australasian (iron & steel) slag association

Australasian (iron and steel) Slag Association Inc.

Material Classification (Iron and Steel Slag) Monitoring Report 2005

Prepared by

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Glossary

Term	*Definition*
AS	Australian Standard
ASA	Australasian (iron & steel) Slag Association
Chain of Custody (COC)	Documentation which accompanies samples to reduce the potential for loss or erroneous labelling or analysis reporting
DEC	Department of Environment and Conservation of New South Wales replaced the Environment Protection Authority (EPA) and National Parks and Wildlife Service (NPWS) and Resource NSW.
EQL	Estimated quantitation limit – the minimum concentration the laboratory can analyse.
ISO	International Standards Organisation
leachate	The water solution containing the released substance.
mg/kg	Milligrams per kilogram or 1×10^{-6} (i.e. one in one-million)
mg/L	Milligrams per litre or 1×10^{-6} (i.e. one in one-million)
ug/l	Micrograms per Litre or 1×10^{-6} if fluid is assumed to be density of 1mg/mL
NATA	National Association of Testing Authorities
ng/g	nano grams per gram or 1×10^{-9} (i.e. one in one-thousand-million)
QA / QC	Quality Assurance. Quality Control
TCLP	Toxicity Characteristic Leaching Procedure – a method of determining the release of a substance via exposure to water solution.
USEPA	United States Environment Protection Agency

Executive Summary

Following the Research and Development Programme of 2004, in particular the published report titled – *"Material Classification of Iron and Steel Slag By-product Waste Classification Investigation Report 2004"*, the Australasian (iron & steel) Slag Association Inc. (ASA) has undertaken to implemented one of the key recommendations for annual monitoring and assessment of iron and steel slag produced and processes by its members.

This report summaries the result of the 2005 monitoring program which investigated and assessed the chemical nature of iron and steel furnace slag's being by-products of three different metallurgical processes, namely, Iron Blast Furnace, Basic Oxygen System Furnace and Electric Arc Furnace respectively.

Iron and steel slag generated and processed throughout Australia, namely BlueScope Steel, One Steel, Smorgon Steel, Australian Steel Mill Services, Multiserv and Steelstone Services are assessed in this report.

Each of the by-products were analysed and the results assessed against the NSW Environment Protection Authority *Environmental Guidelines*.

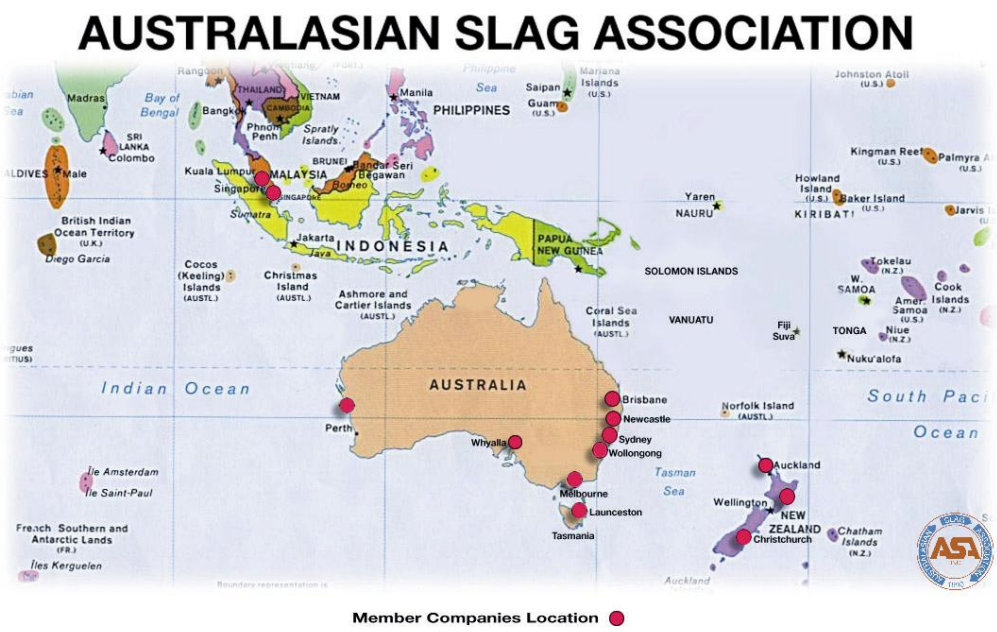
In total, 48 samples were collected and tested for total metal concentrations initially. Where sample results for any individual element exceeded the "*Inert"* category for total metals, these samples were subjected to further leachate analysis according to the process contained in the *Environmental Guidelines* and assessed against the acceptance criteria.

The majority of initial results for total metals were well below the maximum values for total concentration levels. For those elements exceeding these initial acceptance levels (total concentration), investigations were conducted using the TCLP method. Using the 95% UCI, all results were shown to be well below the accepted concentration levels for ***Inert*** classification.

These results are consistent with previous leachate investigations by Golder Associates in the mid 1990's, and the published report *"Material Classification of Iron and Steel Slag By-product Waste Classification Investigation Report 2004"* thus reconfirming the stable and consistent nature of these respective metallurgical processes and resultant products.

This 2005 reports reaffirms iron and steel slag ***Inert*** nature.

Figure 1 Distribution of Members



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1 Introduction

Further to the Research and Development Programme for 2004, in particular the published report titled – *"Material Classification of Iron and Steel Slag By-product Waste Classification Investigation Report 2004"*, the Australasian (iron & steel) Slag Association Inc. (ASA) resolved to implement one of the key recommendations arsing from the report.

In particular the recommendation called for an ongoing monitoring program of iron and steel slag available throughout its membership.

> *8.1 Development of a Monitoring Programme*
>
> *The ASA develop and manage an ongoing testing and monitoring programme with the assistance of its members.*

This report represents the first monitoring assessment by Australasian (iron & steel) Slag Association Inc. (ASA) inline with the recommendation for ongoing monitoring of iron and steel slag available from members.

1.1 Iron and Steel Slag Classification System

The *Environmental Guidelines*[1] are a useful aid in both: distinguishing concentrations of substances and their mobility behaviour; and in the determination process for classification of a waste. The *Environmental Guidelines* provide the process for determination of the Waste Classification, including analytical tables, which indicate the acceptable concentrations of contaminants in the waste.

1.2 Objective of Scope of Work

To collect, analyses, assess and report the concentration and leachability of those species from iron and steel slag using the NSW EPA *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-liquid Wastes*[1].

The aim the monitoring programme is to collate and interpret the analytical results form member products and confirm the stable and consistent nature of these respective metallurgical processes and resulting products.

The chemical characteristics of three main types of metallurgical slags will be examined, these being; Iron Blast Furnace Slag (BFS), Steel Furnace Slag (SFS) and Electric Arc Furnace Slag (EAFS).

Samples for each of these by-products were selected over a range of inventory, which will assist the ASA in identifying appropriate uses to which iron and steel slag by-products can be used.

[1] NSW EPA - Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-liquid Wastes 1999

1.3 1.3 *Material Selection & sample identification*

The specific iron and steel slag products , selected types and sizes for analysis from selected members product ranges with allocated sample identification.

Product Description	**Sample Identification range**
Granulated Blast Furnace Slag	101 to 103 (n=3)
Blast Furnace Slag – Air cooled aggregates	201 to 206 (n=6)
Blast Furnace Slag – Air cooled fines	301 to 306 (n=6)
Steel Furnace Slag – Air cooled aggregates	401 to 406 (n=6)
Steel Furnace Slag – Air cooled fines	501 to 506 (n=6)
Electric Arc Furnace Slag – Air cooled aggregates	601 to 612 and 701 to 709 (n=21)

1.4 Material Processes

Slags can be processed into various forms. Molten slag can be poured into pits and allowed to solidify. This solid rock material (air-cooled slag) can then be processed and crushed into aggregates of various sizes.

The manufacturing process for granulated slag will manifest different physical characteristics as compared to air-cooled slag.

Attachment 1 provides an explanation for each of the slag manufacturing process involved.

1.5 Who is responsible for Classification

For both NSW and other state EPA's the responsibility for the determination of classification is the ***Generators*** responsibility. That is, the NSW Environment Protection Authority (EPA) states it does not classify the waste – that is the responsibility of the generator. The generator determines waste classification according to the *Environmental Guidelines*.

This places an additional burden for the generator to both prove the reliability, and to demonstrate diligence in monitoring by-product stream quality.

To assess the waste, the Environmental Guidelines describe a process which:

- Qualitatively describes the sampling techniques and numbers of samples,
- Analyses contaminant concentration,
- Assesses concentrations in both Total and Available (leachable) forms.

This report is not intended to replace generators responsibility to determine the classification of their respective by-products. However should generators

chose to rely on this report they should satisfy themselves with regards to the accuracy and limitations of the study.

