australasian (iron & steel) slag association

Australasian (iron and steel) Slag Association Inc.

Material Classification (Iron and Steel Slag) Environmental Monitoring Report 2011

Prepared by
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Glossary

Term	*Definition*
AS	Australian Standard
ASA	Australasian (iron & steel) Slag Association
BFS	Blast furnace slag
COC	Chain of Custody : Documentation which accompanies samples to reduce the potential for loss or erroneous labelling or analysis reporting
EAFS	Electric arc furnace slag
EQL	Estimated Quantitation Limit – the minimum concentration the laboratory can analyse.
GBFS	Granulated blast furnace slag
ISO	International Standards Organisation
ISS	iron and steel slags
LFS	Ladle furnace slag
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^{-9} if fluid is assumed to be density of 1mg/mL
MS	Melter slag
NATA	National Association of Testing Authorities
ng/g	Nanograms per gram or 1×10^{-9} (i.e. one in one-thousand-million)
OEH	Office of Environment and Heritage (formally Department of Environment, Climate Change and Water of New South Wales)
QA / QC	Quality Assurance / Quality Control
SFS	Steel furnace slag
TCLP	Toxicity Characteristic Leaching Procedure – a method of determining the release of a substance via exposure to water solution.
TM	Total Metals – a method of determining total elemental characterisation by acid digestion.
USEPA	United States Environment Protection Agency

Executive Summary

The Australasian (iron & steel) Slag Association (ASA) undertakes an Environmental Monitoring Program (EMP) to monitor and assess the iron and steel slags produced, processed and sold by its members.

Commencing in 2005, this annual EMP was established in response to recommendations from the "*Material Classification of Iron and Steel Slag By-product Waste Classification Investigation Report 2004".* Amongst its key recommendations was to establish an annual EMP to increase industry understanding about environmental performance of the iron and steel slag products generated, processed and sold by members.

The EMP methodology involves collecting iron and steel slag samples, where available, from member sites, analyses and reports on total metal (TM) and selected leachable concentrations against, where established, jurisdictional government regulations. Samples are only subjected to a Toxicity Characteristic Leaching Procedure (TCLP) where required and assessed against specified acceptance criteria.

Since 2004 the referenced assessment methods have evolved through ongoing consultation with state regulators, e.g OEH. Initially the NSW Environmental Protection Authority's (EPA) *Environmental Guidelines*[1] were used. These guidelines classified wastes as either; hazardous, industrial, solid or inert. All previous reports have classified all assessed iron and steel slag (ISS) products as inert.

This report is the Association's fifth (5th) EMP, the reference methods and guidelines have evolved slightly to reflect changed criteria and assessment conditions by state regulators. For example general exemption/s titled: *The steel furnace slag exemption, The electric arc furnace slag exemption* and *The blast furnace slag exemption* ('the *Exemption* guidelines')[2] have been used where appropriate.

The following report summarises the results of the 2011 EMP report (EMP2011). Consistent with past reports, all sources for iron and steel slag are compared against nominated thresholds, where provided, for each jurisdiction.

For the EMP2011, the ASA tested a total of seventy two (72) ISS samples from member sites – BlueScope Steel Ltd NSW, BIS Industries SA, Multiserv VIC, Harsco (VIC and SA), Steelstone (Newcastle and Rooty Hill, NSW), OneSteel (Rooty Hill and Newcastle, NSW) and New Zealand Steel Minerals.

ISS are co-products or manufactured products from various metallurgical processes, namely Iron Blast Furnace Slag (BFS), Steel Furnace Slag (SFS), Electric Arc Furnace Slag (EAFS), Sinter Slag Fines, Melter Slag and KOBM Slag.

Analysis of results confirmed the stable and consistent nature of slag samples from member sites, and indicate each sample provided would comply with relevant state requirements.

[1] NSW EPA (1999). Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-liquid Wastes. EPA 99/21. Sydney, NSW, Australia, Environment Protection Authority.

[2] Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A: Current copies can be downloaded from http://www.environment.nsw.gov.au/waste/generalRRE.htm

Figure 1 Distribution of Members

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1 Introduction

Building on the capstone research and development program conducted in 2004, that is 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) implemented a key recommendation arising from the report.

The recommendation specifically called for an ongoing monitoring program of iron and steel slag available throughout its membership.

> *8.1 Develop and implement and annual [Environmental] Monitoring Program [so as to demonstrate the ongoing consistency of ISS co-products]*

This Environmental Monitoring Program (EMP11) report represents the fifth (5th) assessment conducted by the association as part of the ongoing monitoring of iron and steel slag's (ISS) generated, processed and sold.

1.1 Iron and Steel Slag Classification System

In previous studies the NSW Environmental Protection Authority's (EPA) *Environmental Guidelines*[3] have been a useful aid in established standardised methodology for distinguishing concentrations of substances and their mobility behaviour, and in the determination process for classification of a waste. These *Environmental Guidelines*, whilst not exemptions per se, that is, classifying materials which meet these requirements from the waste reporting requirements, have

[3] NSW EPA (1999). Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-liquid Wastes. EPA 99/21. Sydney, NSW, Australia, Environment Protection Authority.

however provided for sound and consistent basis for characterisation under extreme assessment conditions.

Amendments to the *Protection of the Environment Operations Act 1997* and the *Protection of the Environment Operations (Waste) Regulation 2005* with effect from 28 April 2008 provided triggers for the government to impose significant cost imposts [levies] on slag generators. Amendments to the *Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008* of particular interest to our industry are summarised below:

- Fewer and simpler licensing categories for waste
- A streamlined waste classification system
- New resource recovery licensing categories and resource recovery exemptions (RRE)
- *Exemption* guidelines providing the process for determination of the waste classification, including analytical tables, which indicate the acceptable concentrations of contaminants in the waste
- Imposing costs under section 88 for wastes without an exemption

During the course of 2008/9 extensive consultations were undertaken between the association and the NSW Government to develop a series of exemptions ISS.

This report has been amended to reflect the now gazetted *Exemption*[4] requirements for each from of iron and steel slag.

1.2 Objective of Scope of Work

The object of the Environmental Monitoring Program (EMP) is to collect, analyse, assess and report on the chemical concentration and leachable potential assessed against the *Exemption* requirements for Steel Furnace Slag (SFS), Electric Arc Furnace Slag (EAFS), Blast Furnace Slag (BFS), Melter Slag (MS) and Ladle Furnace Slag (LFS).

The aim of the EMP is **NOT** to replace or undertake by proxy generator, processor and or consumer responsibilities under the respective legislation and or specific environmental licence requirements, but to have a nationally maintained central database on the chemical concentration and leachable potential of ISS, which supplements and can be combined with member data on a consistent basis.

Accordingly, the data from these reports should not be relied upon to replace individual member responsibilities as legislated.

A secondary aim for the EMP is to assess and confirm where appropriate the stable and consistent nature of these respective metallurgical processes and resulting co-products.

The chemical characteristics of several types of metallurgical slags will be examined, these being: Iron Blast Furnace Slag (BFS), Steel Furnace Slag (SFS), Electric Arc Furnace Slag (EAFS), Melter Slag (MS) and Ladle Furnace Slags (LFS).

[4] Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A: Draft - The blast furnace slag exemption 2008; Draft – The steel furnace slag exemption 2008; Draft - The electric arc furnace slag exemption 2008

1.3 Material Selection & Sample Identification

The following table sets out the sample identification coding system used to identify each specific iron and steel slag products into their various categories.

Product Description	Sample Identification range	Number of samples received
Granulated Blast Furnace Slag	101 – 103	3
Blast Furnace Slag – Air cooled aggregates	201 – 206	6
Blast Furnace Slag – Air cooled fines	304 – 306	3
Steel Furnace Slag – Air cooled aggregates	401 – 406	6
Steel Furnace Slag – Air cooled fines	501 – 506	6
Electric Arc Furnace Slag – Air cooled aggregates	601 – 618	15
Electric Arc Furnace Slag – Air cooled fines	701 – 718	18
Sinter Slag Fines	801 – 803	3
Melter Slag	901 – 903	3
Ladle Furnace Slag	1001 – 1009	9

1.4 Material Processes

Each metallurgical slag type can be processed into various forms. For example molten slag material can be poured into cooling pits and allowed to solidify like natural rock. This solid rock material when cooled can then be processed and crushed into aggregates of various sizes like any natural quarried product. Some processes such as the manufacture of granulated iron blast furnace slag (GBFS) requires cooling the molten material instantaneously with high volume water sprays and will manifest different physical characteristics when compared with air-cooled slag.

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

1.5 Who is Responsible for Classification/Exemption?

Generally state Environment Protection Authorities (EPA's) do not classify wastes themselves. This task of determining classification is essentially the responsibility of the Generators'. The generator determines waste classifications according to state requirements.

For example in New South Wales, generators assess co-products using the *Exemption* requirements. Once the material is deemed to meet these requirements, the material is exempt for: waste reporting, monitoring and associated levies under section 88 of the PoEA[5].

This responsibility to assess the material places an additional burden for the generator to both demonstrate the reliability, and to show due diligence in, monitoring co-product stream quality.

[5] Protection of the Environment Operations Act 1997

To assess the waste, the *Exemption* describes a process which:

- Qualitatively describes the sampling techniques and numbers of samples;
- Establishes chemical thresholds
- Methods for analysing contaminant concentration;
- Assesses concentrations Total and Available (leachable) forms.

As noted above, this report is not intended to replace generators' responsibility to determine the classification or exemption status of their respective co-products. However, should generators choose to rely on data within this report, they should satisfy themselves with regards to the accuracy, limitations (number of samples assessed - *n*) of the study.

2 Sampling and Analysis Procedures

2.1 Site Sampling Procedures

Slag co-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 completed and despatched with the samples.

2.2 Samples (n) collected

The association centrally coordinated the collection of seventy two (72) samples from member sites throughout Australia and New Zealand. The geographic distribution of Association members is illustrated in Figure 1 above.

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

2.3 Laboratory Procedures

Laboratory procedures for analysis of Total Metals (TM) and Toxicity Characteristic Leaching Procedure (TCLP), as required, were conducted by LabMark Pty Ltd, a NATA certified laboratory.

2.4 Quality Control / Quality Assurance Procedures

The full breakdown of the analytical results for the QA/QC for these analyses are included within 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 various state requirements for collected ISS

4 Comparison of Analytical Results with Environmental Guidelines

4.1 Product Category Assessment Results

Using state requirements, each of the samples was assessed with results shown arithmetic means reported in the following tables.

4.2 Granulated Blast Furnace Slag Assessment

Granulated Blast Furnace Slag

Element			**NSW**[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		0.7	5	N/A	10	N/A
B		50.3	N/A	N/A	N/A	N/A
Ba		400.0	N/A	N/A	N/A	N/A
Be		6.0	10	N/A	20	N/A
Cd		0.05	0.5	0.5	1	N/A
Co		0.5	N/A	N/A	N/A	N/A
Cr		40.3	50	N/A	100	N/A
Cu		1.0	10	N/A	20	N/A
Hg		0.025	0.5	N/A	1	N/A
Mo		0.5	5	5	10	N/A
Ni		2.5	10	N/A	20	N/A
Pb		1.0	10	10	20	N/A
Sb		0.5	N/A	N/A	N/A	N/A
Se		1.5	2	N/A	5	N/A
Sn		0.5	N/A	N/A	N/A	N/A
Zn		0.3	25	25	50	N/A
Mn		3033.3	N/A	N/A	N/A	N/A
Al		42666.7	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 101 to 103 (n=3)
As can be seen from this assessment the co-product ***would be considered exempt***.

4.3 Blast Furnace Slag Aggregate Assessment

Blast Furnace Slag - Air cooled aggregates

Element			NSW[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		0.72	5	N/A	10	N/A
B		11.7	N/A	N/A	N/A	N/A
Ba		73.8	N/A	N/A	N/A	N/A
Be		1.9	10	N/A	20	N/A
Cd		0.05	0.5	0.5	1	N/A
Co		0.5	N/A	N/A	N/A	N/A
Cr		42.0	50	N/A	100	N/A
Cu		1.0	10	N/A	20	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo		0.5	5	5	10	N/A
Ni		1.0	10	N/A	20	N/A
Pb		1.0	10	10	20	N/A
Sb		0.5	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		0.5	N/A	N/A	N/A	N/A
Zn		3.0	25	25	50	N/A
Mn		582	N/A	N/A	N/A	N/A
Al		14500.0	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 201 to 206 (n=6)
As can be seen from this assessment the co-product ***would be considered exempt.***

4.4 Blast Furnace Slag Fines Assessment

Blast Furnace Slag - Air cooled fines

Element			NSW[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		0.6	5	N/A	10	N/A
B		18.4	N/A	N/A	N/A	N/A
Ba		178.2	N/A	N/A	N/A	N/A
Be		3.8	10	N/A	20	N/A
Cd		0.03	0.5	0.5	1	N/A
Co		0.5	N/A	N/A	N/A	N/A
Cr		19.0	50	N/A	100	N/A
Cu		1.0	10	N/A	20	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo		0.5	5	5	10	N/A
Ni		2.1	10	N/A	20	N/A
Pb		1.0	10	10	20	N/A
Sb		0.5	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		0.5	N/A	N/A	N/A	N/A
Zn		7.6	25	25	50	N/A
Mn		2113	N/A	N/A	N/A	N/A
Al		26167	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 301 to 306 (n=6)
As can be seen from this assessment the co-product ***would be considered exempt***.

