Chunxing Used Lead Acid Battery (ULAB) recycling facility

Addendum to WAA - final

Prepared for:
EPA Victoria

On behalf of:
EPA Victoria

Prepared by:
Ascend Waste and Environment

Date:
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About this Addendum

This document and its supporting appendix files respond in detail to EPA requests for information contained in EPA S22(1) Notices issued 31 January 2020, 19 February 2020 and 24 April 2020, including all subsequent follow-ups. It responds to community submissions to EPA and incorporates new information, typically of a more detailed technical nature than was provided in the Works Approval Application (WAA) submitted to EPA on 5 December 2019.

The provision of more detail is simply additive to the WAA, and therefore does not replace original WAA information but complements it. This Addendum delves into further aspects of engineering design and environmental performance as requested by EPA, particularly relating to emissions to air. This extended set of evidence further validates and reinforces the original WAA's estimates and conclusions, providing greater confidence in its modelled impacts to the environment and human health.

There are also a small number of instances where information has changed as a result of Notice follow up work, such as improvements in design or revised calculations. These revisions, or errata, are listed in the WAA Erratum below for clarity.

Consequently, the final 'package' of information pertaining to the Works Approval Application for Chunxing's Used Lead Acid Battery (ULAB) recycling facility at Hazelwood North is made up of:

1. The original WAA (*15041CH Chunxing ULAB WAA - final Rev1.PDF*, issued 5 December 2019, including all of its appendices (A – J).
2. This addendum to WAA (*Chunxing Addendum to WAA – final (issued).PDF*, issued 15 June 2020), incorporating an erratum.
3. Separately provided appendices to this Addendum (1 – 54).

For a complete understanding of the design aspects and estimated environmental impacts of the proposed ULAB recycling facility at Hazelwood North, this entire package should be read together.

WAA Erratum

Section/ page of original WAA	Replaced with Section/ page of new information	Outline of alteration
WAA Section 4.3 – Section 5.7		
Section 4.3 Description of the Hazelwood proposal, p.17, 3rd paragraph	Changes of a minor numerical nature (due to more detailed analysis since WAA submission), so recorded in erratum only	'28,000 tonnes of refined lead per year' changed to '28,000 tonnes of refined lead products per year' 'The main waste will be approximately 4,000 tonnes per year of lead-containing smelting slag' changed to 'The main waste will be approximately 4,500 tonnes per year of lead-containing smelting slag'.
Section 4.4 Process and technology, p.19, Figure 3	Addendum Appendix 50 (new WAA Figure 3)	New lead slag data inserted as range ('lead slag to landfill (0.2 -0.6% Pb)' changed to 'lead slag to landfill (0.4 -1.0% Pb') 'Pure lead Pb>99.994%' changed to 'Pure lead Pb>99.9%'
Section 4.4.2 Waste acid processing for value-added fertilizer (zinc sulfate solution), p.21, 3rd paragraph	Change is minor, so recorded in erratum only	2nd paragraph: 'sourced from galvanizing industries in Australia' deleted. Fertiliser grade zinc oxide will be used.
Section 4.4.3 Melting of lead grid for production of lead alloys, p.22, 1st paragraph	Changes of a minor numerical nature (due to more detailed analysis since WAA submission), so recorded in erratum only	'This is melted to produce lead metal at a relatively low furnace temperature of approximately 1,000 ^{0}C' changed to 'This is melted to produce lead metal at a relatively low furnace temperature of approximately 500 ^{0}C'
Section 4.4.5 and 4.4.6, p.24		4.4.5 p.24, text paragraph 1: 'lead content>99.994%' changed to 'lead content>99.9%' 4.4.6 p.24, text paragraph 5: 'level of 99.994% purity' changed to 'level of >99.9% purity'
Section 4.4.6, p.25-26, Table 4	Addendum Appendix 51 (new WAA Table 4)	Slight changes to input/output tonnages to be consistent with entire WAA and Addendum
Section 4.4.7.1, p.27, paragraph 6	Changes of a minor numerical nature (due to more detailed analysis since WAA submission), so recorded in erratum only	'..sprayed with lime in the scrubbers to form gypsum, achieving a removal efficiency (of SO_2) of 99.95%.' changes to 'sprayed with lime in the scrubbers to form gypsum, achieving a removal efficiency (of SO_2) of 99.86%.'
Section 4.4.7.2, p.31, paragraph 1,2		'.. a typical removal efficiency of 99.98%' changed to 'a typical removal efficiency of 99.4%' '.. (99.95%)' changed to '.. (99.86%)'
Section 4.4.7.3, p.35, paragraph 1		'.. (99.95%)' changed to '.. (99.86%)'
Section 4.4.7.3, p.35, paragraph 2		'Lead on the other hand is substantively reduced at the baghouse (99.98%), which includes a small reduction via the pre-baghouse cooling system, then the cooling tower reduces it by a further 20% (of the cooling tower inlet concentration)

Section/ page of original WAA	Replaced with Section/ page of new information	Outline of alteration
		and finally the scrubbers provide a further polishing effect, removing 90% of scrubber-inlet Pb levels.' Changed to: ''Lead on the other hand is substantively reduced at the baghouse (99.9%) and the scrubbers provide a further polishing effect, removing 75% of scrubber-inlet Pb levels.'
Section 4.5.5, p.40, paragraph 5		'For 50,000 tonnes of ULAB input per year, there is approximately 30,000 tonnes of paste to process. Assuming a typical year of 300 operating days, this results in a total of 400 individual smelting furnace batches in one year. Dividing the 30,000 tonnes of paste by 400 batches gives 75 tonnes of lead paste per batch, which proportionally requires charging with 7.5 tonnes of coal and 6 tonnes of iron.' Changed to: 'For 50,000 tonnes of ULAB input per year, there is approximately 31,000 tonnes of paste to process. Assuming a typical year of 300 operating days, this results in a total of 400 individual smelting furnace batches in one year. Dividing the 31,000 tonnes of paste by 400 batches gives 77.5 tonnes of lead paste per batch, which proportionally requires charging with 9.0 tonnes of coal and 7.2 tonnes of iron.'
Section 4.5.5, p.41, paragraph 2		'.. 4,500 tonnes of slag, at approximately 0.2 – 0.56% lead content.' Changed to: '..4,500 tonnes of slag, at approximately 0.4 – 1.0% lead content.'
Section 4.6, p.44, paragraph 3		'.. (0.2-0.6%[16])' replaced with '.. (0.4-1.0%[16])'
Section 5.4.1, p.49, Table 8		'..0.20 – 0.56% Pb' replaced with '..0.4 – 1.0% Pb'.
Section 5.7, p.53, point 15		'Slag Pb levels around 0.20 – 0.56% Pb..' replaced with 'Slag Pb levels around 0.4 – 1% Pb..'
WAA Section 7 Water resource use		
Section 7 Water resource use, p.70, Figure 11	Addendum Section 7 Water Management, p.78, Figure 26	Water use calculations were re-visited as part of this Notice response. Water volumes required have now been revised down substantially. Figure 26 of the Addendum replaces Figure 11 of the WAA.
WAA Section 8 Air emissions		
Section 8 Air emissions	Revised Section 8 Air emissions (Appendix 22)	Whole section has been replaced. Specific changes are noted below.
p.72	8.3.1.1, p.72-79	New section 8.3.1.1 Emissions from the main stack: allows main stack and fugitives stack to be distinguished. Includes modelling parameters, discussion of China production rate, makes reference to the Addendum regarding further veracity of

Section/ page of original WAA	Replaced with Section/ page of new information	Outline of alteration
		the 1/16 scaling assumption, adds derivation of PM10 and PM2.5 emissions to be modelled and additional arsenic data.
p.72	8.3.1.2, p.79-80	New section 8.3.1.2 Emissions from the fugitives stack: allows main stack and fugitives stack to be distinguished. Includes modelling parameters, fugitive emissions to be modelled.
8.3.2, p.76	8.3.2, p.81-84	Table 21 replaces Table 18 by combining main stack and fugitives stack GLCs from new modelling. Table 22 replaces Table 19 (additional $PM_{2.5}$ and 2-stacks combined data added).
p.80	8.3.2.1, p.85	New section 8.3.2.1 SEPP (AAQ) comparison modelling: allows ambient modelling to be distinguished from Design Criteria comparison modelling (SEPP (AQM)). Includes reference to Addendum's 12-month modelling, includes 24-hour modelling results.
p.80	8.3.2.2, p.85-89	New section 8.3.2.2 Background: describes different the types of background used in modelling and compares results obtained.
p.80	8.3.3, p.89-96	New section 8.3.3 Sensitivity analysis: Conducts sensitivity analysis modelling on various emission scenarios.
8.4, p.80-95	8.4, p.97-112	Section unchanged
8.5, p.95-104	8.5, p.112-121	Section unchanged
WAA Appendix G Air Quality Impact Assessment Report	Revised WAA Appendix G Air Quality Impact Assessment Report (reissued as Appendix 22 to this Addendum)	Updated to contain additional modelling as required by EPA.
WAA Appendix E Hazelwood North site plan (drawing no. PD2019-0084-001 Rev 04)	WAA Appendix E Hazelwood North site plan (drawing no. PD2019-0084-001 Rev 10) (reissued as Appendix 9b. to this Addendum)	Addition of second stack (fugitives) and further detail in response to Council requests for information as part of the planning permit application.
WAA Section 12 Waste		
Section 12.1, p.123, Table 36	Addendum Appendix 52 (new WAA Table 36)	Slight changes to production tonnages to be consistent with entire WAA and Addendum
Section 12.4.2 – 12.4.2.3, p.125-126, including Table 37	Addendum Appendix 53 (new WAA Section 12.4.2 PIW hazard categorisation)	Additional Pb in slag results added, which change provisional classification from Category B to Category A, noting that an application to EPA (once operational) for reclassification to Category B would likely be successful. New Pb in separator data added.

Executive Summary

This Summary section identifies only those issues we deem as critically important new information not previously provided at depth in the WAA.

For a complete understanding of the design aspects and estimated environmental impacts of the proposed ULAB recycling facility at Hazelwood North, the following information package should be read together:

1. The original WAA (*15041CH Chunxing ULAB WAA - final Rev1.PDF*, issued 5 December 2019, including all of its appendices (A – J).
2. This addendum to WAA (*Chunxing Addendum to WAA – final (issued).PDF*, issued 15 June 2020), incorporating an erratum.
3. Separately provided appendices to this Addendum (1 – 54).

1. The China reference plant design is modular and therefore near-identical to Hazelwood North in a single smelter set component

The China reference plant is made up of two plants, each with its own separate stack emission point. Plant #1 began operating in 2017, at a total capacity of 300,000 tonnes ULAB per year. Then plant #2 came on line in late 2017 at 500,000 tonnes ULAB per year total capacity, increasing the overall capacity to 800,000 tonnes ULAB per year.

Plant #2's layout for all flue gas flows from and to key equipment is shown in **Figure S1**. The entire plant contains 12 smelting furnaces, made up of 4 x 3-smelter furnace sets.

A critical observation from Figure S2 is that the most fundamental unit of the China plant is a 3-smelter furnace set (360t lead paste/batch, total set). This module is very similar in scale, equipment and layout to the 2-smelter Hazelwood plant (150t lead paste/batch), including the pollution control used. On this basic-module basis, but for the size/capacity differences between the furnaces (and more obviously two versus three per set), the Hazelwood plant is essentially equivalent to this fragment of China plant #2.

This fact provides a very direct correlation between the emissions performance of this 'plant fragment' and that predicted for the Hazelwood plant.

2. Commissioning of China plant #2 involved detailed testing of emissions at the key equipment set level

China plant #2 has a publicly available detailed commissioning report, which contains extensive testing data carried out on the 24th and 25th of November 2017, to validate its performance. These flue gas tests for key pollutants were taken at sampling points out of each (of 4) smelting furnace sets, each (of 3) refining kettle sets and also at the main stack exit point. These tests provide a level of plant emissions performance detail not previously understood.

Results from these eight sampling points, for the major pollutants SO_2, dust and lead, are given in ***Appendix 4*** and provide:

- evidence of smelting furnace-specific and refining kettle-specific performance that can be directly applied the Hazelwood situation

- evidence of actual performance of pollution control equipment: baghouses (3-parallel and single configurations) scrubbers (two in-line and single configurations)
- the ability to construct an air pollutant mass balance for China plant #2 (***Appendix 5***).

A schematic representation of the China plant #2 air pollutant mass balance is shown in **Figure S2**, with the full mass balance supplied in Appendix 5: Excel workbook *Air flows and mass balance v9*.xlsx, worksheet ‘Flows & mass balance (China 2)’.

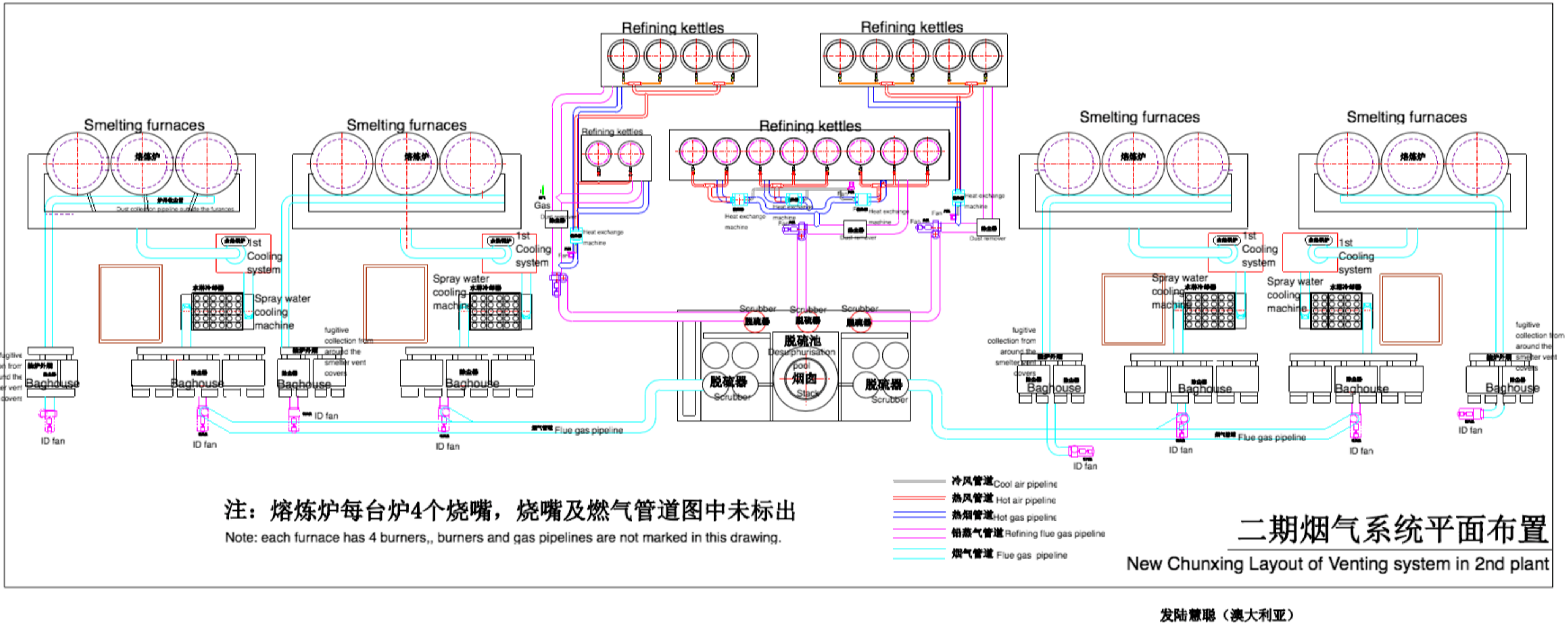


Figure S1: Layout of venting system in China plant #2 (500ktpa)

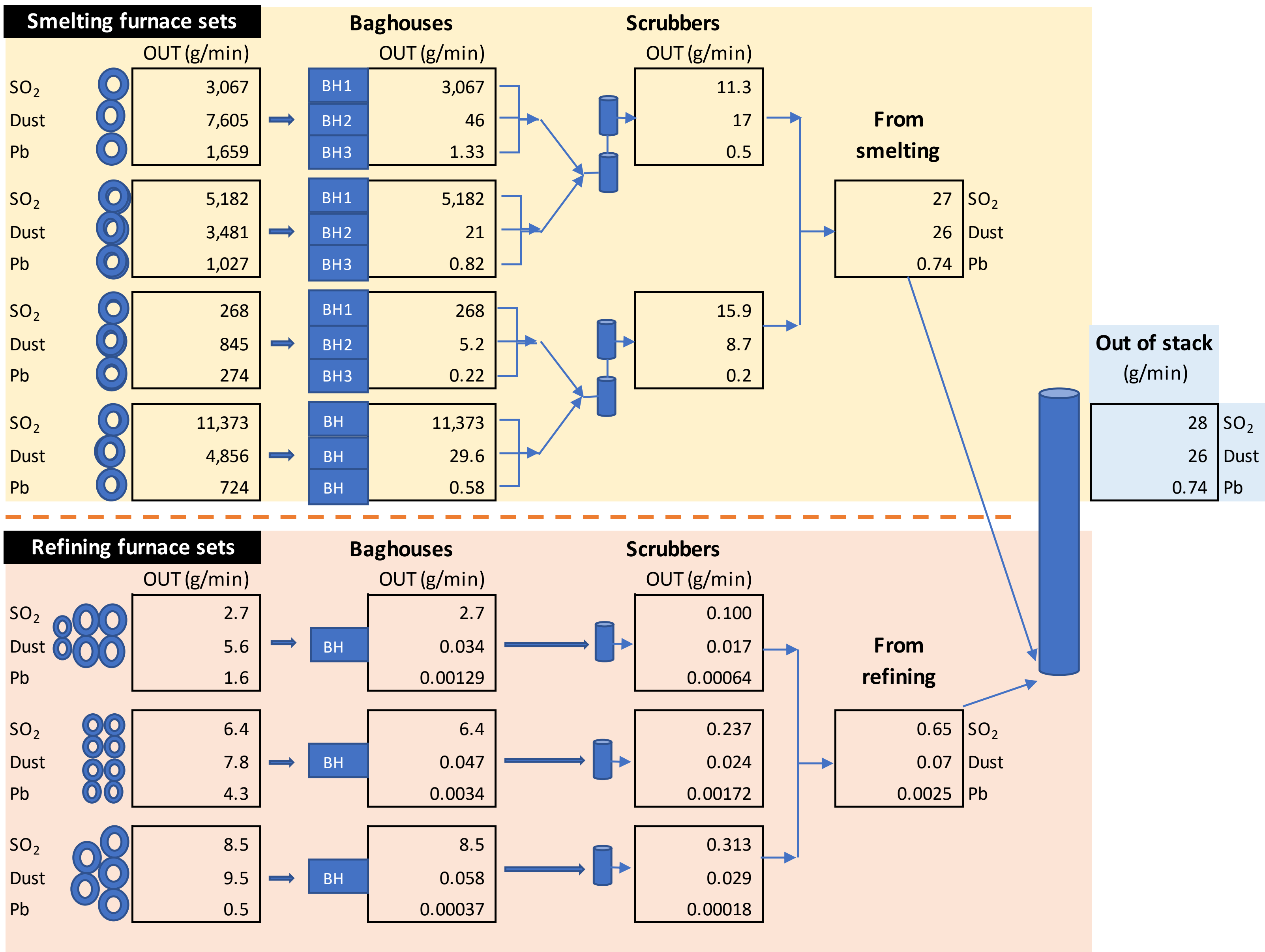


Figure S2: China plant #2 (2017 Commissioning) key pollutant mass balance block diagram

Pollution control equipment performance was back-calculated from the 2017 commissioning test data to be:

- Baghouse (3 in parallel, used per smelting set): 99.39% control efficiency for PM, 99.92% for Pb & 0% for SO_2.
- Scrubbers for each half of the smelting plant (2 x two placed in series, expressed as a control efficiency total): 99.8631% control efficiency for SO_2; 75% for dust & 75% for Pb (50% each scrubber in series).
- Single baghouse/ water dust remover (per refining set): 99.39% control efficiency for PM, 99.92% for Pb & 0% for SO_2.
- Single scrubber (per refining set): 96.3% removal efficiency for SO_2; 50% for dust & 50% for Pb.

The Hazelwood North baghouse and scrubber sizes, designs and configurations are identical to those used in China plant #2. Consequently, the control efficiencies above are directly applicable to Hazelwood North baghouses and scrubbers, and have been used to construct a design air pollutant mass balance for the proposed plant.

3. The Hazelwood North plant mass balance independently demonstrates the 1/16th emission scaling method to be sound

The Hazelwood North key air pollutant mass balance, in terms of mass emission rates at each point in the plant, is summarised in the block diagram of **Figure S3** and detailed in ***Appendix 5*** Excel workbook *Air flows and mass balance v9*.xlsx, worksheet 'Flows & mass balance (Haz)'.

Figure S4 parallels the smallest modular component of the China plant (a 3-smelter furnace set) all the way through to stack, so it can be compared to the similar scale Hazelwood plant.

The mass balances of the Hazelwood North 2-furnace smelting configuration and the China plant #2 3-furnace smelting configuration, are very similar, particularly when the effect of the stack water scrubber (in Hazelwood's design) is ignored. This demonstrates a strong direct link from the Hazelwood design to the reference plant's operation, because the comparison of the plant throughput at module-level is not a 1/16 derivation, but a much closer 1/2.4 (150 tonnes of lead paste/batch for Hazelwood compared to 360 tonnes of lead paste/batch for China plant #2). Because actual measurement data from China plant commissioning is taken at this smelter-module level, the scale-extrapolation required to compare to Hazelwood is small, and therefore a very reliable indicator of expected emissions performance.

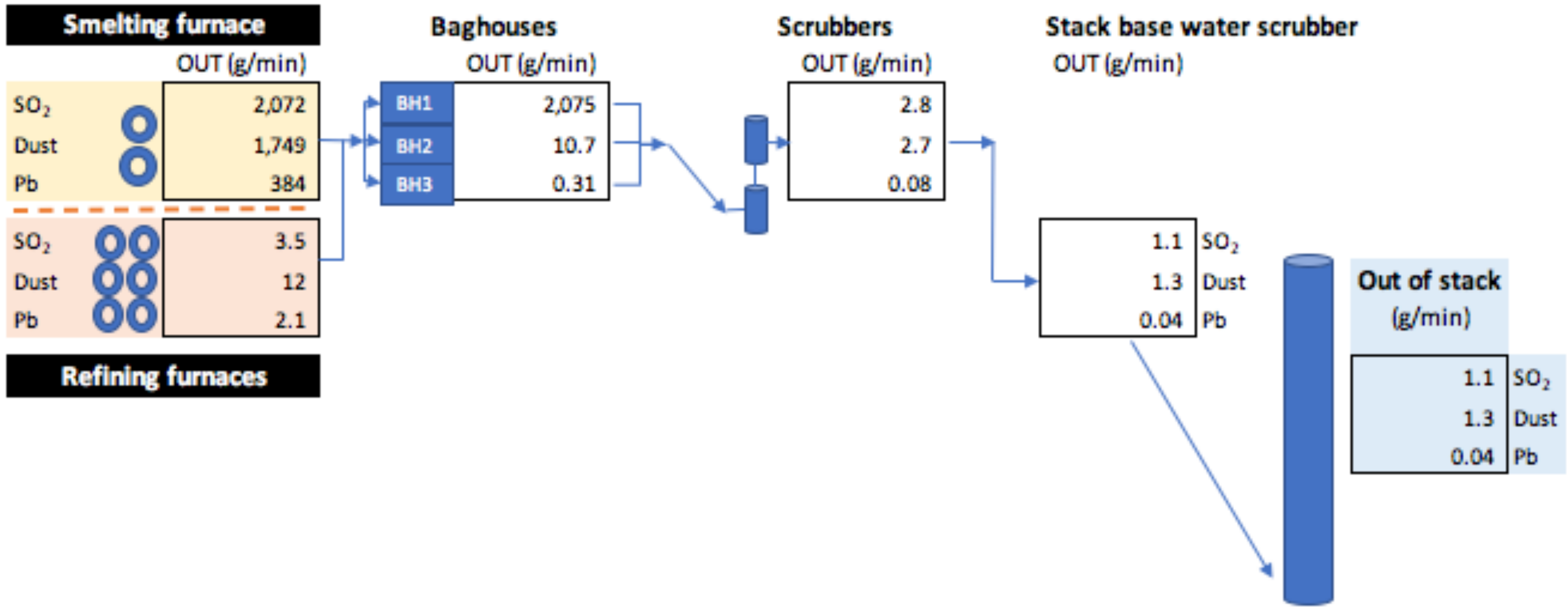


Figure S3: Hazelwood North key pollutant mass balance block diagram (150t lead paste/batch)

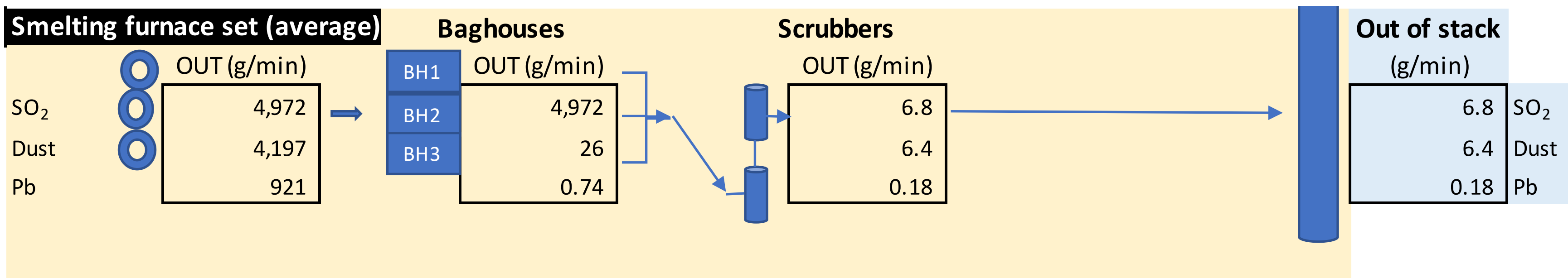


Figure S4: China plant 3-furnace set modular mass balance (360t lead paste/batch)

The Hazelwood mass balance results, which are derived from an entirely independent data source (2017 commissioning testing of China plant #2), have been used to test the modelling input assumption:

- *that the quarterly stack test emission measurements from the sum of the two China plants (800,000 tpa ULAB capacity) would be directly proportional to the emissions from the smaller Hazelwood North facility (50,000 tpa), or 1/16th.*

As described in the WAA, the modelling inputs take all China quarterly stack testing results available (2017 – 2019), for both plants, average them across that period and divide the averages by 16.

The results of the mass balance are shown in **Table S1**, for the key pollutants sulfur dioxide, total dust and lead, compared against the predicted emission rates from Table 16 of the original WAA (the inputs to the model based on 1/16th of the China emissions). Table 17 of the revised Air emissions Section 8 of the WAA, now Appendix 22 to this Addendum, contains identical emission rates.

Table S1: Hazelwood North key pollutant emission estimates

Pollutant	Mass balance method	1/16 estimate used in modelling
	kg/hour	kg/hour
Sulfur dioxide	0.07	0.13
Total Dust	0.08	0.19
Lead	0.002	0.002

The mass balance results and 1/16th estimates used for modelling compare remarkably well.

What is compelling about the mass balance result is that it is taken from measured performance of modular segments of the China plant which, when taken at the segment level, are very similar in scale to the Hazelwood North design, as shown by comparison of Figures S3 and S4. That the one-off commissioning tests agree so well with the two years of plant #2 quarterly data is also proof of the integrity of the quarterly stack testing process, and the reliability of the plant's operation.

Using a completely independent, publicly available, highly credible dataset (China plant #2 commissioning testing), the 1/16 method used in the WAA to estimate emissions from stack (as inputs into the model) is proven to be an appropriate, and for some pollutants conservative, measure of emissions performance of the Hazelwood North facility.

4. Cumulative emissions from the Hazelwood North plant are demonstrated to be orders of magnitude below the most stringent ambient standards in the world

Some stakeholders have raised concerns about the impacts from cumulative emissions, particularly of lead. To analyse this issue more precisely, the model was re-run to produce annual average ground level concentration results, rather than the hourly (or less) averaging times used in design criteria assessment. This approach then allows comparison with ambient standards, such as Australia's (0.5 µg/m^3 for lead) or the US EPA's NAAQS; at 0.15 µg/m^3 it is often quoted as an ambient air benchmark for lead.

The annual average ground level concentration modelled for lead was 0.0011 µg /m^3, or just 0.22% of the Australian ambient standard for lead (or 455 times below it). Comparing against the US EPA's NAAQS (0.15 µg/m^3) the annual average is 0.75%, or 133 times below.

On the basis of annual average modelled emissions, the Hazelwood North facility's emissions are demonstrated to be infinitesimal – to the point that they are substantially below the most stringent ambient standards applied around the world and 100 times below natural background, at their worst case modelled point in the study area.

5. Management of fugitive emissions from the Hazelwood North plant is demonstrated to meet best practice, and these emissions are shown to be orders of magnitude below 'Regulation 10' exemption levels

A fugitives mass balance has been provided in ***Appendix 16*** (Excel workbook file *In-plant air data calculated v8.xlsx*, worksheet 'Haz fugitive'), derived from comprehensive in-plant monitoring undertaken in China plant #2 in 2019 (***Appendix 8***). A summary of the mass balance's emission outputs is shown in **Table S2**.

The total stack emission of all fugitive lead collected by the fugitives vent system is estimated to be 0.0000010 kg/hr. This corresponds to 0.05% of lead emissions estimated from the main stack (0.0019 kg/hr) and just 0.02% of the Regulation 10 exemption level (0.006 kg/hr).

What is striking about this result is that the mass balance has been built using measured in-plant building air concentrations from China plant #2, without any form of scaling reduction, even though it is almost certain that a lower level of fugitive emissions would occur from a plant 1/10th of the size.

Using the *Environmentally Sound Management of Spent Lead Acid Batteries in North America, Technical Guidelines*[1] as a best practice benchmark (as requested by EPA), the Hazelwood North facility's fugitive emissions control methods were assessed as exceeding best practice fugitive emissions management. This is demonstrated by the mass balance's results for lead.

[1] *11665-environmentally-sound-management-spent-lead-acid-batteries-in-north-america-.PDF*, available at: http://www3.cec.org/islandora/en/item/11665-environmentally-sound-management-spent-lead-acid-batteries-in-north-america-en.pdf

Table S2: Estimated emissions to air from proposed Hazelwood plant fugitives stack

Substance	Modelling parameters							
	SEPP (AQM) Sch A Class	Averaging time	SEPP (AQM) Design Criteria mg/m^3	Estimated fugitives stack emission (kg/hr)	Sch Prem Exemption level (kg/hr)	Fugitives emission as % Exemption level	Average main stack emission (kg/hr)	Fugitives emission as % main stack emission
Sulfur dioxide	1 (toxicity)	1-hour	0.45	0.000414	0.42	0.099%	0.13	0.32%
Nitrogen dioxide	NO_2 -1 (toxicity)	1-hour	0.19	0.0024	4.2	0.057%	1.27	0.19%
Total particulate matter (TPM or TSP)	Unclassified (nuisance)	3-minute	0.33	0.00011	0.42	0.027%	0.19	0.06%
PM_{10} - (assuming all TPM = PM_{10})	1 (toxicity)	1-hour	0.08	0.00011	0.42	0.027%	0.19	0.06%
$PM_{2.5}$ - (assuming 65% of TPM = $PM_{2.5}$)	2 (toxicity)	1-hour	0.05	0.000072	0.17	0.043%	0.12	0.06%
Lead	1 (toxicity)	1-hour	0.003	0.0000010	0.006	0.017%	0.0019	0.05%
Sulfuric Acid	2 (toxicity)	3-minute	0.033	0.000005	0.006	0.1%	0.0027	0.19%
Chromium and its compounds	Cr(III): 2 (toxicity)	3-minute	0.017	0.00000019	0.006	0.003%	0.00034	0.05%
Arsenic and its compounds	3 (IARC Group 1 carcinogen)	3-minute	0.00017	0.00000036	0.006	0.006%	0.00067	0.05%
Cadmium and its compounds	3 (IARC Group 1 carcinogen)	3-minute	0.000033	0.00000001	0.006	0.0002%	0.000023	0.05%
Tin and its compounds	Not listed	N/A	N/A	0.00000002	N/A	-	0.000040	0.05%
Antimony and its compounds	2 (toxicity)	3-minute	0.017	0.00000008	0.006	0.001%	0.0001	0.05%

6. Re-modelled emissions, through the addition of $PM_{2.5}$, the inclusion of the fugitives stack and using a variety of averaging times and background considerations result in no material changes to results and conclusions reported in the original WAA.

As part of discussions during the Notice response period, EPA requested that Chunxing undertake the further air quality dispersion modelling:

- to incorporate the additional fugitives stack's emissions
- to account for $PM_{2.5}$
- In addition to modelling against SEPP (AQM) requirements, further modelling to allow for comparison against SEPP (AAQ) requirements, or other ambient standards
- technical variations relating to the treatment of background
- a sensitivity analysis.

The addition of emissions from the fugitive stack to those from the main stack, run through the air dispersion model, resulted in no change to originally predicted ground level concentrations (GLCs). Modelled lead GLCs, for example, remain more than 300-times below EPA standards.

Results of 12-month ambient modelling were substantially below the most stringent ambient standards applied around the world and 100 times below natural background, at their worst case modelled point in the study area.

All results using 24-hour averaging applied without background, including worst case modelling from the highest emission input data, are substantially below 24-hour environmental quality objectives, as set by EPA's SEPP (AAQ).

With respect to background:

- There are no scenarios where SEPP (AQM) Design Criteria are exceeded with background applied, regardless of whether that background is calculated as variable hourly or constant 70th percentile.
- There is one scenario where modelled 24-hour GLC results (applying hourly variable background) exceed the SEPP (AAQ) standards: $PM_{2.5}$.
    - This exceedance is due entirely to the background level itself, since the facility contribution makes up just 1% of this concentration (for the average emission) and 4% (for the high emission).
- The most appropriate treatment of background data in the case of the Latrobe Valley and the proposed Chunxing facility's estimated emissions is to ignore it, because the inclusion of the background data modelled (in any of its forms) simply masks the contribution from the facility, enabling no reasonable assessment to be made.

The results from sensitivity analysis indicate that, in all cases, there are no results remotely near the SEPP (AQM) Design Criteria exceedance point. In terms of lead:

- the best (most likely) case predicts lead emissions more than 300 times below the SEPP (AQM) Design Criteria

- the theoretical high case indicates a lead emission which is still 106 times below the SEPP (AQM) Design Criteria
- the theoretical low case, which is based on actual results currently being obtained by the China reference plant, predicts lead emissions 2,500 times below the SEPP (AQM) Design Criteria.

These additional air quality dispersion modelling results are detailed in Appendices 22, 48 and 49 to this Addendum.

7. A Human health risk assessment (HHRA) confirms all evidence provided by Chunxing to date: that risks to human health associated with exposures from the Chunxing facility are negligible.

Environmental Risk Sciences Pty Ltd (enRiskS) carried out a human health risks assessment, as required by EPA. Their report is provided in ***Appendix 23*** and states:

> *"Based on the evaluation presented in relation to potential health impacts of air emissions from the proposed ULAB recycling facility, the following is concluded:*
>
> - *Inhalation exposures: Risks to human health associated with acute or chronic exposures are negligible. This includes risks to pollutants presents as gases, particulate matter and pollutants bound to particulates.*
> - *Multiple pathway exposures: Risks to human health associated with chronic exposures to pollutants, bound to particulates, that may deposit to surfaces and taken up into produce for home consumption relevant to all surrounding areas, including all rural residential and low- density residential properties, are negligible."*

In relation to industrial neighbours and visitors to the site:

> *"The assessment of potential acute and chronic inhalation exposures in these areas has concluded that there are no risks to the health of workers or visitors."*

In relation to those residential areas located closest to the site:

> *"The assessment of potential acute inhalation and chronic inhalation and multi-pathway exposures in the residential and rural residential areas has concluded that there are no risks to the health of residents."*

This Addendum also responds to a range of other issues requested by the Notices including:

- plastics plant emissions management
- material flows throughout the various processes
- ULAB receipt, storage and handling, process control and emergency management
- waste water treatment
- stormwater and run-off water management
- a detailed set of responses to issues raised by the community through written submissions to EPA's consultation process, held throughout December 2019, January 2020 and February 2020.

1 Introduction

This document and its supporting appendix files respond in detail to requests for information contained in EPA S22(1) Notices issued 31 January 2020, 19 February 2020 and 24 April 2020, including all subsequent follow-ups, requesting further detail about the proposed used lead acid battery (ULAB) recycling facility in Hazelwood North.

The structure of the response is based on a logical flow and grouping of information requests, and a prioritisation of air emission related information first, since this has been a primary issue identified by all stakeholders. As part of the air emissions response, we felt that it was important to further detail the operations of the China reference plant, because this forms the basis of a more detailed understanding of the Hazelwood North proposal.

Section 2.1 and its sub-sections focus solely on the China plant –others in the submission relate to the Hazelwood proposal directly.

1.1 Notice questions and responses map

As a means of navigating this document's information back to the questions asked from the Notices (and subsequent EPA communications), **Table 1** provides a map for easy reference.

Table 1: Chunxing response to EPA request map

#	EPA request	Chunxing response		Additional WAA reference
		Section	Page #	
1	Description of process building design, including dimensions for the whole facility and individual processing areas, their segregation/partition and locations of vents.	2.2 2.2.1 2.2.4 App 9 Figure 9	p. 24 p. 24 p. 40	WAA App E WAA Fig.23, p.129
2	Provide a full list of process equipment to be installed for the whole project, including their capacities	2.2 App 10	p. 24	Appendix L Equipment list for 50,000t ULAB plant (this has now been superseded by *20200316 Equipment list updated.xlsx*, referred to in Section 2.2 of this response).
3	Describe which process areas and/or equipment will be fully enclosed, as well as be installed with air extraction system	2.2.1.1 2.2.4 2.2.5	p. 29 p. 40 p. 52	-
4	Explain which part of building will be under negative pressure and how to achieve it.	2.2.4 2.2.4.1	p. 40 p. 44	-
5	Provide: a. A complete process diagram showing input materials and output materials (products, by- products/wastes - liquid, gaseous and solid). b. Mass material balance.	5.1 App's 19-22	p. 59	WAA, Section 4.3 and 4.4, pp. 16-36.
6	Plastic process and site layout plan.	2.2.5	p. 52	
7	Overview of process control automation system, including operational process control, pollution equipment performance monitoring and response actions/procedures.	6.1 – 6.3.4 App 28	p. 71 – p. 72	-
8	Describe the proposed layout of the battery receival, storage and truck washing areas with a layout plan.	5.2 App 23	p. 64	-

#	EPA request	Chunxing response		Additional WAA reference
		Section	Page #	
9	Explain the management of acid leakage from broken batteries, dust emissions and truck washing water.	5.2 2.2.4	p. 64 p. 40	-
10	Provide a risk assessment for reuse process water on-site to demonstrate that the proposed on-site wastewater treat system is adequately designed and potential risks can be managed with reference to EPA's publication *IWRG632 Industrial Water Reuse Guidelines*.	7.5 App 36	p. 89	-
11	Explain: a. Air pollution emission point sources and management (i.e. locations of collection points). b. Fugitive emissions control and management. This should include identification of the risks of fugitive lead dust emissions from the process (inside the building) and external operational activities; control measures adopted to minimise lead emissions within the building and off- site. c. What could be internal lead concentrations within process areas inside the building? d. Design capacities for the proposed baghouse and scrubbers and their maintenance program. Provide data to confirm performance standards.	2.2 – 2.2.4.1 (inclusive) 2.1.3	p. 24 – p. 44 17	-
12	Engage a qualified consultant with urban stormwater design experience to verify the proposed design, which must include, but not be limited to: a. The sizing of stormwater pond based on a one in 20-year rainfall event. b. The proposed storm collection system. For example, the locations of sumps and their capability of containing pollutants in the event of incidents. c. Explain the management and control of overflows from the collection ponds, high intensity rainfall events and incidents (spill and fire). d. Potential occurrence of off-site run-off and its impact on the surrounding land and water bodies. e. Clarify the height of the proposed site bund around the perimeter of the processing areas/building.	7.1 App 30	p. 78	-
13	Please provide: a. A full list of chemicals, both dangerous and by-products, where they will be stored and storage capacity. Demonstrate the storage facility design meets requirements in EPA's publication 1698 Liquid storage and handling guidelines. b. A full list of solid and liquid wastes (i.e. furnace ashes, sludge/sediments, bag house dust, etc.), including prescribed industrial wastes (PIW), to be generated, their storage and disposal/reuse. c. Final product storage facilities, including lead ingots and plastics.	5.4 7.3.3 App 9 App 29	p. 69 p. 85	WAA Section 12.5.4.2 *Storage and handling of liquids,* p. 136 WAA Solid wastes and by-products: Table 36, p.123

#	EPA request	Chunxing response		Additional WAA reference
		Section	Page #	
	d. How metal impurities (Sb, As Cr and Cd etc.), except for lead, are removed throughout the process and where they will be disposed.	5.4	p. 69	
14	Explain emergency management in the event of fire, explosion, utility supply failure, major pollution control equipment failure (WWTP, baghouse, scrubbers). This should include process control/interlock, detection system and response procedures.	6 - 6.4	p. 71 – p. 74	WAA Section 13.1, Table 42 WAA Sections 13.1.1 and 13.1.2 WAA Section 12.5.4, Table 39
Other EPA information requests				
	Process wastewater			
15	Incoming materials quality control/checking	5.3	66	-
16	Location where slag and alloy lead cooling taking place.	7.3.4 App 9 App 29	p. 88	-
17	Proponent should develop and submit conceptual design of the proposed wastewater treatment plant, including design criteria, sizing of various components, chemical dosing rates, size of chemical storages and site layout plan.	7.3.3	p. 85	-
18	Plant process wastewater treatment system should be located within a bunded area as per EPA publication 1698.	7.3.3 App 29	p. 85	-
19	Contingency for dealing with malfunction of wastewater treatment system or excessive treated wastewater is to discharge into the sewer system. Proponent should enter into a trade waste agreement with Central Gippsland water.	Figure 27	p. 82	-
	Stormwater			
20	The response doesn't actually say that the ponds are sized correctly. It just states their volume and describes the separation of the two streams of stormwater. It is necessary to confirm explicitly that they are sized correctly for a 1 in 20 year rain event. Also, an area for the ponds (i.e. m^2) rather than a volume (i.e. m^3) was provided. Is this a typo or an error?	7.1 App 30	p. 78	-
21	In an emergency, flows will be pumped to the site water pond. It is assumed that this requires portable pumps, unless these pumps will be installed. Please clarify.	7.3	p. 83	-
22	It is stated that "D..no site runoff is expected.." if the facility is designed to cope with 1-in 20 years storm event. What if there is a 1 in 100 year rain event? How it will be contained? Please explain.	7.1 App 30	p. 78	-
23	E. "Each storage pond will be constructed at least 1.0 m above the ground." Does this mean they will be airborne? Please clarify	7.1 App 30	p. 78	-
	Other			-
	It is considered that an Emergency Management Plan (p132) should be developed as part of the detailed design as it would include a fire protection system, equipment, fire water run-off containment and drainage points.	6.4.1	p. 76	-

#	EPA request	Chunxing response		Additional WAA reference
		Section	Page #	
	Responses to stakeholder submissions (February 2020 Notice)			
	You must provide EPA with responses to the issues raised in the public submissions which are attached to this notice.	8.1 8.2	p. 91 p. 105	
	April 2020 Notice requests			
	You must engage a suitably qualified specialist to undertake a public health risk assessment…	3.2 App 23	p. 55	
	You must revise the air dispersion modelling, as agreed.	3.1 App 22 App 46	p. 54	Replacement WAA Section 8 Replacement AQIA report

2 Air emissions

Air emissions are a primary theme in the Notice questions, as well as in the community submissions received. This section provides further detail to the air emissions section of the WAA, by providing more detailed information about plant and equipment used, pollution control configuration, fugitive emission sources and controls and verification of the approach to emissions estimation taken in the WAA.

A key part of providing this more detailed design is a thorough depiction of the operation of the China reference plant. From this, the Hazelwood plant design has then been further described.

2.1 China reference plant

The China reference plant is made up of two plants, each with its own separate stack emission point:

- Plant #1, known as 'Phase 1' or 'Qy01' in quarterly monitoring data[2].
- Plant #2, known as 'Phase 2' or 'Qy02' in quarterly monitoring data.

Plant #1 began operating in 2017, at a total capacity of 300,000 tonnes ULAB per year. Then plant #2 came on line in late 2017 at 500,000 tonnes ULAB per year total capacity, increasing the overall capacity to 800,000 tonnes ULAB per year.

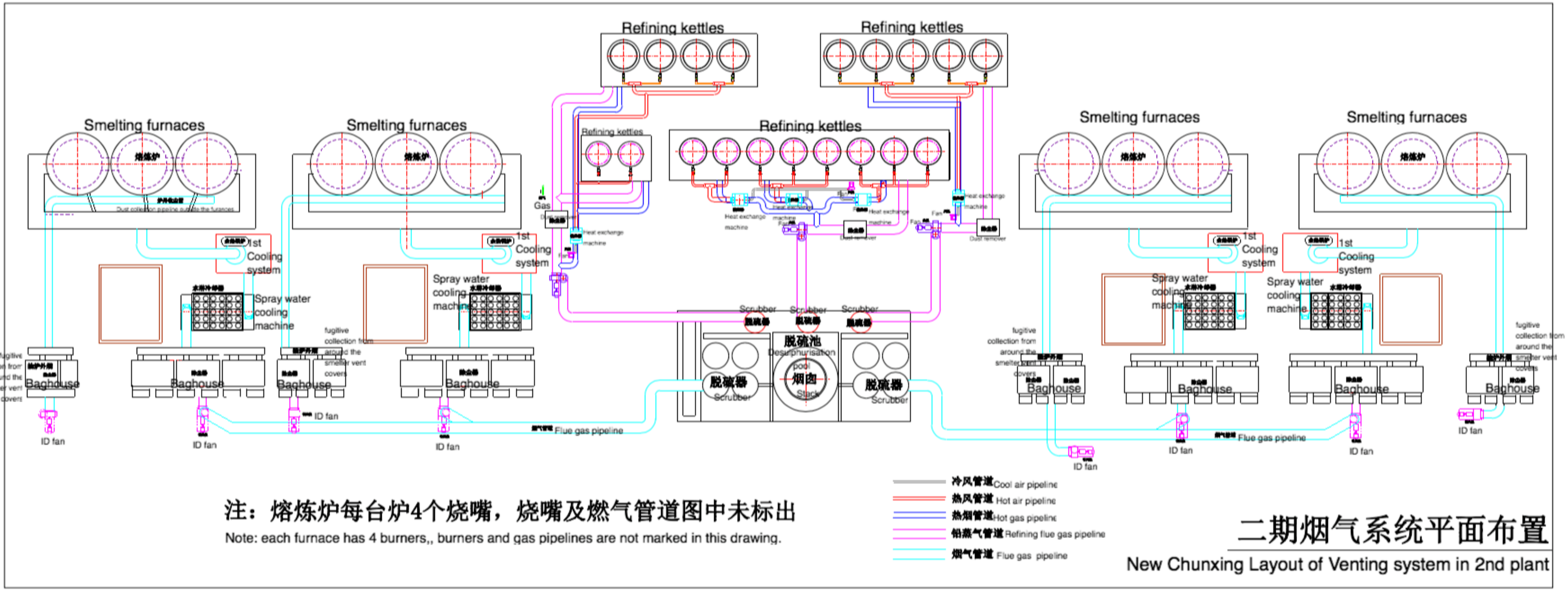
Since plant #2 is the newest and is a simple multiple of ten times the ULAB capacity of the 50,000 tpa Hazelwood North proposed plant, it is detailed hereafter as the reference plant. It is noted however that the 16 times multiplier used in applying quarterly monitoring data in WAA still holds, as this was based on stack data from both plant combined.