2 Sampling and Analysis Procedures

2.1 Site Sampling Procedures

Slag by-product samples were taken in accordance with the following standards:

- AS 1199 Sampling procedures and tables for inspection by attributes
- AS 1399 Guide to AS 1199
- AS 1141.3.1 – Methods for Sampling and Testing Aggregates 1996 (Method 3.1- Sampling Aggregates: Section 6.9 - Sampling from Stockpiles)

A Chain of Custody (COC) form was filled in and despatched with the samples.

2.2 Samples (n) collected

ASA coordinated the collection of 48 samples from member sites throughout Australia.

The geographic distribution of Association members is in Figure 1 above.

These samples, with COC forms were delivered to LabMark Pty Limited a NATA certified laboratory for analysis.

2.3 Laboratory Procedures

Laboratory procedures for analysis of total metals and TCLP were conducted by LabMark Pty Limited a NATA certified laboratory.

2.4 Quality Control / Quality Assurance Procedures

The full breakdown of the analytical results for the QA/QC for this analyses run can be seen at the end of the NATA laboratory reports. All were satisfactory.

3 Assessment and Classification Procedures

3.1 The Classification Process

The assessment and classification process was in accordance with the *NSW EPA - Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-liquid Wastes 1999*.

4 Comparison of Analytical Results with Environmental Guidelines

4.1 Product Category Assessment Results

Using *Environmental Guidelines* table A2 each of the samples were assess with results shown in the following tables.

4.2 Granulated Blast Furnace Slag Assessment

Granulated Blast Furnace Slag

Element	Inert Waste					Solid Waste		Industrial Waste	
	95% UCI TCLP	95% UCI SCC	Maximum Values Without TCLP	Maximum values TCLP	SCC	Maximum values TCLP	SCC	Maximum values TCLP	SCC
	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg
Ag				0.5	180	5	180	20	720
As		0.5	10	0.5	500	5	500	20	2000
B		39.67		N/A	N/A	N/A	N/A	N/A	N/A
Ba		258.37		N/A	N/A	N/A	N/A	N/A	N/A
Be	0.015	6.76	2	0.1	100	1	100	4	400
Cd		0.05	2	0.1	100	1	100	4	400
Co		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Cr		6.76	10	0.5	1900	5	1900	20	7600
Cu		1		N/A	N/A	N/A	N/A	N/A	N/A
F				15	10000	150	10000	600	40000
Hg		0.025		0.02	50	0.2	50	0.8	200
Mo		0.5	10	0.5	1000	5	1000	20	4000
Ni		3.76	4	0.2	1050	2	1050	8	4200
Pb		1	10	0.5	1500	5	1500	20	6000
Sb		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Se	0.025	3.1	2	0.1	50	1	50	4	200
Sn		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Zn		9.11		N/A	N/A	N/A	N/A	N/A	N/A
Mn		2573.36		N/A	N/A	N/A	N/A	N/A	N/A

Sample Identification 101 to 103 (n=3)
As can be seen from this assessment the by-product is ***Inert***.

4.3 Blast Furnace Slag Aggregate Assessment

Blast Furnace Slag - Air cooled aggregates

Element	Inert Waste					Solid Waste		Industrial Waste	
	95% UCI TCLP	95% UCI SCC	Maximum Values Without TCLP	Maximum values TCLP	SCC	Maximum values TCLP	SCC	Maximum values TCLP	SCC
	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg
Ag				0.5	180	5	180	20	720
As		0.5	10	0.5	500	5	500	20	2000
B		38.53		N/A	N/A	N/A	N/A	N/A	N/A
Ba		343.02		N/A	N/A	N/A	N/A	N/A	N/A
Be	0.03	8.1	2	0.1	100	1	100	4	400
Cd		0.05	2	0.1	100	1	100	4	400
Co		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Cr		6.2	10	0.5	1900	5	1900	20	7600
Cu		1		N/A	N/A	N/A	N/A	N/A	N/A
F				15	10000	150	10000	600	40000
Hg		0.025		0.02	50	0.2	50	0.8	200
Mo		0.5	10	0.5	1000	5	1000	20	4000
Ni		3	4	0.2	1050	2	1050	8	4200
Pb		1	10	0.5	1500	5	1500	20	6000
Sb		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Se	0.025	2	2	0.1	50	1	50	4	200
Sn		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Zn		60.44		N/A	N/A	N/A	N/A	N/A	N/A
Mn		2668.73		N/A	N/A	N/A	N/A	N/A	N/A

Sample Identification 201 to 206 (n=6)
As can be seen from this assessment the by-product is ***Inert*.**

4.4 Blast Furnace Slag Fines Assessment

Blast Furnace Slag - Air cooled fines

Element	Inert Waste					Solid Waste		Industrial Waste	
	95% UCI TCLP	95% UCI SCC	Maximum Values Without TCLP	Maximum values TCLP	SCC	Maximum values TCLP	SCC	Maximum values TCLP	SCC
	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg
Ag				0.5	180	5	180	20	720
As		0.79	10	0.5	500	5	500	20	2000
B		41.03		N/A	N/A	N/A	N/A	N/A	N/A
Ba		332.41		N/A	N/A	N/A	N/A	N/A	N/A
Be	0.015	7.91	2	0.1	100	1	100	4	400
Cd		0.05	2	0.1	100	1	100	4	400
Co		3.94		N/A	N/A	N/A	N/A	N/A	N/A
Cr	0.075	104.09	10	0.5	1900	5	1900	20	7600
Cu		11.74		N/A	N/A	N/A	N/A	N/A	N/A
F				15	10000	150	10000	600	40000
Hg		0.08		0.02	50	0.2	50	0.8	200
Mo		1.53	10	0.5	1000	5	1000	20	4000
Ni	0.075	8.04	4	0.2	1050	2	1050	8	4200
Pb		3.91	10	0.5	1500	5	1500	20	6000
Sb		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Se	0.03	2.07	2	0.1	50	1	50	4	200
Sn		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Zn		2.5		N/A	N/A	N/A	N/A	N/A	N/A
Mn		9268.76		N/A	N/A	N/A	N/A	N/A	N/A

Sample Identification 301 to 306 (n=6)
As can be seen from this assessment the by-product is ***Inert***.

4.5 Steel Furnace Slag Aggregates Assessment

Steel Furnace Slag - Air cooled aggregates

Element	Inert Waste					Solid Waste		Industrial Waste	
	95% UCI TCLP	95% UCI SCC	Maximum Values Without TCLP	Maximum values TCLP	SCC	Maximum values TCLP	SCC	Maximum values TCLP	SCC
	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg
Ag				0.5	180	5	180	20	720
As		0.5	10	0.5	500	5	500	20	2000
B		38.66		N/A	N/A	N/A	N/A	N/A	N/A
Ba		257.06		N/A	N/A	N/A	N/A	N/A	N/A
Be	0.0091	8.93	2	0.1	100	1	100	4	400
Cd		0.05	2	0.1	100	1	100	4	400
Co		1.53		N/A	N/A	N/A	N/A	N/A	N/A
Cr	0.04	1064.13	10	0.5	1900	5	1900	20	7600
Cu		7.07		N/A	N/A	N/A	N/A	N/A	N/A
F				15	10000	150	10000	600	40000
Hg		0.08		0.02	50	0.2	50	0.8	200
Mo		4.36	10	0.5	1000	5	1000	20	4000
Ni	0.025	7.26	4	0.2	1050	2	1050	8	4200
Pb		1.59	10	0.5	1500	5	1500	20	6000
Sb		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Se		1.59	2	0.1	50	1	50	4	200
Sn		1.53		N/A	N/A	N/A	N/A	N/A	N/A
Zn		1185.89		N/A	N/A	N/A	N/A	N/A	N/A
Mn		22618.21		N/A	N/A	N/A	N/A	N/A	N/A

Sample Identification 401 to 406 (n=6)
As can be seen from this assessment the by-product is ***Inert*.**

4.6 Steel Furnace Slag Fines Assessment

Steel Furnace Slag - Air cooled fines

Element	Inert Waste					Solid Waste		Industrial Waste	
	95% UCI TCLP	95% UCI SCC	Maximum Values Without TCLP	Maximum values TCLP	SCC	Maximum values TCLP	SCC	Maximum values TCLP	SCC
	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg
Ag				0.5	180	5	180	20	720
As		3.1	10	0.5	500	5	500	20	2000
B		39.1		N/A	N/A	N/A	N/A	N/A	N/A
Ba		60.42		N/A	N/A	N/A	N/A	N/A	N/A
Be		0.5	2	0.1	100	1	100	4	400
Cd		0.05	2	0.1	100	1	100	4	400
Co		8.48		N/A	N/A	N/A	N/A	N/A	N/A
Cr	0.1	549.68	10	0.5	1900	5	1900	20	7600
Cu		26.07		N/A	N/A	N/A	N/A	N/A	N/A
F				15	10000	150	10000	600	40000
Hg		0.06		0.02	50	0.2	50	0.8	200
Mo	0.07	15.53	10	0.5	1000	5	1000	20	4000
Ni	0.075	79.97	4	0.2	1050	2	1050	8	4200
Pb		4	10	0.5	1500	5	1500	20	6000
Sb		0.5		N/A	N/A	N/A	N/A	N/A	N/A
Se		1	2	0.1	50	1	50	4	200
Sn		3		N/A	N/A	N/A	N/A	N/A	N/A
Zn		83.92		N/A	N/A	N/A	N/A	N/A	N/A
Mn		17895.66		N/A	N/A	N/A	N/A	N/A	N/A