4.5 Steel Furnace Slag Aggregates Assessment

Steel Furnace Slag - Air cooled aggregates

Element			NSW[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		0.600	5	N/A	10	N/A
B		13.5	N/A	N/A	N/A	N/A
Ba		35.0	N/A	N/A	N/A	N/A
Be		0.5	10	N/A	20	N/A
Cd		0.09	0.5	0.5	1	N/A
Co		1.0	N/A	N/A	N/A	N/A
Cr	0.025	208.3	1000	N/A	2000	0.2
Cu		6.5	20	N/A	40	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo		1.8	15	15	30	N/A
Ni		4.1	30	30	60	N/A
Pb		2.1	10	10	20	N/A
Sb		0.5	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		0.7	N/A	N/A	N/A	N/A
Zn	0.025	35.1	50	50	100	1
Mn		8833	N/A	N/A	N/A	N/A
Al		9017	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 401 to 406 (n=6)
As can be seen from this assessment the co-product ***would be considered exempt.***

4.6 Steel Furnace Slag Fines Assessment

Steel Furnace Slag - Air cooled fines

Element			NSW[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		0.5	5	N/A	10	N/A
B		21.0	N/A	N/A	N/A	N/A
Ba		52.7	N/A	N/A	N/A	N/A
Be		0.5	10	N/A	20	N/A
Cd		0.23	0.5	0.5	1	N/A
Co		1.1	N/A	N/A	N/A	N/A
Cr	0.025	371.7	1000	N/A	2000	0.2
Cu		11.1	20	N/A	40	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo		8.9	15	15	30	N/A
Ni		6.0	30	30	60	N/A
Pb		3.9	10	10	20	N/A
Sb		0.5	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		1.1	N/A	N/A	N/A	N/A
Zn	0.025	67.2	50	50	100	1
Mn		15067	N/A	N/A	N/A	N/A
Al		9800	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 501 to 506 (n=6)
As can be seen from this assessment the co-product ***would be considered exempt.***

4.7 Electric Arc Furnace Slag Aggregates Assessment

Electric Arc Furnace Slag - Air cooled aggregates

Element			NSW[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		1.0	5	N/A	10	N/A
B		47.0	N/A	N/A	N/A	N/A
Ba		595.3	N/A	N/A	N/A	N/A
Be		0.5	5	N/A	10	N/A
Cd		0.2	0.5	0.5	1	N/A
Co		0.8	N/A	N/A	N/A	N/A
Cr	0.050	1041.3	10,000	N/A	20000	2
Cu		61.2	150	150	300	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo	0.010	8.0	35	35	70	0.2
Ni	0.025	10.5	50	50	100	0.5
Pb		4.4	25	25	50	N/A
Sb		0.6	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		5.0	N/A	N/A	N/A	N/A
Zn	0.080	110.7	400	400	700	4
Mn		10260	N/A	N/A	N/A	N/A
Al		8013	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 601 to 609, 613 to 618 (n=15)
As can be seen from this assessment the co-product ***would be considered exempt.***

4.8 Electric Arc Furnace Slag Fines Assessment

Electric Arc Furnace Slag - Air cooled fines

Element			NSW[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		1.5	5	N/A	10	N/A
B		54.9	N/A	N/A	N/A	N/A
Ba		498.7	N/A	N/A	N/A	N/A
Be		0.5	5	N/A	10	N/A
Cd		0.3	0.5	0.5	1	N/A
Co		1.2	N/A	N/A	N/A	N/A
Cr	0.06	938.7	10,000	N/A	20000	2
Cu		93.5	150	150	300	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo	0.019	8.8	35	35	70	0.2
Ni	0.025	10.9	50	50	100	0.5
Pb		6.1	25	25	50	N/A
Sb		0.8	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		6.7	N/A	N/A	N/A	N/A
Zn	0.106	222.0	400	400	700	4
Mn		11787	N/A	N/A	N/A	N/A
Al		11967	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 701 to 709, 713 to 718 (n=15)
As can be seen from this assessment the co-product ***would be considered exempt*.**

4.9 Sinter Slag Fines Assessment

Steel Furnace Slag - Sinter Fines

Element			NSW[1]			
	Mean TCLP	Mean TM	Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		0.5	5	N/A	N/A	N/A
B		25.0	N/A	N/A	N/A	N/A
Ba		86.0	N/A	N/A	N/A	N/A
Be		0.8	10	N/A	20	N/A
Cd		0.40	0.5	0.5	1	N/A
Co		1.8	N/A	N/A	N/A	N/A
Cr	0.025	270.0	1000	N/A	2000	0.2
Cu		11.1	20	N/A	40	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo		4.8	15	15	30	N/A
Ni		12.9	30	30	60	N/A
Pb		16.3	10	10	20	N/A
Sb		0.5	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		6.8	N/A	N/A	N/A	N/A
Zn	0.025	96.7	50	50	100	1
Mn		12933	N/A	N/A	N/A	N/A
Al		8767	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 801 to 803 (n=3)
As can be seen from this assessment the co-product ***would be considered exempt***.

4.10 Melter Slag Assessment

Melter Slag

Element	Mean TCLP	Mean TM	NSW[1] Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		2.4	5	N/A	10	N/A
B		148.7	N/A	N/A	N/A	N/A
Ba		91.3	N/A	N/A	N/A	N/A
Be		0.5	10	N/A	20	N/A
Cd		0.1	0.5	0.5	1	N/A
Co		2.0	N/A	N/A	N/A	N/A
Cr		40.0	50	N/A	100	N/A
Cu		7.0	10	10	20	N/A
Hg		0.03	0.5	N/A	1	N/A
Mo		0.9	5	5	10	N/A
Ni		4.8	10	N/A	20	N/A
Pb		1.3	10	N/A	20	N/A
Sb		0.8	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		4.7	N/A	N/A	N/A	N/A
Zn		15.7	25	25	50	N/A
Mn		1060	N/A	N/A	N/A	N/A
Al		2000	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 901 to 903 (n=3)
As can be seen from this assessment the co-product ***would be considered exempt.***

4.11 Ladle Furnace Slag Assessment

Ladle Furnace Slag

Element	Mean TCLP	Mean TM	NSW[1] Table 2 values			
			TM(Chara)	TM(Routine)	TM(Max)	TCLP(Max)
	mg/L	mg/kg		mg/kg	mg/kg	mg/L
As		4.4	5	N/A	10	N/A
B		43.7	N/A	N/A	N/A	N/A
Ba		285.6	N/A	N/A	N/A	N/A
Be		0.5	5	N/A	10	N/A
Cd	0.0025	0.5	3	03	5	0.05
Co		2.3	N/A	N/A	N/A	N/A
Cr	0.025	1304.4	10,000	N/A	20000	2
Cu	0.025	75.6	150	150	300	0.2
Hg		0.03	0.5	N/A	1	N/A
Mo	0.02	11.9	35	35	70	0.2
Ni	0.03	23.7	50	50	100	0.5
Pb		12.5	75	75	150	N/A
Sb		1.2	N/A	N/A	N/A	N/A
Se		1.0	2	N/A	5	N/A
Sn		9.0	N/A	N/A	N/A	N/A
Zn	0.025	392.0	3500	3500	5000	4
Mn		14078	N/A	N/A	N/A	N/A
Al		10978	N/A	N/A	N/A	N/A

Legend
Exceeding threshold
Near threshold

Sample Identification 1001 to 1009 (n=9)
As can be seen from this assessment the co-product ***would be considered exempt.***

5 Discussion of Results

5.1 Summary

From the seventy two (72) ISS samples analysed for their TM concentrations from eight separate process locations throughout Australasia, three (3) ISS types returned results with TM concentrations slightly above for the nominated thresholds specified under Column 2 of Table 2 of the *Exemption* for the elements – Lead and Zinc.

- Sinter Slag Fines (Pb, Zn)
- Steel Furnace Slag- Air Cooled Fines (Zn)

Eighteen (18) samples were submitted for further analysis using the TCLP assessments methods. All of results were below detection limits or thresholds.

The results are discussed in more detail below for each of the slag types.

5.2 Granulated Blast Furnace Slag

As demonstrated by the results in Table 4.2, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[6] requirements.

Based on this assessment, the co-product ***would be considered exempt.***

5.3 Blast Furnace Slag Aggregates

As demonstrated by the results in Table 4.3, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[7] requirements.

Based on this assessment, the co-product ***would be considered exempt.***

5.4 Blast Furnace Slag Fines

As demonstrated by the results in Table 4.4, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[8] requirements.

Based on this assessment, the co-product ***would be considered exempt.***

5.5 Steel Furnace Slag Aggregates

As demonstrated by the results in Table 4.5, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[9] requirements.

As specified under Table 2 of the *Exemption*, TCLP assessment was required for two (2) elements, namely Chromium and Zinc. As demonstrated by the results in Table 4.5, all results are well below the nominated thresholds under Column 4 of the Table.

---

[6] Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A: Draft - The blast furnace slag exemption 2008; Draft – The steel furnace slag exemption 2008; Draft - The electric arc furnace slag exemption 2008

[7] ibid

[8] ibid

[9] ibid

Based on this assessment, the co-product ***would be considered exempt.***

5.6 Steel Furnace Slag Fines

As demonstrated by the results in Table 4.6, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[10] requirements, except for Zinc.

As specified under Table 2 of the *Exemption*, TCLP testing was required for two (2) elements, namely Chromium and Zinc. As demonstrated by the results in Table 4.6, all results are well below the nominated thresholds under Column 4 of the Table 2.

Based on this assessment, the co-product ***would be considered exempt.***

5.7 Electric Arc Furnace Slag Aggregates

As demonstrated by the results in Table 4.7, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[11] requirements.

As specified under Table 2 of the *Exemption,* TCLP testing was required for four (4) elements, namely Chromium, Molybdenum Nickel and Zinc. As demonstrated by the results in Table 4.7 all of results are well below the nominated thresholds under Column 4 of the Table.

Based on this assessment, the co-product ***would be considered exempt.***

5.8 Electric Arc Furnace Slag Fines

As demonstrated by the results in Table 4.8, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[12] requirements.

As specified under Table 2 of the *Exemption*, TCLP testing was required for four (4) elements, namely Chromium, Molybdenum Nickel and Zinc. As demonstrated by the results in table 4.8 all of results are well below the nominated thresholds under Column 4 of the Table.

Based on this assessment, the co-product ***would be considered exempt.***

5.9 Sinter Slag Fines

As demonstrated by the results in Table 4.9, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[13] requirements, with exception for Lead and Zinc.

As specified under Table 2 of the *Exemption*, TCLP testing was required for two (2) elements, namely Chromium and Zinc. As demonstrated by the results in table 4.9 all of results are well below the nominated thresholds under Column 4 of the Table.

Based on this assessment, the co-product ***would be considered exempt.***

[10] ibid

[11] ibid

[12] ibid

[13] ibid

5.10 Melter Slag

As demonstrated by the results in Table 4.10, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption*[14] requirements.

Based on this assessment, the co-product ***would be considered exempt.***

5.11 Ladle Furnace Slag

As demonstrated by the results in Table 4.11, each of the elements assessed show TM concentrations well below the nominated thresholds specified under Table 2 of the *Exemption* requirements.

As specified under Table 2 of the *Exemption,* TCLP testing was required for six (6) elements, namely Cadmium, Chromium, Copper, Molybdenum, Nickel and Zinc. As demonstrated by the results in Table 4.11, all results were below the nominated thresholds under Column 4 of the Table.

Based on this assessment, the co-product ***would be considered exempt.***

5.12 Limitations

This report has been produced by assessing the samples as received, analysed and assessed against the *Exemption* requirements set out in Table 2 of the exemption.

The number and method of samples taken for each co-product was **NOT** consistent with the requirements of Table 3 of the *Exemption.* These results could be considered appropriate where:

- For a screening evaluation of the product range to determine the degree of compliance with the accepted standards;
- When coupled with previous investigations, n = Table 3 requirements, and;
- To investigate the consistency of the product.

From the seventy two (72) iron and steel slag samples collected from across Australasia, when coupled with previous reports demonstrates the consistent nature and low coefficient of variation of all iron and steel slags assessed in conjunction with the previous studies and reports published.

- Ecotoxicity & Chemical Characterisation of Experimentally Generated Leachate from Unbound 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 Unbound Electric Arc Furnace Steel Slag – 1997
- Material Classification of Iron and Steel Slag Co-product Waste Classification Investigation Report 2004 by Moeyan Management
- Material Classification (Iron and Steel Slag) Monitoring Report 2006

Despite sample sizes for individual products being low in a statistical significance (n<30), we would argue that the consistency exhibited so far will, coupled with ongoing investigations, only support the findings of this EMP2011 report.

[14] ibid

6 Conclusions

6.1 Compliance with Acceptance Criteria

Based on the acceptance criteria established in the *Exemptions*, each of the following products are assessed in this report as follows;

- Granulated Blast Furnace Slag ***(Exempt)***
- Blast Furnace Slag – Air-cooled aggregates ***(Exempt)***
- Blast Furnace Slag – Air-cooled fines ***(Exempt)***
- Steel Furnace Slag – Air-cooled aggregates ***(Exempt)***
- Steel Furnace Slag – Air-cooled fines ***(Exempt)***
- Electric Arc Furnace Slag – Air-cooled aggregates ***(Exempt)***
- Electric Arc Furnace Slag – Air-cooled fines ***(Exempt)***
- Sinter Slag Fines ***(Exempt)***
- Melter Slag ***(Exempt)***
- Ladle Furnace Slag ***(Exempt)***

7 Related Documents

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

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

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

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

Attachment 1 Slag Manufacturing Process

Blast Furnace Slag - Air Cooled Slag

The first step in the production of steel is the manufacturing of iron. This process begins by combining Iron ore (a mixture of iron oxides, silica and alumina) with a fuel consisting of coke, natural gas, oxygen and pulverised coal, and limestone – which serves as a fluxing agent in a blast furnace. The furnace consists of a large vertical chamber through which high 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 then permitted to cool for a period of time whilst water is sprayed over the slag for the primary purpose of increasing the rate of solidification. The resulting solidified slag is referred to 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, the macro components of granulated blast furnace slag are very consistent.

