio) or 114kg will be available for reacting with aluminium carbide.

Assuming each of the carbides mixes stoichiometrically with water, the following amounts of acetylene and methane are produced:

Al_2C_6 = 1kg of water mixed with 2.33kg of carbide leads to 1.44kg of acetylene

Al_4C_3 = 1kg of water mixed with 1.33kg carbide leads to 0.44kg of methane.

Hence, if half the 114kg of water is available for acetylene production, then 57kg of water produces 57 x 1.33kg = 75.8kg of acetylene. This occurs over a 2 hour period, therefore the release rate is 75.8/(2 x 3,600) = 0.01 kg/s.

For methane production, 57kg of water produces 57 x 0.44 = 25 kg of methane over a 2 hour period. Therefore, the release rate = 25/(2 x 3,600) = 0.0035 kg/s.

5.7.3 Flammability of Acetylene Released

In the unlikely event that acetylene is released, over the 2 hour scenario period, that this gas remains within the building and mixes with the air within the building confines, there is a potential that the gas could reach flammable levels.

The quantity of gas released over the full 2 hour period of the postulated scenario is 75.8kg. The specific volume of acetylene at standard temperature and pressure conditions (STP) is 0.533m^3/kg. Hence, for 75.8kg of acetylene the volume of gas is 75.8 x 0.533 = 40.4m^3. The building volume is 84m x 25m x 12m = 25,200m^3. The percentage of acetylene mixed with the building air is 40.4/25,200 x 100 = 0.16%. The lower flammable limit (LEL) of acetylene is 2.2% of acetylene in air. Based on the analysis above, the acetylene released as a result of the postulated storm damage incident will not reach LEL. Hence, this incident is not carried forward for further analysis.

5.7.4 Flammability of Methane Released

In the unlikely event that methane released, over the 2 hour scenario period, remains within the building and mixes with the air within the building confines, there is a potential that the gas could reach flammable levels.

The quantity of gas released over the full 2 hour period of the postulated scenario is 25kg. The specific volume of methane at STP is 0.754m^3/kg. Hence, for 25kg of methane the volume of gas is 25 x 0.754 = 18.9m^3. The building volume is 84m x 25m x 12m = 25,200m^3. The percentage of methane mixed with the building air is 18.9/25,200 x 100 = 0.075%. The lower flammable limit (LEL) of methane is 5% of methane in air. Based on the analysis above, the methane released as a result of the postulated storm damage incident will not reach LEL. Hence, this incident is not carried forward for further analysis.

5.7.5 Summary of Incident Consequence Impacts

The hazard analysis identified one scenario that had the potential to develop incident consequences that could adversely impact offsite. This incident was storm damage to the Aldex building resulting in roof damage, water ingress and ammonia/acetylene/methane development.

The results of the analysis identified that the ammonia concentrations were below the impact levels published by NOHSC (Ref.8) and the flammable gases generated as a result of the postulated incident did not reach the lower flammable limits within the dross storage.

Based on the analysis conducted in this study, the proposed Weston aluminium facility does not exceed the risk criteria published by the NSW DoP in HIPAP No.4 (Ref.4) and, hence, the facility may be classified as potentially hazardous and not hazardous and would therefore be permitted in the proposed land zoning.

6. REFERENCES

1. Hazardous Industry Planning Advisory Paper No.6, "Guidelines for Hazard Analysis", NSW Department of Planning (1992).

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APPENDIX A

HAZARD IDENTIFICATION TABLE

HAZARD IDENTIFICATION TABLE

Area	**Hazard Cause**	**Hazard Consequence**	**Safeguards**
Dross delivery	Dross tipped into storage bays	Potential for dust generation and release from the storage area	- Dross storage bays will be fitted with curtains to minimise dust escape from bay area - Bays will be fitted with dust extraction ducts - Dust extraction will be passed through a baghouse - Aldex building is fitted with doors than are closed during tipping of dross
Dross pre-processing equipment	Hole in duct-equipment	Potential dust release	- All equipment and ducts will be installed within the building - Building will be fitted with dust extraction equipment - Baghouse will be fitted to extraction system - Bag failure alarms will be fitted to baghouse - Building is fitted with doors to confine any dust releases
Baghouse	Bag failure	Dross discharge direct to atmosphere	- Dross is not acutely hazardous (Class 4.3 hazardous when wet) - Single bag failure would not cause significant impact - Bag failure alarms will be fitted - Spare bag cells in the baghouse - Regular bag inspection and replacement programme
Aldex building	Leaks in roof (minor holes)	Minor water ingress, potential for water dross mixing and minor ammoni/acetylene/ methane development	- Minor water ingress only - Small water quantity-small gas generation - Release contained within the building - Large air flow and extraction via baghouse (dilution) - Steel sheet roofing (minimal holes) - Regular building inspection, maintenance & repair

HAZARD IDENTIFICATION TABLE

Area	Hazard Cause	Hazard Consequence	Safeguards
Aldex building	Storm damage to building – roof sheet blown off	Large water ingress into building – water dross mix and ammonia generation (toxic gas release)	- Steel sheeting screwed to roof - Building designed for 100 year storm - Storm resulting in damage would also result in dispersion of gas - Continued water ingress (rain) would absorb ammonia)
Aldex building	Storm damage to building – roof sheet blown off	Large water ingress into building – water dross mix and acetylene/ methane generation (flammable gas)	- Steel sheeting screwed to roof - Building designed for 100 year storm - Storm resulting in damage would also result in dispersion of gas (wind) - Flammable gas generation is minor side reaction from dross/water mix - Large building volume

Appendix G: Correspondence from DECC

10 April 07

Our reference : DOC 07/12433 LIC06/15
Contact : Mitchell Bennett, 49086806

HLA Envirosciences Pty Limited
PO Box 73
HRMC NSW 2310

Attention: Chris McClung

Dear Mr McClung

WESTON ALUMINIUM - REQUEST FOR ENVIRONMENTAL ASSESSMENT REQUIREMENTS

I refer to your letter dated 29 March 2007 requesting advice on the content of a Statement of Environmental Effects (SEE) being prepared for the proposed modification of the Weston Aluminium Plant at Kurri Kurri.

The requirements provided by the Department of Planning on 23 March 2007 appear to adequately include the Department of Environment and Conservation's requirements.

In presenting the Air Quality Impact Assessment, it will be important to quantify any changes to the impacts of the plant that are predicted due to the new configuration in comparison to the existing impacts.

The Waste Management section of the SEE should include an assessment of the likely impact of the proposed changes on the classification of Weston's wastes under the *Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes* (EPA 1999).

If you have any questions regarding this matter, please contact me on 49086806.

Yours sincerely

MITCHELL BENNETT
Head Regional Operations Unit
North East Branch
Environment Protection and Regulation

PO Box 488G, Newcastle NSW 2300
117 Bull Street, Newcastle West, NSW 2302
Tel: (02) 4908 6800 Fax: (02) 4908 6810
ABN 30 841 387 271
www.environment.nsw.gov.au

Appendix H: Correspondence from Cessnock City Council

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-----Original Message-----
From: Tracy.Sharp@cessnock.nsw.gov.au
[mailto:Tracy.Sharp@cessnock.nsw.gov.au]
Sent: Tuesday, August 21, 2007 5:16 PM
To: Holly Marlin
Cc: Tamai.Davidson@cessnock.nsw.gov.au
Subject: PIN 8196 Lot 796 DP 39877 No 129 Mitchell Avenue Kurri Kurri - Proposed Modifications to the Existing and Approved Buildings and Installation of New Pre-Precessing Equipment

ATTENTION: HOLLY MARLIN - HLA-ENVIROSCIENCES PTY LIMITED

Dear Ms Marlin

The following preliminary comments are made in relation to the proposed modifications to the dross recycling facility indicated in your letter dated 7 August 2007: -

Kurri Sand Swamp Woodland

The subject site has been identified as containing Kurri Sand Swamp Woodland, and has been identified by the Department of Environment and Climate Change as an endangered ecological community. Under Section 78A(8)(b) of the Environmental Planning and Assessment Act, "if the application is in respect of development on land that is, or is a part of, critical habitat or is likely to significantly affect threatened species, populations or ecological communities, or their habitats—a species impact statement prepared in accordance with Division 2 of Part 6 of the Threatened Species Conservation Act 1995".

The application will need to indicate the location of the Woodland to the proposal, if any of the Woodland is to be removed and if so what the impact will be and if there is to be any additional plantings.

Integrated Development

The application is considered Integrated Development under Section 91 of the Environmental Planning and Assessment Act for the following: -

Bushfire - Section 100B of the Rural Fires Act;

The application maybe considered Integrated Development under Section 91 of the Environmental Planning and Assessment Act for the following: -

Environment Protection Licence - Sections 43(a), 47 and 55 of the Protection of the Environment Operations Act
Aboriginal Artifacts or Relics - Section 90 of the National Parks and Wildlife Act

Designated Development

You will need to ascertain if the proposal results in the increased handling of dross and whether or not this increase results in the proposal being classifed as a Designated Development under Schedule 3 of the Environmental Planning and Assessment Regulation 2000. If the proposal is classified as designated development an Environmental Impact Statement will need to be prepared in accordance with the Department of Plannings requirements.

Environmental Planning Instruments

The application will need to consider the following documents: -

State Environmental Planning Policy No 34 - Major Employment Generating
Industrial Development;
State Environmental Planning Policy No 33 - Hazardous and Offensive Development. A preliminary hazard analysis will need to be undertaken.

Fire Safety

With regards to the proposal, the fire safety of the existing building and proposed building will need to be upgraded in accordance with Clause 94 of the Environmental Planning Regulation 2000.

Car Parking

Under Part C.1 Parking and Access of the Cessnock Development Control Plan 2006, industrial premises require 1 space per 75m2 of gross floor area or 1 space per 2 employees whichever is the greater.

Noise

The proposal may result in additional noise from truck movements and/or operations, as such a noise/acoustic report from a qualified consultant maybe required.

Should you have any further enquiries please contact Tracy Sharp of Council's Corporate and Regulatory Services Department between 8.40am and 9:30am, Monday to Friday on (02) 49934100 or via tracy.sharp@cessnock.nsw.gov.au

Yours Faithfully

Tracy Sharp
For Cessnock City Council

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Appendix I: AQIA for Reverbatory Furnace

Air Quality Impact Assessment
Proposed Reverbatory Furnace Modifications

21 November 2007

Prepared for:
Weston Aluminium
PO Box 295
Kurri Kurri NSW 2327

Report by:
HLA-Envirosciences Pty Limited (HLA ENSR)
ABN: 34 060 204 702
18 Warabrook Boulevarde Warabrook NSW 2304
PO Box 73 HRMC NSW 2310
Ph: +61 2 4968 0044
Fax: +61 2 4968 0005

HLA Ref: N5009643_FINAL_RPT_21Nov07.doc

DISTRIBUTION

Air Quality Impact Assessment
Proposed Reverbatory Furnace Modifications
21 November 2007

Copies	Recipient	Copies	Recipient
1	**Christopher McClung** **Manager, Alternative Materials & Environment** **Weston Aluminium** PO Box 295 Kurri Kurri NSW 2327	1	**HLA ENSR File Copy**

This document was prepared for the sole use of Weston Aluminium and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of HLA-Envirosciences Pty Limited (HLA ENSR) and Weston Aluminium.

By

HLA-Envirosciences Pty Limited (HLA ENSR)
ABN: 34 060 204 702
18 Warabrook Boulevarde Warabrook NSW 2304
PO Box 73 HRMC NSW 2310

for **Holly Marlin**
Senior Environmental Scientist

David Rollings
Senior Chemical/Environmental Engineer

Technical Peer Reviewer:	**Date:**
	21/11/07
Graham Taylor **Operations Manager - Hunter Region**	

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APPENDICES

1 INTRODUCTION

Weston Aluminium (WA) currently operates an aluminium dross processing, recycling and alloying plant at Kurri Kurri. The plants include a reverbatory (reverb) furnace, which is used to remelt scrap aluminium. The reverb furnace is composed of two operational sides; the remelt side, into which scrap aluminium is placed, and the holding side, where the metal is kept in a molten state while awaiting casting through heating via natural gas. Emissions from both sides of the reverb furnace are currently emitted from Stack 5 following treatment by the lime-injected Baghouse 5.

WA is seeking to modify the current emission arrangements for the reverb furnace by adding a new stack to the holding side to vent combustion products; emissions from the remelt side, which include fluoride and other compounds, will continue to be vented through Baghouse No. 5. Prior to approval for this change, the Department of Environment and Climate Change (DECC) requires the completion of a Pollution Reduction Program (PRP) as detailed in **Section 2**.

This report was prepared by HLA-Envirosciences Pty Limited (HLA ENSR) on behalf of WA to assess the potential effects on air quality resulting from the separate emission of combustion products from the reverb furnace. The assessment was conducted in accordance with guidance provided in the DECC's Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC, 2005).

The AUSPLUME dispersion model (version 6.0) was used to predict ground level concentrations (GLCs) of combustion products emitted from the facility. Emissions from the proposed stack were estimated using The Combustion Database (v. 2.4 Aug 04) developed by Environment Protection Authority (EPA Vic) for use with reporting for the National Pollutant Inventory. Results of stack emission testing conducted by HLA ENSR between 2004 and 2006 were used to determine combustion emissions from existing sources. Predicted GLCs were compared to relevant impact assessment criteria to establish the potential effect of the proposed facilities on air quality.

2 SCOPE OF WORK

The scope of works for this project was dictated by the requirements of PRP U1.4 on WA's Environment Protection Licence (EPL). The PRP requirements are shown in **Table 1**, together with a reference to the sections of this report in which these requirements are addressed.

Table 1: PRP Requirements

U1.4	Detail Required	Section Reference
(a)	Location of the discharge point for emissions from the holding side of the furnace.	**Section 3.2.1**
(b)	Stack height.	**Section 6.3.1**
(c)	Exhaust temperature and exit velocity.	**Section 6.3.1**
(d)	Design pollutant concentrations.	**Section 0**
(e)	Information that demonstrates that emissions from the new discharge point will have an acceptable off-site environmental impact. This information must be provided in the form of dispersion modelling as per the requirements of the DEC's 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW'.	**This report, particularly Sections 4 – 8**

U1.4	Detail Required	Section Reference
(f)	Proposed timetable for completion of the modification of the emission capture equipment.	**Section 9**
(g)	Stack emission monitoring program to be undertaken when all works are completed for the purpose of monitoring emission from the new discharge from the holding side of the furnace for all pollutants/parameters specified in condition L3.1 for Point 13.	**Section 10**

3 SITE ACTIVITIES

3.1 Site Location

The facility is located on Lot 796, Mitchell Avenue, a nine hectare site in the Kurri Kurri industrial area of NSW. Residences are located approximately 700 m to the south (Kurri Kurri) and west (Weston) of the site. The Hydro Aluminium Smelter, whose buffer zone extends to the northern boundary of the WA site, is located approximately 2 km to the north.

3.2 Process Description

WA has approval to receive 35,000 tonnes of aluminium scrap metal per annum. The scrap consists of materials such as cuttings, cast aluminium, sheeting and wiring. This material is sorted and then remelted in the reverb furnace prior to casting.

The 40 tonne (1600 kW) reverb furnace is heated by a tangential fired natural gas burner located on the holding side of the furnace. The heat from the holding side is sufficient to melt the scrap aluminium fed by forklift loader into the remelt side. Molten aluminium from the rotary furnace (which recovers aluminium from dross using natural gas) can also be added into the remelt side of the reverb furnace via crucibles. Molten metal from the reverb furnace is cast into aluminium pucks and ingots.

Exhaust from the remelt and holdings sides of the reverb furnace are currently consolidated and treated by a lime-fed dry scrubber and baghouse system prior to discharge to atmosphere through Stack 5. Emissions from the holding side consist of the products of natural gas combustion, and are relatively clean and hot. Emissions from the remelt side, however, are at a lower temperature and consist of pollutants such as acid gases, fluoride, volatile organic compounds, particulates and dioxins and furans, and require treatment prior to discharge.

As described in correspondence to the DECC dating back to 1 December 2003, WA proposes to separate the emissions from the discrete sides of the reverb furnace as follows:

- Duct emissions from the holding side to a new, dedicated stack prior to discharge to atmosphere (no further emission treatment required).
- Duct emissions from the remelt side to the existing scrubber and baghouse system (Baghouse 5) for treatment prior to discharge via Stack 5 with 100% of the current fan draw.

The purpose of the modification is to enable the total exhaust capacity of the current emission control system to contain emissions from the remelt side of the reverb furnace. The relative increase in extraction rate from the remelt side may sufficiently mitigate the escape of fugitive emissions from this process.

3.2.1 Emission Sources

The two sources of combustion emissions at the WA facility are the reverb and rotary furnaces, which are both currently serviced by lime-fed scrubbers that remove gaseous fluorides and other acid gases liberated from the materials during the heating process. WA proposes to vent combustion products from the reverb furnace through a new stack (Stack 6), which will vent straight to atmosphere. The efflux velocity from Stack 6 will be dictated by the primary air supply and gas combustion products. The stack will be located directly above the holding side of the furnace as illustrated schematically in **Figure 1**, which will be approximately 10 m south and 10 m west of the northeastern corner of the Plant Building.

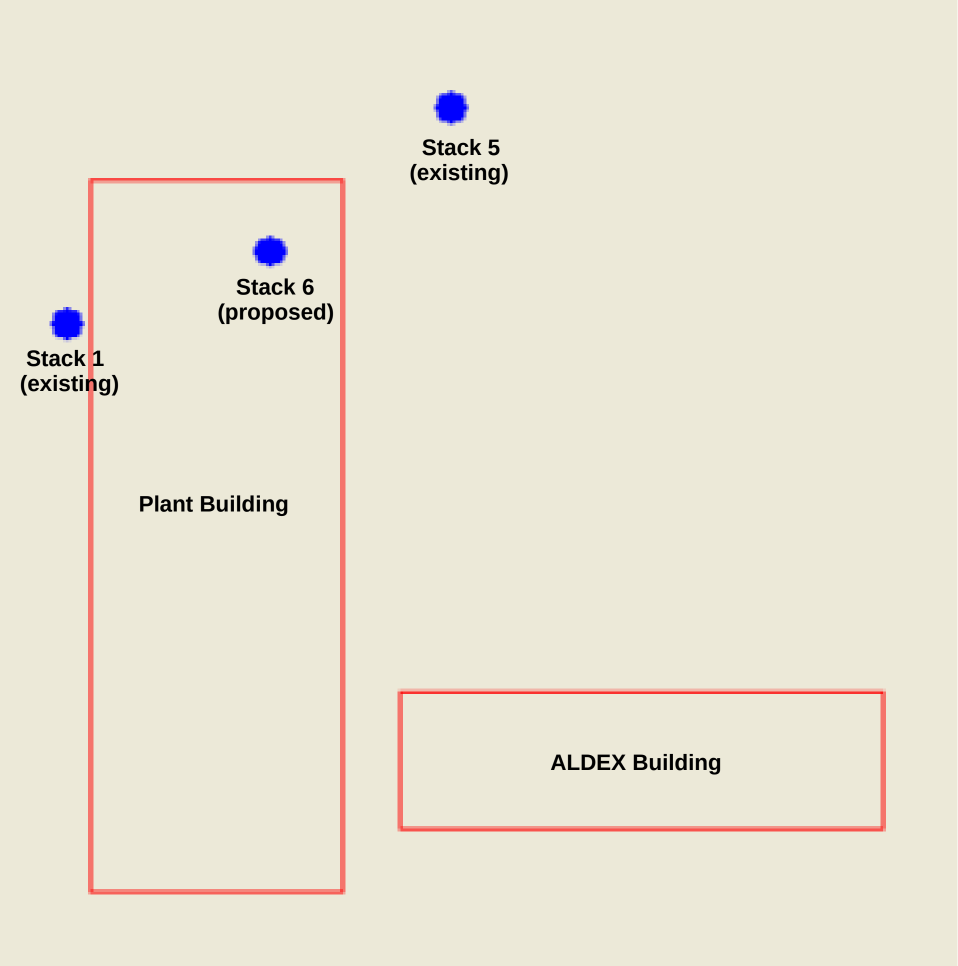

Figure 1: Schematic of Stack Locations

Other emission points at the plant are sources of particulates resulting from materials processing and handling. As this assessment was concerned with pollutants resulting from combustion processes, these sources were not considered in this assessment.

4 ASSESSMENT CRITERIA

The combustion of natural gas results in the generation of a number of pollutants. For this assessment, the most relevant pollutants in terms of quantity and toxicity are sulfur dioxide, nitrogen dioxide, particulate matter less than 10 microns in diameter (PM_{10}) and carbon monoxide. **Table 1** outlines the relevant DECC impact assessment criteria for these pollutants.

Table 2: Impact Assessment Criteria

Pollutant	Averaging period	Concentration
Sulfur dioxide (SO_2)	10 minutes 1 hour 24 hours Annual	712 $\mu g/m^3$ 570 $\mu g/m^3$ 228 $\mu g/m^3$ 60 $\mu g/m^3$
Nitrogen dioxide (NO_2)	1 hour Annual	246 $\mu g/m^3$ 62 $\mu g/m^3$
Particulate matter less than 10 microns (PM_{10})	24 hours Annual	50 $\mu g/m^3$ 30 $\mu g/m^3$
Carbon monoxide (CO)	15 minutes 1 hour 8 hours	100 mg/m^3 30 mg/m^3 10 mg/m^3

5 EXISTING AIR QUALITY

The WA facility is located in an industrial area. Local sources of pollutants include the Hydro Aluminium smelter, coal mines and motor vehicle exhaust. Emissions from the power stations in the Upper Hunter Valley also affect air quality in the area.

5.1 Ambient Air Quality

The DECC operates an ambient monitoring station at Beresfield, which is approximately 16 km east of the WA facility. The Beresfield station monitors levels of sulfur dioxide, nitrogen dioxide and particulate matter (PM_{10}). The closest station recording carbon monoxide levels is at Newcastle. A summary of the DECC monitoring results is shown in **Table 3**.

Table 3: Ambient Air Quality Data, 2006

Pollutant	Averaging Period	Maximum ($\mu g/m^3$)	Average ($\mu g/m^3$)	Assessment Criteria ($\mu g/m^3$)
Sulfur dioxide	1 hour	107	55	570
	24 hours	26	13	228
Nitrogen Dioxide	1 hour	68	56	246
Particulates (PM_{10})	24 hour	52	41	50
Carbon monoxide	1 hour	3 335	1 639	30 000
	8 hour	2 530	1 198	10 000

N.B. Data from DECC's Beresfield monitoring station with the exception of carbon monoxide, which was taken from the Newcastle monitoring station.

As shown in **Table 3**, maximum existing particulate levels at Beresfield occasionally exceed the guideline levels. On average, however, ambient levels of particulate matter are considered to be acceptable. Holmes Air Sciences recently reported monitoring data from Kurri Kurri Hospital (Holmes, 2006), which is located less than 2 km from the WA site. These data indicated that the maximum 24-hour average PM_{10} concentration between 1 May 2005 and 30 April 2006 recorded at the hospital was 16.9 $\mu g/m^3$; however, data recorded in May 2006 indicated a maximum level of 28.7μg/m^3. As the hospital site is located closer to WA's site, the particulate levels recorded at the hospital were considered to be more representative of ambient conditions in the area than those recorded at Beresfield. An ambient concentration of 28.7 μg/m^3 was, therefore, assumed for this assessment. The maximum ambient pollutant concentrations recorded by the DECC's monitoring stations were adopted for the other pollutants.

5.2 Meteorology

Hourly wind speed, wind direction, atmospheric stability class and mixed layer height data for 2005 were collected from a meteorological station located at the Hydro Aluminium Smelter. Meteorological data are used by dispersion models in different ways to estimate the dispersion of air pollutants:

- Ambient temperature is used to incorporate thermal buoyancy effects when calculating the rise and dispersion of pollutant plumes.
- Wind direction determines the direction in which pollutants will be carried.
- Wind speed influences the dilution and entrainment of the plume into the air continuum.
- Atmospheric stability class is a measure of atmospheric turbulence and the dispersive properties of the atmosphere. Most dispersion models utilise six stability classes, ranging from A (very unstable) to F (stable/very stable).
- Vertical mixing height is the height at which vertical mixing occurs in the atmosphere.

Quality assurance checks were undertaken by HLA ENSR to assess the appropriateness of the Hydro data. The stability classes identified for each hour of the day were initially determined, and then compared to the wind speeds at which they occurred as shown in **Appendix B**. This comparison indicated that the stability classes are appropriately designated according to DEC (2005). Winds are predominantly from the southeast.

