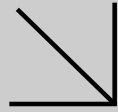




Calscience

Supplemental Report 1

The original report has been revised/corrected.



**WORK ORDER NUMBER: 17-01-2401**

*The difference is service*



AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** Terraphase Engineering, Inc.

**Client Project Name:** ISRI MSR Treatability Study / 0102.001.003

**Attention:** Emily Mosen  
1404 Franklin Street  
Suite 600  
Oakland, CA 94612-3215

Approved for release on 02/13/2017 by:  
Don Burley  
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

# Contents

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 Work Order Number: 17-01-2401

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**Condition Upon Receipt:**

Samples were received under Chain-of-Custody (COC) on 01/27/17. They were assigned to Work Order 17-01-2401.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

**Holding Times:**

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of  $\leq 15$  minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

**Quality Control:**

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

**Subcontractor Information:**

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

**Additional Comments:**

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

The report has been revised to change the sample IDs.



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## Sample Summary

Client: Terraphase Engineering, Inc.	Work Order: 17-01-2401
1404 Franklin Street, Suite 600	Project Name: ISRI MSR Treatability Study / 0102.001.003
Oakland, CA 94612-3215	PO Number:
	Date/Time Received: 01/27/17 10:00
	Number of Containers: 16

Attn: Emily Mosen

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
SMM-1-1-M	17-01-2401-1	01/25/17 11:00	1	Solid
SMM-1M-1-U	17-01-2401-2	01/25/17 11:00	1	Solid
SMM-1-2-M	17-01-2401-3	01/25/17 12:00	1	Solid
SMM-1M-2-U	17-01-2401-4	01/25/17 12:00	1	Solid
SMM-1-3-M	17-01-2401-5	01/25/17 13:00	1	Solid
SMM-1M-3-U	17-01-2401-6	01/25/17 13:00	1	Solid
SMM-1-4-M	17-01-2401-7	01/25/17 14:00	1	Solid
SMM-1M-4-U	17-01-2401-8	01/25/17 14:00	1	Solid
SMM-1-5-M	17-01-2401-9	01/25/17 15:00	1	Solid
SMM-1M-5-U	17-01-2401-10	01/25/17 15:00	1	Solid
SMM-1-6-M	17-01-2401-11	01/25/17 16:00	1	Solid
SMM-1M-6-U	17-01-2401-12	01/25/17 16:00	1	Solid
SMM-1-7-M	17-01-2401-13	01/25/17 17:00	1	Solid
SMM-1M-7-U	17-01-2401-14	01/25/17 17:00	1	Solid
SMM-1-8-M	17-01-2401-15	01/25/17 18:00	1	Solid
SMM-1M-8-U	17-01-2401-16	01/25/17 18:00	1	Solid


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## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/27/17  
 Work Order: 17-01-2401  
 Preparation: N/A  
 Method: ASTM D-2216 (M)  
 Units: %

Project: ISRI MSR Treatability Study / 0102.001.003

Page 1 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-1-M</b>	<b>17-01-2401-1-A</b>	<b>01/25/17 11:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
<b>SMM-1M-1-U</b>	<b>17-01-2401-2-A</b>	<b>01/25/17 11:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		37	0.10		1.00		
<b>SMM-1-2-M</b>	<b>17-01-2401-3-A</b>	<b>01/25/17 12:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		
<b>SMM-1M-2-U</b>	<b>17-01-2401-4-A</b>	<b>01/25/17 12:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		41	0.10		1.00		
<b>SMM-1-3-M</b>	<b>17-01-2401-5-A</b>	<b>01/25/17 13:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		37	0.10		1.00		
<b>SMM-1M-3-U</b>	<b>17-01-2401-6-A</b>	<b>01/25/17 13:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		
<b>SMM-1-4-M</b>	<b>17-01-2401-7-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
<b>SMM-1M-4-U</b>	<b>17-01-2401-8-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/27/17  
 Work Order: 17-01-2401  
 Preparation: N/A  
 Method: ASTM D-2216 (M)  
 Units: %

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-5-M</b>	<b>17-01-2401-9-A</b>	<b>01/25/17 15:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		33	0.10		1.00		
<b>SMM-1M-5-U</b>	<b>17-01-2401-10-A</b>	<b>01/25/17 15:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		45	0.10		1.00		
<b>SMM-1-6-M</b>	<b>17-01-2401-11-A</b>	<b>01/25/17 16:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		39	0.10		1.00		
<b>SMM-1M-6-U</b>	<b>17-01-2401-12-A</b>	<b>01/25/17 16:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
<b>SMM-1-7-M</b>	<b>17-01-2401-13-A</b>	<b>01/25/17 17:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		
<b>SMM-1M-7-U</b>	<b>17-01-2401-14-A</b>	<b>01/25/17 17:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		35	0.10		1.00		
<b>SMM-1-8-M</b>	<b>17-01-2401-15-A</b>	<b>01/25/17 18:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		40	0.10		1.00		
<b>SMM-1M-8-U</b>	<b>17-01-2401-16-A</b>	<b>01/25/17 18:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		33	0.10		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.	Date Received:	01/27/17
1404 Franklin Street, Suite 600	Work Order:	17-01-2401
Oakland, CA 94612-3215	Preparation:	N/A
	Method:	ASTM D-2216 (M)
	Units:	%

Project: ISRI MSR Treatability Study / 0102.001.003 Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>099-05-014-6672</b>	<b>N/A</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB1</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Moisture	ND	0.10	1.00	

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/27/17  
 Work Order: 17-01-2401  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-1-M</b>	<b>17-01-2401-1-A</b>	<b>01/25/17 11:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:02</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	9.36	5.10	10.2	
Lead	656	5.10	10.2	
Zinc	20500	10.2	10.2	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1M-1-U</b>	<b>17-01-2401-2-A</b>	<b>01/25/17 11:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:06</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	26.6	4.83	9.66	
Lead	1220	4.83	9.66	
Zinc	12800	9.66	9.66	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-2-M</b>	<b>17-01-2401-3-A</b>	<b>01/25/17 12:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:07</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	7.82	5.10	10.2	
Lead	549	5.10	10.2	
Zinc	8700	10.2	10.2	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1M-2-U</b>	<b>17-01-2401-4-A</b>	<b>01/25/17 12:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:08</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	17.3	4.98	9.95	
Lead	15500	4.98	9.95	
Zinc	11000	9.95	9.95	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-3-M</b>	<b>17-01-2401-5-A</b>	<b>01/25/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:09</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	7.03	5.08	10.2	
Lead	625	5.08	10.2	
Zinc	6200	10.2	10.2	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1M-3-U</b>	<b>17-01-2401-6-A</b>	<b>01/25/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:10</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	10.4	4.98	9.95	
Lead	1330	4.98	9.95	
Zinc	11100	9.95	9.95	

<b>SMM-1-4-M</b>	<b>17-01-2401-7-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:13</b>	<b>170131L04</b>
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	10.4	4.90	9.80	
Lead	613	4.90	9.80	
Zinc	6450	9.80	9.80	

<b>SMM-1M-4-U</b>	<b>17-01-2401-8-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:14</b>	<b>170131L04</b>
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	9.23	4.88	9.76	
Lead	1030	4.88	9.76	
Zinc	7800	9.76	9.76	

<b>SMM-1-5-M</b>	<b>17-01-2401-9-A</b>	<b>01/25/17 15:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:15</b>	<b>170131L04</b>
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	10.9	5.10	10.2	
Lead	612	5.10	10.2	
Zinc	5690	10.2	10.2	

<b>SMM-1M-5-U</b>	<b>17-01-2401-10-A</b>	<b>01/25/17 15:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:16</b>	<b>170131L04</b>
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	18.4	4.98	9.95	
Lead	757	4.98	9.95	
Zinc	8520	9.95	9.95	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-6-M</b>	<b>17-01-2401-11-A</b>	<b>01/25/17 16:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:17</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	8.58	5.18	10.4	
Lead	663	5.18	10.4	
Zinc	7340	10.4	10.4	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1M-6-U</b>	<b>17-01-2401-12-A</b>	<b>01/25/17 16:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:18</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	9.79	4.78	9.57	
Lead	761	4.78	9.57	
Zinc	7900	9.57	9.57	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-7-M</b>	<b>17-01-2401-13-A</b>	<b>01/25/17 17:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:19</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	8.89	5.05	10.1	
Lead	567	5.05	10.1	
Zinc	10100	10.1	10.1	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1M-7-U</b>	<b>17-01-2401-14-A</b>	<b>01/25/17 17:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:19</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	8.40	4.93	9.85	
Lead	711	4.93	9.85	
Zinc	9810	9.85	9.85	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-8-M</b>	<b>17-01-2401-15-A</b>	<b>01/25/17 18:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:20</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	11.5	4.88	9.76	
Lead	711	4.88	9.76	
Zinc	9260	9.76	9.76	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.	Date Received:	01/27/17
1404 Franklin Street, Suite 600	Work Order:	17-01-2401
Oakland, CA 94612-3215	Preparation:	EPA 3050B
	Method:	EPA 6010B
	Units:	mg/kg

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1M-8-U</b>	<b>17-01-2401-16-A</b>	<b>01/25/17 18:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:21</b>	<b>170131L04</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	10.7	5.10	10.2	
Lead	966	5.10	10.2	
Zinc	11300	10.2	10.2	

Method Blank	097-01-002-24274	N/A	Solid	ICP 7300	01/31/17	02/01/17 11:48	170131L04
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	0.481	0.962	
Lead	ND	0.481	0.962	
Zinc	ND	0.962	0.962	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-1-1-M	17-01-2401-1-A	01/25/17 11:00	Solid	ICP 7300	02/03/17	02/07/17 11:57	170206LA9

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.825	0.100	1.00	
Lead	29.5	0.100	1.00	

SMM-1-1-M	17-01-2401-1-A	01/25/17 11:00	Solid	ICP 7300	02/03/17	02/08/17 15:29	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	497	1.00	10.0	

SMM-1M-1-U	17-01-2401-2-A	01/25/17 11:00	Solid	ICP 7300	02/03/17	02/07/17 11:58	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	1.07	0.100	1.00	
Lead	52.3	0.100	1.00	

SMM-1M-1-U	17-01-2401-2-A	01/25/17 11:00	Solid	ICP 7300	02/03/17	02/08/17 15:30	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	725	1.00	10.0	

SMM-1-2-M	17-01-2401-3-A	01/25/17 12:00	Solid	ICP 7300	02/03/17	02/07/17 11:59	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.519	0.100	1.00	
Lead	18.7	0.100	1.00	

SMM-1-2-M	17-01-2401-3-A	01/25/17 12:00	Solid	ICP 7300	02/03/17	02/08/17 15:31	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	481	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/27/17  
 Work Order: 17-01-2401  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1M-2-U</b>	<b>17-01-2401-4-A</b>	<b>01/25/17 12:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/07/17 12:00</b>	<b>170206LA9</b>

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	0.782	0.100	1.00	
Lead	37.4	0.100	1.00	

<b>SMM-1M-2-U</b>	<b>17-01-2401-4-A</b>	<b>01/25/17 12:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/08/17 15:32</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	574	1.00	10.0	

<b>SMM-1-3-M</b>	<b>17-01-2401-5-A</b>	<b>01/25/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/07/17 12:01</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	0.425	0.100	1.00	
Lead	38.8	0.100	1.00	
Zinc	466	0.100	1.00	

<b>SMM-1M-3-U</b>	<b>17-01-2401-6-A</b>	<b>01/25/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/07/17 12:02</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	0.564	0.100	1.00	
Lead	56.7	0.100	1.00	

<b>SMM-1M-3-U</b>	<b>17-01-2401-6-A</b>	<b>01/25/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/08/17 15:33</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	636	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/27/17  
 Work Order: 17-01-2401  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-1-4-M</b>	<b>17-01-2401-7-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/07/17 12:02</b>	<b>170206LA9</b>

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	0.464	0.100	1.00	
Lead	36.2	0.100	1.00	

<b>SMM-1-4-M</b>	<b>17-01-2401-7-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/08/17 15:34</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	484	1.00	10.0	

<b>SMM-1M-4-U</b>	<b>17-01-2401-8-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/07/17 12:03</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	0.968	0.100	1.00	
Lead	47.1	0.100	1.00	

<b>SMM-1M-4-U</b>	<b>17-01-2401-8-A</b>	<b>01/25/17 14:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/08/17 15:35</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	589	1.00	10.0	

<b>SMM-1-5-M</b>	<b>17-01-2401-9-A</b>	<b>01/25/17 15:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/07/17 12:04</b>	<b>170206LA9</b>
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Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	0.509	0.100	1.00	
Lead	10.3	0.100	1.00	
Zinc	289	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/27/17  
 Work Order: 17-01-2401  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-1M-5-U	17-01-2401-10-A	01/25/17 15:00	Solid	ICP 7300	02/03/17	02/07/17 12:07	170206LA9

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	1.32	0.100	1.00	
Lead	56.1	0.100	1.00	

SMM-1M-5-U	17-01-2401-10-A	01/25/17 15:00	Solid	ICP 7300	02/03/17	02/08/17 15:36	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	635	1.00	10.0	

SMM-1-6-M	17-01-2401-11-A	01/25/17 16:00	Solid	ICP 7300	02/03/17	02/07/17 12:08	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.248	0.100	1.00	
Lead	34.9	0.100	1.00	

SMM-1-6-M	17-01-2401-11-A	01/25/17 16:00	Solid	ICP 7300	02/03/17	02/08/17 15:36	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	473	1.00	10.0	

SMM-1M-6-U	17-01-2401-12-A	01/25/17 16:00	Solid	ICP 7300	02/03/17	02/07/17 12:09	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.172	0.100	1.00	
Lead	60.7	0.100	1.00	

SMM-1M-6-U	17-01-2401-12-A	01/25/17 16:00	Solid	ICP 7300	02/03/17	02/08/17 15:39	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	666	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-1-7-M	17-01-2401-13-A	01/25/17 17:00	Solid	ICP 7300	02/03/17	02/07/17 12:10	170206LA9

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.371	0.100	1.00	
Lead	27.5	0.100	1.00	

SMM-1-7-M	17-01-2401-13-A	01/25/17 17:00	Solid	ICP 7300	02/03/17	02/08/17 15:40	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	452	1.00	10.0	

SMM-1M-7-U	17-01-2401-14-A	01/25/17 17:00	Solid	ICP 7300	02/03/17	02/07/17 12:11	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.232	0.100	1.00	
Lead	38.4	0.100	1.00	

SMM-1M-7-U	17-01-2401-14-A	01/25/17 17:00	Solid	ICP 7300	02/03/17	02/08/17 15:41	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	628	1.00	10.0	

SMM-1-8-M	17-01-2401-15-A	01/25/17 18:00	Solid	ICP 7300	02/03/17	02/07/17 12:12	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.460	0.100	1.00	
Lead	40.5	0.100	1.00	

SMM-1-8-M	17-01-2401-15-A	01/25/17 18:00	Solid	ICP 7300	02/03/17	02/08/17 15:42	170206LA9
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	536	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/27/17  
 Work Order: 17-01-2401  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.003

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-1M-8-U	17-01-2401-16-A	01/25/17 18:00	Solid	ICP 7300	02/03/17	02/07/17 12:13	170206LA9

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.530	0.100	1.00	
Lead	50.8	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-1M-8-U	17-01-2401-16-A	01/25/17 18:00	Solid	ICP 7300	02/03/17	02/08/17 15:43	170206LA9

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	774	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-05-006-8906	N/A	Aqueous	ICP 7300	02/03/17	02/07/17 11:50	170206LA9

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Zinc	ND	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.003

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
<b>SMM-1-1-M</b>	<b>Sample</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:02</b>	<b>170131S04</b>				
<b>SMM-1-1-M</b>	<b>Matrix Spike</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:03</b>	<b>170131S04</b>				
<b>SMM-1-1-M</b>	<b>Matrix Spike Duplicate</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 13:04</b>	<b>170131S04</b>				
<u>Parameter</u>	<u>Sample Conc.</u>	<u>Spike Added</u>	<u>MS Conc.</u>	<u>MS %Rec.</u>	<u>MSD Conc.</u>	<u>MSD %Rec.</u>	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Cadmium	9.359	25.00	34.39	100	38.85	118	75-125	12	0-20	
Lead	656.1	25.00	960.7	4X	1139	4X	75-125	4X	0-20	Q
Zinc	20470	25.00	8694	4X	8747	4X	75-125	4X	0-20	Q

  
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RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.003

Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-02-0432-1	Sample	Aqueous	ICP 7300	02/06/17	02/07/17 11:52	170206SA9
17-02-0432-1	Matrix Spike	Aqueous	ICP 7300	02/06/17	02/07/17 11:53	170206SA9
17-02-0432-1	Matrix Spike Duplicate	Aqueous	ICP 7300	02/06/17	02/07/17 11:56	170206SA9

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	ND	5.000	4.729	95	5.066	101	75-125	7	0-20	
Lead	ND	5.000	4.746	95	5.108	102	75-125	7	0-20	
Zinc	ND	5.000	4.740	95	5.056	101	75-125	6	0-20	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

## Quality Control - PDS/PDSD

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.003

Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number				
<b>SMM-1-1-M</b>	<b>Sample</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17 00:00</b>	<b>02/01/17 13:02</b>	<b>170131S04</b>				
<b>SMM-1-1-M</b>	<b>PDS</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17 00:00</b>	<b>02/01/17 13:05</b>	<b>170131S04</b>				
<b>SMM-1-1-M</b>	<b>PDSD</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17 00:00</b>	<b>02/01/17 13:06</b>	<b>170131S04</b>				
Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	PDSD Conc.	PDSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	9.359	250.0	260.5	100	265.0	102	75-125	2	0-20	
Lead	656.1	250.0	919.0	105	924.7	107	75-125	1	0-20	
Zinc	20470	250.0	21270	4X	21310	4X	75-125	4X	0-20	Q





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## Quality Control - Sample Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: N/A  
Method: ASTM D-2216 (M)

Project: ISRI MSR Treatability Study / 0102.001.003

Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
<b>SMM-1-1-M</b>	<b>Sample</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17 00:00</b>	<b>02/04/17 17:00</b>	<b>H0204MOID1</b>
<b>SMM-1-1-M</b>	<b>Sample Duplicate</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17 00:00</b>	<b>02/04/17 17:00</b>	<b>H0204MOID1</b>
<u>Parameter</u>		<u>Sample Conc.</u>	<u>DUP Conc.</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Moisture		36.00	35.10	3	0-10	

  
Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.003

Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-01-002-24274</b>	<b>LCS</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>01/31/17</b>	<b>02/01/17 11:49</b>	<b>170131L04</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		25.00	24.39	98	80-120	
Lead		25.00	24.09	96	80-120	
Zinc		25.00	23.86	95	80-120	

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/27/17  
Work Order: 17-01-2401  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.003

Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-05-006-8906</b>	<b>LCS</b>	<b>Aqueous</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/07/17 11:51</b>	<b>170206LA9</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		5.000	5.243	105	80-120	
Lead		5.000	5.186	104	80-120	
Zinc		5.000	5.437	109	80-120	

## Sample Analysis Summary Report

Work Order: 17-01-2401

Page 1 of 1

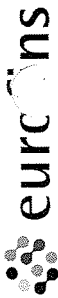
<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
ASTM D-2216 (M)	N/A	1050	N/A	1
EPA 6010B	EPA 3050B	935	ICP 7300	1
EPA 6010B	T22.11.5. All	935	ICP 7300	1

## Glossary of Terms and Qualifiers

Work Order: 17-01-2401

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.



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7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494  
For courier service / sample drop off information, contact us26\_sales@eurofinsus.com or call us.

LABORATORY CLIENT: Terraphase Engineering

ADDRESS: 1404 Franklin Street, Suite 600

CITY: Oakland STATE: CA ZIP: 94612

TEL: 510-645-1850 E-MAIL: emily.mosen@terrphase.com

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:

CHAIN OF CUSTODY

LAB USE ONLY  
**17-01-2401**

DATE: 1/25/2017

PAGE: 1 OF 2

CLIENT PROJECT NAME / NUMBER: ISRI MSR Treatability Study / 0102.001.003

P.O. NO.:

PROJECT CONTACT: Emily Mosen: 510-779-7179 emily.mosen@terrphase.com

SAMPLER(S) (PRINT):  
Matt Hoffmann  
Day Rygraden

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered
1	SMM-2-1-M	1/25/17	1100	Solid	1	X		
2	SMM-2M-1-U	1/25/17	1100	Solid	1	X		
3	SMM-2-2-M	1/25/17	1200	Solid	1	X		
4	SMM-2M-2-U	1/25/17	1200	Solid	1	X		
5	SMM-2-3-M	1/25/17	1300	Solid	1	X		
6	SMM-2M-3-U	1/25/17	1300	Solid	1	X		
7	SMM-2-4-M	1/25/17	1400	Solid	1	X		
8	SMM-2M-4-U	1/25/17	1400	Solid	1	X		

Cd, Pb, Zn (EPA 6010)  
WET Cd, Pb, Zn (EPA 6010 & CCR T22.11.5-A-II)  
Moisture content by ASTM D2216

Relinquished by: (Signature) <i>Matt Hoffmann</i>	Received by: (Signature/Affiliation) Fedex (Tracking #778282373326)	Date: 1/26/2017	Time: 11:00 AM
Relinquished by: (Signature) <i>Matt Hoffmann</i>	Received by: (Signature/Affiliation) <i>Emily Mosen</i>	Date: 1/27/17	Time: 1000
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:



Return to Contents



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LABORATORY CLIENT: Terraphase Engineering

ADDRESS: 1404 Franklin Street, Suite 600  
CITY: Oakland STATE: CA ZIP: 94612

TEL: 510-645-1850 E-MAIL: emily.mosen@terrphase.com

TURNAROUND TIME (Rush surcharges may apply to any "AT" not "STANDARD"):

SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

LOG CODE:

SPECIAL INSTRUCTIONS:

GLOBAL ID:

LOG CODE:

CHAIN OF CUSTODY CORD

LAB USE ONLY  
2401

DATE: 1/25/17  
PAGE: 2 OF 2

CLIENT PROJECT NAME / NUMBER:

ISRI MSR Treatability Study / 0102.001.003

PROJECT CONTACT:

Emily Mosen: 510-779-7179 emily.mosen@terrphase.com

P.O. NO.:

SAMPLER(S): (PRINT)

Matt Hoffman  
Dan Rogroden

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING		MATRIX	NO. OF CONT.	LOG CODE:			Cd, Pb, Zn (EPA 6010)	WET Cd, Pb, Zn (EPA 6010 & CCR T22.11.5-A-II)	Moisture content by ASTM D2216
		DATE	TIME			Unpreserved	Preserved	Field Filtered			
9	SMM-2-5-M	1/25/17	1500	Solid	1	X			X	X	X
10	SMM-2M-5-U	1/25/17	1500	Solid	1	X			X	X	X
11	SMM-2-6-M	1/25/17	1600	Solid	1	X			X	X	X
12	SMM-2M-6-U	1/25/17	1600	Solid	1	X			X	X	X
13	SMM-2-7-M	1/25/17	1700	Solid	1	X			X	X	X
14	SMM-2M-7-U	1/25/17	1700	Solid	1	X			X	X	X
15	SMM-2-8-M	1/25/17	1800	Solid	1	X			X	X	X
16	SMM-2M-8-U	1/25/17	1800	Solid	1	X			X	X	X

Date:	1/26/2017	Time:	11:00 AM
Date:	1/27/17	Time:	1000

Relinquished by: (Signature) *Matt Hoffman*  
 Received by: (Signature/Affiliation) Fedex (Tracking #778282373602)  
 Relinquished by: (Signature) *[Signature]*  
 Received by: (Signature/Affiliation) *[Signature]*  
 Relinquished by: (Signature) *[Signature]*  
 Received by: (Signature/Affiliation) *[Signature]*

3401

ORIGIN ID: JEMA (510) 779-7179  
EMILY MOSEN  
TERRAPHASE ENGINEERING  
1404 FRANKLIN ST  
STE 600  
OAKLAND, CA 94612  
UNITED STATES US

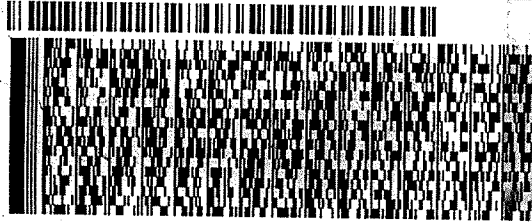
SHIP DATE  
ACTWGT:  
CAD: 10239

BILL SEND

TO DONALD BURLEY  
EUROFINS CALSCIENCE  
7440 LINCOLN WAY

GARDEN GROVE CA 92841

(714) 895-5494 REF: 0102.001.003  
INV. DEPT:  
PO:



FedEx Ship Manager - Print Your Label(s)

ORIGIN ID: JEMA (510) 779-7179  
EMILY MOSEN  
TERRAPHASE ENGINEERING  
1404 FRANKLIN ST  
STE 600  
OAKLAND, CA 94612  
UNITED STATES US

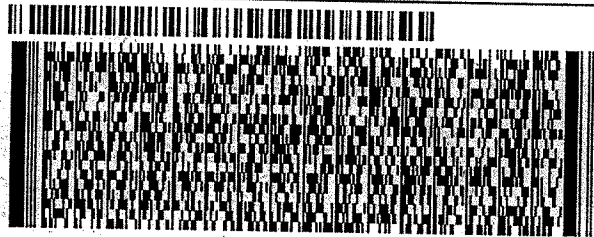
SHIP DATE: 26 JAN 17  
ACTWGT: 10.00 LB  
CAD: 102392669/INET3850

BILL SENDER

TO DONALD BURLEY  
EUROFINS CALSCIENCE  
7440 LINCOLN WAY

GARDEN GROVE CA 92841

(714) 895-5494 REF: 0102.001.003  
INV. DEPT:  
PO:



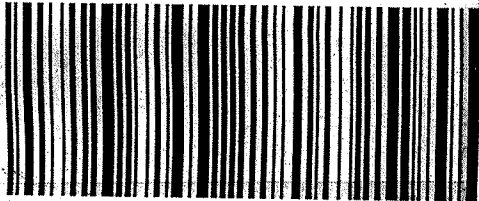
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FedEx Ship Manager - Print Your Label(s)

1 of 2  
TRK# 7782 8237 3326  
0201  
## MASTER ##

FRI  
STANDARD OVERNIGHT

92 APVA



1/26/2017

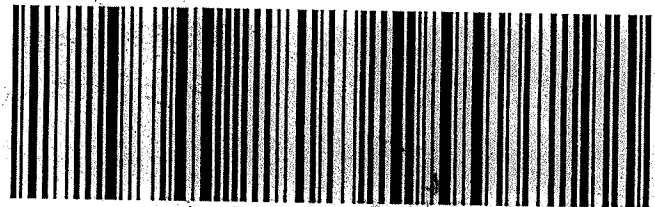
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0263  
Mstr# 7782 8237 3326

FRI - 27 JAN 3:00P  
STANDARD OVERNIGHT

92 APVA

0201

92841  
CA-US SNA



1/26/2017

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SAMPLE RECEIPT CHECKLIST

COOLER 0 OF 0

CLIENT: Terraphase Engg.

DATE: 01/27/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 19.9 °C (w/ CF): 19.9 °C;  Blank  Sample

Sample(s) outside temperature criteria (PM/APM contacted by: 836)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature:  Air  Filter

Checked by: 836

CUSTODY SEAL:

Cooler  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 836

Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 836

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Container(s) for certain analysis free of headspace .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE:

(Trip Blank Lot Number: \_\_\_\_\_)

Aqueous:  VOA  VOA<sub>h</sub>  VOA<sub>na2</sub>  100PJ  100PJ<sub>na2</sub>  125AGB  125AGB<sub>h</sub>  125AGB<sub>p</sub>  125PB  
 125PB<sub>z</sub>  250AGB  250CGB  250CGB<sub>s</sub>  250PB  250PB<sub>n</sub>  500AGB  500AGJ  500AGJ<sub>s</sub>  
 500PB  1AGB  1AGB<sub>na2</sub>  1AGB<sub>s</sub>  1PB  1PB<sub>na</sub>  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

Solid:  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1.5 PJ

Air:  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ Other Matrix (\_\_\_\_):  \_\_\_\_\_  \_\_\_\_\_

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO<sub>3</sub>, na = NaOH, na<sub>2</sub> = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, p = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 836

s = H<sub>2</sub>SO<sub>4</sub>, u = ultra-pure, x = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, z<sub>na</sub> = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 659

**SAMPLE RECEIPT CHECKLIST**

COOLER 0 OF 0

CLIENT: Terraphase Engg.

DATE: 01/27/2017

**TEMPERATURE:** (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)  
 Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 19.7°C (w/ CF): 19.7°C;  Blank  Sample  
 Sample(s) outside temperature criteria (PM/APM contacted by: 836)  
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling  
 Sample(s) received at ambient temperature; placed on ice for transport by courier  
 Ambient Temperature:  Air  Filter  
 Checked by: 836

**CUSTODY SEAL:**  
 Cooler  Present and Intact  Present but Not Intact  Not Present  N/A  
 Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A  
 Checked by: 836  
Box 2/2

<b>SAMPLE CONDITION:</b>	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Container(s) for certain analysis free of headspace .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**CONTAINER TYPE:** (Trip Blank Lot Number: \_\_\_\_\_)  
**Aqueous:**  VOA  VOA<sub>h</sub>  VOA<sub>na2</sub>  100PJ  100PJ<sub>na2</sub>  125AGB  125AGB<sub>h</sub>  125AGB<sub>p</sub>  125PB  
 125PB<sub>z</sub>  250AGB  250CGB  250CGB<sub>s</sub>  250PB  250PB<sub>n</sub>  500AGB  500AGJ  500AGJ<sub>s</sub>  
 500PB  1AGB  1AGB<sub>na2</sub>  1AGB<sub>s</sub>  1PB  1PB<sub>na</sub>  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  
**Solid:**  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1-5 PJ  
**Air:**  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ **Other Matrix** (\_\_\_\_\_)  \_\_\_\_\_  \_\_\_\_\_  
 Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag  
 Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO<sub>3</sub>, **na** = NaOH, **na<sub>2</sub>** = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, **p** = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 836  
**s** = H<sub>2</sub>SO<sub>4</sub>, **u** = ultra-pure, **x** = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, **z** = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 836

Work Order Number	Request	Original sample ID	Corrected sample ID
17-01-2301	Change prefix from "SMM-5 to SMM-4"	SMM-5H-1-U	SMM-4H-1-U
		SMM-5-1-H	SMM-4-1-H
		SMM-5H-2-U	SMM-4H-2-U
		SMM-5-2-H	SMM-4-2-H
		SMM-5H-3-U	SMM-4H-3-U
		SMM-5-3-H	SMM-4-3-H
		SMM-5H-4-U	SMM-4H-4-U
		SMM-5-4-H	SMM-4-4-H
		SMM-5H-5-U	SMM-4H-5-U
		SMM-5-5-H	SMM-4-5-H
		SMM-5H-6-U	SMM-4H-6-U
		SMM-5-6-H	SMM-4-6-H
		SMM-5H-7-U	SMM-4H-7-U
		SMM-5-7-H	SMM-4-7-H
		SMM-5H-8-U	SMM-4H-8-U
		SMM-5-8-H	SMM-4-8-H
17-01-2401	Change prefix from "SMM-2 to SMM-1"	SMM-2M-1-U	SMM-1M-1-U
		SMM-2-1-M	SMM-1-1-M
		SMM-2M-2-U	SMM-1M-2-U
		SMM-2-2-M	SMM-1-2-M
		SMM-2M-3-U	SMM-1M-3-U
		SMM-2-3-M	SMM-1-3-M
		SMM-2M-4-U	SMM-1M-4-U
		SMM-2-4-M	SMM-1-4-M
		SMM-2M-5-U	SMM-1M-5-U
		SMM-2-5-M	SMM-1-5-M
		SMM-2M-6-U	SMM-1M-6-U
		SMM-2-6-M	SMM-1-6-M
		SMM-2M-7-U	SMM-1M-7-U
		SMM-2-7-M	SMM-1-7-M
		SMM-2M-8-U	SMM-1M-8-U
		SMM-2-8-M	SMM-1-8-M
17-01-2544	Change prefix from "SMM-5 to SMM-4"	SMM-5L-1-U	SMM-4L-1-U
		SMM-5-1-L	SMM-4-1-L
		SMM-5L-2-U	SMM-4L-2-U
		SMM-5-2-L	SMM-4-2-L
		SMM-5L-3-U	SMM-4L-3-U
		SMM-5-3-L	SMM-4-3-L
		SMM-5L-4-U	SMM-4L-4-U
		SMM-5-4-L	SMM-4-4-L
		SMM-5L-5-U	SMM-4L-5-U
		SMM-5-5-L	SMM-4-5-L
		SMM-5L-6-U	SMM-4L-6-U
		SMM-5-6-L	SMM-4-6-L
		SMM-5L-7-U	SMM-4L-7-U
		SMM-5-7-L	SMM-4-7-L
		SMM-5L-8-U	SMM-4L-8-U
		SMM-5-8-L	SMM-4-8-L



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Supplemental Report 1

The original report has been revised/corrected.



**WORK ORDER NUMBER: 17-01-2544**

*The difference is service*



AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** Terraphase Engineering, Inc.

**Client Project Name:** ISRI MSR Treatability Study / 0102.001.00

**Attention:** Emily Mosen  
1404 Franklin Street  
Suite 600  
Oakland, CA 94612-3215

Approved for release on 02/13/2017 by:  
Don Burley  
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

# Contents

Client Project Name: ISRI MSR Treatability Study / 0102.001.00

Work Order Number: 17-01-2544

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**Condition Upon Receipt:**

Samples were received under Chain-of-Custody (COC) on 01/30/17. They were assigned to Work Order 17-01-2544.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

**Holding Times:**

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of  $\leq 15$  minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

**Quality Control:**

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

**Subcontractor Information:**

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

**Additional Comments:**

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

The report has been revised to change the sample IDs.



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## Sample Summary

Client: Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Work Order: 17-01-2544 Project Name: ISRI MSR Treatability Study / 0102.001.00 PO Number: Date/Time Received: 01/30/17 13:30 Number of Containers: 16
---	---

Attn: Emily Mosen

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
SMM-4-1-L	17-01-2544-1	01/26/17 11:00	1	Solid
SMM-4-2-L	17-01-2544-2	01/26/17 12:00	1	Solid
SMM-4-3-L	17-01-2544-3	01/26/17 13:00	1	Solid
SMM-4-4-L	17-01-2544-4	01/26/17 14:00	1	Solid
SMM-4L-1-U	17-01-2544-5	01/26/17 11:00	1	Solid
SMM-4L-2-U	17-01-2544-6	01/26/17 12:00	1	Solid
SMM-4L-3-U	17-01-2544-7	01/26/17 13:00	1	Solid
SMM-4L-4-U	17-01-2544-8	01/26/17 14:00	1	Solid
SMM-4-5-L	17-01-2544-9	01/26/17 15:00	1	Solid
SMM-4-6-L	17-01-2544-10	01/26/17 16:00	1	Solid
SMM-4-7-L	17-01-2544-11	01/26/17 17:00	1	Solid
SMM-4-8-L	17-01-2544-12	01/26/17 18:00	1	Solid
SMM-4L-5-U	17-01-2544-13	01/26/17 15:00	1	Solid
SMM-4L-6-U	17-01-2544-14	01/26/17 16:00	1	Solid
SMM-4L-7-U	17-01-2544-15	01/26/17 17:00	1	Solid
SMM-4L-8-U	17-01-2544-16	01/26/17 18:00	1	Solid


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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.00

Page 1 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-1-L</b>	<b>17-01-2544-1-A</b>	<b>01/26/17 11:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		45	0.10		1.00		
<b>SMM-4-2-L</b>	<b>17-01-2544-2-A</b>	<b>01/26/17 12:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		40	0.10		1.00		
<b>SMM-4-3-L</b>	<b>17-01-2544-3-A</b>	<b>01/26/17 13:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		37	0.10		1.00		
<b>SMM-4-4-L</b>	<b>17-01-2544-4-A</b>	<b>01/26/17 14:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		34	0.10		1.00		
<b>SMM-4L-1-U</b>	<b>17-01-2544-5-A</b>	<b>01/26/17 11:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		40	0.10		1.00		
<b>SMM-4L-2-U</b>	<b>17-01-2544-6-A</b>	<b>01/26/17 12:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		41	0.10		1.00		
<b>SMM-4L-3-U</b>	<b>17-01-2544-7-A</b>	<b>01/26/17 13:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
<b>SMM-4L-4-U</b>	<b>17-01-2544-8-A</b>	<b>01/26/17 14:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-5-L</b>	<b>17-01-2544-9-A</b>	<b>01/26/17 15:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		40	0.10		1.00		
<b>SMM-4-6-L</b>	<b>17-01-2544-10-A</b>	<b>01/26/17 16:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		
<b>SMM-4-7-L</b>	<b>17-01-2544-11-A</b>	<b>01/26/17 17:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
<b>SMM-4-8-L</b>	<b>17-01-2544-12-A</b>	<b>01/26/17 18:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		35	0.10		1.00		
<b>SMM-4L-5-U</b>	<b>17-01-2544-13-A</b>	<b>01/26/17 15:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		30	0.10		1.00		
<b>SMM-4L-6-U</b>	<b>17-01-2544-14-A</b>	<b>01/26/17 16:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		41	0.10		1.00		
<b>SMM-4L-7-U</b>	<b>17-01-2544-15-A</b>	<b>01/26/17 17:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
<b>SMM-4L-8-U</b>	<b>17-01-2544-16-A</b>	<b>01/26/17 18:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		39	0.10		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>099-05-014-6674</b>	<b>N/A</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17</b>	<b>02/04/17 17:00</b>	<b>H0204MOIB2</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Moisture	ND	0.10	1.00	

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.00

Page 1 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-1-L</b>	<b>17-01-2544-1-A</b>	<b>01/26/17 11:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 11:58</b>	<b>170203L03</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	8.49	4.81	9.62	
Lead	322	4.81	9.62	
Zinc	6440	9.62	9.62	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-2-L</b>	<b>17-01-2544-2-A</b>	<b>01/26/17 12:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 11:59</b>	<b>170203L03</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	42.5	4.85	9.71	
Lead	1170	4.85	9.71	
Zinc	10300	9.71	9.71	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-3-L</b>	<b>17-01-2544-3-A</b>	<b>01/26/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 12:00</b>	<b>170203L03</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	15.1	4.78	9.57	
Lead	722	4.78	9.57	
Zinc	8450	9.57	9.57	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-4-L</b>	<b>17-01-2544-4-A</b>	<b>01/26/17 14:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 12:01</b>	<b>170203L03</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	9.43	4.83	9.66	
Lead	782	4.83	9.66	
Zinc	10500	9.66	9.66	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4L-1-U</b>	<b>17-01-2544-5-A</b>	<b>01/26/17 11:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 12:02</b>	<b>170203L03</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	11.1	4.81	9.62	
Lead	564	4.81	9.62	
Zinc	9640	9.62	9.62	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/30/17  
 Work Order: 17-01-2544  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-2-U	17-01-2544-6-A	01/26/17 12:00	Solid	ICP 7300	02/03/17	02/06/17 12:02	170203L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	26.8	4.76	9.52	
Lead	1220	4.76	9.52	
Zinc	10800	9.52	9.52	

SMM-4L-3-U	17-01-2544-7-A	01/26/17 13:00	Solid	ICP 7300	02/03/17	02/06/17 12:05	170203L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	22.0	4.88	9.76	
Lead	871	4.88	9.76	
Zinc	10500	9.76	9.76	

SMM-4L-4-U	17-01-2544-8-A	01/26/17 14:00	Solid	ICP 7300	02/03/17	02/06/17 12:06	170203L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	10.7	4.78	9.57	
Lead	687	4.78	9.57	
Zinc	8270	9.57	9.57	

SMM-4-5-L	17-01-2544-9-A	01/26/17 15:00	Solid	ICP 7300	02/03/17	02/06/17 12:07	170203L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	12.4	4.93	9.85	
Lead	860	4.93	9.85	
Zinc	9650	9.85	9.85	

SMM-4-6-L	17-01-2544-10-A	01/26/17 16:00	Solid	ICP 7300	02/03/17	02/06/17 12:08	170203L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	14.1	4.85	9.71	
Lead	1290	4.85	9.71	
Zinc	10100	9.71	9.71	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/30/17  
 Work Order: 17-01-2544  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-7-L	17-01-2544-11-A	01/26/17 17:00	Solid	ICP 7300	02/03/17	02/06/17 12:09	170203L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	9.43	4.76	9.52	
Lead	711	4.76	9.52	
Zinc	9250	9.52	9.52	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-8-L	17-01-2544-12-A	01/26/17 18:00	Solid	ICP 7300	02/03/17	02/06/17 12:10	170203L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	10.1	4.88	9.76	
Lead	905	4.88	9.76	
Zinc	8530	9.76	9.76	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-5-U	17-01-2544-13-A	01/26/17 15:00	Solid	ICP 7300	02/03/17	02/06/17 12:11	170203L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	33.4	4.83	9.66	
Lead	683	4.83	9.66	
Zinc	10800	9.66	9.66	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-6-U	17-01-2544-14-A	01/26/17 16:00	Solid	ICP 7300	02/03/17	02/06/17 12:12	170203L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	8.19	4.93	9.85	
Lead	1020	4.93	9.85	
Zinc	7770	9.85	9.85	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-7-U	17-01-2544-15-A	01/26/17 17:00	Solid	ICP 7300	02/03/17	02/06/17 12:13	170203L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	11.8	4.85	9.71	
Lead	2290	4.85	9.71	
Zinc	13300	9.71	9.71	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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### Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/30/17  
 Work Order: 17-01-2544  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4L-8-U</b>	<b>17-01-2544-16-A</b>	<b>01/26/17 18:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 12:14</b>	<b>170203L03</b>

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	15.0	4.90	9.80	
Lead	2030	4.90	9.80	
Zinc	12400	9.80	9.80	

Method Blank	097-01-002-24308	N/A	Solid	ICP 7300	02/03/17	02/06/17 11:54	170203L03
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	0.478	0.957	
Lead	ND	0.478	0.957	
Zinc	ND	0.957	0.957	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/30/17  
 Work Order: 17-01-2544  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-1-L</b>	<b>17-01-2544-1-A</b>	<b>01/26/17 11:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/01/17</b>	<b>02/03/17 17:02</b>	<b>170203LA3</b>

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	0.100	1.00	
Lead	0.468	0.100	1.00	
Zinc	4.79	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-2-L</b>	<b>17-01-2544-2-A</b>	<b>01/26/17 12:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/01/17</b>	<b>02/03/17 17:02</b>	<b>170203LA3</b>

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	1.04	0.100	1.00	
Lead	37.1	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-2-L</b>	<b>17-01-2544-2-A</b>	<b>01/26/17 12:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/01/17</b>	<b>02/06/17 15:56</b>	<b>170203LA3</b>

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	519	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-3-L</b>	<b>17-01-2544-3-A</b>	<b>01/26/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/01/17</b>	<b>02/03/17 17:12</b>	<b>170203LA3</b>

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	1.10	0.100	1.00	
Lead	37.9	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SMM-4-3-L</b>	<b>17-01-2544-3-A</b>	<b>01/26/17 13:00</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/01/17</b>	<b>02/06/17 15:57</b>	<b>170203LA3</b>