Most relevant to this submission, plant #2 has the advantage of having a publicly available detailed commissioning report, which contains extensive testing data carried out on the 24th and 25th of November 2017, to validate its performance. These flue gas tests for key pollutants were taken at sampling points out of each smelting furnace set, refining kettle set and also at the stack exit point.

2.1.1 Plant layout and description

China plant #2's layout for all flue gas flows from and to key equipment is shown in **Figure 1** (also separately supplied as high-resolution file in ***Appendix 1****.New Chunxing Layout of Venting system in 2nd plant 二期烟气系统平面布.pdf*).

[2] Quarterly stack monitoring data for China plants 1 and 2 from 2017-2019 is provided in the WAA, Appendix H.



发陆慧聪（澳大利亚）

Figure 1: Layout of venting system in China plant #2 (500ktpa)

The key layout at the time of testing was:

- Four sets of smelting furnaces, with each set made up of 3 smelting furnaces of 6.8m diameter and 120 tonnes (of lead paste input) per batch each, totalling a capacity 360 tonnes per batch (of lead paste) for each set.
- Flue gas from each smelting set passes through a cooling system then onto a set of 3 baghouses arranged in parallel. In total this is four cooling sets and 4 x 3 = baghouses.
- Flue gas from two of the 3-baghouse sets passes onto scrubber system #1, which is made up of two lime tower wet scrubbers placed in series.
- Flue gas from the remaining two of the 3-baghouse sets passes onto scrubber system #2, which is made up of a further two lime tower wet scrubbers placed in series.
- There are therefore four active scrubbers in total that service the full smelting plant, with a further four placed in standby as 2 x 2 sets of slaves. All four active scrubbers vent directly to the flue gas (main) stack.
- Dot points 1-5 make up the smelting system flue gas sources and controls.
- There are also three sets of refining kettles, arranged as described in **Figure *2***:
    - Set #1: four kettles (3m diameter, 110 tonnes lead per batch), plus two kettles (2.2m diameter, 40 tonnes lead per batch). Total capacity of set: 6 kettles = 520 tonnes lead per batch).
    - Set #2: eight kettles (2.2m diameter, 40 tonnes lead per batch). Total capacity of set: 8 kettles = 320 tonnes lead per batch).
    - Set #3: five kettles (3m diameter, 110 tonnes lead per batch). Total capacity of set: 5 kettles = 550 tonnes lead per batch).
- Total refining capacity of plant #2 = 1,390 tonnes of lead per batch.
- Each refining set is served by one heat exchange cooling system and one ‘water dust remover’, which is structured similar to a scrubber. The water dust remover uses clean water to cool down the temperature of the flue gas and remove the dust. The diameter of the water dust remover/ scrubber is 2.94m.
- Each refining set flue gas stream passes out of each’s water dust remover to a single scrubber (3 in all) then to the plant’s main stack.
- The total plant flue gas stream therefore houses 12 smelting furnaces, 19 refining furnaces, 12 baghouses, 3 water dust removers, 7 scrubbers and 4 slave scrubbers.
- This layout is depicted as a flow rate diagram for a single 3-smelter set in **Figure 3** (and as a separate file in ***Appendix 2***) and as a total plant in **Figure 4 (*Appendix 3*)**.

Figure 3 represents the most fundamental unit of the China plant: a 3-smelter set. This is very similar in scale, equipment and layout to the 2-smelter Hazelwood plant, including the pollution control used. On this basic-module basis, but for the size/capacity differences between the furnaces (and more obviously two versus three per set), the Hazelwood plant is essentially equivalent to this fragment of China plant #2.

Figure 1 also includes one additional baghouse per smelting furnace set, annotated as collecting ‘exhaust gas outside the furnaces’, which is for fugitive emissions collected by enclosure hoods around the furnace. This is covered in the discussion sections on fugitive emissions in this submission.

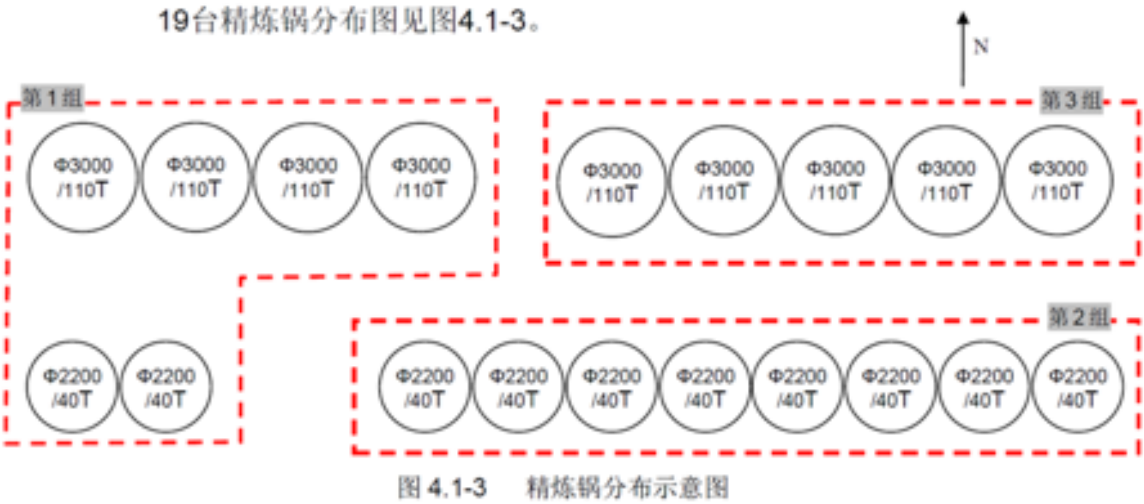


Figure 2: Refining kettle configuration in China plant #2

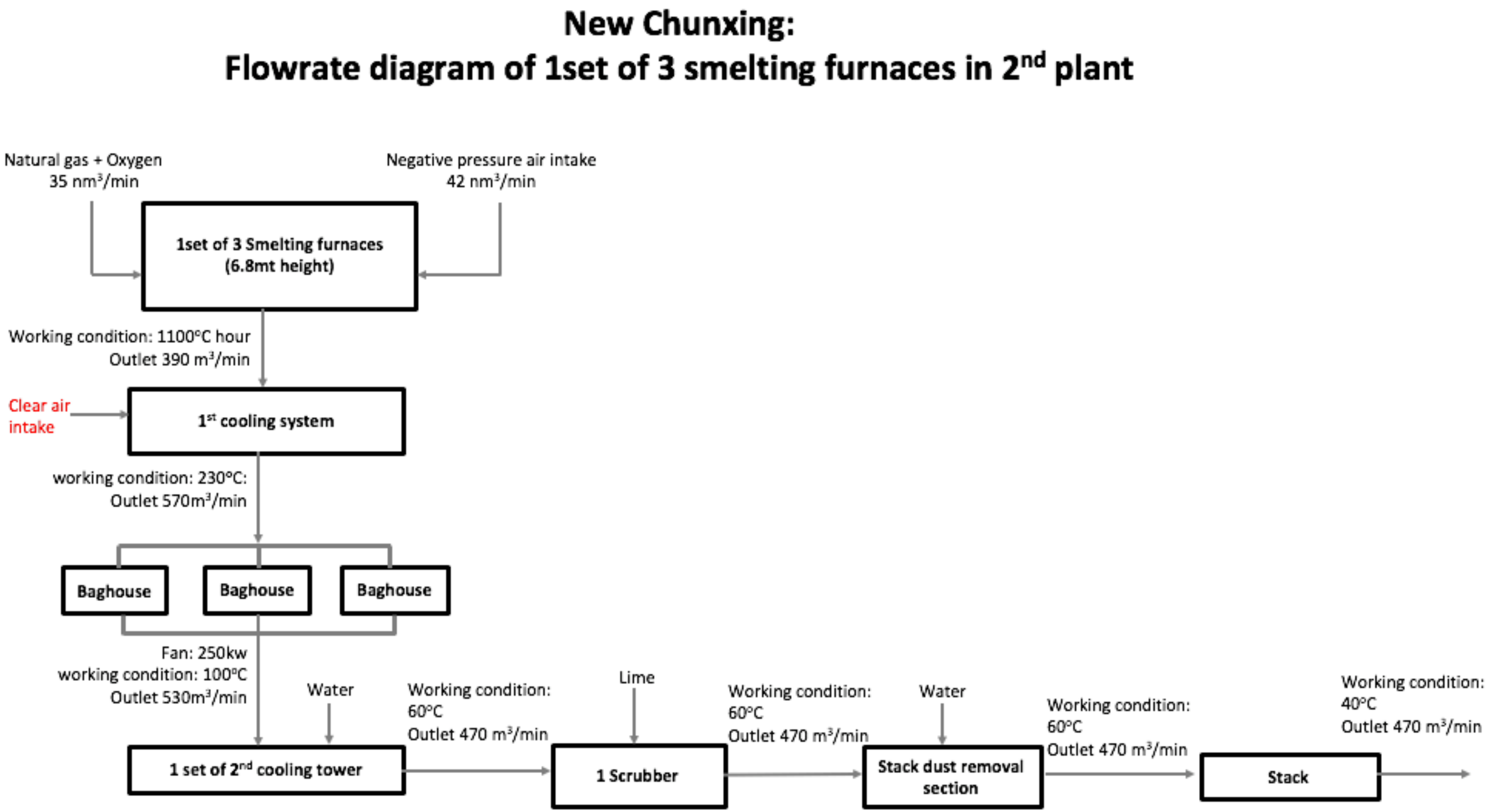


Figure 3: Flow rates of flue gases from single 3-smelter set (China plant #2)

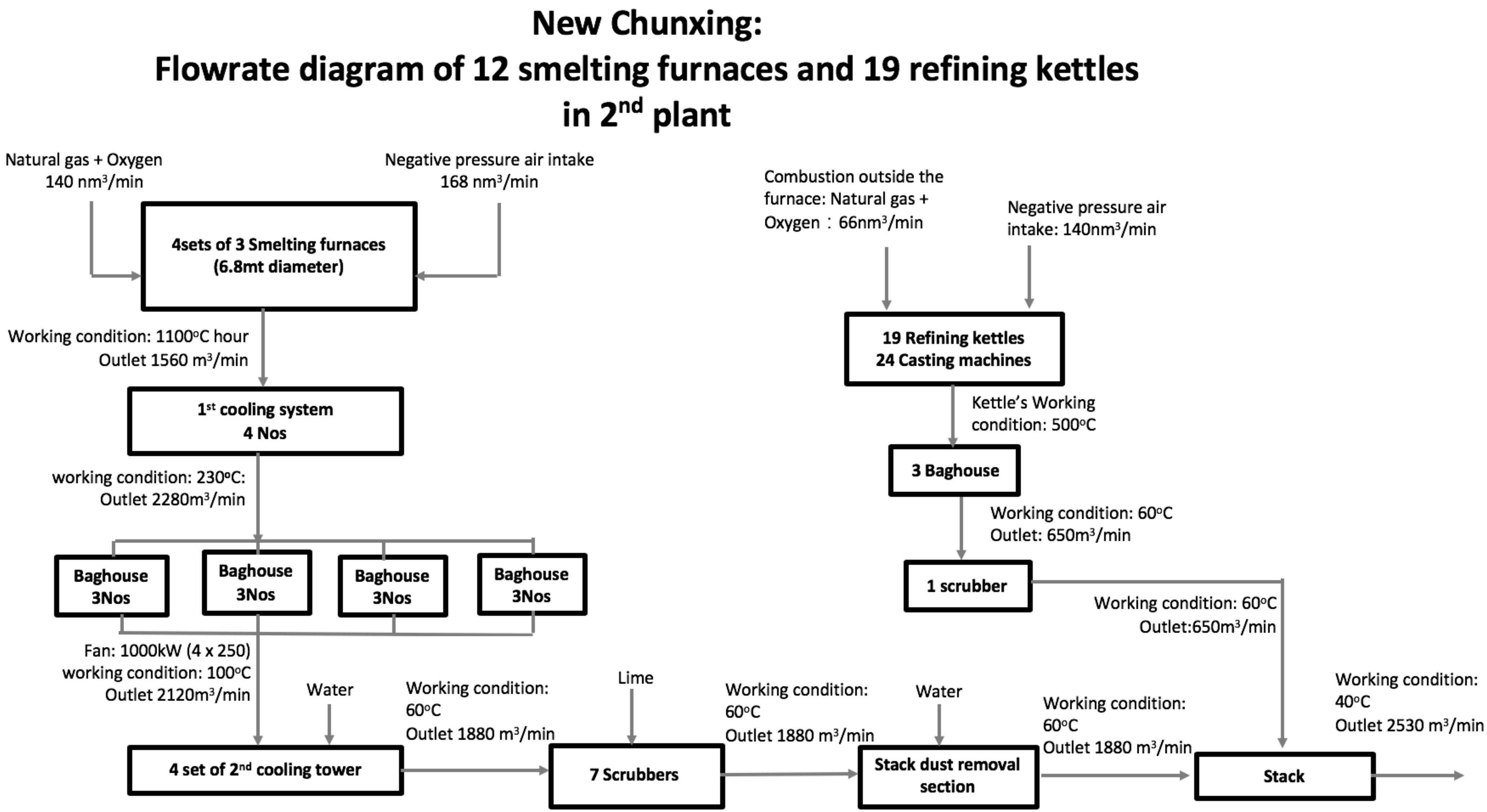


Figure 4: Flow rates of flue gases from total China plant #2

2.1.2 Point source emissions

The main point source emission from plant #2 is flue gas from the main stack, coming from the processes described in Section 2.1.1.

Since plant #2 was commissioned in November 2017 there have been 7 quarterly monitoring stack tests conducted for a range of pollutants, based on China regulatory environmental licence requirements. These results are supplied with the WAA, in its Appendix H. These results (for plant #2 only), in terms of the key pollutants dust, lead and SO_2, are collated in **Table 2** on a mass rate basis.

Table 2: 2018 and 2019 key pollutant quarterly stack testing (China plant #2)

Stack emission	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	All average
	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
Sulfur dioxide	3.3	2.6	1.8	1.8	0	1.3	2.7	2.2
Total Dust (TPM)	6.0	2.0	2.0	1.5	1.6	0.55	0.45	2.0
Lead	0.054	0.012	0.046	0.010	0.005	0.0044	0.0008	0.02

Some community submissions have questioned the validity of using the China plant as a reference and, taking both plant #1 and plant #2 data together (which represents a capacity of 800,000 tpa ULABs combined), using the ratio of the Hazelwood plant (50,000 tpa) to this total (800,000 tpa) (1/16) to derive stack emissions for Hazelwood which are used as inputs to the model.

As a means of verifying this approach, we provide measurement results in ***Appendix 4*** (*Test results of Flue Gas in 2nd plant.docx*), from the commissioning of plant #2, taken on the 24th of November and 25th of November 2017. These results are lifted and translated directly from the Commissioning Report, which is also provided separately in its entirety (in Chinese). The commissioning data set at Appendix 4 contains flue gas tests for key pollutants taken at the following sampling points:

- out of each of four smelting furnace set (taken inside the cooling system)
- out of each refining kettle set
- at the stack exit point.

These results serve a dual purpose of providing alternative stack emissions information (to quarterly testing) and also providing specific data on the emissions performance of each smelting and refining set.

Actual emissions data at this modular design level is pivotal to confirmation of the predicted performance of the Hazelwood plant, as explored in Section 2.2.2.1.

This degree of detail has enabled an air pollutant mass balance to be constructed for China plant #2, to more precisely describe the performance of its key components.

2.1.2.1 Air pollutant mass balance – China plant #2

Following the flue gas path in the plant venting diagram of **Figure 1**, a mass balance has been constructed from the bottom up, using measured concentrations and flow rates at each measurement point and approximate flow rates at points in between, based on design data provided for the plant.

The mass balance is detailed at the sampling points used in commissioning: coming out of each of four smelter sets and each of three refining kettle sets. Then control efficiencies are applied through each pollution control step.

The China plant #2 mass balance is provided at ***Appendix 5*** *Air flows and mass balance v9.xlsx*, worksheet 'Flows & mass balance (China 2)'. A sample from this workbook (for dust) is shown in **Table 3**.

The method used to construct this mass balance, expressed as a mass rate (and therefore independent of flow rate and able to be summed) is as follows:

Smelting furnace contribution to stack emissions

1. Identify the following sampling location data tables from the commissioning testing provided at Appendix A and match them with plant sets/ areas shown in **Figure 1**:
    a. smelting furnace sets 1, 2, 3, 4
    b. refining kettle sets 1, 2, 3
    c. stack exit point.
2. Identify the following data from each test point identified in the commissioning testing provided at Appendix A
    a. measured <u>concentration</u> of key pollutant (dust, Pb and SO_2) mg/m^3 (typically referred to as 'accurate tested concentration')
    b. measured flue gas <u>flow rate</u> at the measurement point in m^3/min (typically referred to as 'volume of exhaust gas')
    c. <u>temperature</u> at the measurement point (for reference only – not used in the mass balance calculation).
3. Starting with smelting set 1, first input 2a-c above, where:
    a. 'concentration measured' = 2a for the cooling system measurement point (and '-' into the furnace)
    b. 'flow rate out' = 2b for the cooling system measurement point
    c. 'temp ^{0}C measured' = 2c.
4. Then calculate the 'mass rate measured' at the cooling system point, using the test data, where: *mass rate (mg/min) = concentration (mg/m^3) x flow rate (m^3/min)*.
5. This is the mass of pollutant measured in the cooling system which, assuming the cooling process does not result in any pollutant removal itself, equals the mass of pollutant exiting the smelting furnace set 1, as well as the mass rate exiting the cooling system and entering the baghouse.
6. Apply the designed pollutant-specific baghouse control efficiencies across the three baghouses, assuming equal parallel flow rates through each, using the formula: (1-CE) x mass rate into the baghouse, where CE (control efficiency) is equal to the fraction of pollutant removed by the baghouse set. If 99% is removed, the CE = 0.99.
7. This results in a mass rate out of set 1's smelting system and baghouses per pollutant. Mass rates are the most important information coming out of the mass balance, because they hold true regardless of changing flow rates, and are presented in red text in the mass balance workbook.

8. To fill-in remaining concentration information (provided as supporting context to mass rates):
    a. Enter the flue gas flow rate coming into the baghouses assuming it is the same as the flue gas flow rate measured at the cooling system measurement point.
    b. Enter the flow rate coming out of the smelting furnaces using the theoretical plant design ratios at surrounding points multiplied by the actual measured flow rate.
        i. For example, **Figure 3** shows the design flow rate out of the smelting furnace set as $390m^3$/min and into the baghouse set as $570m^3$/min, while the measured flow rate at the cooling system measurement point (in **Table 3**) is $673m^3$/min. Therefore the deduced flow rate coming out of the furnace set = (390/570) x 673 = $461m^3$/min.
    c. Enter the flow rate coming out of the baghouse set using the same ratioing approach, where the design flow rate out of the baghouse set (from **Table 3**) as $530m^3$/min.
    d. Fill in remaining concentration data at points in and out of each key smelter set equipment (smelting furnace, cooling system, 3-baghouse set), using in and out flow rate data, where:
        i. *concentration (mg/m³) = mass rate (mg/min)/ flow rate (m³/min)*.
9. Repeat steps 1-8 for smelting furnace sets 2-4.
10. Average all data out of smelting sets and baghouse sets, for later use in the Hazelwood mass balance.
11. Since smelting furnace/ baghouse sets 1 and 2 are served by in-series baghouses 1 and 2, and smelting furnace/ baghouse sets 3 and 4 are served by in-series baghouses 3 and 4, calculate the total smelting set contribution (1 & 2) and (3 & 4) to the stack by applying the designed pollutant-specific scrubber control efficiencies across the two in-series scrubber towers, using the formula: (1-CE) x mass rate into in-series scrubbers, where CE (control efficiency) is equal to the fraction of pollutant removed by the baghouse set. If 99% is removed, the CE = 0.99.
12. Total pollutant mass rate to the stack (from smelting) = mass rate out of scrubber 2 + mass rate out of scrubber 4.
13. (All flow rates from the smelting furnaces to the baghouse exits are the sum of the respective four smelter set flow rates. Flow rates into each scrubber set use the flow rate out of the respective baghouse sets multiplied by the design ratio of flow rates out/into of the second cooling tower: 470/530.)
14. Concentrations into the first in-series scrubber and out of the second in-series scrubber are calculated as in step 8.d.i above.

Refining/ melting contribution to stack emissions

15. Each of the three refining set mass rates, concentrations and flow rates are calculated using the same steps 1-14, using the term ‘baghouse’ and ‘water dust remover’ interchangeably, since their control efficiencies are assumed to be the same.

Total Plant #2 (smelting & refining) stack emissions - mass balance method

16. The total predicted emissions from the main stack using the mass balance method is simply the sum of those from all smelting sets (post scrubbers) and all refining sets (post scrubbers).

Total Plant #2 (smelting & refining) stack emissions – from commissioning data

17. The total emissions from the main stack measured during commissioning is calculated more simply than the other components of the mass balance, because this uses only one set of measurements taken at the (single) stack point. The 'mass rate measured' at the stack exit is calculated from the flow rate and concentration test results as: mass rate (mg/min) = concentration (mg/m^3) x flow rate (m^3/min).

18. Concentrations are calculated using the same method as explained previously.

Back-calculation (and mass balance revision) of actual control efficiencies

19. Since the actual stack testing data is a reliable indicator of actual performance on the day of commissioning testing, and actual smelting set and refining set data are also reliable indicators of actual performance on the day, the only variables are the control efficiencies achieved by the pollution control equipment. These were iteratively back-calculated and re-entered to enable the 'theoretical' mass balance stack results to (approximately) match the actual commissioning stack results.

20. The results of pollution control equipment efficiency back-calculations were:
    a. Baghouse (3 in parallel, used per smelting set): 99.39% control efficiency for PM, 99.92% for Pb & 0% for SO_2.
    b. Scrubbers for each half of the smelting plant (2 x two placed in series, expressed as a control efficiency total): 99.8631% control efficiency for SO_2; 75% for dust & 75% for Pb (50% each scrubber in series).
    c. Single baghouse/ water dust remover (per refining set): 99.39% control efficiency for PM, 99.92% for Pb & 0% for SO_2.
    d. Single scrubber (per refining set): 96.3% removal efficiency for SO_2; 50% for dust & 50% for Pb.

The China plant #2 mass balance, in terms of mass emission rates at each point in the plant, is summarised in the block diagram of **Figure 5**.

Table 3: Excerpt from mass balance for China plant #2 (*Air flows and mass balance v9.xlsx*, worksheet 'Flows & mass balance (China 2)')

Plant equipment - smelting system (Set 2)	Flow rate in (m^3/min)	Flow rate out (m^3/min)	Temp (^{0}C) at test point	Dust			
				Concentration measured (mg/m^3)	Concentration out (mg/m^3)	Mass rate measured (mg/min)	Mass rate out (mg/min)
Smelting furnace		461			7,556		3,481,320
Cooling system measurement point	461	673	471	5,170	5,170	3,481,320	3,481,320
Baghouse system (3 in parallel)	673	626		5,170	33.9	3,481,320	**21,236**

Notes:

1. Green text refers to flow rates that have been estimated from design plant flow rates ratioed to measured commissioning flow rates

2. The mass balance is constructed from the test data in Appendix A, which includes pollutant concentration, flue gas flow rate and temperature at each point. Mass rate is the most important piece of the mass balance, because it is an absolute figure independent of flow rate. Mass rate is calculated as follows:

Mass rate (mg/min) = concentration (mg/m^3) x flow rate (m^3/min).

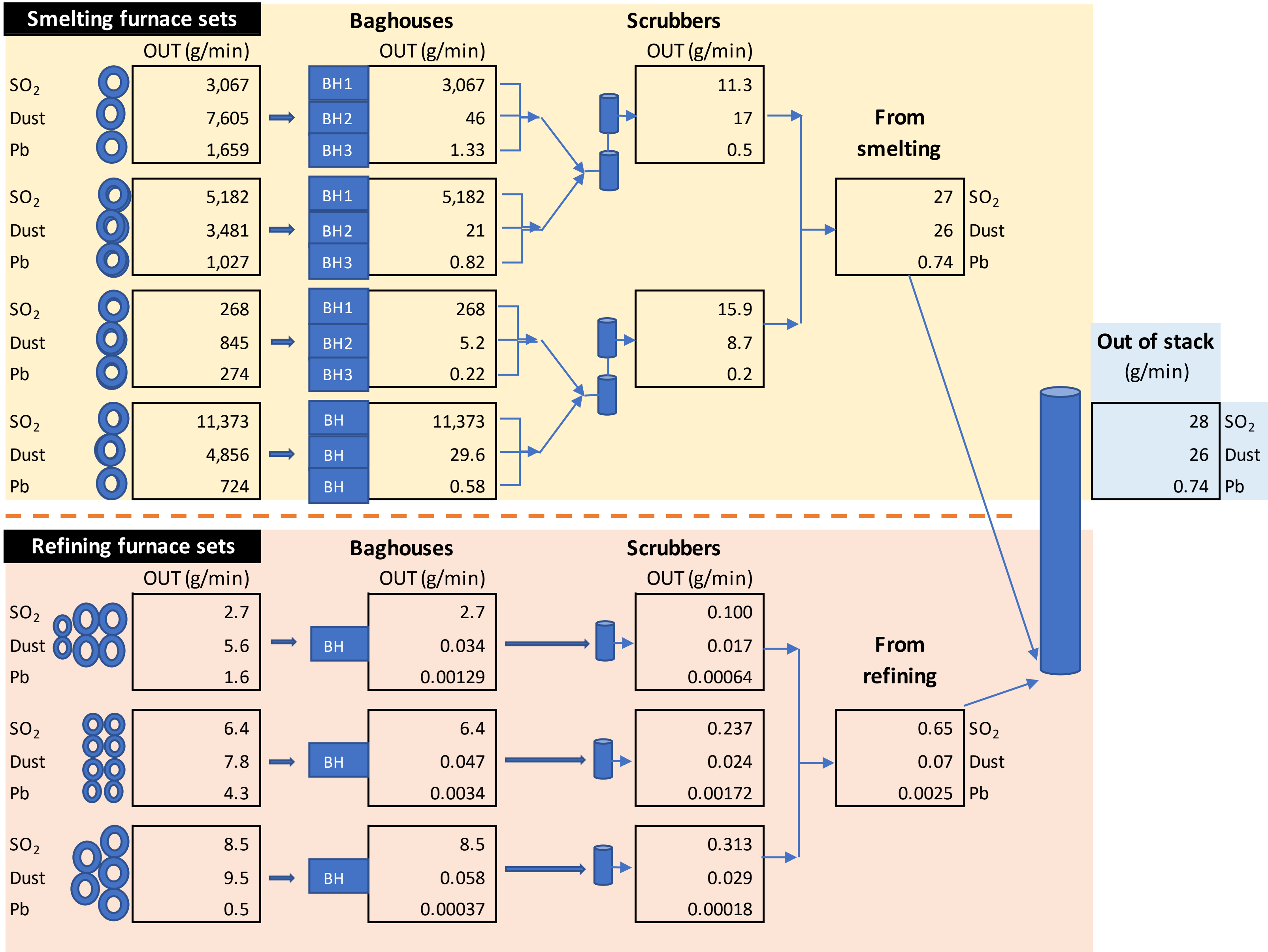


Figure 5: China plant #2 (2017 Commissioning) key pollutant mass balance block diagram

Verification of quarterly stack measurements

The control efficiencies deduced in Section 2.1.2.1 represent best-estimates of actual pollution control performance at commissioning. When these efficiencies are applied, the estimates from the mass balance (based on smelting and refining set measured emissions) approximately match the stack measurements also taken on the 24th and 25th of November 2017. This comparison is shown in Table 3, alongside the averages of 2018-2019 key pollutant quarterly stack testing.

Table 4: Stack testing v mass balance v quarterly monitoring (China plant #2)

Pollutant	From commissioning data 2017		From quarterly monitoring data (plant #2) 2018-2019 (av)
	Stack - measured (av)	Mass balance check (smelting/ refining measured) (av)	
	kg/hour	kg/hour	kg/hour
Sulfur dioxide	1.68	1.67	2.2
Total Dust	1.56	1.54	2.0
Lead	0.04	0.04	0.02

Table 4 shows that the detailed stage-by-stage mass balance check, with control efficiencies applied, almost precisely equals actual stack measurements for each pollutant. This validates the performance of the baghouses and scrubbers.

Measured commissioning results for sulfur dioxide and dust are slightly lower than 3-year quarterly monitoring averages while lead is slightly higher. Given the one-off nature of commissioning testing versus the seven data points of 2018-19 quarterly monitoring, and the changes made to plant #2 since 2017 commissioning was done which have resulted in improved lead emissions (see Section 2.1.4), these two sets of results are in remarkable agreement.

Table 4 shows that these commissioning measurements are very close to the average results achieved from two years of quarterly stack testing, thus validating the quarterly stack testing data as an accurate measure of plant #2's performance. This is an important end-point, because China plant quarterly stack testing data has been relied upon in the WAA to estimate emissions from the Hazelwood plant, used as inputs into air quality modelling.

This conclusion forms the basis of the Hazelwood plant mass balance, discussed in Section 2.2.2.1 of this submission.

2.1.3 Pollution control equipment

2.1.3.1 Scrubbers

Figure 6 (***Appendix 6***) shows a drawing of the scrubber design used throughout the China plant, with 2 x four-chamber scrubbers configured in series in the smelting lines. The scrubber is 3580mm diameter, total 4 levels, 8m high, with the pH in the desulphurisation pool (containing a lime slurry) maintained at 8.5. The design is covered by a Chinese patent and can best be described as a mixture of a plate type and column-chamber type scrubber.

Identical design single scrubbers serve each refining kettle set in the China plant.

The stack has a 60m^3 volume (with larger bottom and smaller top) and there are two more pollution control devices within its base: a spray nozzle water scrubber and (sulfuric acid) mist elimination plate. These provide a final polishing clean-up step prior to stack emission.

The identical scrubber design (same equipment and two in-series, plus the water scrubber/ mist eliminator at the stack base) will be adopted for the Hazelwood North proposal.

2.1.3.2 Baghouses

Figure 7 (***Appendix 7***) shows a drawing of the baghouse design used throughout the China plant, with 3 x baghouses configured in parallel.

The baghouse dimensions are:

- Single Baghouse: length 6.2m, Width 12m and Height 3m.
- Baghouse configuration is 3 in parallel per smelting furnace set. Each baghouse has filtration area of 784m^2, totalling to 2,352m^2.
- The air/ cloth ratio for the system is 0.7 m^3/min.

The baghouse operates a continuous pulse-jet cleaning system, which means that baghouse dust is collected continuously and removed, for feed into the smelter furnace. Pulsed out dust is transported through a closed spiral conveyer to the top of smelting furnace.

The bags are 1.0-1.2mm thick and the weight per collection area is 750g/m^2. The pressure drop achieved is between 700-900 Pa.

The identical 3-parallel baghouse design will be adopted for the Hazelwood North proposal.

2.1.3.3 Cooling systems

The dimensions of the key equipment are:

- 1st Cooling System: total Volume capacity 3,922m^3; 11.6m, width 8.76m and height 38.6m. (Please note tower height in China is very high, therefore the Hazelwood design will be lowered to below 20m (with larger width). It is intended to keep the same capacity.
- 2nd Cooling tower: volume; 63m^3 length 3m, width 3m and height 7m.

The identical first and second cooling system designs will be adopted for the Hazelwood North proposal.

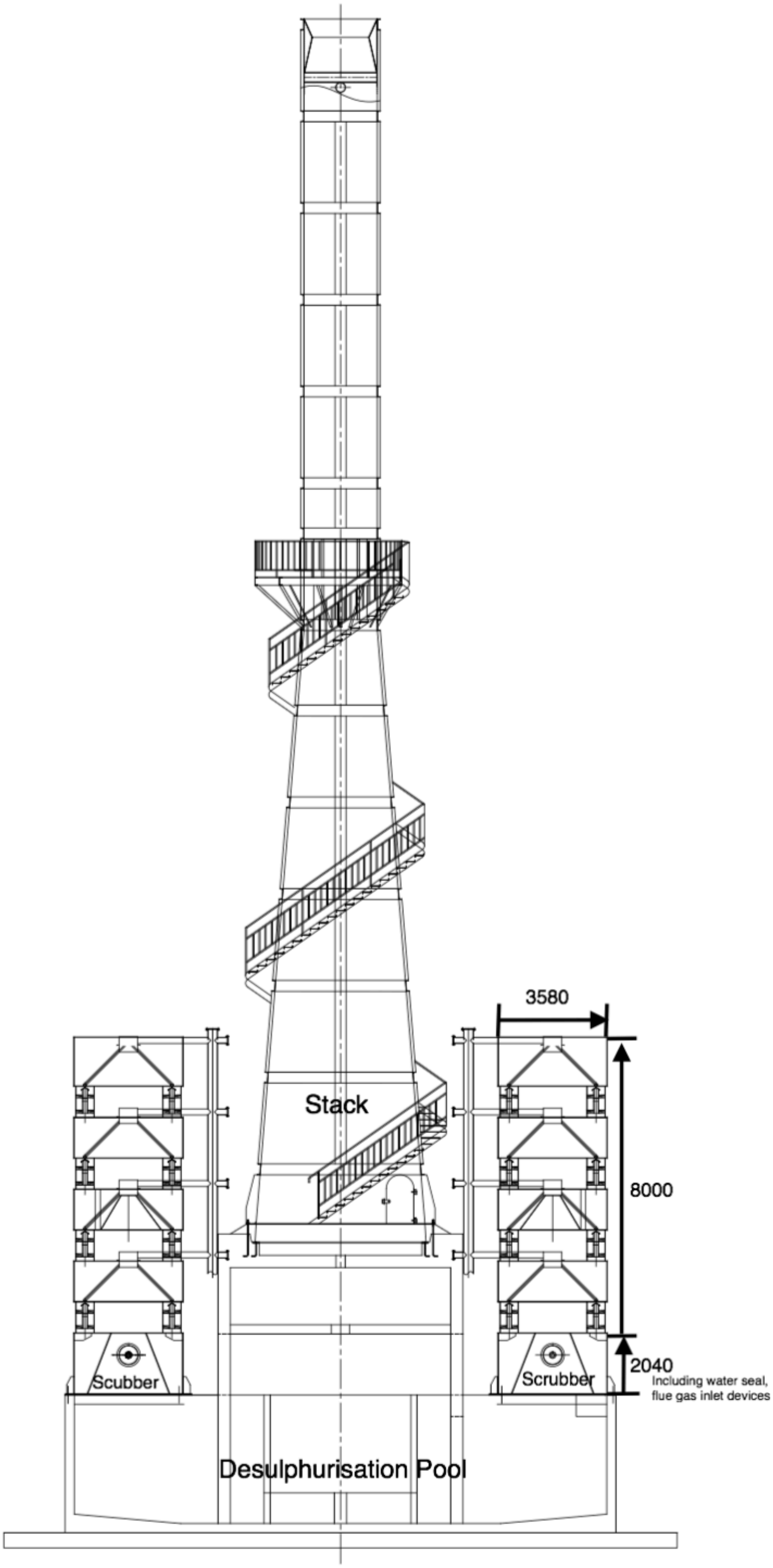


Figure 6: Four-chamber scrubber design used by Chunxing

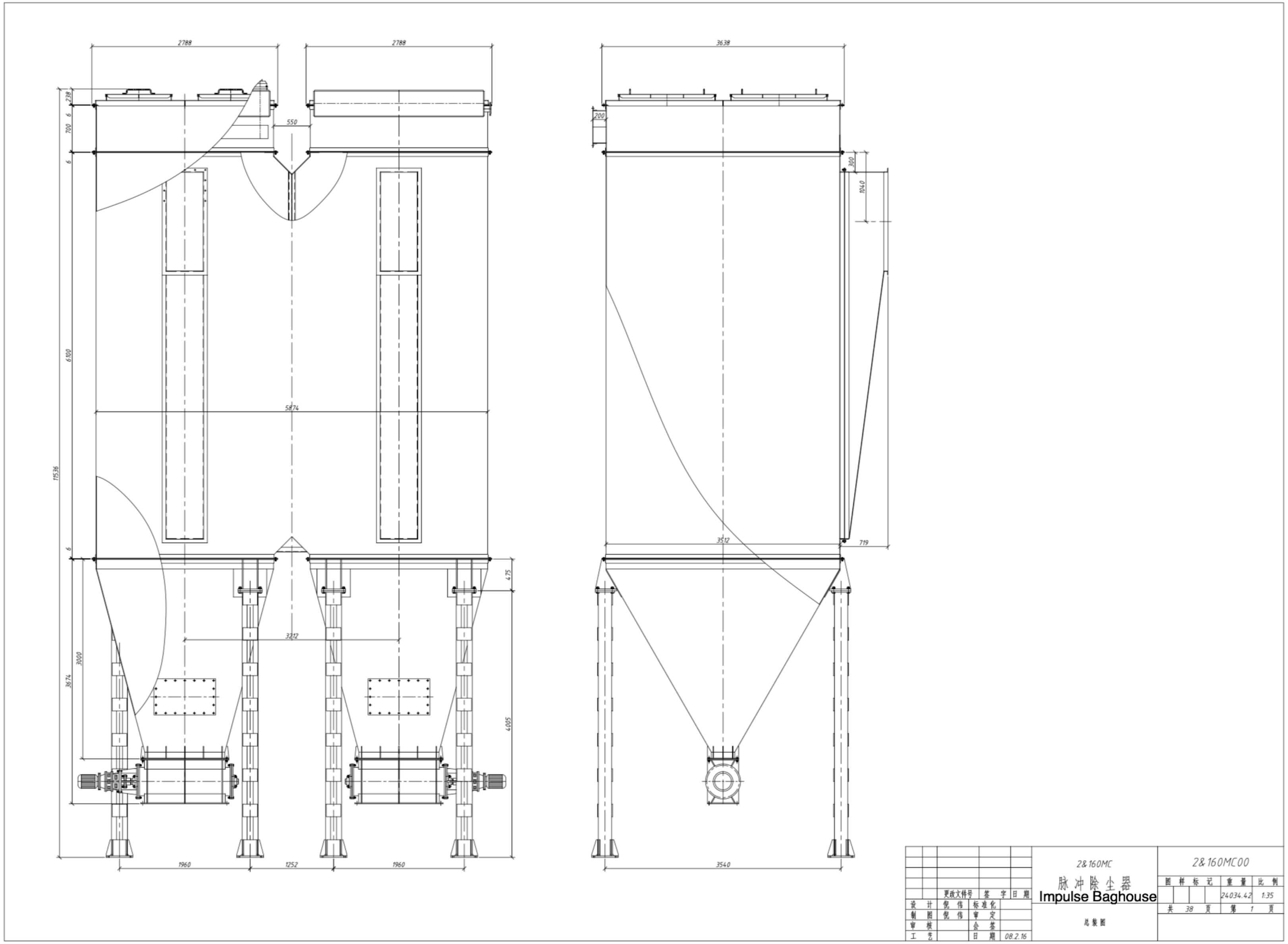


Figure 7: Baghouse design used by Chunxing

2.1.4 Continuous improvement in emissions performance

Plant #2 has been improved since the time of commissioning, as part of a program of continuous improvement in emissions performance. A second cooling system (cooling tower) has been added between the baghouses and the scrubbers (in the smelter line), and a water scrubber and mist remover plate has been added to the base of the stack around the time of the Q3 quarterly monitoring test date. The Hazelwood plant design is in line with these changes, but bases its emissions estimates on all three years of plant #1/ plant #2 data available, which includes higher emissions from quarterly testing conducted on the earlier design iterations, as a conservative assumption.

Actual improvements across quarterly testing results specifically for China plant #2 are shown in the graphs of **Figure 8** (taken from Appendix 5), which plot a typically lowering profile over time for all three key pollutants.

Graphs in **Figure 8** plot kg/hr mass emission rates on the y-axis for each quarter's test result. Quarterly results are numbered 1-7 as follows:

- 1 = Q1 2018
- 2 = Q2 2018
- 3 = Q3 2018
- 4 = Q4 2018
- 5 = Q1 2019
- 6 = Q2 2019
- 7 = Q3 2019.

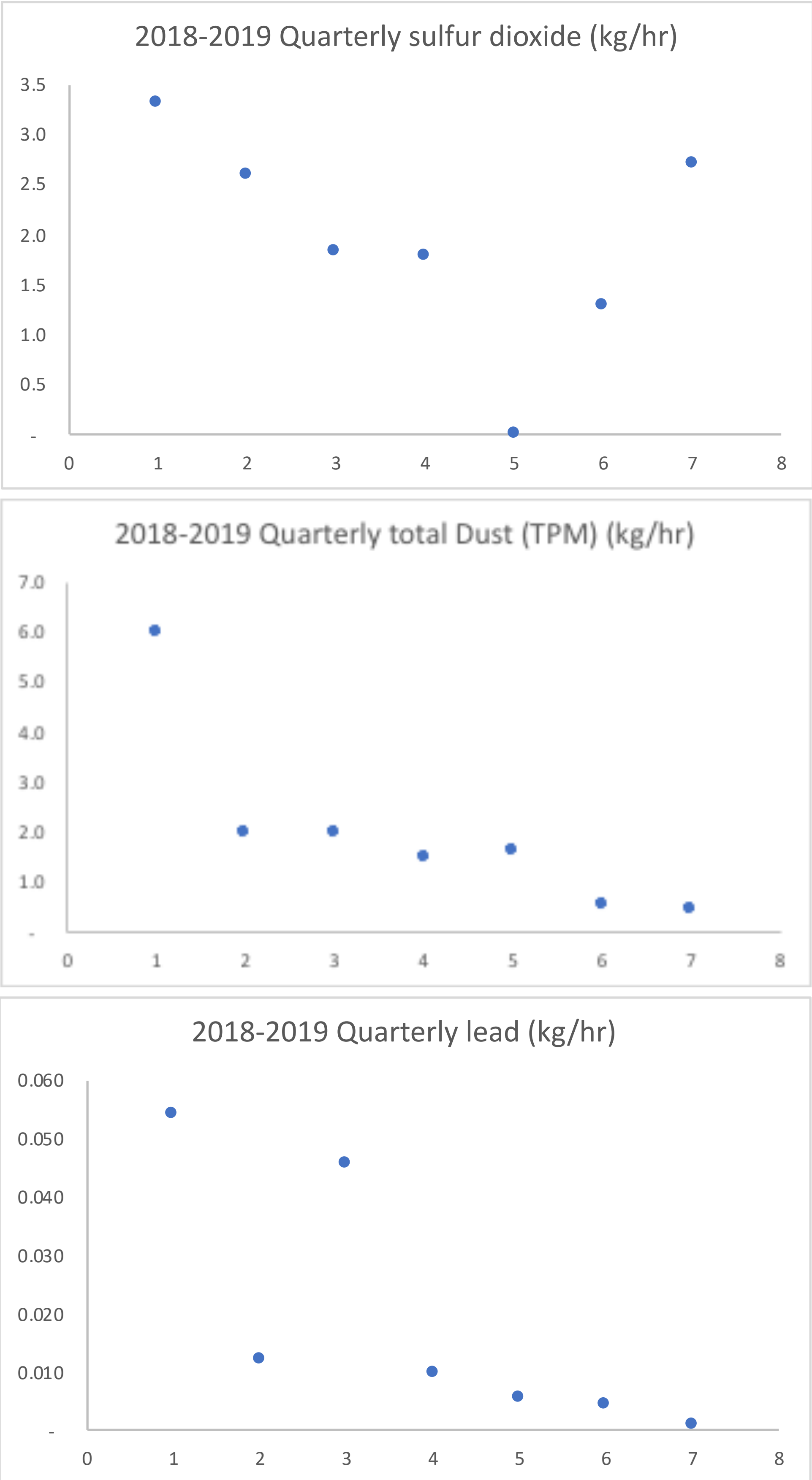


Figure 8: 2018 Q1 - 2019 Q3 Quarterly monitoring data (China plant #2) for key pollutants

2.1.5 Fugitive emissions

Fugitive emissions collected from the negative pressure vent system throughout the plant are negligible compared to flue gas emissions and vent air from the plastics plant are benign with respect to lead and other air pollutants.

Table 5 contains in-plant monitoring data for lead taken on 28/9/2019 in China plant #2, from work areas serviced by fugitives vent collection points (as opposed to the hooded equipment air extraction system). Full in-plant measurements (for all parameters) from China plant #2 are detailed in ***Appendix 8*** *2019 Test Report on occupational disease hazards for 2nd plant in China.docx*. These results have been used in calculating Hazelwood plant fugitive emissions estimates in Section 2.2.3 of this submission.