Sample Identification 501 to 506 (n=6)
As can be seen from this assessment the by-product is ***Inert*.**

4.7 Electric Arc Furnace Slag Aggregates Assessment

Electric Arc Furnace Slag - Air cooled aggregates

Element			Inert Waste			Solid Waste		Industrial Waste	
	95% UCI TCLP	95% UCI SCC	Maximum Values Without TCLP	Maximum values TCLP	SCC	Maximum values TCLP	SCC	Maximum values TCLP	SCC
	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg
Ag				0.5	180	5	180	20	720
As		5.17	10	0.5	500	5	500	20	2000
B		79.39		N/A	N/A	N/A	N/A	N/A	N/A
Ba		706.74		N/A	N/A	N/A	N/A	N/A	N/A
Be		0.5	2	0.1	100	1	100	4	400
Cd		0.3	2	0.1	100	1	100	4	400
Co		6.08		N/A	N/A	N/A	N/A	N/A	N/A
Cr	0.025	3982.85	10	0.5	1900	5	1900	20	7600
Cu		278.79		N/A	N/A	N/A	N/A	N/A	N/A
F				15	10000	150	10000	600	40000
Hg		0.06		0.02	50	0.2	50	0.8	200
Mo	0.036	24.64	10	0.5	1000	5	1000	20	4000
Ni	0.04	54.43	4	0.2	1050	2	1050	8	4200
Pb	0.013	20.28	10	0.5	1500	5	1500	20	6000
Sb		1.32		N/A	N/A	N/A	N/A	N/A	N/A
Se		1	2	0.1	50	1	50	4	200
Sn		26.64		N/A	N/A	N/A	N/A	N/A	N/A
Zn		1184.27		N/A	N/A	N/A	N/A	N/A	N/A
Mn		33656.43		N/A	N/A	N/A	N/A	N/A	N/A

Sample Identification 601 to 612 and 701 to 709 (n=21)
As can be seen from this assessment the by-product is ***Inert*.**

5 Discussion of Results

5.1 Granulated Blast Furnace Slag

For Granulated Blast Furnace Slag, two (2) elements exceeded the “Maximum Values” (MV) requirements without TCLP, namely Beryllium and Selenium. All other elements assessed were well below or “not detected”.

TCLP assessment results for Beryllium and Selenium were well below MV requirements using the 95% Upper confidence Interval (UCI).

Based on this assessment the by-product is ***Inert***

5.2 Blast Furnace Slag Aggregates

For Blast Furnace Slag Aggregates, two (2) elements exceeded the “Maximum Values” (MV) requirements without TCLP, namely Beryllium and Selenium. All other elements assessed were well below or “not detected”.

TCLP assessment results for Beryllium and Selenium were well below MV requirements using the 95% Upper confidence Interval (UCI).

Based on this assessment the by-product is ***Inert***

5.3 Blast Furnace Slag Fines

For Blast Furnace Slag Fines, four (4) elements exceeded the “Maximum Values” (MV) requirements without TCLP, namely Beryllium, Chromium, Nickel and Selenium. All other elements assessed were well below or “not detected”.

TCLP assessment results for Beryllium, Chromium, Nickel and Selenium well below MV requirements using the 95% Upper confidence Interval (UCI).

Based on this assessment the by-product is ***Inert***

5.4 Steel Furnace Slag Aggregates

For Steel Furnace Slag Aggregates, three (3) elements exceeded the “Maximum Values” (MV) requirements without TCLP, namely Beryllium Chromium and Nickel. All other elements assessed were well below or “not detected”.

TCLP assessment results for Beryllium, Chromium and Nickel were well below MV requirements using the 95% Upper confidence Interval (UCI).

Based on this assessment the by-product is ***Inert***

5.5 Steel Furnace Slag Fines

For Steel Furnace Slag Fines, three (3) elements exceeded the “Maximum Values” (MV) requirements without TCLP, namely Chromium, Molybdenum and Nickel. All other elements assessed were well below or “not detected”.

TCLP assessment results for Chromium, Molybdenum and Nickel were well below MV requirements using the 95% Upper confidence Interval (UCI).

Based on this assessment the by-product is ***Inert***

5.6 Electric Arc Furnace Slag

For Steel Furnace Slag Aggregates, four (4) elements exceeded the "Maximum Values" (MV) requirements without TCLP, namely Chromium Molybdenum, Nickel and Lead. All other elements assessed were well below or "not detected".

TCLP assessment results for Chromium, Molybdenum, Nickel and Lead were well below MV requirements using the 95% Upper confidence Interval (UCI).

Based on this assessment the by-product is ***Inert***

5.7 Limitations

This report has been produced by assessing the samples as received, analysed and assessed against the *Environmental Guidelines*. The number of samples taken was considered appropriate:

- for a screening evaluation of the product range to determine the degree of compliance with the accepted standard,
- when coupled with previous investigations, n = > 30, and
- to investigate the consistency of the product.

The 48 samples taken of iron and steel slag by-products have shown to be an indicator of overall product quality, and are very consistent when assessed in conjunction with the previous studies and reports published and provided to the NSW EPA.

- Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbond Rock Blast Furnace Slag – 1994
- Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbound Basic Oxygen Steel Slag – 1996
- Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbond Electric Arc Furnace Steel Slag – 1997
- Material Classification of Iron and Steel Slag By-product Waste Classification Investigation Report 2004" by Moeyan Management

Despite some sample numbers for selected individual products being low in a statistical sense (n=<30), we feel that the consistency exhibited so far will, coupled with ongoing investigations only confirm the findings of this report.

6 Conclusions

6.1 Compliance with Acceptance Criteria

Based on the acceptance criteria established in the guidelines, each of the following products as assessed within this report are classified as ***Inert***:

- Granulated Blast Furnace Slag
- Blast Furnace Slag – Air cooled aggregates
- Blast Furnace Slag – Air cooled fines

- Steel Furnace Slag – Air cooled aggregates
- Steel Furnace Slag – Air cooled fines
- Electric Arc Furnace Slag – Air cooled aggregates

7 Related Documents

1. **Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbound Rock Blast Furnace Slag**, May 1993, 92620109(A), by Golder Associates. Issued January 1994.

2. **Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbound Basic Oxygen Steel Slag**, April 1996, 95623062.I, by Golder Associates.

3. **Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbound Electric Arc Furnace Steel** Slag, January 1997, 96623018.P, by Golder Associates.

4. **Material Classification of Iron and Steel Slag By-product Waste Classification Investigation** Report 2004" by Moeyan Management.

Attachment 1 Slag by-product Manufacturing Process

Blast Furnace Slag - Air Cooled Slag

The first step in the production of steel is to manufacture iron. Iron ore, a mixture of oxides of iron, silica and alumina, together with a fuel consisting of coke, natural gas, oxygen and pulverised coal and also limestone as a fluxing agent, are fed into a blast furnace which consists of a large vertical chamber through which large volumes of hot air are blasted.

The liquid blast furnace slag flows into pits where it is predominantly air cooled and sprayed with a small quantity of water. The cooled slag is then transported to a crushing and screening plant where it is further processed into various products including aggregates

Air-cooled slag is produced when molten blast furnace slag is placed into a slag pit. The slag is allowed to cool for a period of time and water is sprayed over it to increase the rate of solidification among other reasons. This solidified slag can be known as Rock Slag or Air Cooled Slag.

Granulated Blast Furnace Slag

Granulated slag is produced when molten blast furnace slag is introduced to a high-pressure water stream. The effect of this process is to blast the slag stream apart making small globules of slag that are almost instantaneously solidified. The slag created from this process is typically smaller then 6 mm.

On examination of the macro components of blast furnace slag it can be determined that it is very consistent. (**Error! Reference source not found.**, page **Error! Bookmark not defined.**)

Both air cooled and granulated slag are the reclaimed by loader, transported by truck to the BlueScope Steel Recycling area where it is stockpiled in appropriate areas.

Steel Furnace BOS (Basic Oxygen System process) Slag

In the BOS process, a large open-top vessel is generally used into which molten iron, steel scrap and lime are placed. High pressure oxygen is blown into the vessel and a violent chemical reaction takes place. On the completion of the reaction, the steel is drained into one ladle and the slag is poured into another.

BlueScope Steel produces steel furnace slag as a co product the steel making process, which is very consistent. The molten steel furnace slag is poured into a slag pit where it is allowed to cool.

The steel furnace slag is reclaimed by loader, transported by truck to the BlueScope Steel recycling area where it is reprocessed and stockpiled in appropriate areas for despatch.