Both air-cooled and granulated slags are 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, molten iron, steel scrap and lime are placed in an open-top vessel. High pressure oxygen is blown into the vessel and a violent chemical reaction takes place. Upon completion of the reaction, the steel is drained into one ladle and the slag is poured into another. The molten steel furnace slag is then poured into a slag put 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.

BlueScope Steel produces steel furnace slag as a co-product of the steel making process, which is very consistent.

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.

Melter Slag

Iron is mined using conventional earthmoving equipment before being separated magnetically, by creating a slurry and running it over magnetic drums. This is followed by gravimetric separation through a series of cones and spiral separators,

where the heavier iron-bearing materials gravitate towards the centre, while residual clays and silts gravitate outwards. The slurry is then pumped 18 kilometres to the steel mill through an underground pipeline, where it is finally dewatered and stockpiled.

To convert the iron, a direct reduction process is used, adding coal and limestone to the irons before pre-heating them in four multi-hearth furnaces. This drives off the volatile constituents of the coal. The material then enters one of four rotary kilns where the direct reduction takes place over a period of eight hours.

The directly reduced product is then melted in one of two large electric melters. It is from this stage of the process that SteelServ Ltd obtains about 250,000 tonnes per annum of "melter" slag. The chemistry of New Zealand's melter slag differs from other variants of slag. This product consists of a high percentage of titanium and quantities of magnesium oxide and alumina typically higher than the industry norm. In contrast, the material has a characteristically low amount of silica, calcium oxide and sulphur.

KOBM Slag

New Zealand Steel uses a KOBM Oxygen Steel Converter vessel. The vessel is charged with the molten iron from the melters and a small proportion of scrap before refining begins using a top lance and bottom blown tuyeres to produce. The remaining steel making operation follows conventional practices, apart from the chemistry of the slag, which again differs from international equivalents due to irons and source.

KOBM slag is high in fines and cannot be used as an aggregate for road making or surfacings. KOBM can be used, however, as a lime substitute in stabilising clay sub-bases, as an additive to cement manufacture and as a soil conditioner for horticultural farming.

Attachment 2 Analysis and Chain of Custody

ANALYSIS AND CHAIN OF CUSTODY

Quote no: ASA-110704-ES

Commercial-in-Confidence
Australasian (iron & steel) Slag Association
PO Box 1194, WOLLONGONG NSW 2500
T: 02 4225 8466 F: 02 4228 1777
E: info@asa-inc.org.au

Company:	Australasian (iron & steel) Slag Association		
Project Mgr:	Kylie Dal Santo	**Project name:**	MCDS/11
Address:	PO Box 1194, WOLLONGONG NSW 2500		
Telephone:	+61 2 4225 8466	**Email:**	kdalsanto@hbmgroup.com.au

Matrix codes	Preservative codes	Container codes
CW – Clean Water	**P1** – Chilled 4⁰ C	**C1** – 125L PET
WW = Waste Water	**P2** = Frozen	**C2** = 500ml PET
GW = Ground Water	**P3** = Filtered	**C3** = 200ml PET
EF = Effluent	**P4** = HNO_3 PH<2	**C4** = 100ml PET
BS = Biosolid	**P5** = H_2SO_4 PH<2	**C5** = 1L Glass
SL = Soil	**P6** = HCl PH<2	**C6** = Amber Glass
SD = Sediment	**P7** = Lugol's Iodine	**C7** = Sterile
OT = *Other	**P8** = *Other	**C8** = *Other

No	Client Sample ID	Description	Sample Date	Matrix	No. of Containers	Container type and Preservative						ANALYSIS REQUIRED			
												pH	EC	M18 Metals*	TCLP**
1	101	Granulated BFS	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	
2	102	Granulated BFS	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	
3	103	Granulated BFS	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	
4	201	Air Cooled BFS	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	
5	202	Air Cooled BFS	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	
6	203	Air Cooled BFS	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	
7	204	Air Cooled BFS	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	
8	205	Air Cooled BFS	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	
9	206	Air Cooled BFS	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	
10	301	Air Cooled BFS Fines	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	
11	302	Air Cooled BFS Fines	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	
12	303	Air Cooled BFS Fines	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	
13	304	Air Cooled BFS Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	
14	305	Air Cooled BFS Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	
15	306	Air Cooled BFS Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	
16	401	SFS	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
17	402	SFS	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
18	403	SFS	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
19	404	SFS	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)

ANALYSIS AND CHAIN OF CUSTODY

Quote no: ASA-110704-ES

Commercial-in-Confidence
Australasian (iron & steel) Slag Association
PO Box 1194, WOLLONGONG NSW 2500
T: 02 4225 8466 F: 02 4228 1777
E: info@asa-inc.org.au

No	Client Sample ID	Description	Sample Date	Matrix	No. of Containers	Container type and Preservative						ANALYSIS REQUIRED			
												pH	EC	M18 Metals*	TCLP**
20	**405**	SFS	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
21	**406**	SFS	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
22	**501**	SFS Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
23	**502**	SFS Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
24	**503**	SFS Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
25	**504**	SFS Fines	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
26	**505**	SFS Fines	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
27	**506**	SFS Fines	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(2)
28	**601**	EAF Slag	05/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
29	**602**	EAF Slag	05/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
30	**603**	EAF Slag	05/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
31	**604**	EAF Slag	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
32	**605**	EAF Slag	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
33	**606**	EAF Slag	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
34	**607**	EAF Slag	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
35	**608**	EAF Slag	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
36	**609**	EAF Slag	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
37	**613**	EAF Slag	25/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
38	**614**	EAF Slag	25/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
39	**615**	EAF Slag	25/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
40	**616**	EAF Slag	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
41	**617**	EAF Slag	20/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
42	**618**	EAF Slag	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
43	**701**	EAF Slag Fines	05/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
44	**702**	EAF Slag Fines	05/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
45	**703**	EAF Slag Fines	05/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)

ANALYSIS AND CHAIN OF CUSTODY

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No	Client Sample ID	Description	Sample Date	Matrix	No. of Containers	Container type and Preservative						ANALYSIS REQUIRED			
												pH	EC	M18 Metals*	TCLP**
46	**704**	EAF Slag Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
47	**705**	EAF Slag Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
48	**706**	EAF Slag Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
49	**707**	EAF Slag Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
50	**708**	EAF Slag Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
51	**709**	EAF Slag Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
52	**713**	EAF Slag Fines	19/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
53	**714**	EAF Slag Fines	20/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
54	**715**	EAF Slag Fines	21/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
55	**716**	EAF Slag Fines	25/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
56	**717**	EAF Slag Fines	25/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
57	**718**	EAF Slag Fines	25/07/11	OT	1	C2	P8					Yes	Yes	Yes	(1)
58	**801**	Sinter Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	
59	**802**	Sinter Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	
60	**803**	Sinter Fines	22/07/11	OT	1	C2	P8					Yes	Yes	Yes	
61	**901**	Melter Slag	04/08/11	OT	1	C2	P8					Yes	Yes	Yes	
62	**902**	Melter Slag	04/08/11	OT	1	C2	P8					Yes	Yes	Yes	
63	**903**	Melter Slag	04/08/11	OT	1	C2	P8					Yes	Yes	Yes	
64	**1001**	LFS Fines	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	(3)
65	**1002**	LFS Fines	26/07/11	OT	1	C2	P8					Yes	Yes	Yes	(3)
66	**1003**	LFS Fines	26/07/11	OT	2	OT	P8					Yes	Yes	Yes	(3)
67	**1004**	LFS	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(3)
68	**1005**	LFS	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(3)
69	**1006**	LFS	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(3)
70	**1007**	LFS Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(3)
71	**1008**	LFS Fines	24/08/11	OT	1	C2	P8					Yes	Yes	Yes	(3)

Australasian (iron & steel) Slag Association
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T: 02 4225 8466 F: 02 4228 1777
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ANALYSIS AND CHAIN OF CUSTODY

Quote no: ASA-110704-ES

No	Client Sample ID	Description	Sample Date	Matrix	No. of Containers	Container type and Preservative							ANALYSIS REQUIRED			
													pH	EC	M18 Metals*	TCLP**
72	**1009**	LFS Fines	24/08/11	OT	1	C2	P8						Yes	Yes	Yes	(3)

	Samples	Kylie Dal Santo	**Date/Tim**		**Samples rec'd by:**		**Date/Tim**	
	Samples rec'd by:		**Date/Tim**		**Samples rec'd by:**		**Date/Tim**	

COMMENTS: Please retain sample until:

* M18 Metals: As, Cd, Cr, Cu, Co, Ni, Sn, Ba, Se, Pb, Zn, Mo, Be, Sb, B, Mn, Hg, Al

** TCLP Metals as required and as per legion below

(1) TCLP EAF; Cr, Mo, Ni, Zn
(2) TCLP SFS: Cr, Zn
(3) TCLP LFS: Cr, Mo, Ni, Zn, Cd, Cu

Attachment 3 Nata Laboratory Reports

mgt LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Australasian Slag Association
Suite 2/Level 1 336 Keira Street
Wollongong
NSW 2500

Attention: Kylie Dal Santo

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Report	310768-S
Client Reference	PARENT MCDS/11
Received Date	Sep 02, 2011

Client Sample ID			**101**	**102**	**103**	**201**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
mgt-LabMark Sample No.			**S11-Se30505**	**S11-Se30506**	**S11-Se30507**	**S11-Se30508**
Date Sampled			**Jul 21, 2011**	**Jul 21, 2011**	**Jul 21, 2011**	**Jul 21, 2011**
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	120	76	72	540
pH (1:5 Aqueous extract)	0.1	units	9.4	9.4	9.3	11
% Moisture	0.1	%	7.0	7.0	7.1	7.0
Heavy Metals						
Aluminium	10	mg/kg	44000	42000	42000	14000
Barium	5	mg/kg	400	410	390	110
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	1.2	< 1	< 1	< 1
Beryllium	1	mg/kg	7.5	5.7	4.8	1.7
Boron	5	mg/kg	61	48	42	18
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	2	mg/kg	55	94	130	180
Cobalt	1	mg/kg	< 1	< 1	< 1	< 1
Copper	2	mg/kg	< 2	< 2	< 2	< 2
Lead	2	mg/kg	< 2	< 2	< 2	< 2
Manganese	5	mg/kg	3200	3000	2900	910
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	< 1	< 1	< 1	< 1
Nickel	1	mg/kg	2.2	2.7	2.7	< 1
Selenium	2	mg/kg	2.5	< 2	< 2	< 2
Tin	1	mg/kg	< 1	< 1	< 1	< 1
Zinc	5	mg/kg	< 5	< 5	< 5	< 5

Client Sample ID			202	203	204	205
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30509	S11-Se30510	S11-Se30511	S11-Se30512
Date Sampled			Jul 21, 2011	Jul 21, 2011	Jul 26, 2011	Jul 26, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	580	500	610	220
pH (1:5 Aqueous extract)	0.1	units	11	11	9.2	10
% Moisture	0.1	%	7.1	7.1	0.6	1.3
Heavy Metals						
Aluminium	10	mg/kg	14000	14000	17000	15000
Barium	5	mg/kg	110	100	52	35
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	1.1	1.2	< 1	< 1
Beryllium	1	mg/kg	1.6	1.8	2.7	1.6
Boron	5	mg/kg	14	14	10	6.0
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	2	mg/kg	220	250	200	200
Cobalt	1	mg/kg	< 1	< 1	< 1	< 1
Copper	2	mg/kg	< 2	< 2	< 2	< 2
Lead	2	mg/kg	< 2	< 2	< 2	< 2
Manganese	5	mg/kg	760	770	470	310
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	< 1	< 1	< 1	< 1
Nickel	1	mg/kg	< 1	1.0	1.3	1.3
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	< 1	< 1	< 1	< 1
Zinc	5	mg/kg	< 5	< 5	< 5	5.7

Client Sample ID			206	301	302	303
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30513	S11-Se30514	S11-Se30515	S11-Se30516
Date Sampled			Jul 26, 2011	Jul 26, 2011	Jul 26, 2011	Jul 26, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	340	1400	1500	1300
pH (1:5 Aqueous extract)	0.1	units	9.9	9.2	9.5	9.2
% Moisture	0.1	%	0.9	1.7	1.4	1.8
Heavy Metals						
Aluminium	10	mg/kg	13000	14000	16000	13000
Barium	5	mg/kg	36	44	55	40
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	1.0	< 1	< 1
Beryllium	1	mg/kg	2.2	2.2	3.2	2.3
Boron	5	mg/kg	7.9	12	14	8.7
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	2	mg/kg	200	41	51	15
Cobalt	1	mg/kg	< 1	< 1	< 1	< 1
Copper	2	mg/kg	< 2	< 2	2.2	< 2
Lead	2	mg/kg	< 2	< 2	< 2	< 2
Manganese	5	mg/kg	270	2800	1900	880
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	< 1	< 1	< 1	< 1
Nickel	1	mg/kg	1.1	1.7	2.2	1.3
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	< 1	< 1	< 1	< 1
Zinc	5	mg/kg	< 5	13	15	10.0