Table 5: China plant #2 internal lead measurements taken 28/9/2019

Number	Test Location	Check point	Test result (mg/m^3)			
			1	2	3	Average
1	Breaking area	Waste material recycle position 1	0.021	0.021	0.020	0.02
2		Waste material recycle position 2	0.012	0.011	0.012	0.01
3		Lead mug treatment position	0.014	0.014	0.015	0.01
4		Breaking sorting position 1	0.017	0.016	0.018	0.02
5		Breaking sorting position 2	0.011	0.011	0.012	0.01
6		Breaking operating position 1	0.011	0.010	0.010	0.01
7		Breaking operating position 2	0.022	0.023	0.022	0.02
8	Smelting Area	Smelting furnace slag 1	0.010	0.010	0.009	0.01
9		Smelting furnace slag 2	0.021	0.022	0.022	0.02
10		Smelting furnace inspection 1	0.023	0.023	0.023	0.02
11		Smelting furnace inspection 2	0.017	0.017	0.017	0.02
12		Smelting furnace feeding position 1	0.025	0.024	0.025	0.02
13		Smelting furnace feeding position 2	0.027	0.026	0.027	0.03
14		Crane operation	0.038	0.038	0.038	0.04
15		Baghouse inspection 1	0.026	0.026	0.025	0.03
16		Baghouse inspection 2	0.021	0.020	0.023	0.02
17	Refining area	Refining furnace feeding position 1	0.024	0.024	0.025	0.02
18		Refining furnace feeding position 2	0.062	0.062	0.063	0.06
19		Refining furnace feeding position 3	0.009	0.010	0.010	0.01
20		Refining furnace inspection 1	0.016	0.015	0.01	0.01
21		Refining furnace inspection 2	0.010	0.010	0.009	0.01
22		Casting position 1	0.009	0.009	0.010	0.01
23		Casting position 2	0.008	0.008	0.008	0.01
24	Breaking area	Lead mug treatment position 2	0.006	0.005	0.006	0.01
25	Facility	Centre control room	0.010	0.012	0.010	0.01
Average (all areas)						**0.019**

2.2 Hazelwood North proposed plant

The dimensions of the key plant buildings are as follows:

- Main Plant: 192.5m x 60.5m, 15m high, open and close roof window for air access.
- Storage: 64.65m x 24.5m, 15m high, open and close roof window for air access.
- Loading Zone: 64.65m x 16.25m, 15m high, open and close roof window for air access.

The Hazelwood North *Plant area equipment layout* drawings are provided at ***Appendix 9*** as follows:

- *9a. 2020-3-26updated V2 Hazelwood plant layout 澳大利亚5WT平面-Model.pdf* (detailed layout drawing showing all equipment)
- *9b. PD2019-0084-001_Rev10 - Site Plan.pdf* (draftsman's site plan showing building-level detail, dimensions, boundary neighbours and land use overlays). This is a reissue/ update of WAA Appendix E.

A full equipment list for the Hazelwood plant, which matches this plant layout, is provided in ***Appendix 10*** *20200512 updated equipment list with noise 20200523.xlsx*.

2.2.1 Plant layout and description

An excerpt from Appendix 9, showing smelting, refining and pollution control areas ('hot' sections), is given in **Figure 9**. Although very similar to plans provided in the WAA, this layout provides a greater degree of transparency in equipment configuration than was provided in the WAA.

The layout of these hot areas, which are critical to point source emissions, are designed as follows:

- One set of two smelting furnaces, with each furnace 5.0m diameter and 75 tonnes (of lead paste input) per batch each, totalling a capacity 150 tonnes per batch (of lead paste) for the dual set. Flue gas from the smelting set passes through to the first cooling system.
- There is also one set of six refining kettles (five are used as actual refining kettles and one as a melting kettle/pot, although all six are identical in size and temperature of operation (500^0C)). These kettles:
    - are each 3m diameter, 120 tonnes lead grid per batch, which is slightly different to the 3m kettles in the China plant (110 tonnes lead grid per batch)
    - have a total capacity of 6 x 120 = 720 tonnes lead grid per batch
    - send their flue gas to the first cooling system, to connect up with the smelter flue gas.
- Both smelter and refinery flue gases exit the first cooling system then pass into one set of 3 baghouses arranged in parallel.
- Flue gas from the 3-baghouse system passes to the 2^{nd} cooling system then onto a scrubber system made up of two lime tower wet scrubbers placed in series. There is an identical second scrubber set placed in standby as a slave system.
- The two active scrubbers vent to the main stack, where a water scrubber and mist removal plate sits in its base to provide a polishing effect to gases and particulates, before exiting to atmosphere.

- The total plant flue gas stream therefore houses 2 smelting furnaces, 6 refining/melting furnaces, 3 baghouses, 2 scrubbers and 2 slave scrubbers.

This layout is depicted as a flue gas flow rate diagram for the Hazelwood North plant in **Figure 10** (***Appendix 11***), along with design flow rates and temperatures at each stage.

Figure 11 (***Appendix 12***) takes a schematic approach to representing the flue gas and vent gas movements for the plant, with a focus on pollution control equipment.

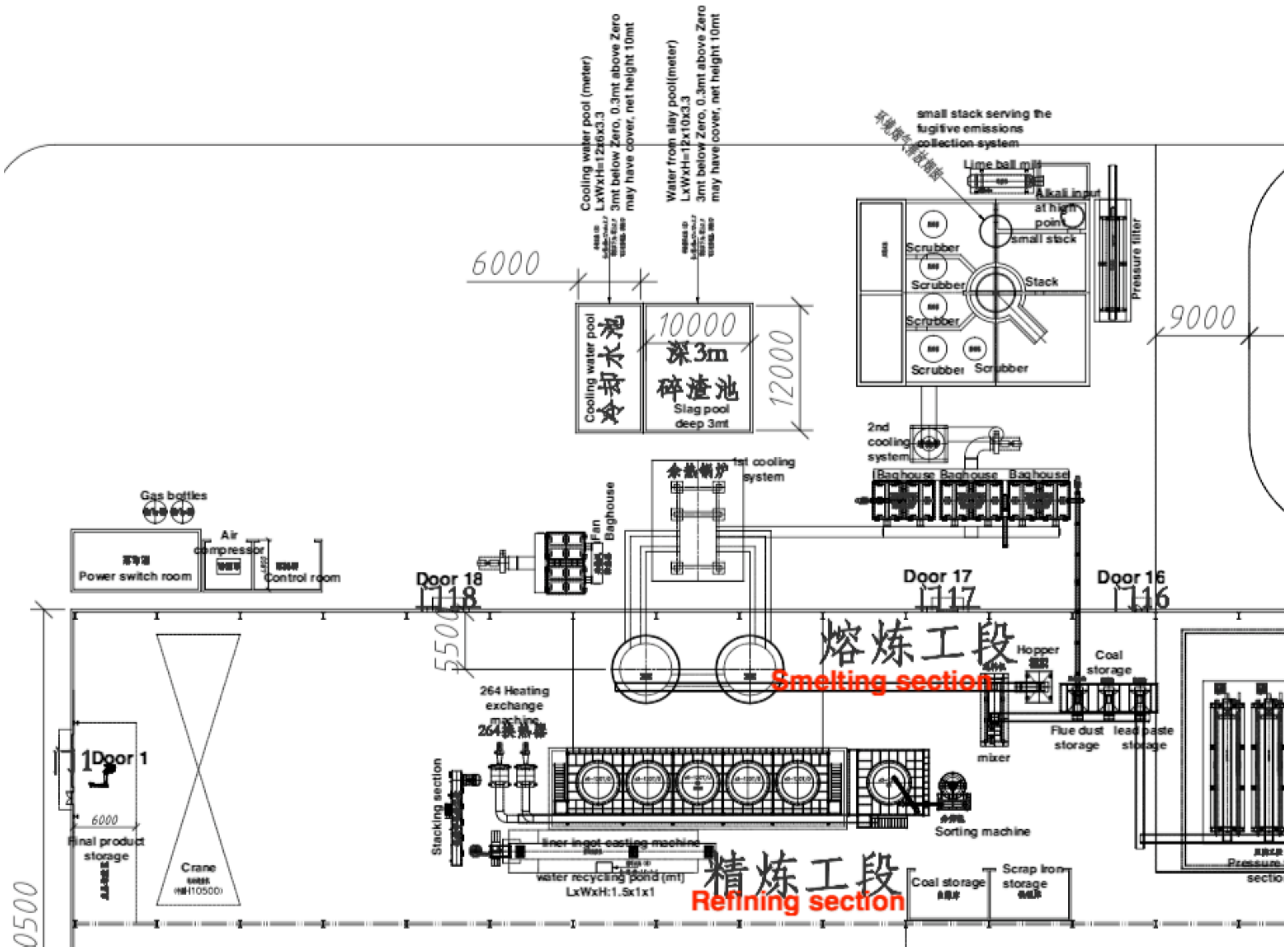


Figure 9: Plant layout excerpt for 'hot' sections of the Hazelwood plant

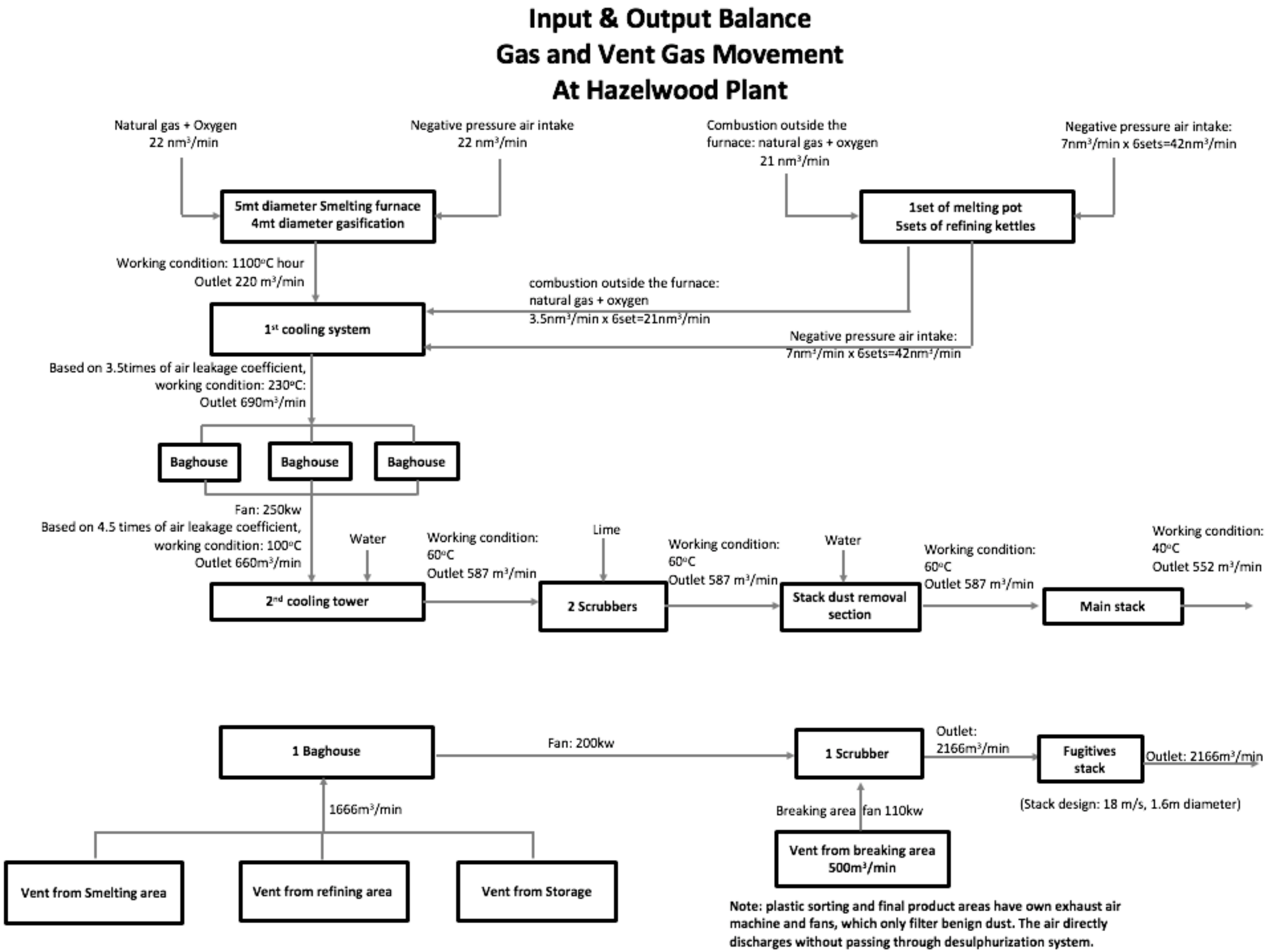


Figure 10: Flow rates of flue gases (and vent gases) from the Hazelwood North plant

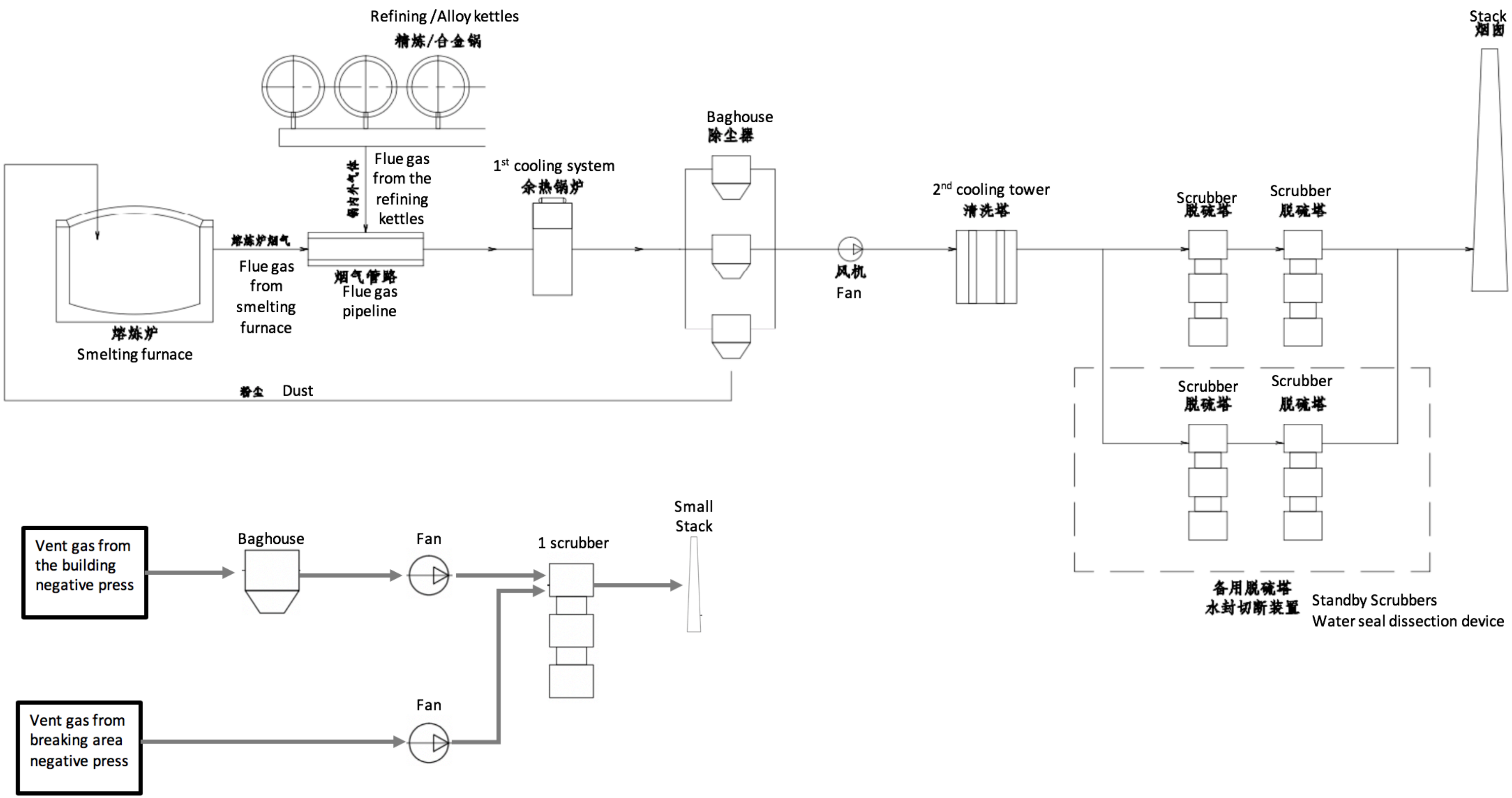


Figure 11: Schematic diagram of flue gas (and vent gas) movements in Hazelwood North plant

2.2.1.1 Description of exhausted gas movements

Flue gas

Further to the process descriptions outlined in the WAA, text supporting flue and vent gas movement in **Figure 10** is provided below.

Flue gas from the dual smelting furnaces is ducted to the first cooling system at 220m^3/min and a temperature of 1,100 ^{0}C. In addition, the 6-kettle refining/melting system sends flue gases to the first cooling system at a kettle exit temperature of approximately 500 ^{0}C at a rate of 63m^3/min.

Flue gases are cooled down to 230 ^{0}C out of the first cooling system[3] and, although thermodynamics lowers the exiting volume (due to the lowering of temperature), the design flow rate out of the first cooling system is in fact higher than that going in, at 690m^3/min. This is due to the large drawing effect of the 250kW fan located on the downside of the baghouses.

Flue gas passes from the first cooling system to the 3-parallel baghouses. Post baghouses, flue gas flow drops to 660m^3/min at 100 ^{0}C, and then passes to the second cooling system.

Flue gas exits the second cooling system at 60 ^{0}C and a flow rate of 587m^3/min, where it approximately remains through to the stack exit, given the small further temperature drops. Through the two scrubbers and stack scrubbing the temperature lowers to be approximately 40 ^{0}C out of the stack at 587m^3/min.

The mass balance works off a slightly higher stack emission flow rate of 664m^3/min, which was also the modelled stack flow rate. This is a maximum figure. From a mass emission rate point of view this flow rate difference is immaterial.

Vent gas (from fugitive source vents)

Figure 10 also tracks the movement of vent gas collected through a network of vent collection points throughout the plant, designed to capture fugitive emissions outside of the main equipment's ducted air pathways. These vent collectors in the smelting, refining and storage building areas of the plant are drawn under negative pressure from a 200kW fan placed between a single baghouse and single scrubber, each dedicated to fugitive vent gas pollution control. This results in a flow rate into and out of the baghouse of 1,666 m^3/min, en-route to the scrubber.

The breaking area also has a number of fugitive vent collectors, which are ducted directly to the scrubber (not baghouse) as the breaking area uses water to control dust, so moist air would quickly block the baghouse if directed there. A 110 kW fan placed before the scrubber draws breaker air at 500m^3/min, which exits the scrubber at the rate, resulting in a flow rate at the small fugitives stack of 1,666 m^3/min + 500 m^3/min = 2,166 m^3/min.

Further discussion about pollutant concentrations in the fugitive source vent gas is provided in Section 2.2.4 of this submission.

[3] We note that the WAA Figure 9, p.34 shows a post-1st cooling temperature of 300 ^{0}C. This is in error; 230 ^{0}C mentioned in this submission (and mass balance) is correct.

2.2.2 Point source emissions

The main point source emission from the proposed Hazelwood North plant is flue gas from the main stack, coming from the processes described in Section 2.2.1. The second stack shown in **Figure 10** serves a large number of fugitive emission collection points, which result a far lower emission again than that from the main stack. This emission is discussed as a function of the individual fugitive sources it is composed of, in Section 2.2.3.

2.2.2.1 Air pollutant mass balance – Hazelwood North

China plant #2's commissioning testing and subsequent mass balance (Section 2.1.2.1) provides a directly relevant basis to carry out an air emissions flue gas mass balance for the Hazelwood North plant, because of the multiple measurement points tested at commissioning, the modular nature of the process sets and the fact that identical pollution control equipment sizings (per item) are part of the Hazelwood North design.

Subsequent to the China #2 plant mass balance, a similar mass balance has been constructed for the Hazelwood plant, from the bottom up, to derive a set of key pollutant emission rates predicted to be released from the stack. The Hazelwood mass balance is provided separately in *Appendix 5 Air flows and mass balance v9.xlsx*, worksheet 'Flows & mass balance (Haz)'. A sample from this workbook (for dust) is shown in **Table 6** below.

The mass balance is constructed for flue gases only, which are released from the main stack. Emissions from the lower section of **Figure 10**, which pick up vent points of fugitive sources throughout the plant, are considered in Section 2.2.3.

The method used to construct the Hazelwood mass balance, expressed as a mass rate (and therefore independent of flow rate) is as follows:

1. Identify the China plant #2 plant configuration sets that match closely with the Hazelwood design. These are:
    a. for smelting furnaces: the average emissions from all four China 3-set furnaces
    b. for refining/melting kettles: the 5-kettle set, which is the closest matching refining kettle configuration to Hazelwood.
2. Equate the capacity of the total China plant 3-smelting furnace set to that of the 2-smelting set to be used at Hazelwood. To do this, multiply the China mass rate emission (average of four 3-sets) by the relative total set capacities for each plant (150 tonnes of lead paste/ 360 tonnes of lead paste). This results in a mass rate for Hazelwood out of the smelting furnace set.
3. Equate the capacity of the total China plant 5-kettle refining set to that of the 6-kettle refining set to be used at Hazelwood. To do this, multiply the China mass rate emission (from the 6-kettle set) by the relative total set capacities for each plant (6/5 kettles x 120 tonnes lead grid / 110 tonnes lead grid). This results in a mass rate for Hazelwood out of the refining kettle set.
4. Assume neither cooling system changes the mass rate (as per the China plant).
5. Apply the same baghouse control efficiencies as back-calculated from China commissioning data.

6. Apply the same scrubber control efficiencies as back-calculated from China commissioning data.
7. Assume 50% dust/Pb control through stack water scrubber as per US EPA estimate of "40-60% for simple spray towers" (https://www3.epa.gov/ttn/catc/dir1/cs6ch2.pdf).
8. Assume 90% SO_2 control through stack water scrubber as per US EPA estimate of "80 to greater than 99 percent, depending upon the type of reagent used and the spray tower design" (https://www3.epa.gov/ttn/catc/dir1/fsprytwr.pdf).
9. Calculate the concentrations of pollutants at each stage using the design flow rates from **Figure 10** as follows:
    c. concentration (mg/m^3) = mass rate (mg/min) / flow rate (m^3/min).

Table 6: Excerpt from mass balance for Hazelwood North (*Air flows and mass balance v9.xlsx*, worksheet 'Flows & mass balance (Haz)')

Plant equipment	Flow rate in (m^3/min)	Flow rate out (m^3/min)	Temp (^{0}C) out	Dust			
				Concentration in (mg/m^3)	Concentration out (mg/m^3)	Mass rate measured (mg/min)	Mass rate out (mg/min)
Smelting furnace (set of 2)	44	220	1100		7,949		1,748,726
Refining kettles (6)	63	63	500		197		12,426
1st Cooling system		690	230	2,552	2,552	1,761,152	1,761,152
Baghouse system (3 in parallel)	690	660	100	2,552	16.3	1,761,152	10,743
2nd Cooling system	660	664	60	16.3	16.2	10,743	10,743
Scrubbers (2 in series)	664	664	45	16.2	4.0	10,743	2,686
Stack base water scrubber/ mist plate	664	664	40	2.02	2.02	2,686	1,343
Stack (mg/min)							**1,343**
Stack (kg/hr)							**0.08**

The Hazelwood North key air pollutant mass balance, in terms of mass emission rates at each point in the plant, is summarised in the block diagram of **Figure 12**.

Figure 13 parallels the smallest modular component of the China plant (a 3-smelter furnace set) all the way through to stack, so it can be compared to the similar scale Hazelwood plant.

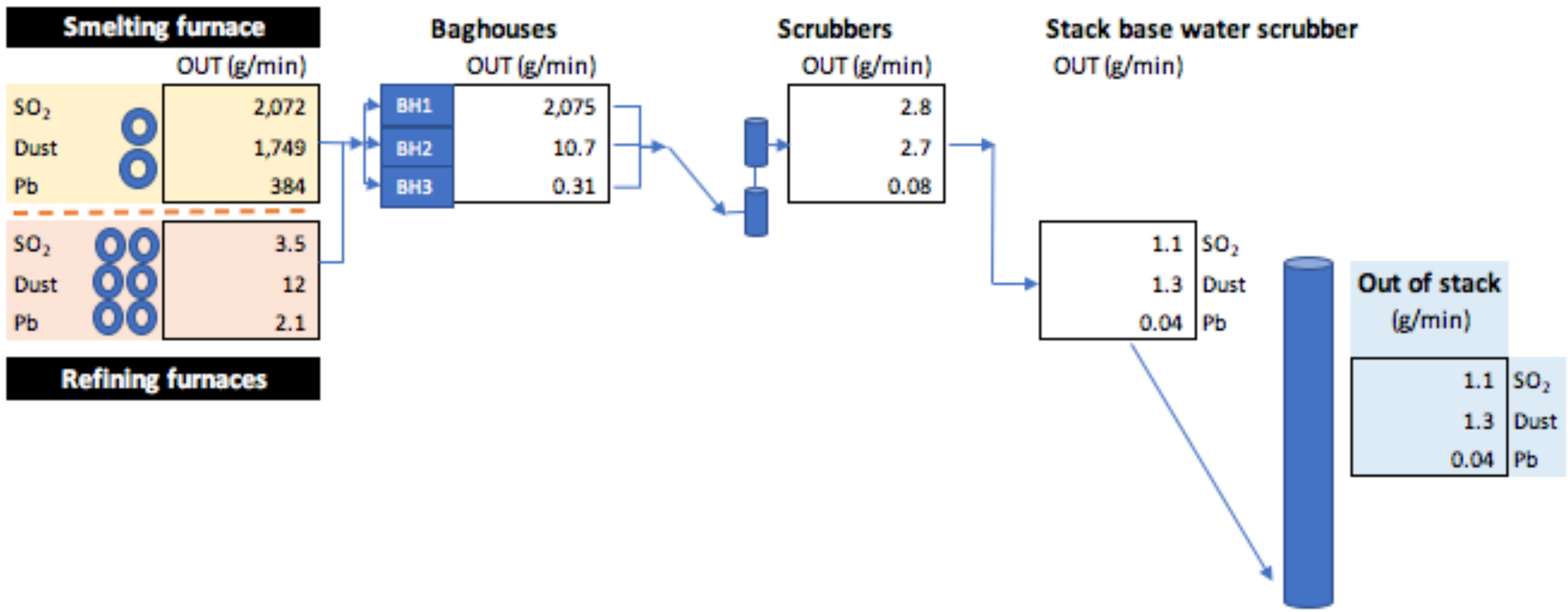


Figure 12: Hazelwood North key pollutant mass balance block diagram (150t lead paste/batch)

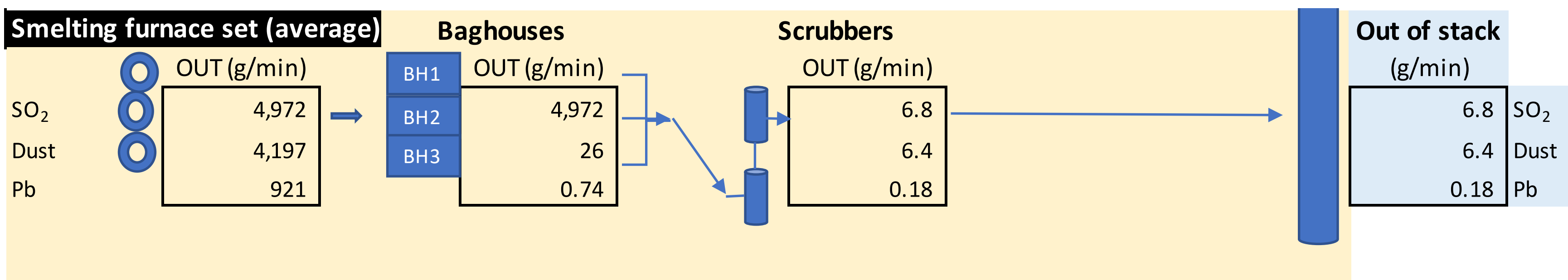


Figure 13: China plant 3-furnace set modular mass balance (360t lead paste/batch)

The mass balances of the Hazelwood North 2-furnace smelting configuration and the China plant #2 3-furnace smelting configuration, are very similar, particularly when the effect of the stack water scrubber (in Hazelwood's design) is ignored. This demonstrates a strong direct link from the Hazelwood design to the reference plant's operation.

Another observation from the Hazelwood mass balance is evidence that the emissions directly out of the refining kettles are tiny compared to the emissions out of smelting furnaces. The proportion of refining set emissions to smelting set emissions are: 0.2% SO_2, 0.7% dust and 0.5% lead.

2.2.2.2 Modelling emissions from Hazelwood North facility

Verification of emissions data used in the WAA

Section 8.3.1 of the WAA derived emissions for the Hazelwood North facility, used as inputs into the air quality dispersion model, from an assumption that the quarterly stack test emission measurements from the sum of the two China plants (800,000 tpa ULAB capacity) would be directly proportional to the emissions from the smaller Hazelwood North facility (50,000 tpa). The basis of this assumption was very simple: the technology, including individual pollution control equipment design, was identical; only the scale was different. The ratio was simply 50,000/ 800,000 or 1/16.

The Hazelwood mass balance results, which are derived from an entirely independent data source (2017 commissioning testing of China plant #2), have been used to test this assumption. The results of the mass balance are shown in **Table 7**, compared against the predicted emission rates from Table 16 of the WAA (the inputs to the model based on 1/16th of the China emissions).

Table 7: Hazelwood North key pollutant emission estimates

Pollutant	Mass balance method	1/16 estimate used in modelling
	kg/hour	kg/hour
Sulfur dioxide	0.07	0.13
Total Dust	0.08	0.19
Lead	0.002	0.002

The mass balance uses measured results of China plant #2 commissioning, taken from individual equipment sets that are either identical in design and size (all pollution control units) or identical in design with small differences in size or configuration (smelting furnaces and refining kettles). The modelling inputs take all China quarterly stack testing results available (2017 – 2019), for both plants, average them across that period and divide the averages by 16.

The mass balance results and 1/16th estimates used for modelling compare remarkably well. In fact, the mass balance predicts lower results for Sulfur dioxide and dust than those used in the modelling. This is not surprising, because the 1/16 approach biases towards the emissions from the lesser-performing original China plant #1 (which also accepts 'dirtier' source materials, such as anode sludge from electrolytic ULAB processing), since this was the only plant operating (providing data) in 2017.

What is compelling about the mass balance result is that it is taken from measured performance of modular segments of the China plant which, when taken at the segment level, are very similar in scale to the Hazelwood North design, as shown by comparison of Figures 12 and 13. That the one-off commissioning tests agree so well with the two years of plant #2 quarterly data is also proof of the integrity of the quarterly stack testing process, and the reliability of the plant's operation.

Using a completely independent, publicly available, highly credible dataset (China plant #2 commissioning testing), the 1/16 method used in the WAA to estimate emissions from stack (as inputs into the model) is proven to be an appropriate, and for some pollutants conservative, measure of emissions performance of the Hazelwood North facility.

Performance guarantee

A declaration of performance guarantee has been supplied by New Chunxing Resource Recycling Group (China) in ***Appendix 13***, the major shareholder of Chunxing Corporation Pty Ltd and supplier of all equipment and technology. This letter provides an assurance that the Hazelwood plant can and will operate within the emission levels specified in the WAA, original Table 16 (inputs to the model).

Assessment of emissions against ambient standards for cumulative emissions

Some stakeholders have raised concerns about the impacts from cumulative emissions, particularly of lead. The WAA (p.164) takes a conservatively extreme approach to this as a means of comparison against soil investigation criteria, to illustrate that over the lifetime of the plant background soil levels in the area would be unaffected.

To analyse this issue more precisely, we have re-run the model to produce annual average ground level concentration results, rather than the hourly (or less) averaging times used in design criteria assessment. This approach then allows comparison with ambient standards, such as the Ambient Air National Environment Protection Measure (NEPM) or the Victorian equivalent of this, the State Environment Protection Policy Ambient Air Quality (SEPP AAQ), or any other ambient standard. This standard for lead is 0.5 μg/m^3 as an annual average.

The US EPA's National Ambient Air Quality Standards (NAAQS) provides an ambient standard of 0.15 μg/m^3, and is often quoted as an ambient air benchmark, since it has been recently updated.

Results of the Hazelwood North emissions modelling using a 12-month averaging period, so they can be compared to ambient standards, are shown in **Table 8**. These are also incorporated into the underlying modelling workbook supplied separately (***Appendix 14*** *Ambient modelling to SEPP AAQ.xlsx*).

Compared to one-hour averages (or less) for Design Criteria comparison, annual averages 'flatten' the emissions, because the occasional peaks are overtaken by the far more dominant background 'noise' over a long averaging period. Consequently, the one-hour average concentration for lead falls from 0.0000090 mg/m^3 (from WAA Table 18) to 0.0000011 mg/m^3 as an annual average, a lowering of approximately ten-fold. This is just 0.22% of the SEPP(AAQ) ambient standard for lead (0.5 μg/m^3), or 455 times below it.

Comparing against the US EPA's NAAQS (0.15 μg/m^3) the annual average is 0.75%, or 133 times below.

In terms of 'natural background' levels quoted by the Australian Government of 0.1 μg/m^3, annual average modelling for the Hazelwood plant is 100 times below this.

Annual averaging is simply the averaging period of the model's hourly data across a year. As is the case with any air quality modelling, the results quoted in **Table 8** are the worst case (highest) identified in a 50m x 50m grid square anywhere in the study area. For locations like sensitive receptors and beyond, these below-ambient standard/ below-background levels drop off by another order of magnitude.

On the basis of annual average modelled emissions, the Hazelwood North facility's emissions are demonstrated to be infinitesimal – to the point that they are substantially below the most stringent ambient standards applied around the world and 100 times below natural background, at their worst case modelled point in the study area.

Table 8: Modelled annual emissions against SEPP ambient air quality (AAQ) standard, 2016

Pollutant	SEPP AAQ/ NEPM standards		2016 MET DATA, No background, ANNUAL AVERAGE					
	Environmental quality objectives	Averaging period	SITE GLC (99.9th%ile) - ave as per SchA unless noted			Percentage of Ambient standard (SEPP AAQ/ NEPM)		
			Lowest Result	Highest Result	Ave Result	Lowest Result	Highest Result	Ave Result
	mg/m³		mg/m³	mg/m³	mg/m³			
Sulfur dioxide	0.05	1 year	0.000017	0.00012	0.000078	0.03%	0.23%	0.15%
Nitrogen oxides (as NO_2)	0.06	1 year	0.00019	0.0024	0.00076	0.34%	4.3%	1.3%
PM_{10} - (assuming all TPM = PM_{10})	0.02	1 year	0.000034	0.00033	0.00011	0.2%	1.6%	0.6%
$PM_{2.5}$ - (assuming all TPM = $PM_{2.5}$)	0.008	1 year	0.000034	0.00033	0.00011	0.4%	4.1%	1.4%
Lead	0.0005	1 year	0.000000088	0.0000037	0.0000011	0.02%	0.74%	0.22%
Sulfuric Acid Mist	-	-	0.0000012	0.000083	0.000032	-	-	-
Chromium and its compounds	-	-	0.000000015	0.00000054	0.00000020	-	-	-
Arsenic and its compounds	-	-	0.00000032	0.00000044	0.00000039	-	-	-
Cadmium and its compounds	-	-	0.0000000019	0.000000020	0.000000014	-	-	-
Tin and its compounds	-	-	0.0000000023	0.000000066	0.000000025	-	-	-
Antimony and its compounds	-	-	0.000000026	0.00000014	0.000000082	-	-	-
Dioxins and Furans (as TCDD I-TEQs)	-	-	0.0000000000012	0.0000000000012	0.0000000000012	-	-	-

Note: SEPP AAQ environmental quality objectives expressed as ppm (nitrogen dioxide and sulfur dioxide) were converted into mg/m³ above according to: mg/m³ = ppm x 0.0409 x molecular weight of gaseous pollutant

2.2.3 Pollution control equipment

All baghouses and scrubbers used in the Hazelwood plant are identical in size, design and operation as those used in China plant #2. These details are described in Section 2.1.3 of this submission.

Since commissioning tests were done in 2017, China plant #2 installed a stack water-scrubber, and in late 2019 installed a mist plate eliminator for sulfuric acid mist reduction. These additions are both part of the Hazelwood design.

Control efficiencies assumed for the Hazelwood plant, based on actual performance deduced from China plant #2 commissioning measurements, are:

- Baghouse (3 in parallel): 99.39% control efficiency for dust, 99.92% for Pb & 0% for SO_2.
- Scrubbers (2 x two placed in series, expressed as a control efficiency total): 99.8631% control efficiency for SO_2; 75% for dust & 75% for Pb (50% each scrubber).
- Single baghouse: 99.39% control efficiency for dust, 99.92% for Pb & 0% for SO_2.
- Single scrubber: 96.3% control efficiency for SO_2; 50% for dust & 50% for Pb.
- Stack water scrubber: 50% dust/Pb control as per US EPA estimate of "40-60% for simple spray towers" (https://www3.epa.gov/ttn/catc/dir1/cs6ch2.pdf).
- Stack water scrubber 60% SO2 control through simple stack water scrubber since US EPA estimate of "80 to greater than 99 percent, depending upon the type of reagent used and the spray tower design" applies to dosed scrubbers (https://www3.epa.gov/ttn/catc/dir1/fsprytwr.pdf).

2.2.3.1 Assessment of the efficacy of the pollution control equipment design

Chunxing engaged Chemtech Pty Ltd to assess whether the design of the baghouse and scrubber system could achieve the stack emission output parameters modelled in the WAA (Table 16, p.74), or more specifically the emission rates identified in the Hazelwood North mass balance (**Figure 12**).

Appendix 15 (*Chemtech pollution control assessment.PDF*) contains Chemtech's calculations and assessment. In summary, Chemtech concluded about the Chunxing Hazelwood North pollution control design system:

> *"Based on the information provided, the design of the baghouse and SO_2 scrubber for the proposed Hazelwood lead smelter will quite adequately achieve the performance levels required."*

2.2.3.2 Baghouse air-to-cloth ratio

Air-to-cloth ratios are a means of assessing and optimising the likely performance of a baghouse, from a design perspective. Key information about the air-to-cloth ratio used in the China plant and designed for the Hazelwood plant, with respect to the ratio suggested by the US best practice guideline, is discussed below:

- The China plant air-to-cloth ratio is 570/(784 x 3) = <u>0.24 $m^3/min.m^2$</u>.
- The US Best practice guideline recommends an air-to-cloth ratio in the range: 3.25 to 4.0 for pulse-jet baghouses, but investigation of the source of this advice shows that the units are imperial – $ft^3/min.ft^2$, which requires a conversion by dividing by 3.28 to

express it as $m^3/min.m^2$. So the actual US Best practice guideline recommendation is 1.0 – 1.2 $m^3/min.m^2$.

- This range is unusually narrow. US EPA[4] recommend a lower ratio for woven fabric bags (which Chunxing uses), specifically for cleaning lead oxide particles, of 2.0 $ft^3/min.ft^2$ (0.6 $m^3/min.m^2$), which is a net ratio (net ratios are always slightly lower than 'actual' ratios, because they are calculated based on assuming one compartment of the baghouse is closed off for cleaning purposes, thus reducing bag area by that amount).
- Terry Goot from Chemtech has previously calculated an optimum air to ratio of 0.7 $m^3/min.m^2$ for the Chunxing Hazelwood application, using the multi-factor first-principles method applied in designing a baghouse from scratch. These factors are also referenced by US EPA[4] and are shown in Appendix 14 (noting our now-superseded flow rate in the original Chemtech's report, which is irrelevant to the design air to ratio calculation).
- Chemtech's 0.7 $m^3/min.m^2$ design estimate agrees well with US EPA's 0.6 $m^3/min.m^2$).
- Discussion with Terry Goot from Chemtech and Chunxing China plant engineers indicated very clearly that there is no operational disbenefit from using ratios on the low side; that this was simply a cost issue (more baghouse materials than necessary). There would be plenty of airflow and no chance of the bags "not working" due to insufficient dust loading. The most important thing is to get the design right so as not to design a ratio that is too high – this is the real risk because of the possibility of unacceptably high pressure drops being created which would increase the risk of bag failure. This opinion is confirmed by the same US EPA reference quoted above (section 1.3 of that reference):
    - *"Estimating a gas-to-cloth ratio that is too high, compared to a correctly estimated gas-to-cloth ratio, leads to higher pressure drops, higher particle penetration (lower collection efficiency), and more frequent cleaning that leads to reduced fabric life. Estimating a gas-to-cloth ratio that is too low increases the size and cost of the baghouse unnecessarily."*
- The Hazelwood air to cloth ratio (without the addition of 300m^3/min of fugitive collection air) would be 690/(784 x 3) = 0.29 $m^3/min.m^2$, or 0.44 $m^3/min.m^2$ if one of the three baghouses was kept offline to enable quicker maintenance procedures (a likely scenario given the baghouse system's relative over-design). This ratio would be closer to the Chemtech calculated and US EPA recommended optimum.
- In summary, there is no operability issue created from using a lower air to cloth ratio than recommended – this is made evident by the performance demonstrated from China plant #2 commissioning data, which shows the actual air to cloth ratio (using the average all of 4 smelter/baghouse sets) to be 0.24 $m^3/min.m^2$, and that this ratio achieved a control efficiency for TSP of 99.39%).

The optimisation of air to cloth ratio beyond that calculated from plant design (such as whether two or three baghouses will be operational at any one time) and subsequent baghouse cleaning performance, is a decision for plant commissioning and operation.

[4] US EPA: https://www3.epa.gov/ttncatc1/cica/files/cs6ch1.pdf

2.2.4 Fugitive emissions

Like the China plant, Hazelwood plant equipment will operate in a fully-enclosed vent collection system, operated under negative pressure in its buildings. All fugitive sources are collected from a large number of vent hoods placed throughout the plant. The fugitives vent layout is provided in **Figure 14** (and supplied separately as ***Appendix 16*** (*Chunxing Hazelwood Project Venting points layout抽风点 English 20200316.PDF*). All vent gas is ducted through pollution control as described in Section 2.2.2.1 (and **Figure 10**) and sent to a small stack which is dedicated to this stream.

There are 33 vents in all, configured throughout the plant as follows:

- storage area: 2
- truck cleaning area: 1
- ULAB pit: 2
- breaker hopper: 1
- breaker ball mill: 1
- main breaker feed-in: 1
- breaker roller separator: 1
- breaker plastic separator: 1
- lead paste transport belt conveyor: 1
- lead paste transport screw conveyor: 1
- lead paste mixing machine (pre-feed to smelter): 2
- lead paste belt conveyor (pre-feed to smelter): 1
- smelting system: 10
- melting pot: 1
- refining kettles: 2
- ingot casting machine: 1
- white coal storage bunker: 1
- iron pellets storage bunker: 1
- slag cooling area: 2

An estimate of fugitive emission concentrations has been carried out based on the following assumptions:

- The Hazelwood plant will produces fugitive emissions <u>at the same rate</u> as China plant #2. This means that no scaling is done, because a linear relationship is harder to demonstrate with fugitive releases compared to stack emissions from flue gases, even though it is certain that a lower level of fugitive emissions would occur from a plant 1/10th of the size.
- Therefore the measured concentrations from China plant #2 (in mg/m^3) have been used as is for Hazelwood, taking all smelting, refining, storage and breaking area sample point concentrations and averaging them as representative of these four work areas.

- Dioxins has been excluded from the estimate of emissions from the fugitives stack because they are a combustion/ cooling reformation by-product, and fugitives air is not drawn directly from any combustion processes.
- The design flow rates for Hazelwood (**Figure 10**) have been used to calculate the mass rate at each point: into/ out of pollution control equipment and out of the dedicated fugitives small stack. This uses the formula: *mass rate (mg/min) = average concentration in plant area (mg/m^3) x flow rate (m^3/min) at calculation point*.

The fugitives mass balance is provided in the Excel workbook file ***Appendix 17*** *In-plant air data calculated v8.xlsx*, worksheet 'Haz fug'. More detailed assumptions used in calculating estimated Hazelwood plant fugitive emissions are also described in the 'Haz fug' worksheet.

The result of the fugitives mass balance, presented as mass rate emission inputs into the air quality model, for the suite of substances emitted, is provided in **Table 9**. Also shown for comparison and context are the SEPP (AQM) standard values (Design Criteria), the Scheduled Premises Regulation 10 exemption levels and the average emission estimated for each parameter from the main stack.

The estimated stack emission of all fugitive lead collected by the fugitives vent system is estimated to be 0.0000010 kg/hr. This corresponds to 0.05% of lead emissions estimated from the main stack (0.0019 kg/hr) and just 0.017% of the Regulation 10 exemption level (0.006 kg/hr).

All other pollutants emitted from the fugitives stack follow this pattern of being vastly below both the main stack emission and the exemption level.

Given the extent that all emissions from fugitives collection are estimated to be well below Exemption levels, and the tenfold larger China plant fugitives data has been used without scaling, Chunxing would be likely to apply for exemption from licensing of this fugitives stack at the commissioning stage.

