

Australasian (iron and steel) Slag Association Inc.

Material Classification (Iron and Steel Slag) Monitoring Report 2005

Prepared by HBM Group Pty Ltd

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Attachment 1	Slag by-product Manufacturing Process
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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 x 10 ⁻⁶
	(i.e. one in one-million)
mg/L	Milligrams per litre or 1 x 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 x 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.





Member Companies Location 🥚

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 <u>it does not classify</u> 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.

Granulated Blast Furnace Slag									
Element			Inert	Waste		Solid Waste		Industrial Waste	
	95% UCI 95% UCI Maximum Values		Maximu	m values	Maximu	m values	Maximum values		
	TCLP	SCC	Without TCLP	TCLP	SCC	TCLP	SCC	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
В		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

4.2 Granulated Blast Furnace Slag Assessment

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

Diast Furnace Stag - All cooled aggregates									
Element			Iner	t Waste		Solid Waste		Industrial Waste	
	95% UCI	95% UCI	Maximum Values	Maximu	m values	Maximu	m values	Maximu	ım values
	TCLP	SCC	Without TCLP	TCLP	SCC	TCLP	SCC	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
В		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

4.3 Blast Furnace Slag Aggregate Assessment

Plast Furnage Slag Air gooled aggregates

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

4.4	Blast Furnace S	Slag Fines	Assessment
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Element	Inert			t Waste	aste		Solid Waste		Industrial Waste	
	95% UCI	95% UCI	Maximum Values	Maximum values		m values Maximum values		Maximum values		
	TCLP	SCC	Without TCLP	TCLP	SCC	TCLP	SCC	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	
В		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	

Blast Furnace Slag - Air cooled fines

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

Steel Furnace Slag - Air cooled aggregates										
Element			Inert	Waste		Solid Waste		Industrial Waste		
	95% UCI	95% UCI	Maximum Values	Maximum Values Maximum values		Maximu	m values	Maximum values		
	TCLP	SCC	Without TCLP	TCLP	SCC	TCLP	SCC	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	
В		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	

4.5 Steel Furnace Slag Aggregates Assessment

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

4.6	Steel Furna	ce Slag Fines	s Assessment
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Element			Iner	t Waste		Solid Waste		Industrial Waste	
	95% UCI	CI 95% UCI Maximum Values Max		Maximu	m values	values Maximum values		Maximum values	
	TCLP	SCC	Without TCLP	TCLP	SCC	TCLP	SCC	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
В		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

Steel Furnace Slag - Air cooled fines

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

			Electric Arc Fur	nace Slag -	Air cooled a	ggregates			
Element			Ine	rt Waste		Solid	Waste	Industri	al Waste
	95% UCI	95% UCI	Maximum Values	Maximu	m values	Maximu	m values	Maximu	m values
	TCLP	SCC	Without TCLP	TCLP	SCC	TCLP	SCC	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
В		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

4.7 Electric Arc Furnace Slag Aggregates Assessment

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 <u>Golder Associates</u>. Issued January 1994.
- 2. Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbound Basic Oxygen Steel Slag, April 1996, 95623062.I, by <u>Golder Associates</u>.
- 3. Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbound Electric Arc Furnace Steel Slag, January 1997, 96623018.P, by <u>Golder Associates</u>.
- 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 cupshaped 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

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Laboratory Report No:	E024272	Page: 1 of 4	
Client Name:	Australian Slag Association	plus cover page	
Contact Name:	Craig Heidrich	Date: 14/11/05	
Client Reference	MCDS/05	This report supercedes repor	orts

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	henry	Contact Name	••	ŭ	aig Heidricl	- u		Dat	e: 14/11/05		of ,	Analysis	
Ì		Client Referen	ee	M	CDS/05			This r	eport supercedes	reports issued on	k: N/A	100	
Laboratory	y Identification		4	4366	44367	44368	44369	44370	4437I	44366d	44366r	44367s	crm
Sample Idei	ntification			101	201 Air	304 Air	401 SFS	501 SFS	801 Sinter	ъ	S	oc	00
			Grai	nulated (Cooled BFS	Cooled BFS		fines	fines	,	,	,	,
Depth (m)				BFS	ł	fines	1	ł	1	1	1	!	
Sampling D	hate recorded on COC		3/	11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	ł	3		
Laboratory	Extraction (Preparation)	Date	/6	11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	9/11/05	1	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	ł	10/11/05	9/11/05
Method	Acid extractable mercu	iry EC	jμ										
E026.2	Mercury	0	05 _ <	0.05	<0.05	<0.05	0.06	0.05	<0.05	<0.05	ŝ	84%	108%
									47777777777777777777777777777777777777				

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.

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Laboratory	y Extraction (Preparation) Date		9/11/05	9/11/05						
Laboratory	y Analysis Date		9/11/05	9/11/05						
Method E026.2	Acid extractable mercury Mercury	EQL 0.05	%86	<0.05						
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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.

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E024272

Laboratory Report No:

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	mann	Contact Name		Craig Heidric	h		Dat	e: 14/11/05		of	Analysis		
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Laborato	ry Identification		44366	44367	44368	44369	44370	44371	44366d	44366r	44367s	crm	
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Danel: ()			Granulated	Cooled BFS	Cooled BFS		fines	fines					
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Method	Acid extractable meta	als E(٦٢										
E022.2	Antimony		7	v	7	<1>	$\vec{\nabla}$	V	~	ł	116%	83%	
	Arsenic		₩ 	V	7	V	√.	••••	7	ł	77%	104%	
	Barium		260	300	310	59	48	50	250	4%	#	100%	
	Beryllium		9	9	7	7	7	ī~	9	%0	95%	78%	
	Boron		31	31	39	30	29	36	29	7%	125%	80%	
	Cadmium	0	.I <0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	95%	89%	
	Chromium		6	ŝ	ŝ	760	540	370	5	18%	83%	102%	
	Cobalt		⊽	7	7	7	7	7	V	ł	78%	89%	
	Copper		7	7	$\langle $	8	11	16	₽	1	80%	%66	
	Lead		2	\sim	\$	\$	4	9	ς,	ł	76%	107%	
	Manganese		2280	2340	2590	27800	24700	18400	2150	6%	#	98%	
	Molybdenum		~	V	7	'n	11	15	7	1	87%	96%	
	Nickel		5	7	7	5	14	54	7	%0	77%	86%	
	Selenium		2	\$	6	4	\$	\$	4	ł	79%	83%	
	Tin		⊽	7	7			Ś	V	ł	%06		
	Zinc		× ∼	Ŷ	Ŷ	6	25	70	ŝ	1	89%	96%	

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Results expressed in mg/kg dry weight unless otherwise specified