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Zinc	562	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-4-L	17-01-2544-4-A	01/26/17 14:00	Solid	ICP 7300	02/01/17	02/03/17 17:13	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.803	0.100	1.00	
Lead	30.9	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-4-L	17-01-2544-4-A	01/26/17 14:00	Solid	ICP 7300	02/01/17	02/06/17 15:58	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	532	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-1-U	17-01-2544-5-A	01/26/17 11:00	Solid	ICP 7300	02/01/17	02/03/17 17:14	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.791	0.100	1.00	
Lead	32.3	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-1-U	17-01-2544-5-A	01/26/17 11:00	Solid	ICP 7300	02/01/17	02/06/17 15:59	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	584	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-2-U	17-01-2544-6-A	01/26/17 12:00	Solid	ICP 7300	02/01/17	02/03/17 17:15	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	1.25	0.100	1.00	
Lead	55.2	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-2-U	17-01-2544-6-A	01/26/17 12:00	Solid	ICP 7300	02/01/17	02/06/17 16:00	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	516	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/30/17  
 Work Order: 17-01-2544  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-3-U	17-01-2544-7-A	01/26/17 13:00	Solid	ICP 7300	02/01/17	02/03/17 17:16	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.884	0.100	1.00	
Lead	33.1	0.100	1.00	

SMM-4L-3-U	17-01-2544-7-A	01/26/17 13:00	Solid	ICP 7300	02/01/17	02/06/17 16:01	170203LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	518	1.00	10.0	

SMM-4L-4-U	17-01-2544-8-A	01/26/17 14:00	Solid	ICP 7300	02/01/17	02/03/17 17:18	170203LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.813	0.100	1.00	
Lead	38.4	0.100	1.00	

SMM-4L-4-U	17-01-2544-8-A	01/26/17 14:00	Solid	ICP 7300	02/01/17	02/06/17 16:02	170203LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	672	1.00	10.0	

SMM-4-5-L	17-01-2544-9-A	01/26/17 15:00	Solid	ICP 7300	02/01/17	02/03/17 17:19	170203LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.824	0.100	1.00	
Lead	32.6	0.100	1.00	

SMM-4-5-L	17-01-2544-9-A	01/26/17 15:00	Solid	ICP 7300	02/01/17	02/06/17 16:03	170203LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	491	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-6-L	17-01-2544-10-A	01/26/17 16:00	Solid	ICP 7300	02/01/17	02/03/17 17:20	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.606	0.100	1.00	
Lead	47.9	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-6-L	17-01-2544-10-A	01/26/17 16:00	Solid	ICP 7300	02/01/17	02/06/17 16:04	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	540	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-7-L	17-01-2544-11-A	01/26/17 17:00	Solid	ICP 7300	02/01/17	02/03/17 17:21	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.401	0.100	1.00	
Lead	23.5	0.100	1.00	
Zinc	363	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-8-L	17-01-2544-12-A	01/26/17 18:00	Solid	ICP 7300	02/01/17	02/03/17 17:22	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.644	0.100	1.00	
Lead	49.3	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4-8-L	17-01-2544-12-A	01/26/17 18:00	Solid	ICP 7300	02/01/17	02/06/17 16:05	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	501	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 01/30/17  
 Work Order: 17-01-2544  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-5-U	17-01-2544-13-A	01/26/17 15:00	Solid	ICP 7300	02/01/17	02/03/17 17:23	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.697	0.100	1.00	
Lead	25.9	0.100	1.00	
Zinc	420	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-6-U	17-01-2544-14-A	01/26/17 16:00	Solid	ICP 7300	02/01/17	02/03/17 17:24	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.670	0.100	1.00	
Lead	70.0	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-6-U	17-01-2544-14-A	01/26/17 16:00	Solid	ICP 7300	02/01/17	02/06/17 17:25	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	720	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-7-U	17-01-2544-15-A	01/26/17 17:00	Solid	ICP 7300	02/01/17	02/03/17 17:25	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.583	0.100	1.00	
Lead	46.0	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-7-U	17-01-2544-15-A	01/26/17 17:00	Solid	ICP 7300	02/01/17	02/06/17 17:26	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	506	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.00

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-8-U	17-01-2544-16-A	01/26/17 18:00	Solid	ICP 7300	02/01/17	02/03/17 17:26	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.653	0.100	1.00	
Lead	68.3	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SMM-4L-8-U	17-01-2544-16-A	01/26/17 18:00	Solid	ICP 7300	02/01/17	02/06/17 17:27	170203LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	621	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-05-006-8900	N/A	Aqueous	ICP 7300	02/01/17	02/03/17 16:55	170203LA3

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Zinc	ND	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.00

Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
<b>SMM-4-2-L</b>	<b>Sample</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 11:59</b>	<b>170203S03</b>
<b>SMM-4-2-L</b>	<b>Matrix Spike</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 11:56</b>	<b>170203S03</b>
<b>SMM-4-2-L</b>	<b>Matrix Spike Duplicate</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 11:57</b>	<b>170203S03</b>

<u>Parameter</u>	<u>Sample Conc.</u>	<u>Spike Added</u>	<u>MS Conc.</u>	<u>MS %Rec.</u>	<u>MSD Conc.</u>	<u>MSD %Rec.</u>	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Cadmium	42.48	25.00	50.04	30	51.18	35	75-125	2	0-20	3
Lead	1175	25.00	1358	4X	1360	4X	75-125	4X	0-20	Q
Zinc	10320	25.00	10810	4X	10730	4X	75-125	4X	0-20	Q

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.00

Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-02-0209-1	Sample	Aqueous	ICP 7300	02/03/17	02/03/17 16:57	170203SA3
17-02-0209-1	Matrix Spike	Aqueous	ICP 7300	02/03/17	02/03/17 16:58	170203SA3
17-02-0209-1	Matrix Spike Duplicate	Aqueous	ICP 7300	02/03/17	02/03/17 16:59	170203SA3

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	ND	5.000	5.187	104	5.124	102	75-125	1	0-20	
Lead	ND	5.000	5.226	105	5.183	104	75-125	1	0-20	
Zinc	ND	5.000	5.329	107	5.263	105	75-125	1	0-20	


 Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Sample Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: N/A  
Method: ASTM D-2216 (M)

Project: ISRI MSR Treatability Study / 0102.001.00

Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
<b>SMM-4L-1-U</b>	<b>Sample</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17 00:00</b>	<b>02/04/17 17:00</b>	<b>H0204MOID2</b>
<b>SMM-4L-1-U</b>	<b>Sample Duplicate</b>	<b>Solid</b>	<b>N/A</b>	<b>02/04/17 00:00</b>	<b>02/04/17 17:00</b>	<b>H0204MOID2</b>

<u>Parameter</u>	<u>Sample Conc.</u>	<u>DUP Conc.</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Moisture	39.80	42.50	7	0-10	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.00

Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-01-002-24308</b>	<b>LCS</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/03/17</b>	<b>02/06/17 11:55</b>	<b>170203L03</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		25.00	23.06	92	80-120	
Lead		25.00	23.53	94	80-120	
Zinc		25.00	22.26	89	80-120	



## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 01/30/17  
Work Order: 17-01-2544  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.00

Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-05-006-8900</b>	<b>LCS</b>	<b>Aqueous</b>	<b>ICP 7300</b>	<b>02/01/17</b>	<b>02/03/17 16:56</b>	<b>170203LA3</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		5.000	5.126	103	80-120	
Lead		5.000	4.948	99	80-120	
Zinc		5.000	5.254	105	80-120	

## Sample Analysis Summary Report

Work Order: 17-01-2544

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
ASTM D-2216 (M)	N/A	1050	N/A	1
EPA 6010B	EPA 3050B	935	ICP 7300	1
EPA 6010B	T22.11.5. All	935	ICP 7300	1

## Glossary of Terms and Qualifiers

Work Order: 17-01-2544

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.



Calscience

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494  
For courier service / sample drop off information, contact.us26\_sales@eurofinus.com or call us.

LABORATORY CLIENT: Terraphase Engineering

ADDRESS: 1404 Franklin Street, Suite 600

CITY: Oakland

STATE: CA

ZIP: 94612

TEL: 510-645-1850

E-MAIL: emily.mosen@terrphase.com

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

GLOBAL ID:

LOG CODE:

SPECIAL INSTRUCTIONS:

COELT EDF

Field Filtered

Preserved

Unpreserved

LAB USE ONLY	SAMPLE ID	SAMPLING		MATRIX	NO. OF CONT.
		DATE	TIME		
1	SMM-5-1-L	1/26/17	1100	Solid	1
2	SMM-5-2-L	1/26/17	1200	Solid	1
3	SMM-5-3-L	1/26/17	1300	Solid	1
4	SMM-5-4-L	1/26/17	1400	Solid	1
5	SMM-5L-1-U	1/26/17	1100	Solid	1
6	SMM-5L-2-U	1/26/17	1200	Solid	1
7	SMM-5L-3-U	1/26/17	1300	Solid	1
8	SMM-5L-4-U	1/26/17	1400	Solid	1

Please check box or fill in blank as needed.

Cd, Pb, Zn (EPA 6010)	WET Cd, Pb, Zn (EPA 6010 & CCR T22.11.5-A-II)	Moisture content by ASTM D2216
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X

REQUESTED ANALYSES

CLIENT PROJECT NAME / NUMBER: ISRI MSR Treatability Study / 0102.001.00

PROJECT CONTACT: Emily Mosen: 510-779-7179 emily.mosen@terrphase.com

P.O. NO.:

SAMPLER(S) (PRIM): Matt Hoffman, Hugo Ortigoza

CHAIN OF CUSTODY RECORD

LAB USE ONLY  
**17-01-2544**

DATE: 1/26/2017

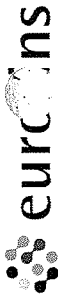
PAGE: 1 OF 2

Date: 1/27/2017 Time: 11:00 AM  
Date: 1/30/17 Time: 1330  
Date: Time:

Received by: (Signature/Affiliation) Fedex Tracking #778293037213  
Received by: (Signature/Affiliation) [Signature]  
Received by: (Signature/Affiliation) [Signature]

Relinquished by: (Signature) Matt Hoffman  
Relinquished by: (Signature)  
Relinquished by: (Signature)





Calscience

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494  
For courier service / sample drop off information, contact us26\_sales@eurofinsus.com or call us.

LABORATORY CLIENT: Terraphase Engineering

ADDRESS: 1404 Franklin Street, Suite 600

CITY: Oakland STATE: CA ZIP: 94612

TEL: 510-645-1850 E-MAIL: emily.mosen@terraphase.com

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:

CHAIN OF CUSTODY

DATE: 1/26/2017

PAGE: 2 OF 2

W/O # / LAB USE ONLY  
2544

CLIENT PROJECT NAME / NUMBER:

ISRI MSR Treatability Study / 0102.001.00

PROJECT CONTACT:

Emily Mosen: 510-779-7179 emily.mosen@terraphase.com

P.O. NO.:

SAMPLER(S): (PRINT)

Matt Hoffman  
Hugo Ortigoza

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Field Filtered	Preserved	Unpreserved	Cd, Pb, Zn (EPA 6010)	WET Cd, Pb, Zn (EPA 6010 & CCR T22.11.5.A-II)	Moisture content by ASTM D2216
	9 SMM-5-5-L	1/26/17	1500	solid	1			X	X	X	X
	10 SMM-5-6-L	1/26/17	1600	solid	1			X	X	X	X
	11 SMM-5-7-L	1/26/17	1700	solid	1			X	X	X	X
	12 SMM-5-8-L	1/26/17	1800	solid	1			X	X	X	X
	13 SMM-5L-5-U	1/26/17	1500	solid	1			X	X	X	X
	14 SMM-5L-6-U	1/26/17	1600	solid	1			X	X	X	X
	15 SMM-5L-7-U	1/26/17	1700	solid	1			X	X	X	X
	16 SMM-5L-8-U	1/26/17	1800	solid	1			X	X	X	X

Received by: (Signature/Affiliation) Fedex (Tracking #778293037772)	Date: 1/27/2017	Time: 11:00AM
Received by: (Signature/Affiliation) [Signature]	Date: 1/28/17	Time: 1330
Relinquished by: (Signature)		
Relinquished by: (Signature)		

GARDEN GROVE CA 92841

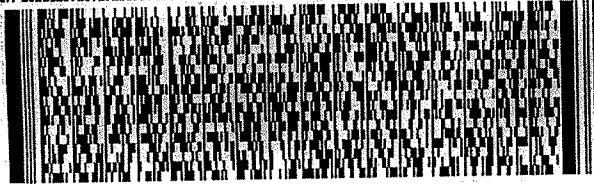
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REF: 0102.001.003

INV:

DEPT:

PO:



FedEx Express



4110170100101

2544

FedEx Ship Manager - Print Your Label(s)

1 of 2

MON - 30 JAN 3:00P  
STANDARD OVERNIGHT

TRK#

0201

7782 9303 7213

## MASTER ##

92841

WZ ADVA

SNA

RT 345

ST 48

01.3

ORIGIN ID: JEMA (510) 779-7179  
EMILY MOSEN  
TERRAPHASE ENGINEERING  
1404 FRANKLIN ST  
STE 600  
OAKLAND, CA 94612  
UNITED STATES US

SHIP DATE: 27 JAN 17  
ACTWGT: 10.00 LB  
CAD: 102392669/NET3850

BILL SENDER

TO DONALD BURLEY  
EUROFINS CALSCIENCE  
7440 LINCOLN WAY

546.J11997.63C1

GARDEN GROVE CA 92841

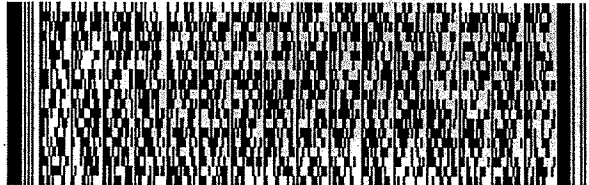
(714) 895-5494

REF: 0102.001.003

INV:

PO:

DEPT:



FedEx Express



4110170100101

FedEx Ship Manager - Print Your Label(s)

2 of 2

MON - 30 JAN 3:00P  
STANDARD OVERNIGHT

MPS#

0263

7782 9303 7772

Mstr# 7782 9303 7213

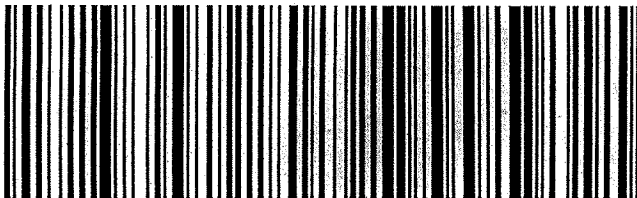
0201

92841

WZ APVA

CA-US

SNA



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SAMPLE RECEIPT CHECKLIST

COOLER 0 OF 0

CLIENT: Terraphase Eng'g

DATE: 01/30/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 24.5 °C (w/ CF): 24.5 °C;  Blank  Sample

Sample(s) outside temperature criteria (PM/APM contacted by: 876)

\*NOICE

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature:  Air  Filter

Checked by: 876

CUSTODY SEAL:

Cooler  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 876

Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 876

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples  Yes  No  N/A

COC document(s) received complete  Yes  No  N/A

Sampling date  Sampling time  Matrix  Number of containers

No analysis requested  Not relinquished  No relinquished date  No relinquished time

Sampler's name indicated on COC  Yes  No  N/A

Sample container label(s) consistent with COC  Yes  No  N/A

Sample container(s) intact and in good condition  Yes  No  N/A

Proper containers for analyses requested  Yes  No  N/A

Sufficient volume/mass for analyses requested  Yes  No  N/A

Samples received within holding time  Yes  No  N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH  Residual Chlorine  Dissolved Sulfide  Dissolved Oxygen  Yes  No  N/A

Proper preservation chemical(s) noted on COC and/or sample container  Yes  No  N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics  Total Metals  Dissolved Metals

Container(s) for certain analysis free of headspace  Yes  No  N/A

Volatile Organics  Dissolved Gases (RSK-175)  Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500)  Ferrous Iron (SM 3500)  Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation  Yes  No  N/A

CONTAINER TYPE:

(Trip Blank Lot Number: \_\_\_\_\_)

Aqueous:  VOA  VOA<sub>h</sub>  VOA<sub>na2</sub>  100PJ  100PJ<sub>na2</sub>  125AGB  125AGB<sub>h</sub>  125AGB<sub>p</sub>  125PB

125PB<sub>z<sub>na</sub></sub>  250AGB  250CGB  250CGB<sub>s</sub>  250PB  250PB<sub>n</sub>  500AGB  500AGJ  500AGJ<sub>s</sub>

500PB  1AGB  1AGB<sub>na2</sub>  1AGB<sub>s</sub>  1PB  1PB<sub>na</sub>  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

Solid:  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1.5 PJ

Air:  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ Other Matrix (\_\_\_\_):  \_\_\_\_\_  \_\_\_\_\_

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO<sub>3</sub>, na = NaOH, na<sub>2</sub> = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, p = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 876

s = H<sub>2</sub>SO<sub>4</sub>, u = ultra-pure, x = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, z<sub>na</sub> = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 679

SAMPLE RECEIPT CHECKLIST

COOLER 0 OF 0

CLIENT: Terraphase Eng'g

DATE: 01/30/2017

**TEMPERATURE:** (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)  
 Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 24.7°C (w/ CF): 24.7°C;  Blank  Sample  
 Sample(s) outside temperature criteria (PM/APM contacted by: 826) \*No ice  
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling  
 Sample(s) received at ambient temperature; placed on ice for transport by courier  
 Ambient Temperature:  Air  Filter Checked by: 826

**CUSTODY SEAL:**  
 Cooler  Present and Intact  Present but Not Intact  Not Present  N/A Checked by: 826  
 Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A Checked by: 826

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Container(s) for certain analysis free of headspace .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

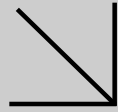
**CONTAINER TYPE:** (Trip Blank Lot Number: \_\_\_\_\_)  
**Aqueous:**  VOA  VOAh  VOAna<sub>2</sub>  100PJ  100PJna<sub>2</sub>  125AGB  125AGBh  125AGBp  125PB  
 125PBz<sub>anna</sub>  250AGB  250CGB  250CGBs  250PB  250PBn  500AGB  500AGJ  500AGJs  
 500PB  1AGB  1AGBna<sub>2</sub>  1AGBs  1PB  1PBna  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  
**Solid:**  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1.5 PJ  
**Air:**  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ **Other Matrix** (\_\_\_\_):  \_\_\_\_\_  \_\_\_\_\_  
 Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag  
 Preservative: b = buffered, f = filtered, h = HCl, n = HNO<sub>3</sub>, na = NaOH, na<sub>2</sub> = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, p = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 826  
 s = H<sub>2</sub>SO<sub>4</sub>, u = ultra-pure, x = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, z<sub>anna</sub> = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 619



Work Order Number	Request	Original sample ID	Corrected sample ID
17-01-2301	Change prefix from "SMM-5 to SMM-4"	SMM-5H-1-U	SMM-4H-1-U
		SMM-5-1-H	SMM-4-1-H
		SMM-5H-2-U	SMM-4H-2-U
		SMM-5-2-H	SMM-4-2-H
		SMM-5H-3-U	SMM-4H-3-U
		SMM-5-3-H	SMM-4-3-H
		SMM-5H-4-U	SMM-4H-4-U
		SMM-5-4-H	SMM-4-4-H
		SMM-5H-5-U	SMM-4H-5-U
		SMM-5-5-H	SMM-4-5-H
		SMM-5H-6-U	SMM-4H-6-U
		SMM-5-6-H	SMM-4-6-H
		SMM-5H-7-U	SMM-4H-7-U
		SMM-5-7-H	SMM-4-7-H
		SMM-5H-8-U	SMM-4H-8-U
		SMM-5-8-H	SMM-4-8-H
17-01-2401	Change prefix from "SMM-2 to SMM-1"	SMM-2M-1-U	SMM-1M-1-U
		SMM-2-1-M	SMM-1-1-M
		SMM-2M-2-U	SMM-1M-2-U
		SMM-2-2-M	SMM-1-2-M
		SMM-2M-3-U	SMM-1M-3-U
		SMM-2-3-M	SMM-1-3-M
		SMM-2M-4-U	SMM-1M-4-U
		SMM-2-4-M	SMM-1-4-M
		SMM-2M-5-U	SMM-1M-5-U
		SMM-2-5-M	SMM-1-5-M
		SMM-2M-6-U	SMM-1M-6-U
		SMM-2-6-M	SMM-1-6-M
		SMM-2M-7-U	SMM-1M-7-U
		SMM-2-7-M	SMM-1-7-M
		SMM-2M-8-U	SMM-1M-8-U
		SMM-2-8-M	SMM-1-8-M
17-01-2544	Change prefix from "SMM-5 to SMM-4"	SMM-5L-1-U	SMM-4L-1-U
		SMM-5-1-L	SMM-4-1-L
		SMM-5L-2-U	SMM-4L-2-U
		SMM-5-2-L	SMM-4-2-L
		SMM-5L-3-U	SMM-4L-3-U
		SMM-5-3-L	SMM-4-3-L
		SMM-5L-4-U	SMM-4L-4-U
		SMM-5-4-L	SMM-4-4-L
		SMM-5L-5-U	SMM-4L-5-U
		SMM-5-5-L	SMM-4-5-L
		SMM-5L-6-U	SMM-4L-6-U
		SMM-5-6-L	SMM-4-6-L
		SMM-5L-7-U	SMM-4L-7-U
		SMM-5-7-L	SMM-4-7-L
		SMM-5L-8-U	SMM-4L-8-U
		SMM-5-8-L	SMM-4-8-L



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**WORK ORDER NUMBER: 17-02-0637**

*The difference is service*



AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** Terraphase Engineering, Inc.

**Client Project Name:** ISRI MSR Treatability Study / 0102.001.004

**Attention:** Emily Mosen  
1404 Franklin Street  
Suite 600  
Oakland, CA 94612-3215

Approved for release on 02/21/2017 by:  
Don Burley  
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 17-02-0637

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**Condition Upon Receipt:**

Samples were received under Chain-of-Custody (COC) on 02/08/17. They were assigned to Work Order 17-02-0637.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

**Holding Times:**

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of  $\leq 15$  minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

**Quality Control:**

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

**Subcontractor Information:**

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

**Additional Comments:**

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.



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## Sample Summary

Client: Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Work Order: 17-02-0637 Project Name: ISRI MSR Treatability Study / 0102.001.004 PO Number: Date/Time Received: 02/08/17 10:10 Number of Containers: 16
---	--

Attn: Emily Mosen

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
SSP-4L-1-U	17-02-0637-1	02/06/17 11:00	1	Solid
SSP-4L-2-U	17-02-0637-2	02/06/17 12:15	1	Solid
SSP-4L-3-U	17-02-0637-3	02/06/17 13:15	1	Solid
SSP-4L-4-U	17-02-0637-4	02/06/17 14:15	1	Solid
SSP-4-1-L	17-02-0637-5	02/06/17 11:00	1	Solid
SSP-4-2-L	17-02-0637-6	02/06/17 12:15	1	Solid
SSP-4-3-L	17-02-0637-7	02/06/17 13:15	1	Solid
SSP-4-4-L	17-02-0637-8	02/06/17 14:15	1	Solid
SSP-4L-5-U	17-02-0637-9	02/06/17 15:15	1	Solid
SSP-4L-6-U	17-02-0637-10	02/06/17 16:15	1	Solid
SSP-4L-7-U	17-02-0637-11	02/06/17 17:15	1	Solid
SSP-4L-8-U	17-02-0637-12	02/06/17 18:15	1	Solid
SSP-4-5-L	17-02-0637-13	02/06/17 15:15	1	Solid
SSP-4-6-L	17-02-0637-14	02/06/17 16:15	1	Solid
SSP-4-7-L	17-02-0637-15	02/06/17 17:15	1	Solid
SSP-4-8-L	17-02-0637-16	02/06/17 18:15	1	Solid


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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-1-U	17-02-0637-1-A	02/06/17 11:00	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		
SSP-4L-2-U	17-02-0637-2-A	02/06/17 12:15	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
SSP-4L-3-U	17-02-0637-3-A	02/06/17 13:15	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		
SSP-4L-4-U	17-02-0637-4-A	02/06/17 14:15	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
SSP-4-1-L	17-02-0637-5-A	02/06/17 11:00	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		64	0.10		1.00		
SSP-4-2-L	17-02-0637-6-A	02/06/17 12:15	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		57	0.10		1.00		
SSP-4-3-L	17-02-0637-7-A	02/06/17 13:15	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		44	0.10		1.00		
SSP-4-4-L	17-02-0637-8-A	02/06/17 14:15	Solid	N/A	02/13/17	02/13/17 19:00	H0213MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		43	0.10		1.00		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4L-5-U</b>	<b>17-02-0637-9-A</b>	<b>02/06/17 15:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		30	0.10		1.00		
<b>SSP-4L-6-U</b>	<b>17-02-0637-10-A</b>	<b>02/06/17 16:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		30	0.10		1.00		
<b>SSP-4L-7-U</b>	<b>17-02-0637-11-A</b>	<b>02/06/17 17:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		38	0.10		1.00		
<b>SSP-4L-8-U</b>	<b>17-02-0637-12-A</b>	<b>02/06/17 18:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
<b>SSP-4-5-L</b>	<b>17-02-0637-13-A</b>	<b>02/06/17 15:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		30	0.10		1.00		
<b>SSP-4-6-L</b>	<b>17-02-0637-14-A</b>	<b>02/06/17 16:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		46	0.10		1.00		
<b>SSP-4-7-L</b>	<b>17-02-0637-15-A</b>	<b>02/06/17 17:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		49	0.10		1.00		
<b>SSP-4-8-L</b>	<b>17-02-0637-16-A</b>	<b>02/06/17 18:15</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		56	0.10		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.	Date Received:	02/08/17
1404 Franklin Street, Suite 600	Work Order:	17-02-0637
Oakland, CA 94612-3215	Preparation:	N/A
	Method:	ASTM D-2216 (M)
	Units:	%

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>099-05-014-6692</b>	<b>N/A</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 19:00</b>	<b>H0213MOIB1</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Moisture	ND	0.10	1.00	



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/08/17  
 Work Order: 17-02-0637  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-1-U	17-02-0637-1-A	02/06/17 11:00	Solid	ICP 7300	02/10/17	02/13/17 12:19	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	7.68	4.78	9.57	
Lead	455	4.78	9.57	
Zinc	7290	9.57	9.57	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-2-U	17-02-0637-2-A	02/06/17 12:15	Solid	ICP 7300	02/10/17	02/13/17 12:22	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	8.93	4.83	9.66	
Lead	632	4.83	9.66	
Zinc	8660	9.66	9.66	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-3-U	17-02-0637-3-A	02/06/17 13:15	Solid	ICP 7300	02/10/17	02/13/17 12:23	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	15.5	4.85	9.71	
Lead	949	4.85	9.71	
Zinc	9010	9.71	9.71	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-4-U	17-02-0637-4-A	02/06/17 14:15	Solid	ICP 7300	02/10/17	02/13/17 12:24	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	9.90	4.81	9.62	
Lead	562	4.81	9.62	
Zinc	7690	9.62	9.62	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-1-L	17-02-0637-5-A	02/06/17 11:00	Solid	ICP 7300	02/10/17	02/13/17 12:25	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	4.88	9.76	
Lead	404	4.88	9.76	
Zinc	4580	9.76	9.76	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/08/17  
 Work Order: 17-02-0637  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-L	17-02-0637-6-A	02/06/17 12:15	Solid	ICP 7300	02/10/17	02/13/17 12:25	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	5.67	4.81	9.62	
Lead	384	4.81	9.62	
Zinc	6080	9.62	9.62	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-L	17-02-0637-7-A	02/06/17 13:15	Solid	ICP 7300	02/10/17	02/13/17 12:26	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	8.17	4.90	9.80	
Lead	498	4.90	9.80	
Zinc	6640	9.80	9.80	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-4-L	17-02-0637-8-A	02/06/17 14:15	Solid	ICP 7300	02/10/17	02/13/17 12:27	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	6.75	4.81	9.62	
Lead	1570	4.81	9.62	
Zinc	7500	9.62	9.62	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-5-U	17-02-0637-9-A	02/06/17 15:15	Solid	ICP 7300	02/10/17	02/13/17 12:28	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	13.4	4.85	9.71	
Lead	965	4.85	9.71	
Zinc	11300	9.71	9.71	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-6-U	17-02-0637-10-A	02/06/17 16:15	Solid	ICP 7300	02/10/17	02/13/17 12:29	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	7.99	4.90	9.80	
Lead	593	4.90	9.80	
Zinc	8030	9.80	9.80	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/08/17  
 Work Order: 17-02-0637  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-7-U	17-02-0637-11-A	02/06/17 17:15	Solid	ICP 7300	02/10/17	02/13/17 12:30	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	17.6	4.83	9.66	
Lead	660	4.83	9.66	
Zinc	7900	9.66	9.66	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-8-U	17-02-0637-12-A	02/06/17 18:15	Solid	ICP 7300	02/10/17	02/13/17 12:33	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	13.1	4.78	9.57	
Lead	624	4.78	9.57	
Zinc	8720	9.57	9.57	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-5-L	17-02-0637-13-A	02/06/17 15:15	Solid	ICP 7300	02/10/17	02/13/17 12:34	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	12.3	4.93	9.85	
Lead	555	4.93	9.85	
Zinc	10500	9.85	9.85	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-6-L	17-02-0637-14-A	02/06/17 16:15	Solid	ICP 7300	02/10/17	02/13/17 12:34	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	10.4	4.85	9.71	
Lead	426	4.85	9.71	
Zinc	6890	9.71	9.71	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-7-L	17-02-0637-15-A	02/06/17 17:15	Solid	ICP 7300	02/10/17	02/13/17 12:35	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	7.94	4.88	9.76	
Lead	519	4.88	9.76	
Zinc	7770	9.76	9.76	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-8-L	17-02-0637-16-A	02/06/17 18:15	Solid	ICP 7300	02/10/17	02/13/17 12:36	170210L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	14.1	4.81	9.62	
Lead	1090	4.81	9.62	
Zinc	11300	9.62	9.62	

Method Blank	097-01-002-24330	N/A	Solid	ICP 7300	02/10/17	02/13/17 12:01	170210L02
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	0.478	0.957	
Lead	ND	0.478	0.957	
Zinc	ND	0.957	0.957	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-1-U	17-02-0637-1-A	02/06/17 11:00	Solid	ICP 7300	02/08/17	02/13/17 11:35	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.196	0.100	1.00	
Lead	34.1	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-1-U	17-02-0637-1-A	02/06/17 11:00	Solid	ICP 7300	02/08/17	02/13/17 15:47	170210LA6

Parameter	Result	RL	DF	Qualifiers
Zinc	663	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-2-U	17-02-0637-2-A	02/06/17 12:15	Solid	ICP 7300	02/08/17	02/13/17 11:36	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.259	0.100	1.00	
Lead	33.0	0.100	1.00	
Zinc	473	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-3-U	17-02-0637-3-A	02/06/17 13:15	Solid	ICP 7300	02/08/17	02/13/17 11:37	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	24.9	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-3-U	17-02-0637-3-A	02/06/17 13:15	Solid	ICP 7300	02/08/17	02/13/17 15:48	170210LA6

Parameter	Result	RL	DF	Qualifiers
Zinc	670	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-4-U	17-02-0637-4-A	02/06/17 14:15	Solid	ICP 7300	02/08/17	02/13/17 11:38	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.129	0.100	1.00	
Lead	26.4	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-4-U	17-02-0637-4-A	02/06/17 14:15	Solid	ICP 7300	02/08/17	02/13/17 15:49	170210LA6

Parameter	Result	RL	DF	Qualifiers
Zinc	511	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-1-L	17-02-0637-5-A	02/06/17 11:00	Solid	ICP 7300	02/08/17	02/13/17 11:39	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.185	0.100	1.00	
Lead	13.7	0.100	1.00	
Zinc	254	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-L	17-02-0637-6-A	02/06/17 12:15	Solid	ICP 7300	02/08/17	02/13/17 11:40	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.263	0.100	1.00	
Lead	3.20	0.100	1.00	
Zinc	283	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-L	17-02-0637-7-A	02/06/17 13:15	Solid	ICP 7300	02/08/17	02/13/17 11:41	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	1.40	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-L	17-02-0637-7-A	02/06/17 13:15	Solid	ICP 7300	02/08/17	02/13/17 15:52	170210LA6

Parameter	Result	RL	DF	Qualifiers
Zinc	1330	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/08/17  
 Work Order: 17-02-0637  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-4-L	17-02-0637-8-A	02/06/17 14:15	Solid	ICP 7300	02/08/17	02/13/17 11:44	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.247	0.100	1.00	
Lead	16.4	0.100	1.00	
Zinc	382	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-5-U	17-02-0637-9-A	02/06/17 15:15	Solid	ICP 7300	02/08/17	02/13/17 11:45	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	38.9	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-5-U	17-02-0637-9-A	02/06/17 15:15	Solid	ICP 7300	02/08/17	02/13/17 15:53	170210LA6

Parameter	Result	RL	DF	Qualifiers
Zinc	1070	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-6-U	17-02-0637-10-A	02/06/17 16:15	Solid	ICP 7300	02/08/17	02/13/17 11:46	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.205	0.100	1.00	
Lead	28.0	0.100	1.00	
Zinc	417	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-7-U	17-02-0637-11-A	02/06/17 17:15	Solid	ICP 7300	02/08/17	02/13/17 11:47	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.289	0.100	1.00	
Lead	29.7	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-7-U	17-02-0637-11-A	02/06/17 17:15	Solid	ICP 7300	02/08/17	02/13/17 15:54	170210LA6

Parameter	Result	RL	DF	Qualifiers
Zinc	563	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4L-8-U	17-02-0637-12-A	02/06/17 18:15	Solid	ICP 7300	02/08/17	02/13/17 11:48	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	19.0	0.100	1.00	
Zinc	340	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-5-L	17-02-0637-13-A	02/06/17 15:15	Solid	ICP 7300	02/08/17	02/13/17 11:49	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	0.460	0.100	1.00	
Zinc	16.3	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-6-L	17-02-0637-14-A	02/06/17 16:15	Solid	ICP 7300	02/08/17	02/13/17 11:50	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.218	0.100	1.00	
Lead	6.98	0.100	1.00	
Zinc	234	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-7-L	17-02-0637-15-A	02/06/17 17:15	Solid	ICP 7300	02/08/17	02/13/17 11:51	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.227	0.100	1.00	
Lead	17.2	0.100	1.00	
Zinc	294	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-8-L	17-02-0637-16-A	02/06/17 18:15	Solid	ICP 7300	02/08/17	02/13/17 11:52	170210LA6

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Zinc	2.24	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.





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### Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/08/17  
 Work Order: 17-02-0637  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>097-05-006-8919</b>	<b>N/A</b>	<b>Aqueous</b>	<b>ICP 7300</b>	<b>02/08/17</b>	<b>02/13/17 11:27</b>	<b>170210LA6</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Zinc	ND	0.100	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-02-0657-1	Sample	Solid	ICP 7300	02/10/17	02/13/17 12:06	170210S02
17-02-0657-1	Matrix Spike	Solid	ICP 7300	02/10/17	02/13/17 12:07	170210S02
17-02-0657-1	Matrix Spike Duplicate	Solid	ICP 7300	02/10/17	02/13/17 12:07	170210S02

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	1.208	25.00	23.39	89	25.10	96	75-125	7	0-20	
Lead	5.020	25.00	27.30	89	27.88	91	75-125	2	0-20	
Zinc	118.6	25.00	145.8	4X	130.3	4X	75-125	4X	0-20	Q


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RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-01-2603-22	Sample	Solid	ICP 7300	02/08/17	02/13/17 11:29	170210SA6
17-01-2603-22	Matrix Spike	Solid	ICP 7300	02/08/17	02/13/17 11:32	170210SA6
17-01-2603-22	Matrix Spike Duplicate	Solid	ICP 7300	02/08/17	02/13/17 11:33	170210SA6

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	ND	5.000	5.287	106	4.905	98	75-125	8	0-20	
Lead	2.679	5.000	7.418	95	7.070	88	75-125	5	0-20	
Zinc	3.616	5.000	8.824	104	8.282	93	75-125	6	0-20	


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RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - PDS/PDSD

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
17-02-0657-1	Sample	Solid	ICP 7300	02/10/17 00:00	02/13/17 12:06	170210S02
17-02-0657-1	PDS	Solid	ICP 7300	02/10/17 00:00	02/14/17 12:32	170210S02
17-02-0657-1	PDSD	Solid	ICP 7300	02/10/17 00:00	02/14/17 12:35	170210S02

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	PDSD Conc.	PDSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	1.208	25.00	24.61	94	23.81	90	75-125	3	0-20	
Lead	5.020	25.00	28.49	94	27.37	89	75-125	4	0-20	
Zinc	118.6	25.00	139.7	4X	140.3	4X	75-125	4X	0-20	Q

  
Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Sample Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: N/A  
Method: ASTM D-2216 (M)

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
SSP-4L-1-U	Sample	Solid	N/A	02/13/17 00:00	02/13/17 19:00	H0213MOID1
SSP-4L-1-U	Sample Duplicate	Solid	N/A	02/13/17 00:00	02/13/17 19:00	H0213MOID1

<u>Parameter</u>	<u>Sample Conc.</u>	<u>DUP Conc.</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Moisture	38.50	36.00	7	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-01-002-24330</b>	<b>LCS</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/10/17</b>	<b>02/13/17 12:02</b>	<b>170210L02</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		25.00	24.18	97	80-120	
Lead		25.00	23.85	95	80-120	
Zinc		25.00	23.68	95	80-120	

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/08/17  
Work Order: 17-02-0637  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-05-006-8919</b>	<b>LCS</b>	<b>Aqueous</b>	<b>ICP 7300</b>	<b>02/08/17</b>	<b>02/13/17 11:28</b>	<b>170210LA6</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		5.000	4.644	93	80-120	
Lead		5.000	4.385	88	80-120	
Zinc		5.000	4.853	97	80-120	

## Sample Analysis Summary Report

Work Order: 17-02-0637

Page 1 of 1

<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
ASTM D-2216 (M)	N/A	1050	N/A	1
EPA 6010B	EPA 3050B	935	ICP 7300	1
EPA 6010B	T22.11.5. All	935	ICP 7300	1



## Glossary of Terms and Qualifiers

Work Order: 17-02-0637

Page 1 of 1

<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.



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CHAIN OF CUSTODY CORD

DATE: 2/6/17

PAGE: 1 OF 2

NO. / LAB USE ONLY  
**17-02-0637**

LABORATORY CLIENT: Terraphase Engineering  
 ADDRESS: 1404 Franklin Street, Suite 600  
 CITY: Oakland STATE: CA ZIP: 94612  
 TEL: 510-645-1850 E-MAIL: emily.mosen@terrphase.com  
 P.O. NO.:  
 CLIENT PROJECT NAME / NUMBER: ISRI MSR Treatability Study / 0102.001.004  
 PROJECT CONTACT: Emily Mosen: 510-779-7179 emily.mosen@terrphase.com  
 SAMPLER(S) (PRINT): Matt Hoffman  
 Hugo Ortigoza

**REQUESTED ANALYSES**

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING		NO. OF CONT.	MATRIX	LOG CODE:		
		DATE	TIME			Unpreserved	Preserved	Field Filtered
1	SSP-4L-1-U	2/6/17	1100	1	Solid	X		
2	SSP-4L-2-V	2/6/17	1215	1	Solid	X		
3	SSP-4L-3-V	2/6/17	1315	1	Solid	X		
4	SSP-4L-4-V	2/6/17	1415	1	Solid	X		
5	SSP-4-1-L	2/6/17	1100	1	Solid	X		
6	SSP-4-2-L	2/6/17	1215	1	Solid	X		
7	SSP-4-3-L	2/6/17	1315	1	Solid	X		
8	SSP-4-4-L	2/6/17	1415	1	Solid	X		

Moisture content by ASTM D2216

WET Cd, Pb, Zn (EPA 6010 & GCR T22.11.5.A-II)

Cd, Pb, Zn (EPA 6010)

Received by: (Signature/Affiliation) *[Signature]* Date: 2/7/2017 Time: 1:00 PM  
 Fedex Tracking #7783 7077 8247

Received by: (Signature/Affiliation) *[Signature]* Date: 2/8/17 Time: 1010

Relinquished by: (Signature) *[Signature]*

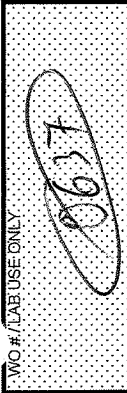
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Relinquished by: (Signature) *[Signature]*



Calscience

CHAIN OF CUSTODY CORD



DATE: 2/16/17

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LABORATORY CLIENT: Terraphase Engineering

ADDRESS: 1404 Franklin Street, Suite 600

CITY: Oakland STATE: CA ZIP: 94612

TEL: 510-645-1850 E-MAIL: emily.mosen@terrphase.com

CLIENT PROJECT NAME / NUMBER: ISRI MSR Treatability Study / 0102.001.004

PROJECT CONTACT: Emily Mosen: 510-779-7179 emily.mosen@terrphase.com

SAMPLER(S) (PRINT): Matt Hoffman  
Hugo Ortigoza

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

COELT EDF

SPECIAL INSTRUCTIONS:

LAB USE ONLY	SAMPLE ID	SAMPLING		NO. OF CONT.	MATRIX	LOG CODE:		
		DATE	TIME			Unpreserved	Preserved	Field Filtered
9	SSP-4L-5-U	2/6/17	1545	1	Solid	X		
10	SSP-4L-6-U	2/6/17	1615	1	Solid	X		
11	SSP-4L-7-U	2/6/17	1715	1	Solid	X		
12	SSP-4L-8-U	2/6/17	1815	1	Solid	X		
17	SSP-4-5-L	2/6/17	1515	1	Solid	X		
14	SSP-4-6-L	2/6/17	1615	1	Solid	X		
15	SSP-4-7-L	2/6/17	1715	1	Solid	X		
16	SSP-4-8-L	2/6/17	1815	1	Solid	X		

Requested Analyses: Cd, Pb, Zn (EPA 6010) X; WET Cd, Pb, Zn (EPA 6010 & CCR T22.11.5.A-11) X; Moisture content by ASTM D2216 X

Received by: (Signature/Affiliation) Fedex (Tracking # 778370778100)

Relinquished by: (Signature) [Signature]

Relinquished by: (Signature) [Signature]

Relinquished by: (Signature) [Signature]

Date: 2/17/2017 Time: 1:00PM

Date: 2/18/17 Time: 1010



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0627

ORIGIN ID: JEMA (510) 779-7179  
EMILY MOSEN  
TERRAPHASE ENGINEERING  
1404 FRANKLIN ST  
STE 600  
OAKLAND, CA 94612  
UNITED STATES US

SHIP DATE: 07FEB17  
ACTWGT: 10.00 LB  
CAD: 102392669/INET3850

BILL SENDER

ORIGIN ID: JEMA (510) 779-7179  
EMILY MOSEN  
TERRAPHASE ENGINEERING  
1404 FRANKLIN ST  
STE 600  
OAKLAND, CA 94612  
UNITED STATES US

SHIP DATE: 07FEB17  
ACTWGT: 10.00 LB  
CAD: 102392669/INET3850

BILL SENDER

DONALD BURLEY  
EUROFINS CALSCIENCE  
7440 LINCOLN WAY

TO DONALD BURLEY  
EUROFINS CALSCIENCE  
7440 LINCOLN WAY

GARDEN GROVE CA 92841

714) 895-5494 REF: 0102.001.004

W: DEPT:

O: DEPT:

546.J1/33BB53C1

546.J1/33BB53C1



GARDEN GROVE CA 92841

(714) 895-5494 REF: 0102.001.004

INV: DEPT:

PO: DEPT:



1 of 2

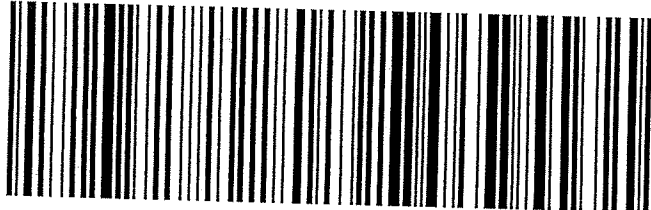
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STANDARD OVERNIGHT

(# 1) 7783 7077 8247

MASTER ##

92 APVA

92841  
CA-US SNA



2 of 2

WED - 08 FEB 3:00P  
STANDARD OVERNIGHT

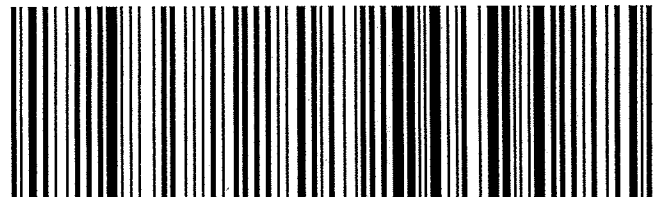
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0263 Mstr# 7783 7077 8247

0201

92 APVA

92841  
CA-US SNA



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**SAMPLE RECEIPT CHECKLIST**

COOLER 0 OF 0

CLIENT: Terraphase Eng'g.