注：环境抽风点图例

Note: Venting point locaiton

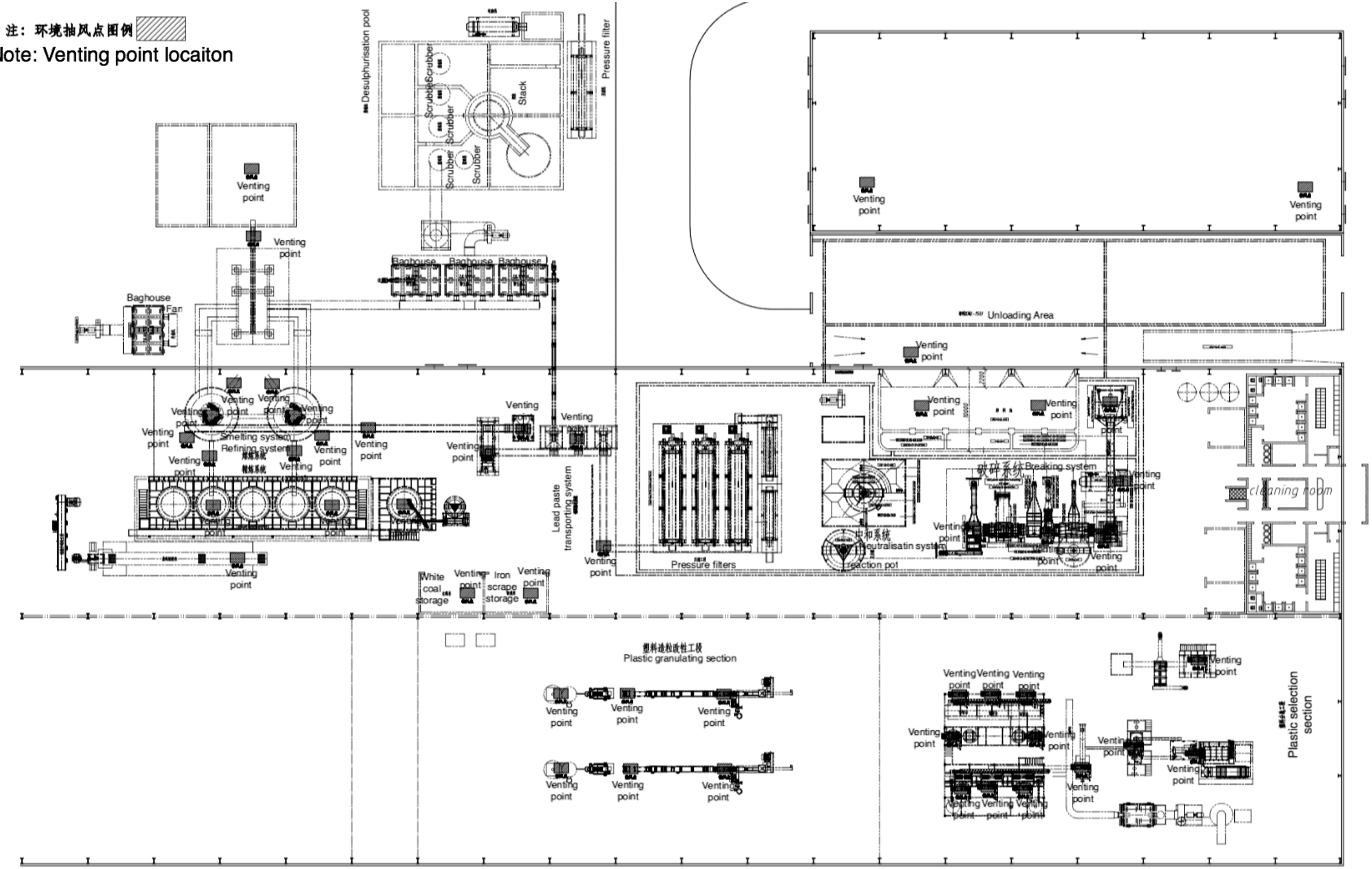


Figure 14: Proposed venting points for collecting fugitive emission at Hazelwood plant

Table 9: Estimated emissions to air from proposed Hazelwood plant fugitives stack

Substance	Modelling parameters							
	SEPP (AQM) Sch A Class	Averaging time	SEPP (AQM) Design Criteria mg/m^3	Estimated fugitives stack emission (kg/hr)	Sch Prem Exemption level (kg/hr)	Fugitives emission as % Exemption level	Average main stack emission (kg/hr)	Fugitives emission as % main stack emission
Sulfur dioxide	1 (toxicity)	1-hour	0.45	0.000414	0.42	0.099%	0.13	0.32%
Nitrogen dioxide	NO_2 -1 (toxicity)	1-hour	0.19	0.0024	4.2	0.057%	1.27	0.19%
Total particulate matter (TPM or TSP)	Unclassified (nuisance)	3-minute	0.33	0.00011	0.42	0.027%	0.19	0.06%
PM_{10} - (assuming all TPM = PM_{10})	1 (toxicity)	1-hour	0.08	0.00011	0.42	0.027%	0.19	0.06%
$PM_{2.5}$ - (assuming 65% of TPM = $PM_{2.5}$)	2 (toxicity)	1-hour	0.05	0.000072	0.17	0.043%	0.12	0.06%
Lead	1 (toxicity)	1-hour	0.003	0.0000010	0.006	0.017%	0.0019	0.05%
Sulfuric Acid	2 (toxicity)	3-minute	0.033	0.000005	0.006	0.1%	0.0027	0.19%
Chromium and its compounds	Cr(III): 2 (toxicity)	3-minute	0.017	0.00000019	0.006	0.003%	0.00034	0.05%
Arsenic and its compounds	3 (IARC Group 1 carcinogen)	3-minute	0.00017	0.00000036	0.006	0.006%	0.00067	0.05%
Cadmium and its compounds	3 (IARC Group 1 carcinogen)	3-minute	0.000033	0.00000001	0.006	0.0002%	0.000023	0.05%
Tin and its compounds	Not listed	N/A	N/A	0.00000002	N/A	-	0.000040	0.05%
Antimony and its compounds	2 (toxicity)	3-minute	0.017	0.00000008	0.006	0.001%	0.0001	0.05%

2.2.4.1 Best practice fugitive emissions control

EPA has indicated that it will assess best practice for the Hazelwood North proposal against the *Environmentally Sound Management of Spent Lead Acid Batteries in North America, Technical Guidelines*[5]. This document is particularly helpful for the assessment of fugitives management.

A detailed assessment of the strategies of Sections 5.3.1 and 5.3.2 of the North America ESM guideline for fugitive dust emission issues and controls is provided in **Table 10** below.

Table 10: Assessment of fugitive emissions management against best practice

<table>
<tr><th>#</th><th>North America ESM (Section 5) fugitive dust emission issue/ control</th><th>Chunxing proposal assessment</th></tr>
<tr><td colspan="3">Fugitive dust sources</td></tr>
<tr><td>1</td><td>Roadways</td><td>All drop-off and material handling occurs within buildings. All trucks are washed before leaving these buildings. All washwater is collected and treated in the onsite wastewater treatment plant.</td></tr>
<tr><td>2</td><td>Storage piles</td><td>All storage occurs within enclosed buildings. Storage areas vented in a negative pressure building to fugitives control through baghouse and scrubber.</td></tr>
<tr><td>3</td><td>Lead-bearing material handling transfer points</td><td>All material handling occurs within enclosed buildings which are vented in a negative pressure building to fugitives control through baghouse and scrubber.</td></tr>
<tr><td>4</td><td>Transport areas</td><td>All drop-off and material handling occurs within buildings. All trucks are washed before leaving these buildings. All washwater is collected and treated in the onsite wastewater treatment plant.</td></tr>
<tr><td>5</td><td>Storage areas</td><td>All storage occurs within enclosed buildings. Storage areas vented in a negative pressure building to fugitives control through baghouse and scrubber.</td></tr>
<tr><td>6</td><td>Other process areas and buildings</td><td>All process areas are vented in a negative pressure building to fugitives control through baghouse and scrubber.</td></tr>
<tr><td colspan="3">Enclosure</td></tr>
<tr><td>7</td><td>Smelting furnaces</td><td rowspan="11">Total enclosure using process vent hoods at equipment plus negative pressure buildings vented to fugitives control through baghouse and scrubber.</td></tr>
<tr><td>8</td><td>Smelting furnace charging areas</td></tr>
<tr><td>9</td><td>Lead taps</td></tr>
<tr><td>10</td><td>Slag taps</td></tr>
<tr><td>11</td><td>Molds during tapping</td></tr>
<tr><td>12</td><td>Battery breaker</td></tr>
<tr><td>13</td><td>Refining kettle</td></tr>
<tr><td>14</td><td>Casting area</td></tr>
<tr><td>15</td><td>Dryers</td></tr>
<tr><td>16</td><td>Material handling areas</td></tr>
<tr><td>17</td><td>Areas where dust from fabric filters, sweepings
or used fabric filters are processed</td></tr>
</table>

[5] *11665-environmentally-sound-management-spent-lead-acid-batteries-in-north-america-.PDF*, available at: http://www3.cec.org/islandora/en/item/11665-environmentally-sound-management-spent-lead-acid-batteries-in-north-america-en.pdf

#	North America ESM (Section 5) fugitive dust emission issue/ control	Chunxing proposal assessment
18	Level 3 enclosure	Chunxing employs level 3 enclosure. In addition to flue gas capture and treatment, the main process areas of the Hazelwood facility are fitted with enclosure hoods, such as indicated in **Figure 15** for the smelting furnaces (high resolution drawing is provided at ***Appendix 18***). These are described by plant location in **Figure 14**. In addition, all plant buildings where processing, handling or storage occurs is totally enclosed with negative-pressure, as demonstrated in Section 2.2.4.3.
19	Level 3 enclosure – ambient lead concentrations in surrounding area (from fugitive emissions) – see guideline Figure 29. Figure 29 displays the annual average lead concentrations at ambient monitoring locations around US facilities based on the enclosure category assigned to the facility. Analysis indicates that facilities with Level 3 enclosure that implement the work practices described as best practice are generally achieving much lower lead concentrations from fugitive emissions near their property boundaries. The graph shows level 3 enclosure can achieve ambient Pb concentrations around ***0.2 mg/m³***) due to fugitive emissions from ULAB plants.	Section 2.2.4 of this submission (fugitives mass balance) demonstrates fugitive emissions of lead from the China #2 plant (which is assumed the same as the Hazelwood plant) to be 0.0000010 kg/hr, at a rate of 1,150 m^3/min, which calculates to a concentration of ***0.00002 mg/m³*** at the stack emission point, or 10,000 times lower than this level (from fugitive emissions alone). At ambient monitoring locations around the plant (which is where Figure 29 data is sourced from) this level would dilute many times. As an estimate, **Table 8** shows the 12-month averaged modelled ambient GLC of lead (as a worst case in the Hazelwood North area) from the main stack to be 0.0000037 mg/m^3 (using the maximum stack emission), and **Table 9** shows the total fugitive lead emission to be just 0.05% of the main stack emission. The ambient ground level concentration (from the fugitives stack emission alone) would therefore be **0.00000001 mg/m³**. The Hazelwood facility clearly demonstrates well beyond level 3 enclosure category performance.
ESM Strategies to Control Fugitive Emissions		
Storage areas:		
20	Enclose storage areas	All storage areas are fully enclosed.
21	Clean residue from broken batteries as soon as possible	Batteries are handled so as not to cause breakage. Washings from any breakage (which could only occur within buildings) are collected and sent to waste water treatment onsite.
22	Where the storage facility is located in an enclosed building, air exchanges within the enclosed lead battery and raw material storage areas must be managed	ULABs and raw materials are stored in separate buildings under negative pressure.
23	Baghouses are generally used for air pollution control in enclosed storage areas.	A pulse baghouse is used to treat air collected under negative pressure from storage areas.
Housekeeping		
24	Clean by wet-washing or vacuum with HEPA filter	Water washing is used throughout handling areas (all enclosed in buildings), including battery breaking. All areas vented in a negative pressure building to fugitives control through baghouse and scrubber.
25	Immediately clean all affected areas if an accidental release of lead dust is detected, within one hour of occurrence	All Pb-work occurs within enclosed buildings with high degrees of automated handling. Work areas are vented in negative pressure buildings to fugitives control through baghouse and scrubber.
	Maintenance should be performed inside an enclosure maintained at negative pressure.	All process areas vented in a negative pressure building to fugitives control through baghouse and scrubber.

#	North America ESM (Section 5) fugitive dust emission issue/ control	Chunxing proposal assessment
	Used fabric filters should be placed in sealed plastic bags or containers prior to removal from a baghouse.	All baghouse maintenance occurs within the baghouse enclosure 'rooms'. Used filter bags are sealed and retained for addition into the smelting furnaces.
	Never dry-sweep any process area, as this causes dust to form	All process areas are maintained wet.
	All lead-bearing material should be contained and covered for transport outside of a total enclosure in a manner that prevents spillage or dust formation.	Lead material handling is highly automated throughout to minimise employee contact.
	Inspect buildings monthly. Repair any new openings within week of discovery.	Building inspections will occur at least monthly.
Surrounding surfaces		
	Paved and other low-level hard surfaces should be cleaned regularly (twice per day is recommended) using either hand or riding vacuum units to collect existing dust particles and minimize wind-blown dust pollution	All drop-off and material handling occurs within buildings on paved surfaces. All trucks are washed before leaving these buildings. All washwater is collected and treated in the onsite wastewater treatment plant.
	Use of proper industrial hygiene methods (discussed in Section 6) will also reduce cross- contamination in non-processing areas.	Noted
	Unpaved areas should be seeded with ground cover, which will capture dust and minimize wind-blown dust generation; there should be no exposed soils.	All drop-off and material handling occurs within buildings on paved surfaces. All trucks are washed before leaving these buildings. All washwater is collected and treated in the onsite wastewater treatment plant. All process areas vented in a negative pressure building to fugitives control through baghouse and scrubber. No fugitive dust will be released from buildings. Significant landscaped buffer areas are provided around buildings within the site.
	Use dust suppressants on unpaved areas that will not support a groundcover (e.g., roadway shoulders, steep slopes, limited-access and limited-use roadways).	
	Unpaved roads should have no more than one vehicle round-trip per day.	
Processing operations and process modifications:		
	Total enclosure should maintain negative pressure values of at least 0.013 mm of mercury (0.007 inches of water) at all times and vent to a control device designed to capture lead particulates.	0.013 mm of mercury is equal to 1.73 Pa. Section 2.2.4.3 calculates a design negative (dynamic) pressure of 125 Pa, which demonstrates that there is ample scope to manage make-up air area controls to ensure best practice negative pressure is achieved. All flue and fugitive vent collection gases are captured and treated through baghouses and scrubbers.
	Total enclosure should be free of significant cracks or gaps that could allow release of lead-bearing material; and maintain an inward flow of air through all natural draft openings.	Negative pressure is achieved in all process buildings. All buildings are newly built without cracks and gaps are limited to small under door and window openings, as required for negative pressure.
	Inspect enclosures and facility structures that contain any lead-bearing materials at least once per month.	Inspection and monitoring programs will be part of operational procedures.

#	North America ESM (Section 5) fugitive dust emission issue/ control	Chunxing proposal assessment
	Repair any gaps, breaks, separations, leak points or other possible routes for emissions of lead to the atmosphere as soon as possible.	Inspection and monitoring programs will be part of operational procedures, with maintenance performed as necessary.
	Before furnace operations: manage the movement of materials so as to minimize the amount of handling; blend wet sludges with dry materials to help minimize dust levels.	All handling of ULABs uses forklift unloading followed by crane claw pick up and deposition into the fully enclosed breaker. Worker manual handling of ULABs is minimised to the maximum extent achievable.
	At the furnace and other hot works: enclose furnace operations to improve operating efficiency of the ventilation systems. Tap furnace metal into moulds/pots under a ventilated shroud or directly into a bath of covered and ventilated molten lead. Minimize lead emissions during ingot casting by keeping the temperature below 500ºC and controlling the flow rate in a manner that reduces dross formation. Fugitive emissions may also occur when materials of different high temperatures are being poured from one vessel to another. Seek to reduce this differential if possible.	Vent hoods are placed over furnaces and ingot casting areas as shown in **Figure 14**. Melting and refining occurs at 500 ^{0}C so subsequent casting must be cooler than 500 ^{0}C.
Ventilation and emission controls systems:		
	Create and implement detailed procedures for inspection, maintenance, and bag leak detection, and corrective action plans for all baghouses (fabric filters or cartridge filters) that are used to control process vents, process fugitive emissions, or fugitive dust emissions from any source, including those used to control emissions from building ventilation.	Inspection, maintenance leak detection procedures for baghouses are provided in Section 4.3 and 4.4.
	Capture dusts and fumes by providing local exhaust ventilation that isolates emission sources and filters the air through a baghouse.	Building areas are vented under LEV negative pressure to fugitives control through baghouse and scrubber.
	Ensure that the capture velocity of an exhaust hood is sufficient to prevent fumes or dust from escaping the airflow into the hood. Though the face velocity required to accomplish this will vary from application to application, one meter per second is usually the minimum required.	Section 2.2.4.2 shows that exhaust hood face velocities range from 3- 4 m/s.
	Isolate employees from the exposure hazard, or provide local exhaust ventilation and clean air stations with positive filtered air so employees can	High levels of automation mean employees minimise contact with lead-handling areas. Strict PPE is maintained when working in these areas. Process control rooms are under positive pressure (clean room air escapes but external air does not enter).

#	North America ESM (Section 5) fugitive dust emission issue/ control	Chunxing proposal assessment
	be in a clean air station when working in the process area.	
Best practices for preventing fugitive emissions from emission control systems include:		
	Daily monitoring of pressure drop	Daily monitoring
	Daily check of compressed air for pulse baghouses; weekly monitoring that dust is removed from baghouses	Daily monitoring, work with the furnace feeding operation. The dust cleaning program starts when the furnace feeding operating, the dust from the baghouse is removed to the smelting furnace for feeding. the frequency of dust cleaning program is variable.
	Monitoring of cleaning cycles for proper operation	Adopt negative pressure monitoring. When the negative pressure reaches the threshold, starts the baghouse vibration. The vibration frequency is about 2-3 hours once (this is China plant frequency. Australian plant will have less dust; therefore the frequency may be adjusted to decrease). Daily monitoring.
	Quarterly check for leaks and physical integrity of air pollution control devices	Daily monitoring
	Quarterly check of all mechanical components, operation of continuous leak detection system; mandatory repair/replacement of bags if leaks are detected	Monthly check
	Monitoring pressure drop and water flow for scrubbers, operating per manufacturer's recommendation.	Chunxing made equipment, daily check
Vehicles:		
	Provide vehicles with enclosed cabs that have positive-pressure HEPA filtered air	All forklifts will be enclosed with positive-pressure HEPA filtered air. No other vehicles (other than trucks) will operate within the plant buildings.
	Wash each vehicle at a wash station inside exit doors from material storage and handling areas. The vehicle wash should include washing of tires, undercarriage and exterior surface of the vehicle, followed by vehicle inspection. This will prevent tracking of contaminants by vehicles to the outside	All unloading of batteries from trucks will occur within the covered and enclosed receipt building, which has an impermeable acid resistant concrete floor, drained to the onsite waste water treatment system. The area has only one entrance and one exit for trucks, and the enclosed area stays closed during drop-offs to avoid dust release. Every truck carrying ULABs is washed down after unloading, with washwaters drained to the waste water treatment system, before the vehicle can exit the building.
Overall operational considerations		
	Modify the plant layout in a way that reduces the amount of materials handled and transported from one part of the process to the next	All handling of ULABs uses forklift unloading followed by crane claw pick up and deposition into the fully enclosed breaker. Worker manual handling of ULABs is minimised to the maximum extent achievable.
	If at all possible, contain the whole process in one enclosed building and separate one operation from another to prevent cross-contamination in the event of a rogue emission.	All processing occurs within enclosed buildings, separated or partitioned as required (see Appendix B: *Hazelwood North Plant area equipment layout drawings*).
	If possible, use mechanical means to perform tasks with a high exposure risk in order to minimize possible exposure pathways	All handling of ULABs uses forklift unloading followed by crane claw pick up and deposition into the fully enclosed breaker. Worker manual handling of ULABs is minimised to the maximum extent achievable. Processes throughout are highly mechanized and automated.

#	North America ESM (Section 5) fugitive dust emission issue/ control	Chunxing proposal assessment
	Wash down areas with water on a regular basis and keep working surfaces damp	Breaking and other dust generation areas maintained wet.
	Operator training, prudent working practices and good housekeeping when operating mobile equipment should all address fugitive dust considerations	Operator training will include fugitive dust control practices.
	Ensure respiratory protection is available to employees involved in processing and subject to exposure. Respirators may come in the form of a mask or the filtered air helmet. If sulfur is present, carbon filter combinations are required.	PPE to be used by employees is detailed in the Excel file *Chunxing Protection Accessories List新春兴车间呼吸防护用品情况说明.xlsx*, located at ***Appendix 19***.
	Place properly maintained belt wipes on a tail pulley on conveyors, skirting and curtains, at the head of any belt drive system	Yes in place
	Environmental Health and Safety Management System (EH&SMS)	To be developed post HAZOP assessment in detailed design.

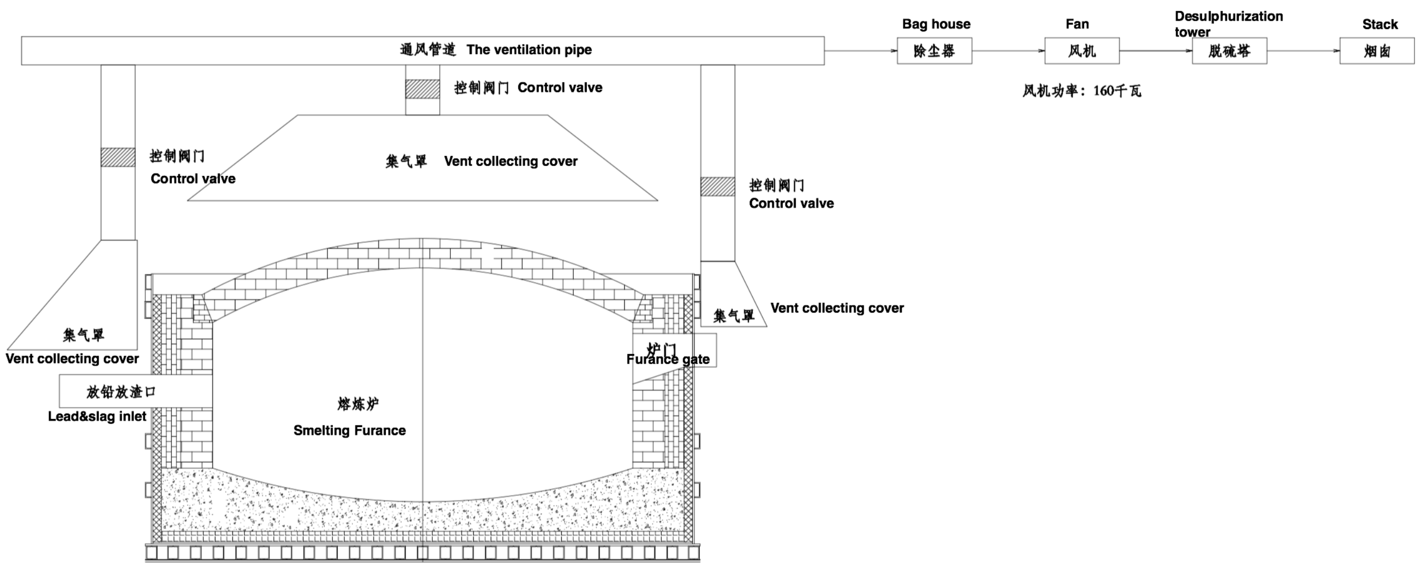


Figure 15: Smelting Furnace enclosure covers and fugitive vent gas system

2.2.4.2 Face velocities (of vent hoods)

Industrial applications such as the one proposed for Hazelwood North employ two forms of source emission collection:

- Full enclosure is the primary method of control, such as what is employed to contain and remove flue gas (or off-gas) from major heat generating equipment, the main one being the smelting furnaces.
- Local exhaust ventilation (LEV) capture points placed as close as possible above and adjacent to these areas, designed to capture any fugitive leakages from loading/ unloading or failures in the primary control.

The objective of LEV operation is to obtain sufficient suction (negative pressure) at the collection point to capture the gaseous emission, instead of allowing it to escape. What is important is that there is sufficient "face velocity" to achieve the goal of capturing the fugitive emission.

The Hazelwood plant's designed face velocities are shown for the major vent points in Table 1 below, including the feed duct flow rates for each. These figures are achieved by valve adjustment on each hood and there is further scope for variation because many of the points do not require much or any ventilation at certain stages of the batch cycle, meaning they can be damped down, like a regular building central heating system.

Table 11: Face velocities of fugitive air collection hoods in Hazelwood plant

Vent face#	Plant Section	Location detail	Vent face area (m^2)	Maximum vent face flow rate (m^3/min)	Maximum face velocity (m/s)
1	Smelting	Slag output	0.6	240	4
2	Smelting	Observation Door	0.3	180	3
3	Smelting	Lead input	0.6	210	3.5
4	Smelting	Lead input	0.6	210	3.5
5	Smelting	Top of furnace	0.6	180	3
6	Smelting	Slag output	0.6	240	4
7	Smelting	Observation Door	0.3	180	3
8	Smelting	Top of furnace	0.6	180	3
9	Smelting	Material input	0.3	180	3
10	Refining		0.8	210	3.5
11	Refining		0.8	210	3.5
12	Refining		0.2	120	2
13	Refining		0.6	180	3
14	Breaking		0.6	210	3.5
15	Breaking		0.8	210	3.5
16	Breaking		0.8	210	3.5
17	Breaking		0.3	180	3
18	Breaking		0.3	180	3
19	Breaking		0.3	180	3
20	Breaking		0.6	210	3.5
21	Breaking		0.3	180	3

These face velocities are designed to deliver much higher suction than the 1 m/s quoted in the US Best Practice reference.

2.2.4.3 Negative pressure

Negative pressure is created in a building envelope when more air is exhausted through fan extraction that what can be supplied through make-up air spaces, such as open doors, windows, vents and building imperfections such as cracks.

The US best practice reference requires a negative pressure of 0.013 mm Hg, which converts to 1.73 Pa (0.013/760 x 101325). This is not a particularly strong negative pressure. It can be expressed as a velocity of incoming air by rearranging:

Dynamic pressure	= 0.5 x fluid density (1.2 kg/m3 for air) x velocity^2 to:
Velocity (of make-up air)	= $\sqrt{}$(Dynamic pressure/ 0.6)
Velocity (of make-up air)	= $\sqrt{}$ (1.73/0.6)
	= 1.70 m/s.

To meet this element of best practice requires the demonstration of at least 1.70 m/s velocity across the combined make-up air area.

The Hazelwood plant fugitives circuit will exhaust 2,166 m^3/min from its stack, and there is 2.5 m^2 available across a typical 24 hour period of combined make-up air area calculated as follows (taken from tab 'Doors' in *17. In-plant air data - calculated v8.xlsx*). An overlay of where the doors are located is also provided (*2020-5-1 Hazelwood plant layout with doors澳大利亚5WT平面-Model copy.PDF*).

- 5 x 20m^2 doors are opened/ closed a maximum of 36 times/day, for an average of 5 minutes each time
- Assume that only one of these main five doors are open at the same time (four others closed)
- Therefore for 36 x 5 = 180 minutes (3 hours) in a 24 hour period (3/24), there is a full 20m^2 door area available for make-up air ingress. The remainder of the time all doors (focusing only on these five large ones) are closed.
- Therefore the average area available for collection of make-up air per day is 20m^2 x 3/24 = **2.5 m^2 per day** (assuming the smaller staff access door is insignificant in size and time open compared to the other 5 doors).

Therefore the average make-up air velocity over a typical 24-hour period would be:

(2,166 m^3/min/ 60 = 36.1 m^3/s)

Make-up air velocity = 36.1/2.5 = 14.44 m/s, which is markedly above 1.70 m/s.

Using Dynamic pressure = 0.6 x velocity^2 :

Dynamic pressure = 0.6 x 14.44^2 = **125 Pa**, which is also well above 1.73 Pa (0.013 mm Hg).

What these calculations demonstrate is that there is more than enough exhaust flow created to manage 'best practice' negative pressure – in fact these numbers indicate that some openings will need to be partially open much more of the time to more closely balance the make-up air and exhausted air volumes. In reality, make-up air is balanced at plant operation/ commissioning through adjustment of these openings to obtain the desired ingress velocities at each, so as to achieve the negative pressure required.

The calculations in this response simply demonstrate that there is sufficient exhaust flow rate to provide ample face velocities at vent points and there is also ample scope to manage make-up air area controls to ensure best practice negative pressure is achieved.

Expert review of negative pressure calculations

Neville Hook is an industrial hygiene expert in the field of ventilation engineering. He works in industrial settings to achieve industrial building negative pressure, in the design, installation and balancing of exhaust air systems and the commissioning of efficient and effective local exhaust ventilation controls.

Chunxing provided Neville with its fugitives air collection and extraction design, calculations and best practice negative pressure requirements (according to the North American guideline), requesting his review of the system's ability to meet best practice negative pressure (for secondary lead facilities). His review is provided in ***Appendix 21***.

2.2.4.4 In-plant monitoring alarms for SO_2 and dust

Chunxing's Hazelwood plant will also install an alarm system at key points within the plant that will be programmed to sound when pre-set concentration thresholds (based on worker exposure levels) are exceeded. The monitoring alarm system sensors will detect SO_2 and dust concentrations. High levels of these pollutants could indicate suction failures in hood enclosures, local disturbances in negative pressure or more significant plant irregularities. A response procedure for control room staff will be developed that will primarily remove nearby workers from the area in question, institute any suction measurements/ increases or equipment shutdown actions required, then address the cause of the issue.

The final location of vents, louvres and where we would place monitoring alarms would be determined as part of final detailed design. The placement of monitoring alarms in particular would be guided from smoke testing (during commissioning) to identify any building 'dead spots' of relatively stagnant air.

2.2.5 Plastics plant emissions management

The plastic process in the context of the whole site is provided in the detailed plant layout drawing (Appendix 9). The plastics half of the main building (plastic sorting and final product areas) has its own exhaust air vents and fans, which filter for dust. This is not a pollutant emission source per se, since the plastic will be free of lead or possible other contaminants from the washing process conducted in the battery breaking and separation process in the building partition next door.

The air out of the filter directly discharges via a roof vent (on the plastics processing building) without the need to go through a scrubbing system, since it carries no risk of pollutant emissions.

The plastics plant's process is shown in **Figure 16** (for the separation process) and **Figure 17** (for the granulation process).

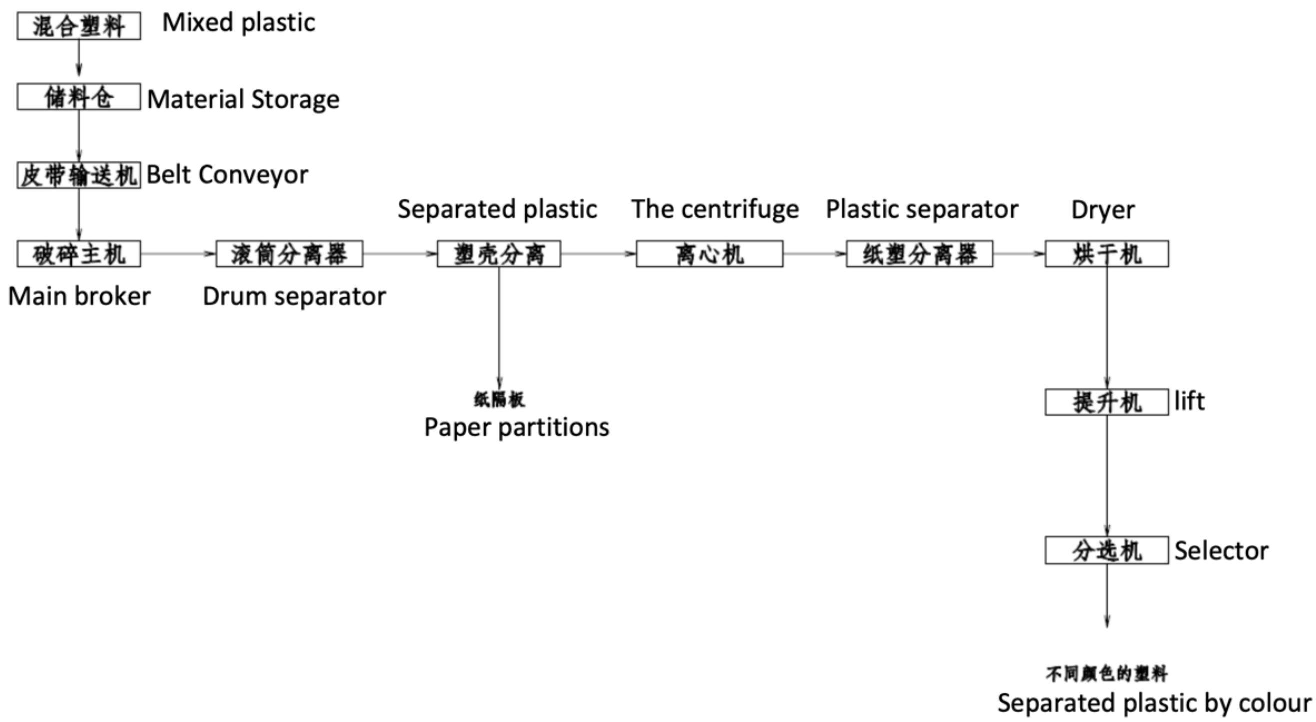


Figure 16: Stage 1 plastic separation process diagram

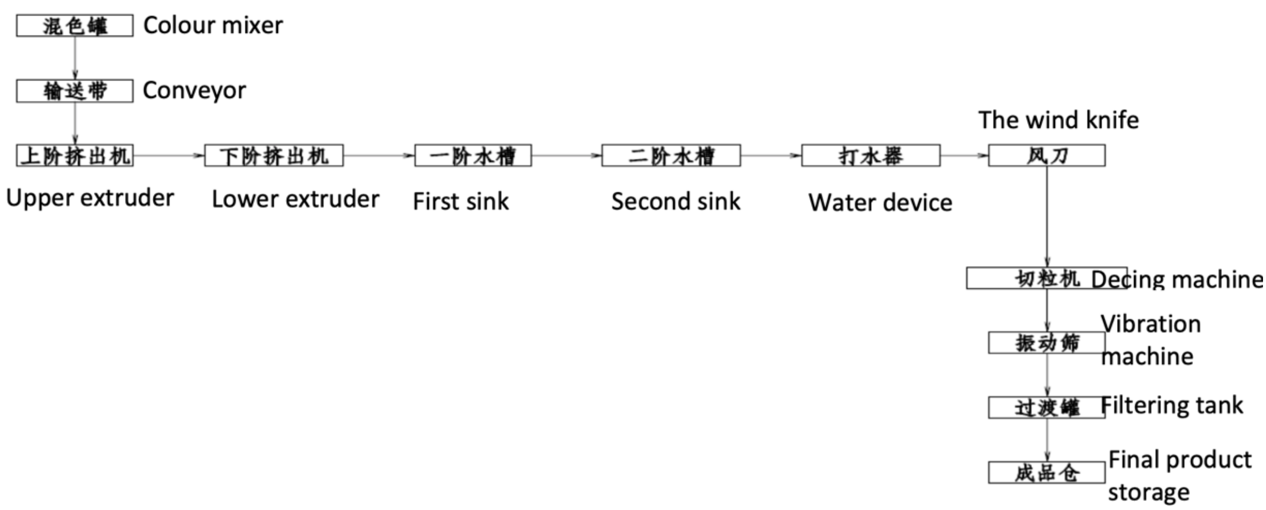


Figure 17: Stage 2 final plastic product granulation process

3 Additional EPA requests relating to air quality

After the completion of the 20B conference report and Chunxing's further work under the January and February 2020 EPA Notices, EPA requested that Chunxing undertake the following additional work:

- further air quality modelling
- a human health risk assessment.

3.1 Further air quality modelling requested by EPA

The original air quality modelling was conducted based on a design that the fugitives collection system would be directed into the main flue gas line and exhausted out of the main (single) stack. In further discussions with Chunxing China's engineers and EPA, we decided to change the design to separate the main flue gas collection and treatment system from the fugitives collection and treatment system. There were two main reasons for this:

1. The fugitives collection air is several orders of magnitude lower than the main stack in pollutant emission concentrations and, to ensure significant negative pressures are achieved, has a much higher flow rate than the main flue gas line. It therefore would represent a large addition of 'dilution air' to the main flue gas emissions circuit, and the dilution effect would hamper the ability of the CEMS to comfortably detect changes in emission levels, which would negatively impact the control room's ability to measure and react to changes in plant operating conditions and performance.
2. In a worst case scenario, due to the much higher flow rate of the fugitives circuit, we felt it was possible that a major failure in the flue gas circuit could create a blow-back effect that could direct flue gases back into the plant, endangering the safety of workers.

Chunxing decided that both potential ramifications of a combined exhaust air system carried unacceptable risk to either worker health or the environment, so the decision to separate the two streams was made. Consequently, additional modelling was undertaken to incorporate the additional fugitives stack.

It is notable that such a fugitives collection vent system is not typical for lead recycling plants around the world. Common practice involves no fugitive local exhaust ventilation at all, and where this is in place it is usually treated by scrubbing and vented direct to atmosphere, without a stack. We have included the second stack in our design to ensure maximum dispersion and to ensure there are no air emission impacts from this system at all.

The original modelling did not specifically consider $PM_{2.5}$, although it included the worst case (in the context of total particulate matter, if this was assumed to be made up of all $PM_{2.5}$). Addition of $PM_{2.5}$ modelling was therefore another request by EPA.

Finally, EPA also requested some technical variations relating to the treatment of background, sensitivity analyses and a re-run of the model on a 24-hour averaging time basis, to allow further comparison to SEPP AAQ.

3.1.1 Revision and replacement of the air quality modelling section of the WAA (Section 8)

Due to these changes in modelling requirements, Chunxing decided that the most transparent way to present both the new information and previously valid data from the WAA was to re-issue Section 8 of the WAA (Air Emissions) in its entirety. This acts as a complete replacement of the original Section 8, with key changes from the original section noted in the erratum in the Section of this Addendum entitled ‘About this Addendum’.

Complete replacement of Section 8 was seen as the most transparent and unambiguous way of presenting new modelling data, but the results of re-modelling have not resulted in any changes to emissions predicted in the original WAA, nor the outcomes of that assessment, as demonstrated by Table 12.

Table 12: Original v revised modelled GLC results $_{(99.9th\ \%ile)}$ 2012 – 2016

Parameter	SUMMARY OF ANNUAL RESULTS (the highest min, max and ave found between 2012 and 2016) - NO BACKGROUND					
	Original WAA modelling (main stack) % Design Criteria			New modelling (both stacks) % Design Criteria		
	Lowest Stack Result	Highest Stack Result	Ave Stack Result	Lowest Stack Result	Highest Stack Result	Ave Stack Result
	%	%	%	%	%	%
Sulfur dioxide	0.03%	0.23%	0.14%	0.03%	0.23%	0.14%
Nitrogen oxides	0.84%	10.47%	3.29%	0.84%	10.47%	3.30%
Total Dust - (criteria for nuisance TPM)	0.16%	1.55%	0.54%	0.16%	1.55%	0.54%
PM_{10} - (assuming all TPM = PM_{10})	0.35%	3.39%	1.19%	0.35%	3.39%	1.19%
$PM_{2.5}$ - (assuming 65% of TPM = $PM_{2.5}$)	-	-	-	0.37%	3.52%	1.23%
Lead	0.02%	1.02%	0.31%	0.02%	1.02%	0.31%
Sulfuric Acid Mist	0.05%	3.93%	1.53%	0.05%	3.93%	1.53%
Chromium and its compounds	0.001%	0.05%	0.02%	0.001%	0.05%	0.02%
Arsenic and its compounds	2.91%	4.06%	3.63%	2.91%	4.06%	3.63%
Cadmium and its compounds	0.09%	0.94%	0.65%	0.09%	0.94%	0.65%
Tin and its compounds	-	-	-	-	-	-
Antimony and its compounds	0.002%	0.01%	0.01%	0.002%	0.01%	0.01%
Dioxins and Furans (as TCDD I-TEQs)	0.49%	0.50%	0.50%	0.49%	0.50%	0.50%

The revised WAA Section 8 *Air emissions* is provided in its entirety in ***Appendix 22***.

3.2 Human health risk assessment

One of the recommendations from the 20B Conference Report was for “EPA to consider requiring the proponent to undertake a human health risk assessment.” Subsequently EPA accepted this recommendation and asked Chunxing to carry out this requirement in the S22(1) Notice issued 24 April 2020. The scope of the human health risk assessment (HHRA) requested by EPA was as follows:

"You must engage a suitably qualified specialist to undertake a public health risk assessment, including, but not be limited to:

a. Assess the potential risk and pathway of lead emissions to the environment (air, land and waterway) and their associated public health risks.

b. Assess the likely long-term adverse impacts due to the potential accumulation of lead on local land, waterway, agricultural food crops and public health.

c. Identify how these will be managed so that pollutants accumulated in the exposed environment will not pose an unacceptable public health risk, where necessary."

Chunxing engaged Environmental Risk Sciences Pty Ltd (enRiskS) to carry out this assessment. Their report is provided in ***Appendix 23***.

Their conclusions were:

"Based on the evaluation presented in relation to potential health impacts of air emissions from the proposed ULAB recycling facility, the following is concluded:

- *Inhalation exposures: Risks to human health associated with acute or chronic exposures are negligible. This includes risks to pollutants presents as gases, particulate matter and pollutants bound to particulates.*
- *Multiple pathway exposures: Risks to human health associated with chronic exposures to pollutants, bound to particulates, that may deposit to surfaces and taken up into produce for home consumption relevant to all surrounding areas, including all rural residential and low- density residential properties, are negligible."*

In relation to industrial neighbours and visitors to the site:

"The assessment of potential acute and chronic inhalation exposures in these areas has concluded that there are no risks to the health of workers or visitors."

In relation to those residential areas located closest to the site:

"The assessment of potential acute inhalation and chronic inhalation and multi-pathway exposures in the residential and rural residential areas has concluded that there are no risks to the health of residents."

4 Confirmation of noise estimates from the WAA

EPA has requested that Chunxing provide an additional high-level check of the potential for noise from the facility, as it would be felt at the nearest sensitive receptor 1.1km away. It was suggested to use a simple first-principles approach, beginning with an equipment list with operation sound power ratings for each item.

Such a list is supplied at Appendix 10, with a distinction made as to whether each piece of equipment shall operate inside or outside facility buildings. A level of attenuation has been applied to estimate noise reduction from building walls, for those equipment housed inside. Then a level of distance attenuation (from these walled perimeters) has been applied to determine the estimated residual noise at a point 1.1km away, where the nearest sensitive receptors are located.

The level of building enclosure attenuation achieved is entirely dependent on the material chosen in the wall's structure. This has not yet been determined for the Hazelwood facility, given that detailed design will came later. To conservatively estimate the sound transmission loss (STL) due to the building's walls we have chosen the poorest-attenuating wall material listed on the Engineering Toolbox website[6] – one-layer plasterboard – even though this material would never actually be chosen for the walls of an industrial building. One-layer plasterboard is listed as providing an STL of -25dB to source equipment noise power inside buildings.

To calculate resulting noise experienced 1.2km away, the formula for estimating attenuation due to 'geometric divergence'[7] has been applied, namely:

$A_{div} = 20 \log_{10}(r) + 11$, where:

A_{div} is the attenuation achieved via geometric divergence, and

r is the distance in metres from the source to the receiver.

Murphy and King also discuss additional attenuation effects experienced in outdoor noise propagation, such as atmospheric absorption, ground surface effect, barrier diffraction and other factors. These have been ignored for simplicity and conservatism in the estimate, since they would add to further reduction in noise along the source to 1.1km distance path.

Applying the geometric divergence calculation to every noise equipment source has the potential to reduce sound power by:

$$A_{div} = 20 \log_{10}(1{,}100) + 11$$
$$= 73 \text{ dB.}$$

Appendix 10 applies these reductions, on top of the 25 dB wall attenuation (where appropriate) to each equipment noise source. In the case of every item of equipment, this method calculates that zero decibels of noise will be transmitted as far as 1.2km away, thus confirming the original WAA estimates and summary statement that:

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[6] The Engineering Toolbox, *Sound Transmission through Massive Walls or Floors*, available at: https://www.engineeringtoolbox.com/sound-transmission-massive-walls-d_1409.html

[7] Murphy E, King E (2014), *Environmental Noise Pollution: Noise Mapping, Public Health, and Policy*, First edition, pp.40-45.

> *"… noise levels estimated to be experienced at the nearest noise sensitive area (SR 1 on Church Road Hazelwood North, 1.1 km away) are significantly below day, evening and night recommended maximum noise levels."*

All calculations for each item of equipment are shown in ***Appendix 10,*** tab 'Noise confirmation'.

5 Material handling and flows

5.1 Material flows

The WAA provides details of the process and material flows in sections 4.3 and 4.4. In addition, the following detailed input /output material balances are provided in the Figures below:

- **Figure 18** shows a solid and liquid mass balance for all processes leading up to the thermal stages of smelting, melting and beyond, which focuses on the ULAB breaker and associated equipment, on an annual basis.
- **Figure 19** shows a solid/liquid/gaseous mass balance for inputs and outputs of the two smelting furnaces, which operate on a 36-hour cycle. Two furnaces running 36 hours each, across 300 days per year (with the remainder as maintenance or other downtime) totals 400 total batches per year.
- **Figure 20** shows a solid mass balance for inputs and outputs of the lead grid melting furnace (to make alloy lead), which operates on an 18-24 hour cycle. Lead grid is batch-melted at a rate of 11,500t/yr, across 96 batches at 120t/batch.
- **Figure 21** shows a solid mass balance for the inputs and outputs of the soft lead refining kettle (to make lead ingot). Lead produced by the smelter (soft lead) is batch-melted at a rate of 16,500t/yr, across 137 batches at 120t/batch.

These four material flow diagrams are included as high resolution documents in ***Appendices 24 – 27*** respectively.

Appendix 54 consolidates all of these sub-process mass balances into one master integrated annual process mass balance.