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

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Method	Acid extractable metal	S	EQL								
E022.2	Antimony		-	108%	7						
	Arsenic		-	98%	7						
	Barium		ŝ	107%	\$						
	Beryllium			91%	V						
	Boron		S	94%	Ŷ						
	Cadmium		0.1	6%%	<0.1						
	Chromium		1	103%	7						
	Cobalt		-	98%	7						
	Copper		7	101%	\$						
	Lead		2	101%	\$						
	Manganese		Ś	101%	Ŷ						
	Molybdenum		y(100%	v		-				
	Nickel			67%	7						
	Selenium		7	100%	<2						
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Results expressed in mg/kg dry weight unless otherwise specified

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

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Laborator	y Identification		44366	44367	44368	44369	44370	44371	44366d	44366r	
Sample Ide	ntification		101	201 Air	304 Air	401 SFS	501 SFS	801 Sinter	бC	oc	
			Granulated	Cooled BFS	Cooled BFS		fines	fines			
Depth (m)			BES	1	fines	1	1	ļ	ļ	}	
Sampling L	hate recorded on COC		3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	ł	 	
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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%0	

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Results expressed in % w/w unless otherwise specified

Comments:

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

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Laborator	y Identification		46012	46013	46014	46015	46016	46017	46018	46019	46020	46021
Sample Ide	ntification		102	101	103	202 Air	201 Air	203 Air	305 Air	304 Air	306 Air	402 SFS
			Granulated	Granulated	Granulated	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	
Depth (m)			BES	BES	BĘS	1	1	1	Fines	Fines	Fines	
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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 mercu	ury EQ	L -									
E026.2	Mercury	0.0	5 <0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11

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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.

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Sample Identi	ffcation		401 SFS	403 SFS	502 SFS Fines	501 SFS Fines	503 SFS Fines	802 Sinter Fines	801 Sinter Fines	803 Sinter Fines	QC	QC	
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Sampling Dat	e 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	4	ţ	
Laboratory Ex	xtraction (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	1	
Laboratory Ai	nalysis 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 A	cid extractable mercury	EQL											
E026.2 N	fercury	0.05	0.06	0.05	0.07	0.06	0.06	0.05	0.06	0.05	<0.05	-	

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Results expressed in mg/kg dry weight unless otherwise specified

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Laborator	y Identification			46023d	46023r	46013s	crm	crm	lcs	lcs	qm	qm	
Sample Ide	ntification			QC	бc	QC	бc	бс	ЭQ	бC	QC	бc	
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Sampling I	Date recorded on COC			ł	1	1	ł	1	;	***	1	:	
Laboratory	Extraction (Preparation) I	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 E026.2	Acid extractable mercu Mercury	ry	EQL 0.05	0.06	18%	87%	%06	98%	%06	91%	<0.05	<0.05	
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Laborato	ry Identification			46012	46013	46014	46015	46016	46017	46018	46019	46020	46021
Sample Id	entification			102	101	103	202 Air	201 Air	203 Air	305 Air	304 Air	306 Air	402 SFS
Danth (m)				Granulated	Granulated	Granulated	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	
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	s	EQL										
E022.2	Antimony		F-~*	V	7	V	√1	7	\overline{v}	V	V	<u>~</u>	V
	Arsenic		1	V	7	$\overline{\nabla}$	₩	۲	7	√	v	v	7
	Barium		Ŷ	190	200	230	310	310	280	310	330	320	51
	Beryllium		1	Ś	S	6	7	7	9	œ	8	7	V
	Boron		Ś	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		Ц	ŝ	S	9	7	4	4	c,	4	4	1050
	Cobalt		-	v	7	V	7	7	īv	7	7	7	brood.
	Copper		2	7	\sim	₽	₽	7	\$	6	7	~2	6
	Lead		3	\$	\$	\$	₽	~~	4	7	7	7	7
	Manganese		Ś	1810	2020	2250	2520	2560	2430	2740	2830	2750	22900
	Molybdenum		•	7	V	.∼	√	۲	√	7	Ÿ	7	4
	Nickel		-	2	64	б	'n	ĥ	ň	ŝ	ŝ	n	8
	Selenium		2	7	7	7	7	2	2	7	2	2	Ŷ
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Comments: # Percent recovery not available due to significant background levels of analyte in sample.

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Laborato	ry Identification			46022	46023	46024	46025	46026	46027	46028	46029	46012d	46012r
Sample Id	entification			401 SFS	403 SFS	502 SFS	501 SFS	503 SFS	802 Sinter	801 Sinter	803 Sinter	ЪС	QC
Danth (m)						Fines	Fines	Fines	Fines	Fines	Fines		
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	1	}
Laboratory	v 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	1
Laboratory	y 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	ł
Method	Acid extractable metal	s	EQL										
E022.2	Antimony			₽	7	7	V	$\vec{\vee}$	⊽	$\overline{\lor}$	7	1×	ł
	Arsenic		1	7	√	7	₹	V	, ,	2	7	v	1
	Barium		S	44	44	50	42	47	53	48	43	240	23%
	Beryllium			∠	īv	√	V	1v	7	~	7	6	18%
	Boron		s	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	ş \$
	Chromium			960	960	950	910	980	480	520	500	7	33%
	Cobalt			∠	71	7	7	2	S	7	6	v	ł
	Copper		2	9	9	11	10	13	19	23	19	°7	ŗ
	Lead		2	₽	8	~	₽	₽	4	4	4	4	\$
	Manganese		s	19800	21000	20500	19600	22300	16900	17400	16700	2470	31%
	Molybdenum			Ŷ	'n	15	13	13	12	14	12	7	ł
	Nickel			7	Ś	14	12	19	56	70	59	ŝ	40%
	Selenium		64	₽	\$	4	4	4	7	\$	4	7	>0%
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	Zinc		Ś	8	8	28	24	27	74	75	66	Ŷ	1