DATE: 02/08/2017

**TEMPERATURE:** (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 20.4°C (w/ CF): 20.4°C;  Blank  Sample

Sample(s) outside temperature criteria (PM/APM contacted by: 15)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature:  Air  Filter

Checked by: 15

**CUSTODY SEAL:**

Cooler  Present and Intact  Present but Not Intact  Not Present  N/A

Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 15

Checked by: 836

**SAMPLE CONDITION:**

Chain-of-Custody (COC) document(s) received with samples .....  Yes  No  N/A

COC document(s) received complete .....  Yes  No  N/A

Sampling date  Sampling time  Matrix  Number of containers

No analysis requested  Not relinquished  No relinquished date  No relinquished time

Sampler's name indicated on COC .....  Yes  No  N/A

Sample container label(s) consistent with COC .....  Yes  No  N/A

Sample container(s) intact and in good condition .....  Yes  No  N/A

Proper containers for analyses requested .....  Yes  No  N/A

Sufficient volume/mass for analyses requested .....  Yes  No  N/A

Samples received within holding time .....  Yes  No  N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH  Residual Chlorine  Dissolved Sulfide  Dissolved Oxygen .....  Yes  No  N/A

Proper preservation chemical(s) noted on COC and/or sample container .....  Yes  No  N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics  Total Metals  Dissolved Metals

Container(s) for certain analysis free of headspace .....  Yes  No  N/A

Volatile Organics  Dissolved Gases (RSK-175)  Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500)  Ferrous Iron (SM 3500)  Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation .....  Yes  No  N/A

**CONTAINER TYPE:**

(Trip Blank Lot Number: \_\_\_\_\_)

**Aqueous:**  VOA  VOA<sub>h</sub>  VOA<sub>na2</sub>  100PJ  100PJ<sub>na2</sub>  125AGB  125AGB<sub>h</sub>  125AGB<sub>p</sub>  125PB

125PB<sub>z<sub>na</sub></sub>  250AGB  250CGB  250CGB<sub>s</sub>  250PB  250PB<sub>n</sub>  500AGB  500AGJ  500AGJ<sub>s</sub>

500PB  1AGB  1AGB<sub>na2</sub>  1AGB<sub>s</sub>  1PB  1PB<sub>na</sub>  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

**Solid:**  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_)  EnCores® (\_\_\_\_)  TerraCores® (\_\_\_\_)  11.5 PJ

**Air:**  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ **Other Matrix** (\_\_\_\_):  \_\_\_\_\_  \_\_\_\_\_

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO<sub>3</sub>, **na** = NaOH, **na<sub>2</sub>** = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, **p** = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 836

**s** = H<sub>2</sub>SO<sub>4</sub>, **u** = ultra-pure, **x** = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, **z<sub>na</sub>** = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 778



SAMPLE RECEIPT CHECKLIST

COOLER 0 OF 0

CLIENT: Terraphase Eng'g

DATE: 02/08/2017

TEMPERATURE: (Criteria: 0.0°C - 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 20.6 °C (w/ CF): 20.6 °C;  Blank  Sample

Sample(s) outside temperature criteria (PM/APM contacted by: 15)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature:  Air  Filter

Checked by: 15

CUSTODY SEAL:

Cooler  Present and Intact  Present but Not Intact  Not Present  N/A

Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 15

Checked by: 836

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples .....  Yes  No  N/A

COC document(s) received complete .....  Yes  No  N/A

Sampling date  Sampling time  Matrix  Number of containers

No analysis requested  Not relinquished  No relinquished date  No relinquished time

Sampler's name indicated on COC .....  Yes  No  N/A

Sample container label(s) consistent with COC .....  Yes  No  N/A

Sample container(s) intact and in good condition .....  Yes  No  N/A

Proper containers for analyses requested .....  Yes  No  N/A

Sufficient volume/mass for analyses requested .....  Yes  No  N/A

Samples received within holding time .....  Yes  No  N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH  Residual Chlorine  Dissolved Sulfide  Dissolved Oxygen .....  Yes  No  N/A

Proper preservation chemical(s) noted on COC and/or sample container .....  Yes  No  N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics  Total Metals  Dissolved Metals

Container(s) for certain analysis free of headspace .....  Yes  No  N/A

Volatile Organics  Dissolved Gases (RSK-175)  Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500)  Ferrous Iron (SM 3500)  Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation .....  Yes  No  N/A

CONTAINER TYPE:

(Trip Blank Lot Number: \_\_\_\_\_)

Aqueous:  VOA  VOA<sub>h</sub>  VOA<sub>na2</sub>  100PJ  100PJ<sub>na2</sub>  125AGB  125AGB<sub>h</sub>  125AGB<sub>p</sub>  125PB

125PB<sub>z</sub><sub>na</sub>  250AGB  250CGB  250CGB<sub>s</sub>  250PB  250PB<sub>n</sub>  500AGB  500AGJ  500AGJ<sub>s</sub>

500PB  1AGB  1AGB<sub>na2</sub>  1AGB<sub>s</sub>  1PB  1PB<sub>na</sub>  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

Solid:  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_)  EnCores® (\_\_\_\_)  TerraCores® (\_\_\_\_)  1-5 PJ

Air:  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ Other Matrix (\_\_\_\_):  \_\_\_\_\_  \_\_\_\_\_

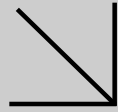
Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO<sub>3</sub>, na = NaOH, na<sub>2</sub> = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, p = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 836

s = H<sub>2</sub>SO<sub>4</sub>, u = ultra-pure, x = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, z<sub>na</sub> = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 718



Calscience



**WORK ORDER NUMBER: 17-02-0769**

*The difference is service*



AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** Terraphase Engineering, Inc.

**Client Project Name:** ISRI MSR Treatability Study / 0102.001.004

**Attention:** Emily Mosen  
1404 Franklin Street  
Suite 600  
Oakland, CA 94612-3215

Approved for release on 02/22/2017 by:  
Don Burley  
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

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 Work Order Number: 17-02-0769

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**Condition Upon Receipt:**

Samples were received under Chain-of-Custody (COC) on 02/09/17. They were assigned to Work Order 17-02-0769.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

**Holding Times:**

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of  $\leq 15$  minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

**Quality Control:**

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

**Subcontractor Information:**

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

**Additional Comments:**

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

## Sample Summary

Client: Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Work Order: 17-02-0769 Project Name: ISRI MSR Treatability Study / 0102.001.004 PO Number: Date/Time Received: 02/09/17 10:20 Number of Containers: 16
---	--

Attn: Emily Mosen

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
SSP-4M-1-U	17-02-0769-1	02/07/17 09:00	1	Solid
SSP-4M-2-U	17-02-0769-2	02/07/17 10:00	1	Solid
SSP-4M-3-U	17-02-0769-3	02/07/17 11:00	1	Solid
SSP-4-1-M	17-02-0769-4	02/07/17 09:00	1	Solid
SSP-4-2-M	17-02-0769-5	02/07/17 10:00	1	Solid
SSP-4-3-M	17-02-0769-6	02/07/17 11:00	1	Solid
SSP-4M-4-U	17-02-0769-7	02/07/17 12:30	1	Solid
SSP-4M-5-U	17-02-0769-8	02/07/17 13:30	1	Solid
SSP-4M-6-U	17-02-0769-9	02/07/17 14:30	1	Solid
SSP-4-4-M	17-02-0769-10	02/07/17 12:30	1	Solid
SSP-4-5-M	17-02-0769-11	02/07/17 13:30	1	Solid
SSP-4-6-M	17-02-0769-12	02/07/17 14:30	1	Solid
SSP-4M-7-U	17-02-0769-13	02/07/17 15:30	1	Solid
SSP-4M-8-U	17-02-0769-14	02/07/17 16:30	1	Solid
SSP-4-7-M	17-02-0769-15	02/07/17 15:30	1	Solid
SSP-4-8-M	17-02-0769-16	02/07/17 16:30	1	Solid


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## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: N/A  
 Method: ASTM D-2216 (M)  
 Units: %

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4M-1-U</b>	<b>17-02-0769-1-A</b>	<b>02/07/17 09:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		50	0.10		1.00		
<b>SSP-4M-2-U</b>	<b>17-02-0769-2-A</b>	<b>02/07/17 10:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		31	0.10		1.00		
<b>SSP-4M-3-U</b>	<b>17-02-0769-3-A</b>	<b>02/07/17 11:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		40	0.10		1.00		
<b>SSP-4-1-M</b>	<b>17-02-0769-4-A</b>	<b>02/07/17 09:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		51	0.10		1.00		
<b>SSP-4-2-M</b>	<b>17-02-0769-5-A</b>	<b>02/07/17 10:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		42	0.10		1.00		
<b>SSP-4-3-M</b>	<b>17-02-0769-6-A</b>	<b>02/07/17 11:00</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		34	0.10		1.00		
<b>SSP-4M-4-U</b>	<b>17-02-0769-7-A</b>	<b>02/07/17 12:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		33	0.10		1.00		
<b>SSP-4M-5-U</b>	<b>17-02-0769-8-A</b>	<b>02/07/17 13:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		44	0.10		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4M-6-U</b>	<b>17-02-0769-9-A</b>	<b>02/07/17 14:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		29	0.10		1.00		
<b>SSP-4-4-M</b>	<b>17-02-0769-10-A</b>	<b>02/07/17 12:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		45	0.10		1.00		
<b>SSP-4-5-M</b>	<b>17-02-0769-11-A</b>	<b>02/07/17 13:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		41	0.10		1.00		
<b>SSP-4-6-M</b>	<b>17-02-0769-12-A</b>	<b>02/07/17 14:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		32	0.10		1.00		
<b>SSP-4M-7-U</b>	<b>17-02-0769-13-A</b>	<b>02/07/17 15:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		43	0.10		1.00		
<b>SSP-4M-8-U</b>	<b>17-02-0769-14-A</b>	<b>02/07/17 16:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		27	0.10		1.00		
<b>SSP-4-7-M</b>	<b>17-02-0769-15-A</b>	<b>02/07/17 15:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		35	0.10		1.00		
<b>SSP-4-8-M</b>	<b>17-02-0769-16-A</b>	<b>02/07/17 16:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		45	0.10		1.00		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.	Date Received:	02/09/17
1404 Franklin Street, Suite 600	Work Order:	17-02-0769
Oakland, CA 94612-3215	Preparation:	N/A
	Method:	ASTM D-2216 (M)
	Units:	%

Project: ISRI MSR Treatability Study / 0102.001.004 Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>099-05-014-6696</b>	<b>N/A</b>	<b>Solid</b>	<b>N/A</b>	<b>02/13/17</b>	<b>02/13/17 20:00</b>	<b>H0213MOIB2</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Moisture	ND	0.10	1.00	

## Analytical Report

Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Date Received: 02/09/17 Work Order: 17-02-0769 Preparation: N/A Method: CA Fish and Game
Project: ISRI MSR Treatability Study / 0102.001.004	Page 1 of 8

Test Species: Fathead Minnow (Pimephales Promelas)	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 09:00:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.84 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.21 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-1-M</b>	<b>17-02-0769-4</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

Parameter	Result	Units
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.

## Analytical Report

Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Date Received: 02/09/17 Work Order: 17-02-0769 Preparation: N/A Method: CA Fish and Game
Project: ISRI MSR Treatability Study / 0102.001.004	Page 2 of 8

Test Species: Fathead Minnow ( <i>Pimephales Promelas</i> )	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 10:00:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.82 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.17 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-2-M</b>	<b>17-02-0769-5</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.

## Analytical Report

Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Date Received: 02/09/17 Work Order: 17-02-0769 Preparation: N/A Method: CA Fish and Game
Project: ISRI MSR Treatability Study / 0102.001.004	Page 3 of 8

Test Species: Fathead Minnow (Pimephales Promelas)	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 11:00:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.85 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.24 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-3-M</b>	<b>17-02-0769-6</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.



## Analytical Report

Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Date Received: 02/09/17 Work Order: 17-02-0769 Preparation: N/A Method: CA Fish and Game
Project: ISRI MSR Treatability Study / 0102.001.004	

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Test Species: Fathead Minnow (Pimephales Promelas)	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 12:30:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.84 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.2 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-4-M</b>	<b>17-02-0769-10</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.

## Analytical Report

Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Date Received: 02/09/17 Work Order: 17-02-0769 Preparation: N/A Method: CA Fish and Game
Project: ISRI MSR Treatability Study / 0102.001.004	Page 5 of 8

Test Species: Fathead Minnow (Pimephales Promelas)	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 13:30:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.84 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.15 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-5-M</b>	<b>17-02-0769-11</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

Parameter	Result	Units
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.

## Analytical Report

Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Date Received: 02/09/17 Work Order: 17-02-0769 Preparation: N/A Method: CA Fish and Game
Project: ISRI MSR Treatability Study / 0102.001.004	Page 6 of 8

Test Species: Fathead Minnow (Pimephales Promelas)	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 14:30:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.86 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.21 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-6-M</b>	<b>17-02-0769-12</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

Parameter	Result	Units
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.

## Analytical Report

Terraphase Engineering, Inc.	Date Received:	02/09/17
1404 Franklin Street, Suite 600	Work Order:	17-02-0769
Oakland, CA 94612-3215	Preparation:	N/A
	Method:	CA Fish and Game

Project: ISRI MSR Treatability Study / 0102.001.004 Page 7 of 8

Test Species: Fathead Minnow ( <i>Pimephales Promelas</i> )	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 15:30:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.83 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.22 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-7-M</b>	<b>17-02-0769-15</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.

## Analytical Report

Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Date Received: 02/09/17 Work Order: 17-02-0769 Preparation: N/A Method: CA Fish and Game
Project: ISRI MSR Treatability Study / 0102.001.004	Page 8 of 8

Test Species: Fathead Minnow (Pimephales Promelas)	Mean Length: 43 mm	Mean Weight: 0.46 g
Sample Collected: 02/07/17 16:30:00	Sample Received: 02/09/17 10:20:00	
Test Start: 02/14/17 19:00:00	Test End: 02/18/17 19:00:00	

### Initial Water Quality Parameters

Residual Chlorine: < 0.01 mg/L	Temperature: 19.8 °C
pH: 7.83 units	Conductivity: 910 umhos/cm
Dissolved Oxygen (D.O.): 7.17 mg/L	Alkalinity: 196 mg/L
Hardness: 42 mg/L	Ammonia: N/A

### Sample Preparation

The sample was adjusted to test temperature.

### Sample Adjustment During Analysis

No Supplemental aeration needed.

If needed, supplemental aeration to maintain required Dissolved Oxygen level is supplied via a low pressure oil-free pump connected to individual lines for each tank/chamber from a common manifold. Individual valves at each tank/chamber control the flow rate as required.

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4-8-M</b>	<b>17-02-0769-16</b>	<b>02/07/17</b>	<b>Solid</b>	<b>02/14/17</b>	<b>02/18/17 19:00:00</b>	

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Bioassay 750 mg/L (% Mortality)	0	%
Bioassay 250 mg/L (% Mortality)	0	%

### Laboratory Notes

Sample was received within recommended holding time.

All testing was within method protocol.

### LC 50 Results

SRT sample (mg/L):	24.20
Upper 95% confidence limit:	25.70
Lower 95% confidence limit:	22.80

SRT: Standard Reference Toxicant.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

Page 1 of 17

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-1-U	17-02-0769-1-A	02/07/17 09:00	Solid	ICP 7300	02/13/17	02/14/17 12:09	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	14.6	7.14	9.52	
Arsenic	ND	7.14	9.52	
Barium	656	4.76	9.52	
Beryllium	ND	2.38	9.52	
Cadmium	13.3	4.76	9.52	
Chromium	62.7	2.38	9.52	
Cobalt	21.9	2.38	9.52	
Copper	3350	4.76	9.52	
Lead	608	4.76	9.52	
Molybdenum	18.2	2.38	9.52	
Nickel	124	2.38	9.52	
Selenium	ND	7.14	9.52	
Silver	4.33	2.38	9.52	
Thallium	ND	7.14	9.52	
Vanadium	7.76	2.38	9.52	
Zinc	11300	9.52	9.52	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-2-U	17-02-0769-2-A	02/07/17 10:00	Solid	ICP 7300	02/13/17	02/14/17 12:13	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	13.6	7.18	9.57	
Arsenic	ND	7.18	9.57	
Barium	888	4.78	9.57	
Beryllium	ND	2.39	9.57	
Cadmium	16.4	4.78	9.57	
Chromium	67.3	2.39	9.57	
Cobalt	21.9	2.39	9.57	
Copper	1440	4.78	9.57	
Lead	619	4.78	9.57	
Molybdenum	22.8	2.39	9.57	
Nickel	169	2.39	9.57	
Selenium	ND	7.18	9.57	
Silver	5.16	2.39	9.57	
Thallium	ND	7.18	9.57	
Vanadium	9.06	2.39	9.57	
Zinc	9360	9.57	9.57	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-3-U	17-02-0769-3-A	02/07/17 11:00	Solid	ICP 7300	02/13/17	02/14/17 12:14	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	13.4	7.81	10.4	
Arsenic	ND	7.81	10.4	
Barium	1050	5.21	10.4	
Beryllium	ND	2.60	10.4	
Cadmium	9.76	5.21	10.4	
Chromium	71.7	2.60	10.4	
Cobalt	19.4	2.60	10.4	
Copper	423	5.21	10.4	
Lead	742	5.21	10.4	
Molybdenum	30.1	2.60	10.4	
Nickel	125	2.60	10.4	
Selenium	ND	7.81	10.4	
Silver	6.75	2.60	10.4	
Thallium	ND	7.81	10.4	
Vanadium	8.76	2.60	10.4	
Zinc	8290	10.4	10.4	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-1-M	17-02-0769-4-A	02/07/17 09:00	Solid	ICP 7300	02/13/17	02/14/17 12:15	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	8.43	7.21	9.62	
Arsenic	8.82	7.21	9.62	
Barium	666	4.81	9.62	
Beryllium	ND	2.40	9.62	
Cadmium	11.6	4.81	9.62	
Chromium	56.4	2.40	9.62	
Cobalt	17.6	2.40	9.62	
Copper	16100	4.81	9.62	
Lead	643	4.81	9.62	
Molybdenum	16.2	2.40	9.62	
Nickel	99.5	2.40	9.62	
Selenium	ND	7.21	9.62	
Silver	8.68	2.40	9.62	
Thallium	ND	7.21	9.62	
Vanadium	40.8	2.40	9.62	
Zinc	6630	9.62	9.62	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-M	17-02-0769-5-A	02/07/17 10:00	Solid	ICP 7300	02/13/17	02/14/17 12:16	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	17.1	7.28	9.71	
Arsenic	ND	7.28	9.71	
Barium	681	4.85	9.71	
Beryllium	ND	2.43	9.71	
Cadmium	12.5	4.85	9.71	
Chromium	112	2.43	9.71	
Cobalt	25.0	2.43	9.71	
Copper	871	4.85	9.71	
Lead	893	4.85	9.71	
Molybdenum	35.1	2.43	9.71	
Nickel	158	2.43	9.71	
Selenium	ND	7.28	9.71	
Silver	4.61	2.43	9.71	
Thallium	ND	7.28	9.71	
Vanadium	19.7	2.43	9.71	
Zinc	11300	9.71	9.71	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-M	17-02-0769-6-A	02/07/17 11:00	Solid	ICP 7300	02/13/17	02/14/17 12:17	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	58.5	7.14	9.52	
Arsenic	ND	7.14	9.52	
Barium	845	4.76	9.52	
Beryllium	ND	2.38	9.52	
Cadmium	14.7	4.76	9.52	
Chromium	124	2.38	9.52	
Cobalt	24.5	2.38	9.52	
Copper	4280	4.76	9.52	
Lead	1580	4.76	9.52	
Molybdenum	29.9	2.38	9.52	
Nickel	147	2.38	9.52	
Selenium	ND	7.14	9.52	
Silver	6.12	2.38	9.52	
Thallium	ND	7.14	9.52	
Vanadium	18.6	2.38	9.52	
Zinc	11000	9.52	9.52	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-4-U	17-02-0769-7-A	02/07/17 12:30	Solid	ICP 7300	02/13/17	02/14/17 12:18	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	ND	7.73	10.3	
Arsenic	ND	7.73	10.3	
Barium	589	5.15	10.3	
Beryllium	ND	2.58	10.3	
Cadmium	21.0	5.15	10.3	
Chromium	3030	2.58	10.3	
Cobalt	35.7	2.58	10.3	
Copper	37300	5.15	10.3	
Lead	784	5.15	10.3	
Molybdenum	66.6	2.58	10.3	
Nickel	168	2.58	10.3	
Selenium	10.2	7.73	10.3	
Silver	4.11	2.58	10.3	
Thallium	ND	7.73	10.3	
Vanadium	ND	2.58	10.3	
Zinc	7660	10.3	10.3	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-5-U	17-02-0769-8-A	02/07/17 13:30	Solid	ICP 7300	02/13/17	02/14/17 12:19	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	11.4	7.39	9.85	
Arsenic	9.87	7.39	9.85	
Barium	692	4.93	9.85	
Beryllium	ND	2.46	9.85	
Cadmium	17.3	4.93	9.85	
Chromium	181	2.46	9.85	
Cobalt	18.8	2.46	9.85	
Copper	11800	4.93	9.85	
Lead	603	4.93	9.85	
Molybdenum	46.2	2.46	9.85	
Nickel	118	2.46	9.85	
Selenium	ND	7.39	9.85	
Silver	4.36	2.46	9.85	
Thallium	ND	7.39	9.85	
Vanadium	8.86	2.46	9.85	
Zinc	7300	9.85	9.85	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-6-U	17-02-0769-9-A	02/07/17 14:30	Solid	ICP 7300	02/13/17	02/14/17 12:20	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	18.8	7.21	9.62	
Arsenic	ND	7.21	9.62	
Barium	715	4.81	9.62	
Beryllium	ND	2.40	9.62	
Cadmium	21.1	4.81	9.62	
Chromium	131	2.40	9.62	
Cobalt	29.8	2.40	9.62	
Copper	4230	4.81	9.62	
Lead	723	4.81	9.62	
Molybdenum	52.6	2.40	9.62	
Nickel	155	2.40	9.62	
Selenium	ND	7.21	9.62	
Silver	7.43	2.40	9.62	
Thallium	ND	7.21	9.62	
Vanadium	11.0	2.40	9.62	
Zinc	10600	9.62	9.62	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-4-M	17-02-0769-10-A	02/07/17 12:30	Solid	ICP 7300	02/13/17	02/14/17 12:24	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	27.7	7.35	9.80	
Arsenic	ND	7.35	9.80	
Barium	2590	4.90	9.80	
Beryllium	ND	2.45	9.80	
Cadmium	8.79	4.90	9.80	
Chromium	75.3	2.45	9.80	
Cobalt	15.0	2.45	9.80	
Copper	926	4.90	9.80	
Lead	506	4.90	9.80	
Molybdenum	24.1	2.45	9.80	
Nickel	327	2.45	9.80	
Selenium	ND	7.35	9.80	
Silver	3.94	2.45	9.80	
Thallium	ND	7.35	9.80	
Vanadium	25.3	2.45	9.80	
Zinc	5920	9.80	9.80	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-5-M	17-02-0769-11-A	02/07/17 13:30	Solid	ICP 7300	02/13/17	02/14/17 12:25	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	7.39	9.85	
Arsenic	13.0	7.39	9.85	
Barium	625	4.93	9.85	
Beryllium	ND	2.46	9.85	
Cadmium	9.82	4.93	9.85	
Chromium	71.3	2.46	9.85	
Cobalt	19.9	2.46	9.85	
Copper	71400	4.93	9.85	
Lead	687	4.93	9.85	
Molybdenum	24.7	2.46	9.85	
Nickel	120	2.46	9.85	
Selenium	ND	7.39	9.85	
Silver	7.34	2.46	9.85	
Thallium	ND	7.39	9.85	
Vanadium	25.7	2.46	9.85	
Zinc	8070	9.85	9.85	


 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-6-M	17-02-0769-12-A	02/07/17 14:30	Solid	ICP 7300	02/13/17	02/14/17 12:26	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Antimony	9.86	7.28	9.71	
Arsenic	ND	7.28	9.71	
Barium	835	4.85	9.71	
Beryllium	ND	2.43	9.71	
Cadmium	8.52	4.85	9.71	
Chromium	169	2.43	9.71	
Cobalt	22.6	2.43	9.71	
Copper	4010	4.85	9.71	
Lead	691	4.85	9.71	
Molybdenum	36.2	2.43	9.71	
Nickel	129	2.43	9.71	
Selenium	ND	7.28	9.71	
Silver	4.48	2.43	9.71	
Thallium	ND	7.28	9.71	
Vanadium	25.0	2.43	9.71	
Zinc	8920	9.71	9.71	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-7-U	17-02-0769-13-A	02/07/17 15:30	Solid	ICP 7300	02/13/17	02/14/17 12:27	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	22.5	7.21	9.62	
Arsenic	ND	7.21	9.62	
Barium	1070	4.81	9.62	
Beryllium	ND	2.40	9.62	
Cadmium	12.3	4.81	9.62	
Chromium	97.4	2.40	9.62	
Cobalt	38.7	2.40	9.62	
Copper	597	4.81	9.62	
Lead	902	4.81	9.62	
Molybdenum	31.2	2.40	9.62	
Nickel	182	2.40	9.62	
Selenium	ND	7.21	9.62	
Silver	6.63	2.40	9.62	
Thallium	ND	7.21	9.62	
Vanadium	11.7	2.40	9.62	
Zinc	9850	9.62	9.62	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-8-U	17-02-0769-14-A	02/07/17 16:30	Solid	ICP 7300	02/13/17	02/14/17 12:28	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	13.6	7.39	9.85	
Arsenic	ND	7.39	9.85	
Barium	708	4.93	9.85	
Beryllium	ND	2.46	9.85	
Cadmium	10.6	4.93	9.85	
Chromium	87.3	2.46	9.85	
Cobalt	18.3	2.46	9.85	
Copper	2180	4.93	9.85	
Lead	832	4.93	9.85	
Molybdenum	26.7	2.46	9.85	
Nickel	143	2.46	9.85	
Selenium	ND	7.39	9.85	
Silver	4.92	2.46	9.85	
Thallium	ND	7.39	9.85	
Vanadium	14.5	2.46	9.85	
Zinc	7670	9.85	9.85	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-7-M	17-02-0769-15-A	02/07/17 15:30	Solid	ICP 7300	02/13/17	02/14/17 12:29	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	7.28	9.71	
Arsenic	ND	7.28	9.71	
Barium	2120	4.85	9.71	
Beryllium	ND	2.43	9.71	
Cadmium	6.70	4.85	9.71	
Chromium	63.1	2.43	9.71	
Cobalt	14.4	2.43	9.71	
Copper	66000	4.85	9.71	
Lead	602	4.85	9.71	
Molybdenum	23.3	2.43	9.71	
Nickel	90.6	2.43	9.71	
Selenium	ND	7.28	9.71	
Silver	5.85	2.43	9.71	
Thallium	ND	7.28	9.71	
Vanadium	13.6	2.43	9.71	
Zinc	6490	9.71	9.71	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-8-M	17-02-0769-16-A	02/07/17 16:30	Solid	ICP 7300	02/13/17	02/14/17 12:29	170213L02

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	11.9	7.25	9.66	
Arsenic	ND	7.25	9.66	
Barium	673	4.83	9.66	
Beryllium	ND	2.42	9.66	
Cadmium	9.16	4.83	9.66	
Chromium	89.2	2.42	9.66	
Cobalt	18.5	2.42	9.66	
Copper	1830	4.83	9.66	
Lead	625	4.83	9.66	
Molybdenum	23.7	2.42	9.66	
Nickel	116	2.42	9.66	
Selenium	ND	7.25	9.66	
Silver	3.65	2.42	9.66	
Thallium	ND	7.25	9.66	
Vanadium	25.9	2.42	9.66	
Zinc	7750	9.66	9.66	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>097-01-002-24335</b>	<b>N/A</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/14/17 10:15</b>	<b>170213L02</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	ND	0.721	0.962	
Arsenic	ND	0.721	0.962	
Barium	ND	0.481	0.962	
Beryllium	ND	0.240	0.962	
Cadmium	ND	0.481	0.962	
Chromium	ND	0.240	0.962	
Cobalt	ND	0.240	0.962	
Copper	ND	0.481	0.962	
Lead	ND	0.481	0.962	
Molybdenum	ND	0.240	0.962	
Nickel	ND	0.240	0.962	
Selenium	ND	0.721	0.962	
Silver	ND	0.240	0.962	
Thallium	ND	0.721	0.962	
Vanadium	ND	0.240	0.962	
Zinc	ND	0.962	0.962	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-1-U	17-02-0769-1-A	02/07/17 09:00	Solid	ICP 7300	02/10/17	02/14/17 11:18	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	0.476	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	3.83	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.507	0.100	1.00	
Chromium	2.27	0.100	1.00	
Cobalt	0.839	0.100	1.00	
Copper	0.158	0.100	1.00	
Lead	21.9	0.100	1.00	
Molybdenum	0.606	0.100	1.00	
Nickel	3.80	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.195	0.100	1.00	
Zinc	572	1.00	10.0	


  
 Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-2-U	17-02-0769-2-A	02/07/17 10:00	Solid	ICP 7300	02/10/17	02/14/17 11:21	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.500	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	4.21	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.741	0.100	1.00	
Chromium	1.96	0.100	1.00	
Cobalt	1.02	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	38.8	0.100	1.00	
Molybdenum	0.661	0.100	1.00	
Nickel	4.37	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.234	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-2-U	17-02-0769-2-A	02/07/17 10:00	Solid	ICP 7300	02/10/17	02/14/17 13:12	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	752	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-3-U	17-02-0769-3-A	02/07/17 11:00	Solid	ICP 7300	02/10/17	02/14/17 11:22	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.683	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	4.60	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.753	0.100	1.00	
Chromium	2.72	0.100	1.00	
Cobalt	1.14	0.100	1.00	
Copper	0.292	0.100	1.00	
Lead	43.4	0.100	1.00	
Molybdenum	0.852	0.100	1.00	
Nickel	4.84	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.259	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-3-U	17-02-0769-3-A	02/07/17 11:00	Solid	ICP 7300	02/10/17	02/14/17 13:13	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	762	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-1-M	17-02-0769-4-A	02/07/17 09:00	Solid	ICP 7300	02/10/17	02/14/17 11:23	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	ND	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	1.65	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	0.592	0.100	1.00	
Cobalt	ND	0.100	1.00	
Copper	2.20	0.100	1.00	
Lead	0.591	0.100	1.00	
Molybdenum	0.176	0.100	1.00	
Nickel	0.420	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	1.52	0.100	1.00	
Zinc	3.61	0.100	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-M	17-02-0769-5-A	02/07/17 10:00	Solid	ICP 7300	02/10/17	02/14/17 11:24	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.626	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	6.79	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.377	0.100	1.00	
Chromium	1.82	0.100	1.00	
Cobalt	0.629	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	18.3	0.100	1.00	
Molybdenum	0.497	0.100	1.00	
Nickel	2.82	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	1.15	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-M	17-02-0769-5-A	02/07/17 10:00	Solid	ICP 7300	02/10/17	02/14/17 13:14	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	582	1.00	10.0	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-M	17-02-0769-6-A	02/07/17 11:00	Solid	ICP 7300	02/10/17	02/14/17 11:25	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.496	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	5.50	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.523	0.100	1.00	
Chromium	2.52	0.100	1.00	
Cobalt	0.821	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	17.4	0.100	1.00	
Molybdenum	0.719	0.100	1.00	
Nickel	3.96	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.562	0.100	1.00	

SSP-4-3-M	17-02-0769-6-A	02/07/17 11:00	Solid	ICP 7300	02/10/17	02/14/17 13:15	170213LA11
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	775	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

**Analytical Report**

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-4-U	17-02-0769-7-A	02/07/17 12:30	Solid	ICP 7300	02/10/17	02/14/17 11:26	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.717	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	4.73	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.125	0.100	1.00	
Chromium	3.61	0.100	1.00	
Cobalt	1.56	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	38.6	0.100	1.00	
Molybdenum	1.04	0.100	1.00	
Nickel	7.86	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.326	0.100	1.00	

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SSP-4M-4-U	17-02-0769-7-A	02/07/17 12:30	Solid	ICP 7300	02/10/17	02/14/17 13:16	170213LA11
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	750	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-5-U	17-02-0769-8-A	02/07/17 13:30	Solid	ICP 7300	02/10/17	02/14/17 11:27	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	1.94	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	4.68	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	1.77	0.100	1.00	
Chromium	2.28	0.100	1.00	
Cobalt	0.898	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	143	0.100	1.00	
Molybdenum	0.727	0.100	1.00	
Nickel	3.57	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.219	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-5-U	17-02-0769-8-A	02/07/17 13:30	Solid	ICP 7300	02/10/17	02/14/17 13:18	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	585	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-6-U	17-02-0769-9-A	02/07/17 14:30	Solid	ICP 7300	02/10/17	02/14/17 11:31	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.910	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	4.38	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.486	0.100	1.00	
Chromium	2.94	0.100	1.00	
Cobalt	0.832	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	36.0	0.100	1.00	
Molybdenum	1.16	0.100	1.00	
Nickel	4.88	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.188	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-6-U	17-02-0769-9-A	02/07/17 14:30	Solid	ICP 7300	02/10/17	02/14/17 13:19	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	590	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-4-M	17-02-0769-10-A	02/07/17 12:30	Solid	ICP 7300	02/10/17	02/14/17 11:32	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	0.266	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	5.68	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.209	0.100	1.00	
Chromium	5.00	0.100	1.00	
Cobalt	0.492	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	11.1	0.100	1.00	
Molybdenum	0.448	0.100	1.00	
Nickel	2.31	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.800	0.100	1.00	
Zinc	311	0.100	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-5-M	17-02-0769-11-A	02/07/17 13:30	Solid	ICP 7300	02/10/17	02/14/17 11:33	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.313	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	5.35	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	1.45	0.100	1.00	
Cobalt	0.365	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	2.34	0.100	1.00	
Molybdenum	0.394	0.100	1.00	
Nickel	2.02	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	1.47	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-5-M	17-02-0769-11-A	02/07/17 13:30	Solid	ICP 7300	02/10/17	02/14/17 13:20	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	565	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-6-M	17-02-0769-12-A	02/07/17 14:30	Solid	ICP 7300	02/10/17	02/14/17 11:34	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	0.515	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	6.46	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.285	0.100	1.00	
Chromium	3.15	0.100	1.00	
Cobalt	0.655	0.100	1.00	
Copper	0.292	0.100	1.00	
Lead	27.0	0.100	1.00	
Molybdenum	0.741	0.100	1.00	
Nickel	3.52	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	1.26	0.100	1.00	
Zinc	414	0.100	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-7-U	17-02-0769-13-A	02/07/17 15:30	Solid	ICP 7300	02/10/17	02/14/17 11:35	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.721	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	4.87	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	3.05	0.100	1.00	
Cobalt	1.50	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	28.8	0.100	1.00	
Molybdenum	1.09	0.100	1.00	
Nickel	5.80	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.247	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-7-U	17-02-0769-13-A	02/07/17 15:30	Solid	ICP 7300	02/10/17	02/14/17 13:21	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	683	1.00	10.0	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-8-U	17-02-0769-14-A	02/07/17 16:30	Solid	ICP 7300	02/10/17	02/14/17 11:36	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	0.700	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	3.94	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.184	0.100	1.00	
Chromium	1.78	0.100	1.00	
Cobalt	0.865	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	33.1	0.100	1.00	
Molybdenum	0.626	0.100	1.00	
Nickel	4.23	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.211	0.100	1.00	
Zinc	464	0.100	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-7-M	17-02-0769-15-A	02/07/17 15:30	Solid	ICP 7300	02/10/17	02/14/17 11:37	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Antimony	0.682	0.150	1.00	
Arsenic	0.247	0.150	1.00	
Barium	6.10	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	2.00	0.100	1.00	
Cobalt	0.745	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	27.2	0.100	1.00	
Molybdenum	0.725	0.100	1.00	
Nickel	3.90	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	0.942	0.100	1.00	

SSP-4-7-M	17-02-0769-15-A	02/07/17 15:30	Solid	ICP 7300	02/10/17	02/14/17 13:22	170213LA11
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	582	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-8-M	17-02-0769-16-A	02/07/17 16:30	Solid	ICP 7300	02/10/17	02/14/17 11:38	170213LA11

Comment(s): - The analysis was performed on a STLC extract of the sample.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Antimony	1.02	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	6.01	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	0.413	0.100	1.00	
Chromium	1.89	0.100	1.00	
Cobalt	0.698	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	35.6	0.100	1.00	
Molybdenum	0.555	0.100	1.00	
Nickel	3.28	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	1.13	0.100	1.00	
Zinc	435	0.100	1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-05-006-8927	N/A	Aqueous	ICP 7300	02/10/17	02/14/17 11:14	170213LA11

Parameter	Result	RL	DF	Qualifiers
Antimony	ND	0.150	1.00	
Arsenic	ND	0.150	1.00	
Barium	ND	0.100	1.00	
Beryllium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	ND	0.100	1.00	
Cobalt	ND	0.100	1.00	
Copper	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Molybdenum	ND	0.100	1.00	
Nickel	ND	0.100	1.00	
Selenium	ND	0.150	1.00	
Silver	ND	0.0500	1.00	
Thallium	ND	0.150	1.00	
Vanadium	ND	0.100	1.00	
Zinc	ND	0.100	1.00	


  
Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: T22.11.5. All  
 Method: EPA 7470A  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-1-U	17-02-0769-1-A	02/07/17 09:00	Solid	Mercury 07	02/10/17	02/17/17 11:54	170216LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4M-2-U	17-02-0769-2-A	02/07/17 10:00	Solid	Mercury 07	02/10/17	02/17/17 12:01	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4M-3-U	17-02-0769-3-A	02/07/17 11:00	Solid	Mercury 07	02/10/17	02/17/17 12:03	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4-1-M	17-02-0769-4-A	02/07/17 09:00	Solid	Mercury 07	02/10/17	02/17/17 12:06	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4-2-M	17-02-0769-5-A	02/07/17 10:00	Solid	Mercury 07	02/10/17	02/17/17 12:08	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4-3-M	17-02-0769-6-A	02/07/17 11:00	Solid	Mercury 07	02/10/17	02/17/17 12:10	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 7470A  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-4-U	17-02-0769-7-A	02/07/17 12:30	Solid	Mercury 07	02/10/17	02/17/17 12:17	170216LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4M-5-U	17-02-0769-8-A	02/07/17 13:30	Solid	Mercury 07	02/10/17	02/17/17 12:19	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4M-6-U	17-02-0769-9-A	02/07/17 14:30	Solid	Mercury 07	02/10/17	02/17/17 12:21	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4-4-M	17-02-0769-10-A	02/07/17 12:30	Solid	Mercury 07	02/10/17	02/17/17 12:24	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4-5-M	17-02-0769-11-A	02/07/17 13:30	Solid	Mercury 07	02/10/17	02/17/17 12:26	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

SSP-4-6-M	17-02-0769-12-A	02/07/17 14:30	Solid	Mercury 07	02/10/17	02/17/17 12:28	170216LA3
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 7470A  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-7-U	17-02-0769-13-A	02/07/17 15:30	Solid	Mercury 07	02/10/17	02/17/17 12:31	170216LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-8-U	17-02-0769-14-A	02/07/17 16:30	Solid	Mercury 07	02/10/17	02/17/17 12:33	170216LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-7-M	17-02-0769-15-A	02/07/17 15:30	Solid	Mercury 07	02/10/17	02/17/17 12:37	170216LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-8-M	17-02-0769-16-A	02/07/17 16:30	Solid	Mercury 07	02/10/17	02/17/17 12:40	170216LA3

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-04-004-850	N/A	Aqueous	Mercury 07	02/10/17	02/17/17 11:50	170216LA3

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.00500	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 7471A Total  
Method: EPA 7471A  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4M-1-U	17-02-0769-1-A	02/07/17 09:00	Solid	Mercury 07	02/15/17	02/15/17 16:46	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		2.20		0.806		10.0	
SSP-4M-2-U	17-02-0769-2-A	02/07/17 10:00	Solid	Mercury 07	02/15/17	02/15/17 13:16	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.71		0.0820		1.00	
SSP-4M-3-U	17-02-0769-3-A	02/07/17 11:00	Solid	Mercury 07	02/15/17	02/15/17 13:19	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.03		0.0806		1.00	
SSP-4-1-M	17-02-0769-4-A	02/07/17 09:00	Solid	Mercury 07	02/15/17	02/16/17 11:38	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		6.14		0.806		10.0	
SSP-4-2-M	17-02-0769-5-A	02/07/17 10:00	Solid	Mercury 07	02/15/17	02/15/17 13:23	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		0.658		0.0847		1.00	
SSP-4-3-M	17-02-0769-6-A	02/07/17 11:00	Solid	Mercury 07	02/15/17	02/15/17 16:53	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		3.00		0.806		10.0	
SSP-4M-4-U	17-02-0769-7-A	02/07/17 12:30	Solid	Mercury 07	02/15/17	02/15/17 13:33	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		0.162		0.0806		1.00	
SSP-4M-5-U	17-02-0769-8-A	02/07/17 13:30	Solid	Mercury 07	02/15/17	02/15/17 13:35	170215L01
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.73		0.0820		1.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 7471A Total  
Method: EPA 7471A  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4M-6-U</b>	<b>17-02-0769-9-A</b>	<b>02/07/17 14:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:37</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.45		0.0794		1.00	
<b>SSP-4-4-M</b>	<b>17-02-0769-10-A</b>	<b>02/07/17 12:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:39</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.28		0.0806		1.00	
<b>SSP-4-5-M</b>	<b>17-02-0769-11-A</b>	<b>02/07/17 13:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:42</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.16		0.0794		1.00	
<b>SSP-4-6-M</b>	<b>17-02-0769-12-A</b>	<b>02/07/17 14:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:44</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		0.586		0.0806		1.00	
<b>SSP-4M-7-U</b>	<b>17-02-0769-13-A</b>	<b>02/07/17 15:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:47</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.25		0.0794		1.00	
<b>SSP-4M-8-U</b>	<b>17-02-0769-14-A</b>	<b>02/07/17 16:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:49</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		0.186		0.0806		1.00	
<b>SSP-4-7-M</b>	<b>17-02-0769-15-A</b>	<b>02/07/17 15:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:51</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		0.929		0.0820		1.00	
<b>SSP-4-8-M</b>	<b>17-02-0769-16-A</b>	<b>02/07/17 16:30</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:58</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Result</u>		<u>RL</u>		<u>DF</u>	<u>Qualifiers</u>
Mercury		1.38		0.0806		1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 7471A Total  
 Method: EPA 7471A  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>099-16-272-2831</b>	<b>N/A</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:05</b>	<b>170215L01</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0833	1.00	



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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3545  
Method: EPA 8082  
Units: ug/kg

Project: ISRI MSR Treatability Study / 0102.001.004

Page 1 of 5

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-1-M	17-02-0769-4-A	02/07/17 09:00	Solid	GC 58	02/20/17	02/21/17 12:03	170220L05

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	1000	5.00	
Aroclor-1221	ND	1000	5.00	
Aroclor-1232	ND	1000	5.00	
Aroclor-1242	11000	1000	5.00	
Aroclor-1248	ND	1000	5.00	
Aroclor-1254	ND	1000	5.00	
Aroclor-1260	ND	1000	5.00	
Aroclor-1262	ND	1000	5.00	
Aroclor-1268	ND	1000	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	132	24-168	
2,4,5,6-Tetrachloro-m-Xylene	83	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-M	17-02-0769-5-A	02/07/17 10:00	Solid	GC 58	02/20/17	02/21/17 12:21	170220L05

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	1000	5.00	
Aroclor-1221	ND	1000	5.00	
Aroclor-1232	ND	1000	5.00	
Aroclor-1242	4000	1000	5.00	
Aroclor-1248	ND	1000	5.00	
Aroclor-1254	ND	1000	5.00	
Aroclor-1260	ND	1000	5.00	
Aroclor-1262	ND	1000	5.00	
Aroclor-1268	ND	1000	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	96	24-168	
2,4,5,6-Tetrachloro-m-Xylene	78	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3545  
 Method: EPA 8082  
 Units: ug/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-M	17-02-0769-6-A	02/07/17 11:00	Solid	GC 58	02/20/17	02/21/17 12:39	170220L05

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	1000	5.00	
Aroclor-1221	ND	1000	5.00	
Aroclor-1232	ND	1000	5.00	
Aroclor-1242	9600	1000	5.00	
Aroclor-1248	ND	1000	5.00	
Aroclor-1254	ND	1000	5.00	
Aroclor-1260	ND	1000	5.00	
Aroclor-1262	ND	1000	5.00	
Aroclor-1268	ND	1000	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	144	24-168	
2,4,5,6-Tetrachloro-m-Xylene	67	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-4-M	17-02-0769-10-A	02/07/17 12:30	Solid	GC 58	02/20/17	02/21/17 12:57	170220L05

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	1000	5.00	
Aroclor-1221	ND	1000	5.00	
Aroclor-1232	ND	1000	5.00	
Aroclor-1242	12000	1000	5.00	
Aroclor-1248	ND	1000	5.00	
Aroclor-1254	ND	1000	5.00	
Aroclor-1260	ND	1000	5.00	
Aroclor-1262	ND	1000	5.00	
Aroclor-1268	ND	1000	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	158	24-168	
2,4,5,6-Tetrachloro-m-Xylene	74	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3545  
Method: EPA 8082  
Units: ug/kg

Project: ISRI MSR Treatability Study / 0102.001.004

Page 3 of 5

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-5-M	17-02-0769-11-A	02/07/17 13:30	Solid	GC 58	02/20/17	02/21/17 13:15	170220L05

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	1000	5.00	
Aroclor-1221	ND	1000	5.00	
Aroclor-1232	ND	1000	5.00	
Aroclor-1242	11000	1000	5.00	
Aroclor-1248	ND	1000	5.00	
Aroclor-1254	ND	1000	5.00	
Aroclor-1260	ND	1000	5.00	
Aroclor-1262	ND	1000	5.00	
Aroclor-1268	ND	1000	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	165	24-168	
2,4,5,6-Tetrachloro-m-Xylene	68	25-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-6-M	17-02-0769-12-A	02/07/17 14:30	Solid	GC 58	02/20/17	02/21/17 13:33	170220L05

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	1000	5.00	
Aroclor-1221	ND	1000	5.00	
Aroclor-1232	ND	1000	5.00	
Aroclor-1242	5300	1000	5.00	
Aroclor-1248	ND	1000	5.00	
Aroclor-1254	ND	1000	5.00	
Aroclor-1260	ND	1000	5.00	
Aroclor-1262	ND	1000	5.00	
Aroclor-1268	ND	1000	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	257	24-168	1,2,7
2,4,5,6-Tetrachloro-m-Xylene	78	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.