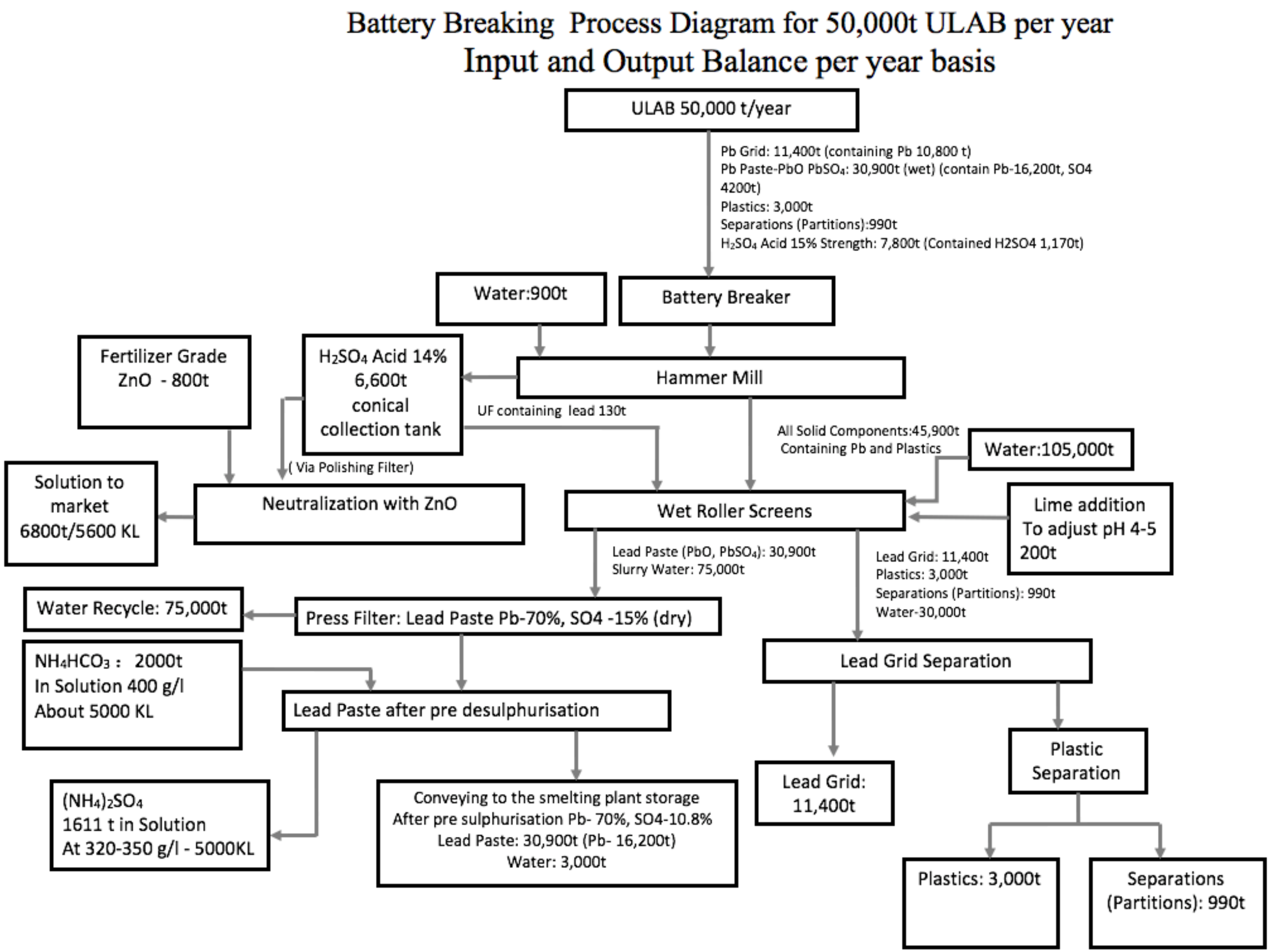

Figure 18: Input and Output Balance Battery breaker Hazelwood North plant (annual basis)

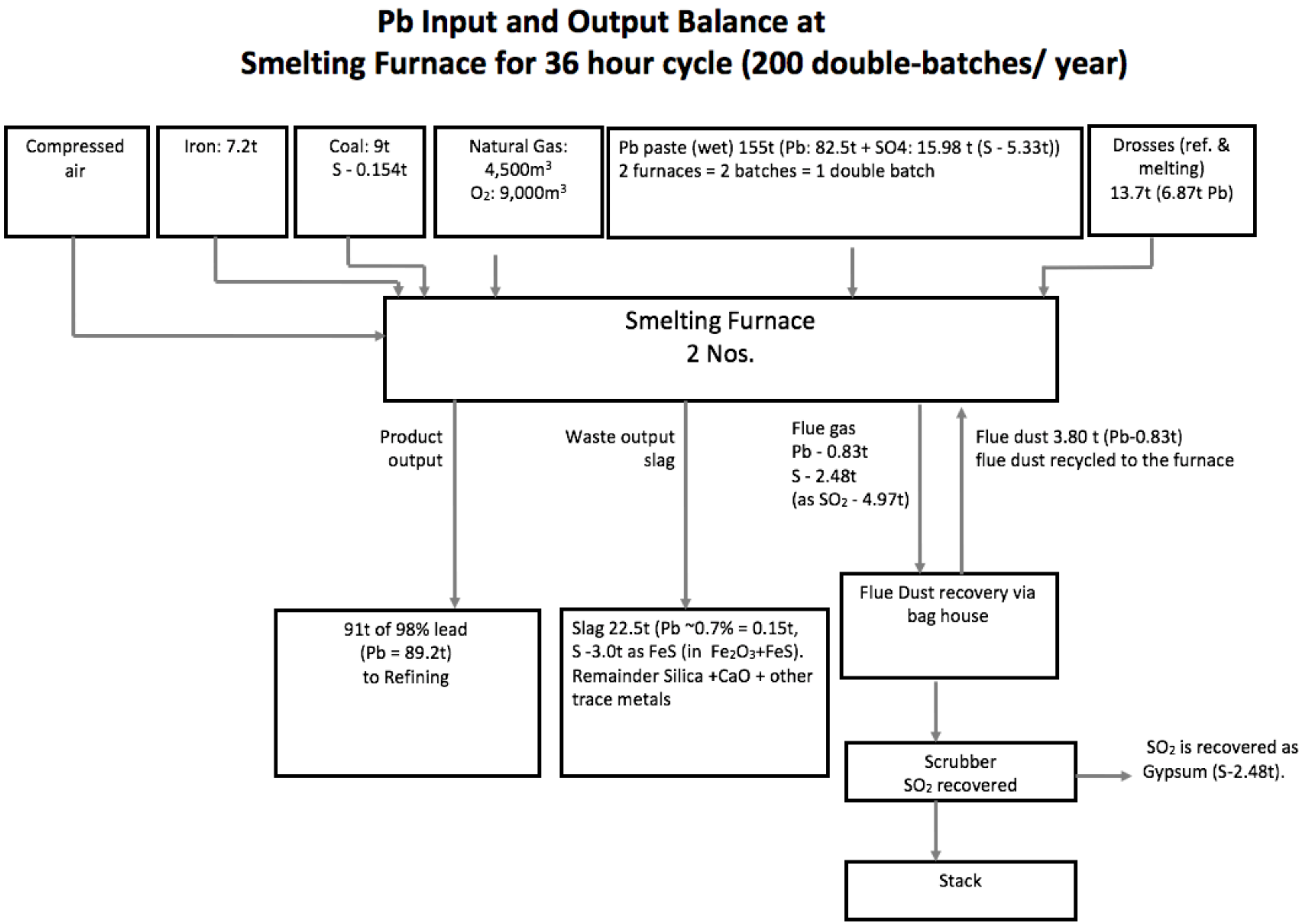

Figure 19: Input and Output Balance Smelting Furnace Hazelwood North plant (cycle basis)

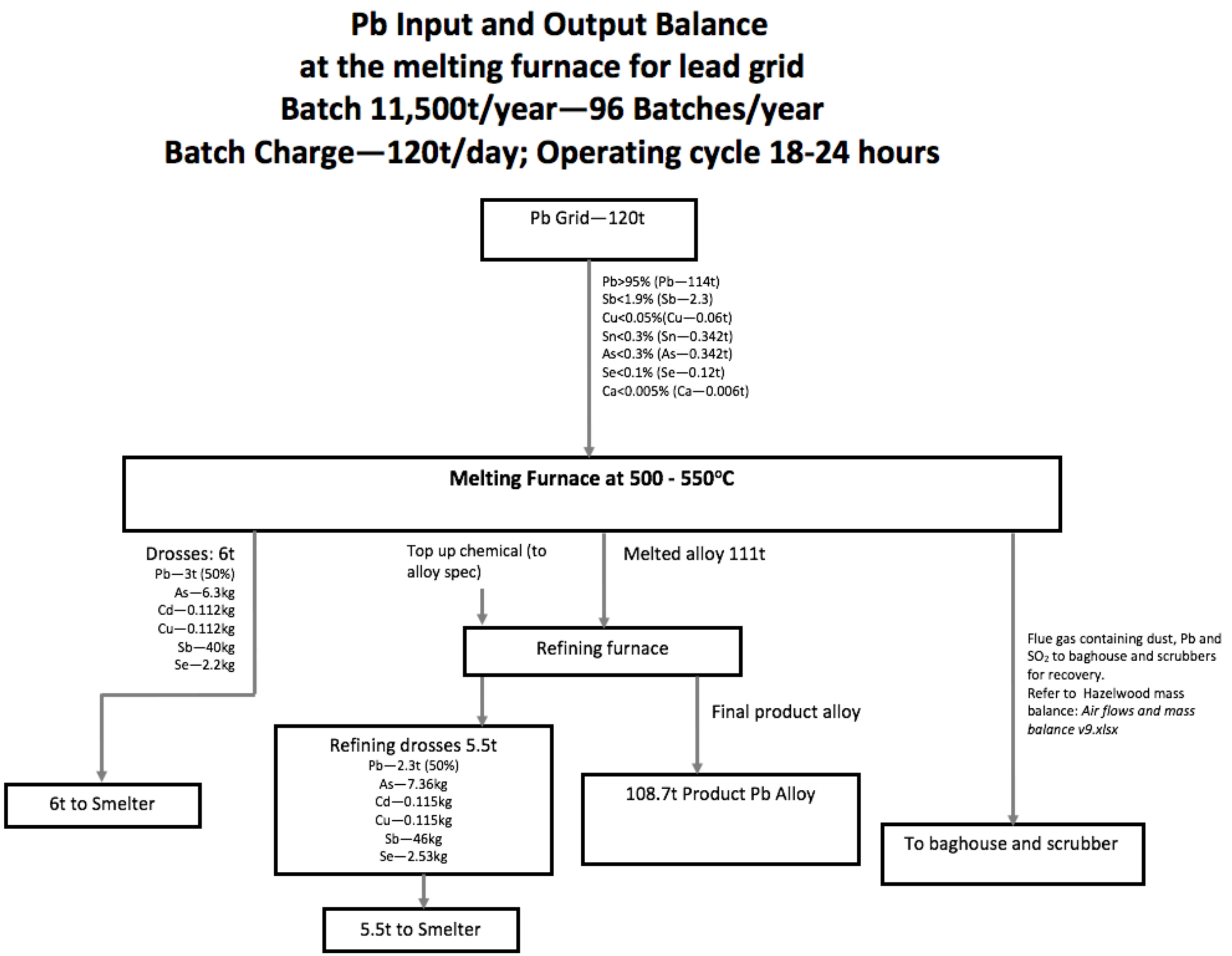

Figure 20: Input and Output Balance Melting Furnace Hazelwood North plant (cycle basis)

Pb Input and Output Balance

Refining of soft Pb in the refining kettle

16,500t per year

Batch charge—120t/day (total 137 Batches/year)

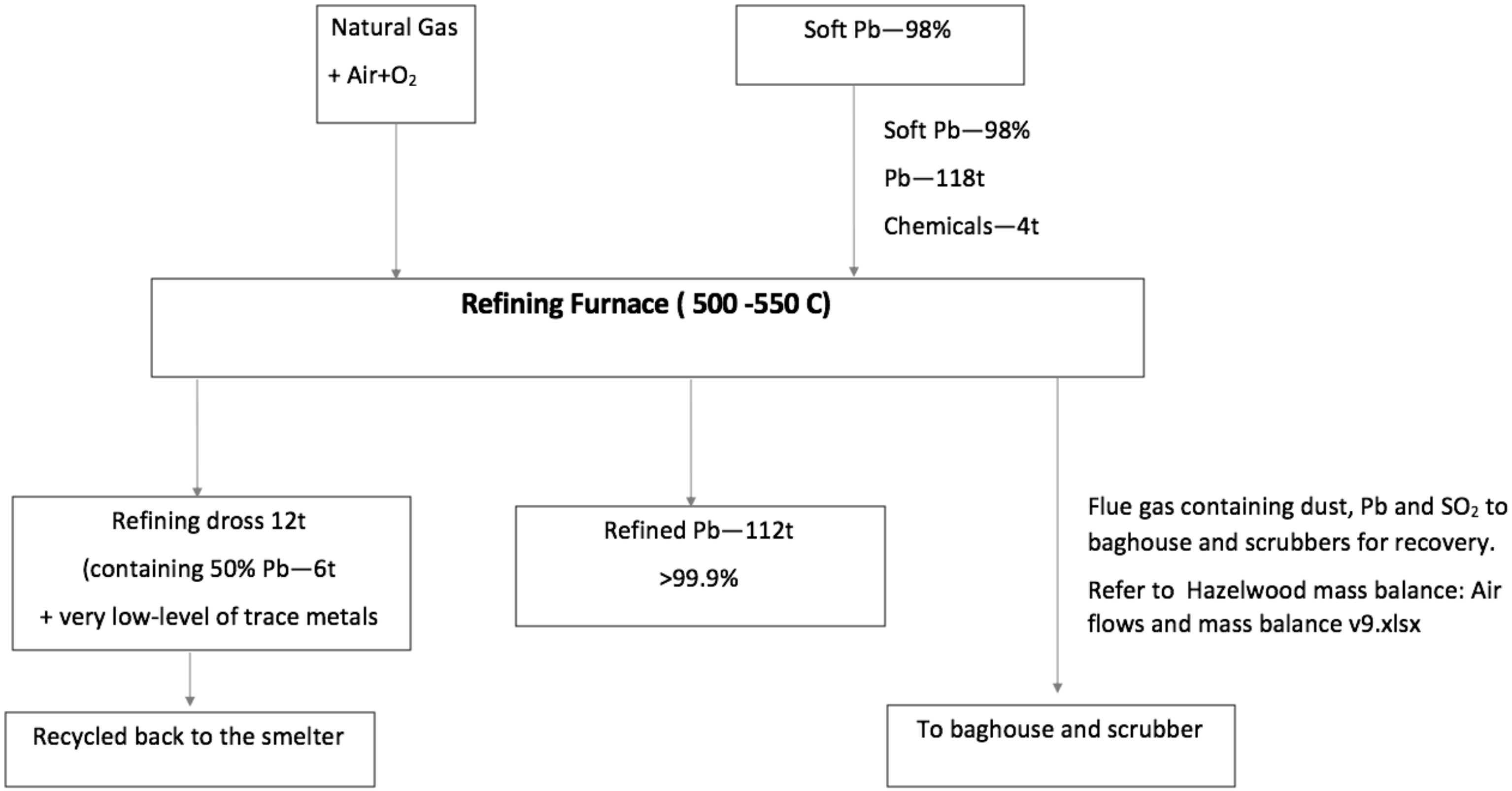

Figure 21: Input and Output Balance <u>Refining Kettle</u> Hazelwood North plant (cycle basis)

5.2 Material receipt, storage and handling

The ULAB (battery) unloading procedure is shown in the separately supplied high-resolution file ***Appendix 28*** *PD2019-0084-010_Rev02 - Battery Processing Area.PDF*, and specifically described under the heading in this drawing 'Battery unloading procedure.'

Note that the concrete bund wall surrounding the Hopper and ULAB Pit enclosure is one metre high to control any spills/ splashing of battery acid, and has two drainage sumps (shown as '05' and '06' in *Appendix 28*).

Figure 22 (separately supplied high-resolution file in ***Appendix 29***) provides a schematic of the process of battery receipt, unloading and transfer mechanisms to the battery breaker.

Truck washing uses collected and treated stormwater (physical settling and separation of solids followed by pH adjustment if required).

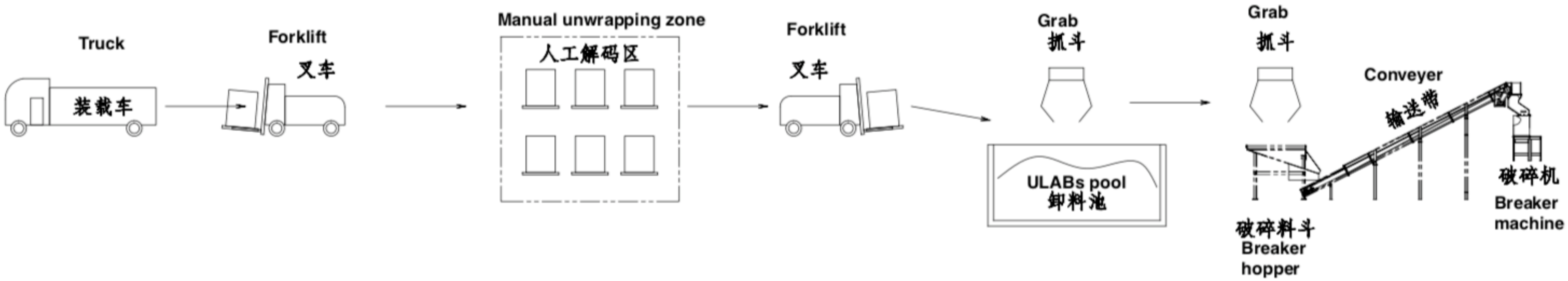

Figure 22: ULAB feed to breaker diagram

5.3 Acceptance criteria for ULABs

Control the quality of used batteries ensures the equal, fair, transparent and reasonable acceptance and safeguards the interests of the company and customers.

Chunxing China plant's acceptance criteria for batteries would be adopted at Hazelwood. Quality considerations are shown in **Table 13**. The acceptance criteria and method used is described below.

Table 13: ULAB quality requirements

Battery type	Impurity content (substantial deduction)	Inner quality	Other requirements
Car battery	No impurities	Not counterfeit	1. Do not mix with different types of batteries 2. Do not mix with impurities such as sand and iron powder, mud, gypsum, hongshan mud and industrial glue, etc 3. No packaging
Maintenance-free battery	No impurities	Not counterfeit	
Communication batteries	No impurities	Not counterfeit	
Electric bike battery	No impurities	Not counterfeit	
Motorbike battery	No impurities	Not counterfeit	
Black bakelite battery	No impurities	Not counterfeit	
Mime lamp battery	No impurities	Not counterfeit	
Lamp battery	No impurities	Not counterfeit	

5.3.1 Sampling method

All incoming used batteries will be weighed on the 80 tonne electronic scale in one batch or divided in batches, and the samples will be randomly taken from the truck after the used batteries are weighed.

The incoming used batteries will be separated into 10 receiving unloading zones. The samples will be randomly taken from each of the receiving unloading zone where the both parties agree. The samples will be taken from three areas of each pile, top, middle and bottom, and then weigh the samples.

The sample quantity is 1% of the batch weight of this type of battery.

5.3.2 Quality control details

a. Electric batteries

i. the electric battery is strictly prohibited to be mixed with motorbike, electronics, handlamp, mine lamp, lead mud and other low-value varieties. If mixed with other items, invoice shall be issued according to the low value item.

ii. If the counterfeit batteries (contain stone, iron and cement) found in the electric batteries are less than 5 pieces and deducted according to the actual weight. If more than 5 pieces of counterfeit batteries are found, the total weight will be deducted 2-5 times of the actual weight of the counterfeit batteries.
iii. if the electric batteries are normally maintained with liquid by the manufacturer, the total weight shall be deducted by 2-4% of water content(maintenance weight).
iv. If added water found in the electric batteries, the total weight shall be deducted by 10-15% (double penalty).
v. If electric batteries containing colloids, the total weight shall be deducted by 3%.
vi. if the used batteries are from battery manufactory with use cycle less than one year, the total weight shall be deducted by 2%.

b. Communication battery

i. If the communication batteries containing colloids, the total weight shall be deducted by 10%.
ii. If the communication battery containing glass, floor tile and poor quality plastic board, the total weight shall be deducted according to the impurities' weight on site. In case of intentional concealment, 2-5 times of the actual impurities' weight shall be deducted after investigation.
iii. for those containing packing materials (iron boxes, cartons, etc.), the packing materials shall be deducted according to the actual weight and shall not be discounted in any form.
iv. Flame retardant batteries should be deducted by 5% of impurities.

c. Car batteries (black battery with no more than 10% 100A is allowed)

i. The weight of car batteries filled with water shall be deducted by 23%. If some vendors deliberately gather poor quality and large water content used batteries during the purchase process, and collectively delivered to Chunxing, the total weight should be deducted by the percentage of actual test onsite added by 1%, but no more than 26%.
ii. Used batteries collected from self-owned collectors containing acid water, within the range of 45A-200A, the total weight shall be deducted by 16-18%.
iii. For tubular car battery, the total weight shall be deducted by 20% for full water, and 15% for natural water.
iv. Purchase standard of waterless car battery: it shall be implemented according to the original recycling standard.(section random sampling)
v. Forklift batteries shall be subject to the test onsite, and shall be invoicing according to tubular car batteries by using the section random sampling method.

d. Maintenance-free battery

i. The price of the water battery is used as the regulating lever, and impurities are not deducted.

ii. Weight of maintenance-free battery above 100A shall be recorded as actual weight onsite without deduct the water percentage. However if it find out that water deliberately added into the batteries, the total weight shall be deducted by 10%.

e. Motorbike batteries, black bakelite batteries

i. The water content of motorcycle battery is 5-7%. If onsite test finds water deliberately added into the batteries the total weight shall be deducted by 5% of original acid water and excessed water content.

ii. For black bakelite batteries the impurities content is tested onsite. The total weight shall be deducted by impurities content tested onsite.

iii. all types of UPS (commonly known as small electronics) below 10A are purchased as motorbike batteries, with 5% impurities deducted.

5.3.3 Quality control process

1. The quality inspection department is divided into four groups. The principle of inspection is one group inspection and another group review (inspection group and review group). The delivery truck will be randomly daily tested according to the vehicle's plate with odd or even number.
2. During the quality inspection, each single sample shall be actually weighted and shall not be estimated the weight.
3. If there is a big difference in quality inspection, the persons in charge shall present onsite and review the recorded video. If need to change the delivery documents, it shall be authorised by finance department, purchase department and supply department.
4. The cut-off time of sampling inspection of incoming used batteries is at 18:00 every day and no sampling inspection after 18:00. All unsampled incoming used batteries will be postponed to the next day.
5. Other situations derived from market changes will be dealt with separately.

5.4 Chemicals, dangerous goods and waste storage and handling

A full list of liquid chemicals, wastes and by-products are described in the WAA, Section 12.5.4.2 *Storage and handling of liquids*, p. 136 and Table 36 on p.123.

WAA Table 36 describes solid wastes and by-products produced and their management/ fates. The mass balances attached with this submission (**Figure 18** - **Figure 21**) also demonstrate quantities and pathways of materials returned back into the process, such as slags and ashes from refining kettles and melting furnaces back into the smelter furnaces.

The storage of liquid wastes is described in the WAA: see Section 12.5.4.2 *Storage and handling of liquids*.

Lead ingots are stored in the final product storage area, along the western wall of the smelting and refining building (see separately supplied high resolution drawing at Appendix 9, within the dotted area marked '6,000').

Separated chipped plastics are stored in color-specific bins in the western quarter of the plastics building (see 'Plastic modification area' in the separately supplied high resolution drawing at Appendix 9).

Table 14 provides a typical metals assay of the metallic lead grid from breaking (referred to as 'lead metal') and **Table 15** a typical assay of the lead paste (referred to as lead oxide concentrate) produced from ULAB in Australia (taken from historical Hydromet data, from their NSW (breaker-only) facility). These assays include lead plus other alloy metals and trace metals.

Table 14: Typical product specification for Australian-produced lead metal (grid) from ULAB breaking

Pb	Ag	As	Bi	Ca	Cu	Sb	Se	Sn	Ni	Zn	Cd
>90%	<0.1	0.3	<0.1	<0.1	<0.1	0.5 – 2.0	<0.1	<0.1	<0.001	<0.001	<0.001

Notes:

All results in % w/w as received, with typical moisture 4%

Sulfur as sulfates: 3.0%

Table 15: Typical product specification for Australian-produced lead paste from ULAB breaking

Pb	Ag	As	Bi	Ca	Cu	Sb	Se	Sn
>70%	0.001	0.02	0.0014	0.11	0.007	0.19	<0.1	<0.1

Notes:

All results in % w/w on a dry weight basis

Typical moisture 12% to 14%

Sulfur as sulfates: 18%

These analyses demonstrate very low levels of non-lead metals both in the paste and grid, leading to low levels of other metals throughout the smelting, melting and refining processes. Because most of these non-lead metals are components of lead grid alloys, they are largely consumed again as alloy ingredients in melting of the lead grid, saving both economically and environmentally.

The process of impurity metal removal uses the following reactions in the refining step, via the addition of caustic/ reducing additives:

$2Sb + 4NaOH + 2NaNO_3 = 2Na_3SbO_4 + N_2 + 2H_2O$

$5Sn + 6NaOH + 4NaNO_3 = 5Na_2SnO_3 + N_2 + 3H_2O$

$2As + 4NaOH + 2NaNO_3 = 2NaAs_3O_4 + N_2 + 2H_2O$

The resultant slag produced by lead refining is rich in arsenic, vanadium, tin and other elements, which are returned to the melting furnace for the configuration of lead-antimony alloy.

The cadmium and chromium content in ULABs are very small. In the process of lead refining, a vulcanizing agent is added to remove cadmium into the refining slag, which is returned to the smelting furnaces.

5.4.1 Lead slag cooling and storage

Attachment 9a (Hazelwood plant layout) shows that slag (after cooling) is stored in the north-east quadrant of the storage area building (located north from the main building).

In terms of the slag cooling area (slag pool), the phrase ‘may have cover’ used in describing the ‘slag pool’ in Attachment 9 refers to the fact that the China plant’s slag cooling area does not have a roof, but that the engineers have indicated that the Hazelwood plant can (i.e. ‘may’ in reference to permission). Therefore the Hazelwood slag pool will have a roof with open sides, which are required to ensure sufficient heat (as steam) can escape.

Appendix 30 shows a diagram of the slag transport system out of the furnaces, where the outlet is 1.6m above ground, and the inlet at the slag cooling pond is 0.1m above the ground. The slag cooling pond itself is dug into the ground with its cornice 0.3m above ground level.

The transfer of slag from the furnace to the slag pool is via a water ‘flume’, which travels along a concrete channel as shown in the photograph in ***Appendix 31***. The flume works by flushing the material down the slope of the outlet channel with water, which provides other benefits of further assisting cooling and thermally cracking/ breaking up the slag material. A screw conveyer is placed at the bottom of the slag pool. When the slag is cold, the operator turns on the switch of the screw conveyer and the cooled slag is carried out by the screw conveyer, to be deposited in the slag storage area.

6 Process control and emergency management

6.1 Process control overview

The process control automation system is divided into local / remote, and manual / automatic control modes.

Local manual control mode

In this mode, the start and stop buttons are on the operating control box, which need to be operated onsite to start-up or stop each motor, valve, and other stand-alone equipment.

Remote manual control mode

In this mode, the start and stop buttons are on the central operating station panel. The operator can control each motor, valve, etc. and other stand-alone equipment in the central operating station.

Remote Automatic control mode

In this mode, the automatic control system operates according to a pre-programed automatic program. Firstly, collecting information of the on-site temperature, pressure, liquid level sensor, flow meters and other detection components and on-site signals. Then according to the collected information and signal, and the logical relationship between the process equipment, the program automatically controls the start and stop of each motor, valve, and equipment in order.

Appendices 32, 33 and ***34*** are process manuals for the following pollution control equipment, respectively: 1st cooling system, scrubbers and baghouses.

6.2 Response actions/ procedures

In automatic mode, the control system monitors the operating status of all motors and valves in real time. When a motor fault occurs (such as motor overload, valve timeout, belt deviation or other minor fault), the system immediately activates the sound and light alarm to inform the user through on-site alarm lights and sirens, and as well as the alarm interface on the central control computer.

When the motor has serious overload, tripping and other faults, the system immediately triggers the sound and light alarm. At the same time, the current fault motor is automatically stopped immediately if the process permits, ensuring all equipment subsequent to the faulty motor is stopped.

When there is a situation of personal safety or equipment safety during operation, the user can immediately press the emergency stop button to ensure that all the equipment in this process section immediately stops.

6.3 Pollution control equipment performance monitoring

6.3.1 Leak detection

Infrasound is used to monitor vent gas pipeline leakage. When the pipeline leaks, the leakage energy causes the pipeline to vibrate. The infrasound sensor collects the vibration signal and then feeds it back to the control system, which immediately sends out an alarm. The operator will take action as soon as possible after receiving the alarm information.

6.3.2 Baghouse maintenance/ rupture

The baghouses are a three-set, connected in parallel with each configured in its own 'room'. Each room/ baghouse is equipped with testing instruments, which can automatically alarm when leakage occurs. The exit dust detector can indicate the location of bag damage. Each baghouse has a valve control for in and out of the room, so each room can be closed off separately.

In the event of cloth bag damage the alarm goes off and the room is closed by shutting the inlet and outlet pipelines of the damaged area, with the cloth bag replaced offline. The other two baghouses work normally while the isolated room is repaired/ replaced.

It is noted that Chemtech's assessment of the baghouse design/ capacity (Section 2.2.3.1) indicates that the required pollution control can be comfortably achieved with only 2 baghouses running and the third in maintenance.

It takes five minutes to close and switch gas lines.

6.3.3 Scrubber failure

The baghouse outlet goes via the second cooling tower system to two scrubbers connected in series. There is also a 'slave' set of two in series. If there is failure in operation of one set, the front-end water sealing mechanism of the desulfurization system can be adjusted to be converted to the other set. The on-line terminal detection device can determine the fault of the desulfurization system.

6.3.4 Real time stack monitoring

The continuous emissions monitoring system (CEMS) operates in real time and is located on the stack in the China plant, as it will be for the Hazelwood plant. The sampling hole of in-line monitoring is 30 metres from the ground on the stack. The collected gas is sent by the sampling tube to the monitoring room where it is analysed, in real time.

Indicative monitoring data taken the CEMS in the China plant is shown in ***Appendix 35*** *20200101 Continuous monitoring minute average report of flue gas emissions在线监测分钟数据.xls*.

Figure 23 shows the sampling and monitoring components, and connection of the CEMS. The system uses Differential Optical Absorption Spectroscopy (DOAS) as a gaseous pollutants analysis instrument (for SO_2 and NO_x in real time). Instrument detection is via advanced diode array, with full spectrum analysis and fibre transmission. The resolution of the spectrometer is as high as 0.35nm (FWHM), and the data transmission time is less than 13ms, and can work reliably at temperatures of -10 to 50oC. The measuring room of the analyser uses strong corrosion-resistant materials, and special materials are sprayed on the indoor and outdoor surfaces of the measuring room, to ensure that the measuring room will not be corroded by flue gas in the long-term use, and there is almost no adsorption effect on acidic gas such as SO_2, therefore ensuring the accuracy of the measurement.

The system uses an LGC-01 flue gas monitor to measure the concentration of solid particles in the flue gas. Infrared backscattering is used to shoot infrared light into the flue gas. When infrared light hits the particles, light scattering occurs. The intensity of scattered light varies with the concentration of particulate matter. The backscattered light is collected through a lens and received by a sensor, which converts the received light signal into an electrical signal and calculates the particle concentration through an amplifier circuit and an computing circuit.

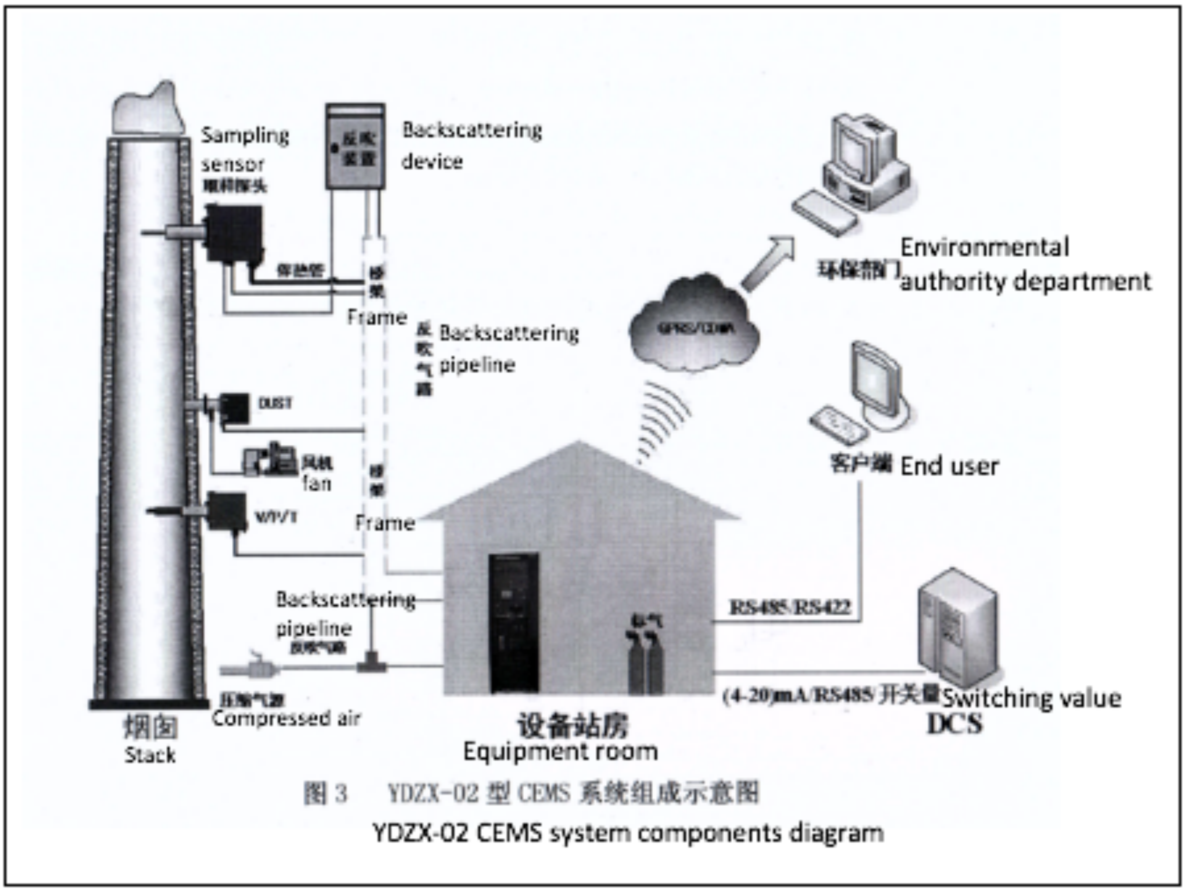

Figure 23: CEMS components

The system is also equipped with temperature, pressure, flow rate (velocity) meters to provide real-time data monitoring.

Data acquisition processing and control subsystem (DAS), including data acquisition processing unit and PLC control unit, respectively complete the data acquisition processing and control functions.

1. Data acquisition and processing system

Industrial control computer and Windows operating system are used as hardware and software operating platforms. All kinds of measurement signals are transmitted to the data acquisition and processing system through the acquisition card and RS232 adapter for data processing and storage. Through wired or wireless network, on-site data is transmitted to the plant monitoring centre and the environmental authority to enable remote data transmission. The system has built-in Chinese standard transmission protocol HJ/T212-2005 pollution source online automatic monitoring system data transmission standard. Through the remote transmission, the manufacturer can also remotely diagnoses faulty equipment on site. The original data can be stored to provide minute mean data, daily mean data, monthly mean data and annual mean data, all of which are stored for more than 10 years.

2. PLC control unit

Siemens PLC control is responsible for collecting alarm and user instruction signals, and outputs the control signals. Main alarm functions include: temperature control alarm, pressure alarm, humidity alarm, flow alarm. The system software can also set the upper limit of the concentration alarm according to the monitoring content. Once the monitoring item's concentration exceeds the limit, the system will alarm and start the emergency plan.

6.3.5 Monitoring: continuous versus periodical monitoring

Appendix 28 is an output of CEMS results from the China #2 plant from 10am to 10pm on 1 January 2020, measured at one minute-intervals across this period. This data is compared to an average of quarterly monitoring data taken by independent stack testers over 2018 and 2019, for two of the main pollutants measured by both, in **Table 16**. Both sets of data indicate a consistent, indicatively similar flow rate between all measurements.

Table 16: CEMS v monitoring data China plant 2

Pollutant	Average CEMS result (of 731 minute by minute results 10am-10pm 01.01.2020) for plant #2 (mg/Nm^3)	Average quarterly monitoring report data (plant #2) (mg/m^3)
Particulate matter	1.04	2.0
Sulfur dioxide	0.34	2.2

According to production records, on 1st Jan 2020, the crude lead output of the China plant was 1,061 tonnes, which is within the normal production range. Average production per month is 33,333 tonnes of Pb (at an average Pb feedstock composition of 50% Pb) for the total 800,000 tonne plant. Dividing this by 31 days in January gives an average daily production (to be at full capacity) of 1,075 tonnes/ day.

The emission performance of the China plant is getting better and better due to continuous technological improvements. It is reasonable that the recent daily performance (January 2020) is better than the quarterly average over the previous 2 years.

6.4 Emergency management

The monitoring room is staffed 24/7. Once the monitoring system starts the alarm, the monitoring personnel will notify the production department to troubleshoot the data abnormal and start the emergency procedures. According to the operating guidelines to conduct corresponding operations, troubleshoot and overhaul each part of the flue gas treatment system section by section, and resume production after the discharge data is normal.

WAA Section 13.1 explores plant upset scenarios, including fire, explosion, utility supply failure, major pollution control equipment failure. Table 42 in particular assess the risks and mitigation for 14 of these such events.

WAA Section 13.1.1 delves into the scenario of total baghouse failure (and consequent lead emissions) while WAA Section 13.1.2 quantifies the impact of total scrubber failure. In reality, both of these events are highly unlikely, since each type of air pollution control is staggered between multiple pieces of equipment for each. The over-engineered nature of baghouses and scrubbers means that even if one component failed (such as one of the two scrubbers in series, or one of the parallel component baghouses) the remaining components are likely to be sufficiently sized to manage the extra duty anyway. Consequently, the short-term emission scenarios presented in 13.1.1 and 13.1.2, while well within their short-term exposure standards (as 15 minute window events) are vastly overstated, as they assume every component of the total baghouse system (lead) or total scrubber system (SOx) fails at once. These sections also assume that emission continues at full scale throughout the entire 15-minute shutdown window, which fails to account for a tapering effect that would occur in practice.

Figure 24 provides the procedural steps for determining and responding to an emergency relating to pipeline leakage while **Figure 25** provides the same for baghouse ruptures. Further information about shutdown procedures and maintenance is provided in Appendices 32-34.

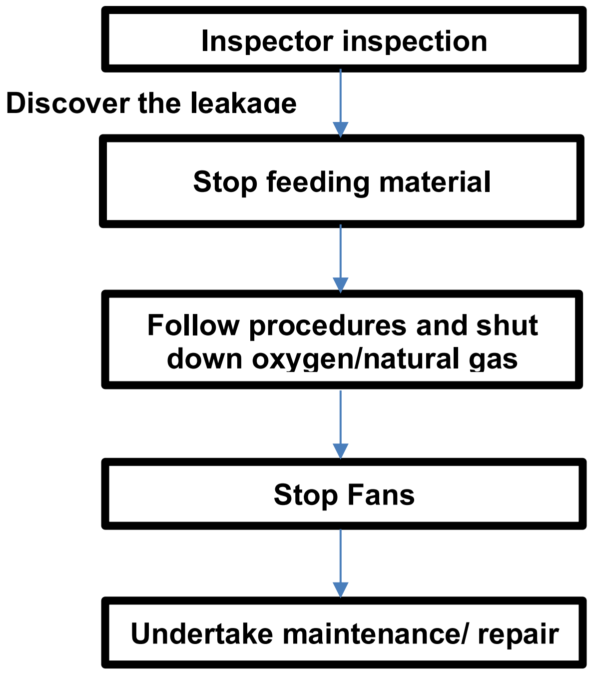

Figure 24: Emergency response procedure: pipeline rupture

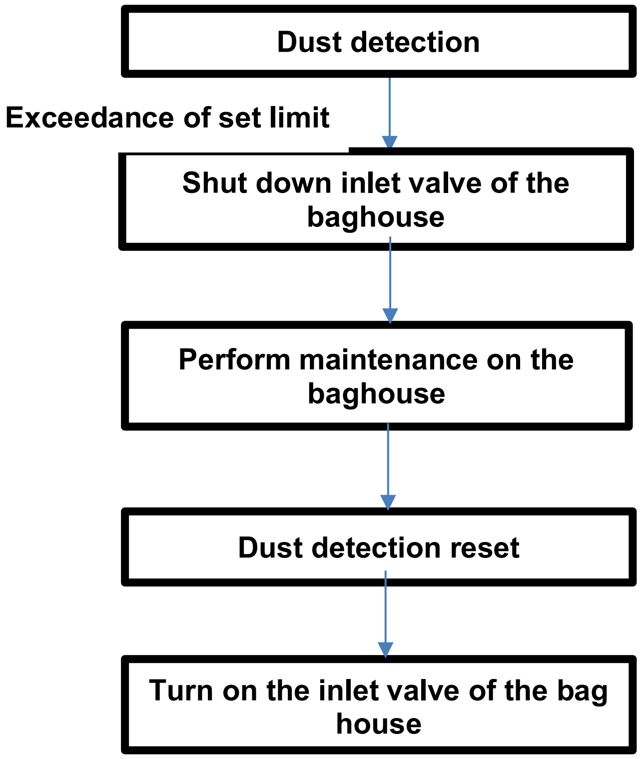

Figure 25: Emergency response procedure: baghouse

In addition, WAA Section 12.5.4 assesses fire risk onsite, and includes a Fire risk register at Table 39. From Table 42, Section 13.1 of the WAA, in response to Upset Risk #13 'Explosion/ fire':

"*All Chunxing facilities and vehicles are provided with adequate fire and safety equipment. Full training will be given to all staff on induction and at regular intervals throughout the year. An automatic fire alarm and protection system will be in operation 24 hours a day*."

6.4.1 The role of CEMS in process control and response

The CEMS monitors the flue gas and solid particles discharged from the stack generated by the production in real time.

MODBUS communication is adopted between the CEMS and the production PLC control system, and transmits data to the production PLC control system. If a measured pollutant levels exceeds the standard, firstly the CEMS triggers a sound and light alarm, then sends the alarm signal to the PLC through MODBUS communication.

SO_2 could exceed the standard for the following reasons:

- Possibility 1: the pH in the desulphurization pool decreases.
    - Emergency measures: PLC monitors the pH value in the desulfurization pool in real-time. When the monitoring of the pH value is decreased, PLC will immediately activate the alkali pump to ensure that the pH value is in the normal range as soon as possible.

- Possibility 2: the upper water pump for the desulfurization pool is out of order.

- Emergency measures: PLC monitors the water flow of the pump in real-time. When the monitoring of the water flow is reduced in the specified time, the PLC control system will activate the standby pump to ensure normal water supply as soon as possible.

NO_x could exceed the standard for the following reasons:

- Possibility 1: the temperature in smelting furnace is too low, resulting in incomplete combustion.
  - Emergency measures: PLC monitors the temperature in the furnace in real-time. When the PLC receives signal from the CEMS as NO compounds exceeds the standard, and the PLC monitors the temperature in the furnace is low, then the control system of PC interface shows out text alarm information and inform the operator. The operator immediately increases the amount of fire in the combustion system.
- Possibility 2: the air volume of baghouse is too small.
  - Emergency measures: PLC monitors the pressure in the pipeline from baghouses. When the pressure is lower than the normal standard, the PLC control system automatically increases the fan power, to ensure the air volume in the normal range.

6.5 Emergency management plan

Contrary to what the WAA says (p.132):

> *"An Emergency management plan (EmMP), which incorporates fire risk, will be developed as part of the development of procedures and systems for workplace health and safety once the site has been constructed..."*

an Emergency Management Plan will be developed as part of the detailed design, which will describe the fire protection system, equipment, fire water run-off containment and drainage points.

7 Water management

This section provides full details of the management of process water, site water and the storm water generated in the proposed project, as well as the use of town supply for sanitary or back-up plant purposes. We also include the conceptual design of the wastewater treatment plant, prepared by Stirloch Construction Pty Ltd, who specialise in the field of water treatment process design and construction works in Australia.

7.1 Overall Water Management and Reuse of the Water in the Proposed Project

The WAA Sections 10.2 for wastewater treatment plant design and 7 (particularly Figure 11) for water resources use, discuss design aspects of the wastewater treatment plant.

NOTE THAT WATER USE CALCULATIONS WERE RE-VISITED AS PART OF THIS NOTICE RESPONSE AND THE WATER VOLUMES REQUIRED HAVE NOW BEEN REVISED DOWN SUBSTANTIALLY. ATTACHED IS A NEW "FIGURE 11" (FIGURE 26 TO THIS PROPOSAL) – PLEASE REPLACE FIGURE 11 FROM THE WAA WITH THE NEW ONE.

In addition to the Water treatment and reuse system schematic of **Figure 26** (new WAA Figure 11), a site-specific overview drawing of the water management system is supplied separately (***Appendix 36*** *PD2019-0084-002_Rev11 - Water Management System.PDF*). This shows the details of the movement of each water source and collection ponds from each area of the plant and the site.

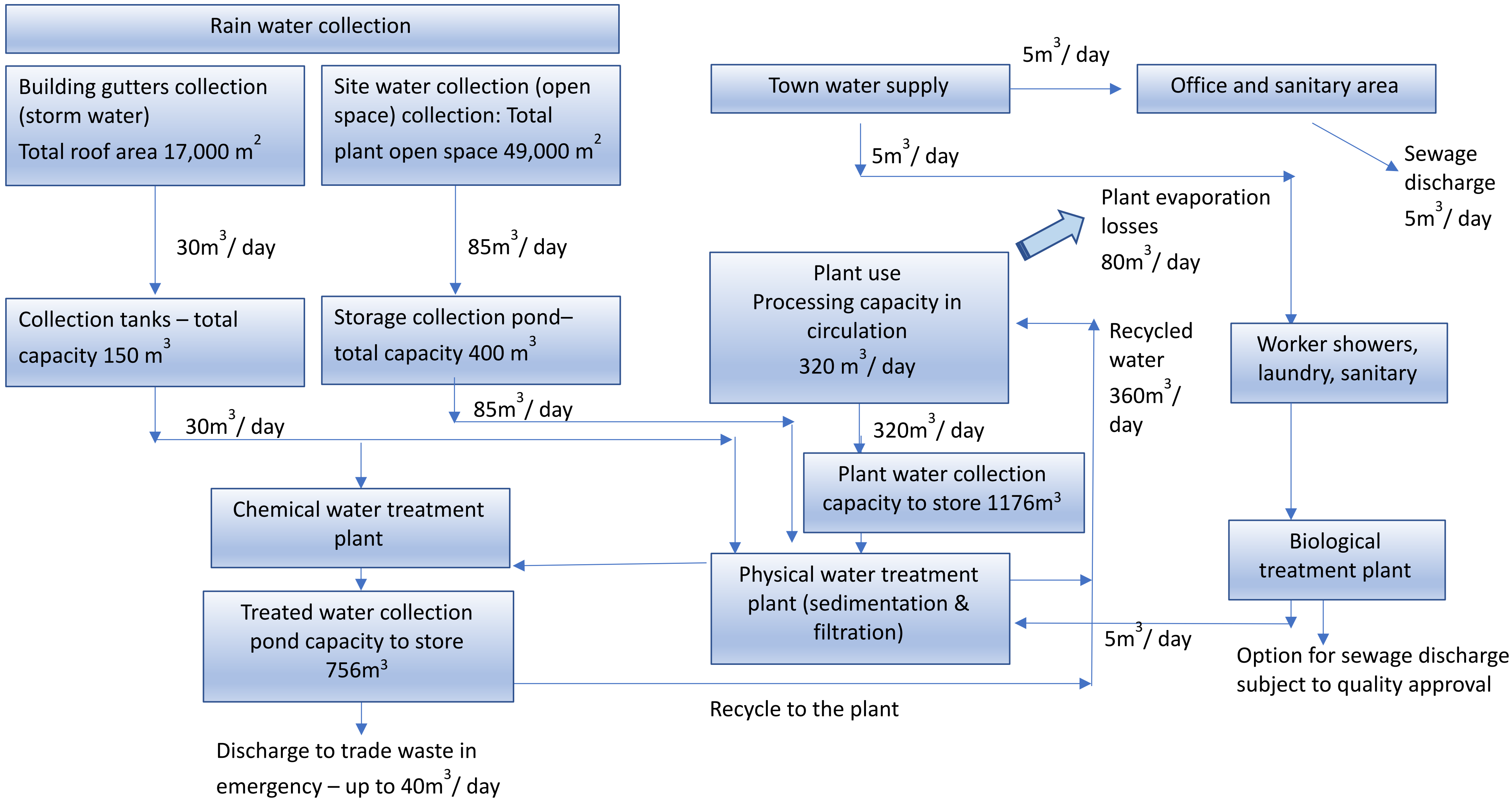

Figure 26: **Water treatment and reuse system including rainwater management (Replacement Figure 11 from WAA)**

The water management system shows five sources of water used or produced in the plant:

1. Storm (rain) water from building rooves

Storm water from the building rooves is collected separately into three ponds described in the water management system. The collected water can either be used in the plant, truck washing, fire-fighting or training or any other use in case of shortage.