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

	Lab	oratory]	Report	: No: B	024411			Pag	e: 5 of 7		Fin	al	
and the		ent Name	••	A	ustralian Sla	ng Associatio	uo	plus	cover page		Ũ	ertificat	e
	Con	itact Nan	le:	0	raig Heidric	h		Date	a: 23/11/05		of	Analysis	12-2-2-
Ì	Clie	ent Refere	snce	■,			100	This r	eport supercedes	reports issued or	: N/A	P.244	
Laborator	y Identification			46023d	46023r	46013s	crm	crm	lcs	lcs	qm	qm	
Sample Ide	ntification			QC	SC	QC	QC	бc	бc	бC	QC	ç	
Depth (m)				1	;	****	1	1	ł	ç	1	1	
Sampling l	Date recorded on COC			**	1	1	1	1	;	ţ	ł	ł	
Laboratory Laboratory	Extraction (Preparation) Date Analysis Date	43		18/11/05	1 1	21/11/05 21/11/05	18/11/05 18/11/05	21/11/05 21/11/05	18/11/05 18/11/05	21/11/05	18/11/05 18/11/05	21/11/05	
Method	Acid extractable metals		sQL										
E022.2	Antimony		-	∨	ł	56%	85%	85%	98%	115%	7	~	
	Arsenic		F	7	ŧ	91%	87%	%66	96%	%66	V	7	
	Barium		s	43	2%	#	100%	103%	%66	111%	Ş	Ş	
	Beryllium		-	V	1	91%	81%	86%	100%	96%	7	V	
	Boron		s	25	4%	81%	37	ł	95%	95%	Ŷ	Ŷ	
	Cadmium		0.1	<0.1	ţ	%26	93%	91%	98%	101%	<0.1	<0.1	
	Chromium		1	910	5%	%66	91%	101%	%66	103%	7	v	
	Cobalt		Ĩ	V	ł	98%	89%	92%	98%	101%	$\vec{\nabla}$	V	
	Copper		2	9	%0	101%	87%	96%	98%	%66	7	\$	
	Lead		2	7	1	104%	98%	112%	%66	112%	₽	4	
	Manganese		ŝ	20400	3%	#	84%	92%	98%	101%	Ŷ	\$	
	Molybdenum		1	ю	%0	94%	81%	86%	96%	101%	7	7	
	Nickel			S	%0	%66	91%	87%	97%	100%	7	∵	
	Selenium		7	4	1	91%	77%	89%	%16	100%	₽	4	
	Tin			V	>0%	63%	***	**	95%	102%	7	√	
	Zinc		5	7	13%	104%	83%	92%	98%	%66	Ŷ	Ş	

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

	N.												
N		Laboratory	Repor	t No: E	3024411			Pag	e: 6 of 7		Fine	Ц	
		Client Name		4	Australian Sla	ag Associati	uo	plus	cover page		Ŭ	ertificate	4)
	menn	Contact Nai	ne:	0	Jraig Heidric	h		Date	e: 23/11/05		of /	Analysis	D
Ì		Client Refer	eoue.		¥			This r	eport supercedes	reports issued or	n: N/A		
Laborator	y Identification			46012	46013	46014	46015	46016	46017	46018	46019	46020	46021
Sample Ide	ntification			102	101	103	202 Air	201 Air	203 Air	305 Air	304 Air	306 Air	402 SFS
				Granulated	Granulated	Granulated	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	Cooled BFS	
Depth (m)				BES	BFS	BES	1	!	2	Fines	Fines	Fines	1
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		1	10	10	10	9	6	Ś	9	9	9	ю
D acritice ave	vraesad in 02 w/w mlace	thorning and	fied.								-	•	

Results expressed in % w/w unless otherwise specified

Comments:

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

ample Identification epth (m)		401 SFS 	403 SFS					04004		514000	
epth (m)	DC	1		502 SFS Fines	501 SFS Fines	503 SFS Fines	802 Sinter Fines	801 Sinter Fines	803 Sinter Fines	бc	QC
amulia Date moordad an OC				1		ł	* 5	\$	3	ł	1
ampining Date recorded on CC	· · · · · · · · · · · · · · · · · · ·	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	3/11/05	1	ť
aboratory Extraction (Prepara	ation) 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	2
aboratory 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	ł
lethod Moisture 005.2 Moisture	EQL	3	6	6	6	6	5	5	6	10	0%
lethod Moisture	EQL -	e e	8	9	9	9	5	2		9	6 10

Results expressed in % w/w unless otherwise specified

Comments:

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

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Ĭ		Laboratory R	eport No	е Н Н	24411		Page: 7 of 7		Final
		Client Name:		At	ıstralian Slaş	g Association	plus cover page		Certificate
	mente	Contact Name		ර්	aig Heidrich		Date: 23/11/05		of Analysis
Ì		Client Referen	lce	Ļ			This report supercedes rep	orts issued on: N/A	
Laborator	y Identification		46	023d	46023r				
Sample Ide	ntification			SC	ъ				
Depth (m)				1					
Sampling I	Date recorded on COC			1	1				
Laboratory	Extraction (Preparation) Date	17/	11/05					
Laboratory	Analysis Date		18/	11/05	3				
Method	Moisture	Ð	QL						
E005.2	Moisture			2	%0				
							· · · · · · · · · · · · · · · · · · ·		

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Results expressed in % w/w unless otherwise specified

Comments:

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

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Laboratory Report No:	E024582	Page: 1 of 4
Client Name:	Australasian Slag Association	plus cover page
Contact Name:	Craig Heidrich	Date: 08/12/05
Client Reference		This report supercedes

This report supercedes reports issued on: 07/12/05 05



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Laborato.	ry Identification		48234	48235	48236	48237	48238	48239	48234d	48234r	48235s	
Sample Id	entification		301 Air	302 Air	303 Air	404 SPS	405 SPS	406 SPS	8	S	З	
			Cooled	Cooled	Cooled			••••••			1	
Depth (m)			BFSF-fines	BFSF-fines	BFSF-fines	ł	ł	ţ	1	***	1	
Sampling	Date recorded on COC		22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	ł	ł	}	
Laboratory	y Extraction (Preparation) Date		6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	1	6/12/05	
Laboratory	y Analysis Date		6/12/05	6/12/05	7/12/05	7/12/05	7/12/05	7/12/05	6/12/05	ł	7/12/05	
Method	Acid extractable mercury	EQL										1
E026.2	Mercury	0.05	0.06	<0.05	0.12	0.05	0.05	<0.05	0.05	18%	72%	

----6/12/05 6/12/05

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.

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Laborato	гу цаенцисацой		ICS	QUU	 			
Sample Id	entification		бc	QC				
Depth (m)			1	\$	 			
Sampling	Date recorded on COC		1	ł	 			
Laborator	y Extraction (Preparation) Date		6/12/05	6/12/05				
Laborator	y Analysis Date		6/12/05	6/12/05	 			
Method E026.2	Acid extractable mercury Mercury	EQL 0.05	%06	<0.05	 			
		1	_					

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.