Climatological data from the Bureau of Meteorology's Cessnock (Nulkaba) monitoring station for 1966 to 2007 are presented in **Appendix C**. The Nulkaba station is located approximately 10 km to the west of the WA site. These data indicate that average monthly maximum temperatures range from 30.4°C in January (summer) to 17.7 °C in July (winter). Annual average relative humidity levels are 72% and 50% at 9:00 am and 3:00 pm respectively. Rain generally falls on 79 days per year with an average recorded rainfall of 748 mm.

6 METHODOLOGY

6.1 Dispersion Modelling

AUSPLUME is an advanced Gaussian plume dispersion model with algorithms based on the Industrial Source Complex – Short Term (ISCST3) model approved by the US EPA for use in regulatory assessments undertaken within the United States. ISCST3 is one of the most widely used regulatory models in the world.

AUSPLUME was developed by the EPA Vic to enhance the ISCST3 model and make it applicable to Australian conditions. AUSPLUME is approved by the DECC for use in regulatory assessments undertaken in NSW. A complete description of the model is provided in the AUSPLUME user manual, which is available upon request.

The model uses the Gaussian dispersion model equation to simulate the dispersion of plumes from point, area, or volume sources. Dry and wet deposition can be taken into account, and algorithms are included to account for retention of dust within open pits. Mechanisms for determining the effect of terrain on plume dispersion are also provided. AUSPLUME operates on an hourly time step, and requires hourly wind speed, wind direction and other dispersion parameter data. The dispersion of each pollutant plume is determined for each hour using conventional Gaussian model assumptions.

Atmospheric dispersion modelling was conducted using AUSPLUME in accordance with the DECC's approved methods (DEC, 2005). This document prescribes calculation modes for accounting for terrain effects, building wake effects, horizontal and vertical dispersion curves, buoyancy effects, surface roughness, plume rise, wind speed categories and wind profile exponents.

6.2 Modelling Scenarios

Two scenarios were utilised in this assessment:

- Scenario 1, which represented the emissions of combustion products for the facility as it is currently configured (all combustion products from the site vented through Stacks 1 and 5).
- Scenario 2, which represented existing emissions (Scenario 1) plus emissions from the proposed Stack 6. This conservative approach effectively double counts emissions from the reverb furnace.

The assessment assumed operations occur 24 hours per day, 7 days a week over 365 days a year. This was a conservative assumption that did not account for plant shut downs and normal operating variations.

6.3 Model Inputs

AUSPLUME requires five main categories of data to determine the dispersion of pollutants:

- Meteorology (as discussed in Section 5.2).
- Source characteristics.
- Emissions inventory.
- Terrain effects.
- Building wake effects.

The above inputs (with the exception of meteorology) are addressed separately in the following sections. Modelling input files are contained in **Appendix A**.

6.3.1 Source Characteristics

As described above, combustion emissions from WA's operations are currently vented to atmosphere through Stacks 1 (rotary furnace) and 5 (reverb furnace); future combustion emissions from the reverb furnace will be through Stack 6. Details of the characteristics of each of these stacks are provided in **Table 4**.

Table 4: Source Characteristics

Parameter	Existing Rotary Stack (Stack 1)	Existing Reverb Stack (Stack 5)	Proposed Reverb Stack (Stack 6)
Velocity (m/s)	11.6	17.4	9.0 [3]
Height (m)	15	20	18
Internal diameter (m)	1.65	1.49	0.6
Temperature (^oC)	63.7	82.6	250
Area (m^2) [1]	2.14	1.74	0.28
Flow (m^3/s) [2]	24.8	30.3[4]	2.5

[1] Area calculated from the internal diameter

[2] Flow calculated using the calculated area and measured / estimated velocity. This data represents stack condition volumetric flow rates (VFR)

[3] The velocity of the proposed stack will be the result of primary air and combustion product driven thermal lift; velocity based on best-practice (to be confirmed following commissioning).

[4] VFR used to calculate mass flows included data measured in May 2006 which was found to be erroneous. This data was used for mass flux calculations which resulted in a higher mass flux than would have been expected using a lower VFR. This approach was considered to deliver the most conservative results and was therefore adopted for the study.

6.3.2 Emissions Inventory

Emissions from Stacks 1 and 5 were determined from stack emission testing conducted by HLA ENSR between 2004 and 2006. Emissions from the proposed stack were estimated using The Combustion Database (v. 2.4 Aug 04) developed by EPA (Vic) for use with reporting for the National Pollutant Inventory (see **Appendix D** for output). Details of the emissions used in the modelling are shown in **Table 5**. The stack emission testing monitors oxides of nitrogen; to provide a conservative assessment, all oxides of nitrogen were assumed to be nitrogen dioxide for this assessment.

Table 5: Emissions Inventory

Pollutant	Emission Rates (g/s)		
	Stack 1	Stack 5	Stack 6
Sulfur dioxide	0.042	0.025	0.0013
Oxides of nitrogen*	0.093	0.286	0.4122
Particulates (PM_{10})	0.129	0.084	0.0184
Carbon monoxide	0.218	0.888	0.0571

* As a conservative approach, all oxides of nitrogen were assumed to be nitrogen dioxide for this assessment.

It should be noted that the emission rates of oxides of nitrogen from the proposed Stack 6 are much higher than those currently measured from the WA facility; this is due to the use of emission factors.

6.3.3 Terrain Effects

The ortho-topographical maps for Cessnock (9132-2N) and Beresfield (9232-2N) were used to determine the terrain in the area surrounding the WA facility. A terrain file was prepared and entered into AUSPLUME. A 5 km x 4 km grid with a spacing of 200 m was used.

6.3.4 Building Wake Effects

The dispersion of pollutants around the WA facility is likely to be affected by aerodynamic wakes generated by winds having to flow around buildings. Building wakes generally decrease the distance downwind at which the plume comes into contact with the ground. This may result in higher ground level pollutant concentrations closer to the emission source.

The Building Profile Input Program (BPIP) utility option in the AUSPLUME program was used to enter building dimension (details are shown as part of the AUSPLUME input file in **Appendix A**). These dimensions were subsequently incorporated into the pollutant dispersion calculations to allow concessions for wake effects in the determination of ground level pollutant concentrations.

7 MODELLING RESULTS

The maximum GLCs of pollutants predicted by the dispersion modelling are shown in **Table 6** for the existing (Stacks 1 and 5) and proposed (Stacks 1, 5 and 6) scenarios. All predicted pollutant levels fell well below the relevant assessment criteria.

Table 6: Maximum Predicted Ground Level Concentrations

Pollutant	Averaging Period	Predicted GLCs (μg/m^3)		Criteria (μg/m^3)
		Scenario 1	Scenario 2	
Sulfur dioxide	10 minutes	4.9	5.1	712
	1 hour	4.9	5.2	570
	24 hours	2.1	2.2	228
	Annual	0.2	0.3	60
Nitrogen dioxide*	1 hour	24.4	81.3	246
	Annual	0.8	3.8	62
Particulate matter (PM$_{10}$)	24 hours	6.4	7.6	50
	Annual	0.7	0.83	30
Carbon monoxide	15 minutes	77.2	79.8	100 000
	1 hour	73.8	106.9	30 000
	8 hours	43.7	45.5	10 000

* Modelling results represent oxides of nitrogen, which were assumed to represent nitrogen dioxide for this assessment.

The large increase in predicted ground level concentrations of nitrogen dioxide in Scenario 2 (proposed configuration) results from the emission factors used to estimate emission rates of nitrogen dioxide from the combustion process in the reverb furnace; as shown in **Table 5**, the estimated emission rates of nitrogen dioxide from Stack 6 were approximately double the existing emissions from Stack 5. Despite this conservative assumption, ground level nitrogen dioxide concentrations are still expected to be well below the assessment criteria.

8 IMPACT ASSESSMENT

In order to fully comply with the DECC guidelines, a cumulative impact assessment is required where the potential emissions from a proposal are added to the existing maximum ambient pollutant levels with the resulting cumulative pollutant concentrations assessed against the guideline criteria. This assessment is shown in **Table 7**, using the maximum ambient levels from **Section 5.1**.

Table 7: Cumulative Pollutant Concentrations

Pollutant	Averaging Period	Ambient Concentration (μg/m³)	Cumulative Concentration (μg/m³)	Assessment Criteria (μg/m³)
Sulfur dioxide	1 hour	107	112	570
	24 hours	26	28	228
Nitrogen dioxide	1 hour	68	149	246
Particulates (PM_{10})	24 hour	29	37	50
Carbon monoxide	1 hour	3 335	3442	30 000
	8 hour	2 530	2756	10 000

As indicated in **Table 7**, all of the cumulative pollutant concentrations were below the assessment criteria. As such, no adverse effects on air quality are anticipated as a result of the proposed modification to the reverb furnace.

9 PROPOSED TIMETABLE FOR MODIFICATION

The timetable for implementation of the proposed modifications to the reverb furnace is outlined below:

- Submission of report to the DECC in accordance with U1.4 by 31 August 2007.
- DECC review and response by 14 September 2007.
- Source and purchase additional ductwork and new stack by 21 September 2007.
- Construction and commissioning of emission reconfiguration by 12 October 2007 (to coincide with scheduled shutdown and maintenance activities).

10 PROPOSED EMISSION TESTING PROGRAM

WA proposes to undertake post-commissioning testing of Stack 6 in November 2007. As prescribed in PRP Condition U1.4, this initial monitoring event will involve an assessment of all pollutants/parameters defined in the EPL for Point 13 (Stack 5). Following a review of test findings, WA will consult with the DECC with regard to the nature and frequency of ongoing testing.

11 SUMMARY

The AUSPLUME dispersion model was used to estimate the dispersion of combustion products from the proposed Stack 6, the purpose of which is to vent emissions from the holding side of the reverb furnace and thereby improve emissions capture from the remelt side. Conservative assumptions were used in the modelling, including:

- A higher than expected volumetric flow rate.
- The reverb furnace assumed to operate continuously throughout the year.
- A worst-case scenario was investigated, which added emissions from the proposed Stack 6 to the existing emissions from Stacks 5 and 6 (in reality, the combustion products vented through Stack 6 will be removed from the Stack 5 emissions).

These assumptions ensure that there is significant conservatism built into the model which ensures that worst case results have been considered.

Results of the dispersion modelling indicated that the ground level concentrations of sulfur dioxide, nitrogen dioxide, particulates (PM_{10}) and carbon monoxide would be below the guideline criteria specified by the DECC (DEC, 2005). No adverse air quality impacts on residents are anticipated as a result of the proposed development.

12 REFERENCES

DEC 2005, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, Department of Environment and Conservation NSW, Sydney.

Holmes Air Sciences, 2006, Air Quality Impact Assessment, Hunter Enviro-Mining (Operations) Pty Limited.

Appendix A: Modelling Input Files

```
1
           ________________________________________________________

             Weston Reverberatory Furnace - Sulfur Dioxide 10 min

           ________________________________________________________

Concentration or deposition                          Concentration
Emission rate units                                  grams/second
Concentration units                                  microgram/m3
Units conversion factor                              1.00E+06
Constant background concentration                             0.00E+00
Terrain effects                                      Egan method
Smooth stability class changes?                      No
Other stability class adjustments ("urban modes")    None
Ignore building wake effects?                        No
Decay coefficient (unless overridden by met. file)   0.000
Anemometer height                                    10 m
Roughness height at the wind vane site               0.300 m

                   DISPERSION CURVES
Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
Horizontal dispersion curves for sources >100m high  Briggs Rural
Vertical  dispersion  curves for sources >100m high  Briggs Rural
Enhance horizontal plume spreads for buoyancy?       Yes
Enhance  vertical  plume spreads for buoyancy?       Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust  vertical  P-G formulae for roughness height? Yes
Roughness height                                     0.400m
Adjustment for wind directional shear                None

                    PLUME RISE OPTIONS
Gradual plume rise?                                  Yes
Stack-tip downwash included?                         Yes
Building downwash algorithm:                        PRIME method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions?          No
Disregard temp. gradients in the hourly met. file?   No

and in the absence of boundary-layer potential temperature gradients
given by the hourly met. file, a value from the following table
(in K/m) is used:

   Wind Speed                Stability Class
    Category       A      B      C      D      E      F
  ________________________________________________________
       1         0.000  0.000  0.000  0.000  0.020  0.035
       2         0.000  0.000  0.000  0.000  0.020  0.035
       3         0.000  0.000  0.000  0.000  0.020  0.035
       4         0.000  0.000  0.000  0.000  0.020  0.035
       5         0.000  0.000  0.000  0.000  0.020  0.035
       6         0.000  0.000  0.000  0.000  0.020  0.035

WIND SPEED CATEGORIES
Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

AVERAGING TIME: 10 minutes.

_____________________________________________________________________________

           ________________________________________________________

             Weston Reverberatory Furnace - Sulfur Dioxide 10 min

                                SOURCE GROUPS
```

```
              Group No.    Members

                    1      S1-SO2 S5-SO2
                    2      S1-SO2 S5-SO2 S6-SO2

1

              Weston Reverberatory Furnace - Sulfur Dioxide 10 min

                             SOURCE CHARACTERISTICS


                    STACK SOURCE: S1-SO2

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57270    69294       12m           15m         1.65m       64C    11.6m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack   -77  -73  -67  -59  -48  -37  -24  -11    3
-1   -4   -7
 Across-flow distance from stack  -25  -29  -33  -35  -36  -36  -35  -33  -30
-25  -21  -15

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack   -11  -13  -16  -18  -19  -20  -26  -32  -36
-40  -42  -43
 Across-flow distance from stack   -9   -3    3    9   15   21   25   29   33
35   36   36

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack   -43  -41  -38  -51  -63  -72  -80  -85  -87
-87  -84  -79
 Across-flow distance from stack   35   33   30   25   21   15    9    3   -3
-9  -15  -21

               (Constant) emission rate = 4.20E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S5-SO2
```

```
    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324       12m           20m        1.49m       82C    17.4m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width         52   67   80   90   98  103  105  104    0
0    0    0
 Effective building height        12   12   12   12   12   12   12   12    0
0    0    0
 Along-flow building length      104  105  103   98   90   80   67   52    0
0    0    0
 Along-flow distance from stack -116 -120 -119 -116 -108  -98  -84  -68    0
0    0    0
 Across-flow distance from stack  22   10   -2  -13  -25  -35  -45  -53    0
0    0    0

 Flow direction                 130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          0    0  109  113  113  110   52   67   80
90   98  103
 Effective building height         0    0   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        0    0  133  122  108   99  104  105  103
98   90   80
 Along-flow distance from stack    0    0  -16   -8    1   10   12   15   16
17   18   18
 Across-flow distance from stack   0    0  -43  -28  -12    5  -22  -10    2
13   25   35

 Flow direction                 250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width        105  104    0    0    0    0    0    0  109
113  113  110
 Effective building height        12   12    0    0    0    0    0    0   12
12   12   12
 Along-flow building length       67   52    0    0    0    0    0    0  133
122  108   99
 Along-flow distance from stack   18   17    0    0    0    0    0    0 -117
-114 -109 -109
 Across-flow distance from stack  45   53    0    0    0    0    0    0   43
28   12   -5

               (Constant) emission rate = 2.50E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S6-SO2

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57298    69304       12m           18m        0.60m      250C     9.0m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width         52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height        12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length      104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack  -92  -92  -90  -84  -76  -66  -54  -40  -25
-26  -27  -27
 Across-flow distance from stack   1   -6  -13  -20  -25  -30  -35  -38  -40
-40  -40  -38

 Flow direction                 130° 140° 150° 160° 170° 180° 190° 200° 210°
```

```
220° 230° 240°
 Effective building width          98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack   -26  -24  -21  -18  -14  -10  -12  -13  -14
-14  -14  -14
 Across-flow distance from stack  -35  -31  -26  -21  -14   -8   -1    6   13
20   25   30

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack   -13  -12  -10  -25  -40  -53  -65  -75  -82
-87  -89  -89
 Across-flow distance from stack   35   38   40   40   40   38   35   31   26
21   14    8

               (Constant) emission rate = 1.30E-03 grams/second
                   No gravitational settling or scavenging.

 _____________________________________________________________________________

1           ________________________________________________________

              Weston Reverberatory Furnace - Sulfur Dioxide 10 min

                              RECEPTOR LOCATIONS

            ________________________________________________________

 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m

 _____________________________________________________________________________

 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r

 _____________________________________________________________________________
```

```
1                             _______________________________________

                             Weston Reverberatory Furnace - PM10

                              _______________________________________

Concentration or deposition                         Concentration
Emission rate units                                 grams/second
Concentration units                                 microgram/m3
Units conversion factor                             1.00E+06
Constant background concentration                            0.00E+00
Terrain effects                                     Egan method
Smooth stability class changes?                     No
Other stability class adjustments ("urban modes")   None
Ignore building wake effects?                       No
Decay coefficient (unless overridden by met. file)  0.000
Anemometer height                                   10 m
Roughness height at the wind vane site              0.300 m

                   DISPERSION CURVES
Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
Horizontal dispersion curves for sources >100m high  Briggs Rural
Vertical  dispersion  curves for sources >100m high  Briggs Rural
Enhance horizontal plume spreads for buoyancy?       Yes
Enhance  vertical  plume spreads for buoyancy?       Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust  vertical  P-G formulae for roughness height? Yes
Roughness height                                     0.400m
Adjustment for wind directional shear                None

                    PLUME RISE OPTIONS
Gradual plume rise?                                  Yes
Stack-tip downwash included?                         Yes
Building downwash algorithm:                        PRIME method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions?          No
Disregard temp. gradients in the hourly met. file?   No

and in the absence of boundary-layer potential temperature gradients
given by the hourly met. file, a value from the following table
(in K/m) is used:

   Wind Speed                Stability Class
    Category       A      B      C      D      E      F
  _________________________________________________________
       1         0.000  0.000  0.000  0.000  0.020  0.035
       2         0.000  0.000  0.000  0.000  0.020  0.035
       3         0.000  0.000  0.000  0.000  0.020  0.035
       4         0.000  0.000  0.000  0.000  0.020  0.035
       5         0.000  0.000  0.000  0.000  0.020  0.035
       6         0.000  0.000  0.000  0.000  0.020  0.035

WIND SPEED CATEGORIES
Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

AVERAGING TIMES
24 hours
 average over all hours
_____________________________________________________________________________

                              _______________________________________

                             Weston Reverberatory Furnace - PM10
```

```
                              SOURCE GROUPS

                   ___________________________________________

             Group No.    Members
             ________________________________________________________________
                   1      S1-PM  S5-PM
                   2      S1-PM  S5-PM  S6-PM

 _____________________________________________________________________________

1                  ___________________________________________

                     Weston Reverberatory Furnace - PM10

                          SOURCE CHARACTERISTICS

                   ___________________________________________


                         STACK SOURCE: S1-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57270    69294        12m           15m        1.65m       64C    11.6m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width         52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height        12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length      104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack  -77  -73  -67  -59  -48  -37  -24  -11    3
-1   -4   -7
 Across-flow distance from stack -25  -29  -33  -35  -36  -36  -35  -33  -30
-25  -21  -15

 Flow direction                 130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width         98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height        12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack  -11  -13  -16  -18  -19  -20  -26  -32  -36
-40  -42  -43
 Across-flow distance from stack  -9   -3    3    9   15   21   25   29   33
35   36   36

 Flow direction                 250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width        105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height        12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack  -43  -41  -38  -51  -63  -72  -80  -85  -87
-87  -84  -79
 Across-flow distance from stack  35   33   30   25   21   15    9    3   -3
-9  -15  -21

               (Constant) emission rate = 1.29E-01 grams/second
                   No gravitational settling or scavenging.
```

```
                  STACK SOURCE: S5-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324       12m          20m        1.49m       82C    17.4m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104    0
0    0    0
 Effective building height         12   12   12   12   12   12   12   12    0
0    0    0
 Along-flow building length       104  105  103   98   90   80   67   52    0
0    0    0
 Along-flow distance from stack  -116 -120 -119 -116 -108  -98  -84  -68    0
0    0    0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0
0    0    0

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width           0    0  109  113  113  110   52   67   80
90   98  103
 Effective building height          0    0   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         0    0  133  122  108   99  104  105  103
98   90   80
 Along-flow distance from stack     0    0  -16   -8    1   10   12   15   16
17   18   18
 Across-flow distance from stack    0    0  -43  -28  -12    5  -22  -10    2
13   25   35

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104    0    0    0    0    0    0  109
113  113  110
 Effective building height         12   12    0    0    0    0    0    0   12
12   12   12
 Along-flow building length        67   52    0    0    0    0    0    0  133
122  108   99
 Along-flow distance from stack    18   17    0    0    0    0    0    0 -117
-114 -109 -109
 Across-flow distance from stack   45   53    0    0    0    0    0    0   43
28   12   -5

             (Constant) emission rate = 8.40E-02 grams/second
                 No gravitational settling or scavenging.


                  STACK SOURCE: S6-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57298    69304       12m          18m        0.60m      250C     9.0m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack   -92  -92  -90  -84  -76  -66  -54  -40  -25
-26  -27  -27
 Across-flow distance from stack    1   -6  -13  -20  -25  -30  -35  -38  -40
-40  -40  -38
```

```
 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width           98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack    -26  -24  -21  -18  -14  -10  -12  -13  -14
-14  -14  -14
 Across-flow distance from stack   -35  -31  -26  -21  -14   -8   -1    6   13
20   25   30

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width          105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack    -13  -12  -10  -25  -40  -53  -65  -75  -82
-87  -89  -89
 Across-flow distance from stack    35   38   40   40   40   38   35   31   26
21   14    8

                    (Constant) emission rate = 1.84E-02 grams/second
                        No gravitational settling or scavenging.
```

```
1

                                Weston Reverberatory Furnace - PM10

                                        RECEPTOR LOCATIONS


 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m
```

```
 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r
```

```
1                    ______________________________________

                       Weston Reverberatory Furnace - NOx

                     ______________________________________

 Concentration or deposition                         Concentration
 Emission rate units                                 grams/second
 Concentration units                                 microgram/m3
 Units conversion factor                             1.00E+06
 Constant background concentration                            0.00E+00
 Terrain effects                                     Egan method
 Smooth stability class changes?                     No
 Other stability class adjustments ("urban modes")   None
 Ignore building wake effects?                       No
 Decay coefficient (unless overridden by met. file)  0.000
 Anemometer height                                   10 m
 Roughness height at the wind vane site              0.300 m

                   DISPERSION CURVES
 Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
 Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
 Horizontal dispersion curves for sources >100m high  Briggs Rural
 Vertical  dispersion  curves for sources >100m high  Briggs Rural
 Enhance horizontal plume spreads for buoyancy?       Yes
 Enhance  vertical  plume spreads for buoyancy?       Yes
 Adjust horizontal P-G formulae for roughness height? Yes
 Adjust  vertical  P-G formulae for roughness height? Yes
 Roughness height                                     0.400m
 Adjustment for wind directional shear                None

                    PLUME RISE OPTIONS
 Gradual plume rise?                                  Yes
 Stack-tip downwash included?                         Yes
 Building downwash algorithm:                        PRIME method.
 Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
 Partial penetration of elevated inversions?          No
 Disregard temp. gradients in the hourly met. file?   No

 and in the absence of boundary-layer potential temperature gradients
 given by the hourly met. file, a value from the following table
 (in K/m) is used:

    Wind Speed                 Stability Class
     Category       A      B      C      D      E      F
   ________________________________________________________
        1         0.000  0.000  0.000  0.000  0.020  0.035
        2         0.000  0.000  0.000  0.000  0.020  0.035
        3         0.000  0.000  0.000  0.000  0.020  0.035
        4         0.000  0.000  0.000  0.000  0.020  0.035
        5         0.000  0.000  0.000  0.000  0.020  0.035
        6         0.000  0.000  0.000  0.000  0.020  0.035

 WIND SPEED CATEGORIES
 Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

 WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

 AVERAGING TIMES
  1 hour
  average over all hours

 _____________________________________________________________________________
```

```
                              SOURCE GROUPS

                   ______________________________________

               Group No.    Members
               ________________________________________________________________
                     1      S1-NOX S5-NOX
                     2      S1-NOX S5-NOX S6-NOX

  ____________________________________________________________________________

1                  ______________________________________

                      Weston Reverberatory Furnace - NOx

                          SOURCE CHARACTERISTICS

                   ______________________________________


                     STACK SOURCE: S1-NOX

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57270    69294       12m           15m        1.65m       64C     11.6m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack   -77  -73  -67  -59  -48  -37  -24  -11    3
-1   -4   -7
 Across-flow distance from stack  -25  -29  -33  -35  -36  -36  -35  -33  -30
-25  -21  -15

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack   -11  -13  -16  -18  -19  -20  -26  -32  -36
-40  -42  -43
 Across-flow distance from stack   -9   -3    3    9   15   21   25   29   33
35   36   36

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack   -43  -41  -38  -51  -63  -72  -80  -85  -87
-87  -84  -79
 Across-flow distance from stack   35   33   30   25   21   15    9    3   -3
-9  -15  -21

                (Constant) emission rate = 9.33E-02 grams/second
                    No gravitational settling or scavenging.
```

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                    STACK SOURCE: S5-NOX

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324        12m          20m       1.49m       82C    17.4m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104    0
0    0    0
 Effective building height         12   12   12   12   12   12   12   12    0
0    0    0
 Along-flow building length       104  105  103   98   90   80   67   52    0
0    0    0
 Along-flow distance from stack  -116 -120 -119 -116 -108  -98  -84  -68    0
0    0    0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0
0    0    0

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width           0    0  109  113  113  110   52   67   80
90   98  103
 Effective building height          0    0   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         0    0  133  122  108   99  104  105  103
98   90   80
 Along-flow distance from stack     0    0  -16   -8    1   10   12   15   16
17   18   18
 Across-flow distance from stack    0    0  -43  -28  -12    5  -22  -10    2
13   25   35

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104    0    0    0    0    0    0  109
113  113  110
 Effective building height         12   12    0    0    0    0    0    0   12
12   12   12
 Along-flow building length        67   52    0    0    0    0    0    0  133
122  108   99
 Along-flow distance from stack    18   17    0    0    0    0    0    0 -117
-114 -109 -109
 Across-flow distance from stack   45   53    0    0    0    0    0    0   43
28   12   -5

               (Constant) emission rate = 2.86E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S6-NOX

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57298    69304        12m          18m       0.60m      250C     9.0m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack   -92  -92  -90  -84  -76  -66  -54  -40  -25
-26  -27  -27
 Across-flow distance from stack    1   -6  -13  -20  -25  -30  -35  -38  -40
-40  -40  -38
```

```
 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack   -26  -24  -21  -18  -14  -10  -12  -13  -14
-14  -14  -14
 Across-flow distance from stack  -35  -31  -26  -21  -14   -8   -1    6   13
20   25   30

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack   -13  -12  -10  -25  -40  -53  -65  -75  -82
-87  -89  -89
 Across-flow distance from stack   35   38   40   40   40   38   35   31   26
21   14    8

                     (Constant) emission rate = 4.12E-01 grams/second
                         No gravitational settling or scavenging.