Client Sample ID			304	305	306	401
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30517	S11-Se30518	S11-Se30519	S11-Se30520
Date Sampled			Jul 22, 2011	Jul 22, 2011	Jul 22, 2011	Jul 22, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	1600	1800	1600	7900
pH (1:5 Aqueous extract)	0.1	units	11	11	11	12
% Moisture	0.1	%	5.2	5.4	5.5	3.2
Heavy Metals						
Aluminium	10	mg/kg	36000	39000	39000	26000
Barium	5	mg/kg	330	300	300	11
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	< 1	< 1	< 1
Beryllium	1	mg/kg	4.6	5.5	5.0	< 1
Boron	5	mg/kg	31	32	31	10
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	2	mg/kg	2.1	2.7	2.3	130
Cobalt	1	mg/kg	< 1	< 1	< 1	< 1
Copper	2	mg/kg	< 2	< 2	< 2	< 2
Lead	2	mg/kg	< 2	< 2	< 2	< 2
Manganese	5	mg/kg	2300	2400	2400	6700
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	< 1	< 1	< 1	< 1
Nickel	1	mg/kg	2.2	2.7	2.7	1.2
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	< 1	< 1	< 1	< 1
Zinc	5	mg/kg	< 5	< 5	< 5	< 5

Client Sample ID			402	403	404	405
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30521	S11-Se30522	S11-Se30523	S11-Se30524
Date Sampled			Jul 22, 2011	Jul 22, 2011	Jul 19, 2011	Jul 19, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	7800	7900	2400	5100
pH (1:5 Aqueous extract)	0.1	units	12	12	12	12
% Moisture	0.1	%	3.0	2.8	1.3	0.5
Heavy Metals						
Aluminium	10	mg/kg	2200	1800	5900	17000
Barium	5	mg/kg	18	8.9	44	64
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	< 1	< 1	1.1
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	8.6	8.2	13	21
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Chromium	2	mg/kg	200	130	200	260
Cobalt	1	mg/kg	< 1	< 1	1.0	2.1
Copper	2	mg/kg	2.9	< 2	6.8	18
Lead	2	mg/kg	< 2	< 2	< 2	3.5
Manganese	5	mg/kg	6300	7000	11000	11000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	< 1	< 1	1.4	2.5
Nickel	1	mg/kg	2.3	1.3	4.5	8.4
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	< 1	< 1	< 1	1.7
Zinc	5	mg/kg	5.5	< 5	26	76

Client Sample ID			406	501	502	503
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30525	S11-Se30526	S11-Se30527	S11-Se30528
Date Sampled			Jul 19, 2011	Jul 22, 2011	Jul 22, 2011	Jul 22, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	3400	8200	8000	8100
pH (1:5 Aqueous extract)	0.1	units	12	12	12	12
% Moisture	0.1	%	0.4	7.9	7.1	7.0
Heavy Metals						
Aluminium	10	mg/kg	12000	9900	8100	6800
Barium	5	mg/kg	64	41	44	40
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	< 1	< 1	< 1
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	20	20	21	21
Cadmium	0.1	mg/kg	0.3	0.1	< 0.1	< 0.1
Chromium	2	mg/kg	330	490	570	520
Cobalt	1	mg/kg	1.4	< 1	< 1	< 1
Copper	2	mg/kg	9.3	5.4	5.2	5.3
Lead	2	mg/kg	5.1	< 2	< 2	< 2
Manganese	5	mg/kg	11000	19000	20000	19000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	5.2	18	9.0	8.4
Nickel	1	mg/kg	6.7	5.5	4.5	4.1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	< 1	< 1	< 1	< 1
Zinc	5	mg/kg	98	6.0	10	7.3

Client Sample ID			504	505	506	601
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30529	S11-Se30530	S11-Se30531	S11-Se30532
Date Sampled			Jul 19, 2011	Jul 19, 2011	Jul 19, 2011	Jul 05, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	7600	8600	7100	870
pH (1:5 Aqueous extract)	0.1	units	12	12	12	11
% Moisture	0.1	%	3.5	3.9	2.1	1.9
Heavy Metals						
Aluminium	10	mg/kg	10000	12000	12000	14000
Barium	5	mg/kg	56	75	60	310
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	< 1	< 1	1.6
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	20	21	23	60
Cadmium	0.1	mg/kg	0.4	0.5	0.3	0.1
Chromium	2	mg/kg	210	240	200	850
Cobalt	1	mg/kg	1.9	2.2	1.1	1.1
Copper	2	mg/kg	12	32	6.7	74
Lead	2	mg/kg	8.6	6.5	5.0	3.9
Manganese	5	mg/kg	9400	11000	12000	9800
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	6.8	9.3	1.6	7.1
Nickel	1	mg/kg	7.2	9.3	5.1	9.1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	1.3	3.1	< 1	8.2
Zinc	5	mg/kg	140	130	110	47

Client Sample ID			**602**	**603**	**604**	**605**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
mgt-LabMark Sample No.			**S11-Se30533**	**S11-Se30534**	**S11-Se30535**	**S11-Se30536**
Date Sampled			**Jul 05, 2011**	**Jul 05, 2011**	**Aug 24, 2011**	**Aug 24, 2011**
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	1000	660	1800	1900
pH (1:5 Aqueous extract)	0.1	units	11	11	12	12
% Moisture	0.1	%	1.1	0.4	3.1	3.5
Heavy Metals						
Aluminium	10	mg/kg	1500	1200	1200	11000
Barium	5	mg/kg	710	740	660	420
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	2.5	1.1	< 1	< 1
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	66	56	51	38
Cadmium	0.1	mg/kg	< 0.1	0.1	0.1	0.2
Chromium	2	mg/kg	900	810	1900	1700
Cobalt	1	mg/kg	1.3	< 1	< 1	< 1
Copper	2	mg/kg	78	47	58	41
Lead	2	mg/kg	5.2	3.9	3.1	2.7
Manganese	5	mg/kg	9800	7600	14000	11000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	7.8	7.7	15	11
Nickel	1	mg/kg	11	6.1	8.0	4.4
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	12	7.3	4.6	2.8
Zinc	5	mg/kg	60	50	120	110

Client Sample ID			**606**	**607**	**608**	**609**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
mgt-LabMark Sample No.			**S11-Se30537**	**S11-Se30538**	**S11-Se30539**	**S11-Se30540**
Date Sampled			**Aug 24, 2011**	**Aug 24, 2011**	**Aug 24, 2011**	**Aug 24, 2011**
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	1800	1200	950	1100
pH (1:5 Aqueous extract)	0.1	units	12	11	11	11
% Moisture	0.1	%	2.0	3.1	4.4	3.0
Heavy Metals						
Aluminium	10	mg/kg	14000	7300	7200	8800
Barium	5	mg/kg	440	690	830	630
Antimony	1	mg/kg	1.6	< 1	< 1	< 1
Arsenic	1	mg/kg	2.8	< 1	< 1	1.7
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	54	38	39	46
Cadmium	0.1	mg/kg	0.2	< 0.1	0.2	0.1
Chromium	2	mg/kg	2500	660	420	960
Cobalt	1	mg/kg	4.2	< 1	< 1	1.6
Copper	2	mg/kg	130	41	61	82
Lead	2	mg/kg	3.5	3.0	5.2	3.8
Manganese	5	mg/kg	17000	9300	7600	11000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	24	5.2	4.0	9.0
Nickel	1	mg/kg	40	5.0	9.0	17
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	9.1	2.4	3.3	5.4
Zinc	5	mg/kg	160	99	150	140

Client Sample ID			613	614	615	616
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30541	S11-Se30542	S11-Se30543	S11-Se30544
Date Sampled			Jul 25, 2011	Jul 25, 2011	Jul 25, 2011	Jul 19, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	650	120	130	880
pH (1:5 Aqueous extract)	0.1	units	11	11	11	11
% Moisture	0.1	%	2.5	2.6	2.4	4.3
Heavy Metals						
Aluminium	10	mg/kg	8300	6800	11000	10000
Barium	5	mg/kg	570	670	760	440
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	< 1	< 1	< 1
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	47	46	56	37
Cadmium	0.1	mg/kg	0.4	0.3	0.6	< 0.1
Chromium	2	mg/kg	480	350	500	1400
Cobalt	1	mg/kg	< 1	1.7	1.4	< 1
Copper	2	mg/kg	57	73	75	36
Lead	2	mg/kg	6.5	5.4	12	2.3
Manganese	5	mg/kg	10000	9400	12000	8600
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	3.5	3.1	4.4	< 1
Nickel	1	mg/kg	7.2	17	14	4.0
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	3.2	3.8	4.4	3.5
Zinc	5	mg/kg	160	150	290	81

Client Sample ID			617	618	701	702
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30545	S11-Se30546	S11-Se30547	S11-Se30548
Date Sampled			Jul 20, 2011	Jul 21, 2011	Jul 05, 2011	Jul 05, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	1100	1100	550	970
pH (1:5 Aqueous extract)	0.1	units	11	11	11	11
% Moisture	0.1	%	0.2	0.5	2.4	2.8
Heavy Metals						
Aluminium	10	mg/kg	12000	5900	9500	14000
Barium	5	mg/kg	650	410	430	520
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	< 1	1.5	2.7
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	44	27	51	64
Cadmium	0.1	mg/kg	0.3	< 0.1	0.2	0.2
Chromium	2	mg/kg	2100	390	480	570
Cobalt	1	mg/kg	< 1	< 1	1.2	1.0
Copper	2	mg/kg	44	21	59	69
Lead	2	mg/kg	4.1	< 2	12	11
Manganese	5	mg/kg	12000	4800	8200	10000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	9.1	8.0	5.0	6.5
Nickel	1	mg/kg	3.5	2.7	9.1	7.3
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	3.7	1.5	8.3	8.5
Zinc	5	mg/kg	30	14	120	170

Client Sample ID			703	704	705	706
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30549	S11-Se30550	S11-Se30551	S11-Se30552
Date Sampled			Jul 05, 2011	Aug 24, 2011	Aug 24, 2011	Aug 24, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	1400	1900	1800	1800
pH (1:5 Aqueous extract)	0.1	units	11	12	12	12
% Moisture	0.1	%	5.0	2.2	2.5	4.0
Heavy Metals						
Aluminium	10	mg/kg	13000	25000	9300	11000
Barium	5	mg/kg	460	660	340	460
Antimony	1	mg/kg	2.2	1.9	< 1	< 1
Arsenic	1	mg/kg	4.1	2.5	1.2	1.4
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	65	83	40	44
Cadmium	0.1	mg/kg	1.3	0.4	0.1	0.1
Chromium	2	mg/kg	360	1600	1600	1600
Cobalt	1	mg/kg	4.1	1.3	< 1	< 1
Copper	2	mg/kg	260	280	47	51
Lead	2	mg/kg	26	4.2	2.7	2.1
Manganese	5	mg/kg	7700	11000	12000	15000
Mercury	0.05	mg/kg	< 0.05	0.08	< 0.05	< 0.05
Molybdenum	1	mg/kg	7.7	33	10.0	9.5
Nickel	1	mg/kg	36	9.9	4.9	5.5
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	26	14	3.3	3.0
Zinc	5	mg/kg	800	260	130	110

Client Sample ID			707	708	709	713
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30553	S11-Se30554	S11-Se30555	S11-Se30556
Date Sampled			Aug 24, 2011	Aug 24, 2011	Aug 24, 2011	Jul 19, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	1000	1100	1000	2200
pH (1:5 Aqueous extract)	0.1	units	11	11	11	12
% Moisture	0.1	%	3.7	2.7	2.6	3.1
Heavy Metals						
Aluminium	10	mg/kg	8000	13000	110000	13000
Barium	5	mg/kg	440	500	590	390
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	< 1	1.2	< 1	< 1
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	47	64	61	37
Cadmium	0.1	mg/kg	0.1	0.2	0.2	< 0.1
Chromium	2	mg/kg	780	1100	750	950
Cobalt	1	mg/kg	< 1	1.2	< 1	< 1
Copper	2	mg/kg	56	73	64	28
Lead	2	mg/kg	2.8	4.2	3.2	2.1
Manganese	5	mg/kg	11000	14000	13000	9800
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	5.3	7.5	5.7	9.0
Nickel	1	mg/kg	5.9	10	9.5	3.9
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	2.2	4.2	3.2	2.8
Zinc	5	mg/kg	130	180	150	130

Client Sample ID			714	715	716	717
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30557	S11-Se30558	S11-Se30559	S11-Se30560
Date Sampled			Jul 20, 2011	Jul 21, 2011	Jul 25, 2011	Jul 25, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	1700	1800	590	620
pH (1:5 Aqueous extract)	0.1	units	12	12	11	11
% Moisture	0.1	%	< 0.1	2.8	2.2	2.5
Heavy Metals						
Aluminium	10	mg/kg	6800	12000	9900	12000
Barium	5	mg/kg	350	420	580	680
Antimony	1	mg/kg	< 1	< 1	< 1	< 1
Arsenic	1	mg/kg	1.1	< 1	1.6	1.1
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	34	41	60	70
Cadmium	0.1	mg/kg	< 0.1	< 0.1	0.6	0.2
Chromium	2	mg/kg	1100	1100	610	750
Cobalt	1	mg/kg	< 1	< 1	1.2	1.3
Copper	2	mg/kg	45	33	80	98
Lead	2	mg/kg	< 2	< 2	7.8	5.1
Manganese	5	mg/kg	9100	14000	12000	14000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	8.5	7.5	3.7	4.8
Nickel	1	mg/kg	7.0	4.0	8.8	12
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	3.5	2.3	4.1	4.7
Zinc	5	mg/kg	230	120	310	220