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## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3545  
Method: EPA 8082  
Units: ug/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-7-M	17-02-0769-15-A	02/07/17 15:30	Solid	GC 58	02/20/17	02/21/17 15:02	170220L05

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	4000	20.0	
Aroclor-1221	ND	4000	20.0	
Aroclor-1232	ND	4000	20.0	
Aroclor-1242	7100	4000	20.0	
Aroclor-1248	ND	4000	20.0	
Aroclor-1254	ND	4000	20.0	
Aroclor-1260	ND	4000	20.0	
Aroclor-1262	ND	4000	20.0	
Aroclor-1268	28000	4000	20.0	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	626	24-168	1,2,7
2,4,5,6-Tetrachloro-m-Xylene	76	25-145	

SSP-4-8-M	17-02-0769-16-A	02/07/17 16:30	Solid	GC 58	02/20/17	02/21/17 14:09	170220L05
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Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	1000	5.00	
Aroclor-1221	ND	1000	5.00	
Aroclor-1232	ND	1000	5.00	
Aroclor-1242	11000	1000	5.00	
Aroclor-1248	ND	1000	5.00	
Aroclor-1254	ND	1000	5.00	
Aroclor-1260	ND	1000	5.00	
Aroclor-1262	ND	1000	5.00	
Aroclor-1268	ND	1000	5.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	111	24-168	
2,4,5,6-Tetrachloro-m-Xylene	72	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3545  
Method: EPA 8082  
Units: ug/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>099-15-959-129</b>	<b>N/A</b>	<b>Solid</b>	<b>GC 58</b>	<b>02/20/17</b>	<b>02/21/17 10:51</b>	<b>170220L05</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
Decachlorobiphenyl	92	24-168	
2,4,5,6-Tetrachloro-m-Xylene	79	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



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## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
<b>SSP-4M-1-U</b>	<b>Sample</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/14/17 12:09</b>	<b>170213S02</b>				
<b>SSP-4M-1-U</b>	<b>Matrix Spike</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/14/17 12:11</b>	<b>170213S02</b>				
<b>SSP-4M-1-U</b>	<b>Matrix Spike Duplicate</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/14/17 12:12</b>	<b>170213S02</b>				
<u>Parameter</u>	<u>Sample Conc.</u>	<u>Spike Added</u>	<u>MS Conc.</u>	<u>MS %Rec.</u>	<u>MSD Conc.</u>	<u>MSD %Rec.</u>	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Antimony	14.65	25.00	45.62	124	32.72	72	50-115	33	0-20	3,4
Arsenic	ND	25.00	29.01	116	27.17	109	75-125	7	0-20	
Barium	655.5	25.00	1236	4X	680.9	4X	75-125	4X	0-20	Q
Beryllium	ND	25.00	23.24	93	23.85	95	75-125	3	0-20	
Cadmium	13.32	25.00	39.33	104	45.15	127	75-125	14	0-20	3
Chromium	62.73	25.00	101.7	156	138.7	304	75-125	31	0-20	3,4
Cobalt	21.88	25.00	53.01	125	57.91	144	75-125	9	0-20	3
Copper	3348	25.00	1315	4X	946.7	4X	75-125	4X	0-20	Q
Lead	608.0	25.00	856.2	4X	726.9	4X	75-125	4X	0-20	Q
Molybdenum	18.17	25.00	55.60	150	50.44	129	75-125	10	0-20	3
Nickel	124.4	25.00	179.2	4X	220.8	4X	75-125	4X	0-20	Q
Selenium	ND	25.00	19.72	79	18.74	75	75-125	5	0-20	
Silver	4.333	12.50	14.41	81	19.82	124	75-125	32	0-20	4
Thallium	ND	25.00	19.20	77	21.22	85	75-125	10	0-20	
Vanadium	7.762	25.00	30.55	91	31.28	94	75-125	2	0-20	
Zinc	11290	25.00	11200	4X	10470	4X	75-125	4X	0-20	Q

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
SSP-4M-1-U	Sample	Solid	ICP 7300	02/10/17	02/14/17 11:18	170213SA11				
SSP-4M-1-U	Matrix Spike	Solid	ICP 7300	02/10/17	02/14/17 11:19	170213SA11				
SSP-4M-1-U	Matrix Spike Duplicate	Solid	ICP 7300	02/10/17	02/14/17 11:20	170213SA11				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Antimony	0.4764	5.000	5.356	98	5.447	99	50-115	2	0-20	
Arsenic	ND	5.000	5.149	103	5.210	104	75-125	1	0-20	
Barium	3.834	5.000	9.330	110	7.967	83	75-125	16	0-20	
Beryllium	ND	5.000	5.047	101	5.001	100	75-125	1	0-20	
Cadmium	0.5066	5.000	5.453	99	5.391	98	75-125	1	0-20	
Chromium	2.269	5.000	7.618	107	7.374	102	75-125	3	0-20	
Cobalt	0.8388	5.000	5.944	102	5.879	101	75-125	1	0-20	
Copper	0.1576	5.000	5.259	102	5.216	101	75-125	1	0-20	
Lead	21.88	5.000	29.52	4X	27.51	4X	75-125	4X	0-20	Q
Molybdenum	0.6059	5.000	5.652	101	5.602	100	75-125	1	0-20	
Nickel	3.803	5.000	9.177	107	8.679	98	75-125	6	0-20	
Selenium	ND	5.000	5.138	103	5.049	101	75-125	2	0-20	
Silver	ND	2.500	2.389	96	1.906	76	75-125	22	0-20	4
Thallium	ND	5.000	4.557	91	4.608	92	75-125	1	0-20	
Vanadium	0.1948	5.000	5.155	99	5.118	98	75-125	1	0-20	
Zinc	572.5	5.000	584.0	4X	536.9	4X	75-125	4X	0-20	Q

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



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## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 7470A

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
SSP-4M-1-U	Sample	Solid	Mercury 07	02/10/17	02/17/17 11:54	170216SA3
SSP-4M-1-U	Matrix Spike	Solid	Mercury 07	02/10/17	02/17/17 11:57	170216SA3
SSP-4M-1-U	Matrix Spike Duplicate	Solid	Mercury 07	02/10/17	02/17/17 11:59	170216SA3

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	ND	0.05000	0.04365	87	0.03612	72	55-133	19	0-20	


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RPD: Relative Percent Difference. CL: Control Limits



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## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 7471A Total  
Method: EPA 7471A

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
SSP-4M-1-U	Sample	Solid	Mercury 07	02/15/17	02/15/17 16:46	170215S01				
SSP-4M-1-U	Matrix Spike	Solid	Mercury 07	02/15/17	02/15/17 16:48	170215S01				
SSP-4M-1-U	Matrix Spike Duplicate	Solid	Mercury 07	02/15/17	02/15/17 16:50	170215S01				
Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	2.203	0.8350	3.564	163	3.813	193	71-137	7	0-14	3

  
Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3545  
Method: EPA 8082

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number				
<b>SSP-4-1-M</b>	<b>Sample</b>	<b>Solid</b>	<b>GC 58</b>	<b>02/20/17</b>	<b>02/21/17 12:03</b>	<b>170220S05</b>				
<b>SSP-4-1-M</b>	<b>Matrix Spike</b>	<b>Solid</b>	<b>GC 58</b>	<b>02/20/17</b>	<b>02/21/17 11:27</b>	<b>170220S05</b>				
<b>SSP-4-1-M</b>	<b>Matrix Spike Duplicate</b>	<b>Solid</b>	<b>GC 58</b>	<b>02/20/17</b>	<b>02/21/17 11:45</b>	<b>170220S05</b>				
<u>Parameter</u>	<u>Sample Conc.</u>	<u>Spike Added</u>	<u>MS Conc.</u>	<u>MS %Rec.</u>	<u>MSD Conc.</u>	<u>MSD %Rec.</u>	<u>%Rec. CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Aroclor-1016	ND	100.0	8703	8703	8805	8805	50-135	1	0-20	3
Aroclor-1260	ND	100.0	828.3	828	768.9	769	50-135	7	0-25	3

  
Return to Contents

RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Sample Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: N/A  
Method: ASTM D-2216 (M)

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
SSP-4-1-M	Sample	Solid	N/A	02/13/17 00:00	02/13/17 20:00	H0213MOID2
SSP-4-1-M	Sample Duplicate	Solid	N/A	02/13/17 00:00	02/13/17 20:00	H0213MOID2

<u>Parameter</u>	<u>Sample Conc.</u>	<u>DUP Conc.</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Moisture	51.40	49.00	5	0-10	

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RPD: Relative Percent Difference. CL: Control Limits



## Quality Control - LCS

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/09/17  
 Work Order: 17-02-0769  
 Preparation: EPA 3050B  
 Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

Page 1 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
<b>097-01-002-24335</b>	<b>LCS</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/14/17 10:16</b>	<b>170213L02</b>	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Antimony		25.00	23.14	93	80-120	73-127	
Arsenic		25.00	22.66	91	80-120	73-127	
Barium		25.00	24.91	100	80-120	73-127	
Beryllium		25.00	23.89	96	80-120	73-127	
Cadmium		25.00	23.79	95	80-120	73-127	
Chromium		25.00	24.74	99	80-120	73-127	
Cobalt		25.00	25.21	101	80-120	73-127	
Copper		25.00	24.53	98	80-120	73-127	
Lead		25.00	24.30	97	80-120	73-127	
Molybdenum		25.00	23.85	95	80-120	73-127	
Nickel		25.00	25.04	100	80-120	73-127	
Selenium		25.00	22.59	90	80-120	73-127	
Silver		12.50	11.67	93	80-120	73-127	
Thallium		25.00	24.40	98	80-120	73-127	
Vanadium		25.00	23.64	95	80-120	73-127	
Zinc		25.00	24.06	96	80-120	73-127	

Total number of LCS compounds: 16

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass

Return to Contents

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number	
<b>097-05-006-8927</b>	<b>LCS</b>	<b>Aqueous</b>	<b>ICP 7300</b>	<b>02/10/17</b>	<b>02/14/17 11:15</b>	<b>170213LA11</b>	
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>ME CL</u>	<u>Qualifiers</u>
Antimony		5.000	4.973	99	80-120	73-127	
Arsenic		5.000	4.985	100	80-120	73-127	
Barium		5.000	5.141	103	80-120	73-127	
Beryllium		5.000	5.062	101	80-120	73-127	
Cadmium		5.000	5.068	101	80-120	73-127	
Chromium		5.000	5.076	102	80-120	73-127	
Cobalt		5.000	5.194	104	80-120	73-127	
Copper		5.000	5.078	102	80-120	73-127	
Lead		5.000	4.992	100	80-120	73-127	
Molybdenum		5.000	5.120	102	80-120	73-127	
Nickel		5.000	5.014	100	80-120	73-127	
Selenium		5.000	5.062	101	80-120	73-127	
Silver		2.500	2.430	97	80-120	73-127	
Thallium		5.000	4.878	98	80-120	73-127	
Vanadium		5.000	5.015	100	80-120	73-127	
Zinc		5.000	5.289	106	80-120	73-127	

Total number of LCS compounds: 16

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass

Return to Contents

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: T22.11.5. All  
Method: EPA 7470A

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>099-04-004-850</b>	<b>LCS</b>	<b>Aqueous</b>	<b>Mercury 07</b>	<b>02/10/17</b>	<b>02/17/17 11:52</b>	<b>170216LA3</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury		0.05000	0.05015	100	80-120	

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 7471A Total  
Method: EPA 7471A

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>099-16-272-2831</b>	<b>LCS</b>	<b>Solid</b>	<b>Mercury 07</b>	<b>02/15/17</b>	<b>02/15/17 13:07</b>	<b>170215L01</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Mercury		0.8350	0.8106	97	85-121	

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/09/17  
Work Order: 17-02-0769  
Preparation: EPA 3545  
Method: EPA 8082

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>099-15-959-129</b>	<b>LCS</b>	<b>Solid</b>	<b>GC 58</b>	<b>02/20/17</b>	<b>02/21/17 11:09</b>	<b>170220L05</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Aroclor-1016		100.0	86.00	86	50-135	
Aroclor-1260		100.0	92.00	92	50-135	

## Sample Analysis Summary Report

Work Order: 17-02-0769

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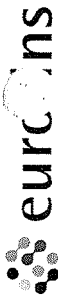
<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
ASTM D-2216 (M)	N/A	1050	N/A	1
CA Fish and Game	N/A	691	TANK	1
EPA 6010B	EPA 3050B	935	ICP 7300	1
EPA 6010B	T22.11.5. All	935	ICP 7300	1
EPA 7470A	T22.11.5. All	868	Mercury 07	1
EPA 7471A	EPA 7471A Total	868	Mercury 07	1
EPA 8082	EPA 3545	944	GC 58	1

## Glossary of Terms and Qualifiers

Work Order: 17-02-0769

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<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.



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# CHAIN OF CUSTODY CORD

DATE: 2/7/17

PAGE: 1 OF 3

LAB USE ONLY  
**17-02-0769**

CLIENT PROJECT NAME / NUMBER:

P.O. NO.:

ISRI MSR Treatability Study / 0102.001.00

PROJECT CONTACT:

Emily Mosen: 510-779-7179 emily.mosen@terraphase.com

SAMPLER(S): (PRINT)

Matt Hoffman  
Hugo Ortega

LABORATORY CLIENT: Terraphase Engineering

ADDRESS: 1404 Franklin Street, Suite 600

CITY: Oakland STATE: CA ZIP: 94612

TEL: 510-645-1850 E-MAIL: emily.mosen@terraphase.com

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS:

LAB USE ONLY	SAMPLE ID	SAMPLING		NO. OF CONT.	LOG CODE:		
		DATE	TIME		Matrix	Unpreserved	Preserved
1	SSP-4M-1-U	2/7/17	0900	1	X		
2	SSP-4M-2-U	2/7/17	1000	1	X		
3	SSP-4M-3-U	2/7/17	1100	1	X		
4	SSP-4-1-M	2/7/17	0900	1	X		
5	SSP-4-2-M	2/7/17	1000	1	X		
6	SSP-4-3-M	2/7/17	1100	1	X		

## REQUESTED ANALYSES

Please check box or fill in blank as needed.

WET - Title 22 Metals (EPA 6010/7471)	Moisture content by ASTM D2216	PCBs (EPA 8082)	96-Hour Aquatic Toxicity
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X

Relinquished by: (Signature) <i>Matt Hoffman</i>	Date: 2/8/17	Time: 1:00 PM
Relinquished by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date: 2/9/17	Time: 1020







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CHAIN OF CUSTODY CORD

NO # / LAB USE ONLY  
 17-02-0769

DATE: 2/7/17  
 PAGE: 3 OF 3

LABORATORY CLIENT: Terraphase Engineering  
 ADDRESS: 1404 Franklin Street, Suite 600  
 CITY: Oakland STATE: CA ZIP: 94612  
 TEL: 510-645-1850 E-MAIL: emily.mosen@terrphase.com

CLIENT PROJECT NAME / NUMBER: ISRI MSR Treatability Study / 0102.001.00  
 PROJECT CONTACT: Emily Mosen: 510-779-7179 emily.mosen@terrphase.com

P.O. NO.:  
 SAMPLER(S) (PRINT): Matt Hoffman  
 Hugo Ortiz

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):  
 SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

COELT EDF GLOBAL ID: LOG CODE:

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING		NO. OF CONT.	MATRIX	LOG CODE:			Title 22 Metals (EPA 6010/7471)	WET - Title 22 Metals (EPA 6010/7471)	Moisture content by ASTM D2216	PCBs (EPA 8082)	96-Hour Aquatic Toxicity
		DATE	TIME			Unpreserved	Preserved	Field Filtered					
13	SSP-4M-7-U	2/7/17	1530	1	Solid	X			X	X	X	X	X
14	SSP-4M-8-U	2/7/17	1630	1	Solid	X			X	X	X	X	X
15	SSP-4-7-M	2/7/17	1530	1	Solid	X			X	X	X	X	X
16	SSP-4-8-M	2/7/17	1630	1	Solid	X			X	X	X	X	X

Relinquished by: (Signature) *Matt Hoffman* Date: 2/8/17 Time: 1:00 PM  
 Received by: (Signature/Affiliation) Peter (Tracking # 778382051455)

Relinquished by: (Signature) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Received by: (Signature/Affiliation) \_\_\_\_\_

Relinquished by: (Signature) \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Received by: (Signature/Affiliation) *Matt Hoffman* Date: 2/9/17 Time: 1020



0769

ORIGIN ID: JEMA (510) 779-7179  
EMILY MOSEN  
TERRAPHASE ENGINEERING  
1404 FRANKLIN ST  
STE 600  
OAKLAND, CA 94612  
UNITED STATES US

SHIP DATE: 08FEB17  
ACTWGT: 20.00 LB  
CAD: 102392669/INET3850

BILL SENDER

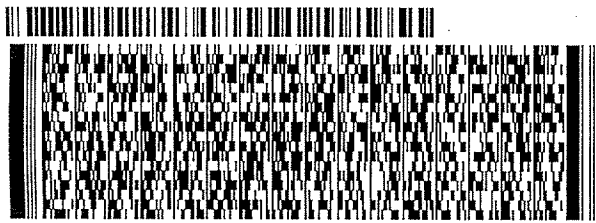
TO DONALD BURLEY  
EUROFINS CALSCIENCE  
7440 LINCOLN WAY

GARDEN GROVE CA 92841

(714) 895-5494 REF: 0102.001.004  
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1 of 3

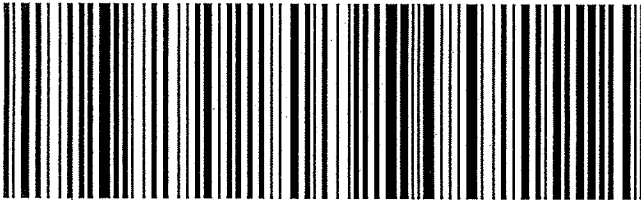
THU - 09 FEB 3:00P  
STANDARD OVERNIGHT

TRK# 7783 8205 1716  
0201

## MASTER ##

92 APVA

92841  
CA-US SNA



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2/8/2017

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THU - 09 FEB  
STANDARD OVE

MPS# 7783 8205 1955  
0263

Mstr# 7783 8205 1716

0201

92 APVA

CA-US



FedEx

2 of 3

THU - 09 FEB 3:00P  
STANDARD OVERNIGHT

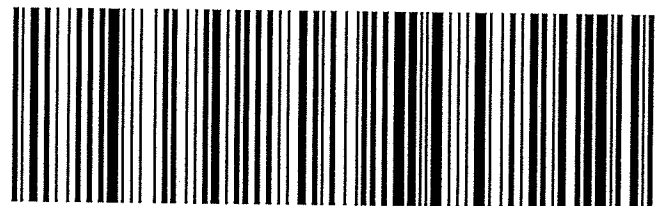
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0263

Mstr# 7783 8205 1716

0201

92 APVA

92841  
CA-US SNA



SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 3

CLIENT: Terraplast

DATE: 02/09/2017

TEMPERATURE: (Criteria: 0.0°C - 6.0°C, not frozen except sediment/tissue)
Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 4.1 °C (w/ CF): 4.1 °C; [ ] Blank [x] Sample
[ ] Sample(s) outside temperature criteria (PM/APM contacted by: \_\_\_\_\_)
[ ] Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling
[ ] Sample(s) received at ambient temperature; placed on ice for transport by courier
Ambient Temperature: [ ] Air [ ] Filter
Checked by: LS

CUSTODY SEAL:
Cooler [ ] Present and Intact [ ] Present but Not Intact [x] Not Present [ ] N/A
Sample(s) [ ] Present and Intact [ ] Present but Not Intact [x] Not Present [ ] N/A
Checked by: LS
Checked by: 1053

SAMPLE CONDITION:
Chain-of-Custody (COC) document(s) received with samples [x] Yes [ ] No [ ] N/A
COC document(s) received complete [x] Yes [ ] No [ ] N/A
[ ] Sampling date [ ] Sampling time [ ] Matrix [ ] Number of containers
[ ] No analysis requested [ ] Not relinquished [ ] No relinquished date [ ] No relinquished time
Sampler's name indicated on COC [x] Yes [ ] No [ ] N/A
Sample container label(s) consistent with COC [x] Yes [ ] No [ ] N/A
Sample container(s) intact and in good condition [x] Yes [ ] No [ ] N/A
Proper containers for analyses requested [x] Yes [ ] No [ ] N/A
Sufficient volume/mass for analyses requested [x] Yes [ ] No [ ] N/A
Samples received within holding time [x] Yes [ ] No [ ] N/A
Aqueous samples for certain analyses received within 15-minute holding time
[ ] pH [ ] Residual Chlorine [ ] Dissolved Sulfide [ ] Dissolved Oxygen [ ] N/A
Proper preservation chemical(s) noted on COC and/or sample container [ ] Yes [ ] No [x] N/A
Unpreserved aqueous sample(s) received for certain analyses
[ ] Volatile Organics [ ] Total Metals [ ] Dissolved Metals
Container(s) for certain analysis free of headspace [ ] Yes [ ] No [x] N/A
[ ] Volatile Organics [ ] Dissolved Gases (RSK-175) [ ] Dissolved Oxygen (SM 4500)
[ ] Carbon Dioxide (SM 4500) [ ] Ferrous Iron (SM 3500) [ ] Hydrogen Sulfide (Hach)
Tedlar™ bag(s) free of condensation [ ] Yes [ ] No [x] N/A

CONTAINER TYPE: (Trip Blank Lot Number: \_\_\_\_\_)
Aqueous: [ ] VOA [ ] VOA h [ ] VOAna2 [ ] 100PJ [ ] 100PJna2 [ ] 125AGB [ ] 125AGBh [ ] 125AGBp [ ] 125PB
[ ] 125PBz nna [ ] 250AGB [ ] 250CGB [ ] 250CGBs [ ] 250PB [ ] 250PBn [ ] 500AGB [ ] 500AGJ [ ] 500AGJs
[ ] 500PB [ ] 1AGB [ ] 1AGBna2 [ ] 1AGBs [ ] 1PB [ ] 1PBna [ ] \_\_\_\_\_ [ ] \_\_\_\_\_ [ ] \_\_\_\_\_ [ ] \_\_\_\_\_
Solid: [ ] 4ozCGJ [ ] 8ozCGJ [ ] 16ozCGJ [ ] Sleeve (\_\_\_\_\_) [ ] EnCores® (\_\_\_\_\_) [ ] TerraCores® (\_\_\_\_\_) [x] 1.5 PJ
Air: [ ] Tedlar™ [ ] Canister [ ] Sorbent Tube [ ] PUF [ ] \_\_\_\_\_ Other Matrix (\_\_\_\_): [ ] \_\_\_\_\_ [ ] \_\_\_\_\_
Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag
Preservative: b = buffered, f = filtered, h = HCl, n = HNO3, na = NaOH, na2 = Na2S2O3, p = H3PO4, Labeled/Checked by: 1053
s = H2SO4, u = ultra-pure, x = Na2SO3+NaHSO4.H2O, z nna = Zn (CH3CO2)2 + NaOH Reviewed by: 681.



Calscience

WORK ORDER NUMBER: 17-02-0769

SAMPLE RECEIPT CHECKLIST

COOLER 2 OF 3

CLIENT: Terraphase

DATE: 02/09/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 4.9 °C (w/ CF): 4.9 °C;  Blank  Sample

Sample(s) outside temperature criteria (PM/APM contacted by: \_\_\_\_\_)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature:  Air  Filter

Checked by: LS

CUSTODY SEAL:

Cooler  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: LS

Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 1053

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples .....  Yes  No  N/A

COC document(s) received complete .....  Yes  No  N/A

Sampling date  Sampling time  Matrix  Number of containers

No analysis requested  Not relinquished  No relinquished date  No relinquished time

Sampler's name indicated on COC .....  Yes  No  N/A

Sample container label(s) consistent with COC .....  Yes  No  N/A

Sample container(s) intact and in good condition .....  Yes  No  N/A

Proper containers for analyses requested .....  Yes  No  N/A

Sufficient volume/mass for analyses requested .....  Yes  No  N/A

Samples received within holding time .....  Yes  No  N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH  Residual Chlorine  Dissolved Sulfide  Dissolved Oxygen .....  Yes  No  N/A

Proper preservation chemical(s) noted on COC and/or sample container .....  Yes  No  N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics  Total Metals  Dissolved Metals

Container(s) for certain analysis free of headspace .....  Yes  No  N/A

Volatile Organics  Dissolved Gases (RSK-175)  Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500)  Ferrous Iron (SM 3500)  Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation .....  Yes  No  N/A

CONTAINER TYPE:

(Trip Blank Lot Number: \_\_\_\_\_)

Aqueous:  VOA  VOA<sub>h</sub>  VOA<sub>na2</sub>  100PJ  100PJ<sub>na2</sub>  125AGB  125AGB<sub>h</sub>  125AGB<sub>p</sub>  125PB

125PB<sub>z<sub>na</sub></sub>  250AGB  250CGB  250CGB<sub>s</sub>  250PB  250PB<sub>n</sub>  500AGB  500AGJ  500AGJ<sub>s</sub>

500PB  1AGB  1AGB<sub>na2</sub>  1AGB<sub>s</sub>  1PB  1PB<sub>na</sub>  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

Solid:  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1.5 PJ

Air:  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ Other Matrix (\_\_\_\_\_)  \_\_\_\_\_  \_\_\_\_\_

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO<sub>3</sub>, na = NaOH, na<sub>2</sub> = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, p = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 1053

s = H<sub>2</sub>SO<sub>4</sub>, u = ultra-pure, x = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, z<sub>na</sub> = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH

Reviewed by: 681

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SAMPLE RECEIPT CHECKLIST

COOLER 3 OF 3

CLIENT: Terraphase

DATE: 02/09/2017

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 5.0 °C (w/ CF): 5.0 °C;  Blank  Sample

Sample(s) outside temperature criteria (PM/APM contacted by: \_\_\_\_\_)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature:  Air  Filter

Checked by: LS

CUSTODY SEAL:

Cooler  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: LS

Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: 1053

SAMPLE CONDITION:

Chain-of-Custody (COC) document(s) received with samples .....  Yes  No  N/A

COC document(s) received complete .....  Yes  No  N/A

Sampling date  Sampling time  Matrix  Number of containers

No analysis requested  Not relinquished  No relinquished date  No relinquished time

Sampler's name indicated on COC .....  Yes  No  N/A

Sample container label(s) consistent with COC .....  Yes  No  N/A

Sample container(s) intact and in good condition .....  Yes  No  N/A

Proper containers for analyses requested .....  Yes  No  N/A

Sufficient volume/mass for analyses requested .....  Yes  No  N/A

Samples received within holding time .....  Yes  No  N/A

Aqueous samples for certain analyses received within 15-minute holding time

pH  Residual Chlorine  Dissolved Sulfide  Dissolved Oxygen .....  Yes  No  N/A

Proper preservation chemical(s) noted on COC and/or sample container .....  Yes  No  N/A

Unpreserved aqueous sample(s) received for certain analyses

Volatile Organics  Total Metals  Dissolved Metals

Container(s) for certain analysis free of headspace .....  Yes  No  N/A

Volatile Organics  Dissolved Gases (RSK-175)  Dissolved Oxygen (SM 4500)

Carbon Dioxide (SM 4500)  Ferrous Iron (SM 3500)  Hydrogen Sulfide (Hach)

Tedlar™ bag(s) free of condensation .....  Yes  No  N/A

CONTAINER TYPE:

(Trip Blank Lot Number: \_\_\_\_\_)

Aqueous:  VOA  VOAh  VOAna<sub>2</sub>  100PJ  100PJna<sub>2</sub>  125AGB  125AGBh  125AGBp  125PB

125PBz<sub>na</sub>  250AGB  250CGB  250CGBs  250PB  250PBn  500AGB  500AGJ  500AGJs

500PB  1AGB  1AGBna<sub>2</sub>  1AGBs  1PB  1PBna  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

Solid:  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1.5 PS

Air:  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ Other Matrix (\_\_\_\_):  \_\_\_\_\_  \_\_\_\_\_

Container: A = Amber, B = Bottle, C = Clear, E = Envelope, G = Glass, J = Jar, P = Plastic, and Z = Ziploc/Resealable Bag

Preservative: b = buffered, f = filtered, h = HCl, n = HNO<sub>3</sub>, na = NaOH, na<sub>2</sub> = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, p = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 1053

s = H<sub>2</sub>SO<sub>4</sub>, u = ultra-pure, x = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, z<sub>na</sub> = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 681



## Donald Burley

---

**From:** Emily Mosen <emily.mosen@terrphase.com>  
**Sent:** Friday, February 10, 2017 10:08 AM  
**To:** Donald Burley  
**Subject:** RE: ISRI MSR Treatability Study / 0102.001.00 - 17-02-0769 - Sample Receipt Confirmation & COC Document

Don,

I noticed an error on the COC. The PCBs and aquatic toxicity should have only been requested for the samples with ID's ending in "-M". (They should not have been requested for samples ending in "-U".)

Thanks,  
 Emily

---

**From:** Emily Mosen  
**Sent:** Friday, February 10, 2017 9:55 AM  
**To:** Donald Burley <[DonaldBurley@eurofinsUS.com](mailto:DonaldBurley@eurofinsUS.com)>  
**Subject:** RE: ISRI MSR Treatability Study / 0102.001.00 - 17-02-0769 - Sample Receipt Confirmation & COC Document

Hi Don,  
 Thank you for asking. I would like a 4 at the end of the project number.

Thanks,  
 Emily

---

**From:** Donald Burley [<mailto:DonaldBurley@eurofinsUS.com>]  
**Sent:** Thursday, February 09, 2017 4:02 PM  
**To:** Emily Mosen <[emily.mosen@terrphase.com](mailto:emily.mosen@terrphase.com)>  
**Subject:** ISRI MSR Treatability Study / 0102.001.00 - 17-02-0769 - Sample Receipt Confirmation & COC Document

Emily,

Do you want a number at the end of the project number extension or leave at .00? Thank you.

Don

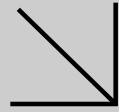
Eurofins Calscience, Inc.  
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Email: [DonaldBurley@eurofinsUS.com](mailto:DonaldBurley@eurofinsUS.com)  
 Website: [www.eurofinsUS.com/Calscience](http://www.eurofinsUS.com/Calscience)

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Calscience



**WORK ORDER NUMBER: 17-02-0911**

*The difference is service*



AIR | SOIL | WATER | MARINE CHEMISTRY

### Analytical Report For

**Client:** Terraphase Engineering, Inc.

**Client Project Name:** ISRI MSR Treatability Study / 0102.001.004

**Attention:** Emily Mosen  
1404 Franklin Street  
Suite 600  
Oakland, CA 94612-3215

Approved for release on 02/22/2017 by:  
Don Burley  
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience, Inc. (Calscience) certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.



# Contents

Client Project Name: ISRI MSR Treatability Study / 0102.001.004

Work Order Number: 17-02-0911

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**Condition Upon Receipt:**

Samples were received under Chain-of-Custody (COC) on 02/10/17. They were assigned to Work Order 17-02-0911.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

**Holding Times:**

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of  $\leq 15$  minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

**Quality Control:**

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

**Subcontractor Information:**

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

**Additional Comments:**

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

## Sample Summary

Client: Terraphase Engineering, Inc. 1404 Franklin Street, Suite 600 Oakland, CA 94612-3215	Work Order: 17-02-0911 Project Name: ISRI MSR Treatability Study / 0102.001.004 PO Number: Date/Time Received: 02/10/17 10:20 Number of Containers: 16
---	--

Attn: Emily Mosen

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
SSP-4H-1-U	17-02-0911-1	02/08/17 07:30	1	Solid
SSP-4H-2-U	17-02-0911-2	02/08/17 08:30	1	Solid
SSP-4H-3-U	17-02-0911-3	02/08/17 09:30	1	Solid
SSP-4H-4-U	17-02-0911-4	02/08/17 10:30	1	Solid
SSP-4-1-H	17-02-0911-5	02/08/17 07:30	1	Solid
SSP-4-2-H	17-02-0911-6	02/08/17 08:30	1	Solid
SSP-4-3-H	17-02-0911-7	02/08/17 09:30	1	Solid
SSP-4-4-H	17-02-0911-8	02/08/17 10:30	1	Solid
SSP-4H-5-U	17-02-0911-9	02/08/17 11:30	1	Solid
SSP-4H-6-U	17-02-0911-10	02/08/17 12:30	1	Solid
SSP-4H-7-U	17-02-0911-11	02/08/17 13:30	1	Solid
SSP-4H-8-U	17-02-0911-12	02/08/17 14:30	1	Solid
SSP-4-5-H	17-02-0911-13	02/08/17 11:30	1	Solid
SSP-4-6-H	17-02-0911-14	02/08/17 12:30	1	Solid
SSP-4-7-H	17-02-0911-15	02/08/17 13:30	1	Solid
SSP-4-8-H	17-02-0911-16	02/08/17 14:30	1	Solid

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-1-U	17-02-0911-1-A	02/08/17 07:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		35	0.10		1.00		
SSP-4H-2-U	17-02-0911-2-A	02/08/17 08:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		37	0.10		1.00		
SSP-4H-3-U	17-02-0911-3-A	02/08/17 09:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		31	0.10		1.00		
SSP-4H-4-U	17-02-0911-4-A	02/08/17 10:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
SSP-4-1-H	17-02-0911-5-A	02/08/17 07:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		46	0.10		1.00		
SSP-4-2-H	17-02-0911-6-A	02/08/17 08:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		40	0.10		1.00		
SSP-4-3-H	17-02-0911-7-A	02/08/17 09:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		45	0.10		1.00		
SSP-4-4-H	17-02-0911-8-A	02/08/17 10:30	Solid	N/A	02/18/17	02/18/17 18:00	H0218MOIB2
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		4.4	0.10		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: N/A  
Method: ASTM D-2216 (M)  
Units: %

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>SSP-4H-5-U</b>	<b>17-02-0911-9-A</b>	<b>02/08/17 11:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		30	0.10		1.00		
<b>SSP-4H-6-U</b>	<b>17-02-0911-10-A</b>	<b>02/08/17 12:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		41	0.10		1.00		
<b>SSP-4H-7-U</b>	<b>17-02-0911-11-A</b>	<b>02/08/17 13:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		31	0.10		1.00		
<b>SSP-4H-8-U</b>	<b>17-02-0911-12-A</b>	<b>02/08/17 14:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		31	0.10		1.00		
<b>SSP-4-5-H</b>	<b>17-02-0911-13-A</b>	<b>02/08/17 11:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		32	0.10		1.00		
<b>SSP-4-6-H</b>	<b>17-02-0911-14-A</b>	<b>02/08/17 12:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		41	0.10		1.00		
<b>SSP-4-7-H</b>	<b>17-02-0911-15-A</b>	<b>02/08/17 13:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		39	0.10		1.00		
<b>SSP-4-8-H</b>	<b>17-02-0911-16-A</b>	<b>02/08/17 14:30</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		44	0.10		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.	Date Received:	02/10/17
1404 Franklin Street, Suite 600	Work Order:	17-02-0911
Oakland, CA 94612-3215	Preparation:	N/A
	Method:	ASTM D-2216 (M)
	Units:	%

Project: ISRI MSR Treatability Study / 0102.001.004

Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>099-05-014-6693</b>	<b>N/A</b>	<b>Solid</b>	<b>N/A</b>	<b>02/18/17</b>	<b>02/18/17 18:00</b>	<b>H0218MOIB2</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Moisture	ND	0.10	1.00	

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/10/17  
 Work Order: 17-02-0911  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

Page 1 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-1-U	17-02-0911-1-A	02/08/17 07:30	Solid	ICP 7300	02/13/17	02/14/17 11:47	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	17.8	5.05	10.1	
Lead	993	5.05	10.1	
Zinc	9790	10.1	10.1	

SSP-4H-2-U	17-02-0911-2-A	02/08/17 08:30	Solid	ICP 7300	02/13/17	02/14/17 11:50	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	11.0	5.00	10.0	
Lead	784	5.00	10.0	
Zinc	9190	10.0	10.0	

SSP-4H-3-U	17-02-0911-3-A	02/08/17 09:30	Solid	ICP 7300	02/13/17	02/14/17 11:51	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	10.4	4.81	9.62	
Lead	656	4.81	9.62	
Zinc	8410	9.62	9.62	

SSP-4H-4-U	17-02-0911-4-A	02/08/17 10:30	Solid	ICP 7300	02/13/17	02/14/17 11:52	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	5.10	10.2	
Lead	214	5.10	10.2	
Zinc	3070	10.2	10.2	

SSP-4-1-H	17-02-0911-5-A	02/08/17 07:30	Solid	ICP 7300	02/13/17	02/14/17 11:52	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	9.79	4.83	9.66	
Lead	789	4.83	9.66	
Zinc	11300	9.66	9.66	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/10/17  
 Work Order: 17-02-0911  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-H	17-02-0911-6-A	02/08/17 08:30	Solid	ICP 7300	02/13/17	02/14/17 11:53	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	7.17	4.83	9.66	
Lead	606	4.83	9.66	
Zinc	6950	9.66	9.66	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-H	17-02-0911-7-A	02/08/17 09:30	Solid	ICP 7300	02/13/17	02/14/17 11:54	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	8.27	4.83	9.66	
Lead	647	4.83	9.66	
Zinc	7410	9.66	9.66	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-4-H	17-02-0911-8-A	02/08/17 10:30	Solid	ICP 7300	02/13/17	02/14/17 11:59	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	12.2	4.90	9.80	
Lead	832	4.90	9.80	
Zinc	10100	9.80	9.80	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-5-U	17-02-0911-9-A	02/08/17 11:30	Solid	ICP 7300	02/13/17	02/14/17 11:59	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	10.3	5.15	10.3	
Lead	775	5.15	10.3	
Zinc	7980	10.3	10.3	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-6-U	17-02-0911-10-A	02/08/17 12:30	Solid	ICP 7300	02/13/17	02/14/17 12:00	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	5.05	10.1	
Lead	1070	5.05	10.1	
Zinc	5160	10.1	10.1	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/10/17  
 Work Order: 17-02-0911  
 Preparation: EPA 3050B  
 Method: EPA 6010B  
 Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-7-U	17-02-0911-11-A	02/08/17 13:30	Solid	ICP 7300	02/13/17	02/14/17 12:01	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	8.49	5.05	10.1	
Lead	8810	5.05	10.1	
Zinc	10100	10.1	10.1	

SSP-4H-8-U	17-02-0911-12-A	02/08/17 14:30	Solid	ICP 7300	02/13/17	02/14/17 12:02	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	9.05	4.88	9.76	
Lead	1630	4.88	9.76	
Zinc	8110	9.76	9.76	

SSP-4-5-H	17-02-0911-13-A	02/08/17 11:30	Solid	ICP 7300	02/13/17	02/14/17 12:03	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	6.05	4.85	9.71	
Lead	471	4.85	9.71	
Zinc	4780	9.71	9.71	

SSP-4-6-H	17-02-0911-14-A	02/08/17 12:30	Solid	ICP 7300	02/13/17	02/14/17 12:04	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	13.3	4.78	9.57	
Lead	928	4.78	9.57	
Zinc	7740	9.57	9.57	

SSP-4-7-H	17-02-0911-15-A	02/08/17 13:30	Solid	ICP 7300	02/13/17	02/14/17 12:07	170213L03
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Comment(s): - The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	4.83	9.66	
Lead	185	4.83	9.66	
Zinc	2280	9.66	9.66	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: EPA 3050B  
Method: EPA 6010B  
Units: mg/kg

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-8-H	17-02-0911-16-A	02/08/17 14:30	Solid	ICP 7300	02/13/17	02/14/17 12:08	170213L03

Comment(s): - The reporting limit is elevated resulting from matrix interference.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	12.0	4.93	9.85	
Lead	707	4.93	9.85	
Zinc	6920	9.85	9.85	

Method Blank	097-01-002-24334	N/A	Solid	ICP 7300	02/13/17	02/14/17 10:17	170213L03
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	0.483	0.966	
Lead	ND	0.483	0.966	
Zinc	ND	0.966	0.966	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/10/17  
 Work Order: 17-02-0911  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-1-U	17-02-0911-1-A	02/08/17 07:30	Solid	ICP 7300	02/13/17	02/16/17 15:57	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.465	0.100	1.00	
Lead	38.4	0.100	1.00	

SSP-4H-1-U	17-02-0911-1-A	02/08/17 07:30	Solid	ICP 7300	02/13/17	02/16/17 16:44	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	559	1.00	10.0	

SSP-4H-2-U	17-02-0911-2-A	02/08/17 08:30	Solid	ICP 7300	02/13/17	02/16/17 16:00	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.217	0.100	1.00	
Lead	40.1	0.100	1.00	

SSP-4H-2-U	17-02-0911-2-A	02/08/17 08:30	Solid	ICP 7300	02/13/17	02/16/17 16:45	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	603	1.00	10.0	

SSP-4H-3-U	17-02-0911-3-A	02/08/17 09:30	Solid	ICP 7300	02/13/17	02/16/17 16:01	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.443	0.100	1.00	
Lead	37.9	0.100	1.00	
Zinc	451	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/10/17  
 Work Order: 17-02-0911  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-4-U	17-02-0911-4-A	02/08/17 10:30	Solid	ICP 7300	02/13/17	02/16/17 16:01	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	32.9	0.100	1.00	
Zinc	456	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-1-H	17-02-0911-5-A	02/08/17 07:30	Solid	ICP 7300	02/13/17	02/16/17 16:02	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.481	0.100	1.00	
Lead	15.6	0.100	1.00	
Zinc	328	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-2-H	17-02-0911-6-A	02/08/17 08:30	Solid	ICP 7300	02/13/17	02/16/17 16:03	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	0.463	0.100	1.00	
Zinc	22.1	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-H	17-02-0911-7-A	02/08/17 09:30	Solid	ICP 7300	02/13/17	02/16/17 16:04	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.484	0.100	1.00	
Lead	27.1	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-3-H	17-02-0911-7-A	02/08/17 09:30	Solid	ICP 7300	02/13/17	02/16/17 16:46	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	691	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/10/17  
 Work Order: 17-02-0911  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-4-H	17-02-0911-8-A	02/08/17 12:30	Solid	ICP 7300	02/13/17	02/16/17 16:05	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	ND	0.100	1.00	
Lead	1.03	0.100	1.00	
Zinc	134	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-5-U	17-02-0911-9-A	02/08/17 11:30	Solid	ICP 7300	02/13/17	02/16/17 16:06	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.446	0.100	1.00	
Lead	46.4	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-5-U	17-02-0911-9-A	02/08/17 11:30	Solid	ICP 7300	02/13/17	02/16/17 16:47	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	582	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-6-U	17-02-0911-10-A	02/08/17 12:30	Solid	ICP 7300	02/13/17	02/16/17 16:07	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.701	0.100	1.00	
Lead	53.2	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-6-U	17-02-0911-10-A	02/08/17 12:30	Solid	ICP 7300	02/13/17	02/16/17 16:48	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	672	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Calscience

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-7-U	17-02-0911-11-A	02/08/17 13:30	Solid	ICP 7300	02/13/17	02/16/17 16:08	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.519	0.100	1.00	
Lead	45.6	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-7-U	17-02-0911-11-A	02/08/17 13:30	Solid	ICP 7300	02/13/17	02/16/17 16:49	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	881	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-8-U	17-02-0911-12-A	02/08/17 14:30	Solid	ICP 7300	02/13/17	02/16/17 16:12	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.425	0.100	1.00	
Lead	40.5	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4H-8-U	17-02-0911-12-A	02/08/17 14:30	Solid	ICP 7300	02/13/17	02/16/17 16:50	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	623	1.00	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-5-H	17-02-0911-13-A	02/08/17 11:30	Solid	ICP 7300	02/13/17	02/16/17 16:13	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.483	0.100	1.00	
Lead	85.3	0.100	1.00	
Zinc	461	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
 1404 Franklin Street, Suite 600  
 Oakland, CA 94612-3215

Date Received: 02/10/17  
 Work Order: 17-02-0911  
 Preparation: T22.11.5. All  
 Method: EPA 6010B  
 Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
SSP-4-6-H	17-02-0911-14-A	02/08/17 12:30	Solid	ICP 7300	02/13/17	02/16/17 16:14	170216LA7

Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.796	0.100	1.00	
Lead	39.4	0.100	1.00	

SSP-4-6-H	17-02-0911-14-A	02/08/17 12:30	Solid	ICP 7300	02/13/17	02/16/17 16:52	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	598	1.00	10.0	

SSP-4-7-H	17-02-0911-15-A	02/08/17 13:30	Solid	ICP 7300	02/13/17	02/16/17 16:15	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.509	0.100	1.00	
Lead	26.5	0.100	1.00	

SSP-4-7-H	17-02-0911-15-A	02/08/17 13:30	Solid	ICP 7300	02/13/17	02/16/17 16:53	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	523	1.00	10.0	

SSP-4-8-H	17-02-0911-16-A	02/08/17 14:30	Solid	ICP 7300	02/13/17	02/16/17 16:16	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Cadmium	0.449	0.100	1.00	
Lead	17.8	0.100	1.00	

SSP-4-8-H	17-02-0911-16-A	02/08/17 14:30	Solid	ICP 7300	02/13/17	02/16/17 16:54	170216LA7
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Comment(s): - The analysis was performed on a STLC extract of the sample.