Electric Arc Furnace Slag

In the EAF process, steel scrap and fluxes are added to a refractory lined cup-shaped vessel. This vessel has a lid through which carbon electrodes are passed. An arc is induced between the scrap and electrodes and the resultant heat generated melts scrap and fluxes which react similarly to the BOS process. Steel and slag are also separated similarly.

Attachment 2 Nata Laboratory Reports

Laboratory Report No: E024272
Client Name: Australian Slag Association
Contact Name: Craig Heidrich
Client Reference MCDS/05

Page: 1 of 4
plus cover page
Date: 14/11/05
This report supercedes reports issued on: N/A

Final
Certificate of Analysis

Laboratory Identification			44366	44367	44368	44369	44370	44371	44366d	44366r	44367s	crm
Sample Identification			101 Granulated BFS	201 Air Cooled BFS	304 Air Cooled BFS fines	401 SFS	501 SFS fines	801 Sinter fines	QC	QC	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	--	--	--	--
Laboratory Extraction (Preparation) Date			9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	--	9/11/05	9/11/05
Laboratory Analysis Date			10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	--	10/11/05	9/11/05
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	<0.05	<0.05	<0.05	0.06	0.05	<0.05	<0.05	--	84%	108%

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			lcs	mb								
Sample Identification			QC	QC								
Depth (m)			--	--								
Sampling Date recorded on COC			--	--								
Laboratory Extraction (Preparation) Date			9/11/05	9/11/05								
Laboratory Analysis Date			9/11/05	9/11/05								
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	98%	<0.05								

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			44366	44367	44368	44369	44370	44371	44366d	44366r	44367s	crm
Sample Identification			101 Granulated BFS	201 Air Cooled BFS	304 Air Cooled BFS fines	401 SFS	501 SFS fines	801 Sinter fines	QC	QC	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	--	--	--	--
Laboratory Extraction (Preparation) Date			9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	--	9/11/05	9/11/05
Laboratory Analysis Date			9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	--	9/11/05	9/11/05
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	<1	<1	<1	<1	<1	<1	--	116%	83%
	Arsenic	1	<1	<1	<1	<1	<1	1	<1	--	77%	104%
	Barium	5	260	300	310	59	48	50	250	4%	#	100%
	Beryllium	1	6	6	7	<1	<1	<1	6	0%	95%	78%
	Boron	5	31	31	39	30	29	36	29	7%	125%	80%
	Cadmium	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	95%	89%
	Chromium	1	6	3	3	760	540	370	5	18%	83%	102%
	Cobalt	1	<1	<1	<1	<1	2	7	<1	--	78%	89%
	Copper	2	<2	<2	<2	8	11	16	<2	--	80%	99%
	Lead	2	<2	<2	<2	<2	<2	6	<2	--	76%	107%
	Manganese	5	2280	2340	2590	27800	24700	18400	2150	6%	#	98%
	Molybdenum	1	<1	<1	<1	3	11	15	<1	--	87%	96%
	Nickel	1	2	2	2	5	14	54	2	0%	77%	86%
	Selenium	2	<2	<2	2	<2	<2	<2	<2	--	79%	83%
	Tin	1	<1	<1	<1	1	1	3	<1	--	90%	--
	Zinc	5	<5	<5	<5	6	25	70	<5	--	89%	96%

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. -

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Identification			lcs	mb								
Sample Identification			QC	QC								
Depth (m)			--	--								
Sampling Date recorded on COC			--	--								
Laboratory Extraction (Preparation) Date			9/11/05	9/11/05								
Laboratory Analysis Date			9/11/05	9/11/05								
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	108%	<1								
	Arsenic	1	98%	<1								
	Barium	5	107%	<5								
	Beryllium	1	91%	<1								
	Boron	5	94%	<5								
	Cadmium	0.1	96%	<0.1								
	Chromium	1	103%	<1								
	Cobalt	1	98%	<1								
	Copper	2	101%	<2								
	Lead	2	101%	<2								
	Manganese	5	101%	<5								
	Molybdenum	1	100%	<1								
	Nickel	1	97%	<1								
	Selenium	2	100%	<2								
	Tin	1	101%	<1								
	Zinc	5	103%	<5								

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. -

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No: E024272 **Page:** 4 of 4 Final

Client Name: Australian Slag Association plus cover page Certificate of Analysis

Contact Name: Craig Heidrich **Date:** 14/11/05

Client Reference MCDS/05 This report supercedes reports issued on: N/A

Laboratory Identification			**44366**	**44367**	**44368**	**44369**	**44370**	**44371**	**44366d**	**44366r**		
Sample Identification			101 Granulated BFS	201 Air Cooled BFS	304 Air Cooled BFS fines	401 SFS	501 SFS fines	801 Sinter fines	QC	QC		
Depth (m)			--	--	--	--	--	--	--	--		
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	--	--		
Laboratory Extraction (Preparation) Date			9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	--		
Laboratory Analysis Date			10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	--		
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	10	6	6	2	6	5	10	0%		

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Report No: E024411
Client Name: Australian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

Page: 1 of 7
plus cover page
Date: 23/11/05
This report supercedes reports issued on: N/A

Final
Certificate of Analysis

Laboratory Identification			46012	46013	46014	46015	46016	46017	46018	46019	46020	46021
Sample Identification			102 Granulated BFS	101 Granulated BFS	103 Granulated BFS	202 Air Cooled BFS	201 Air Cooled BFS	203 Air Cooled BFS	305 Air Cooled BFS Fines	304 Air Cooled BFS Fines	306 Air Cooled BFS Fines	402 SFS
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05
Laboratory Extraction (Preparation) Date			18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05
Laboratory Analysis Date			18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	21/11/05	21/11/05	21/11/05	22/11/05
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			46022	46023	46024	46025	46026	46027	46028	46029	46012d	46012r
Sample Identification			401 SFS	403 SFS	502 SFS Fines	501 SFS Fines	503 SFS Fines	802 Sinter Fines	801 Sinter Fines	803 Sinter Fines	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	--	--
Laboratory Extraction (Preparation) Date			18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	--
Laboratory Analysis Date			21/11/05	21/11/05	21/11/05	21/11/05	21/11/05	21/11/05	21/11/05	21/11/05	18/11/05	--
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	0.06	0.05	0.07	0.06	0.06	0.05	0.06	0.05	<0.05	--

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			46023d	46023r	46013s	crm	crm	lcs	lcs	mb	mb	
Sample Identification			QC	QC	QC	QC	QC	QC	QC	QC	QC	
Depth (m)			--	--	--	--	--	--	--	--	--	
Sampling Date recorded on COC			--	--	--	--	--	--	--	--	--	
Laboratory Extraction (Preparation) Date			18/11/05	--	21/11/05	18/11/05	21/11/05	18/11/05	21/11/05	18/11/05	21/11/05	
Laboratory Analysis Date			21/11/05	--	22/11/05	18/11/05	21/11/05	18/11/05	21/11/05	18/11/05	21/11/05	
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	0.06	18%	87%	90%	98%	90%	91%	<0.05	<0.05	

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			46012	46013	46014	46015	46016	46017	46018	46019	46020	46021
Sample Identification			102 Granulated BFS	101 Granulated BFS	103 Granulated BFS	202 Air Cooled BFS	201 Air Cooled BFS	203 Air Cooled BFS	305 Air Cooled BFS Fines	304 Air Cooled BFS Fines	306 Air Cooled BFS Fines	402 SFS
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05
Laboratory Extraction (Preparation) Date			18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05
Laboratory Analysis Date			19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Arsenic	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Barium	5	190	200	230	310	310	280	310	330	320	51
	Beryllium	1	5	5	6	7	7	6	8	8	7	<1
	Boron	5	26	28	34	35	37	35	39	42	38	30
	Cadmium	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Chromium	1	5	5	6	2	4	4	3	4	4	1050
	Cobalt	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
	Copper	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	7
	Lead	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Manganese	5	1810	2020	2250	2520	2560	2430	2740	2830	2750	22900
	Molybdenum	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4
	Nickel	1	2	2	3	3	3	3	3	3	3	8
	Selenium	2	<2	2	2	2	2	2	2	2	2	<2
	Tin	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2
	Zinc	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	9