Ŵ		Laborator	y Repoi	rt No: E	024582			Page	e: 2 of 4		Fin		
		Client Nan	le:	A	ustralasian S	llag Associa	tion	plus	cover page		Ũ	ertificat	e
	menn	Contact Na	ame:	0	raig Heidricl	.c		Date	: 08/12/05		of 1	Analysis	
J		Client Refe	erence	T				This r	cport supercedes	reports issued on	r: 07/12/05		
Laborato	ry Identification			48234	48235	48236	48237	48238	48239	48234d	48234r	48235s	crm
Sample Id	entification			301 Air	302 Air	303 Air	404 SPS	405 SPS	406 SPS	S	Ş	QC	с
				Cooled	Cooled	Cooled							
Depth (m)				BFSF-tines	BFSE-tines	BFSF-tines		1	; ;	1	;	ł	i
Sampling	Date recorded on COC			22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	1	:	1	ł
Laborator	y 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
Laborator	y Analysis Date			6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	6/12/05	1	6/12/05	6/12/05
Method	Acid extractable meta	ils	EQL										
E022.2	Antimony		ī	~	∼	7	7	7	V	V	1	50%	79%
	Arsenic		1	₩	-		√ √	√ √	V	V	ş	67%	83%
	Barium		5	270	230	300	270	250	200	260	4%	#	105%
	Beryllium		Ţ	Ś	S	S	~	~	6	Ş	%0	%16	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	1	91%	91%
	Chromium		Ţ	87	60	130	20	15	Ś	17	12%	#	88%
	Cobalt		-1	ŝ	4	4	2	1	V	m	%0	73%	83%
	Copper		7	11	11		5	4	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	12	6%	63%	%06
	Lead		7	4	4	ę	2	8	\$	4	%0	73%	109%
	Manganese		5	8900	5980	10600	3460	3410	3390	7720	14%	#	87%
	Molybdenum		•1	7	1	-	v	V	V	1	67%	84%	94%
	Nickel		1	~	7	8	4	ĥ	7	8	%0	69%	%06
	Selenium		7	√2	\$	\$	4	\$	7	7	22	63%	;
	Tin			1⊳	7	V	₩	7	√ 7	V	;	88%	*
	Zinc		s	33	25	36	13	21	Ş	31	6%	77%	87%
									_			Y	

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

: 3 of 4 Final	cover page Certificate	: 08/12/05 of Analysis	port supercedes reports issued on: 07/12/05																					
Page	plus	Date	This rc																					
E024582	Australasian Slag Association	Craig Heidrich		qm	δc			5 6/12/05 5 6/12/05		<1	~~~	\$		<2	<0.1	<1	<1	<2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	\$			<2	
rt No:				lcs	QC	1		6/12/05 6/12/05		%06	<i>%L6</i>	104%	%16	86%	102%	82%	82%	84%	%16	81%	100%	83%	86%	1010%
ry Repor	me:	Jame:	ference						EQL	Ĭ	Ч	S	1	ŝ	0.1	Ţ		~	7	ŝ	1	**** 4	2	-
Laborato	Client Na	Contact N	Client Rei	ory Identification	dentification		t Date recorded on COC	ry Extraction (Preparation) Date ry Analysis Date	Acid extractable metals	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Molybdenum	Nickel	Selenium	Tin
Ń			I	Laborato	Sample Ic	Depth (m)	Sampling	Laborator Laborator	Method	E022.2														

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

	- Ander										
	Labo	ratory Re _l	port No:	E024582			Pag	e:4 of4		Fin	al
A SUNCE	Clien Clien	t Name:	-	Australasian	Slag Associa	tion	plus	cover page		Ŭ	ertificate
	ULS Cont	act Name:	J	Craig Heidric	ų		Dat	e: 08/12/05		of 1	Analysis
J	Clien	t Referenc	e				This 1	report supercedes	reports issued or	t: 07/12/05	· market
Laboratory Ide	ntification		48234	48235	48236	48237	48238	48239	48234d	48234r	
Sample Identific	ation		301 Air	302 Air	303 Air	404 SPS	405 SPS	406 SPS	ос	8	
			Cooled	Cooled	Cooled				,	,	
Depth (m)			BFSF-fines	BFSF-fines	BFSF-fines	ł	1	ţ	ł	1	
Sampling Date r	ecorded on COC		22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	22/11/05	**	1	
Laboratory Extra	action (Preparation) Date		2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	:	
Laboratory Anal	ysis Date		3/12/05	3/12/05	3/12/05	3/12/05	3/12/05	3/12/05	3/12/05	1	
Method Moi	sture	EQ	r r								
E005.2 Moi:	sture	¦ 	m	ł	1	5	1		-	100%	
-											

Results expressed in % w/w unless otherwise specified

Comments:

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

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Laboratory Repoi	rt No: E	024936			Page	e: 1 of 4		Fin	al	
Client Name:	A	Australasian S	llag Associat	tion	plus	cover page		U	ertificate	
Contact Name:	0	Traig Heidric	-C		Date	: 11/01/06		of	Analysis	
Client Reference					This r	eport supercedes	reports issued on:	10/01/06		
	53402	53403	53480	53400	53401	53402	53407A	53407-	534020 1	

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Laboratoi	ry Identification		53402	53403	53489	53490	53491	53492	53402d	53402r	53403s	crm
Sample Ide	entification		604 EAF	605 EAF	606 EAF	704 EAF	705 EAF	706 EAF	SC	QC	20	ос Ос
			Slag	Slag	Slag	Slag fines	Slag fines	Slag fines				
Depth (m)			f	1	1	ł	1	ŀ	ł	ł	1	2
Sampling	Date recorded on COC		2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	ł	1	ł	ł
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	y Analysis Date		10/1/06	11/1/06	11/1/06	11/1/06	11/1/06	11/1/06	10/1/06	1	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%
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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.

Laborator	ry Identification		lcs	qm	 				
Sample Ide	entification		QC	QC	 			 	
Depth (m)			ł	ł					
Sampling I	Date recorded on COC		*	1					
Laboratory	/ Extraction (Preparation) Date		3/1/06	3/1/06	 				
Laboratory	/ Analysis Date		3/1/06	3/1/06					
Method	Acid extractable mercury	EQL			 	<u> </u>			
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.

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Å		Laboratory	Repor	t No:	E024936			Pag	e: 2 of 4		Fin	al	
		Client Nam	e.	•	Australasian 3	Slag Associa	tion	plus	cover page		Ŭ	ertificat	d)
	menn	Contact Na	me:	-	Craig Heidric	ų		Dat	e: 11/01/06		of 1	Analysis 🗧	24
J		Client Refe	rence	-				This r	eport supercedes	reports issued on	: 10/01/08	N SER	
Laborato	ry Identification			53402	53403	53489	53490	53491	53492	53402d	53402r	53403s	crm
Sample Id	entification		•	604 EAF	605 EAF	606 EAF	704 EAF	705 EAF	706 EAF	бc	όc	бc	SC
				Slag	Slag	Slag	Slag fines	Slag fines	Slag fines				
Depth (m)				***	1	ł	1	ł	t	1	ţ	!	**
Sampling	Date recorded on COC			2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05		1	}	1
Laborator	/ Extraction (Preparation)	Date		3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	3/1/06	ŧ	3/1/06	3/1/06
Laborator	/ Analysis Date			4/1/06	4/1/06	4/1/06	4/1/06	4/1/06	4/1/06	4/1/06	1	4/1/06	3/1/06
Method	Acid extractable metal	S	EQL										
E022.2	Antimony		1	⊽	~	7	V	~1	V	v		86%	83%
	Arsenic		1	7	7	2	7	7	7	7	%0	95%	67%
	Barium		5	730	740	620	650	620	740	670	%6	#	107%
	Beryllium		1	√	V	Ţ.	7	7	V	√ ⊽	1	88%	106%
	Boron		S	73	78	62	69	66	70	67	6%	#	75%
	Cadmium		0.1	0.1	0.2	0.6	0.8	0.5	0.3	0.1	0.0%	104%	114%
	Chromium		ī	4720	4380	4510	4530	4470	4410	4240	11%	#	92%
	Cobalt		1	ς	64	ю	ŝ	ŝ	ς	ю	%0	97%	86%
	Copper		ы	190	140	150	150	150	150	160	17%	#	98%
	Lead		~	9	14	4]	49	28	17	9	%0	126%	114%
	Manganese		5	35800	35700	34300	34200	34200	36800	32700	6%	#	91%
	Molybdenum		I	22	19	21	21	22	20	20	10%	##	105%
	Nickel			31	23	29	29	30	27	29	7%	##	82%
	Selenium		7	°	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0	\$	\$	\$	6	ł	80%	6%
	Tin		1	12	6	12	10	6	~	11	9%6	##	
	Zinc		5	110	130	400	1030	360	170	120	%6	#	92%