1

                               Weston Reverberatory Furnace - NOx

                                      RECEPTOR LOCATIONS


 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m


 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r
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1              __________________________________________________

                Weston Reverberatory Furnace - Carbon Monoxide

               __________________________________________________

 Concentration or deposition                          Concentration
 Emission rate units                                  grams/second
 Concentration units                                  microgram/m3
 Units conversion factor                              1.00E+06
 Constant background concentration                             0.00E+00
 Terrain effects                                      Egan method
 Smooth stability class changes?                      No
 Other stability class adjustments ("urban modes")    None
 Ignore building wake effects?                        No
 Decay coefficient (unless overridden by met. file)   0.000
 Anemometer height                                    10 m
 Roughness height at the wind vane site               0.300 m
 Averaging time for sigma-theta values                 60 min.

                   DISPERSION CURVES
 Horizontal dispersion curves for sources <100m high  Sigma-theta
 Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
 Horizontal dispersion curves for sources >100m high  Briggs Rural
 Vertical  dispersion  curves for sources >100m high  Briggs Rural
 Enhance horizontal plume spreads for buoyancy?       Yes
 Enhance  vertical  plume spreads for buoyancy?       Yes
 Adjust horizontal P-G formulae for roughness height? Yes
 Adjust  vertical  P-G formulae for roughness height? Yes
 Roughness height                                     0.400m
 Adjustment for wind directional shear                None

                    PLUME RISE OPTIONS
 Gradual plume rise?                                  Yes
 Stack-tip downwash included?                         Yes
 Building downwash algorithm:                        PRIME method.
 Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
 Partial penetration of elevated inversions?          No
 Disregard temp. gradients in the hourly met. file?   No

 and in the absence of boundary-layer potential temperature gradients
 given by the hourly met. file, a value from the following table
 (in K/m) is used:

    Wind Speed                Stability Class
     Category       A      B      C      D      E      F
   ________________________________________________________
        1         0.000  0.000  0.000  0.000  0.020  0.035
        2         0.000  0.000  0.000  0.000  0.020  0.035
        3         0.000  0.000  0.000  0.000  0.020  0.035
        4         0.000  0.000  0.000  0.000  0.020  0.035
        5         0.000  0.000  0.000  0.000  0.020  0.035
        6         0.000  0.000  0.000  0.000  0.020  0.035

 WIND SPEED CATEGORIES
 Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

 WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

 AVERAGING TIMES
  1 hour
  8 hours

 _____________________________________________________________________________
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```
                              SOURCE GROUPS

               __________________________________________________
              Group No.    Members
              ________________________________________________________________
                    1      S1-CO  S5-CO
                    2      S1-CO  S5-CO  S6-CO
   ____________________________________________________________________________

1              __________________________________________________

                 Weston Reverberatory Furnace - Carbon Monoxide

                           SOURCE CHARACTERISTICS
               __________________________________________________


                    STACK SOURCE: S1-CO

     X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
    57270    69294        12m           15m        1.65m       64C    11.6m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                     10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width            52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height           12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack     -77  -73  -67  -59  -48  -37  -24  -11    3
-1   -4   -7
 Across-flow distance from stack   -25  -29  -33  -35  -36  -36  -35  -33  -30
-25  -21  -15

 Flow direction                    130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width            98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height           12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length          90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack     -11  -13  -16  -18  -19  -20  -26  -32  -36
-40  -42  -43
 Across-flow distance from stack     -9   -3    3    9   15   21   25   29   33
35   36   36

 Flow direction                    250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width           105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height           12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length          67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack     -43  -41  -38  -51  -63  -72  -80  -85  -87
-87  -84  -79
 Across-flow distance from stack     35   33   30   25   21   15    9    3   -3
-9  -15  -21

               (Constant) emission rate = 2.18E-01 grams/second
                   No gravitational settling or scavenging.
```

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                     STACK SOURCE: S5-CO

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324       12m           20m         1.49m       82C    17.4m/s

               ______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width           52   67   80   90   98  103  105  104    0
0    0    0
 Effective building height          12   12   12   12   12   12   12   12    0
0    0    0
 Along-flow building length        104  105  103   98   90   80   67   52    0
0    0    0
 Along-flow distance from stack   -116 -120 -119 -116 -108  -98  -84  -68    0
0    0    0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0
0    0    0

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width            0    0  109  113  113  110   52   67   80
90   98  103
 Effective building height           0    0   12   12   12   12   12   12   12
12   12   12
 Along-flow building length          0    0  133  122  108   99  104  105  103
98   90   80
 Along-flow distance from stack      0    0  -16   -8    1   10   12   15   16
17   18   18
 Across-flow distance from stack     0    0  -43  -28  -12    5  -22  -10    2
13   25   35

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width          105  104    0    0    0    0    0    0  109
113  113  110
 Effective building height          12   12    0    0    0    0    0    0   12
12   12   12
 Along-flow building length         67   52    0    0    0    0    0    0  133
122  108   99
 Along-flow distance from stack     18   17    0    0    0    0    0    0 -117
-114 -109 -109
 Across-flow distance from stack    45   53    0    0    0    0    0    0   43
28   12   -5

               (Constant) emission rate = 8.88E-01 grams/second
                   No gravitational settling or scavenging.


                     STACK SOURCE: S6-CO

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57298    69304       12m           18m         0.60m      250C     9.0m/s

               ______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width           52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack    -92  -92  -90  -84  -76  -66  -54  -40  -25
-26  -27  -27
 Across-flow distance from stack    1   -6  -13  -20  -25  -30  -35  -38  -40
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-40  -40  -38

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width           98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack    -26  -24  -21  -18  -14  -10  -12  -13  -14
-14  -14  -14
 Across-flow distance from stack   -35  -31  -26  -21  -14   -8   -1    6   13
20   25   30

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width          105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack    -13  -12  -10  -25  -40  -53  -65  -75  -82
-87  -89  -89
 Across-flow distance from stack    35   38   40   40   40   38   35   31   26
21   14    8

                  (Constant) emission rate = 5.71E-02 grams/second
                      No gravitational settling or scavenging.

 ______________________________________________________________________________

1              ___________________________________________________

                   Weston Reverberatory Furnace - Carbon Monoxide

                              RECEPTOR LOCATIONS

               ___________________________________________________

 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m

 ______________________________________________________________________________

 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r

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1         ___________________________________________________________

            Weston Reverberatory Furnace - Carbon Monoxide 15 mins

          ___________________________________________________________

Concentration or deposition                          Concentration
Emission rate units                                  grams/second
Concentration units                                  microgram/m3
Units conversion factor                              1.00E+06
Constant background concentration                             0.00E+00
Terrain effects                                      Egan method
Smooth stability class changes?                      No
Other stability class adjustments ("urban modes")    None
Ignore building wake effects?                        No
Decay coefficient (unless overridden by met. file)   0.000
Anemometer height                                    10 m
Roughness height at the wind vane site               0.300 m

                   DISPERSION CURVES
Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
Horizontal dispersion curves for sources >100m high  Briggs Rural
Vertical  dispersion  curves for sources >100m high  Briggs Rural
Enhance horizontal plume spreads for buoyancy?       Yes
Enhance  vertical  plume spreads for buoyancy?       Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust  vertical  P-G formulae for roughness height? Yes
Roughness height                                     0.400m
Adjustment for wind directional shear                None

                    PLUME RISE OPTIONS
Gradual plume rise?                                  Yes
Stack-tip downwash included?                         Yes
Building downwash algorithm:                        PRIME method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions?          No
Disregard temp. gradients in the hourly met. file?   No

and in the absence of boundary-layer potential temperature gradients
given by the hourly met. file, a value from the following table
(in K/m) is used:

   Wind Speed                Stability Class
    Category       A      B      C      D      E      F
  ________________________________________________________
       1         0.000  0.000  0.000  0.000  0.020  0.035
       2         0.000  0.000  0.000  0.000  0.020  0.035
       3         0.000  0.000  0.000  0.000  0.020  0.035
       4         0.000  0.000  0.000  0.000  0.020  0.035
       5         0.000  0.000  0.000  0.000  0.020  0.035
       6         0.000  0.000  0.000  0.000  0.020  0.035

WIND SPEED CATEGORIES
Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

AVERAGING TIME: 15 minutes.

_____________________________________________________________________________

          ___________________________________________________________

            Weston Reverberatory Furnace - Carbon Monoxide 15 mins

                                SOURCE GROUPS
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```
                 ___________________________________________________________

                    Group No.    Members
                    ________________________________________________________________
                          1      S1-CO  S5-CO
                          2      S1-CO  S5-CO  S6-CO

         ____________________________________________________________________________

1                 ___________________________________________________________

                     Weston Reverberatory Furnace - Carbon Monoxide 15 mins

                                    SOURCE CHARACTERISTICS

                  ___________________________________________________________


                             STACK SOURCE: S1-CO

        X(m)     Y(m)    Ground Elev.  Stack Height  Diameter Temperature  Speed
       57270    69294        12m           15m         1.65m       64C    11.6m/s

                      ______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width           52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack    -77  -73  -67  -59  -48  -37  -24  -11    3
-1   -4   -7
 Across-flow distance from stack  -25  -29  -33  -35  -36  -36  -35  -33  -30
-25  -21  -15

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width           98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack    -11  -13  -16  -18  -19  -20  -26  -32  -36
-40  -42  -43
 Across-flow distance from stack    -9   -3    3    9   15   21   25   29   33
35   36   36

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width          105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack    -43  -41  -38  -51  -63  -72  -80  -85  -87
-87  -84  -79
 Across-flow distance from stack    35   33   30   25   21   15    9    3   -3
-9  -15  -21

                       (Constant) emission rate = 2.18E-01 grams/second
                           No gravitational settling or scavenging.


                             STACK SOURCE: S5-CO
```

```
    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324        12m           20m       1.49m       82C    17.4m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104    0
0    0    0
 Effective building height         12   12   12   12   12   12   12   12    0
0    0    0
 Along-flow building length       104  105  103   98   90   80   67   52    0
0    0    0
 Along-flow distance from stack  -116 -120 -119 -116 -108  -98  -84  -68    0
0    0    0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0
0    0    0

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width           0    0  109  113  113  110   52   67   80
90   98  103
 Effective building height          0    0   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         0    0  133  122  108   99  104  105  103
98   90   80
 Along-flow distance from stack     0    0  -16   -8    1   10   12   15   16
17   18   18
 Across-flow distance from stack    0    0  -43  -28  -12    5  -22  -10    2
13   25   35

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104    0    0    0    0    0    0  109
113  113  110
 Effective building height         12   12    0    0    0    0    0    0   12
12   12   12
 Along-flow building length        67   52    0    0    0    0    0    0  133
122  108   99
 Along-flow distance from stack    18   17    0    0    0    0    0    0 -117
-114 -109 -109
 Across-flow distance from stack   45   53    0    0    0    0    0    0   43
28   12   -5

               (Constant) emission rate = 8.88E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S6-CO

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57298    69304        12m           18m       0.60m      250C     9.0m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack   -92  -92  -90  -84  -76  -66  -54  -40  -25
-26  -27  -27
 Across-flow distance from stack    1   -6  -13  -20  -25  -30  -35  -38  -40
-40  -40  -38

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
```

```
220° 230° 240°
 Effective building width          98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack   -26  -24  -21  -18  -14  -10  -12  -13  -14
-14  -14  -14
 Across-flow distance from stack  -35  -31  -26  -21  -14   -8   -1    6   13
20   25   30

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack   -13  -12  -10  -25  -40  -53  -65  -75  -82
-87  -89  -89
 Across-flow distance from stack   35   38   40   40   40   38   35   31   26
21   14    8

                  (Constant) emission rate = 5.71E-02 grams/second
                      No gravitational settling or scavenging.

 ____________________________________________________________________________

1         __________________________________________________________

                 Weston Reverberatory Furnace - Carbon Monoxide 15 mins

                                 RECEPTOR LOCATIONS

          __________________________________________________________

 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m

 ____________________________________________________________________________

 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r

 ____________________________________________________________________________
```

```
1              __________________________________________________

                 Weston Reverberatory Furnace - Sulfur Dioxide

               __________________________________________________

 Concentration or deposition                          Concentration
 Emission rate units                                  grams/second
 Concentration units                                  microgram/m3
 Units conversion factor                              1.00E+06
 Constant background concentration                             0.00E+00
 Terrain effects                                      Egan method
 Smooth stability class changes?                      No
 Other stability class adjustments ("urban modes")    None
 Ignore building wake effects?                        No
 Decay coefficient (unless overridden by met. file)   0.000
 Anemometer height                                    10 m
 Roughness height at the wind vane site               0.300 m
 Averaging time for sigma-theta values                 60 min.

                    DISPERSION CURVES
 Horizontal dispersion curves for sources <100m high  Sigma-theta
 Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
 Horizontal dispersion curves for sources >100m high  Briggs Rural
 Vertical  dispersion  curves for sources >100m high  Briggs Rural
 Enhance horizontal plume spreads for buoyancy?       Yes
 Enhance  vertical  plume spreads for buoyancy?       Yes
 Adjust horizontal P-G formulae for roughness height? Yes
 Adjust  vertical  P-G formulae for roughness height? Yes
 Roughness height                                     0.400m
 Adjustment for wind directional shear                None

                     PLUME RISE OPTIONS
 Gradual plume rise?                                  Yes
 Stack-tip downwash included?                         Yes
 Building downwash algorithm:                        PRIME method.
 Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
 Partial penetration of elevated inversions?          No
 Disregard temp. gradients in the hourly met. file?   No

 and in the absence of boundary-layer potential temperature gradients
 given by the hourly met. file, a value from the following table
 (in K/m) is used:

    Wind Speed                Stability Class
     Category       A      B      C      D      E      F
   ___________________________________________________________
        1         0.000  0.000  0.000  0.000  0.020  0.035
        2         0.000  0.000  0.000  0.000  0.020  0.035
        3         0.000  0.000  0.000  0.000  0.020  0.035
        4         0.000  0.000  0.000  0.000  0.020  0.035
        5         0.000  0.000  0.000  0.000  0.020  0.035
        6         0.000  0.000  0.000  0.000  0.020  0.035

 WIND SPEED CATEGORIES
 Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

 WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

 AVERAGING TIMES
  1 hour
 24 hours
  average over all hours

 _____________________________________________________________________________

               __________________________________________________
```

```
                 Weston Reverberatory Furnace - Sulfur Dioxide

                               SOURCE GROUPS

                ____________________________________________________

               Group No.    Members
               _________________________________________________________________
                     1      S1-SO2 S5-SO2
                     2      S1-SO2 S5-SO2 S6-SO2

 _______________________________________________________________________________

1               ____________________________________________________

                 Weston Reverberatory Furnace - Sulfur Dioxide

                           SOURCE CHARACTERISTICS

                ____________________________________________________


                     STACK SOURCE: S1-SO2

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57270    69294        12m           15m        1.65m       64C    11.6m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack   -77  -73  -67  -59  -48  -37  -24  -11    3
-1   -4   -7
 Across-flow distance from stack  -25  -29  -33  -35  -36  -36  -35  -33  -30
-25  -21  -15

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack   -11  -13  -16  -18  -19  -20  -26  -32  -36
-40  -42  -43
 Across-flow distance from stack   -9   -3    3    9   15   21   25   29   33
35   36   36

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack   -43  -41  -38  -51  -63  -72  -80  -85  -87
-87  -84  -79
 Across-flow distance from stack   35   33   30   25   21   15    9    3   -3
-9  -15  -21

                (Constant) emission rate = 4.20E-02 grams/second
```

```
                        No gravitational settling or scavenging.


                         STACK SOURCE: S5-SO2

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324        12m           20m        1.49m       82C    17.4m/s

                _______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width           52   67   80   90   98  103  105  104    0
0    0    0
 Effective building height          12   12   12   12   12   12   12   12    0
0    0    0
 Along-flow building length        104  105  103   98   90   80   67   52    0
0    0    0
 Along-flow distance from stack   -116 -120 -119 -116 -108  -98  -84  -68    0
0    0    0
 Across-flow distance from stack    22   10   -2  -13  -25  -35  -45  -53    0
0    0    0

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width            0    0  109  113  113  110   52   67   80
90   98  103
 Effective building height           0    0   12   12   12   12   12   12   12
12   12   12
 Along-flow building length          0    0  133  122  108   99  104  105  103
98   90   80
 Along-flow distance from stack      0    0  -16   -8    1   10   12   15   16
17   18   18
 Across-flow distance from stack     0    0  -43  -28  -12    5  -22  -10    2
13   25   35

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width          105  104    0    0    0    0    0    0  109
113  113  110
 Effective building height          12   12    0    0    0    0    0    0   12
12   12   12
 Along-flow building length         67   52    0    0    0    0    0    0  133
122  108   99
 Along-flow distance from stack     18   17    0    0    0    0    0    0 -117
-114 -109 -109
 Across-flow distance from stack    45   53    0    0    0    0    0    0   43
28   12   -5

                   (Constant) emission rate = 2.50E-02 grams/second
                        No gravitational settling or scavenging.


                         STACK SOURCE: S6-SO2

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57298    69304        12m           18m        0.60m      250C     9.0m/s

                _______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width           52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height          12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack    -92  -92  -90  -84  -76  -66  -54  -40  -25
-26  -27  -27
```

```
 Across-flow distance from stack    1   -6  -13  -20  -25  -30  -35  -38  -40
-40  -40  -38

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack   -26  -24  -21  -18  -14  -10  -12  -13  -14
-14  -14  -14
 Across-flow distance from stack  -35  -31  -26  -21  -14   -8   -1    6   13
20   25   30

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack   -13  -12  -10  -25  -40  -53  -65  -75  -82
-87  -89  -89
 Across-flow distance from stack   35   38   40   40   40   38   35   31   26
21   14    8

                  (Constant) emission rate = 1.30E-03 grams/second
                      No gravitational settling or scavenging.

 ____________________________________________________________________________

1              ___________________________________________________

                    Weston Reverberatory Furnace - Sulfur Dioxide

                                 RECEPTOR LOCATIONS

               ___________________________________________________

 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m

 ____________________________________________________________________________

 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r

 ____________________________________________________________________________
```

Appendix B: Quality Assurance of Meteorological Data

Stability Class versus Time of Day – Hydro 2006

Hour	A	B	C	D	E	F	Grand Total
1				22	36	268	326
2				19	40	268	327
3				12	27	288	327
4				16	31	280	327
5				17	34	276	327
6				327			327
7	131	46	11	8	12	119	327
8	242	60	23	2			327
9	244	53	26	4			327
10	233	52	37	5			327
11	219	60	39	9			327
12	211	62	41	13			327
13	192	74	47	14			327
14	163	99	51	14			327
15	158	102	56	11			327
16	142	115	65	5			327
17	119	141	62	5			327
18	105	97	46	10	11	58	327
19				327			327
20				19	49	259	327
21				16	37	274	327
22				16	44	267	327
23				18	39	270	327
24				22	33	272	327
Total	2159	961	504	931	393	2899	7847

Stability Class versus Wind Speed – Hydro 2006

Wind Speed	A	B	C	D	E	F	Grand Total
< 1	371	64	9	333	105	1917	2799
1 - 1.5	434	36	18	108	99	535	1230
1.6 - 2	514	58	13	75	53	241	954
2.1 - 3	840	236	34	137	87	206	1540
3.1 - 4	0	567	38	107	49	0	761
4.1 - 5	0	0	252	65	0	0	317
5.1 - 6	0	0	140	21	0	0	161
6.1 - 7	0	0	0	62	0	0	62
7.1 - 8	0	0	0	19	0	0	19
8.1 - 9	0	0	0	3	0	0	3
9.1 - 10	0	0	0	1	0	0	1
Total	2159	961	504	931	393	2899	7847

Appendix C: Climatological Data Summary

Cessnock (Nulkaba) Climate Averages, 1966 – 2007 (Bureau of Meteorology)

Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean daily max temp (^{o}C)	30.4	29.6	27.5	24.7	21.0	18.2	17.7	19.7	22.6	25.3	27.3	29.5	24.5
Mean daily min temp (^{o}C)	17.6	17.7	15.5	11.6	8.6	5.8	4.5	4.8	7.7	10.9	13.6	16.1	11.2
Mean rainfall (mm)	89.6	100.9	87.9	54.9	54.6	56.1	32.1	36.9	42.0	59.3	68.2	67.8	748
Mean no. of days of rain (≥ 1mm)	7.8	7.7	8.2	6.2	6.3	5.9	4.6	5.1	5.2	7.1	7.9	7.0	79
Mean 9 am temp (^{o}C)	23.2	22.3	20.9	18.2	14.0	10.7	9.8	11.9	16.0	19.2	20.3	22.5	17.4
Mean 9 am relative humidity (%)	70	75	76	75	80	81	79	71	63	60	65	65	72
Mean 9 am wind speed (km/h)	10.3	9.4	9.5	9.2	9.5	10.3	10.8	12.4	13.9	13.1	12.0	11.4	11.0
Mean 3 pm temp (^{o}C)	29.0	28.1	26.1	23.4	19.9	17.0	16.6	18.5	21.3	23.5	25.4	28.1	23.1
Mean 3 pm relative humidity (%)	49	52	54	52	55	56	51	44	43	46	47	45	50
Mean 3 pm wind speed (km/h)	16.7	15.3	15.0	12.8	12.1	13.7	14.3	16.0	17.7	17.0	17.2	17.0	15.4

N.B. Data in red indicate highest figures; data in blue represent lowest values.

Appendix D: Combustion Engine Database Output

The Combustion Database (v. 2.4 Aug 04) Output

Inputs:

- Natural gas
- Tangential fired boiler
- Gas consumption – 166,000 GJ/year (3,735 tonnes/year)

Category 2a Substance Emissions

Reporting Period: 2006/07

Substance	Total Emissions (kg/yr)
Carbon monoxide	1.8E+03
Oxides of nitrogen	1.3E+04
Particulate matter (PM10)	5.8E+02
Polycyclic aromatic hydrocarbons	5.2E-02
Sulfur dioxide	4.0E+01
Total Volatile organic compounds	4.2E+02

Appendix J: AQIA for Modification

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Prepared for:

Weston Aluminium

PO Box 295
Kurri Kurri NSW 2327

Air Quality Impact Assessment

HLA-Envirosciences Pty Limited (HLA ENSR)

20 November 2007

Document No.: N5009629_AQIA_20Nov07

Distribution

Statement of Environmental Effects to Support Modification Applications for Aluminium Dross Recycling Facility

21 November 2007

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By
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ABN: 34 060 204 702
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Hope Wat

Hope Watson
Senior Environmental Scientist

Technical Peer Reviewer:	**Date:**
	21/11/07.
Graham Taylor Operations Manager - Hunter Region	

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Body Report

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1.0 Introduction

Weston Aluminium Pty Ltd (WA) operates an aluminium refining and recycling facility at Kurri Kurri, within the Cessnock Local Government Area. WA seeks approval for modifications to the currently approved dross recycling facility on site. The modifications will provide greater efficiency in operations at the site.