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Identification			46022	46023	46024	46025	46026	46027	46028	46029	46012d	46012r
Sample Identification			401 SFS	403 SFS	502 SFS Fines	501 SFS Fines	503 SFS Fines	802 Sinter Fines	801 Sinter Fines	803 Sinter Fines	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	--	--
Laboratory Extraction (Preparation) Date			18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	--
Laboratory Analysis Date			19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	19/11/05	--
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--
	Arsenic	1	<1	<1	<1	<1	<1	1	2	2	<1	--
	Barium	5	44	44	50	42	47	53	48	43	240	23%
	Beryllium	1	<1	<1	<1	<1	<1	<1	<1	<1	6	18%
	Boron	5	27	26	28	28	29	37	38	38	32	21%
	Cadmium	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--
	Chromium	1	960	960	950	910	980	480	520	500	7	33%
	Cobalt	1	<1	<1	2	2	2	5	7	6	<1	--
	Copper	2	6	6	11	10	13	19	23	19	<2	--
	Lead	2	<2	<2	<2	<2	<2	4	4	4	<2	--
	Manganese	5	19800	21000	20500	19600	22300	16900	17400	16700	2470	31%
	Molybdenum	1	5	3	15	13	13	12	14	12	<1	--
	Nickel	1	7	5	14	12	19	56	70	59	3	40%
	Selenium	2	<2	<2	<2	<2	<2	<2	<2	<2	2	>0%
	Tin	1	1	1	1	1	2	3	3	3	<1	--
	Zinc	5	8	8	28	24	27	74	75	66	<5	--

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No: E024411
Client Name: Australian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

Page: 5 of 7
plus cover page
Date: 23/11/05
This report supercedes reports issued on: N/A

Final
Certificate
of Analysis

Laboratory Identification			46023d	46023r	46013s	crm	crm	lcs	lcs	mb	mb	
Sample Identification			QC	QC	QC	QC	QC	QC	QC	QC	QC	
Depth (m)			--	--	--	--	--	--	--	--	--	
Sampling Date recorded on COC			--	--	--	--	--	--	--	--	--	
Laboratory Extraction (Preparation) Date			18/11/05	--	21/11/05	18/11/05	21/11/05	18/11/05	21/11/05	18/11/05	21/11/05	
Laboratory Analysis Date			19/11/05	--	21/11/05	18/11/05	21/11/05	18/11/05	21/11/05	18/11/05	21/11/05	
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	--	56%	85%	85%	98%	115%	<1	<1	
	Arsenic	1	<1	--	91%	87%	99%	96%	99%	<1	<1	
	Barium	5	43	2%	#	100%	103%	99%	111%	<5	<5	
	Beryllium	1	<1	--	91%	81%	86%	100%	96%	<1	<1	
	Boron	5	25	4%	81%	--	--	95%	95%	<5	<5	
	Cadmium	0.1	<0.1	--	97%	93%	91%	98%	101%	<0.1	<0.1	
	Chromium	1	910	5%	99%	91%	101%	99%	103%	<1	<1	
	Cobalt	1	<1	--	98%	89%	92%	98%	101%	<1	<1	
	Copper	2	6	0%	101%	87%	96%	98%	99%	<2	<2	
	Lead	2	<2	--	104%	98%	112%	99%	112%	<2	<2	
	Manganese	5	20400	3%	#	84%	92%	98%	101%	<5	<5	
	Molybdenum	1	3	0%	94%	81%	86%	96%	101%	<1	<1	
	Nickel	1	5	0%	99%	91%	87%	97%	100%	<1	<1	
	Selenium	2	<2	--	91%	77%	89%	97%	100%	<2	<2	
	Tin	1	<1	>0%	63%	--	--	95%	102%	<1	<1	
	Zinc	5	7	13%	104%	83%	92%	98%	99%	<5	<5	

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Identification			46012	46013	46014	46015	46016	46017	46018	46019	46020	46021
Sample Identification			102 Granulated BFS	101 Granulated BFS	103 Granulated BFS	202 Air Cooled BFS	201 Air Cooled BFS	203 Air Cooled BFS	305 Air Cooled BFS Fines	304 Air Cooled BFS Fines	306 Air Cooled BFS Fines	402 SFS
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05
Laboratory Extraction (Preparation) Date			17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05
Laboratory Analysis Date			18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	10	10	10	6	6	5	6	6	6	3

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Identification			46022	46023	46024	46025	46026	46027	46028	46029	46012d	46012r
Sample Identification			401 SFS	403 SFS	502 SFS Fines	501 SFS Fines	503 SFS Fines	802 Sinter Fines	801 Sinter Fines	803 Sinter Fines	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	--	--
Laboratory Extraction (Preparation) Date			17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	17/11/05	--
Laboratory Analysis Date			18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	18/11/05	--
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	3	2	6	6	6	5	5	6	10	0%

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Identification			46023d	46023r								
Sample Identification			QC	QC								
Depth (m)			--	--								
Sampling Date recorded on COC			--	--								
Laboratory Extraction (Preparation) Date			17/11/05	--								
Laboratory Analysis Date			18/11/05	--								
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	2	0%								

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Report No: E024582
Client Name: Australasian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

Page: 1 of 4
plus cover page
Date: 08/12/05
This report supercedes reports issued on: 07/12/05

Final
Certificate of Analysis

Laboratory Identification			48234	48235	48236	48237	48238	48239	48234d	48234r	48235s	crm
Sample Identification			301 Air Cooled	302 Air Cooled	303 Air Cooled	404 SPS	405 SPS	406 SPS	QC	QC	QC	QC
Depth (m)			BFSF-fines	BFSF-fines	BFSF-fines	--	--	--	--	--	--	--
Sampling Date recorded on COC			22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	--	--	--	--
Laboratory Extraction (Preparation) Date			6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	--	6/12/05	6/12/05
Laboratory Analysis Date			6/12/05	6/12/05	7/12/05	7/12/05	7/12/05	7/12/05	6/12/05	--	7/12/05	6/12/05
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	0.06	<0.05	0.12	0.05	0.05	<0.05	0.05	18%	72%	106%

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			lcs	mb								
Sample Identification			QC	QC								
Depth (m)			--	--								
Sampling Date recorded on COC			--	--								
Laboratory Extraction (Preparation) Date			6/12/05	6/12/05								
Laboratory Analysis Date			6/12/05	6/12/05								
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	90%	<0.05								

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			48234	48235	48236	48237	48238	48239	48234d	48234r	48235s	crm
Sample Identification			301 Air Cooled	302 Air Cooled	303 Air Cooled	404 SPS	405 SPS	406 SPS	QC	QC	QC	QC
Depth (m)			BFSF-fines	BFSF-fines	BFSF-fines	--	--	--	--	--	--	--
Sampling Date recorded on COC			22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	--	--	--	--
Laboratory Extraction (Preparation) Date			6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	--	6/12/05	6/12/05
Laboratory Analysis Date			6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	--	6/12/05	6/12/05
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	<1	<1	<1	<1	<1	<1	--	50%	79%
	Arsenic	1	<1	1	<1	<1	<1	<1	<1	--	67%	83%
	Barium	5	270	230	300	270	250	200	260	4%	#	105%
	Beryllium	1	5	5	5	8	8	9	5	0%	91%	82%
	Boron	5	26	25	31	38	36	39	26	0%	107%	75%
	Cadmium	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	91%	91%
	Chromium	1	87	60	130	20	15	5	77	12%	#	88%
	Cobalt	1	3	4	4	2	1	<1	3	0%	73%	83%
	Copper	2	11	11	11	5	4	<2	12	9%	63%	90%
	Lead	2	4	4	3	2	<2	<2	4	0%	73%	109%
	Manganese	5	8900	5980	10600	3460	3410	3390	7720	14%	#	87%
	Molybdenum	1	2	1	1	<1	<1	<1	1	67%	84%	94%
	Nickel	1	8	7	8	4	3	2	8	0%	69%	90%
	Selenium	2	<2	<2	<2	<2	<2	2	<2	--	63%	--
	Tin	1	<1	<1	<1	<1	<1	<1	<1	--	88%	--
	Zinc	5	33	25	36	13	21	<5	31	6%	77%	87%

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No: E024582
Client Name: Australasian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

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plus cover page
Date: 08/12/05
This report supercedes reports issued on: 07/12/05

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Laboratory Identification			lcs	mb								
Sample Identification			QC	QC								
Depth (m)			--	--								
Sampling Date recorded on COC			--	--								
Laboratory Extraction (Preparation) Date			6/12/05	6/12/05								
Laboratory Analysis Date			6/12/05	6/12/05								
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	90%	<1								
	Arsenic	1	97%	<1								
	Barium	5	104%	<5								
	Beryllium	1	97%	<1								
	Boron	5	86%	<5								
	Cadmium	0.1	102%	<0.1								
	Chromium	1	82%	<1								
	Cobalt	1	82%	<1								
	Copper	2	84%	<2								
	Lead	2	97%	<2								
	Manganese	5	81%	<5								
	Molybdenum	1	100%	<1								
	Nickel	1	83%	<1								
	Selenium	2	86%	<2								
	Tin	1	101%	<1								
	Zinc	5	86%	<5								

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No: E024582
Client Name: Australasian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

Page: 4 of 4
plus cover page
Date: 08/12/05
This report supercedes reports issued on: 07/12/05

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Certificate
of Analysis

Laboratory Identification			48234	48235	48236	48237	48238	48239	48234d	48234r		
Sample Identification			301 Air Cooled	302 Air Cooled	303 Air Cooled	404 SPS	405 SPS	406 SPS	QC	QC		
Depth (m)			BFSF-fines	BFSF-fines	BFSF-fines	--	--	--	--	--		
Sampling Date recorded on COC			22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	--	--		
Laboratory Extraction (Preparation) Date			2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	--		
Laboratory Analysis Date			3/12/05	3/12/05	3/12/05	3/12/05	3/12/05	3/12/05	3/12/05	--		
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	3	--	1	2	1	1	1	100%		