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

Ņ	Y	Laborator	y Repor	t No:	E024936		Page: 3 of 4	Fine	al	
		Client Nan	ne:		Australasian (Slag Association	plus cover page	Ŭ	ertificat	Ð
	menn	Contact Na	ame:		Craig Heidric	th.	Date: 11/01/06	of /	Analysis	24
Ĵ		Client Refe	erence	-•			This report supercedes reports issue	:d on: 10/01/06		20
Laborato	ry Identification			lcs	qm					~~~~
Sample Id	entification			QC	бс					
Depth (m)				1	ţ					
Laboratory	Extraction (Prenaration)	Date		3/1/06	3/1/06					
Laboratory	/ Analysis Date			3/1/06	3/1/06					
Method	Acid extractable meta	ls	EQL							
E022.2	Antimony		1	104%	√					
	Arsenic		1	104%	V					
	Barium		5	103%	Ş					
	Beryllium		1	103%	∠					
	Boron		5	98%	Ş					
	Cadmium		0.1	104%	<0.1					
	Chromium		1	106%	7					
	Cobalt		Ţ	101%	₩.					
	Copper		2	104%	\$					
	Lead		2	106%	4					
	Manganese		5	103%	ŝ					
	Molybdenum		1	104%	√ √					
	Nickel		 1	101%	√					
	Selenium		7	105%	4					
	Tin		-	105%	7					
	Zinc		Ś	102%	Ş					
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Comments: # Percent recovery not available due to significant background levels of analyte in sample. ## Percent recovery not available due to interference from the sample. -

N	Labo	ratory Repoi	t No: H	3024936			Pag	e: 4 of 4		Fina	
	Clien Clien	t Name:	ł	Australasian (Slag Associa	tion	plus	cover page		Ů	rtificate
	Contraction Contraction	ict Name:	Ŭ	Draig Heidric	ų		Dati	:: 11/01/06		of A	nalysis
Ì	Clien	t Reference	-				This r	eport supercedes	reports issued on	: 10/01/06	
Laborator	y Identification		53402	53403	53489	53490	53491	53492	53402d	53402r	
Sample Ide	ntification		604 EAF Slag	605 EAF داءم	606 EAF	704 EAF	705 EAF Slog fines	706 EAF	QC	бC	
Depth (m)			295 297	518 10	314K		-	Stag Inics	ł	1	
Sampling E	ate recorded on COC		2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	2/12/05	ł	1	
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	ł	
Method	Moisture	EQL									
E005.2	Moisture	ţ	1	7	1	5	'n	Ś	••••	1	

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Results expressed in % w/w unless otherwise specified

Comments:

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

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Laboratory Report No:	E024309	Page: 1 of 5
Client Name:	Australian Slag Association	plus cover page
Contact Name:	Craig Heidrich	Date: 16/11/05
Client Reference	MCDS/05	This report supercedes reports

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Final

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	terutor C	ontact Name		ΰ	raig Heidricl	ų		Dat	e: 16/11/05		of ,	Analysis 🕺	
}	C	lient Referen	ice	Ą	ACDS/05			This r	cport supercedes	reports issued or	n: N/A		20
Laboratory	Identification			44712	44713	44714	44715	44716	44717	44718	44719	44720	4472I
Sample Ident.	ification		-00 	07 EAF	707 EAF	602 EAF	603 EAF	608 EAF	609 EAF	702 EAF	703 EAF	708 EAF	709 EAF
				Slag	Slag fines	Slag	Slag	Slag	Slag	Slag fines	Slag fines	Slag fines	Slag fines
Depth (m)				1	1	1	ł	ł	1	ł	1 2	, 1	, ¦
Sampling Da	te recorded on COC		6	//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 E.	xtraction (Preparation) D.	ate	1	1/11/05	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 A	nalysis Date		1	1/11/05	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 A	stractable mercur	y EC	QL										
E026.2 N	Aercury	0.	05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05

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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	qm
Sample Identification		601 EAF Slag	701 EAF Slag fines	бC	бC	бC	бc	бc	бс	бc	бс
Depth (m)		}	,	ł	1	!	ł	1	ŧ	ł	ţ
Sampling Date recorded on COC		7/11/05	7/11/05	ł	ł	1				1	1
Laboratory Extraction (Preparation) Date		11/11/05	11/11/05	11/11/05		11/11/05	1	11/11/05	11/11/05	11/11/05	11/11/05
Laboratory Analysis Date		11/11/05	11/11/05	11/11/05	ł	11/11/05	1	11/11/05	11/11/05	11/11/05	11/11/05
Method Acid extractable mercury E026.2 Mercury	EQL 0.05	<0.05	<0.05	<0.05	I	<0.05		100%	%66	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.

1	I	Laboratory	/ Repoi	rt No: E	3024309			Pag	e: 2 of 5		Fin	al	
		Client Nam	le:	ł	Australian Sla	ig Associatio	uo	plus	cover page		Ŭ	ertificat	e
	mann	Contact Na	:me:	0	Craig Heidrich	_ _		Dat	e: 16/11/05		of ,	Analysis	
1		Client Refe	rence	,	MCDS/05			This 1	eport supercedes	reports issued or	n: N/A		
Laborato.	ry Identification			44712	44713	44714	44715	44716	44717	44718	44719	44720	44721
Sample Id	entification			607 EAF	707 EAF	602 EAF	603 EAF	608 EAF	609 EAF	702 EAF	703 EAF	708 EAF	709 EAF
Darth ()				Slag	Slag fines	Slag	Slag	Slag	Slag	Slag fines	Slag fines	Slag fines	Slag fines
Sampling	Date recorded on COC			 7/11/05	 7/11/05		7/11/05	7/11/05	 7/11/05				
Laboratory	/ Extraction (Preparation) L	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		Ţ	7	V	ς	V	ŗ,	<1	4	V	7	$\vec{\nabla}$
	Arsenic		1	ñ	73	10	3	1	4	14	2	4	7
	Barium		S	670	740	720	680	710	410	630	640	630	640
	Beryllium			V	7	√	~	√	7	V	17	V	√
	Boron		ŝ	62	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	б	13	ŝ	7	n	15	5	S	ŝ
	Copper		3	200	150	520	140	110	170	640	120	250	140
	Lead		Ч	ę	16	14	4	4	m	~	×	8	12
	Manganese		S	34700	35900	31900	31300	26900	19600	26600	30300	27600	30600
	Molybdenum		ľ	21	18	38	13	15	19	41	16	22	17
	Nickel		*****	40	23	110	22	15	26	140	13	45	22
	Selenium		7	7	₽	42	~~~	\$	\$	4	4	\$	\$
	Tin		1	18	18	55	15	15	16	53	13	22	16
	Zinc		S	150	210	150	71	59	55	82	67	110	140

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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.