Parameter	Result	RL	DF	Qualifiers
Zinc	504	1.00	10.0	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

## Analytical Report

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: T22.11.5. All  
Method: EPA 6010B  
Units: mg/L

Project: ISRI MSR Treatability Study / 0102.001.004

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
<b>Method Blank</b>	<b>097-05-006-8933</b>	<b>N/A</b>	<b>Aqueous</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/16/17 15:52</b>	<b>170216LA7</b>

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Cadmium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Zinc	ND	0.100	1.00	





Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
SSP-4H-1-U	Sample	Solid	ICP 7300	02/13/17	02/14/17 11:47	170213S03
SSP-4H-1-U	Matrix Spike	Solid	ICP 7300	02/13/17	02/14/17 11:48	170213S03
SSP-4H-1-U	Matrix Spike Duplicate	Solid	ICP 7300	02/13/17	02/14/17 11:49	170213S03

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	17.76	25.00	42.06	97	32.90	61	75-125	24	0-20	3,4
Lead	992.9	25.00	659.9	4X	558.8	4X	75-125	4X	0-20	Q
Zinc	9786	25.00	8375	4X	5756	4X	75-125	4X	0-20	Q

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RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Spike/Spike Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
17-02-1356-1	Sample	Aqueous	ICP 7300	02/16/17	02/16/17 15:54	170216SA7
17-02-1356-1	Matrix Spike	Aqueous	ICP 7300	02/16/17	02/17/17 17:04	170216SA7
17-02-1356-1	Matrix Spike Duplicate	Aqueous	ICP 7300	02/16/17	02/17/17 17:05	170216SA7

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Cadmium	ND	5.000	5.271	105	4.748	95	75-125	10	0-20	
Lead	ND	5.000	5.236	105	4.744	95	75-125	10	0-20	
Zinc	ND	5.000	5.472	109	4.929	99	75-125	10	0-20	


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RPD: Relative Percent Difference. CL: Control Limits



Calscience

## Quality Control - Sample Duplicate

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: N/A  
Method: ASTM D-2216 (M)

Project: ISRI MSR Treatability Study / 0102.001.004

Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
17-02-1459-1	Sample	Solid	N/A	02/18/17 00:00	02/18/17 18:00	H0218MOID2
17-02-1459-1	Sample Duplicate	Solid	N/A	02/18/17 00:00	02/18/17 18:00	H0218MOID2

<u>Parameter</u>	<u>Sample Conc.</u>	<u>DUP Conc.</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Moisture	75.80	76.00	0	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: EPA 3050B  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-01-002-24334</b>	<b>LCS</b>	<b>Solid</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/14/17 10:18</b>	<b>170213L03</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		25.00	24.43	98	80-120	
Lead		25.00	24.93	100	80-120	
Zinc		25.00	24.47	98	80-120	

## Quality Control - LCS

Terraphase Engineering, Inc.  
1404 Franklin Street, Suite 600  
Oakland, CA 94612-3215

Date Received: 02/10/17  
Work Order: 17-02-0911  
Preparation: T22.11.5. All  
Method: EPA 6010B

Project: ISRI MSR Treatability Study / 0102.001.004

Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
<b>097-05-006-8933</b>	<b>LCS</b>	<b>Aqueous</b>	<b>ICP 7300</b>	<b>02/13/17</b>	<b>02/16/17 15:53</b>	<b>170216LA7</b>
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Cadmium		5.000	5.156	103	80-120	
Lead		5.000	5.110	102	80-120	
Zinc		5.000	5.440	109	80-120	

## Sample Analysis Summary Report

Work Order: 17-02-0911

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<u>Method</u>	<u>Extraction</u>	<u>Chemist ID</u>	<u>Instrument</u>	<u>Analytical Location</u>
ASTM D-2216 (M)	N/A	1050	N/A	1
EPA 6010B	EPA 3050B	935	ICP 7300	1
EPA 6010B	T22.11.5. All	935	ICP 7300	1

## Glossary of Terms and Qualifiers

Work Order: 17-02-0911

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<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

WO # / LAB USE ONLY

**17-02-0911**

DATE: 2/8/17

PAGE: 1 OF 2

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494  
 For courier service / sample drop off information, contact us26\_sales@eurofinsus.com or call us.

LABORATORY CLIENT:

Terraphase Engineering

ADDRESS: 1404 Franklin Street, Suite 600  
 CITY: Oakland STATE: CA ZIP: 94612

TEL: 510-645-1850 E-MAIL: emily.mosen@terrapphase.com

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):

SAME DAY  24 HR  48 HR  72 HR  5 DAYS  STANDARD

GLOBAL ID:

LOG CODE:

SPECIAL INSTRUCTIONS:

CLIENT PROJECT NAME / NUMBER:

ISRI MSR Treatability Study / 0102.001.004

PROJECT CONTACT:

Emily Mosen: 510-779-7179 emily.mosen@terrapphase.com

P.O. NO.:

SAMPLER(S) (PRINT):

Matt Hoffman  
 Hugo Ortega

**REQUESTED ANALYSES**

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING		MATRIX	NO. OF CONT.	LOG CODE:			Cd, Pb, Zn (EPA 6010)	WET Cd, Pb, Zn (EPA 6010 & CCR T22.11.5.A-II)	Moisture content by ASTM D2216
		DATE	TIME			Unpreserved	Preserved	Field Filtered			
1	SSP-4H-1-V	2/8/17	0730	Solid	1	X			X	X	X
2	SSP-4H-2-V	2/8/17	0830	Solid	1	X			X	X	X
3	SSP-4H-3-V	2/8/17	0930	Solid	1	X			X	X	X
4	SSP-4H-4-V	2/8/17	1030	Solid	1	X			X	X	X
5	SSP-4-1-H	2/8/17	0730	Solid	1	X			X	X	X
6	SSP-4-2-H	2/8/17	0830	Solid	1	X			X	X	X
7	SSP-4-3-H	2/8/17	0930	Solid	1	X			X	X	X
8	SSP-4-4-H	2/8/17	1030	Solid	1	X			X	X	X

Relinquished by (Signature): *Emily Mosen*

Relinquished by (Signature): *AA Pats*

Relinquished by (Signature):

Received by: (Signature/Affiliation): Fedex (Tracking #7783 9235 4703)

Received by: (Signature/Affiliation):

Received by: (Signature/Affiliation):

Date: 2/9/17 Time: 1:00 PM

Date: 2/10/17 Time: 1020

Date:





0911

JEMA (510) 779-7179  
SEN  
ENGINEERING  
KLIN ST

SHIP DATE: 09FEB17  
ACTWGT: 10.00 LB  
CAD: 102392669/INET3850

ORIGIN ID: JEMA (510) 779-7179  
EMILY MOSEN  
TERRAPHASE ENGINEERING  
1404 FRANKLIN ST  
STE 600  
OAKLAND, CA 94612  
UNITED STATES US

SHIP DATE: 09FEB17  
ACTWGT: 10.00 LB  
CAD: 102392669/INET3850

CA 94612  
ATES US

BILL SENDER

BILL SENDER

ALD BURLEY  
OFINS CALSCIENCE  
LINCOLN WAY

TO DONALD BURLEY  
EUROFINS CALSCIENCE  
7440 LINCOLN WAY

GARDEN GROVE CA 92841

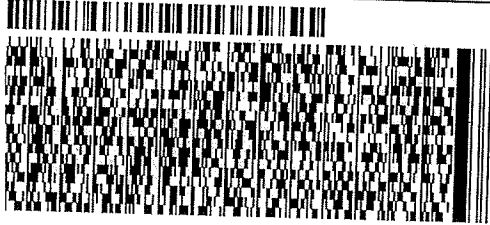
GARDEN GROVE CA 92841

194 REF: 0102.001.004

(714) 895-5494 REF: 0102.001.004

DEPT:

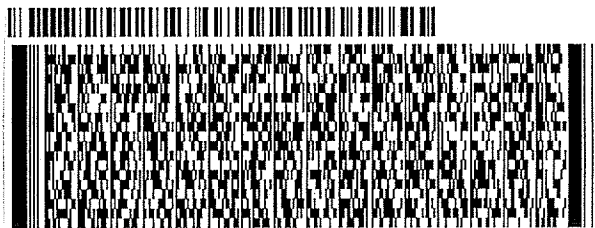
DEPT:



FedEx Express



JT701701081HW



FedEx Express



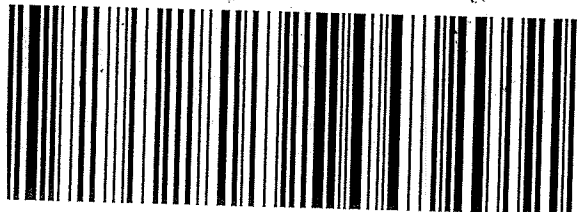
JT701701081HW

1 of 2  
83 9235 4298  
SER #

FRI - 10 FEB 3:00P  
STANDARD OVERNIGHT

APVA

92841  
CA-US SNA



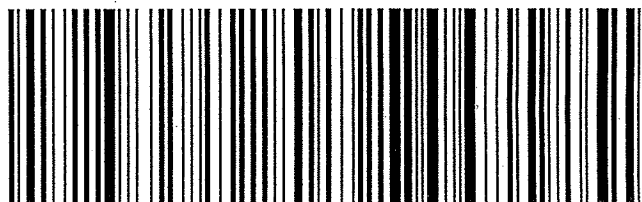
2 of 2

MPS# 7783 9235 4703  
0263  
Mstr# 7783 9235 4298

FRI - 10 FEB 3:00P  
STANDARD OVERNIGHT

92 APVA

92841  
CA-US SNA



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After printing this label:

SAMPLE RECEIPT CHECKLIST

COOLER 0 OF 0

CLIENT: Terraplast

DATE: 02/10/2017

**TEMPERATURE:** (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 21.1 °C (w/ CF): 21.1 °C;  Blank  Sample

Sample(s) outside temperature criteria (PM/APM contacted by: IS)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature:  Air  Filter

Checked by: IS

**CUSTODY SEAL:**

Cooler  Present and Intact  Present but Not Intact  Not Present  N/A

Sample(s)  Present and Intact  Present but Not Intact  Not Present  N/A

Checked by: IS

Checked by: 876

*1 of 2 Box*

**SAMPLE CONDITION:**

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Container(s) for certain analysis free of headspace .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**CONTAINER TYPE:** (Trip Blank Lot Number: \_\_\_\_\_)

**Aqueous:**  VOA  VOAh  VOAna<sub>2</sub>  100PJ  100PJna<sub>2</sub>  125AGB  125AGBh  125AGBp  125PB

125PBz<sub>na</sub>  250AGB  250CGB  250CGBs  250PB  250PBn  500AGB  500AGJ  500AGJs

500PB  1AGB  1AGBna<sub>2</sub>  1AGBs  1PB  1PBna  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

**Solid:**  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1.5 PJ

**Air:**  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ **Other Matrix** (\_\_\_\_\_)  \_\_\_\_\_  \_\_\_\_\_

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO<sub>3</sub>, **na** = NaOH, **na<sub>2</sub>** = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, **p** = H<sub>3</sub>PO<sub>4</sub>, **s** = H<sub>2</sub>SO<sub>4</sub>, **u** = ultra-pure, **x** = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, **z<sub>na</sub>** = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH

Labeled/Checked by: 876

Reviewed by: 681

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**SAMPLE RECEIPT CHECKLIST**

COOLER 0 OF 0

CLIENT: Terraphase

DATE: 02/10/2017

**TEMPERATURE:** (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)  
 Thermometer ID: SC3B (CF: 0.0°C); Temperature (w/o CF): 20.0 °C (w/ CF): 20.0 °C;  Blank  Sample  
 Sample(s) outside temperature criteria (PM/APM contacted by: IS)  
 Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling  
 Sample(s) received at ambient temperature; placed on ice for transport by courier  
 Ambient Temperature:  Air  Filter Checked by: IS

**CUSTODY SEAL:**

Cooler	<input type="checkbox"/> Present and Intact	<input type="checkbox"/> Present but Not Intact	<input checked="" type="checkbox"/> Not Present	<input type="checkbox"/> N/A	Checked by: <u>IS</u>
Sample(s)	<input type="checkbox"/> Present and Intact	<input type="checkbox"/> Present but Not Intact	<input checked="" type="checkbox"/> Not Present	<input type="checkbox"/> N/A	Checked by: <u>826</u>

<b>SAMPLE CONDITION:</b>	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers <input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Container(s) for certain analysis free of headspace .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500) <input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation .....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**CONTAINER TYPE:** (Trip Blank Lot Number: \_\_\_\_\_)

**Aqueous:**  VOA  VOA<sub>h</sub>  VOA<sub>na2</sub>  100PJ  100PJ<sub>na2</sub>  125AGB  125AGB<sub>h</sub>  125AGB<sub>p</sub>  125PB  
 125PB<sub>z</sub>  250AGB  250CGB  250CGB<sub>s</sub>  250PB  250PB<sub>n</sub>  500AGB  500AGJ  500AGJ<sub>s</sub>  
 500PB  1AGB  1AGB<sub>na2</sub>  1AGB<sub>s</sub>  1PB  1PB<sub>na</sub>  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_

**Solid:**  4ozCGJ  8ozCGJ  16ozCGJ  Sleeve (\_\_\_\_\_)  EnCores® (\_\_\_\_\_)  TerraCores® (\_\_\_\_\_)  1-5 RJ

**Air:**  Tedlar™  Canister  Sorbent Tube  PUF  \_\_\_\_\_ **Other Matrix** (\_\_\_\_\_)  \_\_\_\_\_  \_\_\_\_\_

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag  
 Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO<sub>3</sub>, **na** = NaOH, **na<sub>2</sub>** = Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, **p** = H<sub>3</sub>PO<sub>4</sub>, Labeled/Checked by: 826  
**s** = H<sub>2</sub>SO<sub>4</sub>, **u** = ultra-pure, **x** = Na<sub>2</sub>SO<sub>3</sub>+NaHSO<sub>4</sub>.H<sub>2</sub>O, **z** = Zn (CH<sub>3</sub>CO<sub>2</sub>)<sub>2</sub> + NaOH Reviewed by: 681

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**APPENDIX B-III**  
**PILOT STUDY**  
**DATA VALIDATION REPORTS**

---



## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-0548
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/6/2016-7/7/2016	<b>Number of Samples:</b> 4
<b>Data Validation Report Date:</b> 8/1/2016	<b>Analytical Report Date:</b> 7/25/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	√	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 3.0 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batches 160720S02 and 160713SA1, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
Sara-1M-U	16-07-0548-1	solid	07/06/16
Sara-1-M	16-07-0548-2	solid	07/06/16

Sara-1H-U	16-07-0548-3	solid	07/07/16
Sara-1-H	16-07-0548-4	solid	07/07/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-1233
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/18/2016	<b>Number of Samples:</b> 2
<b>Data Validation Report Date:</b> 8/23/2016	<b>Analytical Report Date:</b> 8/2/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. No relinquish time was recorded on the COC.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For zinc in batch 160727S02, the matrix spike recovery compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-2-H	16-07-1233-1	solid	07/18/16
SARA-2H-U	16-07-1233-2	solid	07/18/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-1234
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/15/2016	<b>Number of Samples:</b> 2
<b>Data Validation Report Date:</b> 8/23/2016	<b>Analytical Report Date:</b> 8/2/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. No relinquish date or time was recorded on the COC.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For zinc in batch 160727S02, the matrix spike recovery compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SART-1H-U	16-07-1234-1	solid	07/15/16
SART-1-H	16-07-1234-2	solid	07/15/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-1725 (08-09-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/18/2016-7/20/2016	<b>Number of Samples:</b> 6
<b>Data Validation Report Date:</b> 9/7/2016	<b>Analytical Report Date:</b> 8/9/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	√
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 29.9 and 28.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

All percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-1H-U	16-07-1725-1	solid	07/18/16
SSP-1-H	16-07-1725-2	solid	07/18/16
SSP-1M-U	16-07-1725-3	solid	07/19/16
SSP-1-M	16-07-1725-4	solid	07/19/16
SSP-1L-U	16-07-1725-5	solid	07/20/16

SSP-1-L	16-07-1725-6	Solid	07/20/16
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***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-1726
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/19/2016 – 7/22/16	<b>Number of Samples:</b> 8
<b>Data Validation Report Date:</b> 8/23/2016	<b>Analytical Report Date:</b> 8/9/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. No relinquish date or time was recorded on the COC.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 29.4 and 28.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For zinc in batch 160804S04, the matrix spike recovery compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARB-1H-U	16-07-1726-1	solid	07/20/16
SARB-1-H	16-07-1726-2	solid	07/20/16
SARA-1L-U	16-07-1726-3	solid	07/22/16
SARA-1-L	16-07-1726-4	solid	07/22/16
SARA-2-M	16-07-1726-5	solid	07/19/16
SARA-2M-U	16-07-1726-6	solid	07/19/16
SART-2H-U	16-07-1726-7	solid	07/21/16
SART-2-H	16-07-1726-8	solid	07/21/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-1795
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/25/2016 – 7/26/16	<b>Number of Samples:</b> 4
<b>Data Validation Report Date:</b> 8/23/2016	<b>Analytical Report Date:</b> 8/10/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	√
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. No relinquish time was recorded on the COC.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 29.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

All percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

**SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-3M-U	16-07-1795-1	solid	07/25/16
SARA-3-M	16-07-1795-2	solid	07/25/16
SARA-2L-U	16-07-1795-3	solid	07/26/16
SARA-2-L	16-07-1795-4	solid	07/26/16

*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-1913 (08-11-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/21/16-7/22-16	<b>Number of Samples:</b> 4
<b>Data Validation Report Date:</b> 8/26/2016	<b>Analytical Report Date:</b> 8/11/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	√
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. Sample times listed on the chain of custody for SMM-1H-U and SMM-1-H do not match the sample label. The laboratory was instructed to use the sample times from the labels.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 29.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were received and analyzed after the holding time for moisture had expired.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

All percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SMM-1H-U	16-07-1913-1	solid	7/21/16
SMM-1-H	16-07-1913-2	solid	7/21/16
SMM-1L-U	16-07-1913-3	solid	7/22/16
SMM-1-L	16-07-1913-4	solid	7/22/16

*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-2008 (8-12-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/06/2016 – 7/07/16	<b>Number of Samples:</b> 36
<b>Data Validation Report Date:</b> 8/23/2016	<b>Analytical Report Date:</b> 8/12/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. No relinquish time was recorded on the COC.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.6 and 28.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were received and analyzed after the holding time for moisture had expired.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batches 160808S02, 160808S03, 160803SA6 and 160803SA7 the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batches 160808S02 and 160808S03 recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BV-flagged and BU-flagged the following results as received and analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
Sara-1M-1-U	moisture
Sara-1-1-M	moisture
Sara-1M-2-U	moisture
Sara-1-2-M	moisture
Sara-1M-3-U	moisture
Sara-1-3-M	moisture
Sara-1M-4-U	moisture
Sara-1-4-M	moisture
Sara-1M-5-U	moisture
Sara-1-5-M	moisture
Sara-1M-6-U	moisture
Sara-1-6-M	moisture
Sara-1M-7-U	moisture
Sara-1-7-M	moisture
Sara-1M-8-U	moisture
Sara-1-8-M	moisture
Sara-1M-COMP-U	moisture
Sara-1-COMP-M	moisture
Sara-1H-1-U	moisture
Sara-1-1-H	moisture
Sara-1H-2-U	moisture
Sara-1-2-H	moisture
Sara-1H-3-U	moisture
Sara-1-3-H	moisture
Sara-1H-4-U	moisture
Sara-1-4-H	moisture
Sara-1H-5-U	moisture
Sara-1-5-H	moisture
Sara-1H-6-U	moisture
Sara-1-6-H	moisture
Sara-1H-7-U	moisture
Sara-1-7-H	moisture
Sara-1H-8-U	moisture
Sara-1-8-H	moisture
Sara-1H-COMP-U	moisture
Sara-1-COMP-H	moisture

**SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
Sara-1M-1-U	16-07-2008-1	solid	07/06/16
Sara-1-1-M	16-07-2008-2	solid	07/06/16
Sara-1M-2-U	16-07-2008-3	solid	07/06/16
Sara-1-2-M	16-07-2008-4	solid	07/06/16
Sara-1M-3-U	16-07-2008-5	solid	07/06/16
Sara-1-3-M	16-07-2008-6	solid	07/06/16
Sara-1M-4-U	16-07-2008-7	solid	07/06/16
Sara-1-4-M	16-07-2008-8	solid	07/06/16
Sara-1M-5-U	16-07-2008-9	solid	07/06/16
Sara-1-5-M	16-07-2008-10	solid	07/06/16
Sara-1M-6-U	16-07-2008-11	solid	07/06/16
Sara-1-6-M	16-07-2008-12	solid	07/06/16
Sara-1M-7-U	16-07-2008-13	solid	07/06/16
Sara-1-7-M	16-07-2008-14	solid	07/06/16
Sara-1M-8-U	16-07-2008-15	solid	07/06/16
Sara-1-8-M	16-07-2008-16	solid	07/06/16
Sara-1M-COMP-U	16-07-2008-17	solid	07/06/16
Sara-1-COMP-M	16-07-2008-18	solid	07/06/16
Sara-1H-1-U	16-07-2008-19	solid	07/07/16
Sara-1-1-H	16-07-2008-20	solid	07/07/16
Sara-1H-2-U	16-07-2008-21	solid	07/07/16
Sara-1-2-H	16-07-2008-22	solid	07/07/16
Sara-1H-3-U	16-07-2008-23	solid	07/07/16
Sara-1-3-H	16-07-2008-24	solid	07/07/16
Sara-1H-4-U	16-07-2008-25	solid	07/07/16
Sara-1-4-H	16-07-2008-26	solid	07/07/16
Sara-1H-5-U	16-07-2008-27	solid	07/07/16
Sara-1-5-H	16-07-2008-28	solid	07/07/16
Sara-1H-6-U	16-07-2008-29	solid	07/07/16
Sara-1-6-H	16-07-2008-30	solid	07/07/16
Sara-1H-7-U	16-07-2008-31	solid	07/07/16
Sara-1-7-H	16-07-2008-32	solid	07/07/16
Sara-1H-8-U	16-07-2008-33	solid	07/07/16
Sara-1-8-H	16-07-2008-34	solid	07/07/16
Sara-1H-COMP-U	16-07-2008-35	solid	07/07/16
Sara-1-COMP-H	16-07-2008-36	solid	07/07/16

*END OF REPORT*



## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-07-2008 (11-07-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/6/2016-7/7/2016	<b>Number of Samples:</b> 36
<b>Data Validation Report Date:</b> 12/1/2016	<b>Analytical Report Date:</b> 11/7/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	2
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.6 and 28.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160808S02 and 160808S03 recovery of the Matrix Spike Duplicate (MSD) was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
Sara-1-1-H	cadmium
Sara-1H-2-U	cadmium
Sara-1H-3-U	cadmium
Sara-1H-5-U	cadmium

Sara-1H-6-U	cadmium
Sara-1-6-H	cadmium
Sara-1-7-H	cadmium
Sara-1H-COMP-U	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
Sara-1M-1-U	16-07-2008-1	solid	07/06/16
Sara-1-1-M	16-07-2008-2	solid	07/06/16
Sara-1M-2-U	16-07-2008-3	solid	07/06/16
Sara-1-2-M	16-07-2008-4	solid	07/06/16
Sara-1M-3-U	16-07-2008-5	solid	07/06/16
Sara-1-3-M	16-07-2008-6	solid	07/06/16
Sara-1M-4-U	16-07-2008-7	solid	07/06/16
Sara-1-4-M	16-07-2008-8	solid	07/06/16
Sara-1M-5-U	16-07-2008-9	solid	07/06/16
Sara-1-5-M	16-07-2008-10	solid	07/06/16
Sara-1M-6-U	16-07-2008-11	solid	07/06/16
Sara-1-6-M	16-07-2008-12	solid	07/06/16
Sara-1M-7-U	16-07-2008-13	solid	07/06/16
Sara-1-7-M	16-07-2008-14	solid	07/06/16
Sara-1M-8-U	16-07-2008-15	solid	07/06/16
Sara-1-8-M	16-07-2008-16	solid	07/06/16
Sara-1M-COMP-U	16-07-2008-17	solid	07/06/16
Sara-1-COMP-M	16-07-2008-18	solid	07/06/16
Sara-1H-1-U	16-07-2008-19	solid	07/07/16
Sara-1-1-H	16-07-2008-20	solid	07/07/16
Sara-1H-2-U	16-07-2008-21	solid	07/07/16
Sara-1-2-H	16-07-2008-22	solid	07/07/16
Sara-1H-3-U	16-07-2008-23	solid	07/07/16
Sara-1-3-H	16-07-2008-24	solid	07/07/16
Sara-1H-4-U	16-07-2008-25	solid	07/07/16
Sara-1-4-H	16-07-2008-26	solid	07/07/16
Sara-1H-5-U	16-07-2008-27	solid	07/07/16
Sara-1-5-H	16-07-2008-28	solid	07/07/16
Sara-1H-6-U	16-07-2008-29	solid	07/07/16
Sara-1-6-H	16-07-2008-30	solid	07/07/16
Sara-1H-7-U	16-07-2008-31	solid	07/07/16
Sara-1-7-H	16-07-2008-32	solid	07/07/16
Sara-1H-8-U	16-07-2008-33	solid	07/07/16

Sara-1-8-H	16-07-2008-34	solid	07/07/16
Sara-1H-COMP-U	16-07-2008-35	solid	07/07/16
Sara-1-COMP-H	16-07-2008-36	solid	07/07/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0115 (08-15-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/25/2016-7/27/2016	<b>Number of Samples:</b> 6
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 8/15/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample time for sample -5 was listed as 1510 on the sample jar label and 1535 on COC. All other sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.0 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For zinc in batches 160811S06 and 160804SA2 and lead in batch 160804SA2, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium and lead in batch 160811S06 recovery of the matrix spike or matrix spike duplicate was out of control due to matrix interference. The associated LCS was in control. For cadmium and lead in batch 160811S06 the matrix spike/matrix spike duplicate relative percent difference was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**



No flags were assigned to the analytical results.

### **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-2-H	16-08-0115-1	solid	07/25/16
SSP-2H-U	16-08-0115-2	solid	07/25/16
SSP-2M-U	16-08-0115-3	solid	07/26/16
SSP-2-M	16-08-0115-4	solid	07/26/16
SSP-2L-U	16-08-0115-5	solid	07/27/16
SSP-2-L	16-08-0115-6	solid	07/27/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0116 (11-07-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/27/2016 – 7/29/16	<b>Number of Samples:</b> 6
<b>Data Validation Report Date:</b> 8/24/2016	<b>Analytical Report Date:</b> 8/16/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160804SA2, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-3H-U	16-08-0116-1	solid	7/27/16
SARA-3-H	16-08-0116-2	solid	7/27/16

SARB-2H-U	16-08-0116-3	solid	7/28/16
SARB-2-H	16-08-0116-4	solid	7/28/16
SART-3H-U	16-08-0116-5	solid	7/29/16
SART-3-H	16-08-0116-6	solid	7/29/16

*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0295 (8-18-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/15/16	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 8/24/2016	<b>Analytical Report Date:</b> 8/18/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. No relinquish date or time was recorded on the COC.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were received and analyzed after the holding time for moisture had expired.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc batch 160812S06 the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160812S06 recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BV-flagged and BU-flagged the following results as received and analyzed after holding time expired.



<b>Sample Name</b>	<b>Analyte(s)</b>
SART-1H-1-U	moisture
SART-1-1-H	moisture
SART-1H-2-U	moisture
SART-1-2-H	moisture
SART-1H-3-U	moisture
SART-1-3-H	moisture
SART-1H-4-U	moisture
SART-1-4H	moisture
SART-1H-5-U	moisture
SART-1-5-H	moisture
SART-1H-6-U	moisture
SART-1-6-H	moisture
SART-1H-7-U	moisture
SART-1-7-H	moisture
SART-1H-8-U	moisture
SART-1-8-H	moisture
SART-1H-COMP-U	moisture
SART-1-COMP-U	moisture

## SAMPLE INDEX

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SART-1H-1-U	16-08-0295-1	solid	7/15/16
SART-1-1-H	16-08-0295-2	solid	7/15/16
SART-1H-2-U	16-08-0295-3	solid	7/15/16
SART-1-2-H	16-08-0295-4	solid	7/15/16
SART-1H-3-U	16-08-0295-5	solid	7/15/16
SART-1-3-H	16-08-0295-6	solid	7/15/16
SART-1H-4-U	16-08-0295-7	solid	7/15/16
SART-1-4H	16-08-0295-8	solid	7/15/16
SART-1H-5-U	16-08-0295-9	solid	7/15/16
SART-1-5-H	16-08-0295-10	solid	7/15/16
SART-1H-6-U	16-08-0295-11	solid	7/15/16
SART-1-6-H	16-08-0295-12	solid	7/15/16
SART-1H-7-U	16-08-0295-13	solid	7/15/16
SART-1-7-H	16-08-0295-14	solid	7/15/16
SART-1H-8-U	16-08-0295-15	solid	7/15/16

SART-1-8-H	16-08-0295-16	solid	7/15/16
SART-1H-COMP-U	16-08-0295-17	solid	7/15/16
SART-1-COMP-U	16-08-0295-18	solid	7/15/16

*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0295 (11-08-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/15/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/08/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	2
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package. Sample relinquished time was not included in the COC.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160812S06 recovery of the matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

Sample Name	Analyte(s)
SART-1H-COMP-U	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SART-1H-1-U	16-08-0295-1	solid	7/15/16
SART-1-1-H	16-08-0295-2	solid	7/15/16
SART-1H-2-U	16-08-0295-3	solid	7/15/16
SART-1-2-H	16-08-0295-4	solid	7/15/16
SART-1H-3-U	16-08-0295-5	solid	7/15/16
SART-1-3-H	16-08-0295-6	solid	7/15/16
SART-1H-4-U	16-08-0295-7	solid	7/15/16
SART-1-4H	16-08-0295-8	solid	7/15/16
SART-1H-5-U	16-08-0295-9	solid	7/15/16
SART-1-5-H	16-08-0295-10	solid	7/15/16
SART-1H-6-U	16-08-0295-11	solid	7/15/16
SART-1-6-H	16-08-0295-12	solid	7/15/16
SART-1H-7-U	16-08-0295-13	solid	7/15/16
SART-1-7-H	16-08-0295-14	solid	7/15/16
SART-1H-8-U	16-08-0295-15	solid	7/15/16
SART-1-8-H	16-08-0295-16	solid	7/15/16
SART-1H-COMP-U	16-08-0295-17	solid	7/15/16
SART-1-COMP-U	16-08-0295-18	solid	7/15/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0296 (08-18-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/28/16-7/29/16	<b>Number of Samples:</b> 4
<b>Data Validation Report Date:</b> 8/26/2016	<b>Analytical Report Date:</b> 8/18/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.5 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.



## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For zinc in batch 160812S05, recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SMM-2H-U	16-08-0296-1	solid	7/28/16
SMM-2-H	16-08-0296-2	solid	7/28/16
SMM-2L-U	16-08-0296-3	solid	7/29/16

SMM-2-L	16-08-0296-4	solid	7/29/16
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*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0511 (08-22-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Jennifer Repa	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/3/16-8/4/16	<b>Number of Samples:</b> 4
<b>Data Validation Report Date:</b> 8/26/2016	<b>Analytical Report Date:</b> 8/22/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Laboratory sample -2 was listed as SARA-3-H on the chain of custody and SARA-3-L on the sample jar label. The laboratory was instructed to use SARA-3-L as the sample ID. All other sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.0 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead in batch 160815S02 recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. The MS/MSD RPD was out of control due to suspected matrix interference. For zinc in batch 160815S02 the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results

**SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-3L-U	16-08-0511-1	solid	8/3/16
SARA-3-L	16-08-0511-2	solid	8/3/16
SARB-3H-U	16-08-0511-3	solid	8/4/16
SARB-3-H	16-08-0511-4	solid	8/4/16

*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0609 (08-22-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/2/16-8/3/16	<b>Number of Samples:</b> 4
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 8/22/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	√
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.



## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

All percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SMM-3H-U	16-08-0609-1	solid	8/02/16
SMM-3-H	16-08-0609-2	solid	8/02/16
SMM-3L-U	16-08-0609-3	solid	8/03/16
SMM-3-L	16-08-0609-4	solid	8/03/16



*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0721 (08-24-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/18/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 9/6/2016	<b>Analytical Report Date:</b> 8/24/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 27.2 and 26.4 degrees Celsius. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

All samples were received past holding time for moisture content. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead in batch 160818S07 and zinc in batch 160818S07 and 160813SA1 the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160818S07 recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2H-1-U	Moisture Content
SARA-2-1-H	Moisture Content
SARA-2H-2-U	Moisture Content
SARA-2-2-H	Moisture Content
SARA-2H-3-U	Moisture Content
SARA-2-3-H	Moisture Content
SARA-2H-4-U	Moisture Content
SARA-2-4-H	Moisture Content
SARA-2H-5-U	Moisture Content
SARA-2-5-H	Moisture Content
SARA-2H-6-U	Moisture Content
SARA-2-6-H	Moisture Content
SARA-2H-7-U	Moisture Content
SARA-2-7-H	Moisture Content
SARA-2H-8-U	Moisture Content
SARA-2-8-H	Moisture Content
SARA-2H-COMP-U	Moisture Content
SARA-2-COMP-H	Moisture Content

The laboratory has BV flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2H-1-U	Moisture Content
SARA-2-1-H	Moisture Content
SARA-2H-2-U	Moisture Content
SARA-2-2-H	Moisture Content
SARA-2H-3-U	Moisture Content
SARA-2-3-H	Moisture Content
SARA-2H-4-U	Moisture Content
SARA-2-4-H	Moisture Content
SARA-2H-5-U	Moisture Content
SARA-2-5-H	Moisture Content
SARA-2H-6-U	Moisture Content
SARA-2-6-H	Moisture Content
SARA-2H-7-U	Moisture Content
SARA-2-7-H	Moisture Content
SARA-2H-8-U	Moisture Content
SARA-2-8-H	Moisture Content
SARA-2H-COMP-U	Moisture Content

SARA-2-COMP-H	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-2H-1-U	16-08-0721-1	solid	7/18/16
SARA-2-1-H	16-08-0721-2	solid	7/18/16
SARA-2H-2-U	16-08-0721-3	solid	7/18/16
SARA-2-2-H	16-08-0721-4	solid	7/18/16
SARA-2H-3-U	16-08-0721-5	solid	7/18/16
SARA-2-3-H	16-08-0721-6	solid	7/18/16
SARA-2H-4-U	16-08-0721-7	solid	7/18/16
SARA-2-4-H	16-08-0721-8	solid	7/18/16
SARA-2H-5-U	16-08-0721-9	solid	7/18/16
SARA-2-5-H	16-08-0721-10	solid	7/18/16
SARA-2H-6-U	16-08-0721-11	solid	7/18/16
SARA-2-6-H	16-08-0721-12	solid	7/18/16
SARA-2H-7-U	16-08-0721-13	solid	7/18/16
SARA-2-7-H	16-08-0721-14	solid	7/18/16
SARA-2H-8-U	16-08-0721-15	solid	7/18/16
SARA-2-8-H	16-08-0721-16	solid	7/18/16
SARA-2H-COMP-U	16-08-0721-17	solid	7/18/16
SARA-2-COMP-H	16-08-0721-18	solid	7/18/16

*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0721 (11-08-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/18/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/8/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 27.2 and 26.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160818S07 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2H-1-U	cadmium
SARA-2-1-H	cadmium
SARA-2H-2-U	cadmium
SARA-2H-3-U	cadmium

SARA-2-3-H	cadmium
SARA-2H-4-U	cadmium
SARA-2H-6-U	cadmium
SARA-2-7-H	cadmium
SARA-2H-8-U	cadmium
SARA-2H-COMP-U	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-2H-1-U	16-08-0721-1	solid	7/18/16
SARA-2-1-H	16-08-0721-2	solid	7/18/16
SARA-2H-2-U	16-08-0721-3	solid	7/18/16
SARA-2-2-H	16-08-0721-4	solid	7/18/16
SARA-2H-3-U	16-08-0721-5	solid	7/18/16
SARA-2-3-H	16-08-0721-6	solid	7/18/16
SARA-2H-4-U	16-08-0721-7	solid	7/18/16
SARA-2-4-H	16-08-0721-8	solid	7/18/16
SARA-2H-5-U	16-08-0721-9	solid	7/18/16
SARA-2-5-H	16-08-0721-10	solid	7/18/16
SARA-2H-6-U	16-08-0721-11	solid	7/18/16
SARA-2-6-H	16-08-0721-12	solid	7/18/16
SARA-2H-7-U	16-08-0721-13	solid	7/18/16
SARA-2-7-H	16-08-0721-14	solid	7/18/16
SARA-2H-8-U	16-08-0721-15	solid	7/18/16
SARA-2-8-H	16-08-0721-16	solid	7/18/16
SARA-2H-COMP-U	16-08-0721-17	solid	7/18/16
SARA-2-COMP-H	16-08-0721-18	solid	7/18/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-0722 (08-23-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/1/2016-8/5/2016	<b>Number of Samples:</b> 6
<b>Data Validation Report Date:</b> 9/7/2016	<b>Analytical Report Date:</b> 8/23/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	√
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 29.2 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

All percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-3-H	16-08-0722-1	solid	08/01/16
SSP-3H-U	16-08-0722-2	solid	08/01/16
SSP-3M-U	16-08-0722-3	solid	08/04/16
SSP-3-M	16-08-0722-4	solid	08/05/16
SSP-3-L	16-08-0722-5	solid	08/05/16

SSP-3L-U	16-08-0722-6	solid	08/05/16
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*END OF REPORT*

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-1653 (10-05-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/20/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/08/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 27.5 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160901S08, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160901S08 recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARB-1H-1-U	Moisture Content
SARB-1-1-H	Moisture Content
SARB-1H-2-U	Moisture Content
SARB-1-2-H	Moisture Content
SARB-1H-3-U	Moisture Content
SARB-1-3-H	Moisture Content
SARB-1H-4-U	Moisture Content
SARB-1-4-H	Moisture Content
SARB-1H-5-U	Moisture Content
SARB-1-5-H	Moisture Content
SARB-1H-6-U	Moisture Content
SARB-1-6-H	Moisture Content
SARB-1H-7-U	Moisture Content
SARB-1-7-H	Moisture Content
SARB-1H-8-U	Moisture Content
SARB-1-8-H	Moisture Content
SARB-1H-COMP-U	Moisture Content
SARB-1-COMP-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARB-1H-1-U	Moisture Content
SARB-1-1-H	Moisture Content
SARB-1H-2-U	Moisture Content
SARB-1-2-H	Moisture Content
SARB-1H-3-U	Moisture Content
SARB-1-3-H	Moisture Content
SARB-1H-4-U	Moisture Content
SARB-1-4-H	Moisture Content
SARB-1H-5-U	Moisture Content
SARB-1-5-H	Moisture Content
SARB-1H-6-U	Moisture Content
SARB-1-6-H	Moisture Content
SARB-1H-7-U	Moisture Content
SARB-1-7-H	Moisture Content
SARB-1H-8-U	Moisture Content
SARB-1-8-H	Moisture Content
SARB-1H-COMP-U	Moisture Content

SARB-1-COMP-H	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARB-1H-1-U	16-08-1653-1	solid	7/20/16
SARB-1-1-H	16-08-1653-2	solid	7/20/16
SARB-1H-2-U	16-08-1653-3	solid	7/20/16
SARB-1-2-H	16-08-1653-4	solid	7/20/16
SARB-1H-3-U	16-08-1653-5	solid	7/20/16
SARB-1-3-H	16-08-1653-6	solid	7/20/16
SARB-1H-4-U	16-08-1653-7	solid	7/20/16
SARB-1-4-H	16-08-1653-8	solid	7/20/16
SARB-1H-5-U	16-08-1653-9	solid	7/20/16
SARB-1-5-H	16-08-1653-10	solid	7/20/16
SARB-1H-6-U	16-08-1653-11	solid	7/20/16
SARB-1-6-H	16-08-1653-12	solid	7/20/16
SARB-1H-7-U	16-08-1653-13	solid	7/20/16
SARB-1-7-H	16-08-1653-14	solid	7/20/16
SARB-1H-8-U	16-08-1653-15	solid	7/20/16
SARB-1-8-H	16-08-1653-16	solid	7/20/16
SARB-1H-COMP-U	16-08-1653-17	solid	7/20/16
SARB-1-COMP-H	16-08-1653-18	solid	7/20/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-1653 (11-08-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/20/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/08/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 27.5 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160901S08 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARB-1H-1-U	cadmium
SARB-1-1-H	cadmium
SARB-1H-2-U	cadmium
SARB-1-2-H	cadmium

SARB-1H-3-U	cadmium
SARB-1-3-H	cadmium
SARB-1H-4-U	cadmium
SARB-1-4-H	cadmium
SARB-1H-5-U	cadmium
SARB-1-5-H	cadmium
SARB-1H-6-U	cadmium
SARB-1-6-H	cadmium
SARB-1H-7-U	cadmium
SARB-1-7-H	cadmium
SARB-1H-8-U	cadmium
SARB-1-8-H	cadmium
SARB-1H-COMP-U	cadmium
SARB-1-COMP-H	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARB-1H-1-U	16-08-1653-1	solid	7/20/16
SARB-1-1-H	16-08-1653-2	solid	7/20/16
SARB-1H-2-U	16-08-1653-3	solid	7/20/16
SARB-1-2-H	16-08-1653-4	solid	7/20/16
SARB-1H-3-U	16-08-1653-5	solid	7/20/16
SARB-1-3-H	16-08-1653-6	solid	7/20/16
SARB-1H-4-U	16-08-1653-7	solid	7/20/16
SARB-1-4-H	16-08-1653-8	solid	7/20/16
SARB-1H-5-U	16-08-1653-9	solid	7/20/16
SARB-1-5-H	16-08-1653-10	solid	7/20/16
SARB-1H-6-U	16-08-1653-11	solid	7/20/16
SARB-1-6-H	16-08-1653-12	solid	7/20/16
SARB-1H-7-U	16-08-1653-13	solid	7/20/16
SARB-1-7-H	16-08-1653-14	solid	7/20/16
SARB-1H-8-U	16-08-1653-15	solid	7/20/16
SARB-1-8-H	16-08-1653-16	solid	7/20/16
SARB-1H-COMP-U	16-08-1653-17	solid	7/20/16
SARB-1-COMP-H	16-08-1653-18	solid	7/20/16

***END OF REPORT***



## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-1661 (09-07-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/19/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/07/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160901S07 and 160829SA3 the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160901S07 Recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2M-1-U	Moisture Content
SARA-2-1-M	Moisture Content
SARA-2M-2-U	Moisture Content
SARA-2-2-M	Moisture Content
SARA-2M-3-U	Moisture Content
SARA-2-3-M	Moisture Content
SARA-2M-4-U	Moisture Content
SARA-2-4-M	Moisture Content
SARA-2M-5-U	Moisture Content
SARA-2-5-M	Moisture Content
SARA-2M-6-U	Moisture Content
SARA-2-6-M	Moisture Content
SARA-2M-7-U	Moisture Content
SARA-2-7-M	Moisture Content
SARA-2M-8-U	Moisture Content
SARA-2-8-M	Moisture Content
SARA-2M-COMP-U	Moisture Content
SARA-2-COMP-M	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2M-1-U	Moisture Content
SARA-2-1-M	Moisture Content
SARA-2M-2-U	Moisture Content
SARA-2-2-M	Moisture Content
SARA-2M-3-U	Moisture Content
SARA-2-3-M	Moisture Content
SARA-2M-4-U	Moisture Content
SARA-2-4-M	Moisture Content
SARA-2M-5-U	Moisture Content
SARA-2-5-M	Moisture Content
SARA-2M-6-U	Moisture Content
SARA-2-6-M	Moisture Content
SARA-2M-7-U	Moisture Content
SARA-2-7-M	Moisture Content
SARA-2M-8-U	Moisture Content
SARA-2-8-M	Moisture Content
SARA-2M-COMP-U	Moisture Content

SARA-2-COMP-M	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-2M-1-U	16-08-1661-1	solid	7/19/16
SARA-2-1-M	16-08-1661-2	solid	7/19/16
SARA-2M-2-U	16-08-1661-3	solid	7/19/16
SARA-2-2-M	16-08-1661-4	solid	7/19/16
SARA-2M-3-U	16-08-1661-5	solid	7/19/16
SARA-2-3-M	16-08-1661-6	solid	7/19/16
SARA-2M-4-U	16-08-1661-7	solid	7/19/16
SARA-2-4-M	16-08-1661-8	solid	7/19/16
SARA-2M-5-U	16-08-1661-9	solid	7/19/16
SARA-2-5-M	16-08-1661-10	solid	7/19/16
SARA-2M-6-U	16-08-1661-11	solid	7/19/16
SARA-2-6-M	16-08-1661-12	solid	7/19/16
SARA-2M-7-U	16-08-1661-13	solid	7/19/16
SARA-2-7-M	16-08-1661-14	solid	7/19/16
SARA-2M-8-U	16-08-1661-15	solid	7/19/16
SARA-2-8-M	16-08-1661-16	solid	7/19/16
SARA-2M-COMP-U	16-08-1661-17	solid	7/19/16
SARA-2-COMP-M	16-08-1661-18	solid	7/19/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-1661 (11-08-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/19/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/08/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	2
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160901S07 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2M-1-U	cadmium
SARA-2-1-M	cadmium
SARA-2-3-M	cadmium
SARA-2-5-M	cadmium



SARA-2M-7-U	cadmium
SARA-2-COMP-M	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-2M-1-U	16-08-1661-1	solid	7/19/16
SARA-2-1-M	16-08-1661-2	solid	7/19/16
SARA-2M-2-U	16-08-1661-3	solid	7/19/16
SARA-2-2-M	16-08-1661-4	solid	7/19/16
SARA-2M-3-U	16-08-1661-5	solid	7/19/16
SARA-2-3-M	16-08-1661-6	solid	7/19/16
SARA-2M-4-U	16-08-1661-7	solid	7/19/16
SARA-2-4-M	16-08-1661-8	solid	7/19/16
SARA-2M-5-U	16-08-1661-9	solid	7/19/16
SARA-2-5-M	16-08-1661-10	solid	7/19/16
SARA-2M-6-U	16-08-1661-11	solid	7/19/16
SARA-2-6-M	16-08-1661-12	solid	7/19/16
SARA-2M-7-U	16-08-1661-13	solid	7/19/16
SARA-2-7-M	16-08-1661-14	solid	7/19/16
SARA-2M-8-U	16-08-1661-15	solid	7/19/16
SARA-2-8-M	16-08-1661-16	solid	7/19/16
SARA-2M-COMP-U	16-08-1661-17	solid	7/19/16
SARA-2-COMP-M	16-08-1661-18	solid	7/19/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-1973 (3-29-2017)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/18/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016; revised 3/29/2017	<b>Analytical Report Date:</b> 3/29/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 24.6, 24.8, and 24.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160907S03 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1H-1-U	cadmium
SSP-1-1-H	cadmium
SSP-1H-3-U	cadmium
SSP-1H-4-U	cadmium

SSP-1-5-H	cadmium
SSP-1H-6-U	cadmium
SSP-1-6-H	cadmium
SSP-1H-7-U	cadmium
SSP-1-7-H	cadmium
SSP-1H-COMP-U	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-1H-1-U	16-08-1973-1	solid	7/18/16
SSP-1-1-H	16-08-1973-2	solid	7/18/16
SSP-1H-2-U	16-08-1973-3	solid	7/18/16
SSP-1-2-H	16-08-1973-4	solid	7/18/16
SSP-1H-3-U	16-08-1973-5	solid	7/18/16
SSP-1-3-H	16-08-1973-6	solid	7/18/16
SSP-1H-4-U	16-08-1973-7	solid	7/18/16
SSP-1-4-H	16-08-1973-8	solid	7/18/16
SSP-1H-5-U	16-08-1973-9	solid	7/18/16
SSP-1-5-H	16-08-1973-10	solid	7/18/16
SSP-1H-6-U	16-08-1973-11	solid	7/18/16
SSP-1-6-H	16-08-1973-12	solid	7/18/16
SSP-1H-7-U	16-08-1973-13	solid	7/18/16
SSP-1-7-H	16-08-1973-14	solid	7/18/16
SSP-1H-8-U	16-08-1973-15	solid	7/18/16
SSP-1-8-H	16-08-1973-16	solid	7/18/16
SSP-1H-COMP-U	16-08-1973-17	solid	7/18/16
SSP-1-COMP-H	16-08-1973-18	solid	7/18/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-1973 (09-12-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/18/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/12/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	1		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 24.6, 24.8, and 24.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

The percent recovery for zinc in the laboratory control samples of batch 160907LA1 was out of control limits. All other percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160907S03 and 160907SA1 the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160907S03 recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.



<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1H-1-U	Moisture Content
SSP-1-1-H	Moisture Content
SSP-1H-2-U	Moisture Content
SSP-1-2-H	Moisture Content
SSP-1H-3-U	Moisture Content
SSP-1-3-H	Moisture Content
SSP-1H-4-U	Moisture Content
SSP-1-4-H	Moisture Content
SSP-1H-5-U	Moisture Content
SSP-1-5-H	Moisture Content
SSP-1H-6-U	Moisture Content
SSP-1-6-H	Moisture Content
SSP-1H-7-U	Moisture Content
SSP-1-7-H	Moisture Content
SSP-1H-8-U	Moisture Content
SSP-1-8-H	Moisture Content
SSP-1H-COMP-U	Moisture Content
SSP-1-COMP-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1H-1-U	Moisture Content
SSP-1-1-H	Moisture Content
SSP-1H-2-U	Moisture Content
SSP-1-2-H	Moisture Content
SSP-1H-3-U	Moisture Content
SSP-1-3-H	Moisture Content
SSP-1H-4-U	Moisture Content
SSP-1-4-H	Moisture Content
SSP-1H-5-U	Moisture Content
SSP-1-5-H	Moisture Content
SSP-1H-6-U	Moisture Content
SSP-1-6-H	Moisture Content
SSP-1H-7-U	Moisture Content
SSP-1-7-H	Moisture Content
SSP-1H-8-U	Moisture Content
SSP-1-8-H	Moisture Content
SSP-1H-COMP-U	Moisture Content

SSP-1-COMP-H	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-1H-1-U	16-08-1973-1	solid	7/18/16
SSP-1-1-H	16-08-1973-2	solid	7/18/16
SSP-1H-2-U	16-08-1973-3	solid	7/18/16
SSP-1-2-H	16-08-1973-4	solid	7/18/16
SSP-1H-3-U	16-08-1973-5	solid	7/18/16
SSP-1-3-H	16-08-1973-6	solid	7/18/16
SSP-1H-4-U	16-08-1973-7	solid	7/18/16
SSP-1-4-H	16-08-1973-8	solid	7/18/16
SSP-1H-5-U	16-08-1973-9	solid	7/18/16
SSP-1-5-H	16-08-1973-10	solid	7/18/16
SSP-1H-6-U	16-08-1973-11	solid	7/18/16
SSP-1-6-H	16-08-1973-12	solid	7/18/16
SSP-1H-7-U	16-08-1973-13	solid	7/18/16
SSP-1-7-H	16-08-1973-14	solid	7/18/16
SSP-1H-8-U	16-08-1973-15	solid	7/18/16
SSP-1-8-H	16-08-1973-16	solid	7/18/16
SSP-1H-COMP-U	16-08-1973-17	solid	7/18/16
SSP-1-COMP-H	16-08-1973-18	solid	7/18/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-2157 (9-14-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/21/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/14/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160912S03, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160912S03, recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. The matrix spike/matrix spike duplicate relative percent difference was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SART-2H-1-U	Moisture Content
SART-2-1-H	Moisture Content
SART-2H-2-U	Moisture Content
SART-2-2-H	Moisture Content
SART-2H-3-U	Moisture Content
SART-2-3-H	Moisture Content
SART-2H-4-U	Moisture Content
SART-2-4-H	Moisture Content
SART-2H-5-U	Moisture Content
SART-2-5-H	Moisture Content
SART-2H-6-U	Moisture Content
SART-2-6-H	Moisture Content
SART-2H-7-U	Moisture Content
SART-2-7-H	Moisture Content
SART-2H-8-U	Moisture Content
SART-2-8-H	Moisture Content
SART-2H-Comp-U	Moisture Content
SART-2-Comp-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SART-2H-1-U	Moisture Content
SART-2-1-H	Moisture Content
SART-2H-2-U	Moisture Content
SART-2-2-H	Moisture Content
SART-2H-3-U	Moisture Content
SART-2-3-H	Moisture Content
SART-2H-4-U	Moisture Content
SART-2-4-H	Moisture Content
SART-2H-5-U	Moisture Content
SART-2-5-H	Moisture Content
SART-2H-6-U	Moisture Content
SART-2-6-H	Moisture Content
SART-2H-7-U	Moisture Content
SART-2-7-H	Moisture Content
SART-2H-8-U	Moisture Content
SART-2-8-H	Moisture Content
SART-2H-Comp-U	Moisture Content

SART-2-Comp-H	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SART-2H-1-U	16-08-2157-1	solid	7/21/16
SART-2-1-H	16-08-2157-2	solid	7/21/16
SART-2H-2-U	16-08-2157-3	solid	7/21/16
SART-2-2-H	16-08-2157-4	solid	7/21/16
SART-2H-3-U	16-08-2157-5	solid	7/21/16
SART-2-3-H	16-08-2157-6	solid	7/21/16
SART-2H-4-U	16-08-2157-7	solid	7/21/16
SART-2-4-H	16-08-2157-8	solid	7/21/16
SART-2H-5-U	16-08-2157-9	solid	7/21/16
SART-2-5-H	16-08-2157-10	solid	7/21/16
SART-2H-6-U	16-08-2157-11	solid	7/21/16
SART-2-6-H	16-08-2157-12	solid	7/21/16
SART-2H-7-U	16-08-2157-13	solid	7/21/16
SART-2-7-H	16-08-2157-14	solid	7/21/16
SART-2H-8-U	16-08-2157-15	solid	7/21/16
SART-2-8-H	16-08-2157-16	solid	7/21/16
SART-2H-Comp-U	16-08-2157-17	solid	7/21/16
SART-2-Comp-H	16-08-2157-18	solid	7/21/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-2157 (11-08-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/21/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/08/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160912S03 recovery of the matrix spike was out of control due to suspected matrix interference. The associated LCS recovery was in control. The matrix spike/matrix spike duplicate was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory did not apply any flags to this sample batch.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SART-2H-1-U	16-08-2157-1	solid	7/21/16
SART-2-1-H	16-08-2157-2	solid	7/21/16

SART-2H-2-U	16-08-2157-3	solid	7/21/16
SART-2-2-H	16-08-2157-4	solid	7/21/16
SART-2H-3-U	16-08-2157-5	solid	7/21/16
SART-2-3-H	16-08-2157-6	solid	7/21/16
SART-2H-4-U	16-08-2157-7	solid	7/21/16
SART-2-4-H	16-08-2157-8	solid	7/21/16
SART-2H-5-U	16-08-2157-9	solid	7/21/16
SART-2-5-H	16-08-2157-10	solid	7/21/16
SART-2H-6-U	16-08-2157-11	solid	7/21/16
SART-2-6-H	16-08-2157-12	solid	7/21/16
SART-2H-7-U	16-08-2157-13	solid	7/21/16
SART-2-7-H	16-08-2157-14	solid	7/21/16
SART-2H-8-U	16-08-2157-15	solid	7/21/16
SART-2-8-H	16-08-2157-16	solid	7/21/16
SART-2H-Comp-U	16-08-2157-17	solid	7/21/16
SART-2-Comp-H	16-08-2157-18	solid	7/21/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-2158 (09-14-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/22/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/14/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	2	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

Zinc was detected above the reporting limit in the method blank for batch 160912LA3. The laboratory has B flagged zinc in all samples because analyte were present in the associated method blank. Detected concentrations of zinc were five times the respective method blank result and were thus considered positive results. No other target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160912S04, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160912S04, recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has B flagged the following because analyte was present in the associated method blank.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-1L-1-U	Zinc
SARA-1-1-L	Zinc
SARA-1L-2-U	Zinc
SARA-1-2-L	Zinc
SARA-1L-3-U	Zinc
SARA-1-3-L	Zinc
SARA-1L-4-U	Zinc
SARA-1-4-L	Zinc
SARA-1L-5-U	Zinc
SARA-1-5-L	Zinc
SARA-1L-6-U	Zinc
SARA-1-6-L	Zinc
SARA-1L-7-U	Zinc
SARA-1-7-L	Zinc
SARA-1L-8-U	Zinc
SARA-1-8-L	Zinc
SARA-1L-Comp-U	Zinc
SARA-1-Comp-L	Zinc

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-1L-1-U	Moisture Content
SARA-1-1-L	Moisture Content
SARA-1L-2-U	Moisture Content
SARA-1-2-L	Moisture Content
SARA-1L-3-U	Moisture Content
SARA-1-3-L	Moisture Content
SARA-1L-4-U	Moisture Content
SARA-1-4-L	Moisture Content
SARA-1L-5-U	Moisture Content
SARA-1-5-L	Moisture Content
SARA-1L-6-U	Moisture Content
SARA-1-6-L	Moisture Content
SARA-1L-7-U	Moisture Content
SARA-1-7-L	Moisture Content
SARA-1L-8-U	Moisture Content
SARA-1-8-L	Moisture Content
SARA-1L-Comp-U	Moisture Content

SARA-1-Comp-L	Moisture Content
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The laboratory has BV flagged the following as received after holding time expired.

Sample Name	Analyte(s)
SARA-1L-1-U	Moisture Content
SARA-1-1-L	Moisture Content
SARA-1L-2-U	Moisture Content
SARA-1-2-L	Moisture Content
SARA-1L-3-U	Moisture Content
SARA-1-3-L	Moisture Content
SARA-1L-4-U	Moisture Content
SARA-1-4-L	Moisture Content
SARA-1L-5-U	Moisture Content
SARA-1-5-L	Moisture Content
SARA-1L-6-U	Moisture Content
SARA-1-6-L	Moisture Content
SARA-1L-7-U	Moisture Content
SARA-1-7-L	Moisture Content
SARA-1L-8-U	Moisture Content
SARA-1-8-L	Moisture Content
SARA-1L-Comp-U	Moisture Content
SARA-1-Comp-L	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-1L-1-U	16-08-2158-1	solid	7/22/16
SARA-1-1-L	16-08-2158-2	solid	7/22/16
SARA-1L-2-U	16-08-2158-3	solid	7/22/16
SARA-1-2-L	16-08-2158-4	solid	7/22/16
SARA-1L-3-U	16-08-2158-5	solid	7/22/16
SARA-1-3-L	16-08-2158-6	solid	7/22/16
SARA-1L-4-U	16-08-2158-7	solid	7/22/16
SARA-1-4-L	16-08-2158-8	solid	7/22/16
SARA-1L-5-U	16-08-2158-9	solid	7/22/16
SARA-1-5-L	16-08-2158-10	solid	7/22/16
SARA-1L-6-U	16-08-2158-11	solid	7/22/16
SARA-1-6-L	16-08-2158-12	solid	7/22/16
SARA-1L-7-U	16-08-2158-13	solid	7/22/16



SARA-1-7-L	16-08-2158-14	solid	7/22/16
SARA-1L-8-U	16-08-2158-15	solid	7/22/16
SARA-1-8-L	16-08-2158-16	solid	7/22/16
SARA-1L-Comp-U	16-08-2158-17	solid	7/22/16
SARA-1-Comp-L	16-08-2158-18	solid	7/22/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-2158 (11-08-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/22/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/08/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	2
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 28.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160912S04 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-1L-2-U	cadmium
SARA-1-3-L	cadmium
SARA-1L-4-U	cadmium
SARA-1L-7-U	cadmium

SARA-1L-Comp-U	cadmium
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-1L-1-U	16-08-2158-1	solid	7/22/16
SARA-1-1-L	16-08-2158-2	solid	7/22/16
SARA-1L-2-U	16-08-2158-3	solid	7/22/16
SARA-1-2-L	16-08-2158-4	solid	7/22/16
SARA-1L-3-U	16-08-2158-5	solid	7/22/16
SARA-1-3-L	16-08-2158-6	solid	7/22/16
SARA-1L-4-U	16-08-2158-7	solid	7/22/16
SARA-1-4-L	16-08-2158-8	solid	7/22/16
SARA-1L-5-U	16-08-2158-9	solid	7/22/16
SARA-1-5-L	16-08-2158-10	solid	7/22/16
SARA-1L-6-U	16-08-2158-11	solid	7/22/16
SARA-1-6-L	16-08-2158-12	solid	7/22/16
SARA-1L-7-U	16-08-2158-13	solid	7/22/16
SARA-1-7-L	16-08-2158-14	solid	7/22/16
SARA-1L-8-U	16-08-2158-15	solid	7/22/16
SARA-1-8-L	16-08-2158-16	solid	7/22/16
SARA-1L-Comp-U	16-08-2158-17	solid	7/22/16
SARA-1-Comp-L	16-08-2158-18	solid	7/22/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-2246 (09-15-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/19/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/15/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	2	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 21.1 and 21.3 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

Zinc was detected above the reporting limit in the method blank for batch 160912LA5. The laboratory has B flagged zinc in all samples because analyte was present in the associated method blank. Detected concentrations of zinc were five times the respective method blank result and were thus considered

positive results. No other target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160913S06, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160913S06, recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**



The laboratory has B flagged the following because analyte was present in the associated method blank.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1M-1-U	Zinc
SSP-1-1-M	Zinc
SSP-1M-2-U	Zinc
SSP-1-2-M	Zinc
SSP-1M-3-U	Zinc
SSP-1-3-M	Zinc
SSP-1M-4-U	Zinc
SSP-1-4-M	Zinc
SSP-1M-5-U	Zinc
SSP-1-5-M	Zinc
SSP-1M-6-U	Zinc
SSP-1-6-M	Zinc
SSP-1M-7-U	Zinc
SSP-1-7-M	Zinc
SSP-1M-8-U	Zinc
SSP-1-8-M	Zinc
SSP-1M-COMP-U	Zinc
SSP-1-COMP-M	Zinc

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1M-1-U	Moisture Content
SSP-1-1-M	Moisture Content
SSP-1M-2-U	Moisture Content
SSP-1-2-M	Moisture Content
SSP-1M-3-U	Moisture Content
SSP-1-3-M	Moisture Content
SSP-1M-4-U	Moisture Content
SSP-1-4-M	Moisture Content
SSP-1M-5-U	Moisture Content
SSP-1-5-M	Moisture Content
SSP-1M-6-U	Moisture Content
SSP-1-6-M	Moisture Content
SSP-1M-7-U	Moisture Content
SSP-1-7-M	Moisture Content
SSP-1M-8-U	Moisture Content
SSP-1-8-M	Moisture Content

SSP-1M-COMP-U	Moisture Content
SSP-1-COMP-M	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1M-1-U	Moisture Content
SSP-1-1-M	Moisture Content
SSP-1M-2-U	Moisture Content
SSP-1-2-M	Moisture Content
SSP-1M-3-U	Moisture Content
SSP-1-3-M	Moisture Content
SSP-1M-4-U	Moisture Content
SSP-1-4-M	Moisture Content
SSP-1M-5-U	Moisture Content
SSP-1-5-M	Moisture Content
SSP-1M-6-U	Moisture Content
SSP-1-6-M	Moisture Content
SSP-1M-7-U	Moisture Content
SSP-1-7-M	Moisture Content
SSP-1M-8-U	Moisture Content
SSP-1-8-M	Moisture Content
SSP-1M-COMP-U	Moisture Content
SSP-1-COMP-M	Moisture Content

## SAMPLE INDEX

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-1M-1-U	16-08-2246-1	solid	7/19/16
SSP-1-1-M	16-08-2246-2	solid	7/19/16
SSP-1M-2-U	16-08-2246-3	solid	7/19/16
SSP-1-2-M	16-08-2246-4	solid	7/19/16
SSP-1M-3-U	16-08-2246-5	solid	7/19/16
SSP-1-3-M	16-08-2246-6	solid	7/19/16
SSP-1M-4-U	16-08-2246-7	solid	7/19/16
SSP-1-4-M	16-08-2246-8	solid	7/19/16
SSP-1M-5-U	16-08-2246-9	solid	7/19/16
SSP-1-5-M	16-08-2246-10	solid	7/19/16
SSP-1M-6-U	16-08-2246-11	solid	7/19/16
SSP-1-6-M	16-08-2246-12	solid	7/19/16

SSP-1M-7-U	16-08-2246-13	solid	7/19/16
SSP-1-7-M	16-08-2246-14	solid	7/19/16
SSP-1M-8-U	16-08-2246-15	solid	7/19/16
SSP-1-8-M	16-08-2246-16	solid	7/19/16
SSP-1M-COMP-U	16-08-2246-17	solid	7/19/16
SSP-1-COMP-M	16-08-2246-18	solid	7/19/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-08-2246 (11-08-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/19/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/08/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 21.1 and 21.3 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160913S06 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1-2-M	cadmium

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-1M-1-U	16-08-2246-1	solid	7/19/16
SSP-1-1-M	16-08-2246-2	solid	7/19/16
SSP-1M-2-U	16-08-2246-3	solid	7/19/16
SSP-1-2-M	16-08-2246-4	solid	7/19/16
SSP-1M-3-U	16-08-2246-5	solid	7/19/16
SSP-1-3-M	16-08-2246-6	solid	7/19/16
SSP-1M-4-U	16-08-2246-7	solid	7/19/16
SSP-1-4-M	16-08-2246-8	solid	7/19/16
SSP-1M-5-U	16-08-2246-9	solid	7/19/16
SSP-1-5-M	16-08-2246-10	solid	7/19/16
SSP-1M-6-U	16-08-2246-11	solid	7/19/16
SSP-1-6-M	16-08-2246-12	solid	7/19/16
SSP-1M-7-U	16-08-2246-13	solid	7/19/16
SSP-1-7-M	16-08-2246-14	solid	7/19/16
SSP-1M-8-U	16-08-2246-15	solid	7/19/16
SSP-1-8-M	16-08-2246-16	solid	7/19/16
SSP-1M-COMP-U	16-08-2246-17	solid	7/19/16
SSP-1-COMP-M	16-08-2246-18	solid	7/19/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0276 (09-20-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/25/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/20/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	2	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 25.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

Zinc was detected above the reporting limit in the method blank for batch 160914LA5. The laboratory has B flagged zinc in all samples because analyte was present in the associated method blank. Detected concentrations of zinc were five times the respective method blank result and were thus considered

positive results. No other target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160915S02 and 160914SA5, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160915S02, recovery of the matrix spike or matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has B flagged the following because analyte was present in the associated method blank.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2H-1-U	Zinc
SSP-2-2-H	Zinc
SSP-2H-2-U	Zinc
SSP-2-1-H	Zinc
SSP-2H-3-U	Zinc
SSP-2-3-H	Zinc
SSP-2H-4-U	Zinc
SSP-2-4-H	Zinc
SSP-2H-5-U	Zinc
SSP-2-5-H	Zinc
SSP-2H-6-U	Zinc
SSP-2-6-H	Zinc
SSP-2H-7-U	Zinc
SSP-2-7-H	Zinc
SSP-2H-8-U	Zinc
SSP-2-8-H	Zinc
SSP-2H-Comp-U	Zinc
SSP-2-Comp-H	Zinc

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2H-1-U	Moisture Content
SSP-2-2-H	Moisture Content
SSP-2H-2-U	Moisture Content
SSP-2-1-H	Moisture Content
SSP-2H-3-U	Moisture Content
SSP-2-3-H	Moisture Content
SSP-2H-4-U	Moisture Content
SSP-2-4-H	Moisture Content
SSP-2H-5-U	Moisture Content
SSP-2-5-H	Moisture Content
SSP-2H-6-U	Moisture Content
SSP-2-6-H	Moisture Content
SSP-2H-7-U	Moisture Content
SSP-2-7-H	Moisture Content
SSP-2H-8-U	Moisture Content
SSP-2-8-H	Moisture Content

SSP-2H-Comp-U	Moisture Content
SSP-2-Comp-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

Sample Name	Analyte(s)
SSP-2H-1-U	Moisture Content
SSP-2-2-H	Moisture Content
SSP-2H-2-U	Moisture Content
SSP-2-1-H	Moisture Content
SSP-2H-3-U	Moisture Content
SSP-2-3-H	Moisture Content
SSP-2H-4-U	Moisture Content
SSP-2-4-H	Moisture Content
SSP-2H-5-U	Moisture Content
SSP-2-5-H	Moisture Content
SSP-2H-6-U	Moisture Content
SSP-2-6-H	Moisture Content
SSP-2H-7-U	Moisture Content
SSP-2-7-H	Moisture Content
SSP-2H-8-U	Moisture Content
SSP-2-8-H	Moisture Content
SSP-2H-Comp-U	Moisture Content
SSP-2-Comp-H	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-2H-1-U	16-09-0276-1	solid	7/25/16
SSP-2-2-H	16-09-0276-2	solid	7/25/16
SSP-2H-2-U	16-09-0276-3	solid	7/25/16
SSP-2-1-H	16-09-0276-4	solid	7/25/16
SSP-2H-3-U	16-09-0276-5	solid	7/25/16
SSP-2-3-H	16-09-0276-6	solid	7/25/16
SSP-2H-4-U	16-09-0276-7	solid	7/25/16
SSP-2-4-H	16-09-0276-8	solid	7/25/16
SSP-2H-5-U	16-09-0276-9	solid	7/25/16
SSP-2-5-H	16-09-0276-10	solid	7/25/16
SSP-2H-6-U	16-09-0276-11	solid	7/25/16
SSP-2-6-H	16-09-0276-12	solid	7/25/16

SSP-2H-7-U	16-09-0276-13	solid	7/25/16
SSP-2-7-H	16-09-0276-14	solid	7/25/16
SSP-2H-8-U	16-09-0276-15	solid	7/25/16
SSP-2-8-H	16-09-0276-16	solid	7/25/16
SSP-2H-Comp-U	16-09-0276-17	solid	7/25/16
SSP-2-Comp-H	16-09-0276-18	solid	7/25/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0276 (11-09-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/25/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 25.9 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160915S02 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2H-4-U	cadmium
SSP-2H-8-U	cadmium

## **SAMPLE INDEX**



<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-2H-1-U	16-09-0276-1	solid	7/25/16
SSP-2-2-H	16-09-0276-2	solid	7/25/16
SSP-2H-2-U	16-09-0276-3	solid	7/25/16
SSP-2-1-H	16-09-0276-4	solid	7/25/16
SSP-2H-3-U	16-09-0276-5	solid	7/25/16
SSP-2-3-H	16-09-0276-6	solid	7/25/16
SSP-2H-4-U	16-09-0276-7	solid	7/25/16
SSP-2-4-H	16-09-0276-8	solid	7/25/16
SSP-2H-5-U	16-09-0276-9	solid	7/25/16
SSP-2-5-H	16-09-0276-10	solid	7/25/16
SSP-2H-6-U	16-09-0276-11	solid	7/25/16
SSP-2-6-H	16-09-0276-12	solid	7/25/16
SSP-2H-7-U	16-09-0276-13	solid	7/25/16
SSP-2-7-H	16-09-0276-14	solid	7/25/16
SSP-2H-8-U	16-09-0276-15	solid	7/25/16
SSP-2-8-H	16-09-0276-16	solid	7/25/16
SSP-2H-Comp-U	16-09-0276-17	solid	7/25/16
SSP-2-Comp-H	16-09-0276-18	solid	7/25/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0277 (3-29-2017)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/21/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/6/2016; revised 3/29/2017	<b>Analytical Report Date:</b> 3/29/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 25.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160915S03 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-1H-1-U	cadmium
SMM-1-1-H	cadmium
SMM-1H-2-U	cadmium
SMM-1-2-H	cadmium

SMM-1H-3-U	cadmium
SMM-1-3-H	cadmium
SMM-1H-4-U	cadmium
SMM-1-4-H	cadmium
SMM-1H-5-U	cadmium
SMM-1-5-H	cadmium
SMM-1H-7-U	cadmium
SMM-1H-Comp-U	cadmium
SMM-1-Comp-H	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-1H-1-U	16-09-0277-1	solid	7/21/16
SMM-1-1-H	16-09-0277-2	solid	7/21/16
SMM-1H-2-U	16-09-0277-3	solid	7/21/16
SMM-1-2-H	16-09-0277-4	solid	7/21/16
SMM-1H-3-U	16-09-0277-5	solid	7/21/16
SMM-1-3-H	16-09-0277-6	solid	7/21/16
SMM-1H-4-U	16-09-0277-7	solid	7/21/16
SMM-1-4-H	16-09-0277-8	solid	7/21/16
SMM-1H-5-U	16-09-0277-9	solid	7/21/16
SMM-1-5-H	16-09-0277-10	solid	7/21/16
SMM-1H-6-U	16-09-0277-11	solid	7/21/16
SMM-1-6-H	16-09-0277-12	solid	7/21/16
SMM-1H-7-U	16-09-0277-13	solid	7/21/16
SMM-1-7-H	16-09-0277-14	solid	7/21/16
SMM-1H-8-U	16-09-0277-15	solid	7/21/16
SMM-1-8-H	16-09-0277-16	solid	7/21/16
SMM-1H-Comp-U	16-09-0277-17	solid	7/21/16
SMM-1-Comp-H	16-09-0277-18	solid	7/21/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0277 (09-21-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/21/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/4/2016	<b>Analytical Report Date:</b> 9/21/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 25.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160915S03, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 1609153S03, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.



<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-1H-1-U	Moisture Content
SMM-1-1-H	Moisture Content
SMM-1H-2-U	Moisture Content
SMM-1-2-H	Moisture Content
SMM-1H-3-U	Moisture Content
SMM-1-3-H	Moisture Content
SMM-1H-4-U	Moisture Content
SMM-1-4-H	Moisture Content
SMM-1H-5-U	Moisture Content
SMM-1-5-H	Moisture Content
SMM-1H-6-U	Moisture Content
SMM-1-6-H	Moisture Content
SMM-1H-7-U	Moisture Content
SMM-1-7-H	Moisture Content
SMM-1H-8-U	Moisture Content
SMM-1-8-H	Moisture Content
SMM-1H-Comp-U	Moisture Content
SMM-1-Comp-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-1H-1-U	Moisture Content
SMM-1-1-H	Moisture Content
SMM-1H-2-U	Moisture Content
SMM-1-2-H	Moisture Content
SMM-1H-3-U	Moisture Content
SMM-1-3-H	Moisture Content
SMM-1H-4-U	Moisture Content
SMM-1-4-H	Moisture Content
SMM-1H-5-U	Moisture Content
SMM-1-5-H	Moisture Content
SMM-1H-6-U	Moisture Content
SMM-1-6-H	Moisture Content
SMM-1H-7-U	Moisture Content
SMM-1-7-H	Moisture Content
SMM-1H-8-U	Moisture Content
SMM-1-8-H	Moisture Content
SMM-1H-Comp-U	Moisture Content

SMM-1-Comp-H	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-1H-1-U	16-09-0277-1	solid	7/21/16
SMM-1-1-H	16-09-0277-2	solid	7/21/16
SMM-1H-2-U	16-09-0277-3	solid	7/21/16
SMM-1-2-H	16-09-0277-4	solid	7/21/16
SMM-1H-3-U	16-09-0277-5	solid	7/21/16
SMM-1-3-H	16-09-0277-6	solid	7/21/16
SMM-1H-4-U	16-09-0277-7	solid	7/21/16
SMM-1-4-H	16-09-0277-8	solid	7/21/16
SMM-1H-5-U	16-09-0277-9	solid	7/21/16
SMM-1-5-H	16-09-0277-10	solid	7/21/16
SMM-1H-6-U	16-09-0277-11	solid	7/21/16
SMM-1-6-H	16-09-0277-12	solid	7/21/16
SMM-1H-7-U	16-09-0277-13	solid	7/21/16
SMM-1-7-H	16-09-0277-14	solid	7/21/16
SMM-1H-8-U	16-09-0277-15	solid	7/21/16
SMM-1-8-H	16-09-0277-16	solid	7/21/16
SMM-1H-Comp-U	16-09-0277-17	solid	7/21/16
SMM-1-Comp-H	16-09-0277-18	solid	7/21/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0391 (09-22-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/22/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/5/2016	<b>Analytical Report Date:</b> 9/22/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 21.9 and 22.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160916S04 and 160919SA5, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160916S04, recovery of the Matrix Spike (MS) and Matrix Spike Duplicate (MSD) compound was above control limits due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-1L-1-U	Moisture Content
SMM-1-1-L	Moisture Content
SMM-1L-2-U	Moisture Content
SMM-1-2-L	Moisture Content
SMM-1L-3-U	Moisture Content
SMM-1-3-L	Moisture Content
SMM-1L-4-U	Moisture Content
SMM-1-4-L	Moisture Content
SMM-1L-5-U	Moisture Content
SMM-1-5-L	Moisture Content
SMM-1L-6-U	Moisture Content
SMM-1-6-L	Moisture Content
SMM-1L-7-U	Moisture Content
SMM-1-7-L	Moisture Content
SMM-1L-8-U	Moisture Content
SMM-1-8-L	Moisture Content
SMM-1L-COMP-U	Moisture Content
SMM-1-COMP-L	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-1L-1-U	Moisture Content
SMM-1-1-L	Moisture Content
SMM-1L-2-U	Moisture Content
SMM-1-2-L	Moisture Content
SMM-1L-3-U	Moisture Content
SMM-1-3-L	Moisture Content
SMM-1L-4-U	Moisture Content
SMM-1-4-L	Moisture Content
SMM-1L-5-U	Moisture Content
SMM-1-5-L	Moisture Content
SMM-1L-6-U	Moisture Content
SMM-1-6-L	Moisture Content
SMM-1L-7-U	Moisture Content
SMM-1-7-L	Moisture Content
SMM-1L-8-U	Moisture Content
SMM-1-8-L	Moisture Content
SMM-1L-COMP-U	Moisture Content

SMM-1-COMP-L	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-1L-1-U	16-09-0391-1	solid	7/22/16
SMM-1-1-L	16-09-0391-2	solid	7/22/16
SMM-1L-2-U	16-09-0391-3	solid	7/22/16
SMM-1-2-L	16-09-0391-4	solid	7/22/16
SMM-1L-3-U	16-09-0391-5	solid	7/22/16
SMM-1-3-L	16-09-0391-6	solid	7/22/16
SMM-1L-4-U	16-09-0391-7	solid	7/22/16
SMM-1-4-L	16-09-0391-8	solid	7/22/16
SMM-1L-5-U	16-09-0391-9	solid	7/22/16
SMM-1-5-L	16-09-0391-10	solid	7/22/16
SMM-1L-6-U	16-09-0391-11	solid	7/22/16
SMM-1-6-L	16-09-0391-12	solid	7/22/16
SMM-1L-7-U	16-09-0391-13	solid	7/22/16
SMM-1-7-L	16-09-0391-14	solid	7/22/16
SMM-1L-8-U	16-09-0391-15	solid	7/22/16
SMM-1-8-L	16-09-0391-16	solid	7/22/16
SMM-1L-COMP-U	16-09-0391-17	solid	7/22/16
SMM-1-COMP-L	16-09-0391-18	solid	7/22/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0391 (11-09-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/22/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/6/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 21.9 and 22.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160916S04 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-1L-8-U	cadmium

## **SAMPLE INDEX**

Sample Name	Lab ID	Matrix	Date Collected
SMM-1L-1-U	16-09-0391-1	solid	7/22/16
SMM-1-1-L	16-09-0391-2	solid	7/22/16
SMM-1L-2-U	16-09-0391-3	solid	7/22/16
SMM-1-2-L	16-09-0391-4	solid	7/22/16
SMM-1L-3-U	16-09-0391-5	solid	7/22/16
SMM-1-3-L	16-09-0391-6	solid	7/22/16
SMM-1L-4-U	16-09-0391-7	solid	7/22/16
SMM-1-4-L	16-09-0391-8	solid	7/22/16
SMM-1L-5-U	16-09-0391-9	solid	7/22/16
SMM-1-5-L	16-09-0391-10	solid	7/22/16
SMM-1L-6-U	16-09-0391-11	solid	7/22/16
SMM-1-6-L	16-09-0391-12	solid	7/22/16
SMM-1L-7-U	16-09-0391-13	solid	7/22/16
SMM-1-7-L	16-09-0391-14	solid	7/22/16
SMM-1L-8-U	16-09-0391-15	solid	7/22/16
SMM-1-8-L	16-09-0391-16	solid	7/22/16
SMM-1L-COMP-U	16-09-0391-17	solid	7/22/16
SMM-1-COMP-L	16-09-0391-18	solid	7/22/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0642 (09-26-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/25/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/3/2016	<b>Analytical Report Date:</b> 9/26/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	2	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 24.5 and 24.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

Zinc was detected above the reporting limit in the method blank for batch 160921LA4. The laboratory has B flagged zinc in all samples because analyte was present in the associated method blank. Detected concentrations of zinc were five times the respective method blank result and were thus considered positive results. No other target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160920S04 and 160921SA4, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160920S04, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has B flagged the following because analyte was present in the associated method blank.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-3M-1-U	Zinc
SARA-3-1-M	Zinc
SARA-3M-2-U	Zinc
SARA-3-2-M	Zinc
SARA-3M-3-U	Zinc
SARA-3-3-M	Zinc
SARA-3M-4-U	Zinc
SARA-3-4-M	Zinc
SARA-3M-5-U	Zinc
SARA-3-5-M	Zinc
SARA-3M-6-U	Zinc
SARA-3-6-M	Zinc
SARA-3M-7-U	Zinc
SARA-3-7-M	Zinc
SARA-3M-8-U	Zinc
SARA-3-8-M	Zinc
SARA-3M-COMP-U	Zinc
SARA-3-COMP-M	Zinc

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-3M-1-U	Moisture Content
SARA-3-1-M	Moisture Content
SARA-3M-2-U	Moisture Content
SARA-3-2-M	Moisture Content
SARA-3M-3-U	Moisture Content
SARA-3-3-M	Moisture Content
SARA-3M-4-U	Moisture Content
SARA-3-4-M	Moisture Content
SARA-3M-5-U	Moisture Content
SARA-3-5-M	Moisture Content
SARA-3M-6-U	Moisture Content
SARA-3-6-M	Moisture Content
SARA-3M-7-U	Moisture Content
SARA-3-7-M	Moisture Content
SARA-3M-8-U	Moisture Content
SARA-3-8-M	Moisture Content
SARA-3M-COMP-U	Moisture Content

SARA-3-COMP-M	Moisture Content
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The laboratory has BV flagged the following as received after holding time expired.