Client Sample ID			718	801	802	803
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30561	S11-Se30562	S11-Se30563	S11-Se30564
Date Sampled			Jul 25, 2011	Jul 22, 2011	Jul 22, 2011	Jul 22, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	680	300	100	220
pH (1:5 Aqueous extract)	0.1	units	11	11	9.6	10
% Moisture	0.1	%	3.1	4.7	5.0	3.3
Heavy Metals						
Aluminium	10	mg/kg	12000	9100	5200	12000
Barium	5	mg/kg	660	69	110	79
Antimony	1	mg/kg	1.3	< 1	< 1	< 1
Arsenic	1	mg/kg	2.7	< 1	< 1	< 1
Beryllium	1	mg/kg	< 1	< 1	1.3	< 1
Boron	5	mg/kg	69	33	12	30
Cadmium	0.1	mg/kg	0.3	0.5	0.3	0.4
Chromium	2	mg/kg	730	320	130	360
Cobalt	1	mg/kg	3.3	1.9	1.5	2.0
Copper	2	mg/kg	160	12	12	9.4
Lead	2	mg/kg	5.7	20	14	15
Manganese	5	mg/kg	16000	16000	5800	17000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	7.8	6.6	2.5	5.3
Nickel	1	mg/kg	29	16	7.8	15
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	11	9.3	4.2	7.0
Zinc	5	mg/kg	270	580	190	570

Client Sample ID			901	902	903	1001
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30565	S11-Se30566	S11-Se30567	S11-Se30568
Date Sampled			Aug 04, 2011	Aug 04, 2011	Aug 04, 2011	Jul 26, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	100	91	91	9900
pH (1:5 Aqueous extract)	0.1	units	9.0	8.9	9.4	12
% Moisture	0.1	%	2.7	2.9	2.9	0.3
Heavy Metals						
Aluminium	10	mg/kg	2500	1400	2100	8800
Barium	5	mg/kg	190	45	39	190
Antimony	1	mg/kg	1.4	< 1	< 1	1.3
Arsenic	1	mg/kg	6.2	< 1	< 1	6.0
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	36	190	220	39
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	2	mg/kg	250	15	3.0	250
Cobalt	1	mg/kg	1.5	4.0	< 1	1.4
Copper	2	mg/kg	47	2.4	2.1	46
Lead	2	mg/kg	2.1	< 2	< 2	2.0
Manganese	5	mg/kg	1500	800	880	11000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	1.8	< 1	< 1	1.9
Nickel	1	mg/kg	12	2.0	< 1	12
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	13	< 1	< 1	13
Zinc	5	mg/kg	42	< 5	< 5	40

Client Sample ID			1002	1003	1004	1005
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30569	S11-Se30570	S11-Se30571	S11-Se30572
Date Sampled			Jul 26, 2011	Jul 26, 2011	Aug 24, 2011	Aug 24, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	10000	10000	4600	3100
pH (1:5 Aqueous extract)	0.1	units	12	12	12	12
% Moisture	0.1	%	0.4	0.4	0.5	1.4
Heavy Metals						
Aluminium	10	mg/kg	6900	9100	14000	12000
Barium	5	mg/kg	170	230	370	370
Antimony	1	mg/kg	1.5	1.0	< 1	1.0
Arsenic	1	mg/kg	7.4	2.6	2.7	2.1
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	74	37	47	45
Cadmium	0.1	mg/kg	0.1	< 0.1	0.7	0.9
Chromium	2	mg/kg	400	290	2000	1600
Cobalt	1	mg/kg	4.8	1.8	2.2	2.2
Copper	2	mg/kg	120	50	76	81
Lead	2	mg/kg	2.4	3.0	19	17
Manganese	5	mg/kg	9700	11000	18000	15000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	6.5	2.6	17	14
Nickel	1	mg/kg	40	15	21	22
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	11	5.6	5.5	5.7
Zinc	5	mg/kg	38	40	590	680

Client Sample ID			1006	1007	1008	1009
Sample Matrix			Soil	Soil	Soil	Soil
mgt-LabMark Sample No.			S11-Se30573	S11-Se30574	S11-Se30575	S11-Se30576
Date Sampled			Aug 24, 2011	Aug 24, 2011	Aug 24, 2011	Aug 24, 2011
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract)	5	uS/cm	4500	3100	3700	4200
pH (1:5 Aqueous extract)	0.1	units	12	12	12	12
% Moisture	0.1	%	0.8	1.0	1.1	2.1
Heavy Metals						
Aluminium	10	mg/kg	12000	14000	12000	10000
Barium	5	mg/kg	270	370	350	250
Antimony	1	mg/kg	< 1	3.1	< 1	< 1
Arsenic	1	mg/kg	1.9	14	1.6	1.7
Beryllium	1	mg/kg	< 1	< 1	< 1	< 1
Boron	5	mg/kg	39	46	36	30
Cadmium	0.1	mg/kg	0.8	0.7	0.6	0.5
Chromium	2	mg/kg	1900	2300	1500	1500
Cobalt	1	mg/kg	2.0	3.4	1.3	1.3
Copper	2	mg/kg	75	150	43	39
Lead	2	mg/kg	23	24	11	11
Manganese	5	mg/kg	13000	19000	17000	13000
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	1	mg/kg	17	24	12	12
Nickel	1	mg/kg	36	33	19	15
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Tin	1	mg/kg	4.9	29	3.1	3.4
Zinc	5	mg/kg	740	690	340	370

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Conductivity (1:5 aqueous extract) - Method: E032 Electrical Conductivity (EC)	Sydney	Sep 07, 2011	28 Day
pH (1:5 Aqueous extract) - Method: E018 pH	Sydney	Sep 07, 2011	7 Day
% Moisture - Method: E005 Moisture Content	Sydney	Sep 07, 2011	28 Day
Heavy Metals - Method: E022 Acid Extractable metals in Soils	Sydney	Sep 07, 2011	180 Day
Metals M18 - Method: E020/E030 Metals, E026 Mercury	Sydney	Sep 07, 2011	28 Day

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Company Name: Australasian Slag Association (Iron & Steel)
Address: Suite 2/Level 1 336 Keira Street
Wollongong
NSW 2500

Order No.:
Report #: 310768
Phone: 02 42258466
Fax: 02 4228 1777

Received: Sep 2, 2011 10:00 AM
Due: Sep 9, 2011 4:00 PM
Priority: 5 Day
Contact name: Kylie Dal Santo

Client Job No.: PARENT MCDS/11

mgt-LabMark Client Manager: Dan Thompson

Sample Detail					% Moisture	Aluminium	Barium	Conductivity (1:5 aqueous extract)	pH (1:5 Aqueous extract)	Metals M18
Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site #1261										
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
101	Jul 21, 2011		Soil	S11-Se30505	X	X	X	X	X	X
102	Jul 21, 2011		Soil	S11-Se30506	X	X	X	X	X	X
103	Jul 21, 2011		Soil	S11-Se30507	X	X	X	X	X	X
201	Jul 21, 2011		Soil	S11-Se30508	X	X	X	X	X	X
202	Jul 21, 2011		Soil	S11-Se30509	X	X	X	X	X	X
203	Jul 21, 2011		Soil	S11-Se30510	X	X	X	X	X	X
204	Jul 26, 2011		Soil	S11-Se30511	X	X	X	X	X	X
205	Jul 26, 2011		Soil	S11-Se30512	X	X	X	X	X	X
206	Jul 26, 2011		Soil	S11-Se30513	X	X	X	X	X	X
301	Jul 26, 2011		Soil	S11-Se30514	X	X	X	X	X	X
302	Jul 26, 2011		Soil	S11-Se30515	X	X	X	X	X	X

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Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site #1261										
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X
303	Jul 26, 2011		Soil	S11-Se30516	X	X	X	X	X	X
304	Jul 22, 2011		Soil	S11-Se30517	X	X	X	X	X	X
305	Jul 22, 2011		Soil	S11-Se30518	X	X	X	X	X	X
306	Jul 22, 2011		Soil	S11-Se30519	X	X	X	X	X	X
401	Jul 22, 2011		Soil	S11-Se30520	X	X	X	X	X	X
402	Jul 22, 2011		Soil	S11-Se30521	X	X	X	X	X	X
403	Jul 22, 2011		Soil	S11-Se30522	X	X	X	X	X	X
404	Jul 19, 2011		Soil	S11-Se30523	X	X	X	X	X	X
405	Jul 19, 2011		Soil	S11-Se30524	X	X	X	X	X	X
406	Jul 19, 2011		Soil	S11-Se30525	X	X	X	X	X	X
501	Jul 22, 2011		Soil	S11-Se30526	X	X	X	X	X	X
502	Jul 22, 2011		Soil	S11-Se30527	X	X	X	X	X	X

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Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site #1261										
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X
503	Jul 22, 2011		Soil	S11-Se30528	X	X	X	X	X	X
504	Jul 19, 2011		Soil	S11-Se30529	X	X	X	X	X	X
505	Jul 19, 2011		Soil	S11-Se30530	X	X	X	X	X	X
506	Jul 19, 2011		Soil	S11-Se30531	X	X	X	X	X	X
601	Jul 05, 2011		Soil	S11-Se30532	X	X	X	X	X	X
602	Jul 05, 2011		Soil	S11-Se30533	X	X	X	X	X	X
603	Jul 05, 2011		Soil	S11-Se30534	X	X	X	X	X	X
604	Aug 24, 2011		Soil	S11-Se30535	X	X	X	X	X	X
605	Aug 24, 2011		Soil	S11-Se30536	X	X	X	X	X	X
606	Aug 24, 2011		Soil	S11-Se30537	X	X	X	X	X	X
607	Aug 24, 2011		Soil	S11-Se30538	X	X	X	X	X	X
608	Aug 24, 2011		Soil	S11-Se30539	X	X	X	X	X	X

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Sample Detail					% Moisture	Aluminium	Barium	Conductivity (1:5 aqueous extract)	pH (1:5 Aqueous extract)	Metals M18
Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site #1261										
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X
609	Aug 24, 2011		Soil	S11-Se30540	X	X	X	X	X	X
613	Jul 25, 2011		Soil	S11-Se30541	X	X	X	X	X	X
614	Jul 25, 2011		Soil	S11-Se30542	X	X	X	X	X	X
615	Jul 25, 2011		Soil	S11-Se30543	X	X	X	X	X	X
616	Jul 19, 2011		Soil	S11-Se30544	X	X	X	X	X	X
617	Jul 20, 2011		Soil	S11-Se30545	X	X	X	X	X	X
618	Jul 21, 2011		Soil	S11-Se30546	X	X	X	X	X	X
701	Jul 05, 2011		Soil	S11-Se30547	X	X	X	X	X	X
702	Jul 05, 2011		Soil	S11-Se30548	X	X	X	X	X	X
703	Jul 05, 2011		Soil	S11-Se30549	X	X	X	X	X	X
704	Aug 24, 2011		Soil	S11-Se30550	X	X	X	X	X	X
705	Aug 24, 2011		Soil	S11-Se30551	X	X	X	X	X	X

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Sample Detail					% Moisture	Aluminium	Barium	Conductivity (1:5 aqueous extract)	pH (1:5 Aqueous extract)	Metals M18
Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site #1261										
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X
706	Aug 24, 2011		Soil	S11-Se30552	X	X	X	X	X	X
707	Aug 24, 2011		Soil	S11-Se30553	X	X	X	X	X	X
708	Aug 24, 2011		Soil	S11-Se30554	X	X	X	X	X	X
709	Aug 24, 2011		Soil	S11-Se30555	X	X	X	X	X	X
713	Jul 19, 2011		Soil	S11-Se30556	X	X	X	X	X	X
714	Jul 20, 2011		Soil	S11-Se30557	X	X	X	X	X	X
715	Jul 21, 2011		Soil	S11-Se30558	X	X	X	X	X	X
716	Jul 25, 2011		Soil	S11-Se30559	X	X	X	X	X	X
717	Jul 25, 2011		Soil	S11-Se30560	X	X	X	X	X	X
718	Jul 25, 2011		Soil	S11-Se30561	X	X	X	X	X	X
801	Jul 22, 2011		Soil	S11-Se30562	X	X	X	X	X	X
802	Jul 22, 2011		Soil	S11-Se30563	X	X	X	X	X	X

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Sample Detail					% Moisture	Aluminium	Barium	Conductivity (1:5 aqueous extract)	pH (1:5 Aqueous extract)	Metals M18
Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site #1261										
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X
803	Jul 22, 2011		Soil	S11-Se30564	X	X	X	X	X	X
901	Aug 04, 2011		Soil	S11-Se30565	X	X	X	X	X	X
902	Aug 04, 2011		Soil	S11-Se30566	X	X	X	X	X	X
903	Aug 04, 2011		Soil	S11-Se30567	X	X	X	X	X	X
1001	Jul 26, 2011		Soil	S11-Se30568	X	X	X	X	X	X
1002	Jul 26, 2011		Soil	S11-Se30569	X	X	X	X	X	X
1003	Jul 26, 2011		Soil	S11-Se30570	X	X	X	X	X	X
1004	Aug 24, 2011		Soil	S11-Se30571	X	X	X	X	X	X
1005	Aug 24, 2011		Soil	S11-Se30572	X	X	X	X	X	X
1006	Aug 24, 2011		Soil	S11-Se30573	X	X	X	X	X	X
1007	Aug 24, 2011		Soil	S11-Se30574	X	X	X	X	X	X
1008	Aug 24, 2011		Soil	S11-Se30575	X	X	X	X	X	X