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ļ		Laboratory	Repor	t No: E	3024309			Page	: 3 of 5		Fin	la	
		Client Nam	::	4	Australian Sla	ig Associatic	uc	plus	cover page		Ŭ	ertificat	G
	man	Contact Na	me:	0	Traig Heidrich	ц		Date	: 16/11/05		of 1	Analysis	
I		Client Refe	rence	I	MCDS/05			This re	port supercedes	reports issued or	1: N/A		
Laborato	ry Identification			44722	44723	44712d	44712r	44721d	44721r	44712t	44713s	crm	crm
Sample Id	entification			601 EAF	701 EAF	SC	SC	ç	QC	QC	QC	дс	дс
Depth (m)				Sidg I		ļ	I	1		1	;	:	1
Sampling	Date recorded on COC			7/11/05	7/11/05	1	ł	ł	Į	;	1		
Laborator	/ Extraction (Preparation	1) 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
Laborator	/ Analysis Date			11/11/05	11/11/05	11/11/05	1	11/11/05	3,	15/11/05	11/11/05	11/11/05	14/11/05
Method	Acid extractable met:	als	EQL										
E022.2	Antimony		1	⊽	7	7	ł	7	ł		72%	110%	:
	Arsenic		ц	б	4	Ś	%0	7	%0	7	110%	93%	108%
	Barium		ŝ	770	660	720	7%	690	8%	ł	#	109%	%06
	Beryllium		Ţ	7	₩ V	<u>v</u>	1	7	Ŧ	ł	95%	84%	91%
	Boron		ŝ	83	74	80	1%	76	6%	1	#	91%	ł
	Cadmium		0.1	0.1	<0.1	<0.1	1	0.2	67%	<0.1	102%	97%	87%
	Chromium		ľ	2580	2660	2950	3%	3160	5%	2800	#	97%	103%
	Cobalt		<u>, </u>	c,	4	ς	29%	ŝ	%0	;	117%	%06	92%
	Copper		2	190	200	170	16%	160	13%	140	#	96%	100%
	Lead		2	14	ŝ	ę	%0	13	8%	9	66%	110%	103%
	Manganese		S	31800	28000	34200	1%	31500	3%	32900	#	101%	96%
	Molybdenum		1	18	16	16	27%	19	11%	ł	68%	97%	97%
	Nickel		П	28	32	26	42%	28	24%	61	##	87%	88%
	Selenium		61	₽	8	8	1	7	1	1	96%	92%	%06
	Tin		-	35	19	17	6%	19	17%	1	#	ł	77%
	Zinc		Ś	130	60	75	67%	130	7%	110	#	95%	91%

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.

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		Client Nam	ie:	r	Australian Sl	ag Associatic	u	plus cover page		Certificate	
	menn	Contact Na	ime:	~	Craig Heidric	ų		Date: 16/11/05		of Analysis	
Ì		Client Refe	rence		MCDS/05			This report supercedes reports issu	ted on: N/A		
Laborator	y Identification			lcs	lcs	qm	dm [
Sample Ide	ntification			QC	QC	бc	бс				
Depth (m)				;	ž	1	3				
Sampling l	Date recorded on COC			1	1	1	;				
Laboratory Laboratory	Extraction (Preparation) Analysis Date) Date		11/11/05 11/11/05	14/11/05 14/11/05	11/11/05 11/11/05	14/11/05 14/11/05				
Method	Acid extractable meta	ls	EQL								
E022.2	Antimony		1	%66	116%	V	-1				
	Arsenic			100%	109%	7	īv				
	Barium		ŝ	111%	103%	Ş	Ŷ				
	Beryllium		ĩ	%66	94%	7	₩				
	Boron		Ś	101%	95%	Ŷ	\$				
	Cadmium		0.1	98%	96%	<0.1	<0.1				
	Chromium		ī	103%	106%	√	7				
	Cobalt		1	100%	105%	Ĩ∕	7				
	Copper		2	104%	103%	8	6				
	Lead		7	103%	105%	₽	4				
	Manganese		Ś	100%	108%	Ŷ	Ŷ				
	Molybdenum		F T	102%	98%	V	7				
	Nickel			%66	100%	V	7				
	Selenium		7	100%	%26	4	4				
	Tin		-	101%	98%	V	7				
	Zinc		Ś	%66	100%	Ŷ	Ŷ				
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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.

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

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	Laboratory Repor	t No: E	024309			Pag	e: 5 of 5		Fin	al	
	Client Name:	A	ustralian Slá	ag Associati	on	plus	cover page		Ū	ertificat	e
(International)	Contact Name:	C	raig Heidric	ų		Dat	e: 16/11/05		of	Analysis	
Y	Client Reference	Ž	ICDS/05			This r	eport supercedes	s reports issued or	N/A		
Laboratory Identification		44712	44713	44714	44715	44716	44717	44718	44719	44720	44721
Sample Identification		607 EAF	707 EAF	602 EAF	603 EAF	608 EAF	609 EAF	702 EAF	703 EAF	708 EAF	709 EAF
		Slag	Slag fines	Slag	Slag	Slag	Slag	Slag fines	Slag fines	Slag fines	Slag fines
Depth (m)		1	2 2	;	1		ł	1	1	, ;	, 1
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 (Preparatio.	n) 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
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EQL

Moisture Moisture

Method E005.2 Results expressed in % w/w unless otherwise specified

Comments:

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

Ichorator	u Idantification		CCLVV	20275	147134	-01274	T T T T T T T T	1 - 1 - 1 - 1		
174001 4101	i y tuchuncanun		77/44	C7/++	144 / Y CO	44 / 121	017/44	44/2JF		
Sample Id	entification		601 EAF	701 EAF	ç	8	20	S		
			Slag	Slag fines						
Depth (m)			ł	1	į	ł	!	1		
Sampling i	Date recorded on COC		7/11/05	7/11/05			1	1		
Laboratory	/ Extraction (Preparation) Date		10/11/05	10/11/05	10/11/05	1	10/11/05		-	
Laboratory	/ Anatysis Date		11/11/05	11/11/05	11/11/05	ł	11/11/05	1		
Method	Moisture	EQL								
E005.2	Moisture	ł	a c	3	ł	I	ŝ	%0		