This report was prepared by HLA-Envirosciences Pty Limited (HLA ENSR) on behalf of WA to assess the potential effects on air quality (particulates) resulting from the proposed plant modifications. The assessment was conducted in accordance with guidance provided in the Department of Environment and Climate Change's (DECC) Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC, 2005). The report quantifies the change in impact of the proposed configuration relative to the existing impact as required by the DECC in correspondence dated 2 April 2007.

The AUSPLUME dispersion model (version 6.0) was used to predict ground level concentrations (GLCs) of particulates emitted from the facility. Predicted GLCs were compared to relevant impact assessment criteria to establish the potential effect of the proposed modifications on air quality.

1.1 Background

The modifications sought by WA primarily relate to the installation of new dross pre-processing equipment. This equipment will achieve greater efficiencies in the recycling process and improved environmental performance. The proposed modifications involve:

- Installation of a dross pre-processing facility within the western end of the existing approved ALDEX building.
- Construction of eight dross storage bays by extending the approved ALDEX buildings to the south by approximately six metres to allow trucks delivering dross to the storage bays to reverse into the building and to dump directly into one of the eight bays.
- Use of a new, but previously approved and relocated baghouse for collecting emissions from the dross pre-processing plant.
- Relocation of Baghouse No. 3 (which currently services the Raymond Mill) to an area adjacent to the new storage bays (external to the ALDEX building) to permit preferential exhaust to be applied to two of the eight bays.

WA also seeks approval to construct a new exhaust stack to vent combustion products from the holding side of the existing reverbatory furnace. The effects on air quality from the installation of this stack are addressed in a separate document (Air Quality Impact Assessment – Proposed Reverbatory Furnace Modifications. HLA ENSR, 2007).

The only pollutant emissions from the plant potentially affected by the proposed modifications are particulates (TSP and PM_{10}) and fluoride. While reductions in fluoride emissions may result from the additional pre-processing of material prior to firing in the furnaces, the size of these reductions cannot be estimated at this point and, therefore, were assumed to be unchanged from existing approved levels and hence were not included in this assessment. As such, only changes in particulate levels resulting from the proposed modifications were addressed in this assessment.

2.0 Site activities

2.1 Site Location

The facility is located on Lot 796, Mitchell Avenue, a 22 acre site in the Kurri Kurri industrial area of NSW (see **Figure 1**). Residences are located approximately 700 m to the south (Kurri Kurri) and west (Weston) of the site. The Hydro Aluminium Smelter, whose buffer zone extends to the northern boundary of the WA site, is located approximately 2 km to the north.

2.2 Process Description

The WA facility recovers aluminium from dross, a by-product of the aluminium smelting process. Dross is a dry metallic solid typically composed of aluminium, aluminium oxide, other metal oxides, traces of various fluoride-containing compounds and alloying metals. Bulk dross is currently delivered by truck to the site and stored in one of six bays in the southern portion of the existing main building. Front end loaders are used to retrieve dross from the storage bays and deliver it to the rotary furnaces or Raymond Mill. Approximately 15% - 20% of the material is removed in the Raymond Mill as fines through a baghouse, and the remaining coarser material is then delivered to the rotary furnaces. The agitation in the rotary furnace coupled with the high temperatures liberates aluminium metal, which forms in a pool within the furnace and is tipped into “sows” for solidification. The low metal ash produced from the rotary furnace is transferred to the Metal Recovery Machine where residual molten aluminium is recovered in a spinning action. The residual ash is then cooled in the dross cooler and transferred to a Ball Mill where it is further crushed to release any residual aluminium. During this process fines are extracted for collection in a baghouse, with the residual coarser fraction being returned to the rotary furnaces for further processing.

The plant also recycles scrap aluminium metal, which is fed to a reverbatory furnace.

A detailed evaluation of the existing processing plant has revealed that there are significant savings to be made in processing costs and energy usage by removing the non-metallic portion of the dross from the higher metallic content dross prior to feeding the material to the existing rotary furnace for melting and metal recovery.

WA proposes to deliver dross (via trucks) directly into the eight proposed dross storage bays to be constructed in the extended ALDEX building. During the delivery operation ventilation will be applied to the receiving bay for dust control purposes. Larger material in the dross will be manually separated and pre-processed in a rumbler to remove adhering “bath” material. The fines generated will be extracted via a baghouse, and the coarse material will be delivered to the proposed pre-processing facility. The pre-processing facility will be located within the western end of the of the existing approved ALDEX building.

The remaining dross will be delivered to the pre-processing facility by front end loader. The dross will first pass over a “grizzly” before being transferred to crushers and finally a screen deck. This pre-processing will achieve the removal of non-metallic dross constituents as well as fine particles that would otherwise oxidise in the furnace. Pre-processed dross will then be transferred to the main plant building for storage prior to furnace charge.

During the pre-processing period the dross will be reduced in weight by approximately 30% of the original feed material. The pre-processing facility will replace the existing Raymond Mill which is currently served by Baghouse 3. This baghouse will, therefore, be relocated to the east of the pre-processing facility outside of the ALDEX building and will service the dross bays. An additional (approved) baghouse will also be commissioned to the west of the pre-processing facility to service the pre-processing facility equipment.

The operation of the new facility will not require significant additional labour. Similarly the proposed modifications will not result in additional production at the site.

2.2.1 Emission Sources

The existing and proposed point emission sources are shown in **Figure F1** below.

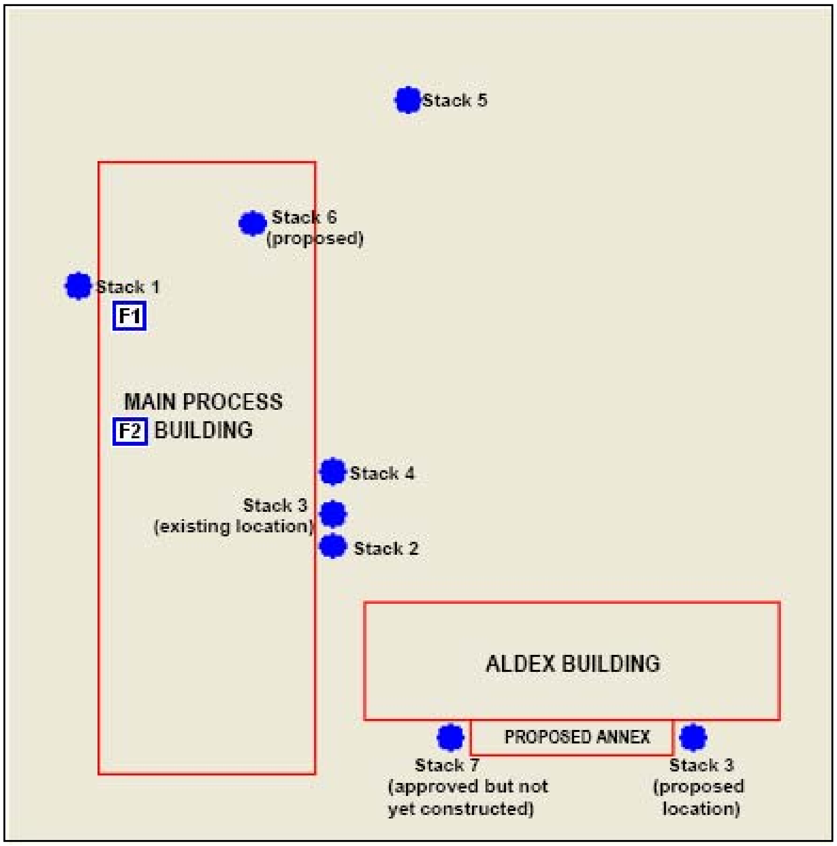

Figure 1: Stack Location Schematic

Existing

The existing storage area in the main building is ventilated via Baghouse No. 2. The Raymond Mill is ventilated to Baghouse No. 3, with the Ball Mill, MRM and rotary cooler venting to Baghouse No. 4. Emissions from the rotary furnaces (designated F1 and F2 above in **Figure F1**) are vented to Baghouse No. 1, which is serviced by a lime injection wet/dry scrubbing system. The reverbatory furnace is serviced by Baghouse No. 5, which is also fitted with a lime scrubbing system.

Proposed

WA proposes to separate emissions from the reverbatory furnace as described in the Air Quality Impact Assessment – Proposed Reverbatory Furnace Modifications (HLA ENSR, 2007). This will require the installation of a new stack (Stack 6) directly above the holding side of the furnace that will vent the natural gas combustion products from the furnace directly to atmosphere. Additionally, WA has approval to install another baghouse and stack (Stack 7) adjacent to the ALDEX building; this baghouse will collect emissions from the pre-processing plant. Furthermore, as the proposed pre-processing facility will replace the functions of the Raymond Mill, the existing Baghouse No. 3 and its associated stack that currently service the Raymond Mill will be relocated to the ALDEX building to preferential exhaust two of the eight dross storage bays.

3.0 Assessment Criteria

Table 1 outlines the relevant DECC impact assessment criteria for particulate matter less than 10 microns in diameter (PM_{10}) and total suspended particulates (TSP).

Table 1: Impact Assessment Criteria

Pollutant	Averaging period	Concentration
PM_{10}	24 hours Annual	50 $\mu g/m^3$ 30 $\mu g/m^3$
TSP	Annual	90 $\mu g/m^3$

4.0 Existing Air Quality

The WA facility is located in an industrial area. Local sources of pollutants include the Hydro Aluminium smelter, coal mines and motor vehicle exhaust. Emissions from the power stations in the Upper Hunter Valley also affect air quality in the area.

4.1 Ambient Air Quality

Holmes Air Sciences recently reported monitoring data from Kurri Kurri Hospital (Holmes, 2006), which is located less than two kilometres from the WA site. These data indicated that the maximum 24-hour average PM_{10} concentration between 24 May 2005 and 11 June 2006 recorded at the hospital was 28.7 $\mu g/m^3$. An ambient 24-hour concentration of 28.7 $\mu g/m^3$ was, therefore, assumed for this assessment. The average of the 24-hour PM_{10} concentrations over this period was 5.9 $\mu g/m^3$, which was used for the annual ambient concentration for this assessment.

The distribution of particle sizes in the Hunter Valley was investigated by the State Pollution Control Commission in 1986 (cited in NSW Minerals Council, 2000). The percentage of particles with a diameter 0 – 10 μm was found to be approximately 40 % of the total dust fraction, which compared well with emission factors developed by the US EPA (e.g. AP-42). For this assessment, therefore, the annual background concentration of TSP was estimated at 14.8 $\mu g/m^3$ (equal to 2.5 times the annual PM_{10} level).

4.2 Meteorology

Hourly wind speed, wind direction, atmospheric stability class and mixed layer height data for 2005 were collected from a meteorological station located at the Hydro Aluminium Smelter.

Quality assurance checks were undertaken by HLA ENSR to assess the appropriateness of the Hydro data. The stability classes identified for each hour of the day were initially determined, and then compared to the wind speeds at which they occurred as shown in **Appendix B**. This comparison indicated that the stability classes are appropriately designated according to DEC (2005). Winds are predominantly from the southeast as shown in **Figure 2**.

Climatological data from the Bureau of Meteorology's Cessnock (Nulkaba) monitoring station for 1966 to 2007 are presented in **Appendix C**. The Nulkaba station is located approximately 10 km to the west of the WA site. These data indicate that average monthly maximum temperatures range from 30.4°C in January (summer) to 17.7 °C in July (winter). Annual average relative humidity levels are 72% and 50% at 9:00 am and 3:00 pm respectively. Rain generally falls on 79 days per year with an average recorded rainfall of 748 mm.

5.0 Methodology

5.1 Dispersion Modelling

Atmospheric dispersion modelling was conducted using AUSPLUME in accordance with the DECC's approved methods (DEC, 2005). This document prescribes calculation modes accounting for terrain effects, building wake effects, horizontal and vertical dispersion curves, buoyancy effects, surface roughness, plume rise, wind speed categories and wind profile exponents.

5.2 Modelling Scenarios

Two scenarios were utilised in this assessment:

- Scenario 1, representing existing particulate emissions from the facility.
- Scenario 2, representing particulate emissions following the proposed modifications to the facility that consist of:
    - relocation of Baghouse 3 from the Raymond Mill (which will cease to operate) to the pre-processing facility bays;
    - the addition of Stack 6 (that will vent small quantities of natural gas derived particulates generated from the combustion of natural gas in the reverbatory furnace); and
    - the addition of Stack 7.

The assessment assumed operations occur 24 hours per day, 7 days a week over 365 days a year. This was a conservative assumption that did not account for plant shut downs and normal operating variations.

5.3 Model Inputs

Modelling input files are contained in **Appendix A**.

5.3.1 Source Characteristics

Details of the characteristics of each of the existing (Stacks 1 – 5) and proposed (Stacks 6 and 7) stacks are provided in **Table 2**. Please note that the source characteristics of Stack 3 were assumed to remain unchanged following the relocation. Following discussion with WA, the characteristics of Stack 7 were assumed to be higher than those assumed for the relocated Stack 3.

Table 2: Source Characteristics

Parameter	Stack Number						
	1	2	3	4	5	6	7
Velocity (m/s)	12.2	13.7	13.9	15.7	16.2	9.0	19.8
Height (m)	15	15	15	15	20	18	15
Internal diameter (m)	1.650	1.265	1.0	1.395	1.49	0.6	1.5
Temperature (^{o}C)	70.6	27.9	27.4	31.1	86.6	250.0	27.4
Area (m^2) [1]	2.1	1.3	0.8	1.5	1.7	0.3	0.77
Flow (m^3/s) [2]	26.1	17.2	10.9	23.9	28.3	2.5	35.0

[1] Area calculated from the internal diameter

[2] Flow calculated using the calculated area and measured / estimated velocity. These data represent stack condition volumetric flow rates (VFR)

5.3.2 Emissions Inventory

Emissions from Stacks 1 and 5 were determined from stack emission testing conducted by HLA ENSR between 2004 and 2006. Emissions from Stack 6 were estimated using The Combustion Database (v. 2.4 Aug 04) developed by EPA (Vic) for use with reporting for the National Pollutant Inventory (see **Appendix D** for output). As Stack 6 will vent natural gas combustion products from the reverbatory furnace, all particulate emissions were assumed to be PM_{10} as natural gas combustion is a relatively clean process. TSP emissions from Stack 7 and the relocated Stack 3 (designated 3b in **Table 3**) were conservatively assumed to be 75% of the Group 6 limits (i.e. 75% of 20 mg/m^3 = 15 mg/m^3). The ratio of PM_{10} to TSP for the existing Stack 3 (2.87) was then used to determine PM_{10} emissions for Stacks 7 and 3b (i.e. 15 / 2.87 = 5.2 mg/m^3).

Table 3: Emissions Inventory

Pollutants[3]	Stack Emissions (g/s)							
	1	2	3a[1]	3b[2]	4	5	6	7
Scenario 1 (existing)								
PM_{10}	0.190	0.044	0.015	N/A	0.100	0.140	N/A	N/A
TSP	0.190	0.044	0.042	N/A	0.185	0.183	N/A	N/A
Scenario 2 (proposed)								
PM_{10}	0.190	0.044	N/A	0.051	0.100	0.140	0.018	0.165
TSP	0.190	0.044	N/A	0.146	0.185	0.183	0.018	0.477

[1] Stack 3 - existing location

[2] Stack 3 - proposed location

[3] Where PM_{10} emission rates exceeded total particulate emissions rates (due to stack measurement limitations), the maximum of the two measurements was used for the emission rates and PM_{10} was assumed to be the same as total particulate.

5.3.3 Terrain Effects

The ortho-topographical maps for Cessnock (9132-2N) and Beresfield (9232-2N) were used to determine the terrain in the area surrounding the WA facility. A terrain file was prepared and entered into AUSPLUME. A 5 km x 4 km grid with a spacing of 200 m was used.

5.3.4 Building Wake Effects

The dispersion of pollutants around the WA facility is likely to be affected by aerodynamic wakes generated by winds having to flow around buildings. Building wakes generally decrease the distance downwind at which the plume comes into contact with the ground. This may result in higher ground level pollutant concentrations closer to the emission source.

The Building Profile Input Program (BPIP) utility option in the AUSPLUME program was used to enter building dimension (details are shown as part of the AUSPLUME input file in **Appendix A**). These dimensions were subsequently incorporated into the pollutant dispersion calculations to allow concessions for wake effects in the determination of ground level pollutant concentrations.

6.0 Modelling Results and Impact Assessment

The maximum GLCs of particulates predicted by the dispersion modelling, and the cumulative concentrations, are shown in **Table 4**. Isopleths showing the existing and predicted ground level concentrations are shown in **Figures 3 – 5**. The cumulative concentrations represent the sum of the existing maximum ambient pollutant levels (from **Section 4.1**) with the maximum predicted levels from the dispersion modelling for Scenario 2, which are then assessed against the guideline criteria.

Table 4: Maximum Predicted Ground Level Concentrations

Pollutant	Averaging Period	Predicted GLCs ($\mu g/m^3$)		Ambient Concentration ($\mu g/m^3$) Scenario 2 (proposed)	Cumulative Concentration (Scenario 2) ($\mu g/m^3$)	Criteria ($\mu g/m^3$)
		Scenario 1 (existing)	Scenario 2 (proposed)			
PM_{10}	24 hours	24.1	35.8	28.7	64.5	50
	Annual	2.8	4.5	5.9	10.4	30
TSP	Annual	4.1	8.7	14.8	23.5	90

As indicated in **Table 4**, the cumulative annual pollutant concentrations of PM_{10} and TSP were well below the assessment criteria. In contrast, the predicted maximum cumulative 24-hour PM_{10} concentration exceeded the criterion as a result of the elevated background PM_{10} level. This exceedance is noted to occur within the premises boundary. As shown in **Figure 3**, predicted ground level concentrations at residential areas were below the assessment criterion. The existing pattern and magnitude of emissions from the facility are not expected to change significantly following the proposed modifications as can be seen in **Figures 3 – 5**.

7.0 Conclusion

The proposed modifications at Weston Aluminium involve the installation of a new baghouse/ stack (Stack 7) and another stack (Stack 6) and the relocation of an existing baghouse/stack to service the dross storage bays (Stack 3). Dispersion modelling of particulate emissions from the facility was conducted using conservative estimates of particulate emissions from the two new and one relocated emission point sources and measured data for the other point sources. The results of the modelling indicated that ground level concentrations of particulates (TSP and PM_{10}) at residential areas surrounding the facility would be below the guideline assessment criteria following the proposed modifications. No adverse effects on air quality are anticipated as a result of the proposed modifications.

8.0 References

DEC 2005, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, Department of Environment and Conservation NSW, Sydney.

Holmes Air Sciences, 2006, Air Quality Impact Assessment, Hunter Enviro-Mining (Operations) Pty Limited.

NSW Minerals Council, 2000. Interim Report: Particulate Matter and Mining – A NSW Minerals Council Technical Paper. NSW Minerals Council, Sydney.

Figures

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PROJECT-FILE NAME	N5009629
DATE	September 2007
DRAWN	HM
APPROVED	DR

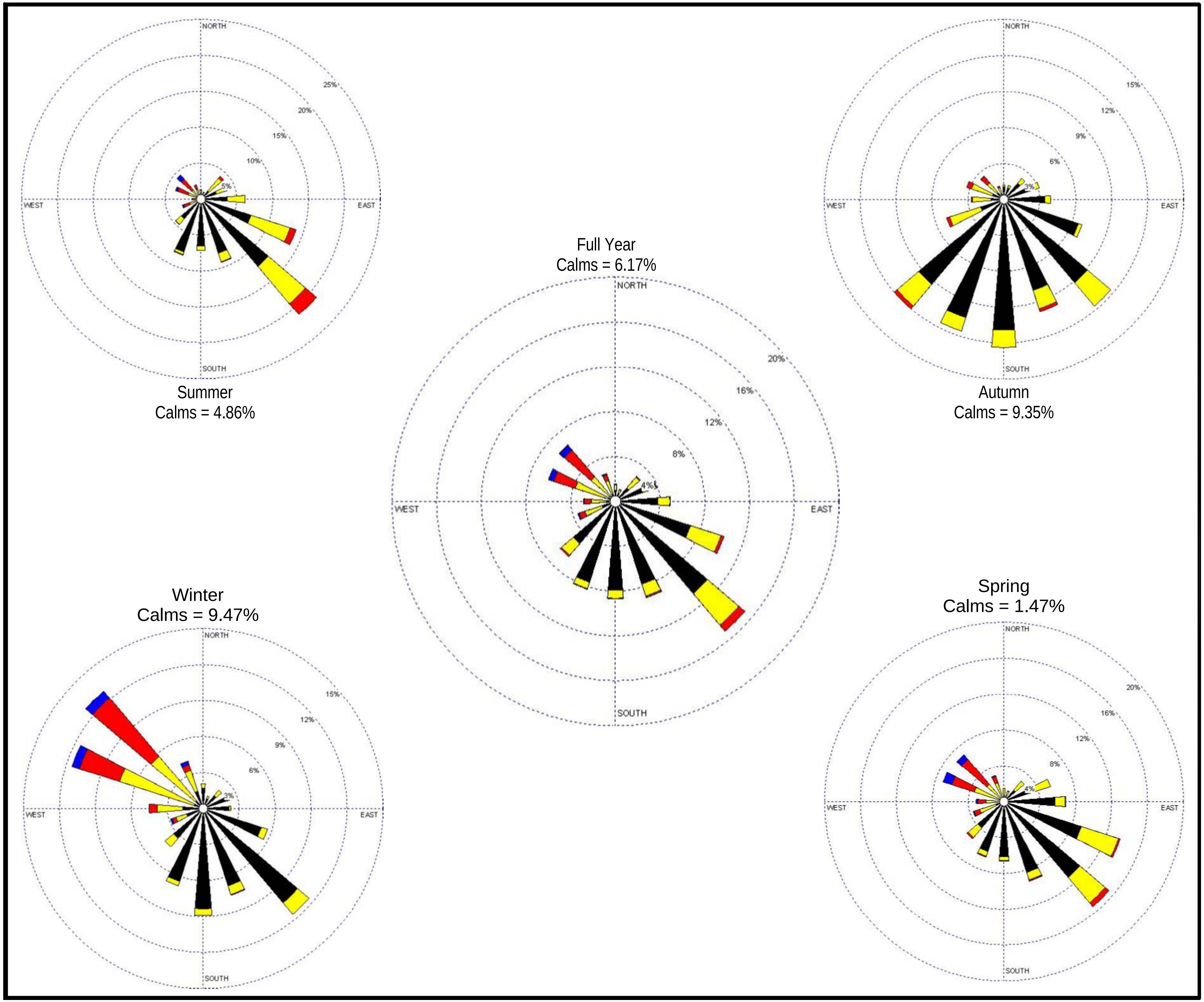
Site Location

Air Quality Impact Assessment
Proposed Pre-Processing Facility
Weston Aluminium

HLA

FIGURE

1



Summer
Calms = 4.86%

Full Year
Calms = 6.17%

Autumn
Calms = 9.35%

Winter
Calms = 9.47%

Spring
Calms = 1.47%

PROJECT-FILE NAME	N5009629
DATE	September 2007
DRAWN	HM
APPROVED	DR

WIND SPEED
(m/s)

🟦	>= 11.1
🟩	8.8 - 11.1
🟦	5.7 - 8.8
🟥	3.6 - 5.7
🟨	2.1 - 3.6
⬛	0.5 - 2.1

Wind Roses

Air Quality Impact Assessment
Proposed Pre-Processing Facility
Weston Aluminium

HLA

FIGURE
2

PROJECT-FILE NAME	N5009629
DATE	November 2007
DRAWN	EH
APPROVED	DR

N

🟩 Scenario 1 (Existing)
⬜ Scenario 2 (Proposed)

PM10 Comparison - 24 Hour Averages

Air Quality Impact Assessment
Proposed Pre-Processing Facility
Weston Aluminium

HLA

FIGURE
3

PROJECT-FILE NAME	N5009629
DATE	November 2007
DRAWN	EH
APPROVED	DR

- 🟩 Scenario 1 (Existing)
- ⬜ Scenario 2 (Proposed)

PM10 Comparison - Annual Averages

Air Quality Impact Assessment
Proposed Pre-Processing Facility
Weston Aluminium

HLA

FIGURE

4

PROJECT-FILE NAME N5009629
DATE November 2007
DRAWN EH
APPROVED DR

N

- 🟩 Scenario 1 (Existing)
- ⬜ Scenario 2 (Proposed)