Sample Name	Analyte(s)
SARA-3M-1-U	Moisture Content
SARA-3-1-M	Moisture Content
SARA-3M-2-U	Moisture Content
SARA-3-2-M	Moisture Content
SARA-3M-3-U	Moisture Content
SARA-3-3-M	Moisture Content
SARA-3M-4-U	Moisture Content
SARA-3-4-M	Moisture Content
SARA-3M-5-U	Moisture Content
SARA-3-5-M	Moisture Content
SARA-3M-6-U	Moisture Content
SARA-3-6-M	Moisture Content
SARA-3M-7-U	Moisture Content
SARA-3-7-M	Moisture Content
SARA-3M-8-U	Moisture Content
SARA-3-8-M	Moisture Content
SARA-3M-COMP-U	Moisture Content
SARA-3-COMP-M	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-3M-1-U	16-09-0642-1	solid	7/25/16
SARA-3-1-M	16-09-0642-2	solid	7/25/16
SARA-3M-2-U	16-09-0642-3	solid	7/25/16
SARA-3-2-M	16-09-0642-4	solid	7/25/16
SARA-3M-3-U	16-09-0642-5	solid	7/25/16
SARA-3-3-M	16-09-0642-6	solid	7/25/16
SARA-3M-4-U	16-09-0642-7	solid	7/25/16
SARA-3-4-M	16-09-0642-8	solid	7/25/16
SARA-3M-5-U	16-09-0642-9	solid	7/25/16
SARA-3-5-M	16-09-0642-10	solid	7/25/16
SARA-3M-6-U	16-09-0642-11	solid	7/25/16
SARA-3-6-M	16-09-0642-12	solid	7/25/16
SARA-3M-7-U	16-09-0642-13	solid	7/25/16



SARA-3-7-M	16-09-0642-14	solid	7/25/16
SARA-3M-8-U	16-09-0642-15	solid	7/25/16
SARA-3-8-M	16-09-0642-16	solid	7/25/16
SARA-3M-COMP-U	16-09-0642-17	solid	7/25/16
SARA-3-COMP-M	16-09-0642-18	solid	7/25/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0642 (11-09-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/25/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 24.5 and 24.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160920S04 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-3-2-M	cadmium
SARA-3-4-M	cadmium
SARA-3M-5-U	cadmium
SARA-3-6-M	cadmium

SARA-3M-7-U	cadmium
SARA-3M-8-U	cadmium
SARA-3M-COMP-U	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-3M-1-U	16-09-0642-1	solid	7/25/16
SARA-3-1-M	16-09-0642-2	solid	7/25/16
SARA-3M-2-U	16-09-0642-3	solid	7/25/16
SARA-3-2-M	16-09-0642-4	solid	7/25/16
SARA-3M-3-U	16-09-0642-5	solid	7/25/16
SARA-3-3-M	16-09-0642-6	solid	7/25/16
SARA-3M-4-U	16-09-0642-7	solid	7/25/16
SARA-3-4-M	16-09-0642-8	solid	7/25/16
SARA-3M-5-U	16-09-0642-9	solid	7/25/16
SARA-3-5-M	16-09-0642-10	solid	7/25/16
SARA-3M-6-U	16-09-0642-11	solid	7/25/16
SARA-3-6-M	16-09-0642-12	solid	7/25/16
SARA-3M-7-U	16-09-0642-13	solid	7/25/16
SARA-3-7-M	16-09-0642-14	solid	7/25/16
SARA-3M-8-U	16-09-0642-15	solid	7/25/16
SARA-3-8-M	16-09-0642-16	solid	7/25/16
SARA-3M-COMP-U	16-09-0642-17	solid	7/25/16
SARA-3-COMP-M	16-09-0642-18	solid	7/25/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0739 (09-28-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/20/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/5/2016	<b>Analytical Report Date:</b> 9/28/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 23.5 and 23.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead, and zinc in batch 160921S03, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160921S03, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.



<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1L-1-U	Moisture Content
SSP-1-1-L	Moisture Content
SSP-1L-2-U	Moisture Content
SSP-1L-3-U	Moisture Content
SSP-1-2-L	Moisture Content
SSP-1-3-L	Moisture Content
SSP-1L-4-U	Moisture Content
SSP-1-4-L	Moisture Content
SSP-1L-5-U	Moisture Content
SSP-1-5-L	Moisture Content
SSP-1L-6-U	Moisture Content
SSP-1-6-L	Moisture Content
SSP-1L-7-U	Moisture Content
SSP-1-7-L	Moisture Content
SSP-1L-8-U	Moisture Content
SSP-1-8-L	Moisture Content
SSP-1L-COMP-U	Moisture Content
SSP-1-COMP-L	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1L-1-U	Moisture Content
SSP-1-1-L	Moisture Content
SSP-1L-2-U	Moisture Content
SSP-1L-3-U	Moisture Content
SSP-1-2-L	Moisture Content
SSP-1-3-L	Moisture Content
SSP-1L-4-U	Moisture Content
SSP-1-4-L	Moisture Content
SSP-1L-5-U	Moisture Content
SSP-1-5-L	Moisture Content
SSP-1L-6-U	Moisture Content
SSP-1-6-L	Moisture Content
SSP-1L-7-U	Moisture Content
SSP-1-7-L	Moisture Content
SSP-1L-8-U	Moisture Content
SSP-1-8-L	Moisture Content
SSP-1L-COMP-U	Moisture Content

SSP-1-COMP-L	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-1L-1-U	16-09-0739-1	solid	7/20/16
SSP-1-1-L	16-09-0739-2	solid	7/20/16
SSP-1L-2-U	16-09-0739-3	solid	7/20/16
SSP-1L-3-U	16-09-0739-4	solid	7/20/16
SSP-1-2-L	16-09-0739-5	solid	7/20/16
SSP-1-3-L	16-09-0739-6	solid	7/20/16
SSP-1L-4-U	16-09-0739-7	solid	7/20/16
SSP-1-4-L	16-09-0739-8	solid	7/20/16
SSP-1L-5-U	16-09-0739-9	solid	7/20/16
SSP-1-5-L	16-09-0739-10	solid	7/20/16
SSP-1L-6-U	16-09-0739-11	solid	7/20/16
SSP-1-6-L	16-09-0739-12	solid	7/20/16
SSP-1L-7-U	16-09-0739-13	solid	7/20/16
SSP-1-7-L	16-09-0739-14	solid	7/20/16
SSP-1L-8-U	16-09-0739-15	solid	7/20/16
SSP-1-8-L	16-09-0739-16	solid	7/20/16
SSP-1L-COMP-U	16-09-0739-17	solid	7/20/16
SSP-1-COMP-L	16-09-0739-18	solid	7/20/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0739 (11-09-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/20/216	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 23.5 and 23.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160921S03 recovery of the matrix spike was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-1-2-L	cadmium
SSP-1-4-L	cadmium
SSP-1-7-L	cadmium
SSP-1-COMP-L	cadmium

**SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-1L-1-U	16-09-0739-1	solid	7/20/16
SSP-1-1-L	16-09-0739-2	solid	7/20/16
SSP-1L-2-U	16-09-0739-3	solid	7/20/16
SSP-1L-3-U	16-09-0739-4	solid	7/20/16
SSP-1-2-L	16-09-0739-5	solid	7/20/16
SSP-1-3-L	16-09-0739-6	solid	7/20/16
SSP-1L-4-U	16-09-0739-7	solid	7/20/16
SSP-1-4-L	16-09-0739-8	solid	7/20/16
SSP-1L-5-U	16-09-0739-9	solid	7/20/16
SSP-1-5-L	16-09-0739-10	solid	7/20/16
SSP-1L-6-U	16-09-0739-11	solid	7/20/16
SSP-1-6-L	16-09-0739-12	solid	7/20/16
SSP-1L-7-U	16-09-0739-13	solid	7/20/16
SSP-1-7-L	16-09-0739-14	solid	7/20/16
SSP-1L-8-U	16-09-0739-15	solid	7/20/16
SSP-1-8-L	16-09-0739-16	solid	7/20/16
SSP-1L-COMP-U	16-09-0739-17	solid	7/20/16
SSP-1-COMP-L	16-09-0739-18	solid	7/20/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0942 (09-28-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/04/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/5/2016	<b>Analytical Report Date:</b> 9/28/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 25.9 and 25.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.



## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160921S04, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160921S04, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. The matrix spike/matrix spike duplicate was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-3M-1-U	Moisture Content
SSP-3-1-M	Moisture Content
SSP-3M-2-U	Moisture Content
SSP-3-2-M	Moisture Content
SSP-3M-3-U	Moisture Content
SSP-3-3-M	Moisture Content
SSP-3M-4-U	Moisture Content
SSP-3-4-M	Moisture Content
SSP-3M-5-U	Moisture Content
SSP-3-5-M	Moisture Content
SSP-3M-6-U	Moisture Content
SSP-3-6-M	Moisture Content
SSP-3M-7-U	Moisture Content
SSP-3-7-M	Moisture Content
SSP-3M-8-U	Moisture Content
SSP-3-8-M	Moisture Content
SSP-3M-COMP-U	Moisture Content
SSP-3-COMP-M	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-3M-1-U	Moisture Content
SSP-3-1-M	Moisture Content
SSP-3M-2-U	Moisture Content
SSP-3-2-M	Moisture Content
SSP-3M-3-U	Moisture Content
SSP-3-3-M	Moisture Content
SSP-3M-4-U	Moisture Content
SSP-3-4-M	Moisture Content
SSP-3M-5-U	Moisture Content
SSP-3-5-M	Moisture Content
SSP-3M-6-U	Moisture Content
SSP-3-6-M	Moisture Content
SSP-3M-7-U	Moisture Content
SSP-3-7-M	Moisture Content
SSP-3M-8-U	Moisture Content
SSP-3-8-M	Moisture Content
SSP-3M-COMP-U	Moisture Content

SSP-3-COMP-M	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-3M-1-U	16-09-0942-1	solid	8/04/16
SSP-3-1-M	16-09-0942-2	solid	8/04/16
SSP-3M-2-U	16-09-0942-3	solid	8/04/16
SSP-3-2-M	16-09-0942-4	solid	8/04/16
SSP-3M-3-U	16-09-0942-5	solid	8/04/16
SSP-3-3-M	16-09-0942-6	solid	8/04/16
SSP-3M-4-U	16-09-0942-7	solid	8/04/16
SSP-3-4-M	16-09-0942-8	solid	8/04/16
SSP-3M-5-U	16-09-0942-9	solid	8/04/16
SSP-3-5-M	16-09-0942-10	solid	8/04/16
SSP-3M-6-U	16-09-0942-11	solid	8/04/16
SSP-3-6-M	16-09-0942-12	solid	8/04/16
SSP-3M-7-U	16-09-0942-13	solid	8/04/16
SSP-3-7-M	16-09-0942-14	solid	8/04/16
SSP-3M-8-U	16-09-0942-15	solid	8/04/16
SSP-3-8-M	16-09-0942-16	solid	8/04/16
SSP-3M-COMP-U	16-09-0942-17	solid	8/04/16
SSP-3-COMP-M	16-09-0942-18	solid	8/04/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0942 (11-09-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/04/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 25.9 and 25.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160921S04 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. The relative percent difference for the matrix spike/matrix spike duplicate was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-3M-5-U	cadmium
SSP-3M-7-U	cadmium

SSP-3-COMP-M	cadmium
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-3M-1-U	16-09-0942-1	solid	8/04/16
SSP-3-1-M	16-09-0942-2	solid	8/04/16
SSP-3M-2-U	16-09-0942-3	solid	8/04/16
SSP-3-2-M	16-09-0942-4	solid	8/04/16
SSP-3M-3-U	16-09-0942-5	solid	8/04/16
SSP-3-3-M	16-09-0942-6	solid	8/04/16
SSP-3M-4-U	16-09-0942-7	solid	8/04/16
SSP-3-4-M	16-09-0942-8	solid	8/04/16
SSP-3M-5-U	16-09-0942-9	solid	8/04/16
SSP-3-5-M	16-09-0942-10	solid	8/04/16
SSP-3M-6-U	16-09-0942-11	solid	8/04/16
SSP-3-6-M	16-09-0942-12	solid	8/04/16
SSP-3M-7-U	16-09-0942-13	solid	8/04/16
SSP-3-7-M	16-09-0942-14	solid	8/04/16
SSP-3M-8-U	16-09-0942-15	solid	8/04/16
SSP-3-8-M	16-09-0942-16	solid	8/04/16
SSP-3M-COMP-U	16-09-0942-17	solid	8/04/16
SSP-3-COMP-M	16-09-0942-18	solid	8/04/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1183 (09-30-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/05/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/5/2016	<b>Analytical Report Date:</b> 9/30/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 25.7 and 25.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160928S02 and 160926SA3, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160928S02, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-3L-1-U	Moisture Content
SSP-3-1-L	Moisture Content
SSP-3L-2-U	Moisture Content
SSP-3-2-L	Moisture Content
SSP-3L-3-U	Moisture Content
SSP-3-3-L	Moisture Content
SSP-3L-4-U	Moisture Content
SSP-3-4-L	Moisture Content
SSP-3L-5-U	Moisture Content
SSP-3-5-L	Moisture Content
SSP-3L-6-U	Moisture Content
SSP-3-6-L	Moisture Content
SSP-3L-7-U	Moisture Content
SSP-3-7-L	Moisture Content
SSP-3L-8-U	Moisture Content
SSP-3-8-L	Moisture Content
SSP-3L-COMP-U	Moisture Content
SSP-3-COMP-L	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-3L-1-U	Moisture Content
SSP-3-1-L	Moisture Content
SSP-3L-2-U	Moisture Content
SSP-3-2-L	Moisture Content
SSP-3L-3-U	Moisture Content
SSP-3-3-L	Moisture Content
SSP-3L-4-U	Moisture Content
SSP-3-4-L	Moisture Content
SSP-3L-5-U	Moisture Content
SSP-3-5-L	Moisture Content
SSP-3L-6-U	Moisture Content
SSP-3-6-L	Moisture Content
SSP-3L-7-U	Moisture Content
SSP-3-7-L	Moisture Content
SSP-3L-8-U	Moisture Content
SSP-3-8-L	Moisture Content

SSP-3L-COMP-U	Moisture Content
SSP-3-COMP-L	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-3L-1-U	16-09-1183-1	solid	8/05/16
SSP-3-1-L	16-09-1183-2	solid	8/05/16
SSP-3L-2-U	16-09-1183-3	solid	8/05/16
SSP-3-2-L	16-09-1183-4	solid	8/05/16
SSP-3L-3-U	16-09-1183-5	solid	8/05/16
SSP-3-3-L	16-09-1183-6	solid	8/05/16
SSP-3L-4-U	16-09-1183-7	solid	8/05/16
SSP-3-4-L	16-09-1183-8	solid	8/05/16
SSP-3L-5-U	16-09-1183-9	solid	8/05/16
SSP-3-5-L	16-09-1183-10	solid	8/05/16
SSP-3L-6-U	16-09-1183-11	solid	8/05/16
SSP-3-6-L	16-09-1183-12	solid	8/05/16
SSP-3L-7-U	16-09-1183-13	solid	8/05/16
SSP-3-7-L	16-09-1183-14	solid	8/05/16
SSP-3L-8-U	16-09-1183-15	solid	8/05/16
SSP-3-8-L	16-09-1183-16	solid	8/05/16
SSP-3L-COMP-U	16-09-1183-17	solid	8/05/16
SSP-3-COMP-L	16-09-1183-18	solid	8/05/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1183 (11-09-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/05/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 25.7 and 25.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160928S02 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-3-6-L	cadmium
SSP-3L-8-U	cadmium

## **SAMPLE INDEX**

Sample Name	Lab ID	Matrix	Date Collected
SSP-3L-1-U	16-09-1183-1	solid	8/05/16
SSP-3-1-L	16-09-1183-2	solid	8/05/16
SSP-3L-2-U	16-09-1183-3	solid	8/05/16
SSP-3-2-L	16-09-1183-4	solid	8/05/16
SSP-3L-3-U	16-09-1183-5	solid	8/05/16
SSP-3-3-L	16-09-1183-6	solid	8/05/16
SSP-3L-4-U	16-09-1183-7	solid	8/05/16
SSP-3-4-L	16-09-1183-8	solid	8/05/16
SSP-3L-5-U	16-09-1183-9	solid	8/05/16
SSP-3-5-L	16-09-1183-10	solid	8/05/16
SSP-3L-6-U	16-09-1183-11	solid	8/05/16
SSP-3-6-L	16-09-1183-12	solid	8/05/16
SSP-3L-7-U	16-09-1183-13	solid	8/05/16
SSP-3-7-L	16-09-1183-14	solid	8/05/16
SSP-3L-8-U	16-09-1183-15	solid	8/05/16
SSP-3-8-L	16-09-1183-16	solid	8/05/16
SSP-3L-COMP-U	16-09-1183-17	solid	8/05/16
SSP-3-COMP-L	16-09-1183-18	solid	8/05/16

***END OF REPORT***



## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1402 (10-05-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/01/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/5/2016	<b>Analytical Report Date:</b> 10/05/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 21.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160929S04, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160929S04, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-3H-1-U	Moisture Content
SMM-3-1-H	Moisture Content
SMM-3H-2-U	Moisture Content
SMM-3-2-H	Moisture Content
SMM-3H-4-U	Moisture Content
SMM-3-4-H	Moisture Content
SMM-3H-3-U	Moisture Content
SMM-3-3-H	Moisture Content
SMM-3H-5-U	Moisture Content
SMM-3-5-H	Moisture Content
SMM-3H-6-U	Moisture Content
SMM-3-6-H	Moisture Content
SMM-3H-7-U	Moisture Content
SMM-3-7-H	Moisture Content
SMM-3H-8-U	Moisture Content
SMM-3-8-H	Moisture Content
SMM-3H-COMP-U	Moisture Content
SMM-3-COMP-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-3H-1-U	Moisture Content
SMM-3-1-H	Moisture Content
SMM-3H-2-U	Moisture Content
SMM-3-2-H	Moisture Content
SMM-3H-4-U	Moisture Content
SMM-3-4-H	Moisture Content
SMM-3H-3-U	Moisture Content
SMM-3-3-H	Moisture Content
SMM-3H-5-U	Moisture Content
SMM-3-5-H	Moisture Content
SMM-3H-6-U	Moisture Content
SMM-3-6-H	Moisture Content
SMM-3H-7-U	Moisture Content
SMM-3-7-H	Moisture Content
SMM-3H-8-U	Moisture Content
SMM-3-8-H	Moisture Content
SMM-3H-COMP-U	Moisture Content

SARA-1-Comp-L	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-3H-1-U	16-09-1616-1	solid	8/02/16
SMM-3-1-H	16-09-1616-2	solid	8/02/16
SMM-3H-2-U	16-09-1616-3	solid	8/02/16
SMM-3-2-H	16-09-1616-4	solid	8/02/16
SMM-3H-4-U	16-09-1616-5	solid	8/02/16
SMM-3-4-H	16-09-1616-6	solid	8/02/16
SMM-3H-3-U	16-09-1616-7	solid	8/02/16
SMM-3-3-H	16-09-1616-8	solid	8/02/16
SMM-3H-5-U	16-09-1616-9	solid	8/02/16
SMM-3-5-H	16-09-1616-10	solid	8/02/16
SMM-3H-6-U	16-09-1616-11	solid	8/02/16
SMM-3-6-H	16-09-1616-12	solid	8/02/16
SMM-3H-7-U	16-09-1616-13	solid	8/02/16
SMM-3-7-H	16-09-1616-14	solid	8/02/16
SMM-3H-8-U	16-09-1616-15	solid	8/02/16
SMM-3-8-H	16-09-1616-16	solid	8/02/16
SMM-3H-COMP-U	16-09-1616-17	solid	8/02/16
SMM-3-COMP-H	16-09-1616-18	solid	8/02/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1402 (11-09-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/01/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 21.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160929S04 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory did not flag any samples for this sample batch.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SMM-3H-1-U	16-09-1616-1	solid	8/02/16
SMM-3-1-H	16-09-1616-2	solid	8/02/16
SMM-3H-2-U	16-09-1616-3	solid	8/02/16



SMM-3-2-H	16-09-1616-4	solid	8/02/16
SMM-3H-4-U	16-09-1616-5	solid	8/02/16
SMM-3-4-H	16-09-1616-6	solid	8/02/16
SMM-3H-3-U	16-09-1616-7	solid	8/02/16
SMM-3-3-H	16-09-1616-8	solid	8/02/16
SMM-3H-5-U	16-09-1616-9	solid	8/02/16
SMM-3-5-H	16-09-1616-10	solid	8/02/16
SMM-3H-6-U	16-09-1616-11	solid	8/02/16
SMM-3-6-H	16-09-1616-12	solid	8/02/16
SMM-3H-7-U	16-09-1616-13	solid	8/02/16
SMM-3-7-H	16-09-1616-14	solid	8/02/16
SMM-3H-8-U	16-09-1616-15	solid	8/02/16
SMM-3-8-H	16-09-1616-16	solid	8/02/16
SMM-3H-COMP-U	16-09-1616-17	solid	8/02/16
SMM-3-COMP-H	16-09-1616-18	solid	8/02/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1403 (10-03-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/26/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/5/2016	<b>Analytical Report Date:</b> 10/03/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample container for SARA-2-7-L was incorrectly labeled as SARA-2L-7-U, but was corrected by the laboratory based on sample mass data provided by Terraphase. Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 22.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 160929S05 and 160926SA5, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 160929S05, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2L-1-U	Moisture Content
SARA-2-1-L	Moisture Content
SARA-2L-2-U	Moisture Content
SARA-2-2-L	Moisture Content
SARA-2L-3-U	Moisture Content
SARA-2-3-L	Moisture Content
SARA-2L-4-U	Moisture Content
SARA-2-4-L	Moisture Content
SARA-2L-5-U	Moisture Content
SARA-2-5-L	Moisture Content
SARA-2L-6-U	Moisture Content
SARA-2-6-L	Moisture Content
SARA-2L-7-U	Moisture Content
SARA-2-7-L	Moisture Content
SARA-2L-8-U	Moisture Content
SARA-2-8-L	Moisture Content
SARA-2L-COMP-U	Moisture Content
SARA-2-COMP-L	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-2L-1-U	Moisture Content
SARA-2-1-L	Moisture Content
SARA-2L-2-U	Moisture Content
SARA-2-2-L	Moisture Content
SARA-2L-3-U	Moisture Content
SARA-2-3-L	Moisture Content
SARA-2L-4-U	Moisture Content
SARA-2-4-L	Moisture Content
SARA-2L-5-U	Moisture Content
SARA-2-5-L	Moisture Content
SARA-2L-6-U	Moisture Content
SARA-2-6-L	Moisture Content
SARA-2L-7-U	Moisture Content
SARA-2-7-L	Moisture Content
SARA-2L-8-U	Moisture Content
SARA-2-8-L	Moisture Content

SARA-2L-COMP-U	Moisture Content
SARA-2-COMP-L	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-2L-1-U	16-09-1403-1	solid	7/26/16
SARA-2-1-L	16-09-1403-2	solid	7/26/16
SARA-2L-2-U	16-09-1403-3	solid	7/26/16
SARA-2-2-L	16-09-1403-4	solid	7/26/16
SARA-2L-3-U	16-09-1403-5	solid	7/26/16
SARA-2-3-L	16-09-1403-6	solid	7/26/16
SARA-2L-4-U	16-09-1403-7	solid	7/26/16
SARA-2-4-L	16-09-1403-8	solid	7/26/16
SARA-2L-5-U	16-09-1403-9	solid	7/26/16
SARA-2-5-L	16-09-1403-10	solid	7/26/16
SARA-2L-6-U	16-09-1403-11	solid	7/26/16
SARA-2-6-L	16-09-1403-12	solid	7/26/16
SARA-2L-7-U	16-09-1403-13	solid	7/26/16
SARA-2-7-L	16-09-1403-14	solid	7/26/16
SARA-2L-8-U	16-09-1403-15	solid	7/26/16
SARA-2-8-L	16-09-1403-16	solid	7/26/16
SARA-2L-COMP-U	16-09-1403-17	solid	7/26/16
SARA-2-COMP-L	16-09-1403-18	solid	7/26/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1403 (11-09-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/26/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample container for SARA-2-7-L was incorrectly labeled as SARA-2L-7-U, but was corrected by the laboratory based on sample mass data provided by Terraphase. Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 22.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.



## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 160929S05 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

Sample Name	Analyte(s)
SARA-2L-8-U	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARA-2L-1-U	16-09-1403-1	solid	7/26/16
SARA-2-1-L	16-09-1403-2	solid	7/26/16
SARA-2L-2-U	16-09-1403-3	solid	7/26/16
SARA-2-2-L	16-09-1403-4	solid	7/26/16
SARA-2L-3-U	16-09-1403-5	solid	7/26/16
SARA-2-3-L	16-09-1403-6	solid	7/26/16
SARA-2L-4-U	16-09-1403-7	solid	7/26/16
SARA-2-4-L	16-09-1403-8	solid	7/26/16
SARA-2L-5-U	16-09-1403-9	solid	7/26/16
SARA-2-5-L	16-09-1403-10	solid	7/26/16
SARA-2L-6-U	16-09-1403-11	solid	7/26/16
SARA-2-6-L	16-09-1403-12	solid	7/26/16
SARA-2L-7-U	16-09-1403-13	solid	7/26/16
SARA-2-7-L	16-09-1403-14	solid	7/26/16
SARA-2L-8-U	16-09-1403-15	solid	7/26/16
SARA-2-8-L	16-09-1403-16	solid	7/26/16
SARA-2L-COMP-U	16-09-1403-17	solid	7/26/16
SARA-2-COMP-L	16-09-1403-18	solid	7/26/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1616 (10-05-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/02/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/5/2016	<b>Analytical Report Date:</b> 10/05/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 26 and 26.2 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead, and zinc in batch 161001S03, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 161001S03, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-3H-1-U	Moisture Content
SMM-3-1-H	Moisture Content
SMM-3H-2-U	Moisture Content
SMM-3-2-H	Moisture Content
SMM-3H-4-U	Moisture Content
SMM-3-4-H	Moisture Content
SMM-3H-3-U	Moisture Content
SMM-3-3-H	Moisture Content
SMM-3H-5-U	Moisture Content
SMM-3-5-H	Moisture Content
SMM-3H-6-U	Moisture Content
SMM-3-6-H	Moisture Content
SMM-3H-7-U	Moisture Content
SMM-3-7-H	Moisture Content
SMM-3H-8-U	Moisture Content
SMM-3-8-H	Moisture Content
SMM-3H-COMP-U	Moisture Content
SMM-3-COMP-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-3H-1-U	Moisture Content
SMM-3-1-H	Moisture Content
SMM-3H-2-U	Moisture Content
SMM-3-2-H	Moisture Content
SMM-3H-4-U	Moisture Content
SMM-3-4-H	Moisture Content
SMM-3H-3-U	Moisture Content
SMM-3-3-H	Moisture Content
SMM-3H-5-U	Moisture Content
SMM-3-5-H	Moisture Content
SMM-3H-6-U	Moisture Content
SMM-3-6-H	Moisture Content
SMM-3H-7-U	Moisture Content
SMM-3-7-H	Moisture Content
SMM-3H-8-U	Moisture Content
SMM-3-8-H	Moisture Content
SMM-3H-COMP-U	Moisture Content

SARA-1-Comp-L	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-3H-1-U	16-09-1616-1	solid	8/02/16
SMM-3-1-H	16-09-1616-2	solid	8/02/16
SMM-3H-2-U	16-09-1616-3	solid	8/02/16
SMM-3-2-H	16-09-1616-4	solid	8/02/16
SMM-3H-4-U	16-09-1616-5	solid	8/02/16
SMM-3-4-H	16-09-1616-6	solid	8/02/16
SMM-3H-3-U	16-09-1616-7	solid	8/02/16
SMM-3-3-H	16-09-1616-8	solid	8/02/16
SMM-3H-5-U	16-09-1616-9	solid	8/02/16
SMM-3-5-H	16-09-1616-10	solid	8/02/16
SMM-3H-6-U	16-09-1616-11	solid	8/02/16
SMM-3-6-H	16-09-1616-12	solid	8/02/16
SMM-3H-7-U	16-09-1616-13	solid	8/02/16
SMM-3-7-H	16-09-1616-14	solid	8/02/16
SMM-3H-8-U	16-09-1616-15	solid	8/02/16
SMM-3-8-H	16-09-1616-16	solid	8/02/16
SMM-3H-COMP-U	16-09-1616-17	solid	8/02/16
SMM-3-COMP-H	16-09-1616-18	solid	8/02/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1616 (11-09-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/02/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/6/2016	<b>Analytical Report Date:</b> 11/09/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 26.0 and 26.2 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 161001S03 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-3H-2-U	cadmium
SMM-3-2-H	cadmium
SMM-3-3-H	cadmium
SMM-3H-5-U	cadmium

SMM-3-7-H	cadmium
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-3H-1-U	16-09-1616-1	solid	8/02/16
SMM-3-1-H	16-09-1616-2	solid	8/02/16
SMM-3H-2-U	16-09-1616-3	solid	8/02/16
SMM-3-2-H	16-09-1616-4	solid	8/02/16
SMM-3H-4-U	16-09-1616-5	solid	8/02/16
SMM-3-4-H	16-09-1616-6	solid	8/02/16
SMM-3H-3-U	16-09-1616-7	solid	8/02/16
SMM-3-3-H	16-09-1616-8	solid	8/02/16
SMM-3H-5-U	16-09-1616-9	solid	8/02/16
SMM-3-5-H	16-09-1616-10	solid	8/02/16
SMM-3H-6-U	16-09-1616-11	solid	8/02/16
SMM-3-6-H	16-09-1616-12	solid	8/02/16
SMM-3H-7-U	16-09-1616-13	solid	8/02/16
SMM-3-7-H	16-09-1616-14	solid	8/02/16
SMM-3H-8-U	16-09-1616-15	solid	8/02/16
SMM-3-8-H	16-09-1616-16	solid	8/02/16
SMM-3H-COMP-U	16-09-1616-17	solid	8/02/16
SMM-3-COMP-H	16-09-1616-18	solid	8/02/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1736 (10-07-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/27/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/19/2016	<b>Analytical Report Date:</b> 10/07/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 21.9 and 21.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161004S04, the matrix spike and post digestive spike recoveries and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 161004S04, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2L-1-U	Moisture Content
SSP-2-1-L	Moisture Content
SSP-2L-2-U	Moisture Content
SSP-2-2-L	Moisture Content
SSP-2L-3-U	Moisture Content
SSP-2-3-L	Moisture Content
SSP-2L-4-U	Moisture Content
SSP-2-4-L	Moisture Content
SSP-2L-5-U	Moisture Content
SSP-2-5-L	Moisture Content
SSP-2L-6-U	Moisture Content
SSP-2-6-L	Moisture Content
SSP-2L-7-U	Moisture Content
SSP-2-7-L	Moisture Content
SSP-2L-8-U	Moisture Content
SSP-2-8-L	Moisture Content
SSP-2L-COMP-U	Moisture Content
SSP-2-COMP-L	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2L-1-U	Moisture Content
SSP-2-1-L	Moisture Content
SSP-2L-2-U	Moisture Content
SSP-2-2-L	Moisture Content
SSP-2L-3-U	Moisture Content
SSP-2-3-L	Moisture Content
SSP-2L-4-U	Moisture Content
SSP-2-4-L	Moisture Content
SSP-2L-5-U	Moisture Content
SSP-2-5-L	Moisture Content
SSP-2L-6-U	Moisture Content
SSP-2-6-L	Moisture Content
SSP-2L-7-U	Moisture Content
SSP-2-7-L	Moisture Content
SSP-2L-8-U	Moisture Content
SSP-2-8-L	Moisture Content

SSP-2L-COMP-U	Moisture Content
SSP-2-COMP-L	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-2L-1-U	16-09-1736-1	solid	7/27/16
SSP-2-1-L	16-09-1736-2	solid	7/27/16
SSP-2L-2-U	16-09-1736-3	solid	7/27/16
SSP-2-2-L	16-09-1736-4	solid	7/27/16
SSP-2L-3-U	16-09-1736-5	solid	7/27/16
SSP-2-3-L	16-09-1736-6	solid	7/27/16
SSP-2L-4-U	16-09-1736-7	solid	7/27/16
SSP-2-4-L	16-09-1736-8	solid	7/27/16
SSP-2L-5-U	16-09-1736-9	solid	7/27/16
SSP-2-5-L	16-09-1736-10	solid	7/27/16
SSP-2L-6-U	16-09-1736-11	solid	7/27/16
SSP-2-6-L	16-09-1736-12	solid	7/27/16
SSP-2L-7-U	16-09-1736-13	solid	7/27/16
SSP-2-7-L	16-09-1736-14	solid	7/27/16
SSP-2L-8-U	16-09-1736-15	solid	7/27/16
SSP-2-8-L	16-09-1736-16	solid	7/27/16
SSP-2L-COMP-U	16-09-1736-17	solid	7/27/16
SSP-2-COMP-L	16-09-1736-18	solid	7/27/16

***END OF REPORT***



## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1736 (11-10-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/27/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/10/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 21.9 and 21.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 161004S04 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2-2-L	cadmium
SSP-2L-4-U	cadmium
SSP-2-5-L	cadmium
SSP-2-6-L	cadmium

SSP-2L-7-U	cadmium
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-2L-1-U	16-09-1736-1	solid	7/27/16
SSP-2-1-L	16-09-1736-2	solid	7/27/16
SSP-2L-2-U	16-09-1736-3	solid	7/27/16
SSP-2-2-L	16-09-1736-4	solid	7/27/16
SSP-2L-3-U	16-09-1736-5	solid	7/27/16
SSP-2-3-L	16-09-1736-6	solid	7/27/16
SSP-2L-4-U	16-09-1736-7	solid	7/27/16
SSP-2-4-L	16-09-1736-8	solid	7/27/16
SSP-2L-5-U	16-09-1736-9	solid	7/27/16
SSP-2-5-L	16-09-1736-10	solid	7/27/16
SSP-2L-6-U	16-09-1736-11	solid	7/27/16
SSP-2-6-L	16-09-1736-12	solid	7/27/16
SSP-2L-7-U	16-09-1736-13	solid	7/27/16
SSP-2-7-L	16-09-1736-14	solid	7/27/16
SSP-2L-8-U	16-09-1736-15	solid	7/27/16
SSP-2-8-L	16-09-1736-16	solid	7/27/16
SSP-2L-COMP-U	16-09-1736-17	solid	7/27/16
SSP-2-COMP-L	16-09-1736-18	solid	7/27/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-1887 (10-05-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/28/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/19/2016	<b>Analytical Report Date:</b> 10/10/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 28.8 and 28.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161006S01 and 161003SA6, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in 161006S01, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-2H-1-U	Moisture Content
SMM-2-1-H	Moisture Content
SMM-2H-2-U	Moisture Content
SMM-2-2-H	Moisture Content
SMM-2H-3-U	Moisture Content
SMM-2-3-H	Moisture Content
SMM-2H-4-U	Moisture Content
SMM-2-4-H	Moisture Content
SMM-2H-5-U	Moisture Content
SMM-2-5-H	Moisture Content
SMM-2H-6-U	Moisture Content
SMM-2-6-H	Moisture Content
SMM-2H-7-U	Moisture Content
SMM-2-7-H	Moisture Content
SMM-2H-8-U	Moisture Content
SMM-2-8-H	Moisture Content
SMM-2H-Comp-U	Moisture Content
SMM-2-Comp-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-2H-1-U	Moisture Content
SMM-2-1-H	Moisture Content
SMM-2H-2-U	Moisture Content
SMM-2-2-H	Moisture Content
SMM-2H-3-U	Moisture Content
SMM-2-3-H	Moisture Content
SMM-2H-4-U	Moisture Content
SMM-2-4-H	Moisture Content
SMM-2H-5-U	Moisture Content
SMM-2-5-H	Moisture Content
SMM-2H-6-U	Moisture Content
SMM-2-6-H	Moisture Content
SMM-2H-7-U	Moisture Content
SMM-2-7-H	Moisture Content
SMM-2H-8-U	Moisture Content
SMM-2-8-H	Moisture Content



SMM-2H-Comp-U	Moisture Content
SMM-2-Comp-H	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-2H-1-U	16-09-1887-1	solid	7/28/16
SMM-2-1-H	16-09-1887-2	solid	7/28/16
SMM-2H-2-U	16-09-1887-3	solid	7/28/16
SMM-2-2-H	16-09-1887-4	solid	7/28/16
SMM-2H-3-U	16-09-1887-5	solid	7/28/16
SMM-2-3-H	16-09-1887-6	solid	7/28/16
SMM-2H-4-U	16-09-1887-7	solid	7/28/16
SMM-2-4-H	16-09-1887-8	solid	7/28/16
SMM-2H-5-U	16-09-1887-9	solid	7/28/16
SMM-2-5-H	16-09-1887-10	solid	7/28/16
SMM-2H-6-U	16-09-1887-11	solid	7/28/16
SMM-2-6-H	16-09-1887-12	solid	7/28/16
SMM-2H-7-U	16-09-1887-13	solid	7/28/16
SMM-2-7-H	16-09-1887-14	solid	7/28/16
SMM-2H-8-U	16-09-1887-15	solid	7/28/16
SMM-2-8-H	16-09-1887-16	solid	7/28/16
SMM-2H-Comp-U	16-09-1887-17	solid	7/28/16
SMM-2-Comp-H	16-09-1887-18	solid	7/28/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-0277 (11-10-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/28/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/6/2016	<b>Analytical Report Date:</b> 11/10/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 28.8 and 28.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 161006S01 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-2H-1-U	cadmium
SMM-2-1-H	cadmium
SMM-2H-2-U	cadmium
SMM-2H-3-U	cadmium

SMM-2-3-H	cadmium
SMM-2H-4-U	cadmium
SMM-2-4-H	cadmium
SMM-2H-5-U	cadmium
SMM-2-5-H	cadmium
SMM-2H-6-U	cadmium
SMM-2-6-H	cadmium
SMM-2H-7-U	cadmium
SMM-2H-8-U	cadmium
SMM-2H-Comp-U	cadmium

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-2H-1-U	16-09-1887-1	solid	7/28/16
SMM-2-1-H	16-09-1887-2	solid	7/28/16
SMM-2H-2-U	16-09-1887-3	solid	7/28/16
SMM-2-2-H	16-09-1887-4	solid	7/28/16
SMM-2H-3-U	16-09-1887-5	solid	7/28/16
SMM-2-3-H	16-09-1887-6	solid	7/28/16
SMM-2H-4-U	16-09-1887-7	solid	7/28/16
SMM-2-4-H	16-09-1887-8	solid	7/28/16
SMM-2H-5-U	16-09-1887-9	solid	7/28/16
SMM-2-5-H	16-09-1887-10	solid	7/28/16
SMM-2H-6-U	16-09-1887-11	solid	7/28/16
SMM-2-6-H	16-09-1887-12	solid	7/28/16
SMM-2H-7-U	16-09-1887-13	solid	7/28/16
SMM-2-7-H	16-09-1887-14	solid	7/28/16
SMM-2H-8-U	16-09-1887-15	solid	7/28/16
SMM-2-8-H	16-09-1887-16	solid	7/28/16
SMM-2H-Comp-U	16-09-1887-17	solid	7/28/16
SMM-2-Comp-H	16-09-1887-18	solid	7/28/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-2176 (10-17-2016)
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/26/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/19/2016	<b>Analytical Report Date:</b> 10/17/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 22.1 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161008S02, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 161008S02, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**



The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2M-1-U	Moisture Content
SSP-2-1-M	Moisture Content
SSP-2M-2-U	Moisture Content
SSP-2-2-M	Moisture Content
SSP-2M-3-U	Moisture Content
SSP-2-3-M	Moisture Content
SSP-2M-4-U	Moisture Content
SSP-2-4-M	Moisture Content
SSP-2M-5-U	Moisture Content
SSP-2-5-M	Moisture Content
SSP-2M-6-U	Moisture Content
SSP-2-6-M	Moisture Content
SSP-2M-7-U	Moisture Content
SSP-2-7-M	Moisture Content
SSP-2M-8-U	Moisture Content
SSP-2-8-M	Moisture Content
SSP-2M-COMP-U	Moisture Content
SSP-2-COMP-M	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2M-1-U	Moisture Content
SSP-2-1-M	Moisture Content
SSP-2M-2-U	Moisture Content
SSP-2-2-M	Moisture Content
SSP-2M-3-U	Moisture Content
SSP-2-3-M	Moisture Content
SSP-2M-4-U	Moisture Content
SSP-2-4-M	Moisture Content
SSP-2M-5-U	Moisture Content
SSP-2-5-M	Moisture Content
SSP-2M-6-U	Moisture Content
SSP-2-6-M	Moisture Content
SSP-2M-7-U	Moisture Content
SSP-2-7-M	Moisture Content
SSP-2M-8-U	Moisture Content
SSP-2-8-M	Moisture Content

SSP-2M-COMP-U	Moisture Content
SSP-2-COMP-M	Moisture Content

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SSP-2M-1-U	16-09-2176-1	solid	7/26/16
SSP-2-1-M	16-09-2176-2	solid	7/26/16
SSP-2M-2-U	16-09-2176-3	solid	7/26/16
SSP-2-2-M	16-09-2176-4	solid	7/26/16
SSP-2M-3-U	16-09-2176-5	solid	7/26/16
SSP-2-3-M	16-09-2176-6	solid	7/26/16
SSP-2M-4-U	16-09-2176-7	solid	7/26/16
SSP-2-4-M	16-09-2176-8	solid	7/26/16
SSP-2M-5-U	16-09-2176-9	solid	7/26/16
SSP-2-5-M	16-09-2176-10	solid	7/26/16
SSP-2M-6-U	16-09-2176-11	solid	7/26/16
SSP-2-6-M	16-09-2176-12	solid	7/26/16
SSP-2M-7-U	16-09-2176-13	solid	7/26/16
SSP-2-7-M	16-09-2176-14	solid	7/26/16
SSP-2M-8-U	16-09-2176-15	solid	7/26/16
SSP-2-8-M	16-09-2176-16	solid	7/26/16
SSP-2M-COMP-U	16-09-2176-17	solid	7/26/16
SSP-2-COMP-M	16-09-2176-18	solid	7/26/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-2176 (11-10-2016)
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/26/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/10/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 22.1 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 161008S02 recovery of the matrix spike and matrix spike duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SSP-2M-2-U	cadmium