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Report No: E024936
Client Name: Australasian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

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Date: 11/01/06
This report supercedes reports issued on: 10/01/06

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Laboratory Identification			53402	53403	53489	53490	53491	53492	53402d	53402r	53403s	crm
Sample Identification			604 EAF Slag	605 EAF Slag	606 EAF Slag	704 EAF Slag fines	705 EAF Slag fines	706 EAF Slag fines	QC	QC	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	--	--	--	--
Laboratory Extraction (Preparation) Date			3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	--	3/1/06	3/1/06
Laboratory Analysis Date			10/1/06	11/1/06	11/1/06	11/1/06	11/1/06	11/1/06	10/1/06	--	11/1/06	3/1/06
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	0.07	0.07	0.11	0.11	0.07	0.06	<0.05	>33%	102%	100%

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			lcs	mb								
Sample Identification			QC	QC								
Depth (m)			--	--								
Sampling Date recorded on COC			--	--								
Laboratory Extraction (Preparation) Date			3/1/06	3/1/06								
Laboratory Analysis Date			3/1/06	3/1/06								
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	97%	<0.05								

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Report No: E024936
Client Name: Australasian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

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Date: 11/01/06
This report supercedes reports issued on: 10/01/06

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Laboratory Identification			53402	53403	53489	53490	53491	53492	53402d	53402r	53403s	crm
Sample Identification			604 EAF Slag	605 EAF Slag	606 EAF Slag	704 EAF Slag fines	705 EAF Slag fines	706 EAF Slag fines	QC	QC	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	--	--	--	--
Laboratory Extraction (Preparation) Date			3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	--	3/1/06	3/1/06
Laboratory Analysis Date			4/1/06	4/1/06	4/1/06	4/1/06	4/1/06	4/1/06	4/1/06	--	4/1/06	3/1/06
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	<1	<1	<1	<1	<1	<1	--	86%	83%
	Arsenic	1	2	2	2	2	2	2	2	0%	95%	97%
	Barium	5	730	740	620	650	620	740	670	9%	#	107%
	Beryllium	1	<1	<1	<1	<1	<1	<1	<1	--	88%	106%
	Boron	5	73	78	62	69	66	70	67	9%	#	75%
	Cadmium	0.1	0.1	0.2	0.6	0.8	0.5	0.3	0.1	0.0%	104%	114%
	Chromium	1	4720	4380	4510	4530	4470	4410	4240	11%	#	92%
	Cobalt	1	3	2	3	3	3	3	3	0%	97%	86%
	Copper	2	190	140	150	150	150	150	160	17%	#	98%
	Lead	2	6	14	41	49	28	17	6	0%	126%	114%
	Manganese	5	35800	35700	34300	34200	34200	36800	32700	9%	#	91%
	Molybdenum	1	22	19	21	21	22	20	20	10%	##	105%
	Nickel	1	31	23	29	29	30	27	29	7%	##	82%
	Selenium	2	<2	<2	<2	<2	<2	<2	<2	--	80%	96%
	Tin	1	12	9	12	10	9	8	11	9%	##	--
	Zinc	5	110	130	400	1030	360	170	120	9%	#	92%

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. ## Percent recovery not available due to interference from the sample. -

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No:	E024936				**Page:** 3 of 4			Final				
Client Name:	Australasian Slag Association				plus cover page			Certificate				
Contact Name:	Craig Heidrich				**Date:** 11/01/06			of Analysis				
Client Reference	[redacted]				This report supercedes reports issued on: 10/01/06							

Laboratory Identification			**lcs**	**mb**								
Sample Identification			QC	QC								
Depth (m)			--	--								
Sampling Date recorded on COC			--	--								
Laboratory Extraction (Preparation) Date			3/1/06	3/1/06								
Laboratory Analysis Date			3/1/06	3/1/06								
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	104%	<1								
	Arsenic	1	104%	<1								
	Barium	5	103%	<5								
	Beryllium	1	103%	<1								
	Boron	5	98%	<5								
	Cadmium	0.1	104%	<0.1								
	Chromium	1	106%	<1								
	Cobalt	1	101%	<1								
	Copper	2	104%	<2								
	Lead	2	106%	<2								
	Manganese	5	103%	<5								
	Molybdenum	1	104%	<1								
	Nickel	1	101%	<1								
	Selenium	2	105%	<2								
	Tin	1	105%	<1								
	Zinc	5	102%	<5								

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. ## Percent recovery not available due to interference from the sample. -

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No: E024936
Client Name: Australasian Slag Association
Contact Name: Craig Heidrich
Client Reference [redacted]

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Date: 11/01/06
This report supercedes reports issued on: 10/01/06

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of Analysis

Laboratory Identification			53402	53403	53489	53490	53491	53492	53402d	53402r		
Sample Identification			604 EAF Slag	605 EAF Slag	606 EAF Slag	704 EAF Slag fines	705 EAF Slag fines	706 EAF Slag fines	QC	QC		
Depth (m)			--	--	--	--	--	--	--	--		
Sampling Date recorded on COC			2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	--	--		
Laboratory Extraction (Preparation) Date			29/12/05	29/12/05	29/12/05	29/12/05	29/12/05	29/12/05	29/12/05	--		
Laboratory Analysis Date			30/12/05	30/12/05	30/12/05	30/12/05	30/12/05	30/12/05	30/12/05	--		
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	--	2	1	2	3	3	1	--		

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Report No: E024309
Client Name: Australian Slag Association
Contact Name: Craig Heidrich
Client Reference MCDS/05

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Date: 16/11/05
This report supercedes reports issued on: N/A

Final
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Laboratory Identification			44712	44713	44714	44715	44716	44717	44718	44719	44720	44721
Sample Identification			607 EAF Slag	707 EAF Slag fines	602 EAF Slag	603 EAF Slag	608 EAF Slag	609 EAF Slag	702 EAF Slag fines	703 EAF Slag fines	708 EAF Slag fines	709 EAF Slag fines
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05
Laboratory Extraction (Preparation) Date			11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05
Laboratory Analysis Date			11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			44722	44723	44712d	44712r	44721d	44721r	44713s	crm	lcs	mb
Sample Identification			601 EAF Slag	701 EAF Slag fines	QC	QC	QC	QC	QC	QC	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	--	--	--	--	--	--	--	--
Laboratory Extraction (Preparation) Date			11/11/05	11/11/05	11/11/05	--	11/11/05	--	11/11/05	11/11/05	11/11/05	11/11/05
Laboratory Analysis Date			11/11/05	11/11/05	11/11/05	--	11/11/05	--	11/11/05	11/11/05	11/11/05	11/11/05
Method	**Acid extractable mercury**	**EQL**										
E026.2	Mercury	0.05	<0.05	<0.05	<0.05	--	<0.05	--	100%	99%	92%	<0.05

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification			44712	44713	44714	44715	44716	44717	44718	44719	44720	44721
Sample Identification			607 EAF Slag	707 EAF Slag fines	602 EAF Slag	603 EAF Slag	608 EAF Slag	609 EAF Slag	702 EAF Slag fines	703 EAF Slag fines	708 EAF Slag fines	709 EAF Slag fines
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05
Laboratory Extraction (Preparation) Date			11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05
Laboratory Analysis Date			11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	<1	3	<1	<1	<1	4	<1	<1	<1
	Arsenic	1	3	2	10	3	1	4	14	2	4	2
	Barium	5	670	740	720	680	710	410	630	640	630	640
	Beryllium	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Boron	5	79	85	100	79	66	80	44	72	62	81
	Cadmium	0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1
	Chromium	1	3050	4200	2440	2910	1910	1640	3990	4150	2920	3310
	Cobalt	1	4	3	13	3	2	3	15	2	5	3
	Copper	2	200	150	520	140	110	170	640	120	250	140
	Lead	2	3	16	14	4	4	3	2	8	8	12
	Manganese	5	34700	35900	31900	31300	26900	19600	26600	30300	27600	30600
	Molybdenum	1	21	18	38	13	15	19	41	16	22	17
	Nickel	1	40	23	110	22	15	26	140	13	45	22
	Selenium	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Tin	1	18	18	55	15	15	16	53	13	22	16
	Zinc	5	150	210	150	71	59	55	82	97	110	140

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. ## Percent recovery not available due to interference from the sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No: E024309 **Page:** 3 of 5 Final