TSP Comparison - Annual Averages

Air Quality Impact Assessment
Proposed Pre-Processing Facility
Weston Aluminium

HLA

FIGURE
5

Appendix A: Modelling Input Files

```
1               ________________________________________________

                  Weston Modification AQIA - TSP - Scenario 1

                ________________________________________________

 Concentration or deposition                          Concentration
 Emission rate units                                  grams/second
 Concentration units                                  microgram/m3
 Units conversion factor                              1.00E+06
 Constant background concentration                             0.00E+00
 Terrain effects                                      Egan method
 Smooth stability class changes?                      No
 Other stability class adjustments ("urban modes")    None
 Ignore building wake effects?                        No
 Decay coefficient (unless overridden by met. file)   0.000
 Anemometer height                                    10 m
 Roughness height at the wind vane site               0.300 m

                   DISPERSION CURVES
 Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
 Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
 Horizontal dispersion curves for sources >100m high  Briggs Rural
 Vertical  dispersion  curves for sources >100m high  Briggs Rural
 Enhance horizontal plume spreads for buoyancy?       Yes
 Enhance  vertical  plume spreads for buoyancy?       Yes
 Adjust horizontal P-G formulae for roughness height? Yes
 Adjust  vertical  P-G formulae for roughness height? Yes
 Roughness height                                     0.400m
 Adjustment for wind directional shear                None

                    PLUME RISE OPTIONS
 Gradual plume rise?                                  Yes
 Stack-tip downwash included?                         Yes
 Building downwash algorithm:                        PRIME method.
 Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
 Partial penetration of elevated inversions?          No
 Disregard temp. gradients in the hourly met. file?   No

 and in the absence of boundary-layer potential temperature gradients
 given by the hourly met. file, a value from the following table
 (in K/m) is used:

    Wind Speed                Stability Class
     Category        A      B      C      D      E      F
   ________________________________________________________
         1         0.000  0.000  0.000  0.000  0.020  0.035
         2         0.000  0.000  0.000  0.000  0.020  0.035
         3         0.000  0.000  0.000  0.000  0.020  0.035
         4         0.000  0.000  0.000  0.000  0.020  0.035
         5         0.000  0.000  0.000  0.000  0.020  0.035
         6         0.000  0.000  0.000  0.000  0.020  0.035

 WIND SPEED CATEGORIES
 Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

 WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

 AVERAGING TIMES
  average over all hours

 _____________________________________________________________________________
1               ________________________________________________

                  Weston Modification AQIA - PM10 - Scenario 1

                             SOURCE CHARACTERISTICS

                ________________________________________________


                   STACK SOURCE: S1-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
```

```
   57270    69294        12m          15m        1.65m       70C    12.2m/s

                ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104   99  104  105
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       104  105  103   98   90   80   67   52   35   52   67
80
 Along-flow distance from stack   -77  -73  -67  -59  -48  -37  -24  -11    3   -1   -4
-7
 Across-flow distance from stack  -25  -29  -33  -35  -36  -36  -35  -33  -30  -25  -21
-15

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          98   90   80   67   52   35   52   67   80   90   98
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        90   98  103  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack   -11  -13  -16  -18  -19  -20  -26  -32  -36  -40  -42
-43
 Across-flow distance from stack   -9   -3    3    9   15   21   25   29   33   35   36
36

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         105  104   99  104  105  103   98   90   80   67   52
35
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        67   52   35   52   67   80   90   98  103  105  104
99
 Along-flow distance from stack   -43  -41  -38  -51  -63  -72  -80  -85  -87  -87  -84
-79
 Across-flow distance from stack   35   33   30   25   21   15    9    3   -3   -9  -15
-21

               (Constant) emission rate = 1.84E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S5-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324        12m          20m        1.49m       86C    16.2m/s

                ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104    0    0    0
0
 Effective building height         12   12   12   12   12   12   12   12    0    0    0
0
 Along-flow building length       104  105  103   98   90   80   67   52    0    0    0
0
 Along-flow distance from stack  -116 -120 -119 -116 -108  -98  -84  -68    0    0    0
0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0    0    0
0

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width           0    0  109  113  113  110   52   67   80   90   98
103
 Effective building height          0    0   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         0    0  133  122  108   99  104  105  103   98   90
80
 Along-flow distance from stack     0    0  -16   -8    1   10   12   15   16   17   18
18
```

```
 Across-flow distance from stack    0    0  -43  -28  -12    5  -22  -10    2   13   25
35

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          105  104    0    0    0    0    0    0  109  113  113
110
 Effective building height          12   12    0    0    0    0    0    0   12   12   12
12
 Along-flow building length         67   52    0    0    0    0    0    0  133  122  108
99
 Along-flow distance from stack     18   17    0    0    0    0    0    0 -117 -114 -109
-109
 Across-flow distance from stack    45   53    0    0    0    0    0    0   43   28   12
-5

               (Constant) emission rate = 1.83E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S2-PM

   X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
  57311    69250        12m           15m        1.26m       28C    13.7m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width           52   67   80   90   98  103  105  104   99   30   41
50
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        104  105  103   98   90   80   67   52   35   69   69
68
 Along-flow distance from stack    -41  -46  -49  -51  -52  -50  -48  -44  -38    6    7
8
 Across-flow distance from stack    23   24   25   25   24   23   21   18   15  -10   -2
5

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width           58   64   68   67   52   35   52   67   80   90   98
103
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         64   58   50  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack      8    9    9  -73  -70  -64  -63  -59  -54  -47  -39
-29
 Across-flow distance from stack    12   19   25  -14  -18  -21  -23  -24  -25  -25  -24
-23

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          105  104   99   30   41   50   58   64   68   67   52
35
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         67   52   35   69   69   68   64   58   50  105  104
99
 Along-flow distance from stack    -19   -8    3  -75  -77  -75  -72  -66  -59  -32  -34
-35
 Across-flow distance from stack   -21  -18  -15   10    2   -5  -12  -19  -25   14   18
21

               (Constant) emission rate = 2.50E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S3A-PM

   X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
  57311    69257        12m           15m        1.00m       27C    13.9m/s

            ______ Effective building dimensions (in metres) ______
```

```
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104   99   30   41
50
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       104  105  103   98   90   80   67   52   35   69   69
68
 Along-flow distance from stack   -48  -52  -55  -57  -56  -54  -50  -45  -38    7    9
11
 Across-flow distance from stack   21   22   22   21   19   17   14   11    8  -16   -9
-1

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          58   64   68   67   52   35   52   67   80   90   98
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        64   58   50  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack    13   14   15  -67  -63  -57  -56  -53  -48  -42  -34
-26
 Across-flow distance from stack    7   14   22  -17  -19  -21  -21  -22  -22  -21  -19
-17

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         105  104   99   30   41   50   58   64   68   67   52
35
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        67   52   35   69   69   68   64   58   50  105  104
99
 Along-flow distance from stack   -17   -7    3  -77  -79  -79  -76  -72  -65  -38  -41
-42
 Across-flow distance from stack  -14  -11   -8   16    9    1   -7  -14  -22   17   19
21

               (Constant) emission rate = 4.20E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S4-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57311    69264       12m           15m         1.39m       31C    15.7m/s

                  ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104   99  104   41
50
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       104  105  103   98   90   80   67   52   35   52   69
68
 Along-flow distance from stack   -55  -59  -61  -62  -61  -57  -52  -46  -38  -46   12
15
 Across-flow distance from stack   20   19   18   16   14   11    7    4    1   -3  -15
-7

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          58   64   68   67   52   35   52   67   80   90   98
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        64   58   50  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack    17   19   21  -60  -56  -50  -49  -46  -42  -36  -30
-22
 Across-flow distance from stack    1   10   18  -19  -20  -21  -20  -19  -18  -16  -14
-11
```

```
 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          105  104   99  104   41   50   58   64   68   67   52
35
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         67   52   35   52   69   68   64   58   50  105  104
99
 Along-flow distance from stack    -14   -6    3   -6  -81  -82  -81  -77  -71  -45  -48
-49
 Across-flow distance from stack    -7   -4   -1    3   15    7   -1  -10  -18   19   20
21

               (Constant) emission rate = 1.85E-01 grams/second
                   No gravitational settling or scavenging.

 _____________________________________________________________________________

1               ________________________________________________

                  Weston Modification AQIA - PM10 - Scenario 1

                               RECEPTOR LOCATIONS

                ________________________________________________

 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m

 _____________________________________________________________________________

 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r


 _____________________________________________________________________________

                    AVERAGE OVER ALL HOURS AND FOR ALL SOURCES
                                 in microgram/m3

    X (km):  55.200   55.400   55.600   55.800   56.000   56.200
    _________________________________________________________________
   Y (km)
   70.800     4.38E-01 4.91E-01 5.42E-01 6.08E-01 6.73E-01 6.96E-01
   70.600     4.88E-01 5.29E-01 5.56E-01 5.58E-01 5.53E-01 5.82E-01
   70.400     5.16E-01 4.87E-01 4.49E-01 4.45E-01 4.93E-01 5.64E-01
   70.200     3.79E-01 4.14E-01 5.06E-01 5.96E-01 6.02E-01 7.16E-01
   70.000     3.35E-01 3.97E-01 5.46E-01 6.40E-01 7.48E-01 7.84E-01
   69.800     2.69E-01 3.17E-01 4.24E-01 5.37E-01 6.26E-01 7.52E-01
   69.600     2.27E-01 2.45E-01 2.68E-01 3.03E-01 3.35E-01 3.79E-01
   69.400     1.79E-01 1.87E-01 1.91E-01 1.99E-01 2.30E-01 2.68E-01
   69.200     1.55E-01 1.57E-01 1.69E-01 1.69E-01 1.97E-01 2.26E-01
   69.000     1.08E-01 1.05E-01 1.14E-01 1.13E-01 1.47E-01 1.64E-01
   68.800     7.06E-02 8.14E-02 9.51E-02 1.05E-01 1.13E-01 1.16E-01
   68.600     6.59E-02 7.49E-02 8.13E-02 8.42E-02 8.89E-02 9.62E-02
   68.400     5.15E-02 6.37E-02 6.66E-02 7.08E-02 7.51E-02 7.39E-02
   68.200     5.31E-02 5.55E-02 6.11E-02 6.10E-02 5.71E-02 4.88E-02
   68.000     4.91E-02 5.00E-02 5.18E-02 4.84E-02 4.17E-02 3.50E-02
   67.800     4.12E-02 4.12E-02 3.99E-02 3.51E-02 3.17E-02 2.66E-02
   67.600     3.56E-02 3.18E-02 3.04E-02 2.69E-02 2.42E-02 2.04E-02


    X (km):  56.400   56.600   56.800   57.000   57.200   57.400
    _________________________________________________________________
   Y (km)
   70.800     6.89E-01 5.76E-01 4.49E-01 3.93E-01 3.86E-01 4.35E-01
   70.600     5.71E-01 5.67E-01 5.07E-01 4.47E-01 4.29E-01 4.91E-01
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70.400      6.25E-01 6.01E-01 6.31E-01 6.23E-01 5.90E-01 5.03E-01
70.200      6.83E-01 8.11E-01 8.98E-01 7.88E-01 4.57E-01 5.54E-01
70.000      9.08E-01 1.16E+00 9.71E-01 8.04E-01 6.22E-01 7.78E-01
69.800      6.49E-01 7.29E-01 8.32E-01 9.42E-01 9.21E-01 1.11E+00
69.600      4.43E-01 5.77E-01 6.60E-01 9.52E-01 1.23E+00 1.65E+00
69.400      3.17E-01 4.13E-01 5.46E-01 9.26E-01 1.36E+00 2.36E+00
69.200      2.72E-01 3.66E-01 5.32E-01 8.09E-01 1.67E+00 3.79E+00
69.000      1.78E-01 2.41E-01 3.02E-01 3.79E-01 3.05E-01 5.37E-01
68.800      1.32E-01 1.64E-01 1.61E-01 1.42E-01 1.46E-01 2.43E-01
68.600      1.01E-01 9.06E-02 7.97E-02 7.28E-02 8.58E-02 1.48E-01
68.400      6.44E-02 5.19E-02 4.45E-02 5.02E-02 6.14E-02 1.08E-01
68.200      4.14E-02 3.31E-02 3.17E-02 4.12E-02 5.07E-02 8.08E-02
68.000      2.89E-02 2.34E-02 2.57E-02 3.37E-02 4.17E-02 5.85E-02
67.800      2.13E-02 1.93E-02 2.16E-02 2.76E-02 3.49E-02 4.72E-02
67.600      1.76E-02 1.82E-02 2.03E-02 2.36E-02 2.91E-02 4.07E-02

 X (km):   57.600   57.800   58.000   58.200   58.400   58.600
  ______________________________________________________________
Y (km)
70.800      5.06E-01 4.76E-01 3.99E-01 3.25E-01 3.02E-01 2.37E-01
70.600      5.79E-01 4.85E-01 3.75E-01 3.25E-01 3.14E-01 2.35E-01
70.400      5.72E-01 5.15E-01 4.02E-01 3.41E-01 3.13E-01 2.37E-01
70.200      6.60E-01 5.89E-01 4.55E-01 4.30E-01 3.46E-01 2.24E-01
70.000      8.39E-01 6.92E-01 5.84E-01 4.63E-01 2.84E-01 1.80E-01
69.800      9.37E-01 6.81E-01 4.44E-01 3.25E-01 1.75E-01 1.16E-01
69.600      1.13E+00 6.10E-01 2.97E-01 1.75E-01 1.17E-01 8.42E-02
69.400      8.09E-01 3.64E-01 2.02E-01 1.43E-01 9.92E-02 7.43E-02
69.200      1.02E+00 4.85E-01 3.08E-01 2.05E-01 1.29E-01 9.74E-02
69.000      7.95E-01 5.18E-01 3.46E-01 2.23E-01 1.66E-01 1.33E-01
68.800      3.90E-01 3.78E-01 2.77E-01 1.93E-01 1.66E-01 1.40E-01
68.600      2.03E-01 2.50E-01 2.18E-01 1.80E-01 1.45E-01 1.21E-01
68.400      1.29E-01 1.68E-01 1.71E-01 1.51E-01 1.28E-01 1.10E-01
68.200      9.12E-02 1.06E-01 1.22E-01 1.20E-01 1.07E-01 9.77E-02
68.000      6.63E-02 6.94E-02 8.42E-02 9.25E-02 9.33E-02 9.14E-02
67.800      5.39E-02 5.56E-02 6.32E-02 7.58E-02 8.16E-02 8.53E-02
67.600      4.72E-02 4.81E-02 5.17E-02 6.17E-02 7.11E-02 7.39E-02

 X (km):   58.800   59.000   59.200
  ______________________________________________________________
Y (km)
70.800      2.07E-01 1.88E-01 1.66E-01
70.600      2.02E-01 1.69E-01 1.40E-01
70.400      2.00E-01 1.45E-01 1.08E-01
70.200      1.79E-01 1.19E-01 8.31E-02
70.000      1.21E-01 8.12E-02 6.55E-02
69.800      8.45E-02 6.85E-02 5.79E-02
69.600      6.67E-02 5.68E-02 4.97E-02
69.400      6.19E-02 5.63E-02 5.10E-02
69.200      8.28E-02 7.53E-02 6.68E-02
69.000      1.09E-01 1.01E-01 8.63E-02
68.800      1.20E-01 1.09E-01 9.65E-02
68.600      1.12E-01 1.05E-01 9.53E-02
68.400      9.54E-02 9.32E-02 8.56E-02
68.200      9.10E-02 8.34E-02 7.95E-02
68.000      8.61E-02 7.84E-02 7.06E-02
67.800      8.18E-02 7.59E-02 6.60E-02
67.600      7.13E-02 6.97E-02 6.15E-02
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1                      ___________________________________

                         Weston Modification AQIA - PM10 - Scenario 2

                       ___________________________________

 Concentration or deposition                           Concentration
 Emission rate units                                   grams/second
 Concentration units                                   microgram/m3
 Units conversion factor                               1.00E+06
 Constant background concentration                              0.00E+00
 Terrain effects                                       Egan method
 Smooth stability class changes?                       No
 Other stability class adjustments ("urban modes")     None
 Ignore building wake effects?                         No
 Decay coefficient (unless overridden by met. file)    0.000
 Anemometer height                                     10 m
 Roughness height at the wind vane site                0.300 m

                    DISPERSION CURVES
 Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
 Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
 Horizontal dispersion curves for sources >100m high  Briggs Rural
 Vertical  dispersion  curves for sources >100m high  Briggs Rural
 Enhance horizontal plume spreads for buoyancy?       Yes
 Enhance  vertical  plume spreads for buoyancy?       Yes
 Adjust horizontal P-G formulae for roughness height? Yes
 Adjust  vertical  P-G formulae for roughness height? Yes
 Roughness height                                     0.400m
 Adjustment for wind directional shear                None

                     PLUME RISE OPTIONS
 Gradual plume rise?                                  Yes
 Stack-tip downwash included?                         Yes
 Building downwash algorithm:                        PRIME method.
 Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
 Partial penetration of elevated inversions?          No
 Disregard temp. gradients in the hourly met. file?   No

 and in the absence of boundary-layer potential temperature gradients
 given by the hourly met. file, a value from the following table
 (in K/m) is used:

    Wind Speed               Stability Class
     Category        A      B      C      D      E      F
   _________________________________________________________
        1          0.000  0.000  0.000  0.000  0.020  0.035
        2          0.000  0.000  0.000  0.000  0.020  0.035
        3          0.000  0.000  0.000  0.000  0.020  0.035
        4          0.000  0.000  0.000  0.000  0.020  0.035
        5          0.000  0.000  0.000  0.000  0.020  0.035
        6          0.000  0.000  0.000  0.000  0.020  0.035

 WIND SPEED CATEGORIES
 Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

 WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

 AVERAGING TIMES
 24 hours
  average over all hours

 _____________________________________________________________________________
1                      ___________________________________

                         Weston Modification AQIA - PM10

                             SOURCE CHARACTERISTICS

                       ___________________________________


                    STACK SOURCE: S1-PM
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    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57270    69294       12m           15m        1.65m       70C    12.2m/s

                ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104   99  104  105
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       104  105  103   98   90   80   67   52   35   52   67
80
 Along-flow distance from stack   -77  -73  -67  -59  -48  -37  -24  -11    3   -1   -4
-7
 Across-flow distance from stack  -25  -29  -33  -35  -36  -36  -35  -33  -30  -25  -21
-15

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          98   90   80   67   52   35   52   67   80   90   98
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        90   98  103  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack   -11  -13  -16  -18  -19  -20  -26  -32  -36  -40  -42
-43
 Across-flow distance from stack   -9   -3    3    9   15   21   25   29   33   35   36
36

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         105  104   99  104  105  103   98   90   80   67   52
35
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        67   52   35   52   67   80   90   98  103  105  104
99
 Along-flow distance from stack   -43  -41  -38  -51  -63  -72  -80  -85  -87  -87  -84
-79
 Across-flow distance from stack   35   33   30   25   21   15    9    3   -3   -9  -15
-21

               (Constant) emission rate = 1.90E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S5-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324       12m           20m        1.49m       86C    16.2m/s

                ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104    0    0    0
0
 Effective building height         12   12   12   12   12   12   12   12    0    0    0
0
 Along-flow building length       104  105  103   98   90   80   67   52    0    0    0
0
 Along-flow distance from stack  -116 -120 -119 -116 -108  -98  -84  -68    0    0    0
0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0    0    0
0

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width           0    0  109  113  113  110   52   67   80   90   98
103
 Effective building height          0    0   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         0    0  133  122  111   99  104  105  103   98   90
80
 Along-flow distance from stack     0    0  -16   -8    1   10   12   15   16   17   18
```

```
18
 Across-flow distance from stack    0    0  -43  -28  -12    5  -22  -10    2   13   25
35

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         105  104    0    0    0    0    0    0  109  113  113
110
 Effective building height         12   12    0    0    0    0    0    0   12   12   12
12
 Along-flow building length        67   52    0    0    0    0    0    0  133  122  111
99
 Along-flow distance from stack    18   17    0    0    0    0    0    0 -117 -114 -112
-109
 Across-flow distance from stack   45   53    0    0    0    0    0    0   43   28   12
-5

               (Constant) emission rate = 1.40E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S6-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57298    69304        12m           18m        0.60m      250C     9.0m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104   99  104  105
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       104  105  103   98   90   80   67   52   35   52   67
80
 Along-flow distance from stack   -92  -92  -90  -84  -76  -66  -54  -40  -25  -26  -27
-27
 Across-flow distance from stack    1   -6  -13  -20  -25  -30  -35  -38  -40  -40  -40
-38

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          98   90   80   67   52   35   52   67   80   90   98
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        90   98  103  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack   -26  -24  -21  -18  -14  -10  -12  -13  -14  -14  -14
-14
 Across-flow distance from stack  -35  -31  -26  -21  -14   -8   -1    6   13   20   25
30

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         105  104   99  104  105  103   98   90   80   67   52
35
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        67   52   35   52   67   80   90   98  103  105  104
99
 Along-flow distance from stack   -13  -12  -10  -25  -40  -53  -65  -75  -82  -87  -89
-89
 Across-flow distance from stack   35   38   40   40   40   38   35   31   26   21   14
 8

               (Constant) emission rate = 1.80E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S2-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57311    69250        12m           15m        1.26m       28C    13.7m/s
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```
             ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width         52   67   80   90   98  103  105  104   99   33   41
50
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length      104  105  103   98   90   80   67   52   35   69   69
68
 Along-flow distance from stack  -41  -46  -49  -51  -52  -50  -48  -44  -38    6    7
8
 Across-flow distance from stack  23   24   25   25   24   23   21   18   15  -11   -2
 5

 Flow direction                 130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width         58   64   68   67   52   35   52   67   80   90   98
103
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       64   58   50  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack    8    9    9  -73  -70  -64  -63  -59  -54  -47  -39
-29
 Across-flow distance from stack  12   19   25  -14  -18  -21  -23  -24  -25  -25  -24
-23

 Flow direction                 250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width        105  104   99   33   41   50   58   64   68   67   52
35
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       67   52   35   69   69   68   64   58   50  105  104
99
 Along-flow distance from stack  -19   -8    3  -75  -77  -75  -72  -66  -59  -32  -34
-35
 Across-flow distance from stack -21  -18  -15   11    2   -5  -12  -19  -25   14   18
21

               (Constant) emission rate = 4.40E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S3B-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57369    69221       12m           15m        1.00m       27C    13.9m/s

             ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width         69   69   68   64   58   50   41   33   25   33   41
50
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       33   41   50   58   64   68   69   69   67   69   69
68
 Along-flow distance from stack   -9  -15  -24  -32  -39  -44  -49  -52  -53  -56  -57
-57
 Across-flow distance from stack  21   23   23   23   22   21   18   14   10    7    5
 1

 Flow direction                 130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width         58   64   68   69   69   67   69   69   68   64   58
50
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       64   58   50   41   33   25   33   41   50   58   64
68
 Along-flow distance from stack  -55  -51  -46  -39  -31  -22  -24  -25  -26  -26  -25
-23
 Across-flow distance from stack  -3   -7  -11  -14  -17  -20  -21  -23  -23  -23  -22
-21
```

```
 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          41   33   25   33   41   50   58   64   68   69   69
67
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        69   69   67   69   69   68   64   58   50   41   33
25
 Along-flow distance from stack   -21  -18  -14  -13  -12  -11   -9   -7   -4   -2   -2
-3
 Across-flow distance from stack  -18  -14  -10   -7   -5   -1    3    7   11   14   17
20

              (Constant) emission rate = 5.10E-02 grams/second
                  No gravitational settling or scavenging.


                   STACK SOURCE: S4-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57311    69264        12m           15m        1.39m       31C    15.7m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104   99  104   41
50
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       104  105  103   98   90   80   67   52   35   52   69
68
 Along-flow distance from stack   -55  -59  -61  -62  -61  -57  -52  -46  -38  -46   12
15
 Across-flow distance from stack   20   19   18   16   14   11    7    4    1   -3  -15
-7

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          58   64   68   67   52   35   52   67   80   90   98
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        64   58   50  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack    17   19   21  -60  -56  -50  -49  -46  -42  -36  -30
-22
 Across-flow distance from stack    1   10   18  -19  -20  -21  -20  -19  -18  -16  -14
-11

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         105  104   99  104   41   50   58   64   68   67   52
35
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        67   52   35   52   69   68   64   58   50  105  104
99
 Along-flow distance from stack   -14   -6    3   -6  -81  -82  -81  -77  -71  -45  -48
-49
 Across-flow distance from stack   -7   -4   -1    3   15    7   -1  -10  -18   19   20
21

              (Constant) emission rate = 1.00E-01 grams/second
                  No gravitational settling or scavenging.


                   STACK SOURCE: S7-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57330    69221        12m           15m        1.50m       27C    19.8m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
```

```
 Effective building width          69   69   68   64   58   50   41   33   25   33   41
50
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        33   41   50   58   64   68   69   69   67   69   69
68
 Along-flow distance from stack    -2   -2   -4   -7   -9  -11  -12  -13  -14  -18  -21
-23
 Across-flow distance from stack  -17  -14  -11   -7   -3    1    5    7   10   14   18
21

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          58   64   68   67   52   67   69   69   68   64   58
50
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        64   58   50  105  104   25   33   41   50   58   64
68
 Along-flow distance from stack   -25  -26  -26 -107 -101  -22  -31  -39  -46  -51  -55
-57
 Across-flow distance from stack   22   23   23  -22  -31   20   17   14   11    7    3
-1

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          41   33   25   33   41   50   58   64   68   67   52
67
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        69   69   67   69   69   68   64   58   50  105  104
25
 Along-flow distance from stack   -57  -56  -53  -52  -49  -44  -39  -32  -24    2   -2
-3
 Across-flow distance from stack   -5   -7  -10  -14  -18  -21  -22  -23  -23   22   31
-20

               (Constant) emission rate = 1.65E-01 grams/second
                   No gravitational settling or scavenging.

 ____________________________________________________________________________

1                      ___________________________________

                          Weston Modification AQIA - PM10

                                RECEPTOR LOCATIONS

                       ___________________________________

 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m
```

```
1               ________________________________________________

                  Weston Modification AQIA - PM10 - Scenario 1

                ________________________________________________

 Concentration or deposition                          Concentration
 Emission rate units                                  grams/second
 Concentration units                                  microgram/m3
 Units conversion factor                              1.00E+06
 Constant background concentration                             0.00E+00
 Terrain effects                                      Egan method
 Smooth stability class changes?                      No
 Other stability class adjustments ("urban modes")    None
 Ignore building wake effects?                        No
 Decay coefficient (unless overridden by met. file)   0.000
 Anemometer height                                    10 m
 Roughness height at the wind vane site               0.300 m

                    DISPERSION CURVES
 Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
 Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
 Horizontal dispersion curves for sources >100m high  Briggs Rural
 Vertical  dispersion  curves for sources >100m high  Briggs Rural
 Enhance horizontal plume spreads for buoyancy?       Yes
 Enhance  vertical  plume spreads for buoyancy?       Yes
 Adjust horizontal P-G formulae for roughness height? Yes
 Adjust  vertical  P-G formulae for roughness height? Yes
 Roughness height                                     0.400m
 Adjustment for wind directional shear                None

                     PLUME RISE OPTIONS
 Gradual plume rise?                                  Yes
 Stack-tip downwash included?                         Yes
 Building downwash algorithm:                        PRIME method.
 Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
 Partial penetration of elevated inversions?          No
 Disregard temp. gradients in the hourly met. file?   No

 and in the absence of boundary-layer potential temperature gradients
 given by the hourly met. file, a value from the following table
 (in K/m) is used:

    Wind Speed                Stability Class
     Category       A      B      C      D      E      F
   ________________________________________________________
        1        0.000  0.000  0.000  0.000  0.020  0.035
        2        0.000  0.000  0.000  0.000  0.020  0.035
        3        0.000  0.000  0.000  0.000  0.020  0.035
        4        0.000  0.000  0.000  0.000  0.020  0.035
        5        0.000  0.000  0.000  0.000  0.020  0.035
        6        0.000  0.000  0.000  0.000  0.020  0.035

 WIND SPEED CATEGORIES
 Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

 WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

 AVERAGING TIMES
 24 hours
  average over all hours

 _____________________________________________________________________________

1               ________________________________________________

                  Weston Modification AQIA - PM10 - Scenario 1
```