The water management system shows allowance for sufficient capacity (> 3,000m^3) for collection, allowing for both 1 in 20 year and also for 1 in 100 year rain events, as per EPA requests.

This water is expected to be of high enough quality that treatment for use in the plant may not be required, although simple measures such as physical solid separation and minor pH adjustment are possible.

2. Site water runoff

Site water collection (site grounds run-off water) collected into a separate pond, treated physically and chemically (as required) and used in the plant.

Runoff water from the open site area flows into sumps which are pumped into four separate ponds. It is expected that the quality of this water may not be as clean as roof-stormwater, so it is likely that filtration of suspended solids will be required, and simple chemical treatment may also be necessary. Once quality is achieved this can be used in the plant or discharged to trade waste in an emergency rain event.

We have also allowed sufficient capacity (> 8,000m^3) for collection in either 1 in 20 or 1in 100 year rain events, having four ponds for this volume.

The stormwater design inclusive of both storm and site water, as described in the Water management system drawing, has been assessed by urban stormwater design consultant Scott McFarlane (Ark Angel Pty Ltd) to be suitably and conservatively sized. In particular, Scott has assessed the storage capacity as sufficient cope with both a one in 20-year and a one in 100-year rainfall event.

He confirms that the total capacity of all storage is 9,556m^3, to cope with these extreme rain events. Ark Angel's report, which responds to a number of stormwater questions raised by EPA, is provided in ***Appendix 37***, and as a separate document: *Ark Angel stormwater report*.PDF.

Regardless, our storage design allows for a capacity of approximately 8,000m^3 for site water and 3000m^3 for storm water, which makes the total storage capacity (of water collected from rain events) over 11,000m^3 (as shown in the Water Management System drawing).

3. Plant water

Plant water from the internal working area (potentially acidic and with some contaminants), is collected separately into a pond to be reused in the plant after physical and chemical treatment. This also includes truck wash water from the unloading area. (It is expected that storm water could also be used for truck washing as it would be very clean or, alternatively, town water could be used.) The total water in circulation and usage in the plant area would be 360 m^3/day.

4. Plant Sanitary Water

Town water is used in the plant amenities for sanitary purposes, including laundry water, and is collected separately into its own tank and treated via a small biological treatment process, before discharge into the plant water collection pond for further treatment or direct discharge to Gippsland Water Sewer line. We expect this volume to be only about 5m^3/day. We will have the capacity to treat up to 10 m^3/day if required before sending to the onsite water treatment system, or as an option to sewerage discharge, subject to the quality accepted by Gippsland water.

5. Town Water Usage and Discharge from office area

We also have town water connection from Gippsland Water to the office and laboratory. Our requirement of the town water would be 5 m^3/day. As this this is a normal commercial discharge it will go directly to sewer, as agree with Gippsland Water.

7.2 Trade waste

A trade waste agreement will be set up with Gippsland Water, with whom we have had early discussions about our water supply and waste water management needs. Gippsland Water has agreed to accept our trade waste (in an emergency up to 40 m^3/day)[8] and could accept well beyond this capacity. A letter from Gippsland Water confirming these arrangements is provided as **Figure 27** (***Appendix 38***). Our treatment process can meet their compliance limits for trade waste, which are outlined in the separately supplied document ***Appendix 39*** *Gippsland water trade waste quality limits.PDF*.

[8] Gippsland Water has advised Chunxing, in an email from Chris Wood, Acting General Manager Business Transformation dated 28.04.2020, that “there are no issues with emergency discharges of up to 80 m^3/day”, should Chunxing require it.

Unclassified: For Official Use Only (FOUO)

20 January 2020

Our reference:
Your reference

GIPPSLAND
WATER

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PO Box 348
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Telephone: (03) 5177 4600
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Dr. Lakshman Jayaweera
CEO/ Director
Chunxing Coperation Pty Ltd
Suite 104 Level 1 Unit 7
11 Lord Street
Botany NSW 2019

Dear Dr. Jayaweera

Re: Proposed Used Lead Acid Recycling Facilites at No 2047, Fourth Road, Hazelwood North, Victoria

Gippsland Water has adequately sized water and sewerage services to the proposed site.

There is an existing 150 mm main that runs up the western boundary of the site.

Your proposed potable water demand of 10m3/day is very achievable using existing infrastructure.

In the event your onsite water collection systems fail/run out of water, we are comfortable that we can supply 735m3/day or 8.4 L/s if needed.

There is an existing sewer on the southern boundary of the proposed site that has sufficient capacity to accommodate sewer discharge of 5m3/day from the office, shower, kitchen and laboratory buildings.

Furthermore, existing sewer has sufficient capacity for emergency discharges of up to 40m3/day of treated water subject to our trade waste quality acceptance limits.

For further enquiries below contact Chris Wood, General Manager Business Transformation on 0427 835 831 or email: Chris.Wood@gippswater.com.au.

Kind regards

Michael Crane
General Manager People and Culture

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Figure 27: Letter from Gippsland Water

7.3 Onsite wastewater treatment system

As per Figure 26 our requirement for process water reuse in the plant will be around 360 m^3/day. However, considering the requirement of a buffer capacity in case of an emergency situation, we plan to have the design capacity to process up to 600-700 m^3/day (25 m^3/hr) of combined plant and site water.

7.3.1 Quality of water to be treated

Metals are the primary source of contamination in plant water, coming from dissolved species in battery acid taken from the breaker. A typical analysis of spent acid decanted from ULABs in Australia is summarised in **Table 17** and provided in detail in the separate attachment ***Appendix 40*** *Typical analysis of diluted spent acid generated from ULAB breaking in Australia.pdf*. This analysis is undertaken on acid drained directly from ULABs, and thus identifies the source levels of these metals, which are further diluted in the treatment process when combined with other plant water.

Table 17: Spent ULAB acid – typical analysis

Analyte	Unit	Spent ULAB acid
pH	pH units	<1
Aluminium - total	mg/L	14
Arsenic - total	mg/L	0.12
Cadmium - total	mg/L	0.012
Copper – total	mg/L	0.27
Chromium – total	mg/L	0.046
Cobalt - total	mg/L	0.001
Iron – total	mg/L	4.3
Lead – total	mg/L	9.4
Mercury – total	mg/L	<0.00005
Nickel – total	mg/L	0.029
Manganese - total	mg/L	0.041
Molybdenum - total	mg/L	0.003
Antimony - total	mg/L	0.22
Tin - total	mg/L	2.2
Selenium - total	mg/L	0.003
Zinc - total	mg/L	2.3
Silicon - total	mg/L	3.0

Source: Envirolab Services certificate of analysis 239332, 25/03/2020

Most water for treatment is generated in the battery breaker area, which includes residual dilute battery acid and large quantities of breaker water, from component sorting, cleaning and flushing. Prior to the collection of this water, almost all the acid has been drained out from the (breaker) hammer mill and neutralized with zinc oxide to produce by-product zinc sulphate solution.

Plant water is expected to contain suspended solids at around 0.02%. These solids are likely to be predominantly fine particles of lead paste material depositing on the plant floors during battery breaking and in the furnace area. The first stage of treatment is filtration to collect this insoluble material for recycling back into the smelter furnace. The filtrate is acidic with pH between 3-5 and H_2SO_4 concentration <0.1%.

From Table 17 we can see that most metal analytes are present in (undiluted) spent battery acid at levels below Gippsland Water's trade waste requirements (*Gippsland water trade waste quality limits.PDF*), apart from the primary metals in batteries such as lead, copper and zinc. The acid content of plant water (<0.1% at pH 3-5), compared to the pH of the tested battery acid (<1) indicates a likely dilution from the original acid contaminants source of about 100-fold. Therefore, indicative plant water presenting for treatment would be approximately 100 times lower in metal concentrations than levels indicated in Table 17.

Dissolved lead levels are limited by lead's extremely low solubility in the acidic sulphate environment. Treatment requires low dosage of chemicals such as hydrated lime to precipitate any dissolved metals.

7.3.2 Typical assays of the final water (post treatment)

Typical assays of treated water from the China plant (for heavy metals) are provided in the WAA, Table 35, p.118. This is reproduced below.

Table 18: 2019 China plant monthly monitoring of treated water quality for heavy metals (Table 35 from WAA)

Date	Sample	Heavy metal concentration		
		Pb (mg/L)	As (mg/L)	Cd (mg/L)
16 Jan 2019	Clear water pool	0.05	0.062	0.0048
30 Jan 2019	Clear water pool	0.04	0,013	0.0012
7 March 2019	Clear water pool	0.09	0.047	0.004
11 March 2019	Clear water pool	0.07	0.037	0.0033
15 March 2019	Clear water pool	0.04	0.058	0.0012
24 April 2019	Clear water pool	0.059	0.083	0.0076
27 April 2019	Clear water pool	0.092	0.029	0.0027
13 May 2019	Clear water pool	0.028	0.022	0.0025
22 May 2019	Clear water pool	0.011	0.076	0.00613
12 June 2019	Clear water pool	0.09	0.026	0.00619
18 June 2019	Clear water pool	0.08	0.08	0.0012
25 June 2019	Clear water pool	0.08	0.081	0.0017

The highest reported results for lead (0.092 mg/L) and cadmium (0.0076 mg/L) are well below their respective trade waste limits of 0.3 mg/L and 0.05 mg/L. The pH of treated water is 7-8, which is also within trade waste requirements.

7.3.3 Proposed treatment process for plant waste water

Figure 28 (***Appendix 41*** *Flow diagram for treating plant water at Hazelwood North.docx*) summarises the basic flow diagram for the in-house water treatment facility to process the plant water. The diagram also summarizes the basic steps and the equipment's sizes, used to prepare a conceptual design for the above purpose.

Appendix 42 (*Conceptual Design for processing waste water- Stirloch Construction Pty Ltd Recycling*) outlines the conceptual design for treating waste water generated from the plant and site area for reuse, as prepared by Stirloch Construction Pty Ltd. The waste water treatment plant is fully bunded as per plant layout and also housed under cover.

The treatment process is summarised with the following steps, and depicted in **Figure 28** overleaf:

1. Water is collected from all sumps and drainage areas of the plant via permanent pumps to two clarifying tanks 40m^3 in size. (Locations of these sumps are identified and described in the separate high-resolution file *PD2019-0084-010_Rev02 - Battery Processing Area.PDF*, Appendix 30, first referenced in Section 5.2 of this submission.)

    Approximately 80% of the wastewater is generated from the battery breaking area, which is where the majority of sumps are located (as shown in Appendix 28).

    The process is designed to collect automatically using the permanent pumps with level sensors. There are also submerged pumps standby in additions in case of emergency situation with pump failures.

2. The overflow water from the clarifying tanks are then pumped either into the press and frame filter press or into media press filters and then into the plant water collection pond after adjusting with a small dosage of lime to pH 6.

3. The water from the plant water pond is continuously treated with lime slurry to a pH of 8-9 in stirred tanks of size 30m^3 (two of with one standby). Residence time is of 1 hour with dosing of hydrated lime in slurry form, with trace dosage of ferric sulphate and calcium dihydrogen phosphate.

4. The purpose of using hydrated lime is to precipitate any the metal contaminants at pH between 8-9. Trace level of addition of ferric sulphate and calcium di hydrogen phosphate will further ensure all metal contaminant concentrations are reduced to extremely low levels. This approach is widely established: calcium di hydrogen phosphate acts as a very effective chemical to reduce Pb in the water to extremely low levels, because of the extremely low solubility of lead phosphate in water. In order to enhance filtration, small doses of polymer is added at this stage.

5. Treated water in a slurry form is now transferred to slurry holding tank (2 Nos) with 30m^3 size (one standby) before filtering.

6. Slurry is then filtered through press and frame filter into the treated water pond.

7. Treated water is tested for the contaminants frequently and recycled back to the plant after dosing with a trace level of solution of sodium hypochlorite (23 L/day of 12.5% solution to maintain Cl level in the water to max of 1 ppm of equivalent Cl_2). In case of emergency the treated water may be discharged to trade waste via agreement signed with Gippsland Water.

8. Chemical requirements on daily basis to treat 600-700m^3/day of water:

- hydrated lime: 850kg /day (at a dosing rate of 35.5 kg/hr), storage requirement minimum 20 t at any time
- calcium dihydrogen phosphate: 50 kg/day (at a dosing rate of 2.1 kg/hr), 1t to be kept on stock
- ferric sulphate: 50kg/day (at a dosing rate of 2.1 kg/hr), 1t to be kept in stock
- sodium hypochlorite solution (12.5%) at a dosing rate of 30 L/day and a stock of 1,000 L at any time.

9. By- products produced:

- 1st filtration product: 150kg per day containing Pb 20-40% (recycled back to smelter)
- water treatment sludge: 1.5 t per day gypsum (to be recycled back to smelter if the Pb content is higher than 1,000ppm).

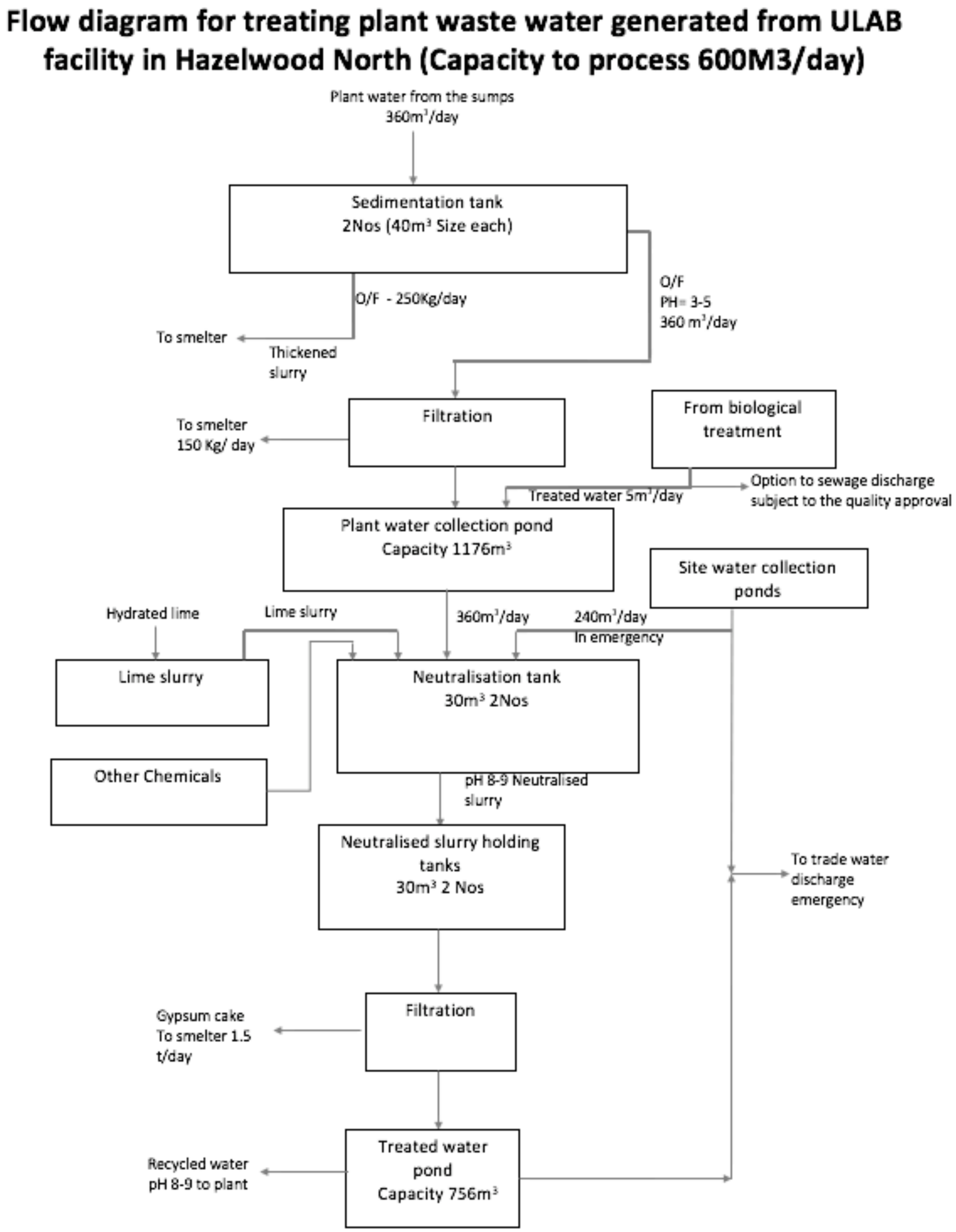

Figure 28: **Waste water treatment plant Hazelwood North – flow diagram**

7.3.4 Other water to be treated

Storm and site water require minimal treatment (potentially pH adjustments and solids removal at most). Trade waste limits will comfortably be reached in emergency discharge situations.

Town water ($5m^3$/ day) will be used for worker's amenity, which includes sanitary, showers and laundry facilities. We prefer not to discharge this waste water to the normal sewer discharge due to the potential for metal contaminants from the laundry facilities. Therefore this stream is treated biologically by installing a small off the shelf facility to achieve the required health standard (biological) and then the treated water is pumped into the plant water collection pond after testing. However as an option at a later date, should the quality of the water be proved to be clean and complying to the Gippsland Water sewerage discharge, then we intend to seek their permission for direct discharge.

The Slag and Alloy Cooling area is described in the plant layout (*Appendix 36 PD2019-0084-002_Rev11 - Water Management System.PDF*) as a bunded area with water collected from this cooling area pumped into the plant water collection for treatment.

7.4 Contingency for dealing with malfunction of the waste water treatment plant

The proponent has number of options as below in case of the malfunction:

Option 1:

As per the typical analysis given in the attachment 8 the waste water to be treated has trace levels of metal contaminants only. Therefore, in case of malfunction, we only require adjusting the pH to 7 either by dosing small amount of Caustic Soda or Lime and then it can be reused in the plant without having to treat it. The amount of water to be used is small (maximum approximately 15 m^3/hr).

Option 2:

Based on typical assays of battery acid, metal contaminants may be below Gippsland water trade waste levels without <u>any treatment</u>, other than adjusting the pH to 8-9. They have provided us with a letter accepting it provided it complies to their quality standard.

Option 3:

As per the water management plan in Figure 26, the proposed plant will have the capacity of steaming $80m^3$/day because of the water usage for indirect cooling the off gas from 1,100 ^{0}C to 230 ^{P}C in the 1st cooling tower. This cooling is managed by mixture of fresh air intake and water.

Although we have allowed a maximum $80m^3$/day to steam out for cooling, we have the capacity to go up to $140m^3$/day if required, just by slowing down the fresh air intake. As an alternative, the above option is available in case of an emergency by reducing the air intake at the expense of an additional cost.

7.5 Water reuse process risk assessment

Appendix 43 provides an assessment of risks, according to EPA's publication *IWRG632 Industrial Water Reuse Guidelines*, posed by reusing process water onsite.

8 Community engagement within the WAA process

Chunxing has responded to questions, issues and comments raised by written community submissions to the EPA Works Approval consultation process, as requested by EPA S22(1) Notice, issued 19 February 2020. This response is laid out in this section, and has been tackled in two ways:

- By drawing out the key issues, identifying major themes and addressing each theme. These responses are provided in Section 8.1.1.
- We have identified approximately 14 large submissions (some are over 100 pages long). Where the issues in these larger submissions cover off on the issues above, they have been addressed under *Key themes*. Where some issues are only raised once and do not qualify for addressing under *Key themes*, we have still provided a response in respect to the effort invested in developing such a significant submission. These responses are provided in Section 8.2.

8.1 Responses to key themes raised in community submissions

Appendix 44 provides an evaluation or overview of all submissions, which has determined that:

- 140 submissions were received
- 34 of these are exact duplicates
- 73 use a template, supplied from the Hazelwood North Community Facebook page, which has been designed for the respondent to also insert either their personal objections or select from a supplied list.

8.1.1 Key themes

The key themes from the submissions are summarised in **Table 19**. These focus on issues that were most commonly raised.

There were also other more subjective themes frequently raised, such as questions of EPA's technical ability to conduct their assessment, or impacts on the image/perceived image of the region and how these might relate to future investment. Neither of these issues are relevant to considerations within the Works Approval process, nor are they able to be answered by the applicant, so they have not been addressed in this document.

Table 19: Key themes identified from submissions

#	Key theme	No. responses (approx.) raising issue
1	Emissions could impact human health and particular concerns about those living closest to the facility, including the Hazelwood North Primary School	~ 80
2	Cumulative impacts of emissions to surrounding soil, waterways, agricultural land (and livestock)	~ 25
3	The distance from the facility to the nearest residences/school is too small (buffer zone)	~ 25
4	Sulfur dioxide levels will be too high (reference to a previous LV Express article based on a Greenpeace Report, showing high levels of SO_2 in the Valley)	~ 15
5	Dividing the China plant emissions by 16 to use as modelling input for the Hazelwood North proposed plant is "not good science".	~ 10
6	Lack of trust in Chinese data (or Chinese businesses)	~ 10
7	Emissions from the facility could contaminate the pine bark next door	~ 10
8	The plant could have a negative impact on property values	~ 10
9	The timing or number of engagements held has been inadequate	~ 5
10	There is newer technology available, such as that promoted by AquaMetals, than what Chunxing is proposing	~ 5

These themes are responded to, one by one, below. All of these key themes have been previously raised in community meetings and communications, and all have been addressed within the WAA, primarily via its Appendix C *Responses to issues and concern raised by* *stakeholders*. These responses are collated, and in some cases expanded upon, in the sections below.

8.1.1.1 Emissions could impact human health and particular concerns about those living closest to the facility, including the Hazelwood North Primary School

This is by far the biggest concern raised by stakeholders. We have addressed this issue in detail in many documents and forums, in particular the WAA Appendix C *Responses to issues and concern raised by stakeholders*. Specifically:

- WAA Appendix C.1 p.159, response #1
- WAA Appendix C.1 p.162, response #3
- WAA Appendix C.2 p.171, responses #1, 2, 3, 4, 13, 14,

Some salient points from these explanations are:

- The worst case modelling result anywhere in the Hazelwood North area shows lead emissions at 300 times lower than EPA standards set to protect human health. This worst case result falls within the boundary of the Chunxing facility.
- At the nearest residences (approx.1.5km from the stack emission point) the emissions are virtually zero (1,500 times lower than EPA standards), which is undetectable by field monitoring equipment. The school is further away again (2km from stack).
- These levels are significantly below the "natural concentration of lead in the air" according to the Australian Government environment department[11].
- Based on actual water testing results from Gippsland Water[9] the nearest resident could be exposed to 200 times more lead from simply drinking eight glasses of Morwell water supply each day, than from breathing the air at their location. (This is in the context that, while lead has been reported (publicly) as detected in this water supply (like many others in Victoria), it was not present above levels for water set to protect human health, so there is no health issue with Morwell's water supply.)

To further inform our conclusion that lead emissions from the facility are so far below the EPA standard as to be negligible and beneath natural background levels, key data types relating to standards and modelled Hazelwood facility emissions are shown in Table 2, and presented graphically in Figures 1a and 1b. Where applicable, some data has been converted to ground level concentrations (GLCs) (or GLCs-equivalent to Hazelwood North conditions) to enable a comparative assessment of all parameters.

Figure 29a's scale is so disparate between the highest and lowest figure that the lower concentrations (Chunxing's modelled ground level concentrations) cannot be readily distinguished. However, the labels and descriptions can be.

Figure 29b takes exactly the same graph (supplied separately as an Excel file: *Standards and emissions graph*) and 'stretches' it out so that this sense of scale can be better seen,

[9] Gippsland Water 2015-16 Annual Report on Drinking Water Quality, available at: https://www.gippswater.com.au/application/files/7114/7752/4332/SDWA_Annual_Report_on_Drinking_Water_Quality_2015-2016_.pdf

which obscures the graph labels. However, it does put Chunxing's low modelled levels in perspective.

Table 20: Modelled Hazelwood facility emissions against relevant standards

Data type (for lead, Pb)	Ground level conc.[10] (ng/m^3)	How many times below EPA standard?
EPA design criteria	3,000	1
Hydromet Laverton EPA licence limit	1,421	2.1
Aust Govt background Pb level	100	30
EPA (Regulation 10) exemption level	28	106
Chunxing Haz Nth (worst case anywhere)	9	333
Chunxing Haz Nth (worst case closest receptor)	2	1,500

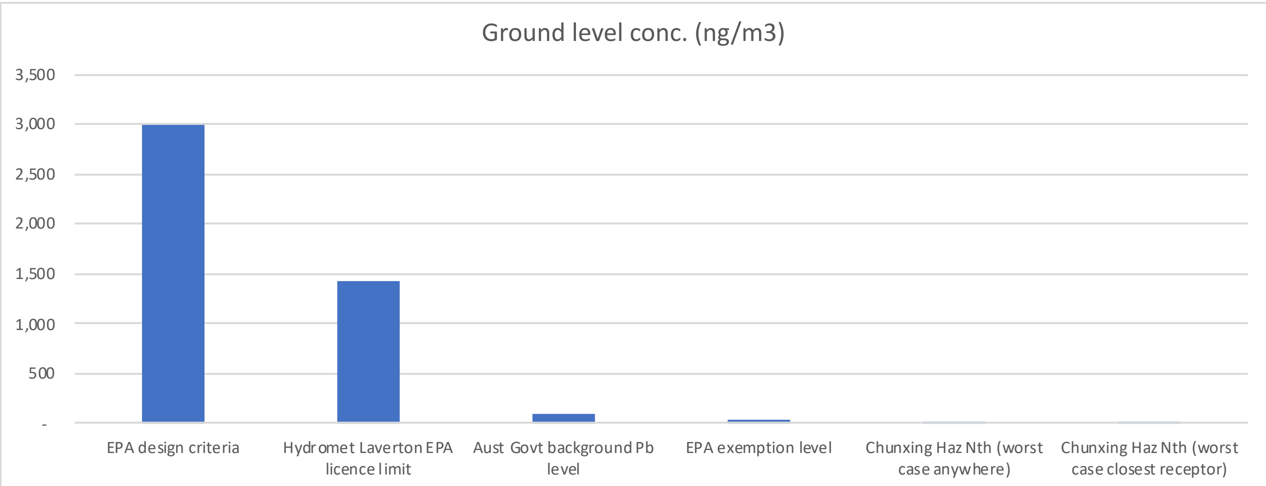

Figure 29a) Modelled Hazelwood facility emissions against relevant standards

[10] Or ground level concentration as calculated from stack emission data, run through the model established to predict Hazelwood North emissions dispersion behaviour.

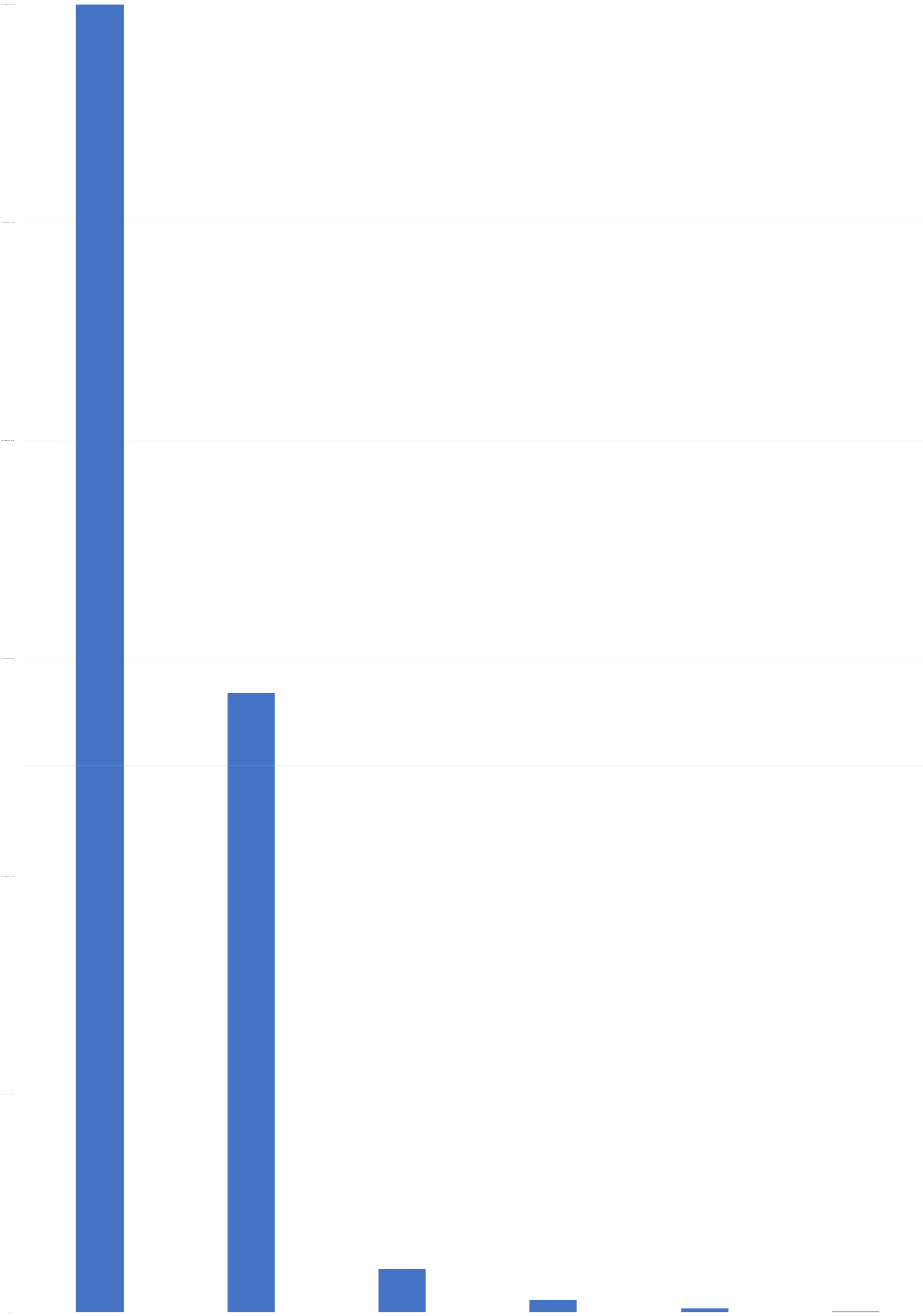

Figure 29b) Modelled Hazelwood facility emissions against relevant standards (expanded scale)

Table 20 and **Figure 29** a and b show that emissions from this plant are predicted to be, based on the worst modelled case:

- over 300 times below the EPA standard
- over 150 times lower than Hydromet Laverton's actual EPA licence limit, which was very recently amended (February 2018)
- eleven times below "natural background" levels expected in Australia[11]
- one-third of the General Exemption level (from the need for Works Approval), which is itself set at what would be equivalent to less than a third of natural background.

To assert that these emission levels could cause "poisoning" is simply impossible. Ground level concentrations of lead predicted by the model at the nearest sensitive receptor are just 2% of natural background levels typically found anywhere in Australia, or 50 times lower. This level, which is a worst case, is negligible and indistinguishable from what Latrobe Valley residents, and indeed people across Australia, are breathing now, every day.

Finally, a Human Health Risk Assessment has been carried out by Environmental Risk Sciences Pty Ltd (enRiskS). Their report is provided at ***Appendix 23*** and concludes that:

> *"The assessment of potential acute inhalation and chronic inhalation and multi-pathway exposures in the residential and rural residential areas has concluded that there are no risks to the health of residents."*

"There is no safe level of lead exposure"

The WHO's document is actually written to address a worldwide problem of lead impacts from unregulated, sometimes backyard recycling operations, particularly those in developing countries. The proposed Hazelwood North facility will be heavily regulated using modern technology and techniques to ensure the safety of its employees and the community. This type of facility is exactly what the WHO, in this very same document, conclude to be the way forward for dealing with the problem of poor environmental practices at 'dodgy' lead recycling facilities.

The WHO does not say there is no safe level of lead emissions, as claimed by the Action Group; it states that in the context of blood lead levels "there is no known safe level of exposure to lead".

The author has communicated directly to the author of the WHO document in which this statement was made (Dr. Joanna Tempowski). She has confirmed that this statement relates to an "absorbed dose (in the bloodstream) of lead" and that "because of natural background contamination with lead it may not be possible to entirely prevent lead exposure and to achieve a zero blood lead concentration (I'm not sure that this could be confirmed analytically in any case)."

[11] Australian Government Department of Agriculture, Water and Environment, available at: http://www.environment.gov.au/protection/chemicals-management/lead?fbclid=IwAR07e89h3JgVn8F4tyuH_SM-Elnm_DY5uAUmS_fl1wTnF-jk_uBSqXpo91Y

Dr. Tempowski also noted that "there is a lot of anxiety about lead exposure, and risk communication around this topic can be difficult." We agree that these concepts are difficult to convey and are easily misunderstood."

The WHO itself has also published[12] an indicative relationship between ambient levels of lead in the air and how that might translate to blood levels in children, the most vulnerable group. It deduced a relationship that a concentration of 1 $\mu g/m^3$ Pb in ambient air could approximately produce a blood concentration (in children) of 1.9 µg/dL of Pb in blood, and that 10 µg/dL was a 'critical level' for children.

Using this data, if Chunxing's worst case ground level concentration was not a one-off worst case but occurred 24 hours a day, it could theoretically result in a level in blood of 0.0038 µg/dL, which is 2,600 times below this 'critical level' and 2 orders of magnitude below typical detection limits blood testing laboratories are capable of achieving (0.1µg/L). Detection limits are science's practical way of determining "zero".

Finally, a Human Health Risk Assessment has been carried out by Environmental Risk Sciences Pty Ltd (enRiskS). Their report is provided at ***Appendix 23*** and concludes that:

> *"The assessment of potential acute inhalation and chronic inhalation and multi-pathway exposures in the residential and rural residential areas has concluded that there are no risks to the health of residents."*

8.1.1.2 Cumulative impacts of emissions to surrounding soil, waterways, agricultural land (and livestock)

This is the equal second biggest concern raised by stakeholders. We have addressed this issue in detail in the WAA Appendix C *Responses to issues and concern raised by stakeholders*. Specifically on page 159 (response 8).

The WAA response made some highly conservative assumptions about deposition of lead from the air surrounding the plant, to provide an estimate of the risk of contamination of local soil, waterways, farmland and livestock. The upshot of that was, over a 20-year lifetime of the plant, approximate levels of lead added to soil outside the facility boundary could be as much as 0.04mg/kg on top of existing background, which is 0.006% of the Contaminated Soil NEPM's soil investigation level (600 mg/kg) for childcare facilities. This level is negligible.

Given that the maximum amount of lead emission that could be contributed by the plant is below natural levels in the air, it is not surprising that calculations of cumulative emissions demonstrate <u>no measurable impact whatsoever</u> to surrounding land, livestock and waterways.

To provide further comfort about the impact of cumulative emissions, the air quality model was re-run using annual averaging, to enable the results to be compared to the most stringent ambient standards in the world. This is a far more accurate but less conservative exploration of the cumulative impacts issue. These results are discussed in Section 2.2.2.2 of this Addendum.

[12] http://www.euro.who.int/__data/assets/pdf_file/0020/123077/AQG2ndEd_6_7Lead.pdf

Finally, an independent human health risk assessment (HHRA) has been commissioned by Chunxing as requested by EPA. This has been discussed in Section 3.2 of this Addendum with the full report provided in ***Appendix 23***. The report concludes, with respect to cumulative impacts of emissions to surrounding soil, waterways, agricultural land (and livestock), that:

> *"Multiple pathway exposures: Risks to human health associated with chronic exposures to pollutants, bound to particulates, that may deposit to surfaces and taken up into produce for home consumption relevant to all surrounding areas, including all rural residential and low- density residential properties, are negligible."*

Further:

> *"The assessment of potential acute inhalation and chronic inhalation and multi-pathway exposures in the residential and rural residential areas has concluded that there are no risks to the health of residents."*

8.1.1.3 The distance from the facility to the nearest residences/school is too small (buffer zone)

This is also the equal second biggest concern raised by stakeholders. We have addressed this issue in detail in the WAA Appendix C *Responses to issues and concern raised by stakeholders*, specifically:

- WAA Appendix C.2 p.175, response #10
- WAA Appendix C.2 p.176, response #11
- WAA Appendix C.2 p.177, response #17.

There is an inference in some submissions that 2km is some kind of significant boundary or "buffer zone" where there is potential for health impacts. The 2km "buffer" has no meaning, but has been given a life of its own by the Action Group. Chunxing apologises for incorrectly using the words "2km buffer" in the original newspaper advertisement in June 2019, where it was used to (correctly) describe the distance to Morwell, the closest residential area or township, but not the closest residences (which are in Hazelwood North).

From this small error, the Action Group has continued to infer there is such a thing as a 2km buffer around the plant. The only buffer is the EPA's required separation distance of 500m, which is comfortably achieved.

The other key issue that is raised relates to the supposed "best practice" of a "5km buffer zone" in NSW, and that this should be adopted in the Hazelwood North case. The author has communicated with NSW EPA specifically on this issue.

There is no "5km buffer zone" in NSW. The NSW EPA does not specify buffer distances at all, but relies on case by case air quality modelling to assess impacts to sensitive receptors.

The Wagga Wagga plant expansion (more than double the capacity of the Hazelwood facility) was approved by NSW EPA in 2019, and this facility is actually located <u>1.2km away</u> from the nearest residence, <u>not 5km</u>.

The NSW Government (Department of Planning and Environment), in its assessment report dated February 2019, simply noted the geographical reality of the 1.2km nearest residence and 5km nearest township. The Department's assessment further states:

> *"No public submissions were received during the exhibition of the EIS, likely due to the isolated nature of the facility which is located 1.2km from the nearest residence" (emphasis added).*

The Chunxing facility is 1.1km away from the nearest residence (sensitive receptor), or 1.2km if you measure from where the facility's building will be placed on the property and closer to 1.5km from the actual stack location.

8.1.1.4 Sulfur dioxide levels will be too high (reference to a previous LV Express article based on a Greenpeace Report, showing high levels of SO2 in the Valley)

We have addressed this issue in detail in the WAA Appendix C *Responses to issues and concern raised by stakeholders*, specifically in Appendix C.2 p.177, response #14.

Suggestions that there will be a problem with SO_2 emissions from the Chunxing facility are a massive exaggeration. The Chunxing facility will emit such infinitesimally low levels of sulfur dioxide that it will be just 0.001% (1/100,000th) of the existing industrial emissions of sulfur dioxide in the Latrobe Valley.

Sulfur dioxide levels at the nearest residence are modelled to be almost 3,500 times lower than EPA limits (design criteria). These levels are so negligible as to be effectively zero.

8.1.1.5 Dividing the China plant emissions by 16 to use as modelling input for the Hazelwood North proposed plant is "not good science".

The capacity of the reference plant in China is 800,000 tonnes of ULABs; the Hazelwood facility is designed to process 50,000 tonnes of ULABs – 1/16th of the size. Applying this ratio is a simple mass balance, because lead is not introduced into the process from anywhere other than feedstock ULABs. This approach is valid because the processing and emissions control technology are identical in both cases, designed to produce the same quantity of output lead products and lead emissions per tonne of input lead (ULABs).

We have addressed this issue in detail:

- in the WAA Appendix C *Responses to issues and concern raised by stakeholders*, specifically in Appendix C.2 p.176, response #12
- in definitive evidence from 2017 commissioning data from China plant #2 (all of Section 2 and specifically Section 2.2.2).
- in the additional modelling and subsequent revision of the WAA Air emissions Section 8 (provided as ***Appendix 22*** to this document).

8.1.1.6 Lack of trust in Chinese data (or Chinese businesses)

This could be inferred to be a bigger issue than recorded, since many of the 'template letter' respondents chose to underline the words "Chinese Company Chunxing" in their submission. The Action Group template does not underline these words.

We understand this suspicion, given the history of poor practice in this industry overseas, including in China in the past. But things change – not so long ago China wasn't the largest economy in the world.

Contemporary air emission regulations in China are similar to those in Victoria. These have become substantially more stringent since China has moved to clean up the air in its highly polluted cities over the last decade or so. The Chunxing plant in China must meet these requirements.

To do so, they get an independent stack testing sampler and laboratory to take quarterly stack samples for a range of air quality parameters, which are then compared with their licence limits. In their three years of operation they have always met these limits. This quarterly monitoring regime also includes testing of air, noise and water quality at the facility's boundary points and in four residential areas to the points of the compass.

All test data has been provided with the WAA, translated by EPA's nominated certified translation body, and all laboratory certification provided by the independent stack tester in China has also been provided, as translated by EPA's nominated certified translation body. All laboratory methods are transparent.

What is most important to note is that Chunxing's facility in China was established within an industrial park designed to showcase world-leading environmental performance. Consequently, this facility's purpose is to provide exceptional levels of environmental controls. Extremely low emissions is what the Chunxing technology relies upon for commercial advantage, which it is using increasingly to secure international business and partnerships. The China plant was only commissioned in late 2016 so it is very modern.

In terms of the WAA and EPA's assessment process, it is in the hands of EPA to determine the technology bona fides of the company and its process.

8.1.1.7 Emissions from the facility could contaminate the pine bark next door

We have addressed this issue in detail in the WAA Appendix C *Responses to issues and concern raised by stakeholders*, specifically in Appendix C.2 p.179, response #21, as well as via the human health risk assessment (***Appendix 23***).

Mulch or any other nearby industry's material/soil/surface will not be "contaminated" with lead.

Air emissions are so low as not to be measurable at nearby residences and farms – even cumulative quantities over many years would not be identifiable above background soil levels (as calculated in response 1.2 above).

Regardless, levels of metals like lead are closely regulated in soils, composts and mulches via the Australian Standard (AS 4454—2003), Composts, soil conditioners and mulches. Allowable levels are required to be met through product composition and contaminant testing.

Finally, a Human Health Risk Assessment has been carried out by Environmental Risk Sciences Pty Ltd (enRiskS). Their report is provided at ***Appendix 23*** and concludes that:

"In relation to industrial neighbours and visitors to the site:

> *"The assessment of potential acute and chronic inhalation exposures in these areas has concluded that there are no risks to the health of workers or visitors."*

8.1.1.8 The plant could have a negative impact on property values

We have addressed this issue in detail in the WAA Appendix C *Responses to issues and concern raised by stakeholders*, specifically in Appendix C.1 p.164, response #9.

This issue is neither within the expertise of the author or part of the assessment of environmental impacts. The Chunxing plant will be a state of the art industrial facility located within a zoned industrial park. It will look somewhat different to the older industrial premises nearby, as shown by the artist's impression of the facility provided in Figure 25 of the WAA (p.165).

8.1.1.9 The timing or number of engagements held has been inadequate

We have addressed this issue in detail in the WAA Appendix C *Responses to issues and concern raised by stakeholders*, specifically in Appendix C.1 p.178, response #18.

In the earliest stages of developing the application for Works Approval, Chunxing held two open community meetings in Morwell in June 2019, as a means of starting a conversation with the local community. The Works Approval Application had not even been started at that time.

Between then and now, Chunxing has had at least 20 different meetings and engagements with local stakeholders, often one-on-one, over kitchen tables, in local cafes and boardrooms, explaining the proposal in detail. This has also involved letter drops into the Hazelwood North community.

We have met with the Action Group on at least five occasions and have shared our working draft of the Works Approval application document, as far back as August 2019 (before submission to EPA) as well as all supporting data and other evidence we have used in carrying out the various environmental assessments. We received no comments on these documents.

Our requests to attend the community meetings held by the Action Group were declined.

The Works Approval assessment process itself, run by EPA once the Works Approval application was accepted, is the actual formal public process, which has included two community drop-in sessions, an extended submission period and a 20B conference. The drop in sessions included the participation of the Action Group as an information provider, and the Action Group also ran two information evenings of its own.

8.1.1.10 There is newer technology available, such as that promoted by AquaMetals, than what Chunxing is proposing

We have addressed this issue in detail in the WAA Appendix C *Responses to issues and concern raised by stakeholders*, specifically in:

- Appendix C.2 p.172, response #5
- Appendix C.2 p.173, response #6

- Appendix C.2 p.178, response #19.

The Chunxing technology has been described in some submissions as outdated. Nothing could be further from the truth.

The current China facility is four years old and uses world-leading technology – its Vertical Smelt Furnace has been granted a Chinese invention patent. The only thing “very old” about it is the word ‘smelting’. Unlike traditional secondary lead smelting, Chunxing maximises lead recovery by employing both a ‘melting’ furnace (for one type of lead) and a 'smelting’ furnace for the other type of lead present. This furnace has unique design characteristics to ensure high reaction efficiency and its chemistry is process-controlled to minimise emissions and maximise lead recovery.

The evidence of how new this technology is shows in its emissions performance. The other Australian plant is modern (2012), was ‘best practice’ at the time of its commissioning and is well-run and well-regarded by NSW EPA. Emissions from the Hazelwood North plant are modelled to be significantly lower than this because of the intelligent chemistry, process control, automation and other engineering features it uses, plus its comprehensive pollution control system: multiple wet scrubbers, adsorbent dosing, cooling chambers and baghouses. No other ULAB recycler goes this far.

Newer technologies have been suggested as safer, more environmentally sound and superior, such as hydrometallurgical (electrolytic) lead reduction, including the use of solvent dissolution.

The only commercially available hydrometallurgical technology is based on leaching with hydrofluoric acid, followed by electrowinning. This technology was trialled 40 years ago in Port Kembla, NSW and could not be commercialised due to major issues around health and safety, and environmental performance. Currently there is one commercial plant believed to be operating in Asia with many challenges of health and safety issues.

Fluorinated acids are extremely dangerous. Australia’s chemical assessment body (NICNAS) notes of hydrofluoric acid:

> *“acute exposure through either inhalation or skin contact has led to deaths in humans and that even contact with dilute solutions (0.1%) can “cause painful second and third degree burns that heal very slowly.”*

The Action Group’s own handout states that hydrofluoric acid can cause harm, including from inhalation: “can cause death from an irregular heartbeat or from fluid build-up in the lungs.”

Apart from these health effects, neither fluosilicic nor fluoboric acid (fluorinated acids similar to hydrofluoric acid) can be kept from decomposing and releasing fluoride ions that could precipitate lead as lead fluoride, which is highly corrosive. The literature on fluorine based solvent use in lead recovery notes that this high corrosiveness limits commercialisation of processes using these chemicals.

Chunxing is not comfortable taking such risks with that kind of technology in Australia due to potential emissions of fluorine gas and leakage of reagents.

AquaMetals USA

A US company (AquaMetals) has recently patented a process for extracting lead using Methane- Sulfonic Acid (MSA) as a solvent, then recovering it using electrowinning.