Client Name: Australian Slag Association plus cover page Certificate

Contact Name: Craig Heidrich **Date:** 16/11/05 of Analysis

Client Reference MCDS/05 This report supercedes reports issued on: N/A

Laboratory Identification			44722	44723	44712d	44712r	44721d	44721r	44712t	44713s	crm	crm
Sample Identification			601 EAF Slag	701 EAF Slag fines	QC	QC	QC	QC	QC	QC	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	--	--	--	--	--	--	--	--
Laboratory Extraction (Preparation) Date			11/11/05	11/11/05	11/11/05	--	11/11/05	--	14/11/05	11/11/05	11/11/05	14/11/05
Laboratory Analysis Date			11/11/05	11/11/05	11/11/05	--	11/11/05	--	15/11/05	11/11/05	11/11/05	14/11/05
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	<1	<1	<1	--	<1	--	--	72%	110%	--
	Arsenic	1	3	4	3	0%	2	0%	2	110%	93%	108%
	Barium	5	770	660	720	7%	690	8%	--	#	109%	90%
	Beryllium	1	<1	<1	<1	--	<1	--	--	95%	84%	91%
	Boron	5	83	74	80	1%	76	6%	--	#	91%	--
	Cadmium	0.1	0.1	<0.1	<0.1	--	0.2	67%	<0.1	102%	97%	87%
	Chromium	1	2580	2660	2950	3%	3160	5%	2800	#	97%	103%
	Cobalt	1	3	4	3	29%	3	0%	--	117%	90%	92%
	Copper	2	190	200	170	16%	160	13%	140	#	96%	100%
	Lead	2	14	3	3	0%	13	8%	6	66%	110%	103%
	Manganese	5	31800	28000	34200	1%	31500	3%	32900	#	101%	96%
	Molybdenum	1	18	16	16	27%	19	11%	--	68%	97%	97%
	Nickel	1	28	32	26	42%	28	24%	19	##	87%	88%
	Selenium	2	<2	<2	<2	--	<2	--	--	96%	92%	90%
	Tin	1	35	19	17	6%	19	17%	--	#	--	77%
	Zinc	5	130	60	75	67%	130	7%	110	#	95%	91%

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. ## Percent recovery not available due to interference from the sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Identification			lcs	lcs	mb	mb						
Sample Identification			QC	QC	QC	QC						
Depth (m)			--	--	--	--						
Sampling Date recorded on COC			--	--	--	--						
Laboratory Extraction (Preparation) Date			11/11/05	14/11/05	11/11/05	14/11/05						
Laboratory Analysis Date			11/11/05	14/11/05	11/11/05	14/11/05						
Method	**Acid extractable metals**	**EQL**										
E022.2	Antimony	1	99%	116%	<1	<1						
	Arsenic	1	100%	109%	<1	<1						
	Barium	5	111%	103%	<5	<5						
	Beryllium	1	99%	94%	<1	<1						
	Boron	5	101%	95%	<5	<5						
	Cadmium	0.1	98%	96%	<0.1	<0.1						
	Chromium	1	103%	106%	<1	<1						
	Cobalt	1	100%	105%	<1	<1						
	Copper	2	104%	103%	<2	<2						
	Lead	2	103%	105%	<2	<2						
	Manganese	5	100%	108%	<5	<5						
	Molybdenum	1	102%	98%	<1	<1						
	Nickel	1	99%	100%	<1	<1						
	Selenium	2	100%	97%	<2	<2						
	Tin	1	101%	98%	<1	<1						
	Zinc	5	99%	100%	<5	<5						

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. ## Percent recovery not available due to interference from the sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Report No: E024309
Client Name: Australian Slag Association
Contact Name: Craig Heidrich
Client Reference MCDS/05

Date: 16/11/05
This report supercedes reports issued on: N/A

Final
Certificate of Analysis

Laboratory Identification			44712	44713	44714	44715	44716	44717	44718	44719	44720	44721
Sample Identification			607 EAF Slag	707 EAF Slag fines	602 EAF Slag	603 EAF Slag	608 EAF Slag	609 EAF Slag	702 EAF Slag fines	703 EAF Slag fines	708 EAF Slag fines	709 EAF Slag fines
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05	7/11/05
Laboratory Extraction (Preparation) Date			10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05	10/11/05
Laboratory Analysis Date			11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05	11/11/05
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	--	3	--	--	--	1	2	3	2	3

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Identification			44722	44723	44712d	44712r	44721d	44721r				
Sample Identification			601 EAF Slag	701 EAF Slag fines	QC	QC	QC	QC				
Depth (m)			--	--	--	--	--	--				
Sampling Date recorded on COC			7/11/05	7/11/05	--	--	--	--				
Laboratory Extraction (Preparation) Date			10/11/05	10/11/05	10/11/05	--	10/11/05	--				
Laboratory Analysis Date			11/11/05	11/11/05	11/11/05	--	11/11/05	--				
Method	**Moisture**	**EQL**										
E005.2	Moisture	--	--	2	--	--	3	0%				

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Report No: E025600 **Page:** 1 of 10 Final

Client Name: Australasian Slag Association plus cover page Certificate

Contact Name: Craig Heidrich **Date:** 08/03/06 of Analysis

Client Reference TCLP Analysis - Additional request This report supercedes reports issued on: 03/03/06

Laboratory Identification			8920	8921	8922	8923	8924	8925	8926	8927	8928	8929
Sample Identification			601	602	603	604	605	606	607	608	609	701
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	7/11/05	2/12/05	2/12/05	2/12/05	7/11/05	7/11/05	7/11/05	7/11/05
Laboratory Extraction (Preparation) Date			27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06
Laboratory Analysis Date			--	--	--	--	--	--	--	--	--	--
Method	**TCLP Preparation**	**EQL**										
E019.2	TCLP Fluid No.	--	2	2	2	2	2	2	2	1	1	2
	Initial pH (pH units)	--	10.7	10.6	10.7	11.0	11.1	10.5	10.9	10.7	10.8	10.3
	pH after HCl (pH units)	--	9.5	8.0	5.6	9.9	9.9	5.7	10.2	3.6	3.1	6.4
	Final pH (pH units)	--	7.4	8.0	8.4	8.3	8.6	6.7	7.8	10.1	10.1	6.7

Results expressed in pH units unless otherwise specified

Comments:

E019.2: Soil leached for 18 hours with fluid as specified above . Refer to relevant water method for results.

Laboratory Identification			8930	8931	8932	8933	8934	8935	8936	8937	8938	8939
Sample Identification			702	703	704	705	706	707	708	709	401	402
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	2/12/05	2/12/05	2/12/05	7/11/05	7/11/05	7/11/05	3/11/05	3/11/05
Laboratory Extraction (Preparation) Date			27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06
Laboratory Analysis Date			--	--	--	--	--	--	--	--	--	--
Method	**TCLP Preparation**	**EQL**										
E019.2	TCLP Fluid No.	--	2	2	2	2	1	2	2	2	2	2
	Initial pH (pH units)	--	10.5	10.2	10.9	10.8	10.7	10.5	10.4	10.3	11.1	11.7
	pH after HCl (pH units)	--	6.7	6.7	10.8	6.4	2.9	6.1	6.9	8.9	9.2	11.5
	Final pH (pH units)	--	6.4	6.3	8.6	6.9	10.5	6.7	7.5	8.1	7.6	7.6

Results expressed in pH units unless otherwise specified

Comments:

E019.2: Soil leached for 18 hours with fluid as specified above . Refer to relevant water method for results.

Laboratory Identification			8940	8941	8942	8943	8944	8945	8946	8947	8948	8949
Sample Identification			403	404	405	406	501	502	503	801	802	803
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	22/11/05	22/11/05	22/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05
Laboratory Extraction (Preparation) Date			27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06
Laboratory Analysis Date			--	--	--	--	--	--	--	--	--	--
Method	**TCLP Preparation**	**EQL**										
E019.2	TCLP Fluid No.	--	2	1	2	1	2	2	2	2	1	2
	Initial pH (pH units)	--	11.2	9.5	10.2	10.2	11.5	11.6	11.4	11.2	10.9	11.0
	pH after HCl (pH units)	--	10.4	1.8	5.1	4.4	11.6	11.4	11.4	9.3	4.6	6.4
	Final pH (pH units)	--	6.5	5.6	5.0	5.9	11.5	11.7	11.6	6.9	10.5	6.9

Results expressed in pH units unless otherwise specified

Comments:

E019.2: Soil leached for 18 hours with fluid as specified above . Refer to relevant water method for results.

Laboratory Identification			8950	8951	8952	8953	8954	8955	8956	8957	8958	
Sample Identification			201	202	203	101	102	103	304	305	306	
Depth (m)			--	--	--	--	--	--	--	--	--	
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	
Laboratory Extraction (Preparation) Date			27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	27/2/06	
Laboratory Analysis Date			--	--	--	--	--	--	--	--	--	
Method	**TCLP Preparation**	**EQL**										
E019.2	TCLP Fluid No.	--	2	2	2	1	1	1	1	1	1	
	Initial pH (pH units)	--	11.1	11.0	11.1	10.0	10.0	9.9	10.7	10.9	10.5	
	pH after HCl (pH units)	--	9.0	8.4	8.4	2.8	3.1	3.1	3.4	4.5	2.8	
	Final pH (pH units)	--	5.2	5.0	5.1	5.8	5.9	5.8	8.5	8.9	8.9	

Results expressed in pH units unless otherwise specified

Comments:

E019.2: Soil leached for 18 hours with fluid as specified above . Refer to relevant water method for results.