SOURCE CHARACTERISTICS

```
                    STACK SOURCE: S1-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57270    69294        12m          15m        1.65m       70C    12.2m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width         52   67   80   90   98  103  105  104   99
104  105  103
 Effective building height        12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length      104  105  103   98   90   80   67   52   35
52   67   80
 Along-flow distance from stack  -77  -73  -67  -59  -48  -37  -24  -11    3
-1   -4   -7
 Across-flow distance from stack -25  -29  -33  -35  -36  -36  -35  -33  -30
-25  -21  -15

 Flow direction                 130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width         98   90   80   67   52   35   52   67   80
90   98  103
 Effective building height        12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       90   98  103  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack  -11  -13  -16  -18  -19  -20  -26  -32  -36
-40  -42  -43
 Across-flow distance from stack  -9   -3    3    9   15   21   25   29   33
35   36   36

 Flow direction                 250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width        105  104   99  104  105  103   98   90   80
67   52   35
 Effective building height        12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       67   52   35   52   67   80   90   98  103
105  104   99
 Along-flow distance from stack  -43  -41  -38  -51  -63  -72  -80  -85  -87
-87  -84  -79
 Across-flow distance from stack  35   33   30   25   21   15    9    3   -3
-9  -15  -21

               (Constant) emission rate = 1.90E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S5-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324        12m          20m        1.49m       86C    16.2m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width         52   67   80   90   98  103  105  104    0
0    0    0
 Effective building height        12   12   12   12   12   12   12   12    0
0    0    0
 Along-flow building length      104  105  103   98   90   80   67   52    0
0    0    0
```

```
 Along-flow distance from stack  -116 -120 -119 -116 -108  -98  -84  -68    0
0    0    0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0
0    0    0

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width           0    0  109  113  113  110   52   67   80
90   98  103
 Effective building height          0    0   12   12   12   12   12   12   12
12   12   12
 Along-flow building length         0    0  133  122  108   99  104  105  103
98   90   80
 Along-flow distance from stack     0    0  -16   -8    1   10   12   15   16
17   18   18
 Across-flow distance from stack    0    0  -43  -28  -12    5  -22  -10    2
13   25   35

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104    0    0    0    0    0    0  109
113  113  110
 Effective building height         12   12    0    0    0    0    0    0   12
12   12   12
 Along-flow building length        67   52    0    0    0    0    0    0  133
122  108   99
 Along-flow distance from stack    18   17    0    0    0    0    0    0 -117
-114 -109 -109
 Across-flow distance from stack   45   53    0    0    0    0    0    0   43
28   12   -5

               (Constant) emission rate = 1.40E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S2-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57311    69250        12m           15m        1.26m       28C    13.7m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
30   41   50
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
69   69   68
 Along-flow distance from stack   -41  -46  -49  -51  -52  -50  -48  -44  -38
6    7    8
 Across-flow distance from stack   23   24   25   25   24   23   21   18   15
-10   -2    5

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          58   64   68   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        64   58   50  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack     8    9    9  -73  -70  -64  -63  -59  -54
-47  -39  -29
 Across-flow distance from stack   12   19   25  -14  -18  -21  -23  -24  -25
-25  -24  -23

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
```

```
340° 350° 360°
 Effective building width         105  104   99   30   41   50   58   64   68
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   69   69   68   64   58   50
105  104   99
 Along-flow distance from stack   -19   -8    3  -75  -77  -75  -72  -66  -59
-32  -34  -35
 Across-flow distance from stack  -21  -18  -15   10    2   -5  -12  -19  -25
14   18   21

               (Constant) emission rate = 4.40E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S3A-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57311    69257       12m           15m         1.00m       27C    13.9m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
30   41   50
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
69   69   68
 Along-flow distance from stack   -48  -52  -55  -57  -56  -54  -50  -45  -38
7    9   11
 Across-flow distance from stack   21   22   22   21   19   17   14   11    8
-16   -9   -1

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          58   64   68   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        64   58   50  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack    13   14   15  -67  -63  -57  -56  -53  -48
-42  -34  -26
 Across-flow distance from stack    7   14   22  -17  -19  -21  -21  -22  -22
-21  -19  -17

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99   30   41   50   58   64   68
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   69   69   68   64   58   50
105  104   99
 Along-flow distance from stack   -17   -7    3  -77  -79  -79  -76  -72  -65
-38  -41  -42
 Across-flow distance from stack  -14  -11   -8   16    9    1   -7  -14  -22
17   19   21

               (Constant) emission rate = 1.50E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S4-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
```

```
   57311    69264        12m           15m        1.39m       31C    15.7m/s

            ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90°
100° 110° 120°
 Effective building width          52   67   80   90   98  103  105  104   99
104   41   50
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length       104  105  103   98   90   80   67   52   35
52   69   68
 Along-flow distance from stack   -55  -59  -61  -62  -61  -57  -52  -46  -38
-46   12   15
 Across-flow distance from stack   20   19   18   16   14   11    7    4    1
-3  -15   -7

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210°
220° 230° 240°
 Effective building width          58   64   68   67   52   35   52   67   80
90   98  103
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        64   58   50  105  104   99  104  105  103
98   90   80
 Along-flow distance from stack    17   19   21  -60  -56  -50  -49  -46  -42
-36  -30  -22
 Across-flow distance from stack    1   10   18  -19  -20  -21  -20  -19  -18
-16  -14  -11

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330°
340° 350° 360°
 Effective building width         105  104   99  104   41   50   58   64   68
67   52   35
 Effective building height         12   12   12   12   12   12   12   12   12
12   12   12
 Along-flow building length        67   52   35   52   69   68   64   58   50
105  104   99
 Along-flow distance from stack   -14   -6    3   -6  -81  -82  -81  -77  -71
-45  -48  -49
 Across-flow distance from stack   -7   -4   -1    3   15    7   -1  -10  -18
19   20   21

               (Constant) emission rate = 1.00E-01 grams/second
                   No gravitational settling or scavenging.
```

```
1

                 Weston Modification AQIA - PM10 - Scenario 1

                             RECEPTOR LOCATIONS
```

```
 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m
```

```
 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
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r

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1                    ____________________________________

                       Weston Modification AQIA - TSP - SCENARIO 2

                     ____________________________________

 Concentration or deposition                         Concentration
 Emission rate units                                 grams/second
 Concentration units                                 microgram/m3
 Units conversion factor                             1.00E+06
 Constant background concentration                            0.00E+00
 Terrain effects                                     Egan method
 Smooth stability class changes?                     No
 Other stability class adjustments ("urban modes")   None
 Ignore building wake effects?                       No
 Decay coefficient (unless overridden by met. file)  0.000
 Anemometer height                                   10 m
 Roughness height at the wind vane site              0.300 m

                    DISPERSION CURVES
 Horizontal dispersion curves for sources <100m high  Pasquill-Gifford
 Vertical  dispersion  curves for sources <100m high  Pasquill-Gifford
 Horizontal dispersion curves for sources >100m high  Briggs Rural
 Vertical  dispersion  curves for sources >100m high  Briggs Rural
 Enhance horizontal plume spreads for buoyancy?      Yes
 Enhance  vertical  plume spreads for buoyancy?      Yes
 Adjust horizontal P-G formulae for roughness height? Yes
 Adjust  vertical  P-G formulae for roughness height? Yes
 Roughness height                                    0.400m
 Adjustment for wind directional shear               None

                     PLUME RISE OPTIONS
 Gradual plume rise?                                 Yes
 Stack-tip downwash included?                        Yes
 Building downwash algorithm:                       PRIME method.
 Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
 Partial penetration of elevated inversions?         No
 Disregard temp. gradients in the hourly met. file?  No

 and in the absence of boundary-layer potential temperature gradients
 given by the hourly met. file, a value from the following table
 (in K/m) is used:

    Wind Speed                Stability Class
     Category       A      B      C      D      E      F
   ________________________________________________________
        1         0.000  0.000  0.000  0.000  0.020  0.035
        2         0.000  0.000  0.000  0.000  0.020  0.035
        3         0.000  0.000  0.000  0.000  0.020  0.035
        4         0.000  0.000  0.000  0.000  0.020  0.035
        5         0.000  0.000  0.000  0.000  0.020  0.035
        6         0.000  0.000  0.000  0.000  0.020  0.035

 WIND SPEED CATEGORIES
 Boundaries between categories (in m/s) are:  1.54,  3.09,  5.14,  8.23, 10.80

 WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

 AVERAGING TIMES
  average over all hours

 _____________________________________________________________________________
1                    ____________________________________

                       Weston Modification AQIA - TSP10

                            SOURCE CHARACTERISTICS

                     ____________________________________


                    STACK SOURCE: S1-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
```

```
   57270    69294        12m          15m        1.65m       70C    12.2m/s

                ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104   99  104  105
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       104  105  103   98   90   80   67   52   35   52   67
80
 Along-flow distance from stack   -77  -73  -67  -59  -48  -37  -24  -11    3   -1   -4
-7
 Across-flow distance from stack  -25  -29  -33  -35  -36  -36  -35  -33  -30  -25  -21
-15

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          98   90   80   67   52   35   52   67   80   90   98
103
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        90   98  103  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack   -11  -13  -16  -18  -19  -20  -26  -32  -36  -40  -42
-43
 Across-flow distance from stack   -9   -3    3    9   15   21   25   29   33   35   36
36

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         105  104   99  104  105  103   98   90   80   67   52
35
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        67   52   35   52   67   80   90   98  103  105  104
99
 Along-flow distance from stack   -43  -41  -38  -51  -63  -72  -80  -85  -87  -87  -84
-79
 Across-flow distance from stack   35   33   30   25   21   15    9    3   -3   -9  -15
-21

               (Constant) emission rate = 1.90E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S5-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57323    69324        12m          20m        1.49m       86C    16.2m/s

                ______ Effective building dimensions (in metres) ______
 Flow direction                   10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width          52   67   80   90   98  103  105  104    0    0    0
 0
 Effective building height         12   12   12   12   12   12   12   12    0    0    0
 0
 Along-flow building length       104  105  103   98   90   80   67   52    0    0    0
 0
 Along-flow distance from stack  -116 -120 -119 -116 -108  -98  -84  -68    0    0    0
 0
 Across-flow distance from stack   22   10   -2  -13  -25  -35  -45  -53    0    0    0
 0

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width           0    0  109  113  113  110   52   67   80   90   98
103
 Effective building height          0    0   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         0    0  133  122  111   99  104  105  103   98   90
80
 Along-flow distance from stack     0    0  -16   -8    1   10   12   15   16   17   18
18
```

```
 Across-flow distance from stack    0    0  -43  -28  -12    5  -22  -10    2   13   25
35

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          105  104    0    0    0    0    0    0  109  113  113
110
 Effective building height          12   12    0    0    0    0    0    0   12   12   12
12
 Along-flow building length         67   52    0    0    0    0    0    0  133  122  111
99
 Along-flow distance from stack     18   17    0    0    0    0    0    0 -117 -114 -112
-109
 Across-flow distance from stack    45   53    0    0    0    0    0    0   43   28   12
-5

               (Constant) emission rate = 1.83E-01 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S6-PM

   X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
  57298    69304        12m           18m        0.60m      250C     9.0m/s

             ______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width           52   67   80   90   98  103  105  104   99  104  105
103
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        104  105  103   98   90   80   67   52   35   52   67
80
 Along-flow distance from stack    -92  -92  -90  -84  -76  -66  -54  -40  -25  -26  -27
-27
 Across-flow distance from stack     1   -6  -13  -20  -25  -30  -35  -38  -40  -40  -40
-38

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width           98   90   80   67   52   35   52   67   80   90   98
103
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         90   98  103  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack    -26  -24  -21  -18  -14  -10  -12  -13  -14  -14  -14
-14
 Across-flow distance from stack   -35  -31  -26  -21  -14   -8   -1    6   13   20   25
30

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          105  104   99  104  105  103   98   90   80   67   52
35
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         67   52   35   52   67   80   90   98  103  105  104
99
 Along-flow distance from stack    -13  -12  -10  -25  -40  -53  -65  -75  -82  -87  -89
-89
 Across-flow distance from stack    35   38   40   40   40   38   35   31   26   21   14
 8

               (Constant) emission rate = 1.80E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S2-PM

   X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
  57311    69250        12m           15m        1.26m       28C    13.7m/s

             ______ Effective building dimensions (in metres) ______
```

```
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width           52   67   80   90   98  103  105  104   99   33   41
50
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        104  105  103   98   90   80   67   52   35   69   69
68
 Along-flow distance from stack    -41  -46  -49  -51  -52  -50  -48  -44  -38    6    7
8
 Across-flow distance from stack    23   24   25   25   24   23   21   18   15  -11   -2
 5

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width           58   64   68   67   52   35   52   67   80   90   98
103
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         64   58   50  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack      8    9    9  -73  -70  -64  -63  -59  -54  -47  -39
-29
 Across-flow distance from stack    12   19   25  -14  -18  -21  -23  -24  -25  -25  -24
-23

 Flow direction                   250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          105  104   99   33   41   50   58   64   68   67   52
35
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         67   52   35   69   69   68   64   58   50  105  104
99
 Along-flow distance from stack    -19   -8    3  -75  -77  -75  -72  -66  -59  -32  -34
-35
 Across-flow distance from stack   -21  -18  -15   11    2   -5  -12  -19  -25   14   18
21

               (Constant) emission rate = 4.40E-02 grams/second
                   No gravitational settling or scavenging.


                    STACK SOURCE: S3B-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57369    69221       12m           15m         1.00m       27C    13.9m/s

                  ______ Effective building dimensions (in metres) ______
 Flow direction                    10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width           69   69   68   64   58   50   41   33   25   33   41
50
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         33   41   50   58   64   68   69   69   67   69   69
68
 Along-flow distance from stack     -9  -15  -24  -32  -39  -44  -49  -52  -53  -56  -57
-57
 Across-flow distance from stack    21   23   23   23   22   21   18   14   10    7    5
 1

 Flow direction                   130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width           58   64   68   69   69   67   69   69   68   64   58
50
 Effective building height          12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length         64   58   50   41   33   25   33   41   50   58   64
68
 Along-flow distance from stack    -55  -51  -46  -39  -31  -22  -24  -25  -26  -26  -25
-23
 Across-flow distance from stack    -3   -7  -11  -14  -17  -20  -21  -23  -23  -23  -22
-21
```

```
 Flow direction                 250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width         41   33   25   33   41   50   58   64   68   69   69
67
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       69   69   67   69   69   68   64   58   50   41   33
25
 Along-flow distance from stack  -21  -18  -14  -13  -12  -11   -9   -7   -4   -2   -2
-3
 Across-flow distance from stack -18  -14  -10   -7   -5   -1    3    7   11   14   17
20

              (Constant) emission rate = 1.46E-01 grams/second
                  No gravitational settling or scavenging.


                    STACK SOURCE: S4-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57311    69264       12m          15m        1.39m       31C    15.7m/s

              ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width         52   67   80   90   98  103  105  104   99  104   41
50
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length      104  105  103   98   90   80   67   52   35   52   69
68
 Along-flow distance from stack  -55  -59  -61  -62  -61  -57  -52  -46  -38  -46   12
15
 Across-flow distance from stack  20   19   18   16   14   11    7    4    1   -3  -15
-7

 Flow direction                 130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width         58   64   68   67   52   35   52   67   80   90   98
103
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       64   58   50  105  104   99  104  105  103   98   90
80
 Along-flow distance from stack   17   19   21  -60  -56  -50  -49  -46  -42  -36  -30
-22
 Across-flow distance from stack   1   10   18  -19  -20  -21  -20  -19  -18  -16  -14
-11

 Flow direction                 250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width        105  104   99  104   41   50   58   64   68   67   52
35
 Effective building height        12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length       67   52   35   52   69   68   64   58   50  105  104
99
 Along-flow distance from stack  -14   -6    3   -6  -81  -82  -81  -77  -71  -45  -48
-49
 Across-flow distance from stack  -7   -4   -1    3   15    7   -1  -10  -18   19   20
21

              (Constant) emission rate = 1.85E-01 grams/second
                  No gravitational settling or scavenging.


                    STACK SOURCE: S7-PM

    X(m)     Y(m)   Ground Elev.  Stack Height  Diameter Temperature  Speed
   57330    69221       12m          15m        1.50m       27C    19.8m/s

              ______ Effective building dimensions (in metres) ______
 Flow direction                  10°  20°  30°  40°  50°  60°  70°  80°  90° 100° 110°
120°
 Effective building width         69   69   68   64   58   50   41   33   25   33   41
```

```
50
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        33   41   50   58   64   68   69   69   67   69   69
68
 Along-flow distance from stack    -2   -2   -4   -7   -9  -11  -12  -13  -14  -18  -21
-23
 Across-flow distance from stack  -17  -14  -11   -7   -3    1    5    7   10   14   18
21

 Flow direction                  130° 140° 150° 160° 170° 180° 190° 200° 210° 220° 230°
240°
 Effective building width          58   64   68   67   52   67   69   69   68   64   58
50
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        64   58   50  105  104   25   33   41   50   58   64
68
 Along-flow distance from stack   -25  -26  -26 -107 -101  -22  -31  -39  -46  -51  -55
-57
 Across-flow distance from stack   22   23   23  -22  -31   20   17   14   11    7    3
-1

 Flow direction                  250° 260° 270° 280° 290° 300° 310° 320° 330° 340° 350°
360°
 Effective building width          41   33   25   33   41   50   58   64   68   67   52
67
 Effective building height         12   12   12   12   12   12   12   12   12   12   12
12
 Along-flow building length        69   69   67   69   69   68   64   58   50  105  104
25
 Along-flow distance from stack   -57  -56  -53  -52  -49  -44  -39  -32  -24    2   -2
-3
 Across-flow distance from stack   -5   -7  -10  -14  -18  -21  -22  -23  -23   22   31
-20

               (Constant) emission rate = 4.77E-01 grams/second
                   No gravitational settling or scavenging.

 _____________________________________________________________________________

1                     ____________________________________

                        Weston Modification AQIA - TSP10

                               RECEPTOR LOCATIONS

                      ____________________________________

 The Cartesian receptor grid has the following x-values (or eastings):
  55200.m   55400.m   55600.m   55800.m   56000.m   56200.m   56400.m
  56600.m   56800.m   57000.m   57200.m   57400.m   57600.m   57800.m
  58000.m   58200.m   58400.m   58600.m   58800.m   59000.m   59200.m

 and these y-values (or northings):
  67600.m   67800.m   68000.m   68200.m   68400.m   68600.m   68800.m
  69000.m   69200.m   69400.m   69600.m   69800.m   70000.m   70200.m
  70400.m   70600.m   70800.m

 _____________________________________________________________________________

 METEOROLOGICAL DATA : Weston AQIA Reveberatory Furnace - Met data from Hyd
r


 _____________________________________________________________________________

                    AVERAGE OVER ALL HOURS AND FOR ALL SOURCES
                               in microgram/m3


    X (km):  55.200   55.400   55.600   55.800   56.000   56.200
     _________________________________________________________________
   Y (km)
   70.800     1.05E+00 1.18E+00 1.31E+00 1.47E+00 1.63E+00 1.69E+00
```

```
70.600      1.17E+00 1.27E+00 1.34E+00 1.37E+00 1.38E+00 1.46E+00
70.400      1.24E+00 1.19E+00 1.11E+00 1.12E+00 1.25E+00 1.43E+00
70.200      9.36E-01 1.03E+00 1.25E+00 1.47E+00 1.50E+00 1.79E+00
70.000      8.27E-01 9.86E-01 1.35E+00 1.58E+00 1.85E+00 1.96E+00
69.800      6.55E-01 7.82E-01 1.05E+00 1.34E+00 1.58E+00 1.90E+00
69.600      5.38E-01 5.87E-01 6.47E-01 7.42E-01 8.35E-01 9.71E-01
69.400      4.16E-01 4.31E-01 4.36E-01 4.50E-01 5.17E-01 5.98E-01
69.200      3.59E-01 3.61E-01 3.84E-01 3.75E-01 4.31E-01 4.85E-01
69.000      2.49E-01 2.39E-01 2.59E-01 2.49E-01 3.30E-01 3.64E-01
68.800      1.57E-01 1.81E-01 2.13E-01 2.34E-01 2.54E-01 2.58E-01
68.600      1.46E-01 1.69E-01 1.85E-01 1.93E-01 2.03E-01 2.17E-01
68.400      1.15E-01 1.45E-01 1.52E-01 1.62E-01 1.72E-01 1.76E-01
68.200      1.21E-01 1.26E-01 1.39E-01 1.41E-01 1.36E-01 1.20E-01
68.000      1.11E-01 1.14E-01 1.21E-01 1.16E-01 1.02E-01 8.49E-02
67.800      9.41E-02 9.56E-02 9.50E-02 8.47E-02 7.61E-02 6.37E-02
67.600      8.27E-02 7.48E-02 7.24E-02 6.39E-02 5.70E-02 4.86E-02

 X (km):   56.400   56.600   56.800   57.000   57.200   57.400
  _________________________________________________________________
Y (km)
70.800      1.67E+00 1.41E+00 1.10E+00 9.70E-01 1.01E+00 1.16E+00
70.600      1.44E+00 1.41E+00 1.25E+00 1.10E+00 1.12E+00 1.31E+00
70.400      1.59E+00 1.53E+00 1.56E+00 1.53E+00 1.53E+00 1.31E+00
70.200      1.75E+00 2.07E+00 2.24E+00 1.93E+00 1.11E+00 1.37E+00
70.000      2.28E+00 2.92E+00 2.49E+00 1.93E+00 1.43E+00 1.82E+00
69.800      1.68E+00 1.90E+00 2.19E+00 2.40E+00 2.00E+00 2.35E+00
69.600      1.17E+00 1.54E+00 1.77E+00 2.62E+00 2.57E+00 3.02E+00
69.400      7.09E-01 9.49E-01 1.35E+00 2.72E+00 4.45E+00 3.78E+00
69.200      5.70E-01 7.59E-01 1.11E+00 1.74E+00 3.39E+00 8.73E+00
69.000      3.81E-01 5.28E-01 6.54E-01 8.82E-01 8.09E-01 1.21E+00
68.800      2.93E-01 3.66E-01 3.89E-01 3.65E-01 3.59E-01 5.53E-01
68.600      2.34E-01 2.22E-01 2.00E-01 1.74E-01 2.08E-01 3.38E-01
68.400      1.59E-01 1.27E-01 1.08E-01 1.16E-01 1.46E-01 2.44E-01
68.200      1.01E-01 7.98E-02 7.39E-02 9.48E-02 1.18E-01 1.81E-01
68.000      6.98E-02 5.50E-02 5.87E-02 7.74E-02 9.57E-02 1.30E-01
67.800      5.07E-02 4.43E-02 4.89E-02 6.33E-02 7.91E-02 1.04E-01
67.600      4.09E-02 4.11E-02 4.55E-02 5.40E-02 6.54E-02 8.93E-02

 X (km):   57.600   57.800   58.000   58.200   58.400   58.600
  _________________________________________________________________
Y (km)
70.800      1.30E+00 1.20E+00 9.87E-01 8.02E-01 7.38E-01 5.69E-01
70.600      1.48E+00 1.20E+00 9.17E-01 7.91E-01 7.65E-01 5.63E-01
70.400      1.41E+00 1.26E+00 9.81E-01 8.23E-01 7.60E-01 5.71E-01
70.200      1.57E+00 1.44E+00 1.10E+00 1.07E+00 8.58E-01 5.62E-01
70.000      1.95E+00 1.71E+00 1.46E+00 1.19E+00 7.43E-01 4.68E-01
69.800      2.09E+00 1.61E+00 1.11E+00 8.93E-01 4.54E-01 2.84E-01
69.600      2.59E+00 1.63E+00 8.08E-01 4.40E-01 2.81E-01 1.98E-01
69.400      2.65E+00 9.82E-01 5.00E-01 3.41E-01 2.28E-01 1.66E-01
69.200      2.27E+00 1.04E+00 6.56E-01 4.34E-01 2.69E-01 2.04E-01
69.000      2.22E+00 1.37E+00 8.57E-01 5.17E-01 3.74E-01 2.96E-01
68.800      9.60E-01 9.61E-01 6.82E-01 4.70E-01 3.98E-01 3.29E-01
68.600      4.73E-01 6.02E-01 5.33E-01 4.33E-01 3.44E-01 2.87E-01
68.400      2.97E-01 3.86E-01 4.08E-01 3.63E-01 3.04E-01 2.57E-01
68.200      2.08E-01 2.41E-01 2.82E-01 2.85E-01 2.54E-01 2.30E-01
68.000      1.49E-01 1.54E-01 1.90E-01 2.14E-01 2.20E-01 2.15E-01
67.800      1.20E-01 1.24E-01 1.41E-01 1.72E-01 1.88E-01 1.98E-01
67.600      1.05E-01 1.07E-01 1.14E-01 1.37E-01 1.61E-01 1.70E-01

 X (km):   58.800   59.000   59.200
  _________________________________________________________________
Y (km)
70.800      4.95E-01 4.49E-01 3.99E-01
70.600      4.84E-01 4.08E-01 3.42E-01
70.400      4.90E-01 3.59E-01 2.66E-01
70.200      4.55E-01 2.96E-01 2.02E-01
70.000      3.04E-01 1.96E-01 1.55E-01
69.800      2.02E-01 1.61E-01 1.34E-01
69.600      1.54E-01 1.30E-01 1.13E-01
69.400      1.37E-01 1.24E-01 1.12E-01
69.200      1.75E-01 1.60E-01 1.43E-01
69.000      2.40E-01 2.23E-01 1.90E-01
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68.800     2.76E-01 2.49E-01 2.19E-01
68.600     2.65E-01 2.46E-01 2.20E-01
68.400     2.23E-01 2.17E-01 1.99E-01
68.200     2.11E-01 1.92E-01 1.83E-01
68.000     2.00E-01 1.80E-01 1.61E-01
67.800     1.90E-01 1.75E-01 1.51E-01
67.600     1.65E-01 1.61E-01 1.41E-01
```