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Results expressed in % w/w unless otherwise specified

Comments:

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

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	Li	aboratory I	Report	t No: E	3025600			Pag	e: 1 of 10		Fin	al	
	C. C.	lient Name:	••	Ł	Australasian S	Slag Associa	ttion	plus	cover page		C	ertificat	Ð
	menn c	ontact Nan	1e:	0	Craig Heidric	Ч		Dati	e: 08/03/06		of	Analysis 🗧	ja) Se m
Ì	C	lient Refere	ence]	FCLP Analys	is - Additior	ıal request	This r	report supercedes	reports issued or	1: 03/03/06		
Laborator	y Identification			8920	8921	8922	8923	8924	8925	8926	8927	8928	8929
Sample Idu	sutification			601	602	603	604	605	606	607	608	609	701
Depth (m)				ł	ł	ł	1	1	1	ł	1	ş	ł
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) D	ate		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			-	1	-	-	-	!	1		ł	ł
Method	TCLP Preparation		EQL		_								
E019.2	TCLP Fluid No.		!	7	7	2	5	7	2	5	1	1	7
	Initial pH (pH units)		ł	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)		1	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

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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.

	I	aboratory	' Repor	t No: I	3025600			Pag	e: 2 of 10		Fin	al	
		Client Nan	ie:	4	Australasian S	Slag Associa	ttion	plus	cover page		Ũ	ertificat	e
Manen)		Contact Na	me:	Ŭ	Craig Heidric	ų		Dat	e: 08/03/06		of.	Analysis 🗧	
ł	Ŭ	Client Refe	rence		FCLP Analys	iis - Addition	al request	This r	cport supercedes	reports issued or	1: 03/03/06		
Laboratory Id	entification			8930	8931	8932	8933	8934	8935	8936	8937	8938	8939
Sample Identifi	cation		ı	702	703	704	705	706	707	708	607	401	402
Depth (m)				ł	1	ł	ł	1	ł	ţ	1	ł	ł
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 Ext.	raction (Preparation) I	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 Ani	alysis Date			* *	1 ;	1	:		-	1	***	ł	ł
Method TC	LP Preparation		EQL										
E019.2 TC	'LP Fluid No.		1	7	7	5	5	1	2	7	7	6	7
Init	tial pH (pH units)		ł	10.5	10.2	10.9	10.8	10.7	10.5	10.4	10.3	11.1	11.7
Hd	after HCI (pH units)			6.7	6.7	10.8	6.4	2.9	6.1	6.9	8.9	9.2	11.5
Fin	al pH (pH units)		1	6.4	6.3	8.6	6.9	10.5	6.7	7.5	8.1	7.6	7.6

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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.

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LabMark Pty Ltd ABN 27 079 798 397 SYDNEY: Unit 1, 8 Leighton Place Asquith NSW 2077 Telephone: (02) 9476 6533 Fax: (02) 9476 8219 MELBOURNE: 116 Moray Street, South Melbourne VIC 3205 Telephone: (03) 9686 8344 Fax: (03) 9686 7344

		Laborator	y Repoi	rt No: 1	3025600			Pag	e: 3 of 10		Fin	al	
Merch M		Client Nan	ne:	*	Australasian S	Slag Associa	ttion	snlq	cover page		C V	ertificat	Ð
(Anna)	TELLE	Contact N:	ame:	~	Craig Heidric	Ч		Dat	e: 08/03/06		of	Analysis	
ł		Client Ref	erence	ι`	<i><u>FCLP</u></i> Analys	is - Addition	aal request	This 1	report supercedes	reports issued or	n: 03/03/06		
Laboratory	ldentification			8940	8941	8942	8943	8944	8945	8946	8947	8948	8949
Sample Ident	ification			403	404	405	406	501	502	503	801	802	803
Depth (m)				1	ł	1	3 5	ł	1	ł	;	1	
Sampling Da	te 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 E	xtraction (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 A	nalysis Date			1.	F 1	1	1	ţ	1	1	ł	;	5 5
Method 7	CLP Preparation		EQL										
E019.2 T	CLP Fluid No.		1	5	<u> </u>	7	1	2	6	2	7		7
	nitial pH (pH units)		;	11.2	9.5	10.2	10.2	11.5	11.6	11.4	11.2	10.9	11.0
а 	H after HCl (pH units)		1	10.4	1.8	5.1	4.4	11.6	11.4	11.4	9.3	4.6	6.4
11 	inal pH (pH units)		1	6.5	5.6	5.0	5.9	11.5	11.7	11.6	6.9	10.5	6.9
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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.

LabMark Pty Ltd ABN 27 079 798 397 SYDNEY: Unit 1, 8 Leighton Place Asquith NSW 2077 Telephone: (02) 9476 6533 Fax: (02) 9476 8219 MELBOURNE: 116 Moray Street, South Melbourne VIC 3205 Telephone: (03) 9686 8344 Fax: (03) 9686 7344 Fax: (02) 9476 8219 MELBOURNE: 116 Moray Street, South Melbourne VIC 3205 Telephone: (03) 9686 8344 Fax: (03) 9686 7344 Fax: (02) 9476 8219 MELBOURNE: 116 Moray Street, South Melbourne VIC 3205 Telephone: (03) 9686 8344 Fax: (03) 9686 7344

Ń	Labo	ratory Repo	rt No:	E025600			Pag	e: 4 of 10		Fin	al	
A SIN	(Client	t Name:		Australasian	Slag Associa	ation	plus	cover page		Ũ	ertificate	
	Conti	act Name:		Craig Heidric	h		Dat	e: 08/03/06		of	Analysis	
Ì	Clien	t Reference		TCLP Analys	sis - Addition	nal request	Thís r	cport supercedes	reports issued or	1: 03/03/06		
Laborator	/ Identification		8950	8951	8952	8953	8954	8955	8956	8957	8958	
Sample Ide	ntification		201	202	203	101	102	£01	304	305	306	
Depth (m)			2 E	ł	ł	ł	ŧ	1	2	1	1	
Sampling D	ate 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		;	-	-	-		1	1	}	1	
Method	TCLP Preparation	EQL									-	
E019.2	TCLP Fluid No.	•	7	2	7	1	<u> </u>	Ţ	1	Ц	••••	
	Initial pH (pH units)		1.1	11.0	11.1	10.0	10.0	9.9	10.7	10.9	10.5	
	pH after HCI (pH units)	1	0.6	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	

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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.

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		Client Nam	ie:	ł	Australasian S	Slag Associa	ution	plus	s cover page		U	ertificat	e
	Trente	Contact Na	me:)	Craig Heidric	h		Dat	e: 08/03/06		of	Analysis	
Ì		Client Refe	rence	ſ~	FCLP Analys	is - Additior	ıal request	This 1	report supercedes	reports issued or	n: 03/03/06		
Laborator	y Identification			8920	8921	8922	8923	8924	8925	8926	8927	8928	8929
Sample Ide	ntification			601	602	603	604	605	909	607	608	609	701
Depth (m)				1	Ę	ł		1	1	ł	;	ţ	I
Sampling I	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

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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.