It established its first (and currently only) facility in Nevada USA in 2017, a very small-scale demonstration plant whose largest production month (September 2019) was 160 tonnes of lead product. Chunxing's proposed plant is small by world standards, but its output is planned to be 15 times larger than this.

AquaMetals own website (https://www.aquametals.com/aquarefining/) illustrates this process as suitable only for the lead paste component, noting that the lead metal plates and grid are "shipped to smelter for processing." Therefore, AquaRefining is not a full solution for ULAB recycling – such a plant would either require a smelter onsite as well or the need to ship lead grid back out again to a smelting facility elsewhere. The technology is marketed as bolt-on technology to existing smelters, not standalone.

There are other questionable aspects about AquaMetals' process, including a significant fire in September 2019[13]– fire is notably uncommon in lead acid battery smelting/ melting processes. There is also a large class action[14] against it the US at present[15], which focuses on the claim that the company repeatedly misled investors about what their technology was capable of.

AquaMetals' aquarefining technology is promising but far too early in its development

to demonstrate scale, commerciality and safety, and still requires the use of a smelter on or offsite, as well as a thermal melting facility onsite (to consolidate the electrolysed lead into ingots).

Dissolution using novel solvents (another is called the PLACID process) and a recent study using 'deep eutectic solvents' are also promising but limited to pilot or laboratory scale, with varying levels of lead recovery rates. They are also limited to lead recovery from paste so require the lead grid fraction to be smelted.

None of these hydrometallurgical/electrolytic technologies are yet proven safe enough at sufficient scale or commercially viable enough to be considered for the proposed Latrobe Valley facility.

[13] https://markets.businessinsider.com/news/stocks/aqua-metals-suffers-significant-fire-damage-1028728476
[14] https://finance.yahoo.com/news/nasdaq-aqms-investor-notice-lawsuit-111000496.html
[15] Further more detailed information about this class action is available at: http://securities.stanford.edu/filings-documents/1064/AMI00_20/2018720_r01c_17CV07142.pdf

8.1.2 Issues that raise integrity concerns

In addition to these key themes there were other infrequent issues raised that we have addressed because they have raised concerns about the integrity of the parent company's operations, or of the CEO himself. These include:

a) False and misleading information about New Chunxing Resource Recycling Group (NCRRG) (the parent company of Chunxing Corporation Pty Ltd Australia) referred to as "Some Facts About CHUNXING Lead Company". These suggest that Chunxing has been responsible for lead poisoning in China.

b) Suggestions that Dr. Jayaweera had previously "walked away" from Hydromet, the company he founded and ran successfully for over 20 years, due to some known environmental problems at the company.

c) Inference that Dr. Jayaweera, the founder of Hydromet Corporation, had some past issues with environmental performance while at Hydromet and assertions that he has some sort of tarnished environmental record.

d) A request for EPA to check past employment of Dr. Jayaweera in New Zealand.

e) Claims that Dr. Jayaweera was somehow involved in the recent poor environmental practices at Hydromet in NSW.

These specific issues are addressed below.

8.1.2.1 False and misleading article alleging poor past practices by Chunxing China

This article is incoherently translated, rambling, poorly referenced and contains errors, false claims and makes clumsy inferences as if they were facts that relate to Chunxing's China operations in 2008, at another location in China to the current plant.

This issue has been previously raised and responded to by Chunxing.

Further media investigation also occurred with a corresponding article by the *China Nonferrous Metal News*, exonerating Chunxing's role in this 'incident'. This article, which concluded that independent testing "proves that Chunxing's production in the past 20 years has not caused pollution to the local environment" is provided in ***Appendix 43***.

We encourage EPA to investigate this online article as they see fit.

8.1.2.2 Suggestions that Dr. Jayaweera sold Hydromet because of entrenched environmental problems

Some submissions suggested that Dr Jayaweera previously "walked away" from Hydromet, the company he founded and ran successfully for over 20 years, due to some known environmental problems at the company.

This is completely inaccurate.

Hydromet was a publicly listed company. The board was approached by a foreign party who wished to purchase the company. Dr Jayaweera had no interest in such a sale but what occurred was a 'hostile takeover' which, in business terms, means the acquisition of one company by another that is accomplished by going directly to the company's shareholders or fighting to replace management to get the acquisition approved. This purchase was finalised in May 2012.

As a result, Dr Jayaweera sold his interests in the company, a new owner took over in its entirety and a new board and management team was engaged.

There were no “environmental problems” at Hydromet in 2012 (when the sale occurred) or at any time throughout the company’s 22 year tenure under Dr Jayaweera.

8.1.2.3 Claims about Dr. Jayaweera’s past environmental performance

Dr Lakshman Jayaweera came to Australia from Sri Lanka in 1978. Dr Jayaweera is a chemical engineer by profession with over 30 years’ experience in the resource recovery sector in Australia, including his career success with Rio Tinto (formerly, CRA Ltd) from 1980 to 1986. He was the founder of Hydromet Corporation Limited, a company specialising in metallurgical processing and metal recycling in Australia, particularly in the field of lead acid battery recycling. During his tenure in the company from 1987 to 2012, he held various positions including Managing Director and Executive Chairman.

As a widely-recognised scientist in Australia, in 1986, he was awarded the prestigious John Brodie Medal at the CHEMICA conference by the Institution of Engineers Australia, Institution of Engineers UK and the Royal Australian Chemical Institute (Australia) for his work in the field of Chemical Engineering and Chemistry.

In the 22 years he was in charge of Hydromet there were two cases where EPA audits of his facility identified issues to be rectified – both pump failures – and both resulted in fines in the order of $300 - $500, which was compulsory at the time for any such inconsistencies found by inspecting NSW EPA officers. These incidents occurred between 1992 and 1994, more than 26 years ago.

These are clearly trivial issues in the context of claims of past poor environmental performance.

One of the submission in particular, from a company in the lead acid battery supply chain in NSW that is directly linked to (what would be) Chunxing’s major competitor in Australia makes the statement: “Considering the history of both the applicant and the site …”. This implies some questionable history on the part of Dr. Jayaweera. There is no ‘such history’ in relation to Dr Jayaweera, and the history of the site is extensively chronicled in the statement of environmental audit previously carried out on the site, as described in Section 11 of the WAA.

8.1.2.4 A request for EPA to check past employment of Dr Jayaweera in New Zealand

Dr Jayaweera has never worked in New Zealand. Presumably the author of this statement was confusing him with Mr Simon Henry from New Zealand, who bought all shares in Hydromet in 2012, therefore taking control of the company. Mr Henry retains control of Hydromet to this day.

8.1.2.5 Claims implicating Dr Jayaweera to recent poor environmental practices at Hydromet in NSW

EPA NSW fined Hydromet for poor waste storage practices in October 2017[16]. This related to an unused site that had been storing hazardous wastes without sufficient oversight, including container inspection, bunding and other containment practices.

A small number of submissions connected Dr Jayaweera to these incidents, despite having left the company four years earlier.

How the new owners and their management chose to run Hydromet has nothing to do with Dr Jayaweera and he is certainly completely unrelated to any of those activities, anything that might have led to those work practices or subsequent legal proceedings by EPA.

Any connection of Dr Jayaweera to these incidents is completely inaccurate.

8.2 Responses to large submissions

We have identified approximately 14 large submissions (some are over 100 pages long). Core issues from these submissions are addressed in Section 8.1. Detailed issues raised (outside of these key themes) are presented here, against each individual large submission, in the sub-sections and corresponding tables below.

We recognise and appreciate the considerable effort these authors have gone to in compiling their submissions.

8.2.1 Response to Hazelwood North Action Group submission

A detailed response to the Hazelwood North Action Group's submission is provided below.

Table 21: Responses to Hazelwood North Action Group submission (in addition to key themes)

Issue #	Issue	Response
1	**Predicted emissions** It is not known if the China reference plant was operating at full capacity at the time of testing	WAA Attachment 'Sched Prem check v5.2 checks' (Excel spreadsheet) shows that the China plant was operating initially as a 300,000 tpa plant then was upgraded to an 800,000 tpa plant. These conversions have been applied accordingly.
	The proponent has not provided evidence of the testing methodology for Chinese emissions data.	Incorrect. Testing methodology is provided in WAA Appendix H in all translated test reports. The external accreditation (similar to NATA in Australia) of this laboratory to carry out these particular tests is also provided in Appendix H.
	The predicted emissions do not reflect the proposed design changes for the Hazelwood North Plant.	There are two design changes to that used by the plant in China: taking plastic separators to landfill (instead of returning them to the furnace) and adding the stack-base water scrubber and mist removal plate. Other changes are incremental operating improvements to existing baghouses and scrubbers. In every case these 'changes' are designed to further reduce emissions. The modelling is done as if these improvements were not made, to preserve comparability with the China plant, and provide a higher

[16] See NSW EPA website: https://www.epa.nsw.gov.au/news/media-releases/2017/epamedia17101601

Issue #	Issue	Response
	Emissions are also based on design assumptions associated with the inclusion of additional plant controls to further reduce predicted emissions – that is not proven design assumptions. The China reference plant operates as two plants in one, with a single stack serving the two plants.	level of conservatism – the actual emissions (inclusive of design improvements) will be lower than this. Incorrect – see immediately above. Incorrect. The China plant is two virtually identical plants, each with its own stack, as can clearly be seen from stack testing data and as mentioned on p.73 of the WAA.
3	The Proponent claims emissions will be 300 times below EPA licence limits – how does the proponent know what the EPA licence limits are?	Incorrect. This author has consistently stated in writing, in the press, in meetings and in the WAA that the worst case emission will be 300 times below EPA design criteria, referred to as 'the EPA standard or limit' in shorthand, because people do not readily understand what design criteria means. This is not the same as an EPA licence limit, which has not been set yet.
4	EPA - health impact to those working at the plant – the Proponent has said they will need to have regular blood tests to monitor the level of lead in their blood stream. We understand that the impact of lead is accumulative	Yes a worker blood testing regime is the standard requirement of WorkSafe for lead-based industries, such as mining, e-waste processing, spray painting and geo-assay laboratories. This also the case in China. Lead is absorbed and released in bodily processes in an equilibrium with exposure. If a person is withdrawn from the place of exposure blood levels reduce. Lead is not continually accumulative but at all times workers' blood levels must remain below critical adult concentrations, as required by WorkSafe.
6	The proposed secondary lead smelter may cause other industries to reconsider their decision to establish or expand their current operations in the Latrobe Valley due to the potential impacts of the secondary lead smelter, representing a loss of future employment opportunities.	Not relevant to the WAA assessment. Considering that the modelling demonstrates that there will be no impact to adjoining businesses, we do not believe that this impact will occur.
8	The Latrobe City Council Transfer Station, is located next door to the proposed secondary lead smelter. Contractors, Council employees and the visiting public, including women and children may be affected by the proposed facility.	People using or working at the transfer station will not be exposed to levels of pollutants that could affect their health. The Council transfer station is located within the modelled area, where the worst case ground level concentration modelled anywhere in that area was 300 times below EPA limits set to protect human health. These limits assume breathing of that air occurs 24 hours a day across a lifetime. The 'worst case' concentration in a model is the worst hour it predicts across five years of hourly data, so this level doesn't occur continuously across a year, a week or even a day. The

Issue #	Issue	Response
		layers of conservativism in air quality modelling are very high, to ensure confidence in the protective nature of its results.
9	A range of toxic emissions will be emitted from the proposed plant – resulting in public health impacts and environmental impacts.	No ‘toxic’ emissions, with human health or environmental impacts, are modelled to occur. Emissions from the plant will be so low they will not be measurable at the nearest residence by field monitoring equipment and are considerably below the levels set by EPA to protect human health and the environment.
10	Potential plant odour emissions	Odour is not a relevant consideration for this type of industry.
11	Discharges to Sewer and Drainage via the Saline Waste Outfall Pipeline (SWOP) Line. It is understood that the SWOP line is not licensed for these toxic discharges.	Incorrect. Gippsland Water advises in writing that “existing sewer has sufficient capacity for emergency discharges of up to 40m^3/day of treated water subject to our trade waste water quality acceptance limits.” The facility will use this trade waste option in high-rainfall event scenarios (emergency), even though it could use it every day, and discharges will always be within Gippsland Water limits.
12	The water collected and used on site will over time collect pollutants which are held in solution. It is understood that these pollutants will need to be collected and disposed of, off site to an EPA licensed landfill.	Incorrect. No wastewater will be disposed of to landfill. Solids containing low levels of lead or similar pollutants removed from onsite treatment of plant water via precipitation chemistries will be returned to the smelting furnace from time to time.
14	Management of prescribed waste emissions – Disposal of used contaminated pellets, slag and plastics will be required to go to an EPA approved landfill. Processes need to sufficient to ensure that all prescribed waste is correctly labelled and disposed of in accordance with EPA regulations.	All prescribed wastes will be managed according to EPA licence. All ULAB transport vehicles must be permitted by EPA to carry that specific waste, and therefore are required to follow the same procedures. All wastes will be subject to EPA tracking requirements. All onsite lead-related handling and work procedures will be in accordance with strict WorkSafe Victoria requirements.
15	Issues regarding the safety of plant workers including delivery drivers, visitors to the site.	
16	The impact of rain /high wind events on air emissions to the environment. High wind events may distribute the air borne pollutants beyond the proponents 2km area of impact	The proponent does not claim a “2km area of impact” (see ‘key themes’ responses). High winds and rain data are included in the 5-year meteorological data file – the worst case concentration of lead (at 300 times below the EPA standard) occurs in the context of these more extreme weather events.

Issue #	Issue	Response
17	Full noise assessment should be done and there is a need to verify the China Plant noise emissions data.	A noise assessment has been done commensurate with the risk of noise impacts, as directed by the EPA Works Approval guideline[17]. As a further measure of assurance we provided an alternative method to model noise, which was used as a check. China noise testing methods used have been supplied to EPA. Further verification of noise estimates are provided in Section 4 of this document.
18	If the WAA is approved, the EPA must "lock" the proponent into the predicted emission levels described in the WAA – that is hold them to account. The Commissioning Licence and the Operating Licence must reflect the predicted levels in the approved WAA. Unless the predicted emissions level are achieved during the commissioning and operating stages of the plant, the plant will not operate.	This is a matter for EPA.
19	The Proponent claims that the lead emissions from the plant will not be able to be distinguished from already existing background lead levels. It is understood that lead levels are not currently measured, so it is difficult to understand how this claim can be substantiated	We reference the Australian Government Department of Agriculture, Water and Environment's website[18], which states that "the natural concentration of lead in the air is less than 0.1 microgram per cubic metre." There is no basis to indicate the Latrobe Valley's ambient lead levels would be any higher than elsewhere, since the main past air emission source (lead in petrol) was eliminated decades ago.
20	The proponent states on page 164 that the emissions will deposited up to 2km's from the stack, confirming the school and playgroup will be impacted by the air emissions, including lead emissions	Dealt with in Section 1.2 of Notice response #1. The proponent does not under any circumstances state that "the emissions will deposited up to 2km's from the stack, confirming the school and playgroup will be impacted by the air emissions, including lead emissions." This objection chooses to totally misuse the high-level calculation from p.164 Appendix C1 of the WAA (response #8), which responds to the question: *"8. Concern about the cumulative impact of lead pollution: collecting on rooves, drinking water, land contamination."* The answer to this question begins by stating that "due to the combination of low emissions and large atmospheric dilution,

[17] Available at: https://www.epa.vic.gov.au/about-epa/publications/1658
[18] Available at: https://www.environment.gov.au/protection/chemicals-management/lead

Issue #	Issue	Response
	References to dioxins toxicity, environmental longevity and emissions	cumulative levels falling on surfaces such as rooves and soil in residential locations will be too low to be measurable." It then goes on to quantify this using a series of unrealistically conservative assumptions that cannot actually happen but serve to simplify the calculations to heavily inflate the outcome to err on the side of conservativism in the estimate of ground deposition. The approach draws a totally artificial boundary around the plant and, "for the sake of the exercise" uses "black-box" style assumptions that all emissions immediately fall to land in this area and stay there, in the topsoil, and concentrate (without any run-off or seepage) for the 20-year life of the plant. This is far in excess of what could happen in reality, but the simplistic conservativism combined with the result that just 0.006% of the soil investigation level (600 mg/kg for childcare facilities) could be theoretically added over 20 years serves to demonstrate how negligible this impact is. From reading the context of p.164, it is clear that what was written was designed as a highly conservative estimate of worst case cumulative deposition to land, complete with assumptions "for the sake of the exercise" to ensure maximum conservatism. This objection (and others that have used the template) misuse it as a factual "admission" of emission impacts to the surrounding area. It is categorically not. As described throughout this document (and consistently throughout all Chunxing communications), impacts of lead emissions to the school and surrounding residences will not just be extremely low, but are quantified as negligible. We agree about the toxicity and other damaging effects of dioxins. Despite the China plant's measured dioxins emissions being below the IED limit, which is the international standard that EPA Victoria requires, for the Hazelwood plant we changed the design to exclude plastic separators from the furnace and send them to landfill. Dioxins are not present in feedstock (such as these plastics) but can form with the right set of conditions in a thermal process. This relates to both the rate of cooling of exhaust gases and the potential for organic halogens to be present in the feedstock. We felt that the plastic separators had the potential to contain PVC (which contains chlorine, a halogen) and so it was a best practice decision to remove this risk of dioxin formation. Consequently, any reference to dioxins emissions and community or environmental impacts from the Hazelwood North plant are false and unfounded.
21	The adequacy of the proposed emissions monitoring system needs to be confirmed, including scope, maintenance, calibration, monitoring and reporting, etc.	The CEMS system monitors for particulates, SO_x and NO_x. Maintenance, calibration, reporting, inspection and auditing procedures will be established in the detailed design phase. An overview of these aspects has been provided to EPA.

Issue #	Issue	Response
	Need to provide details of auditing / inspection processes to check and verify processes. The use of independent NATA Accredited companies and laboratories needs to be confirmed. Need to clarify the processes to enable public access to the live (real time) monitoring data to enable comparison of actual emissions compared to EPA Licence limits.	NATA requirements will be followed as required and the use of NATA accredited stack testers and laboratories is a basic EPA requirement. The WAA has committed Chunxing to provide real time monitoring data access to the public, both from the CEMS system and from a series of community monitoring points.
22	The WAA provides little or no information regarding proposed maintenance processes to ensure the safety and integrity of the plant and management of pollution control and monitoring systems. This includes adequate maintenance of the pollution control equipment which is also critical to manage emission levels in accordance with EPA Licence limits. Proposals for the maintenance of the plant should be described and included in the EPA Licence, if approved.	The WAA addresses the needs of the Works Approval assessment process, for a plant that has not been built yet. Details of proposed maintenance, worker safety and plant integrity procedures beyond that already described in the WAA and in subsequent EPA response to questions are the subject of the detailed design engineering phase.
24	Port Pirie – It is understood that the EPA licence limits at Port Pirie need to be reduced by 80% to meet safe levels for human health. Therefore, if approved, the proposed EPA Licence limits for the proposed Hazelwood North plant not necessarily reflect safe levels for human health.	Nyrstar Port Pirie's operations and their interaction with the SA EPA, an unrelated entity to the Victorian EPA, are neither similar nor relevant to the Chunxing Hazelwood North proposal. *"The Licensee must aim to achieve an annual average TSP Lead in Air target of 1.60 TSP Lead (ug/m3) based on the daily measurements of Lead in Air at the Licensee's Ellen St monitoring station and 0.60 TSP Lead (ug/m3) based on the daily measurements of Lead in Air at the Licensee's Boat Ramp monitoring station for each 12 month period prior to 30 June and 31 December for the duration of the Licence."* The modelling for the Hazelwood facility indicates a lead worst case GLC of 0.002 ug/m3 at the nearest sensitive receptor. This is a single worst case occurrence, not annual averages like Port Pirie, because modelling is highly conservative. Regardless, this level is equal to just 0.3% of the lowest target concentration mentioned in Nyrstar's licence, which is also below natural background in the air in Australia, as stated by the Australian Government Department of Agriculture, Water and Environment[18].

Issue #	Issue	Response
		Therefore, since EPA Vic licence limits will reflect the emissions performance demonstrated by modelling in the WAA, the proposed Hazelwood North plant will reflect safe levels for human health.
25	Operation of the plant – the WAA does not clearly define the number of years the plant will operate.	WAA guidelines do not specifically request this information. However, the plant's expected lifetime is 20 years, as mentioned on p.164 of the WAA. Actual life of plant depends on a range of operational factors.
27	The Hazelwood North plant uses smelting and melting, not just melting. Inspecting the proposed site, there is not a 500m buffer to adjacent industries, public road and the Council Transfer Station.	EPA's scheduled premises type 'IO2 Metal Melting' definitionally includes both melting and smelting activities. The buffer distance applies to 'sensitive land uses', which are defined by EPA[19] as: "Any land uses which require a particular focus on protecting the beneficial uses of the air environment relating to human health and wellbeing, local amenity and aesthetic enjoyment, for example residential premises, child care centres, pre-schools, primary schools, education centres or informal outdoor recreation sites." This excludes "adjacent industries, public road and the Council Transfer Station", but the industrial land user must comply with all relevant environmental regulations. The most important point to make is that the worst case emission from the plant is modelled to be 300 times below EPA standards and occur within the facility boundary. This provides similar levels of protection to co-located land uses as nearby sensitive land uses.
32	The risk assessment provided in Section 12 – Table 39 (page 134) is totally inadequate and does not the requirements of ISO31000 – Risk Management. Note: referring to Section 13 – Environmental Management, the risk assessment provided in Table 42 (page 143 onwards) is also totally inadequate and is not consistent in format to Table 39 in the WAA. The proponent does not state that in the risk assessment they consulted with the relevant combat agencies (for example: EMV, CFA, SES, Police, Hospitals, etc.).	As mentioned in the introduction of the section, its contents are based on an assessment of compliance with EPA Publication 1667.2 'Management and storage of combustible recyclable and waste materials – guidelines' and EPA Publication 1698 'Liquid and storage handling guidelines'. The assessment required at the Works Approval stage of the business' development is sufficient to satisfy these guidelines. Table 42 outlines a high-level risk assessment of potential plant upset situations. There is no requirement that it be identical in format to Table 39. As described it is a 'high-level' risk assessment that is commensurate with the requirements of a Works Approval, specifically Section 13.1 of the Works Approval Guidelines[17]. Consultation with these agencies and detailed incident response plans (beyond what is already covered in the WAA) are is not required by the Works Approval process, which is an environmental assessment at the design stage. An Emergency Response Plan (ERP) is not required as part of the Works Approval process, and will be addressed at later stages of design.

[19] See EPA publication 1518 (March 2013), *Recommended separation distances for industrial residual air emissions*, available at: https://www.epa.vic.gov.au/about-epa/publications/1518

Issue #	Issue	Response
	The WAA does not describe the processes used to assess emergency response protocols. Are the appropriate resources available to respond to the potential types of incidents? Are trial emergency response exercises proposed?	
33		See response to 32
34	What is the impact of the loss of power and impact on the pollution control equipment to affectively control plant emissions to the surrounding environment?	This issue is considered by the WAA, section 13.1. A conservative quantitative assessment of the air quality impacts of complete scrubber or baghouse failure has been undertaken in WAA Sections 13.1.1 and 13.1.2. These assessments assume total and immediate failure of these equipment, which is highly conservative. In practice, any such failure would be compartmentalized and emissions control would slowly reduce in effectiveness, rather than immediately cease to function.
35		See response to 32
36	What are the risks associated with vehicles transporting used batteries to the plant from around Australia and prescribed waste material (slag, plastics, pellets) being transported off site and also the transport off site of the refined lead materials	These risks are currently managed by the transporters of these materials, which are required to use EPA-permitted vehicles and drivers and are also regulated by WorkSafe requirements for transporting and handling dangerous goods.
37	The proponent in describing the proposed Hazelwood North as representing best practice only compares the proposed Hazelwood North plant against the Wagga Wagga Plant. The proponent does compare the proposed Hazelwood North Plant against other world-wide plants. The proponent confirmed at the proponents community meeting held on the 29th October 2019, the Chunxing technology has not been used outside of China.	Incorrect. The best practice assessment compares all relevant worldwide technology options, to construct top-down what elements would be necessary in best practice for this type of operation. The Wagga Wagga plant is also included as this is an Australian plant that operates within an Australian regulatory framework, which assists the best practice assessment.
40 & 41	An audit report dated 2008 identified that the site is still contaminated and included	The WAA addresses Section 11 of the Works Approval Guideline[17] and summaries the findings of the 2008 site audit in WAA Section

Issue #	Issue	Response
	a Site Management Plant that was to be adopted in any future use of the site. The auditor in the Statement of Environmental Audit specifically noted that a Certificate of Environmental Audit had not been issued due to the site being contaminated and provided the conditions that needed to be addressed before a Certificate would be issued. The audit was conducted over 10 years ago (September 2008) and the audit report should be reviewed and updated to reflect the current condition of the site before any work is commenced. A site inspection should also be conducted and documented as an absolute minimum and an action plan developed to address the inspection findings. Proposals for the ongoing monitoring of the site need to be described and reflected in the EPA licence. The impact of the former coal to oil plant, located next door should also be checked. The WAA does not adequately reflect the requirements of the audit reports Site Management Plant and liaison with the neighbour on the northern boundary in managing site contamination.	11.1. WAA Section 11.2 these describes the management implications for Chunxing, should the facility go ahead: “The proposed development of the land by Chunxing to build and operate a ULAB recycling facility is in accordance with the audit and EMP conditions, since it will not extract groundwater for any uses, will not build over the nominated “building restriction zone” and will not build or operate its facility in any way that is contrary to the requirements of the EMP.” The EMP notes that its implementation rests with “future site owners/ occupiers” which will be Chunxing in this case. The EMP’s tasks and responsibilities are nominated in Section 11.2, which Chunxing will adopt.
42	The December revision of the WAA has not authorised by the proponent as required by the Guideline. The December 2019 revision of the WAA is therefore not a legally binding document. The authorisation date for the December 2019 revision, reflects the same date and the superseded	The December 2019 revision occurred in response to us picking up an error, specifically referenced in our submission cover email to EPA: “Updated emission estimates for the Australian plant (based on corrected 300,000t to 50,000t ratio in 2017 China plant data).” We had neglected to account for the size of the plant in 2017 quarterly monitoring data, when it was running as a 300,000 tpa plant, prior to moving to full production from late 2017 onwards. We corrected all emissions and modelling predictions for Hazelwood North that considered 2017 China plant data. Because

Issue #	Issue	Response
	November 2019 revision of the WAA. This December 2019 revision of the WAA has been accepted by the EPA for assessment and has been made available to the public for review and the providing the EPA with submissions as part of the consultation process.	there are 3 years of China data, and this related only to four parameters across one year of that dataset: SO2, NOx, total dust and lead, the net result was inconsequential to all of our assessments. Lead emissions and modelling, for example, remained completely unchanged. Consequently the December revision was not materially different to the original November submission. We agree that it was an oversight not to provide a replacement Applicant statement. However, the December revision was minor and had no material effect on the data and content of the WAA whatsoever, so it was a virtually identical document. The Works Approval Guideline makes no specific reference to the legalities or administrative nuances of the *Applicant statement* at all; it does not "require" anything. The *Applicant statement* includes the CEO's signature to confirm that: *"I declare that to the best of my knowledge the information in this application is true and correct, that I have made all the necessary enquiries and that no matters of significance have been withheld from EPA."* This statement was true of the November submission and is also true of the December revision. A corrected application statement page has been sent to EPA, with an explanatory letter. Thank you for alerting us to this oversight.

8.2.2 Response to Enirgi Power Storage Recycling Pty Ltd

A detailed response to the Enirgi Power Storage Recycling Pty Ltd submission is provided below. A further submission on behalf of Enirgi, prepared by their consultant EMM Consulting, is described and responded to in Section 8.2.3.

As a general response we note that the Enirgi plant in Wagga Wagga NSW represents Chunxing's future competition as Australia's only fully thermal secondary lead (ULAB) smelter. Enirgi stands to lose market share from a new entrant like Chunxing so its submission is responded to in the context that it is not a Victorian stakeholder with the potential to be impacted by any aspect explored by the Works Approval process, emanating from the proposed Hazelwood North facility.

Table 22: Responses to Enirgi Power Storage Recycling Pty Ltd submission (in addition to key themes)

Issue #	Issue	Response
1	**National ULAB recycling capacity** With Australia's ULAB market of 120,000 tpy of	There are a number of issues with this comment: • Fundamentally, a discussion of the market is irrelevant to the EPA Works Approval process. What market risks

Issue #	Issue	Response
	ULAB versus a total installed capacity of 168,000 tpy and an additional approved 110,000 tpy, there exists an overcapacity in the recycling sector. The addition of a further 50,000 tpy of capacity would destabilize the current efficient and effective recycling industry.	Chunxing determines that it wants to take is entirely its commercial decision. • We believe the 'installed' capacity figures to be incorrect. Ledox Mt Druitt NSW is a mothballed facility and all others (apart from Enirgi themselves) are breakers only, noting that Hydromet Laverton operates only as a breaker. This means that the breaker market capacity is 150,000 tpa, while the full recycling capacity is just 70,000 tpa (Enirgi only). • The *Hazardous Waste (Regulation of Exports and Imports) Act 1989* and subordinate regulation implements reflects the Basel Convention in Australia. This means that the Australian Government must consider available Australian (full recycling) infrastructure capacity first, before granting a permit to export hazardous waste such as ULAB scrap (the output of breakers). Consequently Enirgi have a monopoly within Australia up to their operating capacity – beyond that breakers can export. Once another 50,000 tpa capacity is available within Australia (the Chunxing facility), this essentially takes 50,000 tpa out of what the government can allow breakers to export, directing it to either Enirgi or Chunxing. Enirgi have approval for their plant expansion plans but have not developed that infrastructure as yet. In our view a more competitive market is a better outcome than the existing monopoly. • Such a monopoly has the potential to create price pressure on the supply side of the market – battery collectors, who could respond by taking short-cuts to maintain their margins, which could further lead to unsound environmental management of ULABs.
2	**Emission Assumptions** Emissions estimates, and the modelling results, may have underestimated the potential air quality impacts The scaling (1/16th) used is only valid if the China plant test results were obtained with the plant running at full capacity. Chapter 4.2 of the WAA stated that the China plant was not running at full capacity for the year 2017.	 The China plant test results were obtained with the plant running at full capacity. We have provided production data broken down by month to demonstrate this. Correct, as explained in the WAA Section 4.2 p.15 which states: "The plant began operating in 2017 with one of its lines operating, at a total capacity of 300,000 tonnes ULAB per year. Then was increased to 800,000 tonnes per year in late 2017. This plant and key monitoring data received from it has been used in this application as the reference plant for estimation of impacts on key environmental segments as follows:

Issue #	Issue	Response
	The use of an emission scaling assumption relies on the emissions being linear to battery recycling throughput. No evidence is presented to show emission intensity correlates linearly with scale.	• In estimating emissions to air, based on an approximate scaling rate of Hazelwood being 1/16th the capacity (size) of the China plant (for data collected in 2018 and 2019). • In estimating emissions to air, based on an approximate scaling rate of Hazelwood being 1/6th the capacity (size) of the China plant (for data collected in 2017)…" See Key themes Section 8.1.1.5.
3	**Sulphur Removal Technology** [Desulphurisation] (various comments) Specific comment: "The choice to use ammonia would require significant safety systems to protect employees and neighbours from an ammonia gas leak and may require the facility to be registered as a Major Hazard Facility.	Our general response is that the comments/ questions supplied under this heading are vague and unclear. The comment does not appear to appreciate the multiple levels of desulfurisation that occur throughout the Chunxing process and provides a simplified opinion. This comment is inaccurate. There is no mention in the WAA of using ammonia gas – Section 4.4.4 clearly states that ammonium bicarbonate or lime will be used. There will be no ammonia gas used onsite.
4	**Waste** No waste analysis was included in the WAA to justify plastic separator waste categorization. This waste is likely to be >5% Pb content and TCLP leach >20mg/L for Pb.	Waste separators emanating from the Chunxing process are typically <<1% Pb due to the cleaning techniques used by Chunxing in their battery breaking/ separation process, which is more advanced than their competitors. A current spot-test (carried out at the China plant) came back as 0.012% Pb and 3mg/L as TCLP. Consequently we remain comfortable with the WAA's indicative waste characterisation of Cat B or Cat C. Therefore this waste stream is manageable within the existing waste management classification and management system in Victoria. Ultimately, correct classification of this wastestream will be an operational issue, to be demonstrated through actual testing. The purpose of the WAA is to identify likely classification and demonstrate that the waste can be managed within the Victorian waste management framework
	Only one test result is given for slag leachability and total heavy metals, which is limited to only lead and cadmium. Other elements of concern, such as Antimony, Arsenic, Nickel and Selenium have not been considered.	Incorrect. Analysis of slag in Table 37 of the WAA covers a wide range of metals for both total and leachability testing. "Other elements of concern, such as Antimony, Arsenic, Nickel and Selenium have been considered.

Issue #	Issue	Response
	Also, there is a need to present a detailed description of the technology to be used. The type of furnace and smelting technology needs clarification. The WAA specified in Chapter 4.5.5. the use of a modified ISASMELT (VSF) technology, however Figure 10 in the WAA points to a different type of furnace. This matter requires clarity as it is relevant in determining the amount and quality of slag generated, flue gas and dust generation and thermal efficiency. There is also no mention of licensing compliance to use ISASMELT technology (owned by Glencore), or a modified version as mentioned in the WAA.	The furnace is Chunxing's design. It builds on ISASMELT but is not the same. That is why is it called 'modified' ISASMELT. There is no need for ISASMELT technology 'licensing'. This Chunxing technology is described as 'modified ISASMELT' in descriptive terms because of the features it has in common and to assist the reader's conceptual understanding.
5	Enirgi engaged the services of EMM Consulting to undertake an independent Technical Adequacy Review of the Works Approval Application. EMM identified numerous issues which are summarized in Table 1.	These issues are considered in the following section's specific response to the EMM Consulting submission.

8.2.3 Response to EMM Consulting's submission (engaged by Enirgi)

A detailed response to the EMM Consulting's submission (engaged by Enirgi to undertake an independent Technical Adequacy Review of the Works Approval Application) is provided below.

EMM's assessments of compliance with sections of the WA guideline is noted and not commented on below. Only those findings that raise a question or suggest an issue are captured and responded to.

We note that EMM's submission has been provided to us an un-editable PDF. For this reason the issue details are summarised only in **Table 23**, or referred back to the original submission. For a detailed understanding of these issues we suggest the reader downloads *Submissions_Part_3.PDF* from the Engage Victoria website.

Table 23: Responses to EMM Consulting submission (in addition to key themes)

Issue #	Issue	Response
1	Various gaps in the planning approvals requirements	Non-issue. The Council planning permit has been submitted as per EPA's advice. For the purposes of works approval of this facility there are no other relevant approvals required that would impact the decision. All other legislation stated in EMM's Table 3.1 are not necessary at this stage of the development (a Works Approval is simply a permit to begin construction works).
2	Relevant offence declaration is not sufficient	A Relevant offence declaration has been signed and submitted as requested by EPA. Further information about Dr Jayaweera's 22 year environmental offence track record as office-bearer of a company in the ULAB industry in NSW has been provided in our first Notice response.
	Inference that Dr. Jayaweera has some question mark over his environmental credentials and as to whether he is a 'fit and proper person'.	See Section 8.1.2.3, which answers a baseless claim about Dr Jayaweera's past environmental performance.
3	GHG gas emissions: avoided emissions from mining, processing and smelting of lead are "effectively Scope 3 emissions that are not owned or controlled by Chunxing."	We believe this view to be incorrect. Avoided emissions are not Scope 3 emissions because they are not emissions "that occur in the value chain of the reporting company, including both upstream and downstream emissions" (GHG Protocol[20]). Scope 3 emissions, like Scopes 1 and 2, are used to define the scope of the emissions of a company. There is no attempt by the WAA (or EMM) to attribute avoided mining related emissions (of virgin lead) to Chunxing. Regardless, avoided emissions are provided to enable a lifecycle view which is useful in contextualizing Scope 1 and 2 emissions and in making an integrated environmental assessment to determine the importance of GHG to the overall environmental assessment.

[20] https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf

Issue #	Issue	Response
		No "caveat" is necessary since the Scope 1 and 2 emissions are clearly stated in Table 9 (separate to the avoided emissions discussion and quantification).
4	Issues regarding Table 10 (Equipment power configuration) Table 10: Chinese text characters should be revised to English.	A site electricity use estimate is determined by scaling figures from the operating China refence facility which is sufficient for the purposes of Scope 2 GHG calculation. Detailed calculations have been provided in the accompanying Excel workbook (*Chunxing_GHG emissions v3.xlsx*). Chinese text characters have been translated with English beside them.
5	Water resource use, Issues with the water balance (specifically Figure 11) and the rainfall water supply estimate	An updated Figure 11 has recently been supplied to EPA, as part of further information requests, along with more detailed information about the water requirements, stormwater collection and storage, plant use needs, rainfall events and wastewater treatment.
6	**Air quality impact assessment**	There are a large number of technical comments about the air quality impact assessment. Specific issues are responded to below against the dot point numbers of each issue, as outlined in *Submissions Part 4*, EMM report pages 33-35 under the "8. Air emissions" heading.
	Summary statement: "EMM considers … may have significantly underestimated the potential air quality impacts associated with the proposed ULAB plant."	**This statement is false**, as proven by the detailed responses to each issue raised by EMM below. Chunxing have not under-estimated potential air quality impacts. The detailed list of issues raised by EMM below is dominated by incorrect assumptions, mistakes and a misunderstanding of the Victorian air quality modelling and assessment regulatory environment.
	Dot point 1	*".. 1/16 assumption … is only valid if the stack testing at the China plant occurred with the plant running at full capacity."* See Issue 2 in Enirgi's response (Section 8.2.2). The stack testing <u>did</u> occur when the plant was running at full capacity. A monthly breakdown of plant production (which is commercial information that will not be shared with an industry competitor) demonstrates this.
	Dot point 2	**Incorrect statement**: The AQIA revision note is <u>not</u> "the only place where the plant throughput at the time of testing is reported." 300,000tpa plant throughput in 2017 is reported on pp 15-16 of the WAA, as is 800,000 tpa in 2018 and 2019. **Incorrect statement:** 1/6 scaling was done for 2017, as described on p.16 of the WAA..
	Dot point 3	**Incorrect statement:** The China plant is two plants each with its own separate stack. This is both specifically mentioned on p.73 of the WAA and evident in the China plant monitoring reports. **Incorrect statement:** The plant throughput was considered in the decision to use 1/6 scaling in 2017 and 1/16 in the other years.
	Dot point 4	EPA Vic's air quality modelling requirements are clear that the model input should be based on actual emissions data wherever possible, and that inferior methods such as the use of a standard

Issue #	Issue	Response
		below which it must operate are only acceptable when no such data exists. The purpose of modelling is to predict ground level concentrations to compare against design criteria. It is not an exercise in determining licence limits. Why would Chunxing choose to model to EU IED levels as if they were indicative of plant emissions when there is three years' of actual reference plant emissions available to use?
	Dot point 5	Our description of why we excluded the As replicate is documented and justified. The fact that the outlier is only one of a single triplicate measurement (rather than an actual averaged measurement on its own), coupled with how consistent (and significantly lower) all of the other five replicate samples are is strong evidence that this replicate in unreliable.
	Dot point 6	All relevant pollutants are provided in the revised WAA Air Section, Appendix 22 to this document.
	Dot point 7	All relevant pollutants are provided in the revised WAA Air Section, Appendix 22 to this document.
	Dot point 8	**Incorrect statement:** Individual years' data are provided in the AQIA, the supporting workbook and all modelling data files supplied with the WAA.
	Dot point 9	Section 8 is a summary of the AQIA at Appendix G. The AQIA and all modelling data is supplied both with and without background. It is an unresolved industry debate about when to use background so we have provided both. The reality is, with background included, the Chunxing GLCs are virtually invisible, so it is pointless to judge the facilities performance when you can't distinguish what it is. We have included charts with background overlays to demonstrate this, and to ensure the context of background is understood. All data and information is available for EPA's assessment as required by the SEPP (AQM).
	Dot point 10	The issue of use of constant background is a practical necessity and an ongoing debate in the modelling fraternity. This is primarily a particulates issue. Errors and anomalies that occur in these massive datasets, as well as the high incidence of spikes of non-industry dust events, makes the use of hourly data unworkable. Regardless, we have rerun the model with variable background data, for all pollutants where background is relevant (see revised WAA Section 8 Air emissions).
	Dot point 11	**Correct**, you have identified an inconsistency in the AQIA's presentation of background data. The chapter titled 'Ambient (background) levels' is the primary part of the report that discusses background and how it is used. All background data in this chapter is correct. The chapter titled 'Results' for NO_x, SO_x, PM_{10} and TSP used preliminary background data, which was updated in the data's development after discussions about how to treat background with EPA. Unfortunately, the original background data in this section's tables, which were drafted as preliminary to allow

Issue #	Issue	Response
		presentation to the June 2019 public meeting, was never subsequently updated. This has now been corrected. We thank you for pointing this out. We note that these changes are small enough to be immaterial to the background level itself and have no impact whatsoever on the results discussed in the WAA, as well as the presentations and meetings that have used this data, because these results are presented without background. Consequently there are no changes required to the WAA document. An updated Appendix G AQIA report has been issued for administrative consistency.
	Dot point 12	**Incorrect statement:** Total particulate matter (TPM) or nuisance dust has a design criteria based on a 3-minute averaging time. PM_{10} has a design criteria based on a 1-hour averaging time. We have data for total dust only, so have made the most conservative assumption possible, that total dust = PM_{10}. Therefore TPM and PM_{10} are an identical emission but a different modelled GLC, because the averaging time for PM_{10} needs to be multiplied up by ~1.89 to account to be expressed as a 3-minute average.
	Dot point 13	**Incorrect statement:** Your 'spot check is incorrect'. The NOx maximum example you mention is correct in both the underlying workbook and the AQIA (0.0199 = 0.0352 – 0.0153). We agree that pagination would have been useful and apologise for the difficulty in report navigation. This has been corrected in the revised AQIA Appendix 48 to this document).
	Dot point 14	**Incorrect statement:** Presentation of results at sensitive receptors is not a requirement of SEPP or AERMOD guidance – we do so to assist neighbours understand the nature of impacts to them. EPA requires that compliance with SEPP design criteria is demonstrated in all locations within the grid area.
	Dot point 15	**Incorrect statement:** Neither the underlying data files, the AQIA report at Appendix G or the summary of the assessment in Chapter 8 of the WAA confuse the need to adjust for averaging time between Class 1 and Class 2/3 indicators. These adjustments have already been made.
	Dot point 16	**Correct**. The modelling results for $PM_{2.5}$ was not originally included. Further modelling results (outlined in the revised WAA Section 8 Air emissions, Appendix 22 to this document) now include $PM_{2.5}$ – thank you for pointing this out.
	Dot point 17	Table 18 (and all of Section 8) is a summary of the actual AQIA report at Appendix G, where all data is sourced from. The audience for Appendix G and its attached files is different to the reader who does not go beyond Section 8 of the WAA. Concepts such as averaging time, TSP used against a PM_{10} design criteria, etc. are complex and foreign to many readers, as was pointed out numerous times from consultation during the drafting process. The decision was made for key summary tables like Table 18 to be simplified to include only one particle based pollutant, which is most obviously TSP because this is what the reference measure (from the China plant) is. Please note that we have now added all

Issue #	Issue	Response
		forms of particulates to relevant tables in the revised WAA Section 8 Air emissions.
	Dot point 18	**Incorrect statement:** Hydrogen fluoride modelling results are not discussed in Section 8.3.2 of the WAA.
	Dot point 19	**Incorrect statement:** Hydrogen fluoride modelling results are not discussed in Section 8.3.2 of the WAA.
	Dot point 20	We don't believe making the (correct) assertion that emission levels further away (at sensitive receptors) would be lower is a redundant point. This is demonstrated by the data in Table 19 compared to Table 18. "The design criteria apply everywhere, and not just at sensitive receptors" – correct. It appears that the submitter is arguing against their own point made in 'dot point 14', which critiques that "the individual years are not shown at sensitive receptors".
	Dot point 21	The AQIA does this for PM_{10} – the issue of $PM_{2.5}$ is discussed above under dot point 16.
	Dot point 22	Contour plots are identical for each pollutant because they are functions of the meteorological data. Repeating contour plots (or including them at all) is therefore superfluous. Yes, a single modelling run was done to get an emission rate – particle depletion/ scavenging was not carried out. Such further manipulations would only reduce modelled GLCs further – we have chosen to use the highest level of conservatism at every opportunity, which is the most defensible practice.
	Dot point 23	Atmospheric conversion of NO_x to NO_2 might be a useful exercise but, given the assumption used that all NO_x is NO_2 is the most conservative case possible, such a consideration is redundant.
7	Noise emissions (various points)	We agree that Noise modelling would be the most reliable method of determining noise emissions at the nearest sensitive receptors but this is an unnecessarily expensive approach if noise emissions are expected to be low, as they are in this case. The WAA guideline distinguishes between requiring a general noise impact assessment (WAA guideline 9.1, which does not require noise modelling) and requiring a detailed noise impact assessment (WAA guideline 9.2, which requires noise modelling), to tailor the assessment effort to the risk. Since the buffer distance to the nearest sensitive receptor is more than twice that required for this type of industry, and the major noise emitting activities occur inside fully enclosed structures, the noise impact is likely to be low, and we believe that using modelling to demonstrate this is excessive. As a means of gauging our approach we provided a draft WAA to EPA to screen for the level of information provided. Their written response was that "the approach taken appears commensurate with the risks."

Issue #	Issue	Response
8	Stormwater – insufficient details provided (according to the guideline)	The Works Approval Guideline (EPA publication 1658) is clear that assessment of stormwater in the WAA is only required *"if your proposed works will result in generating contaminated stormwater."* The facility will not generate contaminated stormwater. Regardless, Chunxing have provided a detailed stormwater design within their Council planning permit, where it is required to be addressed and this detail has been shared with EPA.
9	Wastewater treatment system – insufficient details provided (according to the guideline)	The Works Approval Guideline (EPA publication 1658) requests details about a wastewater treatment system if your premises: *"- is or will be scheduled under the Scheduled Premises Regulations as Sewage Treatment (A03), or* *- involves operating a wastewater treatment system which does not discharge to a centralized treatment plant.* *and* *you intend to:* *- discharge the wastewater to surface water, or* *- apply the treated wastewater on land for reuse."* Chunxing's management and treatment of wastewater satisfies none of those definitions. Regardless, Chunxing have provided further details of wastewater treatment to EPA post submission of the WAA.
10	**Waste** Secondary beneficial reuse	 Your understanding of secondary beneficial reuse (SBR) in the practical Victorian regulatory context (with respect to ULABs) is **incorrect**. EPA have specifically advised us that they do not deem intact ULABs to be PIW. Consequently, there can be no SBR post treatment, if the original waste (ULABs) was not PIW in the first place.
	"Despite the proponent's claim that ULABs generated within Victoria are already recognised by EPA Victoria as having secondary beneficial re-use (and hence exemption as a PIW), no evidence of this EPA determination is provided in the WAA document."	This statement does not make sense and is **incorrect**. A search of the WAA shows that the term secondary beneficial re-use (or SBR or anything related to these) does not appear. Hence the proponent has never 'claimed' anything about SBR.
	Doubts about the correct scheduled premises classification and a question about 'the need .. to provide a financial assurance declaration.'	As discussed above, EPA have advised that ULABs are not PIW. They have also agreed that the scheduling of this plant would be I02 (Metal melting works) and A02 (Other waste treatment). We cannot see any requirement for financial assurance, nor has EPA suggested there would be one.