Appendix B: Quality Assurance of Meteorological Data

Stability Class Versus Time of Day – Hydro Aluminium 2006

Hour	A	B	C	D	E	F	Grand Total
1				22	36	268	326
2				19	40	268	327
3				12	27	288	327
4				16	31	280	327
5				17	34	276	327
6				327			327
7	131	46	11	8	12	119	327
8	242	60	23	2			327
9	244	53	26	4			327
10	233	52	37	5			327
11	219	60	39	9			327
12	211	62	41	13			327
13	192	74	47	14			327
14	163	99	51	14			327
15	158	102	56	11			327
16	142	115	65	5			327
17	119	141	62	5			327
18	105	97	46	10	11	58	327
19				327			327
20				19	49	259	327
21				16	37	274	327
22				16	44	267	327
23				18	39	270	327
24				22	33	272	327
Total	**2159**	**961**	**504**	**931**	**393**	**2899**	**7847**

Stability Class Versus Wind Speed – Hydro Aluminium 2006

Wind Speed	A	B	C	D	E	F	Grand Total
< 1	371	64	9	333	105	1917	2799
1 - 1.5	434	36	18	108	99	535	1230
1.6 - 2	514	58	13	75	53	241	954
2.1 - 3	840	236	34	137	87	206	1540
3.1 - 4	0	567	38	107	49	0	761
4.1 - 5	0	0	252	65	0	0	317
5.1 - 6	0	0	140	21	0	0	161
6.1 - 7	0	0	0	62	0	0	62
7.1 - 8	0	0	0	19	0	0	19
8.1 - 9	0	0	0	3	0	0	3
9.1 - 10	0	0	0	1	0	0	1
Total	**2159**	**961**	**504**	**931**	**393**	**2899**	**7847**

Appendix C: Climatological Data Summary

Cessnock (Nulkaba) Climate Averages, 1966 – 2007 (Bureau of Meteorology)

Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean daily max temp (°C)	30.4	29.6	27.5	24.7	21.0	18.2	17.7	19.7	22.6	25.3	27.3	29.5	24.5
Mean daily min temp (°C)	17.6	17.7	15.5	11.6	8.6	5.8	4.5	4.8	7.7	10.9	13.6	16.1	11.2
Mean rainfall (mm)	89.6	100.9	87.9	54.9	54.6	56.1	32.1	36.9	42.0	59.3	68.2	67.8	748
Mean no. of days of rain (≥ 1mm)	7.8	7.7	8.2	6.2	6.3	5.9	4.6	5.1	5.2	7.1	7.9	7.0	79
Mean 9 am temp (°C)	23.2	22.3	20.9	18.2	14.0	10.7	9.8	11.9	16.0	19.2	20.3	22.5	17.4
Mean 9 am relative humidity (%)	70	75	76	75	80	81	79	71	63	60	65	65	72
Mean 9 am wind speed (km/h)	10.3	9.4	9.5	9.2	9.5	10.3	10.8	12.4	13.9	13.1	12.0	11.4	11.0
Mean 3 pm temp (°C)	29.0	28.1	26.1	23.4	19.9	17.0	16.6	18.5	21.3	23.5	25.4	28.1	23.1
Mean 3 pm relative humidity (%)	49	52	54	52	55	56	51	44	43	46	47	45	50
Mean 3 pm wind speed (km/h)	16.7	15.3	15.0	12.8	12.1	13.7	14.3	16.0	17.7	17.0	17.2	17.0	15.4

N.B. Data in red indicate highest figures; data in blue represent lowest values.

Appendix D: Combustion Engine Database Output

The Combustion Database (v. 2.4 Aug 04) Output

Inputs:

- Natural gas
- Tangential fired boiler
- Gas consumption – 166,000 GJ/year (3,735 tonnes/year)

Category 2a Substance Emissions

Reporting Period: 2006/07

Substance	Total Emissions (kg/yr)
Carbon monoxide	1.8E+03
Oxides of nitrogen	1.3E+04
Particulate matter (PM10)	5.8E+02
Polycyclic aromatic hydrocarbons	5.2E-02
Sulfur dioxide	4.0E+01
Total Volatile organic compounds	4.2E+02

Appendix K: Noise Impact Assessment

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SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

Project No: 07332

Noise Impact Assessment
Weston Aluminium Pre Processing Facility
Kurri Kurri, NSW

Prepared for:

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September 2007

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1.0 INTRODUCTION

Weston Aluminium Pty Ltd (WA) operates an aluminium refining and recycling facility at Kurri Kurri in NSW. WA proposes to modify the approved development on site being the Aldex buildings, together with the installation of new pre-processing equipment.

The existing facility and proposed modifications are located on Lot 796 DP 39877 Mitchell Avenue Kurri Kurri. The site is located within the Parish of Heddon, County of Northumberland, City of Cessnock (see **Figure 1**).

The proposed modifications involve the addition of a pre processing facility which would include installation of additional noise generating equipment including a rumbler, hammermill and impact flinger. In addition it would involve the relocation of an existing baghouse.

The NSW Department of Planning (DoP) has indicated that a noise impact assessment for the project should be carried out in accordance with the *NSW Industrial Noise Policy* (INP, 2000).

2.0 BACKGROUND TO THE PROPOSAL

Currently dross is delivered to the existing facility by road. Trucks unload the raw material directly into storage bays, in the Main Plant building, from where it is segregated prior to processing. Dross from the storage bays is recovered by front end loader for delivery into either a rotary furnace or a Raymond Mill.

WA proposes to install a pre-processing facility within the western end of the existing approved Aldex building. Eight dross storage bays would be constructed in the extended Aldex building. Trucks delivering dross would enter the shed and unload directly into the storage bays. During the delivery operation ventilation will be applied to the receiving bay for dust control purposes.

As is currently the case at WA, truck movements on the site would be limited to the hours of 7 am to 7 pm (although for logistic reasons this is usually limited to 4 pm).

Larger material in the dross would be separated and pre processed in a rumbler to remove adhering bath material. The remaining dross would be delivered by front end loader to a grizzly before being transferred to crushers and finally a screen deck. This pre processing will achieve the removal of non-metallic dross constituents as well as fine particles that would otherwise oxidise in the furnace. Pre processed dross would then be transferred to the main plant building for storage prior to furnace charge.

The pre processing facility would replace the existing Raymond Mill which is currently served by Baghouse number 3. This baghouse would, therefore, be relocated to the east of the pre processing facility outside of the Aldex building and will service the dross bays. An additional (approved) baghouse would also be commissioned to the west of the pre processing facility to service the pre processing facility equipment.

The operation of the new facility would not require significant additional labour. Similarly the proposed modifications would not result in additional production at the site.

3.0 DESCRIPTION OF TERMS

This section of the report aims to convey an understanding of several commonly used acoustical terms. Various terms are explained in plain language and the effects of certain atmospheric phenomena on noise propagation are discussed. Noise level percentiles are explained with the aid of a diagram of a hypothetical noise signal.

The descriptions in this section are not formal definitions of the terms. Formal definitions may be found in AS1633-1985 “Acoustics – Glossary of terms and related symbols”.

3.1 General Terms

Sound Power Level

The amount of acoustic energy (per second) emitted by a noise source. Usually written as “Lw” or “SWL”, the Sound Power Level is expressed in decibels (dB) and cannot be directly measured. Lw is usually calculated from a measured sound pressure level.

Sound Pressure Level

The “noise level”, in decibels (dB), heard by our ears and/or measured with a sound level meter. Written as “SPL”, the sound pressure level generally decreases with increasing distance from a source. Noise levels are often written as dB(A) rather than dB. The “A-weighting” is a correction applied to the measured noise signal to account for the ear’s ability to hear sound differently at different frequencies.

For example, 40dB at 500Hz (speech frequency) is clearly audible but 40dB at 50Hz (very low bass) would be far less audible. The A-weighted sound pressure level therefore represents the measured (or predicted) noise level as it would be heard by the typical human ear.

3.2 Noise Level Percentiles

A noise level percentile (Ln) is the noise level (SPL) in decibels which is exceeded for “n” % of a given monitoring period. Several important Ln percentiles will be explained by considering the hypothetical time signal in **Figure 2**.

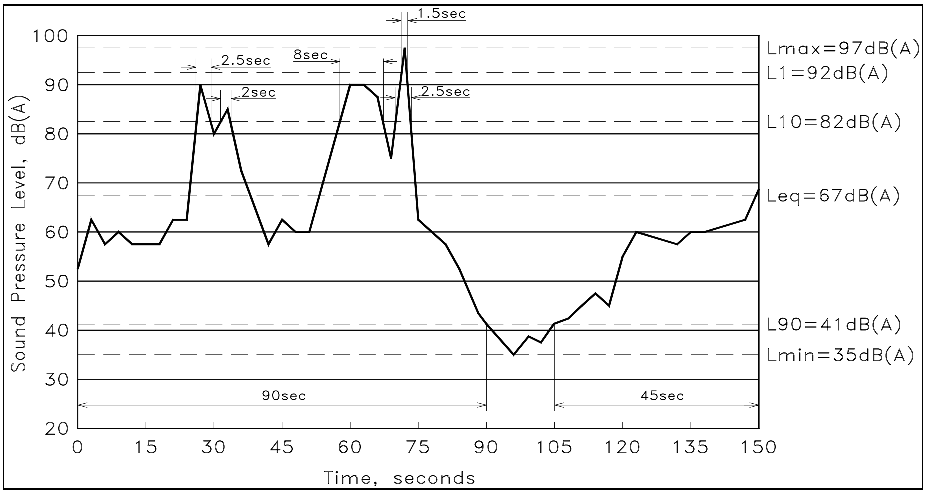


FIGURE 2. *Hypothetical time-trace of 150-second sound signal*

The signal in **Figure 2** has a duration of 2.5 minutes (i.e. 150 seconds) with noises occurring as follows:

- The person holding the instrument is standing beside a road and hears crickets in nearby grass at a level of around 60 dB (A);
- At about the 30 second mark a motorcycle passes on the road, followed by a car;
- At 60 seconds a truck passes;
- After the truck passes it sounds its air horn at the 73 second mark;
- The crickets are frightened into silence and the truck fades into the distance;

- All is quiet until 105 seconds when the crickets slowly start to make noise, reaching full pitch by 120 seconds;
- The measurement stops at 150 seconds, just when an approaching car starts to become audible.

L1 Noise Level

Near the top of **Figure 2**, there is a dashed line at 92 dB(A). A small spike of 1.5 sec duration extends above this line at around 73 seconds. Since 1.5 sec is 1% of the signal duration (150 seconds), the L1 (or LA_1 to signify A-weighting) noise level of this sample is 92 dB(A). The L1 percentile is often called the *average peak noise level* and is used by the DEC as a measure of potential disturbance to sleep.

L10 Noise Level

The dashed line at 82 dB(A) is exceeded for four periods of duration 2.5 sec, 2 sec, 8 sec and 2.5 sec, respectively. The total of these is 15 sec, which is 10% of the total sample period. Therefore, the L10 noise level of this sample is 82 dB(A). The L10 percentile is called the *average maximum noise level* and has been widely used as an indicator of annoyance caused by noise.

L90 Noise Level

In similar fashion to L1 and L10, **Figure 2** shows that the noise level of 41 dB(A) is exceeded for 135 seconds (90 + 45 =135). As this is 90% of the total sample period, the L90 noise level of this sample is 41 dB(A). The L90 percentile is called the *background noise level*.

Leq Noise Level

Equivalent continuous noise level. As the name suggests, the Leq of a fluctuating signal is the continuous noise level which, if occurring for the duration of the signal, would deliver equivalent acoustic energy to the actual signal. Leq can be thought of as a kind of ‘average’ noise level. Recent research suggests that Leq is the best indicator of annoyance caused by industrial noise and the INP takes this into consideration.

4.0 NOISE CRITERIA

4.1 Plant Operations

The existing facility is located in an industrial area with the nearest residential receivers being approximately 600m away from the main plant buildings. The Hydro Aluminium Smelter is located approximately 2 km to the north and is a major noise source in the area.

The site currently operates under an Environmental Protection Licence (EPL number 6423) which provides noise limits for protecting the amenity of residential areas. These noise limits are detailed below in **Table 1**.

TABLE 1

WESTON ALUMINIUM NOISE LIMITS (EPL 6423)

Location	Day*	Evening*	Night*
Residences at the corner of Government and Tenth Streets	48 dB(A) Leq (15 min)	48 dB(A) Leq (15 min) 40 dB(A) Leq (evening)	47 dB(A) Leq (15 min) 35 dB(A) Leq (night) 57 dB(A) L1 (1 min)
Residences on Northcote Street	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min)	44 dB(A) Leq (15 min) 40 dB(A) Leq (night) 57 dB(A) L1(1 min)
Residences in the light industrial zone on Mitchell and Railway Avenues	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min)	43 dB(A) Leq (15 min) 41 dB(A) Leq (night) 55 dB(A) L1 (1 min)

* Where "Day" is 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, "Evening" is 6pm to 10pm and "Night" is all other times.

The Licence states that "where amenity noise levels are lower than intrusive noise levels, both levels are in the licence condition in order to ensure that intrusive noise impacts are controlled at all times."

In setting noise goals for a particular project the INP takes into account the existing ambient noise levels in the area. The INP details the methodology for determining background noise levels. The procedure is to measure the existing noise levels over a period of a minimum of seven days. In the case of the upgrade to an existing industry the measurements must not be influenced by noise from that industry.

The INP states that to measure the noise a data logger must be sited at the most (or potentially most) affected noise sensitive locations. If this is impractical, the logger should be sited at a location with a similar acoustic environment. The INP also notes that care must be taken to choose sites that are truly representative of the noise environment at the noise sensitive receivers.

In relation to the current project at WA, the existing industry operates 24 hours per day/ seven days per week. It is, therefore, not possible to measure the ambient noise environment at the nearest noise sensitive receivers in the absence of noise from WA.

As indicated above, WA is located in an industrial area with many noise sources operating at various hours of the day. This includes noise from the nearby Hydro Aluminium smelter which is a significant contributor to the acoustic environment. It is, therefore, not possible to site a noise logger in a similar acoustic environment to the nearest noise sensitive receivers to WA (i.e. that is influenced by noise from all nearby industries and a large aluminium smelter and all traffic associated with these and other usage).

In applying the INP to existing operations it is acknowledged that the scope for applying reasonable and feasible mitigation measures to existing noise sources is usually far more limited than for new developments.

The INP devotes a section (section 10) to applying the policy to existing industrial premises. The section recognises the difficulty in reducing the noise emissions from an existing industry. The intent of the section is to allow established industries to adapt to changes in the noise expectations of the community while remaining economically viable. It is generally aimed at industries producing high existing noise emissions.

This section is also, strictly speaking, not applicable to the current project as regular noise monitoring has shown it is operating within its existing noise goals and it is, therefore, not exceeding any reasonable expectations of the local community.

As a result it is not possible to accurately determine a set of project specific noise goals for the site as per procedures in the INP. In addition, the application of the INP to existing premises is generally aimed at maintaining the acoustic amenity of any potentially affected receivers.

The existing noise goals for the WA site were determined from noise levels measured in 2001. It is considered unlikely that the background noise levels in the area would have decreased in the interim. The approach taken in this assessment is to adopt the existing project specific noise goals for the site (as determined previously through procedures in the INP) and ensure that noise emissions from the proposed modifications do not add significantly to the total noise emissions from the entire site.

4.2 Sleep Disturbance

The L1 (1 min) sleep disturbance criteria for the site are detailed in **Table 1** for the various potentially affected receiver areas.

4.3 Vehicle Noise

In NSW, noise from vehicle movements associated with an industrial source is assessed in terms of the INP if the vehicles are not on a public road. If the vehicles are on a public road, the NSW Environmental Criteria for Road Traffic Noise (ECRTN) apply. Noise from the proposal must, therefore, be assessed against the project specific noise goals of the INP and also the criteria in the ECRTN.

Access to the site would remain unchanged by the proposed modifications. Trucks delivering dross would travel around the existing main building to the Aldex building. This transport route is currently used by other vehicles travelling on the site. The operation of the pre processing facility would not create additional traffic to or on site and, therefore, there would be no significant difference in vehicle noise emissions as a result of the pre processing facility.

4.4 Road Traffic Noise

The ECRTN recommends various criteria based on the functional categories of roads applied by the Roads and Traffic Authority (RTA).

The RTA differentiates roads based on a number of factors including traffic volume, heavy vehicle use, through or local traffic, vehicle speeds and applicable traffic management options.

Vehicles accessing the site would do so via Mitchell Avenue which is considered a collector road as per definitions in the ECRTN.

Table 2 below shows the noise criteria relevant to traffic on various road types extracted from Table 1 of the ECRTN. For the assessment of traffic noise, the day time period is from 7am to 10pm, whilst night is from 10pm to 7am.

TABLE 2
ROAD TRAFFIC NOISE CRITERIA

Situation	Recommended Criteria	
	Day (7am to 10pm)	Night (10pm to 7am)
8. Landuse developments with potential to create additional traffic on a collector road	Leq (1hr) 60	Leq (1hr) 55

The ECRTN also advises that, where criteria are already exceeded:

"In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB."

4.5 Construction Noise

Recommended construction criteria vary depending on construction time, as outlined in Section 171 of the EPA *Environmental Noise Control Manual* (ENCM 1992) and reproduced below:

Up to 4 weeks:	Background + 20 dB
4 to 26 weeks:	Background + 10 dB
More than 26 weeks:	Background + 5 dB

The EPA specifies that construction activity is allowed during the period 7.00am to 6.00pm Monday to Friday and 8.00am to 1.00pm Saturday, with no work on Sundays or public holidays. The authorities can approve works outside these hours, if it can be demonstrated that the construction activities will have negligible impacts on nearby residential dwellings. Permits are also granted where issues of safety require out of hours operations, or where construction work would result in major traffic disturbances.

Total construction time is anticipated to be approximately 15 weeks and therefore the criterion of 'background + 10dB(A)' will apply, resulting in a construction noise planning level of **53 dB(A) L10** in Government Street, **49 dB(A) L10** in Northcote Street and **48 dB(A) L10** in Mitchell and Railway Avenues.

5.0 ASSESSMENT METHODOLOGY

5.1 Meteorology

The atmospheric conditions most relevant to noise assessments are temperature inversions, gentle winds (indicative of possible wind shear) and relative humidity. The INP states that wind effects need to be assessed where source to receiver winds (at 10m height) of 3m/s or below occur for 30% of the time in any season in any assessment period.

It is well documented that prevailing winds in the Hunter Valley are generally from the south east in summer and north west in winter.

The following points are the most significant with respect to noise propagation from the site:

- Extremes of relative humidity (RH) are rarely experienced. For modelling purposes, a value of 70% RH was adopted, and
- Noise modelling was carried out under the prevailing conditions of a 3m/s wind from the south east and from the north west.
- It is anticipated that temperature inversions are a prevailing site feature at night in winter. A default value of +3°/100m vertical temperature gradient has been adopted for modelling purposes.
- The topography of the area surrounding the site is relatively flat with no receivers that are topographically lower than the proposed development. Drainage winds associated with temperature inversions are, therefore, not considered in this assessment

The following atmospheric conditions were used in the noise modelling:

- ***Scenario 1*** - SE Wind – 20^{o}C, 70% R.H., 3 m/sec wind from SE.
- ***Scenario 2*** - NW Wind – 20^{o}C, 70% R.H., 3 m/sec wind from NW.
- ***Scenario 3*** - 10^{o}C, 70% R.H., +3^o C/100m positive temperature gradient (temp. inversion).

5.2 Plant Operations

Assessment of operational noise was conducted using RTA Technologies Environmental Noise Model (ENM) v3.06.

Previous noise measurements have been made at locations in and around the WA site and, from these, sound power levels have been determined for the entire site. Note that the majority of noise producing items that are not fully enclosed in buildings are on the eastern side of the plant and as a result the sound power levels used in the modelling vary for each side of the plant. Noise levels were previously measured for Baghouse number 3. This baghouse is to be relocated to an alcove area on the southern side of the Aldex building (at the eastern end of the building). A similar baghouse, in acoustic terms, is to be located in an approved location in an alcove at the western end of the building (on the southern side).