Laboratory Report No: E025600 **Page:** 5 of 10 Final

Client Name: Australasian Slag Association plus cover page Certificate

Contact Name: Craig Heidrich **Date:** 08/03/06 of Analysis

Client Reference TCLP Analysis - Additional request This report supercedes reports issued on: 03/03/06

Laboratory Identification			8920	8921	8922	8923	8924	8925	8926	8927	8928	8929
Sample Identification			601	602	603	604	605	606	607	608	609	701
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	7/11/05	2/12/05	2/12/05	2/12/05	7/11/05	7/11/05	7/11/05	7/11/05
Laboratory Extraction (Preparation) Date			2/3/06	2/3/06	2/3/06	2/3/06	2/3/06	2/3/06	2/3/06	2/3/06	2/3/06	28/2/06
Laboratory Analysis Date			3/3/06	3/3/06	3/3/06	3/3/06	3/3/06	3/3/06	3/3/06	3/3/06	3/3/06	1/3/06
Method	**TCLP metals**	**EQL**										
E022.1	Chromium	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	Lead	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	160
	Molybdenum	10	40	70	30	40	30	40	50	20	20	40
	Nickel	50	<50	<50	<50	80	<50	160	90	<50	<50	<50

Results expressed in ug/l unless otherwise specified

Comments: -

E022.1: Filtered TCLP leachate acidifed with nitric/hydrochloric acid. Analysis by ICP/MS. Results are expressed as in the leachate.

Laboratory Identification			8930	8931	8932	8933	8934	8935	8936	8937	8938	8939
Sample Identification			702	703	704	705	706	707	708	709	401	402
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			7/11/05	7/11/05	2/12/05	2/12/05	2/12/05	7/11/05	7/11/05	7/11/05	3/11/05	3/11/05
Laboratory Extraction (Preparation) Date			28/2/06	28/2/06	2/3/06	28/2/06	28/2/06	28/2/06	28/2/06	28/2/06	2/3/06	2/3/06
Laboratory Analysis Date			1/3/06	1/3/06	3/3/06	1/3/06	1/3/06	1/3/06	1/3/06	1/3/06	3/3/06	3/3/06
Method	**TCLP metals**	**EQL**										
E022.1	Beryllium	10	--	--	--	--	--	--	--	--	<10	<10
	Chromium	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	Lead	10	<10	<10	<10	<10	<10	<10	<10	<10	--	--
	Molybdenum	10	40	40	40	30	20	30	40	40	--	--
	Nickel	50	<50	<50	<50	50	<50	<50	<50	<50	<50	<50

Results expressed in ug/l unless otherwise specified

Comments: -

E022.1: Filtered TCLP leachate acidifed with nitric/hydrochloric acid. Analysis by ICP/MS. Results are expressed as in the leachate.

Laboratory Identification			8940	8941	8942	8943	8944	8945	8946	8947	8948	8949
Sample Identification			403	404	405	406	501	502	503	801	802	803
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	22/11/05	22/11/05	22/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05
Laboratory Extraction (Preparation) Date			2/3/06	6/3/06	2/3/06	2/3/06	28/2/06	28/2/06	28/2/06	28/2/06	28/2/06	28/2/06
Laboratory Analysis Date			3/3/06	6/3/06	3/3/06	3/3/06	1/3/06	1/3/06	1/3/06	1/3/06	1/3/06	1/3/06
Method	**TCLP metals**	**EQL**										
E022.1	Beryllium	10	<10	<10	30	<10	--	--	--	--	--	--
	Chromium	50	<50	<50	90	50	<50	<50	<50	<50	<50	50
	Molybdenum	10	--	--	--	--	20	20	20	20	20	30
	Nickel	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

Results expressed in ug/l unless otherwise specified

Comments: -

E022.1: Filtered TCLP leachate acidifed with nitric/hydrochloric acid. Analysis by ICP/MS. Results are expressed as in the leachate.

Laboratory Report No: E025600 **Page:** 8 of 10 Final

Client Name: Australasian Slag Association plus cover page Certificate

Contact Name: Craig Heidrich **Date:** 08/03/06 of Analysis

Client Reference TCLP Analysis - Additional request This report supercedes reports issued on: 03/03/06

Laboratory Identification			8950	8951	8952	8953	8954	8955	8956	8957	8958	8920d
Sample Identification			201	202	203	101	102	103	304	305	306	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	--
Laboratory Extraction (Preparation) Date			2/3/06	2/3/06	2/3/06	28/2/06	28/2/06	28/2/06	28/2/06	28/2/06	28/2/06	2/3/06
Laboratory Analysis Date			3/3/06	3/3/06	3/3/06	1/3/06	1/3/06	1/3/06	1/3/06	1/3/06	1/3/06	3/3/06
Method	**TCLP metals**	**EQL**										
E022.1	Beryllium	10	10	10	10	<10	<10	<10	<10	<10	<10	--
	Chromium	50	--	--	--	--	--	--	<50	<50	<50	<50
	Lead	10	--	--	--	--	--	--	--	--	--	<10
	Molybdenum	10	--	--	--	--	--	--	--	--	--	40
	Nickel	50	--	--	--	--	--	--	<50	<50	<50	<50
	Selenium	20	--	--	--	--	--	--	<20	<20	<20	--

Results expressed in ug/l unless otherwise specified

Comments: -

E022.1: Filtered TCLP leachate acidifed with nitric/hydrochloric acid. Analysis by ICP/MS. Results are expressed as in the leachate.

Laboratory Report No: E025600 **Page:** 9 of 10 Final

Client Name: Australasian Slag Association plus cover page Certificate

Contact Name: Craig Heidrich **Date:** 08/03/06 of Analysis

Client Reference TCLP Analysis - Additional request This report supercedes reports issued on: 03/03/06

Laboratory Identification			8920r	8930d	8930r	8938d	8938r	8944d	8944r	8952d	8952r	8921s
Sample Identification			QC	QC	QC	QC	QC	QC	QC	QC	QC	QC
Depth (m)			--	--	--	--	--	--	--	--	--	--
Sampling Date recorded on COC			--	--	--	--	--	--	--	--	--	--
Laboratory Extraction (Preparation) Date			--	2/3/06	--	1/3/06	--	28/2/06	--	2/3/06	--	2/3/06
Laboratory Analysis Date			--	1/3/06	--	3/3/06	--	1/3/06	--	3/3/06	--	3/3/06
Method	**TCLP metals**	**EQL**										
E022.1	Beryllium	10	--	--	--	<10	--	--	--	10	0%	--
	Chromium	50	--	<50	--	<50	--	<50	--	--	--	96%
	Lead	10	--	<10	--	--	--	--	--	--	--	95%
	Molybdenum	10	0%	40	0%	--	--	20	0%	--	--	97%
	Nickel	50	--	<50	--	<50	--	<50	--	--	--	93%

Results expressed in ug/l unless otherwise specified

Comments: -

E022.1: Filtered TCLP leachate acidifed with nitric/hydrochloric acid. Analysis by ICP/MS. Results are expressed as in the leachate.

Laboratory Report No: E025600 **Page:** 10 of 10 Final

Client Name: Australasian Slag Association plus cover page Certificate

Contact Name: Craig Heidrich **Date:** 08/03/06 of Analysis

Client Reference TCLP Analysis - Additional request This report supercedes reports issued on: 03/03/06

Laboratory Identification			8945s	8951s	lcs	lcs	lcs	mb	mb	mb		
Sample Identification			QC	QC	QC	QC	QC	QC	QC	QC		
Depth (m)			--	--	--	--	--	--	--	--		
Sampling Date recorded on COC			--	--	--	--	--	--	--	--		
Laboratory Extraction (Preparation) Date			28/2/06	2/3/06	28/2/06	2/3/06	6/3/06	28/2/06	2/3/06	6/3/06		
Laboratory Analysis Date			1/3/06	3/3/06	1/3/06	2/3/06	6/3/06	1/3/06	2/3/06	6/3/06		
Method	**TCLP metals**	**EQL**										
E022.1	Beryllium	10	--	96%	104%	106%	102%	<10	<10	<10		
	Chromium	50	85%	--	85%	99%	88%	<50	<50	<50		
	Lead	10	--	--	101%	102%	102%	<10	<10	<10		
	Molybdenum	10	102%	--	98%	100%	107%	<10	<10	<10		
	Nickel	50	90%	--	84%	97%	95%	<50	<50	<50		
	Selenium	20	--	--	94%	101%	94%	<20	<20	<20		

Results expressed in ug/l unless otherwise specified

Comments: -

E022.1: Filtered TCLP leachate acidifed with nitric/hydrochloric acid. Analysis by ICP/MS. Results are expressed as in the leachate.