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Sample Detail					% Moisture	Aluminium	Barium	Conductivity (1:5 aqueous extract)	pH (1:5 Aqueous extract)	Metals M18
Laboratory where analysis is conducted										
Melbourne Laboratory - NATA Site #1261										
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X
1009	Aug 24, 2011		Soil	S11-Se30576	X	X	X	X	X	X

mgt-LabMark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis.
7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001)

For samples received on the last day of holding time, notification of testing requirements should have been received at least

6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

UNITS

mg/kg:milligrams per Kilogram

mg/L:milligrams per litre

µg/L:micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%:Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

TERMS

Dry:	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR:	Limit Of Reporting.
SPIKE:	Addition of the analyte to the sample and reported as percentage recovery.
RPD:	Relative Percent Difference between two Duplicate pieces of analysis.
LCS:	Laboratory Control Sample - reported as percent recovery.
CRM:	Certified Reference Material - reported as percent recovery.
Method Blank:	In the case of solid samples these are performed on laboratory certified clean sands.
	In the case of water samples these are performed on de-ionised water.
Surr - Surrogate:	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate:	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate:	A second piece of analysis from a sample outside of the client's batch of samples but run within the laboratory batch of analysis.
Batch SPIKE:	Spike recovery reported on a sample from outside of the client's batch of samples but run within the laboratory batch of analysis.
USEPA:	U.S Environmental Protection Agency
APHA:	American Public Health Association
ASLP:	Australian Standard Leaching Procedure (AS4439.3)
TCLP:	Toxicity Characteristic Leaching Procedure
COC:	Chain Of Custody
SRA:	Sample Receipt Advice
CP:	Client Parent - QC was performed on samples pertaining to this report
NCP:	Non-Client Parent - QC was performed on samples not pertaining to this report, however QC is representative of the sequence or batch that client samples were analysed within

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample>
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data below the LOR with a positive RPD - eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals E022 Acid Extractable metals in Soils							
Aluminium	mg/kg	< 10			10	Pass	
Barium	mg/kg	< 5			5	Pass	
Antimony	mg/kg	< 1			1	Pass	
Arsenic	mg/kg	< 1			1	Pass	
Beryllium	mg/kg	< 1			1	Pass	
Boron	mg/kg	< 5			5	Pass	
Cadmium	mg/kg	< 0.1			0.1	Pass	
Chromium	mg/kg	< 2			2	Pass	
Cobalt	mg/kg	< 1			1	Pass	
Copper	mg/kg	< 2			2	Pass	
Lead	mg/kg	< 2			2	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.05			0.05	Pass	
Molybdenum	mg/kg	< 1			1	Pass	
Nickel	mg/kg	< 1			1	Pass	
Selenium	mg/kg	< 2			2	Pass	
Tin	mg/kg	< 1			1	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals E022 Acid Extractable metals in Soils							
Aluminium	%	124			70-130	Pass	
Barium	%	92			70-130	Pass	
Antimony	%	127			70-130	Pass	
Arsenic	%	85			70-130	Pass	
Beryllium	%	95			70-130	Pass	
Boron	%	93			70-130	Pass	
Cadmium	%	84			70-130	Pass	
Chromium	%	91			70-130	Pass	
Cobalt	%	102			70-130	Pass	
Copper	%	89			70-130	Pass	
Lead	%	85			70-130	Pass	
Manganese	%	109			70-130	Pass	
Mercury	%	78			70-130	Pass	
Molybdenum	%	97			70-130	Pass	
Nickel	%	92			70-130	Pass	
Selenium	%	96			70-130	Pass	
Tin	%	104			70-130	Pass	
Zinc	%	93			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Metals M18				Result 1					
Manganese	S11-Se30189	NCP	%	114			70-130	Pass	
Spike - % Recovery									
				Result 1					
Barium	S11-Se30513	CP	%	96			70-130	Pass	
Antimony	S11-Se30513	CP	%	113			70-130	Pass	
Arsenic	S11-Se30513	CP	%	91			70-130	Pass	
Beryllium	S11-Se30513	CP	%	79			70-130	Pass	
Boron	S11-Se30513	CP	%	111			70-130	Pass	
Cadmium	S11-Se30513	CP	%	101			70-130	Pass	
Chromium	S11-Se30513	CP	%	106			70-130	Pass	
Cobalt	S11-Se30513	CP	%	99			70-130	Pass	
Copper	S11-Se30513	CP	%	93			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Lead	S11-Se30513	CP	%	116			70-130	Pass	
Mercury	S11-Se30513	CP	%	72			70-130	Pass	
Molybdenum	S11-Se30513	CP	%	94			70-130	Pass	
Nickel	S11-Se30513	CP	%	96			70-130	Pass	
Selenium	S11-Se30513	CP	%	94			70-130	Pass	
Zinc	S11-Se30513	CP	%	91			70-130	Pass	
Spike - % Recovery									
Metals M18				Result 1					
Antimony	S11-Se30515	CP	%	110			70-130	Pass	
Arsenic	S11-Se30515	CP	%	88			70-130	Pass	
Beryllium	S11-Se30515	CP	%	105			70-130	Pass	
Boron	S11-Se30515	CP	%	123			70-130	Pass	
Cadmium	S11-Se30515	CP	%	91			70-130	Pass	
Cobalt	S11-Se30515	CP	%	95			70-130	Pass	
Copper	S11-Se30515	CP	%	97			70-130	Pass	
Lead	S11-Se30515	CP	%	90			70-130	Pass	
Mercury	S11-Se30515	CP	%	72			70-130	Pass	
Molybdenum	S11-Se30515	CP	%	83			70-130	Pass	
Nickel	S11-Se30515	CP	%	99			70-130	Pass	
Selenium	S11-Se30515	CP	%	92			70-130	Pass	
Spike - % Recovery									
Metals M18				Result 1					
Antimony	S11-Se30530	CP	%	100			70-130	Pass	
Arsenic	S11-Se30530	CP	%	81			70-130	Pass	
Beryllium	S11-Se30530	CP	%	73			70-130	Pass	
Boron	S11-Se30530	CP	%	75			70-130	Pass	
Cadmium	S11-Se30530	CP	%	90			70-130	Pass	
Cobalt	S11-Se30530	CP	%	110			70-130	Pass	
Copper	S11-Se30530	CP	%	111			70-130	Pass	
Lead	S11-Se30530	CP	%	91			70-130	Pass	
Mercury	S11-Se30530	CP	%	70			70-130	Pass	
Selenium	S11-Se30530	CP	%	81			70-130	Pass	
Spike - % Recovery									
Metals M18				Result 1					
Antimony	S11-Se30532	CP	%	114			70-130	Pass	
Arsenic	S11-Se30532	CP	%	86			70-130	Pass	
Beryllium	S11-Se30532	CP	%	106			70-130	Pass	
Cadmium	S11-Se30532	CP	%	96			70-130	Pass	
Cobalt	S11-Se30532	CP	%	98			70-130	Pass	
Lead	S11-Se30532	CP	%	93			70-130	Pass	
Mercury	S11-Se30532	CP	%	92			70-130	Pass	
Nickel	S11-Se30532	CP	%	91			70-130	Pass	
Selenium	S11-Se30532	CP	%	96			70-130	Pass	
Spike - % Recovery									
Metals M18				Result 1					
Antimony	S11-Se30547	CP	%	122			70-130	Pass	
Arsenic	S11-Se30547	CP	%	96			70-130	Pass	
Beryllium	S11-Se30547	CP	%	101			70-130	Pass	
Cadmium	S11-Se30547	CP	%	116			70-130	Pass	
Cobalt	S11-Se30547	CP	%	108			70-130	Pass	
Lead	S11-Se30547	CP	%	107			70-130	Pass	
Mercury	S11-Se30547	CP	%	81			70-130	Pass	
Nickel	S11-Se30547	CP	%	117			70-130	Pass	
Selenium	S11-Se30547	CP	%	105			70-130	Pass	
Spike - % Recovery									
Metals M18				Result 1					
Beryllium	S11-Se30549	CP	%	112			70-130	Pass	
Cobalt	S11-Se30549	CP	%	89			70-130	Pass	
Mercury	S11-Se30549	CP	%	82			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Selenium	S11-Se30549	CP	%	83			70-130	Pass	
Spike - % Recovery									
Metals M18				Result 1					
Antimony	S11-Se30564	CP	%	103			70-130	Pass	
Arsenic	S11-Se30564	CP	%	94			70-130	Pass	
Beryllium	S11-Se30564	CP	%	103			70-130	Pass	
Boron	S11-Se30564	CP	%	95			70-130	Pass	
Cadmium	S11-Se30564	CP	%	103			70-130	Pass	
Cobalt	S11-Se30564	CP	%	98			70-130	Pass	
Copper	S11-Se30564	CP	%	83			70-130	Pass	
Lead	S11-Se30564	CP	%	71			70-130	Pass	
Mercury	S11-Se30564	CP	%	81			70-130	Pass	
Nickel	S11-Se30564	CP	%	81			70-130	Pass	
Selenium	S11-Se30564	CP	%	89			70-130	Pass	
Spike - % Recovery									
Metals M18				Result 1					
Arsenic	S11-Se30566	CP	%	100			70-130	Pass	
Beryllium	S11-Se30566	CP	%	99			70-130	Pass	
Cadmium	S11-Se30566	CP	%	104			70-130	Pass	
Chromium	S11-Se30566	CP	%	96			70-130	Pass	
Cobalt	S11-Se30566	CP	%	128			70-130	Pass	
Copper	S11-Se30566	CP	%	115			70-130	Pass	
Lead	S11-Se30566	CP	%	93			70-130	Pass	
Mercury	S11-Se30566	CP	%	87			70-130	Pass	
Molybdenum	S11-Se30566	CP	%	98			70-130	Pass	
Nickel	S11-Se30566	CP	%	119			70-130	Pass	
Selenium	S11-Se30566	CP	%	106			70-130	Pass	
Zinc	S11-Se30566	CP	%	107			70-130	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract)	S11-Se30508	CP	uS/cm	540	530	2	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S11-Se30512	CP	mg/kg	15000	14000	6	30%	Pass	
Antimony	S11-Se30512	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Arsenic	S11-Se30512	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Beryllium	S11-Se30512	CP	mg/kg	1.6	1.6	1	30%	Pass	
Boron	S11-Se30512	CP	mg/kg	6.0	7.4	21	30%	Pass	
Cadmium	S11-Se30512	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Chromium	S11-Se30512	CP	mg/kg	200	< 2	4	30%	Pass	
Cobalt	S11-Se30512	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Copper	S11-Se30512	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Lead	S11-Se30512	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Mercury	S11-Se30512	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30512	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Nickel	S11-Se30512	CP	mg/kg	1.3	1.4	5	30%	Pass	
Selenium	S11-Se30512	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	S11-Se30512	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Zinc	S11-Se30512	CP	mg/kg	5.7	< 5	110	30%	Fail	Q15
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S11-Se30514	CP	mg/kg	14000	18000	25	30%	Pass	
Barium	S11-Se30514	CP	mg/kg	44	53	18	30%	Pass	
Antimony	S11-Se30514	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Arsenic	S11-Se30514	CP	mg/kg	1.0	< 1	<1	30%	Pass	
Beryllium	S11-Se30514	CP	mg/kg	2.2	3.2	38	30%	Fail	Q15
Boron	S11-Se30514	CP	mg/kg	12	10	11	30%	Pass	
Cadmium	S11-Se30514	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	S11-Se30514	CP	mg/kg	< 1	< 1	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Copper	S11-Se30514	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Lead	S11-Se30514	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Mercury	S11-Se30514	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30514	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Nickel	S11-Se30514	CP	mg/kg	1.7	1.8	8	30%	Pass	
Selenium	S11-Se30514	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	S11-Se30514	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Zinc	S11-Se30514	CP	mg/kg	13	11	11	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract)	S11-Se30518	CP	uS/cm	1800	1700	1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract)	S11-Se30528	CP	uS/cm	8100	8100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S11-Se30529	CP	mg/kg	10000	9200	11	30%	Pass	
Barium	S11-Se30529	CP	mg/kg	56	55	3	30%	Pass	
Antimony	S11-Se30529	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Arsenic	S11-Se30529	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Beryllium	S11-Se30529	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Boron	S11-Se30529	CP	mg/kg	20	19	6	30%	Pass	
Cadmium	S11-Se30529	CP	mg/kg	0.4	0.4	12	30%	Pass	
Chromium	S11-Se30529	CP	mg/kg	210	190	8	30%	Pass	
Cobalt	S11-Se30529	CP	mg/kg	1.9	1.9	2	30%	Pass	
Copper	S11-Se30529	CP	mg/kg	12	13	4	30%	Pass	
Manganese	S11-Se30529	CP	mg/kg	9400	9300	1	30%	Pass	
Mercury	S11-Se30529	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30529	CP	mg/kg	6.8	4.7	36	30%	Fail	Q15
Nickel	S11-Se30529	CP	mg/kg	7.2	8.9	21	30%	Pass	
Selenium	S11-Se30529	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	S11-Se30529	CP	mg/kg	1.3	1.4	2	30%	Pass	
Zinc	S11-Se30529	CP	mg/kg	140	120	17	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S11-Se30531	CP	mg/kg	12000	8700	29	30%	Pass	
Barium	S11-Se30531	CP	mg/kg	60	62	4	30%	Pass	
Antimony	S11-Se30531	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Arsenic	S11-Se30531	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Beryllium	S11-Se30531	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Boron	S11-Se30531	CP	mg/kg	23	25	8	30%	Pass	
Cadmium	S11-Se30531	CP	mg/kg	0.3	0.2	41	30%	Fail	
Chromium	S11-Se30531	CP	mg/kg	200	180	10	30%	Pass	
Cobalt	S11-Se30531	CP	mg/kg	1.1	1.4	30	30%	Pass	
Copper	S11-Se30531	CP	mg/kg	6.7	8.1	20	30%	Pass	
Lead	S11-Se30531	CP	mg/kg	5.0	4.0	22	30%	Pass	
Manganese	S11-Se30531	CP	mg/kg	12000	9400	21	30%	Pass	
Mercury	S11-Se30531	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30531	CP	mg/kg	1.6	2.1	24	30%	Pass	
Nickel	S11-Se30531	CP	mg/kg	5.1	6.8	28	30%	Pass	
Selenium	S11-Se30531	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	S11-Se30531	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Zinc	S11-Se30531	CP	mg/kg	110	83	24	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract)	S11-Se30538	CP	uS/cm	1200	1100	2	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S11-Se30546	CP	mg/kg	5900	7300	21	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Antimony	S11-Se30546	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Arsenic	S11-Se30546	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Beryllium	S11-Se30546	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Boron	S11-Se30546	CP	mg/kg	27	36	29	30%	Pass	
Cobalt	S11-Se30546	CP	mg/kg	< 1	1.4	100	30%	Fail	Q15
Lead	S11-Se30546	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Mercury	S11-Se30546	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Selenium	S11-Se30546	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	S11-Se30546	CP	mg/kg	1.5	3.5	79	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract)	S11-Se30548	CP	uS/cm	970	950	2	30%	Pass	
Duplicate									
Metals M18				Result 1	Result 2	RPD			
Beryllium	S11-Se30548	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Boron	S11-Se30548	CP	mg/kg	64	48	28	30%	Pass	
Cobalt	S11-Se30548	CP	mg/kg	1.0	2.0	64	30%	Fail	Q15
Copper	S11-Se30548	CP	mg/kg	69	74	8	30%	Pass	
Lead	S11-Se30548	CP	mg/kg	11	5.5	64	30%	Fail	
Mercury	S11-Se30548	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30548	CP	mg/kg	6.5	6.0	8	30%	Pass	
Selenium	S11-Se30548	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	S11-Se30548	CP	mg/kg	8.5	8.2	3	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract)	S11-Se30558	CP	uS/cm	1800	1800	1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Barium	S11-Se30563	CP	mg/kg	110	130	10	30%	Pass	
Antimony	S11-Se30563	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Beryllium	S11-Se30563	CP	mg/kg	1.3	< 1	51	30%	Fail	Q15
Boron	S11-Se30563	CP	mg/kg	12	12	4	30%	Pass	
Cadmium	S11-Se30563	CP	mg/kg	0.3	0.2	22	30%	Pass	
Chromium	S11-Se30563	CP	mg/kg	130	150	16	30%	Pass	
Cobalt	S11-Se30563	CP	mg/kg	1.5	2.2	40	30%	Fail	Q15
Copper	S11-Se30563	CP	mg/kg	12	14	14	30%	Pass	
Lead	S11-Se30563	CP	mg/kg	14	11	21	30%	Pass	
Manganese	S11-Se30563	CP	mg/kg	5800	6600	13	30%	Pass	
Mercury	S11-Se30563	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30563	CP	mg/kg	2.5	4.2	50	30%	Fail	Q15
Selenium	S11-Se30563	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	S11-Se30563	CP	mg/kg	4.2	2.6	46	30%	Fail	Q15
Zinc	S11-Se30563	CP	mg/kg	190	220	13	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S11-Se30565	CP	mg/kg	2500	2700	4	30%	Pass	
Mercury	S11-Se30565	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract)	S11-Se30568	CP	uS/cm	9900	9900	1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes mgt-LabMark's Acceptance Criteria as stipulated in AS-POL-002. Refer to Glossary Page of this report for further details