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Ņ	Laborato	ory Repo	rt No: I	E025600			Pag	e: 6 of 10		Fin	al	
	Client N ² Client N ²	ame:	7	Australasian	Slag Associ:	ation	plus	cover page		Ŭ	ertificat	ø
	Contact 1	Name:	•	Craig Heidrik	ch		Dati	e: 08/03/06		of .	Analysis	
ſ	Client Re	eference		TCLP Analy:	sis - Additio	nal request	This r	report supercedes	reports issued or	1: 03/03/06		
Laborato	ry Identification		8930	8931	8932	8933	8934	8935	8936	8937	8938	×
Sample Ic	lentification		702	703	704	705	706	707	708	709	401	4
Depth (m	(1	1	1	l	;	ţ	1	1	ţ	
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	3/1
Laborator	y 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/
Laborator	y 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/:
Method	TCLP metals	EQL										
E022.1	Beryllium	10	1		1	ł	1	{	!	!	<10	v
	Chromium	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	v
	Lead	10	<10	<10	<10	<10	<10	<10	<10	<10	}	
	Molybdenum	10	40	40	40	30	20	30	40	40	1	
	Nickel	50	<50	<50	<50	50	<50	<50	€20	<50	<50	v

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3/11/05 2/3/06 3/3/06

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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.

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	Lat	ooratory Repo	rt No:	E025600			Pag	e: 7 of 10		Fin	al	
		ent Name:		Australasian 3	Slag Associa	ution	plus	cover page		C	ertificat	e
	ELLIN COL	ntact Name:		Craig Heidric	h		Dat	e: 08/03/06		of	Analysis	5.4 1.2.1 m
}	Cli	ent Reference		TCLP Analys	iis - Addition	nal request	This ,	report supercedes	reports issued or	1: 03/03/06		R.
Laboratory Id	lentification		8940	8941	8942	8943	8944	8945	8946	8947	8948	8949
Sample Identifi	ication		403	404	405	406	501	502	503	801	802	803
Depth (m)			1		;	ł	ł	ł	;	1	ł	1
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 Ext	raction (Preparation) Dat	Э	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 An	alysis 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 TC	LP metals	EQL										
E022.1 Be	ryllium	10	<10	<10	30	<10	ţ	1	ł	;	ļ	ł
Ch	romium	50	<50	<50	06	50	<50	<50	<50	<50	<50	50
Ŭ	Jybdenum	10	1	ţ	1	1	20	20	20	20	20	30
Nic	ckel	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

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Results expressed in ug/l unless otherwise specified

Comments: -

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<i>I</i>	X	Laboratory	Repor	t No:	E025600			Pag	e: 8 of 10		Fin	al	
		Client Nam	:3	•	Australasian S	Slag Associa	ation	plus	cover page		Ŭ	ertificat	0
	menne	Contact Na	me:	•	Craig Heidric	ų		Dat	e: 08/03/06		of ,	Analysis	
Ì		Client Refer	rence		TCLP Analys	iis - Addition	nal request	This 1	eport supercedes	reports issued or	3: 03/03/06		
Laborato	ry Identification			8950	8951	8952	8953	8954	8955	8956	8957	8958	8920d
Sample Id	entification			201	202	203	101	102	103	304	305	306	QC
Depth (m)				ł	;	ł	1	ł	\$ \$	1		ļ	**
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	ł
	Chromium		50	ł	ŀ	***	!	1	1	<50	<50	<50	<50
	Lead		10	;	;	ł	ŧ	1	1	1	1	ţ	<10
	Molybdenum		10	ł	1.2	ł	1	2	1	!	1	7	40
	Nickel		50	ł	1	ł	ł	ŧ	ł	<50	<50	<50	<50
	Selenium		20	* *	1	ł	ł	ş	ł	<20	<20	<20	1

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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.

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Ń		Laboratory	Report	No: F	3025600			Pag	e: 9 of 10		Fin	al	
	MCCO7	Client Name		ł	Australasian S	slag Associa	tion	plus	cover page		Ŭ	ertificat	Ð
	The International Action	Contact Nai	ne:	U	Craig Heidric	ч		Dat	e: 08/03/06		of .	Analysis 💈	
Ì		Client Refer	ence	Ľ	CCLP Analysi	is - Addition	ial request	This r	eport supercedes	reports issued or	1: 03/03/06		
Laborator	y Identification			8920r	8930d	8930r	8938d	8938r	8944d	8944r	8952d	8952r	8921s
Sample Ide	ntification			QC	QC	бc	QC	бc	ებ	Ъ	ç	SC	QC
Depth (m)				ł	1	1	;	1	****	ļ	ł	ł	ł
Sampling L	Date recorded on COC			ł	Į	ł	ł	1	1	ţ	ł	;	1
Laboratory	Extraction (Preparation)) Date		ł	2/3/06	-	1/3/06	1	28/2/06		2/3/06	E I	2/3/06
Laboratory	Analysis Date			1	1/3/06	ł	3/3/06	1	1/3/06	ł	3/3/06	}	3/3/06
Method	TCLP metals		EQL										
E022.1	Beryllium		10	ł	ł	1	<10	1	1	1	10	%0	ł
	Chromium		50	ł	<50	}	<50	ł	<50	1	1	1	96%
	Lead		10	1	<10	4 2	1	1	ţ	1	1	**	95%
	Molybdenum		10	%0	40	%0	1	ł	20	%0	-	1	97%
	Nickel		50	ł	<50	:	<50	ł	∕50	1	ł	1	93%
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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.

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and M		Client Nam	::		Australasian S	Slag Associa	tion	plus	cover page		Ŭ	sttificate
	menny	Contact Na	me:		Craig Heidric	ц		Dat	e: 08/03/06		of /	unalysis
Ì		Client Refe	rence		TCLP Analys	is - Addition	al request	This r	eport supercedes	reports issued or	r: 03/03/06	
Laborato	y Identification			8945s	8951s	lcs	lcs	lcs	dm	qm	qui	
Sample Id	sntification			QC	QC	бc	бc	ებ	бС	бс	СC	
Depth (m)				ł	7	1	***	1	1	ł	3 9	
Sampling	Date recorded on COC			1	1	ł	1	ł	}	!	1	
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%	%66	88%	<50	<50	<50	
	Lead		10	ł	1	101%	102%	102%	<10	<10	<10	
	Molybdenum		10	102%	ł	98%	100%	107%	<10	<10	<10	
	Nickel		50	%06	;	84%	97%	95%	<50	<50	<50	
	Selenium		20	5	1	94%	101%	94%	<20	<20	<20	
											· · · · · · · · · · · · · · · · · · ·	

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Comments: -

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

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