8.2.4 Response to community submission Part_6 (142 pages)

A detailed response to the142-page long community submission outlined in Part 6 of the submissions is provided below. Note that due to the size of the submission only the points requiring clarification have been directly addressed in **Table 24** below. Other points are taken simply as the objector's opinion that a response would not add tangible value to.

Table 24: Responses to community submission Part_6 (142 pages) (in addition to key themes)

Issue #	Issue	Response
1	Economic Viability of the Proposed Hazelwood Plant	See Section 8.2.2, Issue #1.
2	I believe that an EES is required for this proposed development	Reference is made to the EIS process in NSW, as was required for the Wagga plant upgrade, as a precedent that an EES is required in the Hazelwood North case. An EIS is not the same process (and does not have the same triggers) as an EES in Victoria. What is most important to note is that the Works Approval process does not exist in NSW, so the EIS process is the relevant approval mechanism. The technical rigour required by an EIS in NSW is significantly less than the scale of an EES in Victoria. The proponent has written to DELWP with a self-assessment of the need for an EES for the project, using the referral criteria outlined on page 7 of the relevant Ministerial guidelines[21]. It is clear from this assessment that no trigger for EES exists. DELWP has responded by phone to indicate that they are happy with this assessment.
3	Validity of monitoring data. The proponent claims that the emission data has been independently sourced, but has not provided any details as to methodology or certification processes involved in the independent sampling, testing and reporting of the emissions data.	Incorrect. Appendix H of the WAA provides all required details of the sampling and laboratory analysis, the methodology used, the certification of the independent samplers and testers that carried out and reported the work. All of these records have been supplied as translated by EPA's preferred certified translation service provider.
4	Was the China plant operating at full capacity at the time of monitoring?	Quarterly monitoring is carried out under typical plant operating conditions. ***Appendix 46*** (Monthly Production 2019.xlsx) is a monthly breakdown of lead product output production. These monthly production figures show that production was quite even in 2019. A theoretical monthly 100% production figure for the total 800,000 tpa ULAB would be 33,333 t/month Pb product. Using this figure, monthly production ranges from 60% in February (a typical slowdown month due to Chinese New Year) to 133% in October, at a monthly average of 106%. These figures are evidence that the plant was operating within a reasonable variation of full capacity during quarterly testing periods, which is the data used for modelling inputs for the Hazelwood plant.

[21] Department of Sustainability and Environment 2006, *Ministerial guidelines for assessment of environmental effects under the Environmental Effects At 1978*, seventh edition, available at: https://www.planning.vic.gov.au/__data/assets/pdf_file/0033/95487/DSE097_EES_FA.pdf

Issue #	Issue	Response
5	WAA Authorization	See response in Section 8.2.1 (Issue #42).
6	The site does not have the required 500 metre buffer	Incorrect. The buffer distance applies to 'sensitive land uses', which are defined by EPA[22] as: "Any land uses which require a particular focus on protecting the beneficial uses of the air environment relating to human health and wellbeing, local amenity and aesthetic enjoyment, for example residential premises, child care centres, pre-schools, primary schools, education centres or informal outdoor recreation sites." This excludes "adjacent industries, public road and the Council Transfer Station", but the industrial land user must comply with all relevant environmental regulations. The most important point to make is that the worst case emission from the plant is modelled to be 300 times below EPA standards and occur within the facility boundary. This provides similar levels of protection to co-located land uses as nearby sensitive land uses.
7	In referring to Figure 2 (p.184 of WAA), the proponent has labelled the western area of the site as "buffer zone – landscaped wetlands". This does not meet the EPA's definition of a 500m buffer requirement.	'Buffer zone', the term used by the draftsman is entirely appropriate. "Buffer zone" in this plant layout drawing takes the regular use of the term, to mean a buffer from the operating plant, that will not be further built on. This is not the EPA's 'separation distance', which is also commonly called a 'buffer' (see EPA publication 1518).
8	The proponent states on page 164 of WAA that air emissions will be deposited within an area up to 2km's from the stack, confirming that the Hazelwood North Primary School, the Council Transfer Station, adjacent industries and local residences will be impacted by toxic emissions.	See Section 8.1.1.2. This comment is false. The proponent does not 'state' this whatsoever. There is no such 'confirmation' of these impacts whatsoever. This objection (and others that have used the template) misuse information on p.164 of the WAA as a factual "admission" of emission impacts to the surrounding area. It is not.
9	Condition of the proposed site	WAA Section 11 described the relevant issues and requirements from the 2008 site environmental audit and commits to all of the conditions of the EMP.
10	The Latrobe Health Innovation Zone – how can the proposed ULAB Recycling Plant improve health standards within the Latrobe Valley?	Key themes Section 8.1.1.1 addresses the level of lead emissions from the proposed Hazelwood North facility, and demonstrates that they are many orders of magnitude below standards set by EPA to protect health, lower than natural lead levels in the air and below the level where EPA allows exemption from approval at all. The level of pollutant controls adopted by this facility is unprecedented in ULAB recycling in the world.

[22] See EPA publication 1518 (March 2013), *Recommended separation distances for industrial residual air emissions*, available at: https://www.epa.vic.gov.au/about-epa/publications/1518

Issue #	Issue	Response
		To adopt what would be the most advanced ULAB full-recycling facility in the world, in terms of environmental footprint, could be seen in the context of the Latrobe Health Innovation Zone as a highly innovative new business to the region. The innovation lies in Chunxing's decision to employ such levels of pollution control and prevention so as to be not only well-below current levels of standards set by EPA, but to anticipate a possible regulatory future that could lower these standards further. This plant is designed to be not only lower than EPA's health standards, but lower than natural levels of background lead in Latrobe Valley (and indeed Australia), as stated by the Australian Government Department of Agriculture, Water and the Environment[18]. This demonstrates a commitment in design to place the highest value on the health impact of those closest to the facility.
11	The proponent confirms on page 164 of the WAA, that emissions will impact the surrounding environment up to 2km's from the proposed facility.	See response to issue #8.
12	The applicant is, in the opinion of EPA, not a fit and proper person	No evidence supplied for this statement. There is certainly no such opinion from EPA.
13	We understand that Chunxing have plans for future expansion of the proposed plant. I believe we should know if the proponent is planning or considering future expansion irrespective of the timeframe.	Chunxing have stated, in every public and private meeting, that they have no plans for expansion of the proposed 50,000 tpa ULAB plant. There is no basis whatsoever for this 'understanding'. Any future expansion would have to be the subject of an entirely new works approval process.
14	This section does not include those approvals in addition to EPA Works Approval and Latrobe City Planning Approval. For example: Trade Waste Agreements, etc. that are referred to in the WAA document.	See EMM Consulting response to this issue (Section 8.2.3 Issue #1).
15	If the emission levels from the proposed facility are so low, why does the site need to be zoned Industrial 2?	The site is already zoned INZ2, regardless of a proponent's plans for it. It is required to be INZ2 because the plant is scheduled by EPA as I02 Melting Works, regardless of its emissions performance.
16	At the meeting on 19 June the proponent had not identified the sensitive receptors in the area and were surprised to hear that a primary school was located in the area.	This statement is completely false. Sensitive receptors were identified and discussed in all meetings. It is worth noting that these June 2019 meetings were arranged before the various assessments in the works approval had been finalised, or, in many cases even begun. We acted on the advice of the EPA to begin talking to the community early – in June 2019 it was very early in terms of the environmental assessments.

Issue #	Issue	Response
17	Limited Operating Timeframe (3 years): This is a very short operating timeframe and the therefore the China plant emissions data used is very limited and therefore unreliable as a basis to predict another plant's predicted emissions. A much longer term operating regime is required to establish a truly representative and reliable and proven emissions dataset.	This comment does not recognise the value of having a real, operational reference plant to provide actual emissions data. Most WAA's, including the one submitted for the Maryvale Mill EfW plant, do not have actual data available so they use a standard limit value as the emissions input into the model, on the basis that a manufacturer 'guarantees' within below this level because the equipment is made to comply with the law. In the case of the EfW proposal, the EU's IED limits were assumed as the emissions of the operating plant. We do not seek to criticize Paper Australia's approach. EPA require the use of actual data wherever possible – often this is simply a one-off measurement study from a similar plant. EPA allow the use of arbitrary values like standard limits in the case of no other available data. Regarding the Chunxing situation, to have 3-years of constant independent monitoring data is a luxury most greenfield project do not have. To imply that a regime of longer than 3 years data is 'required' requests a level of information, for an identical-designed plant, that does not exist in the real world.
18	Hazelwood Plant Design Basis – Design Changes. The WAA provides numerous examples of how the design of the China plant has been modified for the proposed Hazelwood Plant. Examples contained in the WAA that describe changes to the China Plant's design include, for example: Page 21 and page 44 – Partition / plastic separators; Page 27 – two scrubbers in series; Page 28 – two more scrubbers in parallel; Page 35 – additional controls; Page 38 – Baghouses; Page 50 – Plastic separators to landfill; Page 92 – Removal of input plastics from the furnace feed; and Page 103 – Sulfuric acid mist – further improvements to design.	We state in the WAA in Section 4.2 and reiterate in other places that the Hazelwood plant: " uses a smaller scale but virtually identical design" to the China reference plant. This is the case. <u>Partition / plastic separators</u> – this is a design change to remove the risk of dioxin formation, by removing them from the furnace. We have deliberately retained the China dioxin emission data (they combust these separators in their furnace) to take a conservative approach on dioxins – therefore our model over-estimates this emission. This is the most conservative and transparent thing to do. <u>Two scrubbers in series</u> – this is not a design change. It has always been in the WAA and reflects the China approach. <u>Two more scrubbers in parallel</u> – this is not a design change. It has always been in the WAA and reflects the China approach. <u>Page 35 – additional controls</u> – there are additional controls planned for Hazelwood North but the modelling assumes these do not occur to maintain the most conservative and transparent approach. <u>Page 38 – Baghouses</u> – there is no mention of baghouses on p.38 of the WAA. <u>Plastic separators to landfill/ Removal of input plastics from the furnace feed</u> – this is the same point as "Partition / plastic separators" above. <u>Sulfuric acid mist – further improvements to design</u> – as discussed in this section of the WAA, this is an improvement the Hazelwood North design will adopt to lower acid mist emissions. However, to preserve the most conservative and transparent approach, the modelling assumes this improvement has not been done.

Issue #	Issue	Response
	It is not clear if that modelling has been updated to take account of the recent planned design modifications … etc.	Modelling has not been updated to take account of the recent planned design modifications. This preserves the most conservative and transparent approach, because in all cases, such changes will result in lower emissions.
19	The company claims that emissions will be so low they will be exempt from a licence to emit waste into the atmosphere	This is incorrect. The emissions we model are below Regulation 10 exemption levels, which technically allow an exemption from Works Approval for stack emissions. However, because they are the core issue of community concerns, we provide a full assessment in the WAA. We have never claimed or requested an exemption from licensing of these emissions, and would certainly not expect there to be.
20	Slag waste Slag volume 4,000 or 4,500 tpa? There is doubt regarding the level of lead contamination within the slag. It is understood, that the plastic separators that will disposed of into an EPA approved landfill, are severely contaminated and require treatment before being able to transported off site. The proponent does not describe how the plastic separators will be treated prior to being transported off site.	The correct figure is 4,500 tpa of slag. We apologise for the error in Section 4.3 (where 4,000 is mentioned). It is noted that this is only 11% less, which makes no material impact on the assessment. We have quoted a range of 0.2 – 0.56% lead, for indicative classification purposes, in Section 12.4.2.1 of the WAA. Chunxing's waste separators are typically <<1% Pb due to the cleaning techniques used by Chunxing in their battery breaking/ separation process, which is more advanced than their competitors. A current spot-test (carried out at the China plant) came back as 0.012% Pb and 3mg/L as TCLP. Consequently we remain comfortable with the WAA's indicative waste characterisation of Cat B or Cat C. Therefore this waste stream is manageable within the existing waste management classification and management system in Victoria. Ultimately, correct classification of this wastestream will be an operational issue, to be demonstrated through actual testing. The purpose of the WAA is to identify likely classification and demonstrate that the waste can be managed within the Victorian waste management framework.
21	To provide increased certainty, the proponent should include in the WAA further information regarding the monitoring program for each pollutant (Table 5 proposes such a regime).	The monitoring program will be established in detailed design and confirmed once constructed with EPA, to be used in commissioning. Parameters as suggested will be detailed in the 'Air' conditions of the EPA licence.
22	Section 5.1 – Environmental Risk Assessment Where is the risk assessment? The proponent claims that the EPA's application checklist provides the basis for the	"Environmental Risk Assessment" in the context of this section is simply a summary of the detailed assessments carried out in each chapter, which is used (in consultation with EPA) to agree on the most important considerations of the WAA. It is not as simple as the 'boxed' information – they are summaries of detailed assessments in subsequent chapters that have been carried out commensurate with the risks they pose.

Issue #	Issue	Response
	environmental risk assessment.	
23	Net reducer of GHG emissions – the GHD assessment does not include the transport of ULAB's, refined lead and other waste products and should be re-assessed with transport included	(Off site) transport is not included in Scope 1 and 2 emissions[23] (as required by EPA in the WAA).
24	Chunxing's energy use per tonne of lead produced is higher than conventional smelting alternatives appears to be an error	Correct, this is an error. Thank you for pointing this out.
25	"Best practice process controls including …" is a subjective claim and not substantiated	This statement is incorrect – these are not subjective claims. These process controls are actual best practice controls identified in the best practice reference documents used, as is transparent in Table 20 of the WAA.
26	"Best practice air pollution controls by......", again is a subjective claim and not substantiated	This statement is incorrect – these are not subjective claims. These air pollution controls are actual best practice controls identified in the best practice reference documents used, as is transparent in Table 21 of the WAA.
27	The comment (c) – "Keeping combustion or co-combustion gases at a temperature of at least 850 degree c for at least two seconds after the last injection of air", does not include the additional requirements as discussed on page 81 of the WAA	All aspects of IED compliance are described and assessed in the Air section's Best Practice assessment, and are summarised in Table 22.
28	Water Resource Use: Checks need to be made to confirm that the sewer is able to take these discharges, particularly if they carry in solution toxic pollutants.	Letter confirming Gippsland Water's interest and capability to accept trade waste is provided in our technical Notice responses to EPA, post submission of the WAA.
29	To find what the stack height is, the reader must refer to Appendix C – Responses to Issues and Concern Raised by Stakeholders, page 169 of the WAA, Question 18 What height is the stack? The response is "Maximum	It is appropriate that technical details important to air modelling would be found in the air modelling report (at Appendix G), which supports Section 8. That is where this information is (Table 2 of the AQIA).

[23] https://ghgprotocol.org/sites/default/files/standards_supporting/Chapter4.pdf

Issue #	Issue	Response
	height is 30m". You would expect to find details regarding the stack in the body of the WAA, in discussions regarding air modelling, etc.	
30	There is no information regarding stack diameter, efflux velocity and typical and maximum lead concentrations, making it impossible to calculate the volume flow and therefore the plume dispersion calculations	Incorrect. These data are provided in Table 2 of the AQIA report at Appendix G.
31	In the application a statement is made that the lead emissions from the plant represent one 300th of the EPA standard but nowhere is this standard value quoted.	Incorrect. This standard value (the EPA design criteria) is quoted throughout the WAA Section 8, the AQIA report at Appendix G and in the stakeholder responses (Appendix C). It has been presented and quoted in every presentation/ meeting held from the beginning in June 2019. The design criteria (standard) for Lead is 0.003 mg/m^3 (quoted in Table 19 plus many other places), the worst case lead GLC is 0.000009 mg/m^3 (quoted in Table 18 amongst many other places) and one divided by the other gives 333 times.
32	I am not sure how the proponent can comment on compliance with the standard, since the EPA has not issued a license indicating what the limits are!	Incorrect. This author has consistently stated in writing, in the press, in meetings and in the WAA that the worst case emission will be 300 times below EPA design criteria, referred to as 'the EPA standard or limit' in shorthand, because people do not readily understand what design criteria means. This is not the same as an EPA licence limit, which has not been set yet.
33	Why is the modelling restricted to only quarterly stack testing and not CEMS and annual monitoring data	CEMS in internal data that is not obtained by an independent stack tester. It is also not calibrated to represent the same sampling and analysis techniques as required to assess against the plant's licence limits. There is no 'annual monitoring data' – there are 4 quarterly data points. The writer is used to annual monitoring because that is how often the power station he worked at were required by EPA to have stack testing done. The Chinese regulator requires it every quarter.
34	As discussed in Section 4.4.7 – Air Pollution Control System (page 27) the Hazelwood North plant reflects significant changes to the pollution control system including bag houses, scrubbers, etc.	Incorrect. This section makes no mention of 'changes'. It simply describes the pollution control system.
35	Referring to "Table 18: Summary of Modelled GLC Results 2012 – 2016", the reference to "2012" does	2012-2016 is the five years of meteorological data used for modelling. It has nothing to do with the operating history of the China plant.

Issue #	Issue	Response
	not appear to be correct based on the limited operating history of the China reference plant.	
36	Emission Discharges meet IED with respect to – at least non-continuous air emission monitoring of other pollutants such as heavy metals, dioxins and furans, a minimum of two measurements per year, which should be more frequent during the initial operation of the plan".	If this comment is in reference to the China plant, it has quarterly monitoring of heavy metals and 6-monthly monitoring of dioxins, so is in compliance. If it is in reference to Hazelwood North it isn't built yet, but will comply with these requirements. It is important to be aware that the EU IED is for incineration plants – we are just using it as a useful stringent guide for a lead acid battery plant.
37	The China Plant data provided in Table 23 for dioxins and Furans is not that much below IED Limits	Correct, although it is noted that the IED limit for dioxins is the most stringent standard in the world and is set to protect human health. It is also noted that these emission levels (modelled for Hazelwood North) result in GLCs well below the Exemption level. Regardless, the Hazelwood plant has removed the potential for dioxin formation anyway, by not putting plastic separators in the furnace (as has been done in the China plant although it should be noted that this has now stopped as a learning from this WAA process).
38	The proponent in providing the power station lead emissions is scare mongering and being unprofessional in their assessment and comparison of their proposed plant lead emissions, with existing Latrobe Valley generators.	NPI data may have limitations – which is not confined to Power Stations – but for the purposes of comparing total mass emissions per year it is the most reliable and comprehensive, fully transparent and published data there is. The power station CEO's themselves have signed off on these emissions numbers as true and correct, as part of the NPI data submission process. Are you suggesting the CEO's in question are providing the community with false emissions information?
39	The proponent is inferring that since other plants emit lead, then it is OK for them to emit lead – i.e. they believe that gives them a social licence to further pollute the environment. Not the attitude or culture that a good corporate citizen would display!	There is no such inference. Chunxing has demonstrated in the WAA how far it feels necessary to go beyond compliance with SEPP and design criteria. We are designing out plant to operate far beneath the current standard as a way of ensuring any future more stringent requirements can also be met.
40	The proponent states (page 91 of the WAA): "Noise modelling would be the most reliable method of determining noise emissions at the nearest sensitive receptor, but this is an unnecessarily	We state that Noise modelling would be the most reliable method of determining noise emissions at the nearest sensitive receptors but this is an unnecessarily expensive approach if noise emissions are expected to be low, as they are in this case. The WAA guideline distinguishes between requiring a general noise impact assessment (WAA guideline 9.1, which does not require noise modelling) and requiring a detailed noise impact

Issue #	Issue	Response
	expensive approach if noise emissions are expected to be low". This statement suggests that cost is the controlling factor in the assessment of noise.	assessment (WAA guideline 9.2, which requires noise modelling), to tailor the assessment effort to the risk. Since the buffer distance to the nearest sensitive receptor is more than twice that required for this type of industry, and the major noise emitting activities occur inside fully enclosed structures, the noise impact is likely to be low, and we believe that using modelling to demonstrate this is excessive. As a means of gauging our approach we provided a draft WAA to EPA to screen for the level of information provided. Their written response was that "the approach taken appears commensurate with the risks."
41	It is understood that over time, the water will collect pollutants which will be held in solution within the water. The discharge of wastewater off site will need to be treated to enable water quality and quantity parameters to be met.	Incorrect. Refer to Section 8.2.1, Issue #12.
42	My interpretation is that basically, the proponent can effectively promise what they like in the WAA to gain the required EPA WAA approval. However, once EPA approval is obtained, the proponent can then proceed to construct the plant without any further EPA approval being required, until such time during construction, the proponent will contact the EPA to obtain a commissioning license.	The Works Approval provides an approval to proceed to construction, Once constructed, a second approval process begins, where the proponent's emissions performance must demonstrate compliance with Works Approval. Unlike other applicants for Works Approval, who don't use actual emissions data but select a higher value, such as a benchmark standard level (for example the EU IED), Chunxing will be held to account to the levels outlined in this WAA.
43	It appears that the proponent, Chunxing Corporation, does not stand behind the predicted emission levels provided in their WAA.	Chunxing Corporation, absolutely stands behind the predicted emission levels provided in the WAA.
44	The proponent's statement that "All lead remains in the top 150mm of soil" is a real concern in the use of the surrounding land not only for agricultural use but also children playing in paddocks / lawns in residential areas and the local school. The Hazelwood North playgroup	This comment is false and completely misrepresents the information supplied in the WAA. See Issue #8's response (in this table).

Issue #	Issue	Response
	also located within 2km's of the stack, opposite the Hazelwood North Primary School, again presenting a risk to human health.	
45	As noted above in Section 6.1 - ‚Process CO2 emissions method, the greenhouse gas emissions associated with the gas and electricity used in the process should be also included in the proponent's greenhouse gas assessment.	The GHG emissions associated with the gas and electricity used in the process are included in the proponent's greenhouse gas assessment.

8.2.5 Response to submission Part_4 pp.23 – 30

A detailed response to the submission provided in Part_4 pp.23 – 30 is provided below. While this submission was not as long as others in this document we have responded individually to it because of the uniqueness of issues it raises.

Table 25: Responses to submission Part_4 pp.23 – 30 (in addition to key themes)

Issue #	Issue	Response
1	The materials provided by Ascend Waste and Environment and Chunxing show the Valley exposure … will be at hazardous levels ..	The assertion is incorrect. 'Hazardous levels' are determined by modelled ground level concentrations (GLCs) referenced to design criteria. Lead GLCs from the facility have been modelled (based on the worst case result found anywhere in the domain) to be more than 300 times below the design criteria. Furthermore, these levels are beneath 'natural background' for lead as described by the Australian Government.[18]
2	The narrow and "deliberate" restricted framing of the proposal to exclude potential sites of exposure to the Valley community	There is no restricted framing to exclude anything – the modelling study domain is 5km by 5km with its centrepoint on the facility, as is the requirement for modelling set by EPA.
3	The modelling and assumptions used treat the plant as a greenfields site	The modelling is provided both with background and without so it is not treated as a 'greenfields' site. The modelled GLCs and the total emission loads demonstrate that this proposal certainly does not 'represent a significant increase in local toxic exposure and carbon emissions.'
4	A dramatic and unsustainable increase in carbon emissions	This is demonstrated by the GHG emissions section of the WAA (specifically p.63) to be incorrect. The emissions from this plant make up just 0.02% of current power station carbon emissions in the Latrobe Valley. This does not include other LV industry, agricultural, transport and other non-industrial sources.
5	Increase in PM10 and PM2.5 pollution through diesel emissions.	Ten additional trucks per day does not constitute "a substantial rise in traffic movements' and is so incrementally small as to provide virtually no additional impact to air quality in the region.
6	Modeling parameters that do not include the conditions experienced in Nov 2019-Jan 2020	The submission was provided in December 2019. It is not possible to include data from a period in the future. CO_2 'exposure' is not a ground level air quality issue but a global greenhouse gas/ climate change issue. Moreover, modelling follows procedures required by EPA, which is to use 6 years of meteorological data. Because of the massive scale of these datasets, and the need to provide extensive QA in their preparation for use, 2012-2016 was officially the most recent data available and useable for air quality modelling in 2019.
7	The lack of track record of either of the two directors in the field of lead smelting	<u>Director no.1</u>: Dr Lakshman Jayaweera came to Australia from Sri Lanka in 1978. Dr Jayaweera is a chemical engineer by profession with over 30 years' experience in the resource recovery sector in Australia, including his career success with Rio Tinto (formerly, CRA Ltd) from 1980 to 1986. He was the founder of Hydromet Corporation Limited, a company specialising in metallurgical processing and metal recycling in Australia, particularly in the field of lead acid battery recycling. During his tenure in the company from 1990 to 2012, he held various positions including Managing Director and Executive Chairman.

Issue #	Issue	Response
		Director no.2: Feng Chen ('she' not 'he') completed her Accounting degree and CPA in Australia and then worked in China with Chunxing (in the plant in Jiangsu Province) as a project manager looking after overseas projects. She then returned to Australia five years ago and was the CEO of a trading company, prior to joining Chunxing's Australian operation. She has remained close to the China plant's operations during that time.
8	The unconventional company structure with neither director having financial buy-in to the project	This comment is irrelevant to the assessment for works approval. The New Chunxing Resource Recycling Group have provided 100% of the project establishment funding. Overseas investors in an Australian company is common, and Chunxing Corporation Pty Ltd (the Australian company) has two Australian Directors which is also common. Once the facility is approved and in the establishment phase, the company plan to expand the company structure to four directors, all of whom will become shareholders in the company. Ultimately it is expected that the company will list on the Australian Stock Exchange.

8.2.6 Response to Latrobe Valley Health Assembly

A detailed response to the Latrobe Valley Health Assembly's submission is provided below.

The Latrobe Health Assembly's submission provides a useful overview of the declaration of the Latrobe Valley as Australia's first Health Innovation Zone, and provides accurate and well-researched evidence about the hazards associated with lead and how that relates to air quality standards. There is also a range of recommendations that pertain to EPA.

Our response below provides a small number of clarifications where we feel it to be necessary.

Table 26: Responses to Latrobe Valley Health Assembly submission (in addition to key themes)

Issue #	Issue	Response
1	Air quality standards	All of the information provided in the submission regarding the regulation of lead in ambient air is correct. We have a few minor corrections: • The US EPA does not list lead as a "critical" air pollutant, but rather a "criteria" air pollutant. This is long-established regulatory language, which denotes those pollutants monitored in ambient air that are seen as the most important –due to their health concerns but also their ubiquity in urban living. Lead was established years ago as a criteria pollutant because of its historical presence in petrol. • This is the reason there is no other metal designated as a "criteria" pollutant in the US NAAQS. • EPA Vic's equivalent to this structure is to designate Class 1 indicators (to be equivalent to criteria air pollutants) while Classes 2 and 3 are typically more toxic pollutants but are found less regularly in an industrial context.
2	The hazards of lead and how this relates to the Latrobe Health Innovation Zone	Chunxing agrees wholeheartedly with the Latrobe Health Assembly's summary of the literature's evidence of the health effects of lead, particularly for children and unborn infants. That is why the plant's design prioritises the highest levels of emission controls possible. More universally, that is why the WHO and similar organisations identify that ULAB recycling must be preferenced above mining for virgin lead and that such recycling must be done in a highly controlled facility in a highly regulated manner. Section 1.1 of our first Notice response (key themes) addresses the level of lead emissions from the proposed Hazelwood North facility, and demonstrates that they are <u>many orders of magnitude</u> below standards set by EPA to protect health, lower than natural lead levels in the air and below the level where EPA allows exemption from approval at all. The level of pollutant controls adopted by this facility is unprecedented in ULAB recycling in the world. To adopt what would be the most advanced ULAB full-recycling facility in the world, in terms of environmental footprint, could be seen in the context of the Latrobe Health Innovation Zone as a highly innovative new business to the region. The innovation lies in

Issue #	Issue	Response
		Chunxing's decision to employ such levels of pollution control and prevention so as to be not only well-below current levels of standards set by EPA, but to anticipate a possible regulatory future that could lower these standards further. This plant is designed to be not only lower than EPA's health standards, but lower than natural levels of background lead in Latrobe Valley (and indeed Australia), as stated by the Australian Government Department of Agriculture, Water and the Environment[18]. This demonstrates a commitment in design to place the highest value on the health impact of those closest to the facility.
3	Community concerns	We also agree with your assessment of some of the community's concern and can understand why. Our view is that these concerns must be discussed with access to facts wherever possible. The author has communicated directly to the author of the WHO document, from which much of the lead health-related information found in submissions to this process have been sourced. Dr. Joanna Tempowski, the author, noted that the "there is a lot of anxiety about lead exposure, and risk communication around this topic can be difficult." We agree that these concepts are difficult to convey and are easily misunderstood." The WHO itself has also published[24] an indicative relationship between ambient levels of lead in the air and how that might translate to blood levels in children, the most vulnerable group. It deduced a relationship that a concentration of 1 µg/m3 Pb in ambient air could approximately produce a blood concentration (in children) of 1.9 µg/dL of Pb in blood, and that 10 µg/dL was a 'critical level' for children. Using this data, if Chunxing's worst case ground level concentration was not a one-off worst case but occurred 24 hours a day, it could theoretically result in a level in blood of 0.0038 µg/dL, which is 2,600 times below this 'critical level' and 2 orders of magnitude below typical detection limits blood testing laboratories are capable of achieving (0.1µg/L). Laboratory detection limits are science's practical way of determining "zero".
4	Technicality re distance to Hazelwood North Primary School	Section 2.3 of the WAA does not state that the Hazelwood North Primary School is located "around 1.7km from the stack" but rather "approximately 1.7 km south east from the nearest point on the proposed site boundary." Further, p.162 of the WAA explains that the distance from the primary school to the actual stack emission point is 2.0km, due to its position on the plan of the site.

[24] http://www.euro.who.int/__data/assets/pdf_file/0020/123077/AQG2ndEd_6_7Lead.pdf

8.2.7 Response to Voices of the Valley submission

A detailed response to the Voices of the Valley submission is provided below.

Table 27: Responses to Voices of the Valley submission (in addition to key themes)

Issue #	Issue	Response
1	Health aspects of the proposal and its relationship with the Latrobe Health Innovation Zone	To adopt what would be the most advanced ULAB full-recycling facility in the world, in terms of environmental footprint, could be seen in the context of the Latrobe Health Innovation Zone as a highly innovative new business to the region. The innovation lies in Chunxing's decision to employ such levels of pollution control and prevention so as to be not only well-below current levels of standards set by EPA, but to anticipate a possible regulatory future that could lower these standards further. This plant is designed to be not only lower than EPA's health standards, but lower than natural levels of background lead in Latrobe Valley (and indeed Australia), as stated by the Australian Government Department of Agriculture, Water and the Environment[18]. This demonstrates a commitment in design to place the highest value on the health impact of those closest to the facility.
2	The difficulty of measuring very low lead emissions means that it would also be difficult to measure the cumulative amount of lead released by the plant and remaining in the surrounding environment	Although this issue is not described in detail in the submission, it is worthy of exploration. There is no inherent difficulty in measuring lead in a laboratory sense – methods are widely available and reasonable detection limits are achievable for analysis of lead compared to other heavy metals. The issue relates to a CEMS system, which is a real time system employed in industrial facilities to monitor flue gas pollutants continuously to ensure good process control. These systems do not have the ability to monitor lead in real time. Whether this limitation extends to sensor-based field monitoring equipment is a different issue and one to be explored. Early indications from the providers of current monitoring networks indicated that lead could be done. Regardless, for either CEMS or real-time field monitoring, because the battery feedstock is consistent, a conservative relationship can be established between particles (covered by these systems) and the lead composition of particles, since lead is present as a solid. This relationship is established by historical testing of samples of dust (for lead), assuming the results are consistent over time. Dust deposition sampling and analysis is the conventional way to test for dust and its compositional elements in the field, but this is not in real time.
3	Issues with Chunxing's community engagement	This issue is, in the main, covered in the key themes. We admit that out approach to community consultation has not been without its challenges. However, there are some points we wish to address: • The first two meetings (June 2019) were held before the WAA had even begun to be written – we were advised by EPA to get information out early so we did. In hindsight we would have waited until our environmental assessments were more complete. • We were not in a position to hold detailed community meetings again until we had a formed environmental assessment. • As our WAA draft was closer to completion, we had several meetings with stakeholders, including several with Action Group members, with whom we shared our draft of the WAA and all the data underpinning that. This was before we had even submitted the WAA to EPA.

Issue #	Issue	Response
		• Shortly thereafter the Action Group called two community meetings about our proposal. We asked to attend and present but were specifically declined from any involvement. • Having been provided with both a report of the meetings and the specific handouts from them, we were surprised at the blatant inaccuracies printed as an emotional series of 'claims', at the meeting, in the written handout and in subsequent media appearances. These claims were presented as fact and understandably garnered a lot of opposition to the proposal. The details, environmental assessments or other facts about the proposal were completely absent from these meetings. • It was in this context that the October 29 meeting by Chunxing took place. • We took this meeting as the only opportunity we had to respond to some of the most inaccurate claims previously made by the Action Group. • Questions and issues from genuinely concerned residents were not "dismissed" or "mocked". In fact, in all of our interactions with people with genuine concerns we have been respectful and sensitive, and we have always followed up with additional information. However, a firm tone was taken with those from the Action Group whose purpose was to disrupt the meeting. • We apologise for this being interpreted as aggressive. Indeed the author has had discussions with one individual after the event where we both apologised to each other for our behaviour and have spoken a number of times since, recognising each other's' differing point of view.
4	Transport	The WAA discusses packaging and transport requirements for ULABs in Section 12.5.1. There is no ULAB-specific fire risk associated with transport, as there are no flammable material components of ULABs. There is such a risk with lithium-ion batteries but not ULABs. The comparison with the Maryvale proposal was provided for context. A traffic assessment is part of the Council planning permit process but is not specifically required by the EPA WA. It was included because the community had asked for it to be responded to. ULABs move in Victoria (and interstate) within the requirements of waste tracking systems, which include specific permitting requirements for drivers and vehicles, who must be permitted (licensed) by EPA to carry the waste in question, in this case 'D220 lead and compounds'.
5	The WAA considers and rejects burning plastic for energy so as not to produce associated emissions. It mentions this in several places – is this a genuine concern or a	Of course this is a genuine concern. Dioxins are class 3 indicators and we must take reasonable steps to reduce these to the maximum extent achievable, as required for best practice in EPA's SEPP (AQM). As a result of our advice the China plant has now stopped the practice of burning plastic separators. We mention it in a couple of places because EPA's required structure for works approval applications is somewhat clunky and repetitive.

Issue #	Issue	Response
	distraction from other risky emissions?	
6	We are greatly concerned that in sections 8.1 and 8.5 they assert emissions will be so low as to not require a licence for air emissions	This is not simply an assertion. The data we have indicates that a works approval does not technically have to consider air emissions if the levels are below Regulation 10's Exemption levels (as mass rate out of stack). The only debate about this is whether to 'believe' the data from the China reference plant. Given all of the accreditations of samplers, testers and the requirements in the China plant's environmental licence, along with our understanding of the pollution control systems used, we have no suspicion that these data are fabricated. However, this is up to EPA to determine, and we have welcomed throughout their visit to audit the plant in question. Regardless of these comments, we have never entertained not including emissions data in the WAA, nor have we ever imagined that such emissions would not be licensed.
7	There should be an assessment of how the proposed plant might add to the existing pollution load in the LV	This is already done in two ways. Firstly, total emission loads are compared across other major LV sources for all pollutants. Secondly, the AQIA (Appendix G) presents and discusses results both with and without background (which is a sum of all existing emission sources dispersed as an ambient concentration).
8	Appendix J Relevant offence declaration has been left blank	Incorrect. It was supplied as a separate Appendix document as part of the submission. This is available at Engage Victoria's website, specifically: https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/6815/7601/4981/Appendix_J_Relevant_offence_declaration.PDF
9	There are comments at various points in the WAA that the expected emissions are lower than are required to be regulated. This is something to be determined by the EPA not the proponents.	These emissions will be regulated and covered by EPA licence conditions. We specifically enquired with EPA, in writing, about how the process of identifying if you are under the Regulation 10 exemption works. They indicated that it was self-assessed in the first instance, so that is what we did in the WAA.

8.2.8 Response to submission Part_1 pp.45 – 50

A detailed response to submission Part_1 pp.45 – 50 is provided below.

Table 28: Responses to submission Part_1 pp.45 – 50 (in addition to key themes)

Issue #	Issue	Response
1	The company goes on to make the breathtaking claim that their lead emissions fall far below the EPA Regulation 10 level and are thus technically exempt from regulation	This is simply posited evidence. The data we have indicates that air emissions are likely to be below Regulation 10 mass emission rates. The only debate about this is whether to 'believe' the data from the China reference plant. Given all of the accreditations of samplers, testers and the requirements in the China plant's environmental licence, along with our understanding of the pollution control systems used, we have no suspicion that these data are fabricated. However, this is up to EPA to determine, and we have welcomed throughout a visit by them to audit the plant in question. Regardless of these comments, we have never entertained not including emissions data in the WAA, nor have we ever imagined that such emissions would not be licensed.
2	The company is relying on computer modelling when it states that the major deposition zone of its lead bearing particulates lies within the perimeter of the plant. Chunxing claims that this local deposition is due to the high density lead content of the particulates.	The modelling simply indicates that the worst case emission anywhere in the study zone occurs with the plant's boundary. There is no further comment about the density of the particles, this is simply what the model predicts as a ground level concentration. This comment goes on to talk about the 'deposition rate' being greater than what is predicted. The modelling approach and parameters used are completely in line with EPA's requirements, and this is what the model predicts.
3	Chunxing claims three years of modelling data was used to determine the plume behaviour when determining the maximum ground level concentration, but I'm uncertain that the modelling has been updated to take account of recent planned modifications, including the installation of wet lime scrubbers to control sulphur dioxide and sulphuric acid mist.	Incorrect – 5 years of modelling data was used. The 'recent planned modifications' are not modifications they have always been part of the plant's design. The modelling reflects this. We state in the WAA in Section 4.2 and reiterate in other places that the Hazelwood plant: " uses a smaller scale but virtually identical design" to the China reference plant. The only design changes are: <u>Partition / plastic separators</u> – this is a design change to remove the risk of dioxin formation, by removing them from the furnace. We have deliberately retained the China dioxin emission data (they have been combusting these separators in their furnace) to take a conservative approach on dioxins – therefore our model over-estimates this emission. This is the most conservative and transparent thing to do. <u>Sulfuric acid mist – further improvements to design</u> – as discussed in this section of the WAA, this is an improvement the Hazelwood North design will adopt to lower acid mist emissions. However, to preserve the most conservative and transparent approach, the modelling assumes this improvement has not been done.

Issue #	Issue	Response
		Modelling has not been updated to take account of the recent planned design modifications. This preserves the most conservative and transparent approach, because in all cases, such changes will result in lower emissions.
4	What method will the Company use to continuously monitor the emission of lead from the plant? Much is made of the use of CEMS instrumentation to provide real- time data relating to stack emissions, but there is no suitable method for short- term monitoring of lead in air, particularly at the levels they claim in their application.	CEMS systems do not have the ability to monitor lead in real time. Whether this limitation extends to sensor-based field monitoring equipment is a different issue and one to be explored. Early indications from the providers of current monitoring networks indicated that lead could be done. Regardless, for either CEMS or real-time field monitoring, because the battery feedstock is consistent, a relationship can be established between particles (covered by these systems) and the lead composition of particles, since lead is present as a solid. This relationship is established by historical testing of samples of dust (for lead), assuming the results are consistent over time. Dust deposition sampling and analysis is the conventional way to test for dust and its compositional elements in the field, but this is not in real time. These comments are consistent with the discussion on this issue provided by the commenter.
5	Grossly exaggerated emission data for the three large power stations	NPI data may have limitations – which is not confined to Power Stations – but for the purposes of comparing total mass emissions per year it is the most reliable and comprehensive, fully transparent and published data there is. The power station CEO's themselves have signed off on these emissions numbers as true and correct, as part of the NPI data submission process. It is unlikely that the CEO's in question would knowingly provide the community with false emissions information.
6	Why does the applicant withhold some of the parameters relating to the plant discharge point? It seems that an effort is being made to downplay the true situation with regard to the emissions and their verification by an independent assessor	Incorrect. All parameters are provided in Table 2 of the AQIA report at Appendix G, as well as in the supporting Excel workbook and the myriad of modelling datafiles supplied to EPA.
7	The last-minute modifications to the plant design, by incorporating extra lime scrubbers and further cooling to reduce sulphur emissions has drastically reduced the discharge temperature of the stack emissions. What impact will these modifications have on the plume dispersion? Has	There are no last-minute modifications to the plant design – these aspects are the design. Modelling is based precisely on this design.

Issue #	Issue	Response
	modelling data been obtained for the modifications and the lower stack temperature?	

8.2.9 Response to submission Part_8 pp.12 – 40

A detailed response to submission Part_8 pp.12 – 40 is provided below.

This submission takes a reasonable and well-referenced approach to the issues it raises. We provide responses to a number its points made below. There are a number of recommendations identified for EPA's consideration. Thank you for the considered approach taken in your analysis.

Table 29: Responses to submission Part_8 pp.12 – 40 (in addition to key themes)

Issue #	Issue	Response
1	Current data suggests we do not exceed annual supply of spent ULAB and have sufficient existing processing capability and plant extensions approvals to meet any increase.	Your assumptions about the Australian ULAB market do not consider the role of the Australian Government's Hazardous Waste Imports and Exports Act, which implements our obligations under the Basel Convention. Please refer to Section 8.2.2, Issue #1.
2	Issues raised about the Proponent's consultation approach	This issue is, in the main, is covered in 'key themes' (Section 8.1.1.9). We admit that out approach to community consultation has not been without its challenges. However, there are some points we wish to address: • The first two meetings (June 2019) were held before the WAA had even begun to be written – we were advised by EPA to get information out early so we did. In hindsight we would have waited until our environmental assessments were more complete. • We were not in a position to hold detailed community meetings again until we had a formed environmental assessment. • As our WAA draft was closer to completion, we had several meetings with stakeholders, including several with Action Group members, with whom we shared our draft of the WAA and all the data underpinning that. This was before we had even submitted the WAA to EPA. • Shortly thereafter the Action Group called two community meetings about our proposal. We asked to attend and present but were specifically declined from any involvement. • Having been provided with both a report of the meetings and the specific handouts from them, we were surprised at the blatant inaccuracies printed as an emotional series of 'claims', at the meeting, in the written handout and in subsequent media appearances. These claims were presented as fact and understandably garnered a lot of opposition to the proposal. The details, environmental

Issue #	Issue	Response
		assessments or other facts about the proposal were completely absent from these meetings. • It was in this context that the October 29 meeting by Chunxing took place. • We took this meeting as the only opportunity we had to respond to some of the most wildly inaccurate claims previously made by the Action Group. • In all of our interactions with people with genuine concerns we have been respectful and sensitive, and have always followed up with additional information. However, a firm tone was taken with those from the Action Group whose purpose was to disrupt the meeting. • We apologise for this being interpreted as adversarial. Indeed the author has had discussions with one individual after the event where we both apologised for our behaviour and have spoken a number of times since, recognising each other's' sometimes differing point of view.
3	It is possible to consider that several items in Chunxing "fact" sheets /response may be viewed as interpretations/assumptions rather than facts and these may be issued without substantive supporting independent evidence.	Everything that the proponent has claimed in writing, in the WAA, in the media or in public meetings is supported by evidence. It is your or anyone's right to contest our evidence.
4	One example is in relation to the World Health Organisation policy on no safe exposure levels to lead. The Company advises (claim#2 ,page 171) in the WAA this is misleading. However, at present I am unable to locate in the WHO published material on lead any available information that it has qualified this finding or amended it's global advice that would support the Company position that this is misleading.	The claim and response on page 171 of the WAA says in full: *"Claim #2: The World Health Organisation (WHO) say "there is no safe level of lead"* *• This is a misleading statement.* *• The WHO's document is actually written to address a worldwide problem of lead impacts from unregulated, sometimes backyard recycling operations, particularly those in developing countries. The proposed ULAB facility will be heavily regulated using modern technology and techniques to ensure the safety of its employees and the community.* *• To compare the environmental credentials of these approaches with those of the proposed facility is like comparing the speed of a horse and cart with that of a jumbo jet. They both get you from A to B though, in the same way rudimentary and high- technology recycling both recover lead.* *• Lead is present in the earth's crust and as a result is naturally present in soil, water and air. It is also found in processed foods and some consumer products. A safe level of lead is measured by a set of standards. The WHO's own safe level of lead in drinking water is set at 10 µg/L. These levels are not and should not be a cause for concern.* *• There is no question about the health and environmental impacts of lead – that is why it is important to recycle batteries in a highly-controlled facility, so it does not leach into the environment and contaminate soil, water supplies and beyond."*

Issue #	Issue	Response
		At no stage does this response say that the WHO's advice is misleading, which is what you have suggested. The Action Group had claimed in television, newspaper and radio interviews that the "The World Health Organisation (WHO) say "there is no safe level of lead". The WHO actually say that in the context of blood lead levels "there is no known safe level of exposure to lead". These are quite different quantifications, as further discussed in Response to Notice #1 (key themes) Section 1.1 (and specifically page 6). However, we recognise how this distinction could be misinterpreted.

8.2.10 Other large responses

There are two submissions of significant length (approximately 40 pages) that are identical, apart from a 12-page insertion in one of research about the health impacts of lead and related Latrobe Valley, general community and overseas information, the latter relating to ULAB processing.

These two submissions also mirror other submissions included in this response, both in terms of the issues they raise and in some cases their word-for-word content. Since the major issues they both raise are largely covered both by this submission and the first one (key themes) they have not been further responded to.

We would like to acknowledge the submission from the Latrobe Health Advocate and note the recommendations it poses to EPA. There are no issues from this submission for Chunxing to respond directly to.

We would also like to acknowledge two other large submissions and the effort involved in their preparation:

- The submission from the Latrobe Valley Sustainability Group, which supports the project and does not raise objections that require Chunxing's response.
- The submission in part_11 pp.55-61, which supports the project and does not raise objections that require Chunxing's response.