Authorised By

Dan Thompson	Client Services

NATA Signatories:

Bob Symons	Senior Analyst-Inorganic (NSW)
James Norford	Senior Analyst-Metal (NSW)

Dr. Bob Symons
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

mgt LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Australasian Slag Association
Suite 2/Level 1 336 Keira Street
Wollongong
NSW 2500

Attention: Kylie Dal Santo

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Report	310780-S
Client Reference	TCLP MCDS/11
Received Date	Sep 02, 2011

Client Sample ID			**401**	**402**	**403**	**404**
Sample Matrix			**TCLP**	**TCLP**	**TCLP**	**TCLP**
mgt-LabMark Sample No.			**S11-Se30579**	**S11-Se30580**	**S11-Se30581**	**S11-Se30582**
Date Sampled			**Jul 22, 2011**	**Jul 22, 2011**	**Jul 22, 2011**	**Jul 19, 2011**
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	12	11	11	11
pH (TCLP - off)	0.1	units	12	12	12	10

Client Sample ID			405	406	501	502
Sample Matrix			**TCLP**	**TCLP**	**TCLP**	**TCLP**
mgt-LabMark Sample No.			**S11-Se30583**	**S11-Se30584**	**S11-Se30585**	**S11-Se30586**
Date Sampled			**Jul 19, 2011**	**Jul 19, 2011**	**Jul 22, 2011**	**Jul 22, 2011**
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	11	11	11	11
pH (TCLP - off)	0.1	units	11	12	12	11

Client Sample ID			503	504	505	506
Sample Matrix			TCLP	TCLP	TCLP	TCLP
mgt-LabMark Sample No.			S11-Se30587	S11-Se30588	S11-Se30589	S11-Se30590
Date Sampled			Jul 22, 2011	Jul 19, 2011	Jul 19, 2011	Jul 19, 2011
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	12	11	11	11
pH (TCLP - off)	0.1	units	11	9.7	12	11

Client Sample ID			**601**	**602**	**603**	**604**
Sample Matrix			**TCLP**	**TCLP**	**TCLP**	**TCLP**
mgt-LabMark Sample No.			**S11-Se30591**	**S11-Se30592**	**S11-Se30593**	**S11-Se30594**
Date Sampled			**Jul 05, 2011**	**Jul 05, 2011**	**Jul 05, 2011**	**Aug 24, 2011**
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	0.09
Molybdenum	0.01	mg/L	0.01	0.01	< 0.01	0.018
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	0.10	0.28	0.19	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	10	9.8	9.8	10
pH (TCLP - off)	0.1	units	7.1	7.1	6.7	9.7

Client Sample ID			**605**	**606**	**607**	**608**
Sample Matrix			**TCLP**	**TCLP**	**TCLP**	**TCLP**
mgt-LabMark Sample No.			**S11-Se30595**	**S11-Se30596**	**S11-Se30597**	**S11-Se30598**
Date Sampled			**Aug 24, 2011**	**Aug 24, 2011**	**Aug 24, 2011**	**Aug 24, 2011**
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	0.08	0.09	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.02	0.02	0.02	0.01
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	10	10	10	10
pH (TCLP - off)	0.1	units	9.7	9.7	9.3	9.0

Client Sample ID			**609**	**613**	**614**	**615**
Sample Matrix			**TCLP**	**TCLP**	**TCLP**	**TCLP**
mgt-LabMark Sample No.			**S11-Se30599**	**S11-Se30600**	**S11-Se30601**	**S11-Se30602**
Date Sampled			**Aug 24, 2011**	**Jul 25, 2011**	**Jul 25, 2011**	**Jul 25, 2011**
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.02	0.01	0.01	0.01
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	10	9.8	9.9	9.9
pH (TCLP - off)	0.1	units	9.0	8.7	8.6	8.1

Client Sample ID			616	617	618	701
Sample Matrix			**TCLP**	**TCLP**	**TCLP**	**TCLP**
mgt-LabMark Sample No.			**S11-Se30603**	**S11-Se30604**	**S11-Se30605**	**S11-Se30606**
Date Sampled			**Jul 19, 2011**	**Jul 20, 2011**	**Jul 21, 2011**	**Jul 05, 2011**
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	0.13	0.09	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.02	< 0.01	0.01	0.02
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	0.18	0.14	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	10	11	9.9	9.8
pH (TCLP - off)	0.1	units	5.9	5.7	5.3	7.5

Client Sample ID			702	703	704	705
Sample Matrix			TCLP	TCLP	TCLP	TCLP
mgt-LabMark Sample No.			S11-Se30607	S11-Se30608	S11-Se30609	S11-Se30610
Date Sampled			Jul 05, 2011	Jul 05, 2011	Aug 24, 2011	Aug 24, 2011
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	< 0.05	0.07	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.02	0.02	0.02	0.03
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	10	10	10	11
pH (TCLP - off)	0.1	units	7.8	8.0	7.6	8.7

Client Sample ID			706	707	708	709
Sample Matrix			TCLP	TCLP	TCLP	TCLP
mgt-LabMark Sample No.			S11-Se30611	S11-Se30612	S11-Se30613	S11-Se30614
Date Sampled			Aug 24, 2011	Aug 24, 2011	Aug 24, 2011	Aug 24, 2011
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.02	0.02	0.01	0.02
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	0.89	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	11	10	10	10
pH (TCLP - off)	0.1	units	8.8	8.4	6.0	8.8

Client Sample ID			713	714	715	716
Sample Matrix			TCLP	TCLP	TCLP	TCLP
mgt-LabMark Sample No.			S11-Se30615	S11-Se30616	S11-Se30617	S11-Se30618
Date Sampled			Jul 19, 2011	Jul 20, 2011	Jul 21, 2011	Jul 25, 2011
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.05	mg/L	0.44	< 0.05	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.03	0.02	0.02	0.01
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	0.09	0.23	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	11	10	11	10
pH (TCLP - off)	0.1	units	9.0	6.2	6.9	8.5

Client Sample ID			**717**	**718**	**1001**	**1002**
Sample Matrix			**TCLP**	**TCLP**	**TCLP**	**TCLP**
mgt-LabMark Sample No.			**S11-Se30619**	**S11-Se30620**	**S11-Se30621**	**S11-Se30622**
Date Sampled			**Jul 25, 2011**	**Jul 25, 2011**	**Jul 26, 2011**	**Jul 26, 2011**
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.005	mg/L	-	-	< 0.005	< 0.005
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Copper	0.05	mg/L	-	-	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.01	0.01	< 0.01	< 0.01
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05	0.06
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	10	11	12	12
pH (TCLP - off)	0.1	units	8.1	8.4	12	12

Client Sample ID			1003	1004	1005	1006
Sample Matrix			TCLP	TCLP	TCLP	TCLP
mgt-LabMark Sample No.			S11-Se30623	S11-Se30624	S11-Se30625	S11-Se30626
Date Sampled			Jul 26, 2011	Aug 24, 2011	Aug 24, 2011	Aug 24, 2011
Test/Reference	LOR	Unit				
Heavy Metals						
Cadmium	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Copper	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	0.01	mg/L	< 0.01	0.03	0.02	0.03
Nickel	0.05	mg/L	0.06	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)						
pH (TCLP - initial)	0.1	units	12	11	11	11
pH (TCLP - off)	0.1	units	9.1	9.6	9.0	9.2

Client Sample ID			1007	1008	1009
Sample Matrix			TCLP	TCLP	TCLP
mgt-LabMark Sample No.			S11-Se30627	S11-Se30628	S11-Se30629
Date Sampled			Aug 24, 2011	Aug 24, 2011	Aug 24, 2011
Test/Reference	LOR	Unit			
Heavy Metals					
Cadmium	0.005	mg/L	< 0.005	< 0.005	< 0.005
Chromium	0.05	mg/L	< 0.05	< 0.05	< 0.05
Copper	0.05	mg/L	< 0.05	< 0.05	< 0.05
Molybdenum	0.01	mg/L	0.02	0.03	0.03
Nickel	0.05	mg/L	< 0.05	< 0.05	< 0.05
Zinc	0.05	mg/L	< 0.05	< 0.05	< 0.05
Toxicity Characteristic Leaching Procedure (TCLP)					
pH (TCLP - initial)	0.1	units	11	11	10
pH (TCLP - off)	0.1	units	9.5	9.4	9.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Heavy Metals - Method: E022 Acid Extractable metals in Soils	Sydney	Sep 07, 2011	180 Day
Toxicity Characteristic Leaching Procedure (TCLP) - Method: E019 TCLP Preparation	Sydney	Sep 07, 2011	14 Day

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NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
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Phone : +61 7 3902 4600

Company Name: Australasian Slag Association (Iron & Steel)
Address: Suite 2/Level 1 336 Keira Street
Wollongong
NSW 2500

Order No.:
Report #: 310780
Phone: 02 42258466
Fax: 02 4228 1777

Received: Sep 2, 2011 10:00 AM
Due: Sep 9, 2011 4:00 PM
Priority: 5 Day
Contact name: Kylie Dal Santo