Noise levels for the plant items to be used in the proposed pre processing facility were sourced from measurements made at a similar facility operating under similar conditions. The measurements were taken when all plant items were operating at maximum production rate over a full 15 minute period.

A summary of all measured noise levels is shown below in **Table 3**. In keeping with the usual convention, spectral data are presented below as unweighted (linear) decibel levels and the total is A-weighted.

TABLE 3
SOUND POWER LEVELS AND FREQUENCY SPECTRA OF MAJOR NOISE SOURCES
(as Leq 15 mins)

Item	Frequency (Hz)									
	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
Existing Operations (total) – east side	112	122	122	113	109	105	104	103	102	92
Existing Operations (total) – west side	102	117	113	104	100	98	95	95	94	86
Baghouse 3	95	100	94	97	97	92	91	84	80	80
Pre processing facility	110	112	107	110	109	107	104	102	98	93

The pre processing facility would be located in the western end of the existing Aldex building. All production activities would be carried out within the shed. For noise modelling, plant items in the shed were considered to be producing the noise level shown in **Table 3** inside the shed, for a full 15 minute period. The combined sound pressure level from all plant items was calculated to the inner surface of the building.

Sound transmission loss data for a steel shed was used to calculate the sound pressure level immediately outside of the shed. This value was then combined with a calculated area gain for the dimension of the shed surface to determine a sound power level for each shed wall for input into the noise model.

A front end loader (FEL) would be used to load raw feed material into the pre processing plant. For assessing a worst case, however, it was considered that the FEL was operating for an entire 15 minute assessment period inside the shed as included in the noise measurement shown in **Table 3**. Noise from Baghouse number 3 was modelled at the outside of the south western corner of the Aldex building.

Current noise emissions from WA were modelled using noise levels for all existing sources on the site operating at typical full capacity. This includes measurements of all baghouses, the rotary furnace and trucks arriving and departing the site and being unloaded. For noise modelling the existing WA facility was considered to be a series of point noise sources representing the total noise for the site. The model was verified for accuracy against the noise measurements made at various locations on the boundary of the site.

To determine any additional noise impacts from the proposed pre processing facility the model was then run again with the extra noise sources described above included. For assessment of the worst case scenario, it was assumed that the pre processing facility was at full capacity and producing the typical noise levels detailed in **Table 3** over an entire 15 minute period.

The noise criteria detailed in EPL 6423 (shown in **Table 1**) for some of the locations have an Leq (15 min) and Leq (evening/night) limit. The purpose of these is to ensure intrusive noise (Leq (15 min)) impacts are controlled at all times. The nature of noise emissions from a large industrial site like WA is typically cyclical depending upon production rates and activities at any given time. That is, there would be 15 minute periods where the noise output is at a worst case but when taken over an entire evening or night the average noise level would be less. This assessment has considered the worst case 15 minute intervals when the plant (existing and proposed) is at full production and results are compared to the Leq (15 min) criteria to determine compliance.

5.3 Sleep Disturbance

The pre processing facility would operate within the confines of the existing Aldex building. All activities would be carried out within this building. Emissions from the pre processing operations would be relatively steady state. Lmax noises would mainly be associated with movements and operation of the FEL.

5.4 Road Traffic Noise

There would be no additional traffic generated by the project and there would, therefore, not be any differences in the currently compliant traffic noise. As detailed previously truck movements are limited to the day time hours of 7 am to 7 pm, although for logistic reasons this is usually limited to 7 am to 4 pm). No further assessment of traffic noise is considered here.

5.5 Construction Noise

Construction activities will consist of the addition of eight storage bays to the southern side of the Aldex building, the installation of baghouses on cement slabs external to the southern side of the Aldex building and the installation of the pre processing equipment in the western end of the Aldex building.

Construction works will, therefore, consist of laying concrete flooring, erection of steel sheds and the installation of plant and machinery inside and outside of the shed. The external works will be carried out over a relatively small area of already disturbed ground. There will be only limited need for site preparation.

Plant machinery items for the pre processing plant will arrive on site pre fabricated and be installed in the shed. Other works will involve final fitout of the plant. Similarly, baghouse number 3 will be relocated from its existing position on site. The other baghouse will be erected on site from prefabricated components.

6.0 RESULTS AND DISCUSSION

6.1 Plant Operations

Noise levels were modelled using ENM for each of the various atmospheric scenarios detailed in **Section 5.1**. Contours of equal sound pressure level were generated out to the 30 dB(A) level for;

- Just the existing WA operations (results shown in **Figures 3**, **5** and **7**),

- Just the proposed pre processing facility (results shown in **Figures 4**, **6** and **8**), and

- The total combined noise from the existing and proposed operations (i.e. existing operations plus pre processing facility). Noise contours for this and for just the existing operations are shown together for comparison purposes in **Figures 9**, **10** and **11**. These contours represent the noise levels "before" and "after" the introduction of the operation of the pre processing facility.

It must be noted that the ENM model takes into account ground topography and includes the effects of all large buildings on the WA site. The influence of other buildings in the industrial area around the WA site has not been included in the model.

The noise contours have been draped over the Cessnock 1:25000 topographic map to enable a rapid appraisal of received noise levels at any location surrounding the WA site.

The contours in **Figure 4**, **6** and **8** show that, under the assessed conditions, noise from the pre processing facility would be less than 35 dB(A) at all residential receivers. This result is in keeping with all noise criteria detailed in **Table 1**.

The contours shown in **Figures 9**, **10** and **11** show that, under the modelled conditions, noise from the entire site would increase marginally at some locations as a result of additional noise emissions from the pre processing facility. The increase in noise would not result in the total received noise exceeding any of the Leq (15 min) noise criteria detailed in **Table 1**. There would, therefore, be no adverse noise impacts as a result of the operation of the facility.

6.2 Sleep Disturbance

Potential sleep disturbance impacts may arise from movements of the FEL inside the Aldex building. The results shown in **Figures 4**, **6** and **8** show that the worst case received noise as a result of typical operations of the pre processing facility would be less than 35 dB(A) at the nearest receiver to the site in Mitchell Avenue. This is based on a modelled sound power level of 110 dB(A). Based on the sleep disturbance criteria detailed in **Table 1** (i.e. 57 dB(A) L1 (1 min)) this would indicate that L1 (1 min) noise levels of >130 dB(A) would be required in order to have the potential to create sleep disturbance impacts at any residential receivers. Noise of this magnitude from an FEL, or any other activities in the pre processing facility, would not be expected to occur.

6.3 Cumulative Noise Impacts

Existing noise levels were measured in the area in July 2007. Ambient noise levels were measured at 15 minute statistical intervals using two Svan 949 sound and vibration analysers used as environmental noise loggers. The measurements were done in accordance with relevant DECC guidelines and AS 1055-1997 “Acoustics – Description and Measurement of Environmental Noise”. The noise loggers used comply with the requirements of AS 1259.2-1990 “Acoustics – Sound Level Meters”, and has current NATA calibration certification.

The loggers were programmed to continuously register environmental noise levels over the 15 minute intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. Calibration of the loggers was performed as part of the instrument’s initialisation procedures, with calibration results being within the allowable ± 0.5 dB(A) range.

Ambient Leq and background noise levels, obtained from the loggers, are shown below in **Table 4** and graphically in **Appendix I**. One logger was located on the verandah of number 42 Northcote Street and the other on the verandah of number 8 Tenth Street. The loggers were in place from Monday July 23 to Sunday July 29, 2007.

TABLE 4
MEASURED AMBIENT NOISE LEVELS AT 23/7/07 to 29/7/07

Parameter	Day*		Evening *		Night*	
	Leq	L90	Leq	L90	Leq	L90
Northcote St	63	46	59	46	56	45
Tenth Street	53	35	49	41	47	35

* Where "Day" is 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, "Evening" is 6pm to 10pm and "Night" is all other times.

As detailed previously in his report the WA site is located in an industrial zone with many industrial noise sources including the Hydro Aluminium smelter all contributing to the overall acoustic environment of nearby residential areas.

The noise from the combined emissions of the pre processing facility and the operation of the existing operations at WA are shown in **Figures 9**, **10** and **11**. These figures show that the maximum predicted Leq noise level in Tenth Street will be approximately 30 dB(A) Leq (15 min) under the assessed south east wind. This is 5 dB(A) below the lowest measured background noise level (day time) in the area. It is 17 dB(A) below the measured Leq noise level.

The worst case predicted noise in Northcote Street would be 40 dB(A) Leq (15 min) under the assessed north west wind. Again this is 5 dB(A) below the lowest measured background noise level (night time) in the area. It is 16 dB(A) below the measured Leq noise level in the area.

There would be, therefore, no cumulative noise impacts as a result of the operation of the pre processing facility.

6.4 Construction Noise

Typical noise levels of construction plant items are shown in **Table 5**.

TABLE 5
TYPICAL NOISE LEVELS – CONSTRUCTION PLANT @ 7m

Plant Item	dB(A) L10
Vibrating Roller	82
Concrete Pump	84
Concrete Vibrator	87
Crane	83

Excavator	80

Construction noise levels would vary throughout individual days and also throughout the length of the overall works. The noise level at individual receivers would also be dependant upon the location of the various works, relative to those receivers, at various times.

To determine potential noise impacts, a sample calculation was carried out of a typical construction scenario of a concrete pump and concrete vibrator working in close proximity, and producing the noise levels shown in **Table 5**. Theoretical received noise levels were determined for the nearest residential receiver in Mitchell Avenue, approximately 600 m away. The results of this assessment are shown below in **Table 6**.

TABLE 6
CONSTRUCTION NOISE – MITCHELL AVENUE

Construction noise as described above, dB(A)L10	114
Distance Loss to Receiver, (600 m)	64
Received Noise dB(A)L10	50
Criterion dB(A) L10	48
Impact	2

The results in **Table 6** show that there is a potential for a 2 dB(A) exceedance of the construction noise criterion under the assessed conditions. It must be noted, however, that the calculation of construction noise impacts, detailed above, is simplistic in that it takes into account only attenuation due to hemispherical spreading (distance loss). There is no allowance for partial screening effects of intervening structures or topography, or atmospheric absorption. More importantly, there is no allowance for attenuation due to ground absorption. At distances beyond a few hundred metres such attenuation can be significant. As a consequence the results shown in **Table 6** will likely overestimate received noise by several decibels.

The impacts detailed above will only occur in the early stages of construction during the laying of concrete slabs etc. After that the majority of noise generation would occur inside the Aldex building and noise emissions would be significantly reduced.

As such the potential impacts of the construction noise criterion will be day time only and short term in nature and are not expected to adversely impact on the acoustic amenity of receivers

7.0 CONCLUSION

A noise assessment has been carried out in regard to the addition of a proposed pre processing facility at Weston Aluminium Pty Ltd's aluminium refining and recycling facility at Kurri Kurri in NSW. Noise modelling was undertaken for a range of metrological conditions to determine potential noise impacts at nearby residential receivers.

Existing noise levels from the current operations have been compared to the theoretical noise levels with the addition of emissions from the pre processing facility in full operation. This comparison has shown that there would be no significant increase in overall noise as a result of the operation of the pre processing facility. The results also show that the total combined noise emissions from the site, with all existing and proposed operations at full production, would not exceed the relevant noise criteria at any residential receivers.

It is, thus, concluded that the operation of the pre processing facility would have no cumulative noise impacts on the surrounding residential areas.

An assessment of potential for sleep disturbance has also shown that there would be no adverse impacts as a result of the operation of the facility.

Road traffic noise associated with the development would not change from the current operations.

There is a potential for a minor exceedance of the construction noise criterion but this will be only short term and is not expected to adversely impact on the acoustic amenity of receivers. It is noted that the assessment of construction noise does not consider the effects of acoustic absorption by intervening structures, ground, topography, or the atmospheric, which can be significant. Hence, the results of the assessment will overestimate received noise by several decibels.

The results of the assessment, therefore, show there are no requirements for noise mitigation and no acoustic reasons why the project should not proceed.

8.0 REFERENCES

Environment Protection Authority (EPA), 1994. Environmental Noise Control Manual, Sydney.

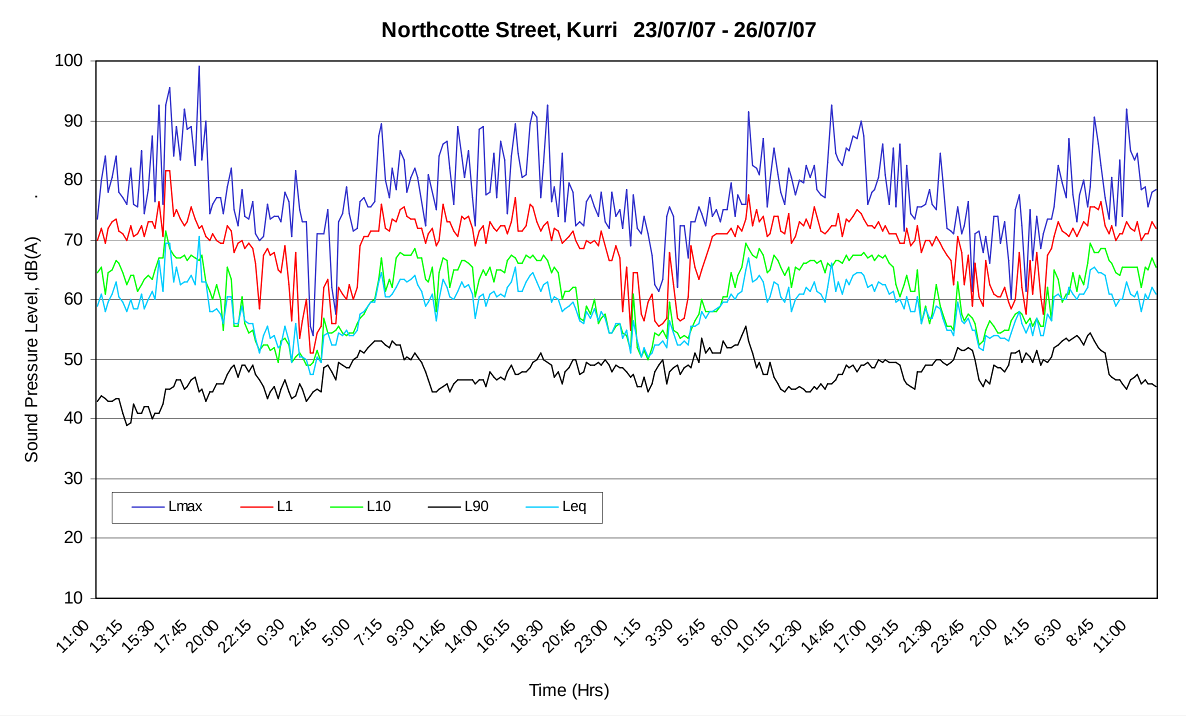
Environment Protection Authority (EPA), 1999. Environmental Criteria for Road Traffic Noise, Sydney

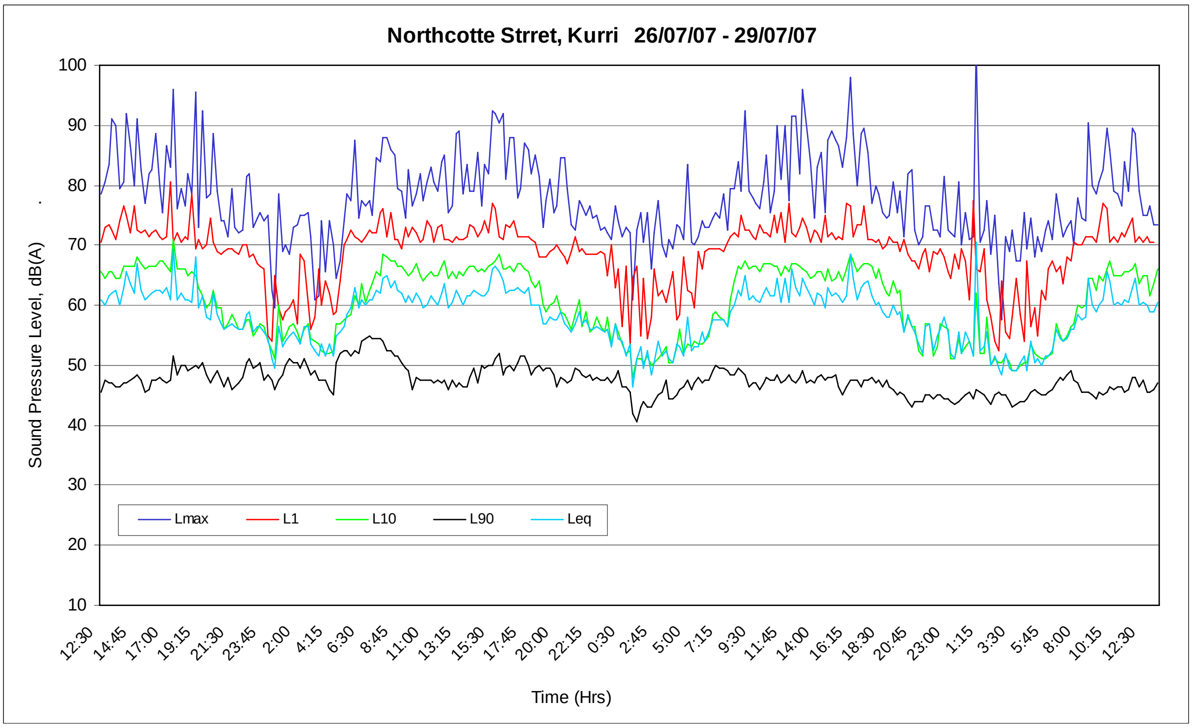
Environment Protection Authority (EPA), 2000. NSW Industrial Noise Policy, Sydney

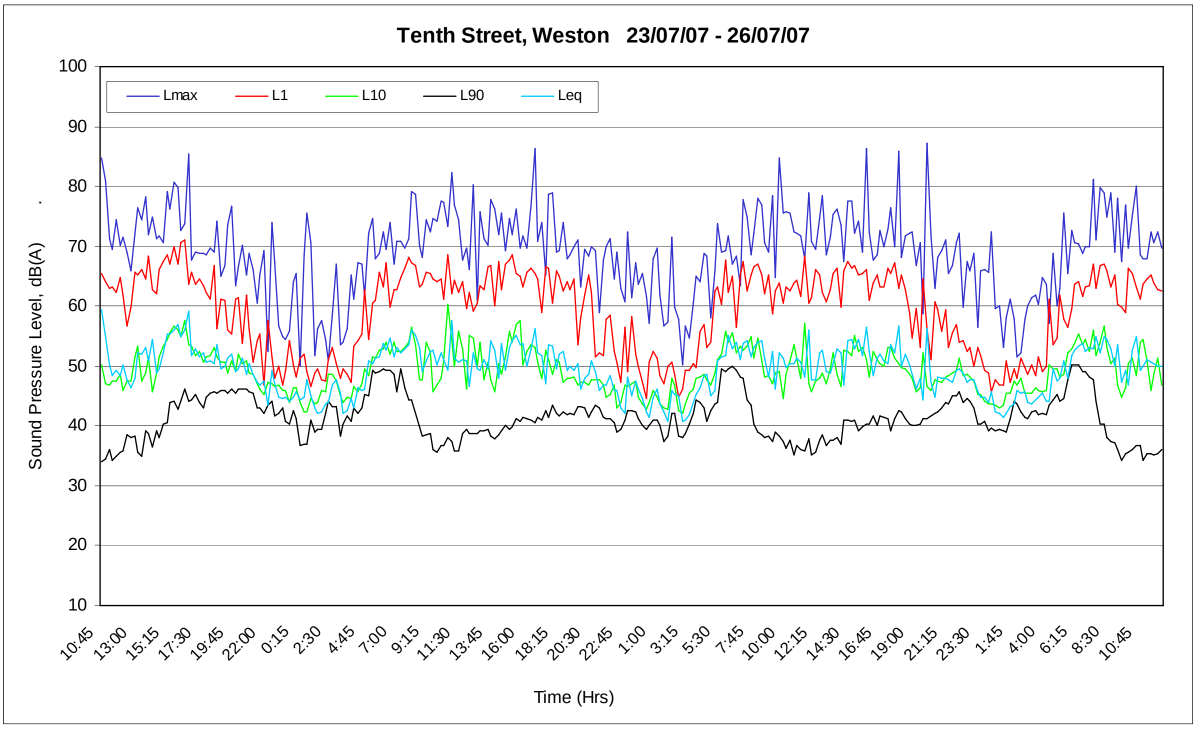
Australian Standard - AS1633-1985 “Acoustics – Glossary of terms and related symbols”.

APPENDIX I

NOISE LOGGER CHARTS


Northcotte Street, Kurri 23/07/07 - 26/07/07
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
Lmax
L1
L10
L90
Leq
11:00
13:15
15:30
17:45
20:00
22:15
0:30
2:45
5:00
7:15
9:30
11:45
14:00
16:15
18:30
20:45
23:00
1:15
3:30
5:45
8:00
10:15
12:30
14:45
17:00
19:15
21:30
23:45
2:00
4:15
6:30
8:45
11:00
Time (Hrs)


Northcotte Strret, Kurri 26/07/07 - 29/07/07
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
Lmax
L1
L10
L90
Leq
12:30
14:45
17:00
19:15
21:30
23:45
2:00
4:15
6:30
8:45
11:00
13:15
15:30
17:45
20:00
22:15
0:30
2:45
5:00
7:15
9:30
11:45
14:00
16:15
18:30
20:45
23:00
1:15
3:30
5:45
8:00
10:15
12:30
Time (Hrs)


Tenth Street, Weston 23/07/07 - 26/07/07
Lmax
L1
L10
L90
Leq
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
10:45
13:00
15:15
17:30
19:45
22:00
0:15
2:30
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7:00
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13:45
16:00
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1:00
3:15
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7:45
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16:45
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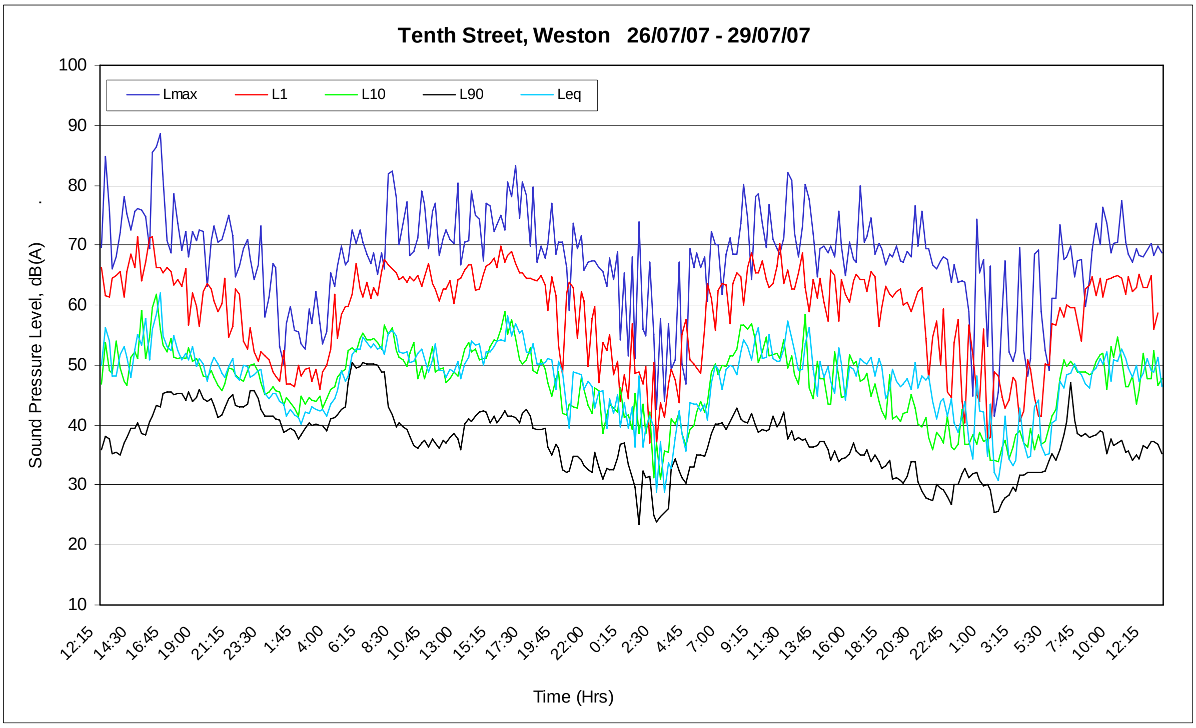
1:45
4:00
6:15
8:30
10:45
Time (Hrs)


Tenth Street, Weston 26/07/07 - 29/07/07
Lmax
L1
L10
L90
Leq
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
12:15
14:30
16:45
19:00
21:15
23:30
1:45
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17:30
19:45
22:00
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2:30
4:45
7:00
9:15
11:30
13:45
16:00
18:15
20:30
22:45
1:00
3:15
5:30
7:45
10:00
12:15
Time (Hrs)