Client Job No.: TCLP MCDS/11

mgt-LabMark Client Manager: Dan Thompson

Sample Detail					Cadmium	Chromium	Copper	Molybdenum	Nickel	Zinc	Toxicity Characteristic Leaching Procedure (TCLP)
Laboratory where analysis is conducted											
Melbourne Laboratory - NATA Site #1261											
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X	X
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
401	Jul 22, 2011		TCLP	S11-Se30579		X				X	X
402	Jul 22, 2011		TCLP	S11-Se30580		X				X	X
403	Jul 22, 2011		TCLP	S11-Se30581		X				X	X
404	Jul 19, 2011		TCLP	S11-Se30582		X				X	X
405	Jul 19, 2011		TCLP	S11-Se30583		X				X	X
406	Jul 19, 2011		TCLP	S11-Se30584		X				X	X

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Sample Detail					Cadmium	Chromium	Copper	Molybdenum	Nickel	Zinc	Toxicity Characteristic Leaching Procedure (TCLP)
Laboratory where analysis is conducted											
Melbourne Laboratory - NATA Site #1261											
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X	X
501	Jul 22, 2011		TCLP	S11-Se30585		X				X	X
502	Jul 22, 2011		TCLP	S11-Se30586		X				X	X
503	Jul 22, 2011		TCLP	S11-Se30587		X				X	X
504	Jul 19, 2011		TCLP	S11-Se30588		X				X	X
505	Jul 19, 2011		TCLP	S11-Se30589		X				X	X
506	Jul 19, 2011		TCLP	S11-Se30590		X				X	X
601	Jul 05, 2011		TCLP	S11-Se30591		X		X	X	X	X
602	Jul 05, 2011		TCLP	S11-Se30592		X		X	X	X	X

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mgt-LabMark Client Manager: Dan Thompson

Sample Detail					Cadmium	Chromium	Copper	Molybdenum	Nickel	Zinc	Toxicity Characteristic Leaching Procedure (TCLP)
Laboratory where analysis is conducted											
Melbourne Laboratory - NATA Site #1261											
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X	X
603	Jul 05, 2011		TCLP	S11-Se30593		X		X	X	X	X
604	Aug 24, 2011		TCLP	S11-Se30594		X		X	X	X	X
605	Aug 24, 2011		TCLP	S11-Se30595		X		X	X	X	X
606	Aug 24, 2011		TCLP	S11-Se30596		X		X	X	X	X
607	Aug 24, 2011		TCLP	S11-Se30597		X		X	X	X	X
608	Aug 24, 2011		TCLP	S11-Se30598		X		X	X	X	X
609	Aug 24, 2011		TCLP	S11-Se30599		X		X	X	X	X
613	Jul 25, 2011		TCLP	S11-Se30600		X		X	X	X	X

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Client Job No.: TCLP MCDS/11

mgt-LabMark Client Manager: Dan Thompson

Sample Detail					Cadmium	Chromium	Copper	Molybdenum	Nickel	Zinc	Toxicity Characteristic Leaching Procedure (TCLP)
Laboratory where analysis is conducted											
Melbourne Laboratory - NATA Site #1261											
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X	X
614	Jul 25, 2011		TCLP	S11-Se30601		X		X	X	X	X
615	Jul 25, 2011		TCLP	S11-Se30602		X		X	X	X	X
616	Jul 19, 2011		TCLP	S11-Se30603		X		X	X	X	X
617	Jul 20, 2011		TCLP	S11-Se30604		X		X	X	X	X
618	Jul 21, 2011		TCLP	S11-Se30605		X		X	X	X	X
701	Jul 05, 2011		TCLP	S11-Se30606		X		X	X	X	X
702	Jul 05, 2011		TCLP	S11-Se30607		X		X	X	X	X
703	Jul 05, 2011		TCLP	S11-Se30608		X		X	X	X	X

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Contact name: Kylie Dal Santo

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mgt-LabMark Client Manager: Dan Thompson

Sample Detail					Cadmium	Chromium	Copper	Molybdenum	Nickel	Zinc	Toxicity Characteristic Leaching Procedure (TCLP)
Laboratory where analysis is conducted											
Melbourne Laboratory - NATA Site #1261											
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X	X
704	Aug 24, 2011		TCLP	S11-Se30609		X		X	X	X	X
705	Aug 24, 2011		TCLP	S11-Se30610		X		X	X	X	X
706	Aug 24, 2011		TCLP	S11-Se30611		X		X	X	X	X
707	Aug 24, 2011		TCLP	S11-Se30612		X		X	X	X	X
708	Aug 24, 2011		TCLP	S11-Se30613		X		X	X	X	X
709	Aug 24, 2011		TCLP	S11-Se30614		X		X	X	X	X
713	Jul 19, 2011		TCLP	S11-Se30615		X		X	X	X	X
714	Jul 20, 2011		TCLP	S11-Se30616		X		X	X	X	X

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Phone : +61 2 8215 6222
NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
Phone : +61 7 3902 4600

Company Name: Australasian Slag Association (Iron & Steel)
Address: Suite 2/Level 1 336 Keira Street
Wollongong
NSW 2500

Order No.:
Report #: 310780
Phone: 02 42258466
Fax: 02 4228 1777

Received: Sep 2, 2011 10:00 AM
Due: Sep 9, 2011 4:00 PM
Priority: 5 Day
Contact name: Kylie Dal Santo

Client Job No.: TCLP MCDS/11

mgt-LabMark Client Manager: Dan Thompson

Sample Detail					Cadmium	Chromium	Copper	Molybdenum	Nickel	Zinc	Toxicity Characteristic Leaching Procedure (TCLP)
Laboratory where analysis is conducted											
Melbourne Laboratory - NATA Site #1261											
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X	X
715	Jul 21, 2011		TCLP	S11-Se30617		X		X	X	X	X
716	Jul 25, 2011		TCLP	S11-Se30618		X		X	X	X	X
717	Jul 25, 2011		TCLP	S11-Se30619		X		X	X	X	X
718	Jul 25, 2011		TCLP	S11-Se30620		X		X	X	X	X
1001	Jul 26, 2011		TCLP	S11-Se30621	X	X	X	X	X	X	X
1002	Jul 26, 2011		TCLP	S11-Se30622	X	X	X	X	X	X	X
1003	Jul 26, 2011		TCLP	S11-Se30623	X	X	X	X	X	X	X
1004	Aug 24, 2011		TCLP	S11-Se30624	X	X	X	X	X	X	X

mgt LabMark
ENVIRONMENTAL LABORATORIES
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Laboratory where analysis is conducted											
Melbourne Laboratory - NATA Site #1261											
Sydney Laboratory - NATA Site #1645					X	X	X	X	X	X	X
1005	Aug 24, 2011		TCLP	S11-Se30625	X	X	X	X	X	X	X
1006	Aug 24, 2011		TCLP	S11-Se30626	X	X	X	X	X	X	X
1007	Aug 24, 2011		TCLP	S11-Se30627	X	X	X	X	X	X	X
1008	Aug 24, 2011		TCLP	S11-Se30628	X	X	X	X	X	X	X
1009	Aug 24, 2011		TCLP	S11-Se30629	X	X	X	X	X	X	X

mgt-LabMark Internal Quality Control Review

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis.
7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001)

For samples received on the last day of holding time, notification of testing requirements should have been received at least

6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as an RPD

UNITS

mg/kg:milligrams per Kilogram

mg/L:milligrams per litre

µg/L:micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%:Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

TERMS

Dry:	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR:	Limit Of Reporting.
SPIKE:	Addition of the analyte to the sample and reported as percentage recovery.
RPD:	Relative Percent Difference between two Duplicate pieces of analysis.
LCS:	Laboratory Control Sample - reported as percent recovery.
CRM:	Certified Reference Material - reported as percent recovery.
Method Blank:	In the case of solid samples these are performed on laboratory certified clean sands.
	In the case of water samples these are performed on de-ionised water.
Surr - Surrogate:	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate:	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate:	A second piece of analysis from a sample outside of the client's batch of samples but run within the laboratory batch of analysis.
Batch SPIKE:	Spike recovery reported on a sample from outside of the client's batch of samples but run within the laboratory batch of analysis.
USEPA:	U.S Environmental Protection Agency
APHA:	American Public Health Association
ASLP:	Australian Standard Leaching Procedure (AS4439.3)
TCLP:	Toxicity Characteristic Leaching Procedure
COC:	Chain Of Custody
SRA:	Sample Receipt Advice
CP:	Client Parent - QC was performed on samples pertaining to this report
NCP:	Non-Client Parent - QC was performed on samples not pertaining to this report, however QC is representative of the sequence or batch that client samples were analysed within

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample>
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data below the LOR with a positive RPD - eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals E022 Acid Extractable metals in Soils							
Cadmium	mg/L	< 0.005			0.005	Pass	
Chromium	mg/L	< 0.05			0.05	Pass	
Copper	mg/L	< 0.05			0.05	Pass	
Molybdenum	mg/L	< 0.01			0.01	Pass	
Nickel	mg/L	< 0.05			0.05	Pass	
Zinc	mg/L	< 0.05			0.05	Pass	
LCS - % Recovery							
Heavy Metals E022 Acid Extractable metals in Soils							
Cadmium	%	97			70-130	Pass	
Chromium	%	103			70-130	Pass	
Copper	%	103			70-130	Pass	
Molybdenum	%	103			70-130	Pass	
Nickel	%	103			70-130	Pass	
Zinc	%	111			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S11-Se30586	CP	%	96			70-130	Pass	
Chromium	S11-Se30586	CP	%	93			70-130	Pass	
Copper	S11-Se30586	CP	%	105			70-130	Pass	
Molybdenum	S11-Se30586	CP	%	106			70-130	Pass	
Nickel	S11-Se30586	CP	%	90			70-130	Pass	
Zinc	S11-Se30586	CP	%	110			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S11-Se30588	CP	%	106			70-130	Pass	
Chromium	S11-Se30588	CP	%	97			70-130	Pass	
Copper	S11-Se30588	CP	%	108			70-130	Pass	
Molybdenum	S11-Se30588	CP	%	100			70-130	Pass	
Nickel	S11-Se30588	CP	%	90			70-130	Pass	
Zinc	S11-Se30588	CP	%	108			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S11-Se30601	CP	%	95			70-130	Pass	
Chromium	S11-Se30601	CP	%	99			70-130	Pass	
Copper	S11-Se30601	CP	%	97			70-130	Pass	
Molybdenum	S11-Se30601	CP	%	98			70-130	Pass	
Nickel	S11-Se30601	CP	%	98			70-130	Pass	
Zinc	S11-Se30601	CP	%	101			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S11-Se30610	CP	%	93			70-130	Pass	
Chromium	S11-Se30610	CP	%	96			70-130	Pass	
Copper	S11-Se30610	CP	%	101			70-130	Pass	
Molybdenum	S11-Se30610	CP	%	96			70-130	Pass	
Nickel	S11-Se30610	CP	%	95			70-130	Pass	
Zinc	S11-Se30610	CP	%	106			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S11-Se30618	CP	%	103			70-130	Pass	
Chromium	S11-Se30618	CP	%	93			70-130	Pass	
Copper	S11-Se30618	CP	%	98			70-130	Pass	
Molybdenum	S11-Se30618	CP	%	91			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel	S11-Se30618	CP	%	92			70-130	Pass	
Zinc	S11-Se30618	CP	%	97			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Cadmium	S11-Se30628	CP	%	101			70-130	Pass	
Chromium	S11-Se30628	CP	%	90			70-130	Pass	
Copper	S11-Se30628	CP	%	96			70-130	Pass	
Molybdenum	S11-Se30628	CP	%	87			70-130	Pass	
Nickel	S11-Se30628	CP	%	90			70-130	Pass	
Zinc	S11-Se30628	CP	%	96			70-130	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	S11-Se30589	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Chromium	S11-Se30589	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Copper	S11-Se30589	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30589	CP	mg/L	0.04	0.04	9	30%	Pass	
Nickel	S11-Se30589	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	S11-Se30589	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	S11-Se30608	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Chromium	S11-Se30608	CP	mg/L	0.07	0.06	2	30%	Pass	
Copper	S11-Se30608	CP	mg/L	< 0.05	< 0.05	22	30%	Pass	
Molybdenum	S11-Se30608	CP	mg/L	0.02	0.02	13	30%	Pass	
Nickel	S11-Se30608	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	S11-Se30608	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	S11-Se30609	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Chromium	S11-Se30609	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Copper	S11-Se30609	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30609	CP	mg/L	0.02	0.02	6	30%	Pass	
Nickel	S11-Se30609	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	S11-Se30609	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	S11-Se30617	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Chromium	S11-Se30617	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Copper	S11-Se30617	CP	mg/L	< 0.05	< 0.05	9	30%	Pass	
Molybdenum	S11-Se30617	CP	mg/L	0.02	0.02	11	30%	Pass	
Nickel	S11-Se30617	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	S11-Se30617	CP	mg/L	0.23	0.25	11	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	S11-Se30624	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Chromium	S11-Se30624	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Copper	S11-Se30624	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Molybdenum	S11-Se30624	CP	mg/L	0.03	0.03	6	30%	Pass	
Nickel	S11-Se30624	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	S11-Se30624	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes mgt-LabMark's Acceptance Criteria as stipulated in AS-POL-002. Refer to Glossary Page of this report for further details

Authorised By

Dan Thompson Client Services

NATA Signatories:

James Norford Senior Analyst-Metal (NSW)

Dr. Bob Symons
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request