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-2M-1-U	16-09-2176-1	solid	7/26/16
SSP-2-1-M	16-09-2176-2	solid	7/26/16
SSP-2M-2-U	16-09-2176-3	solid	7/26/16
SSP-2-2-M	16-09-2176-4	solid	7/26/16
SSP-2M-3-U	16-09-2176-5	solid	7/26/16
SSP-2-3-M	16-09-2176-6	solid	7/26/16
SSP-2M-4-U	16-09-2176-7	solid	7/26/16
SSP-2-4-M	16-09-2176-8	solid	7/26/16
SSP-2M-5-U	16-09-2176-9	solid	7/26/16
SSP-2-5-M	16-09-2176-10	solid	7/26/16
SSP-2M-6-U	16-09-2176-11	solid	7/26/16
SSP-2-6-M	16-09-2176-12	solid	7/26/16
SSP-2M-7-U	16-09-2176-13	solid	7/26/16
SSP-2-7-M	16-09-2176-14	solid	7/26/16
SSP-2M-8-U	16-09-2176-15	solid	7/26/16
SSP-2-8-M	16-09-2176-16	solid	7/26/16
SSP-2M-COMP-U	16-09-2176-17	solid	7/26/16
SSP-2-COMP-M	16-09-2176-18	solid	7/26/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-2177 (10-17-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/27/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/21/2016	<b>Analytical Report Date:</b> 10/17/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 22.1 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**



No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161008S03, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 161008S03, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. The matrix spike/matrix spike duplicate was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-3H-1-U	Moisture Content
SARA-3-1-H	Moisture Content
SARA-3H-2-U	Moisture Content
SARA-3-2-H	Moisture Content
SARA-3H-3-U	Moisture Content
SARA-3-3-H	Moisture Content
SARA-3H-4-U	Moisture Content
SARA-3-4-H	Moisture Content
SARA-3H-5-U	Moisture Content
SARA-3-5-H	Moisture Content
SARA-3H-6-U	Moisture Content
SARA-3-6-H	Moisture Content
SARA-3H-7-U	Moisture Content
SARA-3-7-H	Moisture Content
SARA-3H-8-U	Moisture Content
SARA-3-8-H	Moisture Content
SARA-3H-COMP-U	Moisture Content
SARA-3-COMP-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-3H-1-U	Moisture Content
SARA-3-1-H	Moisture Content
SARA-3H-2-U	Moisture Content
SARA-3-2-H	Moisture Content
SARA-3H-3-U	Moisture Content
SARA-3-3-H	Moisture Content
SARA-3H-4-U	Moisture Content
SARA-3-4-H	Moisture Content
SARA-3H-5-U	Moisture Content
SARA-3-5-H	Moisture Content
SARA-3H-6-U	Moisture Content
SARA-3-6-H	Moisture Content
SARA-3H-7-U	Moisture Content
SARA-3-7-H	Moisture Content
SARA-3H-8-U	Moisture Content
SARA-3-8-H	Moisture Content

SARA-3H-COMP-U	Moisture Content
SARA-3-COMP-H	Moisture Content

## SAMPLE INDEX

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-3H-1-U	16-09-2177-1	solid	7/27/16
SARA-3-1-H	16-09-2177-2	solid	7/27/16
SARA-3H-2-U	16-09-2177-3	solid	7/27/16
SARA-3-2-H	16-09-2177-4	solid	7/27/16
SARA-3H-3-U	16-09-2177-5	solid	7/27/16
SARA-3-3-H	16-09-2177-6	solid	7/27/16
SARA-3H-4-U	16-09-2177-7	solid	7/27/16
SARA-3-4-H	16-09-2177-8	solid	7/27/16
SARA-3H-5-U	16-09-2177-9	solid	7/27/16
SARA-3-5-H	16-09-2177-10	solid	7/27/16
SARA-3H-6-U	16-09-2177-11	solid	7/27/16
SARA-3-6-H	16-09-2177-12	solid	7/27/16
SARA-3H-7-U	16-09-2177-13	solid	7/27/16
SARA-3-7-H	16-09-2177-14	solid	7/27/16
SARA-3H-8-U	16-09-2177-15	solid	7/27/16
SARA-3-8-H	16-09-2177-16	solid	7/27/16
SARA-3H-COMP-U	16-09-2177-17	solid	7/27/16
SARA-3-COMP-H	16-09-2177-18	solid	7/27/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-09-2177 (11-10-2016)
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/27/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 12/5/2016	<b>Analytical Report Date:</b> 11/10/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	NA
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 22.1 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

Sample duplicate analysis was not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For cadmium in batch 161008S03, recovery of the matrix spike and matrix spike duplicate compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. The matrix spike/matrix spike duplicate RPD was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has J flagged the following results as analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARA-3H-1-U	cadmium
SARA-3H-2-U	cadmium

**SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-3H-1-U	16-09-2177-1	solid	7/27/16
SARA-3-1-H	16-09-2177-2	solid	7/27/16
SARA-3H-2-U	16-09-2177-3	solid	7/27/16
SARA-3-2-H	16-09-2177-4	solid	7/27/16
SARA-3H-3-U	16-09-2177-5	solid	7/27/16
SARA-3-3-H	16-09-2177-6	solid	7/27/16
SARA-3H-4-U	16-09-2177-7	solid	7/27/16
SARA-3-4-H	16-09-2177-8	solid	7/27/16
SARA-3H-5-U	16-09-2177-9	solid	7/27/16
SARA-3-5-H	16-09-2177-10	solid	7/27/16
SARA-3H-6-U	16-09-2177-11	solid	7/27/16
SARA-3-6-H	16-09-2177-12	solid	7/27/16
SARA-3H-7-U	16-09-2177-13	solid	7/27/16
SARA-3-7-H	16-09-2177-14	solid	7/27/16
SARA-3H-8-U	16-09-2177-15	solid	7/27/16
SARA-3-8-H	16-09-2177-16	solid	7/27/16
SARA-3H-COMP-U	16-09-2177-17	solid	7/27/16
SARA-3-COMP-H	16-09-2177-18	solid	7/27/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-10-0022
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/29/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/20/2016	<b>Analytical Report Date:</b> 10/20/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.



## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 25.4 and 25.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161012S06, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SART-3H-1-U	Moisture Content
SART-3-1-H	Moisture Content
SART-3H-2-U	Moisture Content
SART-3-2-H	Moisture Content
SART-3H-3-U	Moisture Content
SART-3-3-H	Moisture Content
SART-3H-4-U	Moisture Content
SART-3-4-H	Moisture Content
SART-3H-5-U	Moisture Content
SART-3-5-H	Moisture Content
SART-3H-6-U	Moisture Content
SART-3-6-H	Moisture Content
SART-3H-7-U	Moisture Content
SART-3-7-H	Moisture Content
SART-3H-8-U	Moisture Content
SART-3-8-H	Moisture Content
SART-3H-COMP-U	Moisture Content
SART-3-COMP-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SART-3H-1-U	Moisture Content
SART-3-1-H	Moisture Content
SART-3H-2-U	Moisture Content
SART-3-2-H	Moisture Content
SART-3H-3-U	Moisture Content
SART-3-3-H	Moisture Content
SART-3H-4-U	Moisture Content
SART-3-4-H	Moisture Content
SART-3H-5-U	Moisture Content
SART-3-5-H	Moisture Content
SART-3H-6-U	Moisture Content
SART-3-6-H	Moisture Content
SART-3H-7-U	Moisture Content
SART-3-7-H	Moisture Content
SART-3H-8-U	Moisture Content
SART-3-8-H	Moisture Content
SART-3H-COMP-U	Moisture Content

SART-3-COMP-H	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SART-3H-1-U	16-10-0022-1	solid	7/29/16
SART-3-1-H	16-10-0022-2	solid	7/29/16
SART-3H-2-U	16-10-0022-3	solid	7/29/16
SART-3-2-H	16-10-0022-4	solid	7/29/16
SART-3H-3-U	16-10-0022-5	solid	7/29/16
SART-3-3-H	16-10-0022-6	solid	7/29/16
SART-3H-4-U	16-10-0022-7	solid	7/29/16
SART-3-4-H	16-10-0022-8	solid	7/29/16
SART-3H-5-U	16-10-0022-9	solid	7/29/16
SART-3-5-H	16-10-0022-10	solid	7/29/16
SART-3H-6-U	16-10-0022-11	solid	7/29/16
SART-3-6-H	16-10-0022-12	solid	7/29/16
SART-3H-7-U	16-10-0022-13	solid	7/29/16
SART-3-7-H	16-10-0022-14	solid	7/29/16
SART-3H-8-U	16-10-0022-15	solid	7/29/16
SART-3-8-H	16-10-0022-16	solid	7/29/16
SART-3H-COMP-U	16-10-0022-17	solid	7/29/16
SART-3-COMP-H	16-10-0022-18	solid	7/29/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-10-0023
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/28/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/21/2016	<b>Analytical Report Date:</b> 10/20/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 25.6, 25.9 and 25.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead in batch 161012S05 and zinc in batch 161012S05 and 161012SA3, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARB-2H-1-U	Moisture Content
SARB-2-1-H	Moisture Content
SARB-2H-2-U	Moisture Content
SARB-2-2-H	Moisture Content
SARB-2H-3-U	Moisture Content
SARB-2-3-H	Moisture Content
SARB-2H-4-U	Moisture Content
SARB-2-4-H	Moisture Content
SARB-2H-5-U	Moisture Content
SARB-2-5-H	Moisture Content
SARB-2H-6-U	Moisture Content
SARB-2-6-H	Moisture Content
SARB-2H-7-U	Moisture Content
SARB-2-7-H	Moisture Content
SARB-2H-8-U	Moisture Content
SARB-2-8-H	Moisture Content
SARB-2H-COMP-U	Moisture Content
SARB-2-COMP-H	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SARB-2H-1-U	Moisture Content
SARB-2-1-H	Moisture Content
SARB-2H-2-U	Moisture Content
SARB-2-2-H	Moisture Content
SARB-2H-3-U	Moisture Content
SARB-2-3-H	Moisture Content
SARB-2H-4-U	Moisture Content
SARB-2-4-H	Moisture Content
SARB-2H-5-U	Moisture Content
SARB-2-5-H	Moisture Content
SARB-2H-6-U	Moisture Content
SARB-2-6-H	Moisture Content
SARB-2H-7-U	Moisture Content
SARB-2-7-H	Moisture Content
SARB-2H-8-U	Moisture Content
SARB-2-8-H	Moisture Content
SARB-2H-COMP-U	Moisture Content



SARB-2-COMP-H	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARB-2H-1-U	16-10-0023-1	solid	7/28/16
SARB-2-1-H	16-10-0023-2	solid	7/28/16
SARB-2H-2-U	16-10-0023-3	solid	7/28/16
SARB-2-2-H	16-10-0023-4	solid	7/28/16
SARB-2H-3-U	16-10-0023-5	solid	7/28/16
SARB-2-3-H	16-10-0023-6	solid	7/28/16
SARB-2H-4-U	16-10-0023-7	solid	7/28/16
SARB-2-4-H	16-10-0023-8	solid	7/28/16
SARB-2H-5-U	16-10-0023-9	solid	7/28/16
SARB-2-5-H	16-10-0023-10	solid	7/28/16
SARB-2H-6-U	16-10-0023-11	solid	7/28/16
SARB-2-6-H	16-10-0023-12	solid	7/28/16
SARB-2H-7-U	16-10-0023-13	solid	7/28/16
SARB-2-7-H	16-10-0023-14	solid	7/28/16
SARB-2H-8-U	16-10-0023-15	solid	7/28/16
SARB-2-8-H	16-10-0023-16	solid	7/28/16
SARB-2H-COMP-U	16-10-0023-17	solid	7/28/16
SARB-2-COMP-H	16-10-0023-18	solid	7/28/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-10-0559
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 8/03/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/21/2016	<b>Analytical Report Date:</b> 10/21/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 27.3 and 27.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161018S04, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 161018S04 recovery of the Matrix Spike and Matrix Spike Duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-3L-1-U	Moisture Content
SMM-3-1-L	Moisture Content
SMM-3L-2-U	Moisture Content
SMM-3L-3-U	Moisture Content
SMM-3-2-L	Moisture Content
SMM-3-3-L	Moisture Content
SMM-3L-4-U	Moisture Content
SMM-3-4-L	Moisture Content
SMM-3L-5-U	Moisture Content
SMM-3-5-L	Moisture Content
SMM-3L-6-U	Moisture Content
SMM-3-6-L	Moisture Content
SMM-3L-7-U	Moisture Content
SMM-3-7-L	Moisture Content
SMM-3L-8-U	Moisture Content
SMM-3-8-L	Moisture Content
SMM-3L-COMP-U	Moisture Content
SMM-3-COMP-L	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-3L-1-U	Moisture Content
SMM-3-1-L	Moisture Content
SMM-3L-2-U	Moisture Content
SMM-3L-3-U	Moisture Content
SMM-3-2-L	Moisture Content
SMM-3-3-L	Moisture Content
SMM-3L-4-U	Moisture Content
SMM-3-4-L	Moisture Content
SMM-3L-5-U	Moisture Content
SMM-3-5-L	Moisture Content
SMM-3L-6-U	Moisture Content
SMM-3-6-L	Moisture Content
SMM-3L-7-U	Moisture Content
SMM-3-7-L	Moisture Content
SMM-3L-8-U	Moisture Content
SMM-3-8-L	Moisture Content
SMM-3L-COMP-U	Moisture Content

SMM-3-COMP-L	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-3L-1-U	16-10-0559-1	solid	8/03/16
SMM-3-1-L	16-10-0559-2	solid	8/03/16
SMM-3L-2-U	16-10-0559-3	solid	8/03/16
SMM-3L-3-U	16-10-0559-4	solid	8/03/16
SMM-3-2-L	16-10-0559-5	solid	8/03/16
SMM-3-3-L	16-10-0559-6	solid	8/03/16
SMM-3L-4-U	16-10-0559-7	solid	8/03/16
SMM-3-4-L	16-10-0559-8	solid	8/03/16
SMM-3L-5-U	16-10-0559-9	solid	8/03/16
SMM-3-5-L	16-10-0559-10	solid	8/03/16
SMM-3L-6-U	16-10-0559-11	solid	8/03/16
SMM-3-6-L	16-10-0559-12	solid	8/03/16
SMM-3L-7-U	16-10-0559-13	solid	8/03/16
SMM-3-7-L	16-10-0559-14	solid	8/03/16
SMM-3L-8-U	16-10-0559-15	solid	8/03/16
SMM-3-8-L	16-10-0559-16	solid	8/03/16
SMM-3L-COMP-U	16-10-0559-17	solid	8/03/16
SMM-3-COMP-L	16-10-0559-18	solid	8/03/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-10-0560
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 7/29/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 10/21/2016	<b>Analytical Report Date:</b> 10/21/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 27.6 and 27.4 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

For moisture, samples were received and analyzed after holding time expired. All other analyses were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**



No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161018S06, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

The laboratory has BU flagged the following as analyzed after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-2L-1-U	Moisture Content
SMM-2-1-L	Moisture Content
SMM-2L-2-U	Moisture Content
SMM-2-2-L	Moisture Content
SMM-2L-3-U	Moisture Content
SMM-2-3-L	Moisture Content
SMM-2L-4-U	Moisture Content
SMM-2-4-L	Moisture Content
SMM-2L-5-U	Moisture Content
SMM-2-5-L	Moisture Content
SMM-2L-6-U	Moisture Content
SMM-2-6-L	Moisture Content
SMM-2L-7-U	Moisture Content
SMM-2-7-L	Moisture Content
SMM-2L-8-U	Moisture Content
SMM-2-8-L	Moisture Content
SMM-2L-Comp-U	Moisture Content
SMM-2-Comp-L	Moisture Content

The laboratory has BV flagged the following as received after holding time expired.

<b>Sample Name</b>	<b>Analyte(s)</b>
SMM-2L-1-U	Moisture Content
SMM-2-1-L	Moisture Content
SMM-2L-2-U	Moisture Content
SMM-2-2-L	Moisture Content
SMM-2L-3-U	Moisture Content
SMM-2-3-L	Moisture Content
SMM-2L-4-U	Moisture Content
SMM-2-4-L	Moisture Content
SMM-2L-5-U	Moisture Content
SMM-2-5-L	Moisture Content
SMM-2L-6-U	Moisture Content
SMM-2-6-L	Moisture Content
SMM-2L-7-U	Moisture Content
SMM-2-7-L	Moisture Content
SMM-2L-8-U	Moisture Content
SMM-2-8-L	Moisture Content
SMM-2L-Comp-U	Moisture Content

SMM-2-Comp-L	Moisture Content
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## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SMM-2L-1-U	16-10-0560-1	solid	7/29/16
SMM-2-1-L	16-10-0560-2	solid	7/29/16
SMM-2L-2-U	16-10-0560-3	solid	7/29/16
SMM-2-2-L	16-10-0560-4	solid	7/29/16
SMM-2L-3-U	16-10-0560-5	solid	7/29/16
SMM-2-3-L	16-10-0560-6	solid	7/29/16
SMM-2L-4-U	16-10-0560-7	solid	7/29/16
SMM-2-4-L	16-10-0560-8	solid	7/29/16
SMM-2L-5-U	16-10-0560-9	solid	7/29/16
SMM-2-5-L	16-10-0560-10	solid	7/29/16
SMM-2L-6-U	16-10-0560-11	solid	7/29/16
SMM-2-6-L	16-10-0560-12	solid	7/29/16
SMM-2L-7-U	16-10-0560-13	solid	7/29/16
SMM-2-7-L	16-10-0560-14	solid	7/29/16
SMM-2L-8-U	16-10-0560-15	solid	7/29/16
SMM-2-8-L	16-10-0560-16	solid	7/29/16
SMM-2L-Comp-U	16-10-0560-17	solid	7/29/16
SMM-2-Comp-L	16-10-0560-18	solid	7/29/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-10-0561
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> Soil
<b>Sampling Date:</b> 8/4/2016	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 11/2/2016	<b>Analytical Report Date:</b> 10/24/2016

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	1	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	2	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P – Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

### DATA PACKAGE COMPLETENESS

The data package included the required elements: chain-of-custody, sample receipt checklist, case narrative, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

All sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the EDD and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.8 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Moisture content was analyzed outside of proper hold times. All other samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

In batch 161014LA3, Zinc was detected in the method blank sample. Associated sample results were qualified with a B-flag by the laboratory. Detected concentrations of zinc were five times the respective method blank result and were thus considered positive results. No other target compounds were detected in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery was not performed for this sample batch.

### **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

### **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch.

### **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 161018S05 and 161014SA3, spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 161018S05 recovery of the Matrix Spike and Matrix Spike Duplicate was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

### **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

### **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

### **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

### **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

### **COMPOUND QUANTITATION**

The laboratory applied the following flag:

- B Analyte was present in the associated method blank.

Results for the following samples/analytes were B-flagged:

<b>Sample</b>	<b>J-Flagged Analytes</b>
SARB-3H-1-U	zinc
SARB-3-1-H	zinc

SARB-3H-2-U	zinc
SARB-3-2-H	zinc
SARB-3H-3-U	zinc
SARB-3-3-H	zinc
SARB-3H-4-U	zinc
SARB-3-4-H	zinc
SARB-3H-5-U	zinc
SARB-3-5-H	zinc
SARB-3H-6-U	zinc
SARB-3-6-H	zinc
SARB-3H-7-U	zinc
SARB-3-7-H	zinc
SARB-3H-8-U	zinc
SARB-3-8-H	zinc
SARB-3H-Comp-U	zinc
SARB-3-Comp-H	zinc

The laboratory applied the following flag:

BV Sample received after holding time expired.

Results for the following samples/analytes were B-flagged:

<b>Sample</b>	<b>B-Flagged Analytes</b>
SARB-3H-1-U	moisture
SARB-3-1-H	moisture
SARB-3H-2-U	moisture
SARB-3-2-H	moisture
SARB-3H-3-U	moisture
SARB-3-3-H	moisture
SARB-3H-4-U	moisture
SARB-3-4-H	moisture
SARB-3H-5-U	moisture
SARB-3-5-H	moisture
SARB-3H-6-U	moisture
SARB-3-6-H	moisture
SARB-3H-7-U	moisture
SARB-3-7-H	moisture
SARB-3H-8-U	moisture

SARB-3-8-H	moisture
SARB-3H-Comp-U	moisture
SARB-3-Comp-H	moisture

The laboratory applied the following flag:

BU Sample analyzed after holding time expired.

Results for the following samples/analytes were B-flagged:

Sample	B-Flagged Analytes
SARB-3H-1-U	moisture
SARB-3-1-H	moisture
SARB-3H-2-U	moisture
SARB-3-2-H	moisture
SARB-3H-3-U	moisture
SARB-3-3-H	moisture
SARB-3H-4-U	moisture
SARB-3-4-H	moisture
SARB-3H-5-U	moisture
SARB-3-5-H	moisture
SARB-3H-6-U	moisture
SARB-3-6-H	moisture
SARB-3H-7-U	moisture
SARB-3-7-H	moisture
SARB-3H-8-U	moisture
SARB-3-8-H	moisture
SARB-3H-Comp-U	moisture
SARB-3-Comp-H	moisture

## SAMPLE INDEX

Sample Name	Lab ID	Matrix	Date Collected
SARB-3H-1-U	16-10-0561-1	soil	8/4/16
SARB-3-1-H	16-10-0561-2	soil	8/4/16
SARB-3H-2-U	16-10-0561-3	soil	8/4/16
SARB-3-2-H	16-10-0561-4	soil	8/4/16
SARB-3H-3-U	16-10-0561-5	soil	8/4/16
SARB-3-3-H	16-10-0561-6	soil	8/4/16



SARB-3H-4-U	16-10-0561-7	soil	8/4/16
SARB-3-4-H	16-10-0561-8	soil	8/4/16
SARB-3H-5-U	16-10-0561-9	soil	8/4/16
SARB-3-5-H	16-10-0561-10	soil	8/4/16
SARB-3H-6-U	16-10-0561-11	soil	8/4/16
SARB-3-6-H	16-10-0561-12	soil	8/4/16
SARB-3H-7-U	16-10-0561-13	soil	8/4/16
SARB-3-7-H	16-10-0561-14	soil	8/4/16
SARB-3H-8-U	16-10-0561-15	soil	8/4/16
SARB-3-8-H	16-10-0561-16	soil	8/4/16
SARB-3H-Comp-U	16-10-0561-17	soil	8/4/16
SARB-3-Comp-H	16-10-0561-18	soil	8/4/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 16-10-0562
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Kristen Stroud	<b>Matrix:</b> soil
<b>Sampling Date:</b> 8/3/16	<b>Number of Samples:</b> 18
<b>Data Validation Report Date:</b> 11/3/16	<b>Analytical Report Date:</b> 10/24/16

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	2	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	2
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P – Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

### DATA PACKAGE COMPLETENESS

The data package included the required elements: chain-of-custody, sample receipt checklist, case narrative, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

All sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the EDD and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 26.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Moisture content was analyzed outside of proper hold times. All other samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery was not performed for this sample batch.

**SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

**BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch.

**MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batcg 161018S07 spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

**TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

**EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

**FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

**REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

**COMPOUND QUANTITATION**

The laboratory applied the following flag:

BV Sample received after holding time expired.

Results for the following samples/analytes were B-flagged:

Sample	B-Flagged Analytes
SARA-3L-1-U	moisture
SARA-3-1-L	moisture
SARA-3L-2-U	moisture
SARA-3-2-L	moisture
SARA-3L-3-U	moisture

SARA-3-3-L	moisture
SARA-3L-4-U	moisture
SARA-3-4-L	moisture
SARA-3L-5-U	moisture
SARA-3-5-L	moisture
SARA-3L-6-U	moisture
SARA-3-6-L	moisture
SARA-3L-7-U	moisture
SARA-3-7-L	moisture
SARA-3L-8-U	moisture
SARA-3-8-L	moisture
SARA-3L-COMP-U	moisture
SARA-3-COMP-L	moisture

The laboratory applied the following flag:

BU Sample analyzed after holding time expired.

Results for the following samples/analytes were B-flagged:

Sample	B-Flagged Analytes
SARA-3L-1-U	moisture
SARA-3-1-L	moisture
SARA-3L-2-U	moisture
SARA-3-2-L	moisture
SARA-3L-3-U	moisture
SARA-3-3-L	moisture
SARA-3L-4-U	moisture
SARA-3-4-L	moisture
SARA-3L-5-U	moisture
SARA-3-5-L	moisture
SARA-3L-6-U	moisture
SARA-3-6-L	moisture
SARA-3L-7-U	moisture
SARA-3-7-L	moisture
SARA-3L-8-U	moisture
SARA-3-8-L	moisture
SARA-3L-COMP-U	moisture
SARA-3-COMP-L	moisture

**SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-3L-1-U	16-10-0562-1	soil	8/3/16
SARA-3-1-L	16-10-0562-2	soil	8/3/16
SARA-3L-2-U	16-10-0562-3	soil	8/3/16
SARA-3-2-L	16-10-0562-4	soil	8/3/16
SARA-3L-3-U	16-10-0562-5	soil	8/3/16
SARA-3-3-L	16-10-0562-6	soil	8/3/16
SARA-3L-4-U	16-10-0562-7	soil	8/3/16
SARA-3-4-L	16-10-0562-8	soil	8/3/16
SARA-3L-5-U	16-10-0562-9	soil	8/3/16
SARA-3-5-L	16-10-0562-10	soil	8/3/16
SARA-3L-6-U	16-10-0562-11	soil	8/3/16
SARA-3-6-L	16-10-0562-12	soil	8/3/16
SARA-3L-7-U	16-10-0562-13	soil	8/3/16
SARA-3-7-L	16-10-0562-14	soil	8/3/16
SARA-3L-8-U	16-10-0562-15	soil	8/3/16
SARA-3-8-L	16-10-0562-16	soil	8/3/16
SARA-3L-COMP-U	16-10-0562-17	soil	8/3/16
SARA-3-COMP-L	16-10-0562-18	soil	8/3/16

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-01-1450
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 1/17/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 2/15/2017	<b>Analytical Report Date:</b> 1/31/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 21.2 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.



## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 170124S03 of the post digestive spikes and zinc in batch 170124S03 of the matrix spikes, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-4H-1-U	17-01-1450-1	solid	1/17/17

SARA-4-1-H	17-01-1450-2	solid	1/17/17
SARA-4H-2-U	17-01-1450-3	solid	1/17/17
SARA-4-2-H	17-01-1450-4	solid	1/17/17
SARA-4H-3-U	17-01-1450-5	solid	1/17/17
SARA-4-3-H	17-01-1450-6	solid	1/17/17
SARA-4H-4-U	17-01-1450-7	solid	1/17/17
SARA-4-4-H	17-01-1450-8	solid	1/17/17
SARA-4H-5-U	17-01-1450-9	solid	1/17/17
SARA-4-5-H	17-01-1450-10	solid	1/17/17
SARA-4H-6-U	17-01-1450-11	solid	1/17/17
SARA-4-6-H	17-01-1450-12	solid	1/17/17
SARA-4H-7-U	17-01-1450-13	solid	1/17/17
SARA-4-7-H	17-01-1450-14	solid	1/17/17
SARA-4H-8-U	17-01-1450-15	solid	1/17/17
SARA-4-8-H	17-01-1450-16	solid	1/17/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-01-1554
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 1/18/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 2/15/2017	<b>Analytical Report Date:</b> 1/31/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at a temperature of 21.2 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 170124S04 of the matrix spikes, the spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-4M-1-U	17-01-1554-1	solid	1/18/17
SARA-4-1-M	17-01-1554-2	solid	1/18/17

SARA-4M-2-U	17-01-1554-3	solid	1/18/17
SARA-4-2-M	17-01-1554-4	solid	1/18/17
SARA-4M-3-U	17-01-1554-5	solid	1/18/17
SARA-4-3-M	17-01-1554-6	solid	1/18/17
SARA-4M-4-U	17-01-1554-7	solid	1/18/17
SARA-4-4-M	17-01-1554-8	solid	1/18/17
SARA-4M-5-U	17-01-1554-9	solid	1/18/17
SARA-4-5-M	17-01-1554-10	solid	1/18/17
SARA-4M-6-U	17-01-1554-11	solid	1/18/17
SARA-4-6-M	17-01-1554-12	solid	1/18/17
SARA-4M-7-U	17-01-1554-13	solid	1/18/17
SARA-4-7-M	17-01-1554-14	solid	1/18/17
SARA-4M-8-U	17-01-1554-15	solid	1/18/17
SARA-4-8-M	17-01-1554-16	solid	1/18/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-01-1737
<b>Project Number:</b> 0102.001.002	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 1/19/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 2/15/2017	<b>Analytical Report Date:</b> 2/02/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	1
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	√	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

Sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 3.8 and 3.2 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.



## **SURROGATE COMPOUND RECOVERY**

For many samples, surrogate compound recovery was out of control limits for decachlorobiphenyl due to a required sample dilution and/or matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. All other surrogate compound recoveries were within acceptable criteria established by the laboratory for the respective testing methods.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For antimony, barium, thallium, and zinc in batch 170126S01, recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control limits due to suspected matrix interference. The associated LCS recovery was in control limits. For thallium in batch 170126S01 and mercury in batch 170130SA2, the MS/MSD RPD was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## SAMPLE INDEX

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SARA-4-1-L	17-01-1737-1	solid	1/19/17
SARA-4-2-L	17-01-1737-2	solid	1/19/17
SARA-4-3-L	17-01-1737-3	solid	1/19/17
SARA-4-4-L	17-01-1737-4	solid	1/19/17
SARA-4-5-L	17-01-1737-5	solid	1/19/17
SARA-4-6-L	17-01-1737-6	solid	1/19/17
SARA-4-7-L	17-01-1737-7	solid	1/19/17
SARA-4-8-L	17-01-1737-8	solid	1/19/17
SARA-4L-1-U	17-01-1737-9	solid	1/19/17
SARA-4L-2-U	17-01-1737-10	solid	1/19/17
SARA-4L-3-U	17-01-1737-11	solid	1/19/17
SARA-4L-4-U	17-01-1737-12	solid	1/19/17
SARA-4L-5-U	17-01-1737-13	solid	1/19/17
SARA-4L-6-U	17-01-1737-14	solid	1/19/17
SARA-4L-7-U	17-01-1737-15	solid	1/19/17
SARA-4L-8-U	17-01-1737-16	solid	1/19/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-01-2301
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 1/24/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 2/16/2017	<b>Analytical Report Date:</b> 2/13/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	√
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	1		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

The laboratory was instructed to change sample name prefix from “SMM-5” to “SMM-4”. All other sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 4.7 and 5.1 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

For zinc in batch 170201LA6, the LCS Recovery Percentage is above control limits, but within the Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean). All other percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

All surrogate compound recoveries were within acceptable criteria established by the laboratory for the respective testing methods.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For Aroclor-1016 and Aroclor-1260 in batch 170202S03 and antimony, selenium, and vanadium in batch 170130S08, the matrix spike/matrix spike duplicate RPD was out of control limits due to suspected matrix interference. The associated LCS recovery was in control limits. For antimony and selenium in batch 170130S08 and mercury in batch 170206S02, the matrix spike/matrix spike duplicate RPD was out of control due to suspected matrix interference. For many analytes in batch 170130S08, spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## COMPOUND QUANTITATION

No flags were assigned to the analytical results.

## SAMPLE INDEX

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SMM-4-1-H	17-01-2301-1	solid	1/24/17
SMM-4H-1-U	17-01-2301-2	solid	1/24/17
SMM-4-2-H	17-01-2301-3	solid	1/24/17
SMM-4H-2-U	17-01-2301-4	solid	1/24/17
SMM-4-3-H	17-01-2301-5	solid	1/24/17
SMM-4H-3-U	17-01-2301-6	solid	1/24/17
SMM-4-4-H	17-01-2301-7	solid	1/24/17
SMM-4H-4-U	17-01-2301-8	solid	1/24/17
SMM-4-5-H	17-01-2301-9	solid	1/24/17
SMM-4H-5-U	17-01-2301-10	solid	1/24/17
SMM-4-6-H	17-01-2301-11	solid	1/24/17
SMM-4H-6-U	17-01-2301-12	solid	1/24/17
SMM-4-7-H	17-01-2301-13	solid	1/24/17
SMM-4H-7-U	17-01-2301-14	solid	1/24/17
SMM-4-8-H	17-01-2301-15	solid	1/24/17
SMM-4H-8-U	17-01-2301-16	solid	1/24/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-01-2401
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 1/25/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 2/17/2017	<b>Analytical Report Date:</b> 2/13/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

The laboratory was instructed to change sample name prefix from "SMM-2" to "SMM-1". All other sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 19.9 and 19.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.



## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 170131S04 of the matrix spikes and zinc in batch 170131S04 of the post digestive spikes, spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SMM-1-1-M	17-01-2401-1	solid	1/25/17
SMM-1M-1-U	17-01-2401-2	solid	1/25/17
SMM-1-2-M	17-01-2401-3	solid	1/25/17
SMM-1M-2-U	17-01-2401-4	solid	1/25/17
SMM-1-3-M	17-01-2401-5	solid	1/25/17
SMM-1M-3-U	17-01-2401-6	solid	1/25/17
SMM-1-4-M	17-01-2401-7	solid	1/25/17
SMM-1M-4-U	17-01-2401-8	solid	1/25/17
SMM-1-5-M	17-01-2401-9	solid	1/25/17
SMM-1M-5-U	17-01-2401-10	solid	1/25/17
SMM-1-6-M	17-01-2401-11	solid	1/25/17
SMM-1M-6-U	17-01-2401-12	solid	1/25/17
SMM-1-7-M	17-01-2401-13	solid	1/25/17
SMM-1M-7-U	17-01-2401-14	solid	1/25/17
SMM-1-8-M	17-01-2401-15	solid	1/25/17
SMM-1M-8-U	17-01-2401-16	solid	1/25/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-01-2544
<b>Project Number:</b> 0102.001.003	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 1/26/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 2/17/2017	<b>Analytical Report Date:</b> 2/13/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

The laboratory was instructed to change sample name prefix from “SMM-5” to “SMM-4”. All other sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 24.5 and 24.7 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 170203S03, spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 170203S03, recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## SAMPLE INDEX

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SMM-4-1-L	17-01-2544-1	solid	1/26/17
SMM-4-2-L	17-01-2544-2	solid	1/26/17
SMM-4-3-L	17-01-2544-3	solid	1/26/17
SMM-4-4-L	17-01-2544-4	solid	1/26/17
SMM-4L-1-U	17-01-2544-5	solid	1/26/17
SMM-4L-2-U	17-01-2544-6	solid	1/26/17
SMM-4L-3-U	17-01-2544-7	solid	1/26/17
SMM-4L-4-U	17-01-2544-8	solid	1/26/17
SMM-4-5-L	17-01-2544-9	solid	1/26/17
SMM-4-6-L	17-01-2544-10	solid	1/26/17
SMM-4-7-L	17-01-2544-11	solid	1/26/17
SMM-4-8-L	17-01-2544-12	solid	1/26/17
SMM-4L-5-U	17-01-2544-13	solid	1/26/17
SMM-4L-6-U	17-01-2544-14	solid	1/26/17
SMM-4L-7-U	17-01-2544-15	solid	1/26/17
SMM-4L-8-U	17-01-2544-16	solid	1/26/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-02-0637
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 2/6/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 2/22/2017	<b>Analytical Report Date:</b> 2/21/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

All sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 20.4 and 20.6 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.



## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For zinc in batch 170210S02 of the matrix spikes and post digestive spikes, spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## **SAMPLE INDEX**

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-4L-1-U	17-02-0637-1	solid	2/06/17
SSP-4L-2-U	17-02-0637-2	solid	2/06/17

SSP-4L-3-U	17-02-0637-3	solid	2/06/17
SSP-4L-4-U	17-02-0637-4	solid	2/06/17
SSP-4-1-L	17-02-0637-5	solid	2/06/17
SSP-4-2-L	17-02-0637-6	solid	2/06/17
SSP-4-3-L	17-02-0637-7	solid	2/06/17
SSP-4-4-L	17-02-0637-8	solid	2/06/17
SSP-4L-5-U	17-02-0637-9	solid	2/06/17
SSP-4L-6-U	17-02-0637-10	solid	2/06/17
SSP-4L-7-U	17-02-0637-11	solid	2/06/17
SSP-4L-8-U	17-02-0637-12	solid	2/06/17
SSP-4-5-L	17-02-0637-13	solid	2/06/17
SSP-4-6-L	17-02-0637-14	solid	2/06/17
SSP-4-7-L	17-02-0637-15	solid	2/06/17
SSP-4-8-L	17-02-0637-16	solid	2/06/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-02-0769
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 2/7/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 3/9/2017	<b>Analytical Report Date:</b> 2/22/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	1
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	√	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

All sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 4.1, 4.9, and 5.0 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.

## **SURROGATE COMPOUND RECOVERY**

For samples SSP-4-6-M and SSP-4-7-M, surrogate Decachlorobiphenyl compound recovery was above the control limits due to a required sample dilution and matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 170213SA11 and many analytes in batch 170213S02, spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For mercury in batch 170215S01, aroclor-1016 and aroclor-1260 in batch 170220S05, and many analytes in batch 170213S02, the recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. For antimony, chromium, and silver in batch 170213S02 and silver in batch 170213SA11, the MS/MSD RPD was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

## SAMPLE INDEX

<b>Sample Name</b>	<b>Lab ID</b>	<b>Matrix</b>	<b>Date Collected</b>
SSP-4M-1-U	17-02-0769-1	solid	2/07/17
SSP-4M-2-U	17-02-0769-2	solid	2/07/17
SSP-4M-3-U	17-02-0769-3	solid	2/07/17
SSP-4-1-M	17-02-0769-4	solid	2/07/17
SSP-4-2-M	17-02-0769-5	solid	2/07/17
SSP-4-3-M	17-02-0769-6	solid	2/07/17
SSP-4M-4-U	17-02-0769-7	solid	2/07/17
SSP-4M-5-U	17-02-0769-8	solid	2/07/17
SSP-4M-6-U	17-02-0769-9	solid	2/07/17
SSP-4-4-M	17-02-0769-10	solid	2/07/17
SSP-4-5-M	17-02-0769-11	solid	2/07/17
SSP-4-6-M	17-02-0769-12	solid	2/07/17
SSP-4M-7-U	17-02-0769-13	solid	2/07/17
SSP-4M-8-U	17-02-0769-14	solid	2/07/17
SSP-4-7-M	17-02-0769-15	solid	2/07/17
SSP-4-8-M	17-02-0769-16	solid	2/07/17

***END OF REPORT***

## DATA VALIDATION REPORT

<b>Project Name:</b> ISRI MSR Treatability Study	<b>Lab Reference Number:</b> 17-02-0911
<b>Project Number:</b> 0102.001.004	<b>Laboratory:</b> Eurofins Calscience
<b>Validated by:</b> Julia Kho	<b>Matrix:</b> solid
<b>Sampling Date:</b> 2/8/2017	<b>Number of Samples:</b> 16
<b>Data Validation Report Date:</b> 3/9/2017	<b>Analytical Report Date:</b> 2/22/2017

The quality control (QC) elements that were reviewed are listed below.

Data Package Completeness	√	Surrogate Compound Recovery	NA
Verification of EDD to Hardcopy Data Package	√	Sample Duplicate Analysis	√
Chain-of-Custody and Sample Preservation	1	Blank Spike/Blank Spike Duplicate Sample Analyses	NA
Holding Times	√	Matrix Spike/Matrix Spike Duplicate Sample Analyses	1
Retention Time Windows	NE	Trip Blank Sample Analysis	NA
Initial Calibration	NE	Equipment Blank Sample Analysis	NA
Initial Calibration Verification	NE	Field Duplicate Sample Analysis	NA
Continuing Calibration	NE	Reference Material Analysis	NA
Method Blank Analysis	√	Compound Quantitation	√
Laboratory Control Samples	√		

√ - Method quality objectives (MQO) and QC criteria have been met. No outliers are noted or discussed.

1 - Quality control results are discussed below, but no data were qualified.

2 - Quality control outliers that impact the reported data were noted. Data qualifiers were issued as discussed in this Data Validation Report.

NA – Not applicable

NE – Not evaluated

P - Pending

### OVERALL ASSESSMENT

All data, as qualified, are acceptable for use.

## **DATA PACKAGE COMPLETENESS**

The data package included the required elements: chain-of-custody, sample receipt checklist, results and QC results.

## **VERIFICATION OF EDD TO HARDCOPY DATA PACKAGE**

Sample results and related quality control data were received in both an electronic and hardcopy format. Electronic data were verified against the laboratory report; no errors were found.

## **CHAIN-OF-CUSTODY**

All sample identification (ID) numbers listed on the chain-of-custody record are consistent with the sample ID reported in the laboratory electronic data deliverable (EDD) and hardcopy data package.

## **SAMPLE PRESERVATION**

Samples were received at temperatures of 21.1 and 21.0 degrees Centigrade. Proper preservation includes samples chilled to  $4 \pm 2$  degrees Celsius.

## **HOLDING TIMES**

Samples were analyzed within the holding time.

## **RETENTION TIME WINDOWS**

Not evaluated.

## **INITIAL CALIBRATION**

Not evaluated.

## **INITIAL CALIBRATION VERIFICATION**

Not evaluated.

## **CONTINUING CALIBRATION**

Not evaluated.

## **METHOD BLANK ANALYSIS**

No target compounds were detected above the reporting limit in the method blank samples.

## **LABORATORY CONTROL SAMPLES**

All percent recovery values for laboratory control samples (LCS) were within acceptable criteria established by the laboratory for the respective testing methods.



## **SURROGATE COMPOUND RECOVERY**

Surrogate compound recovery analysis was not performed for this sample batch.

## **SAMPLE DUPLICATE ANALYSIS**

All percent recoveries and RPDs for sample duplicates were within acceptable criteria established by the laboratory for the respective testing methods and were below the project precision RPD goal of 50.

## **BLANK SPIKE/BLANK SPIKE DUPLICATE SAMPLE ANALYSES**

Blank spike and blank spike duplicate analyses were not performed for this sample batch. Precision was evaluated using the matrix spike and matrix spike duplicate analysis.

## **MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE ANALYSES**

For lead and zinc in batch 170213S03 spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. For cadmium in batch 170213S03, the recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control. In addition, the MS/MSD RPD was out of control due to suspected matrix interference. All other percent recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within acceptable criteria established by the laboratory for the respective testing methods.

## **TRIP BLANK SAMPLE ANALYSIS**

A trip blank sample was not submitted for this sample batch.

## **EQUIPMENT BLANK SAMPLE ANALYSIS**

An equipment blank sample was not submitted for this sample batch.

## **FIELD DUPLICATE ANALYSES**

A field duplicate sample was not collected for this sample batch.

## **REFERENCE MATERIAL ANALYSIS**

No reference material analysis was performed.

## **COMPOUND QUANTITATION**

No flags were assigned to the analytical results.

**SAMPLE INDEX**

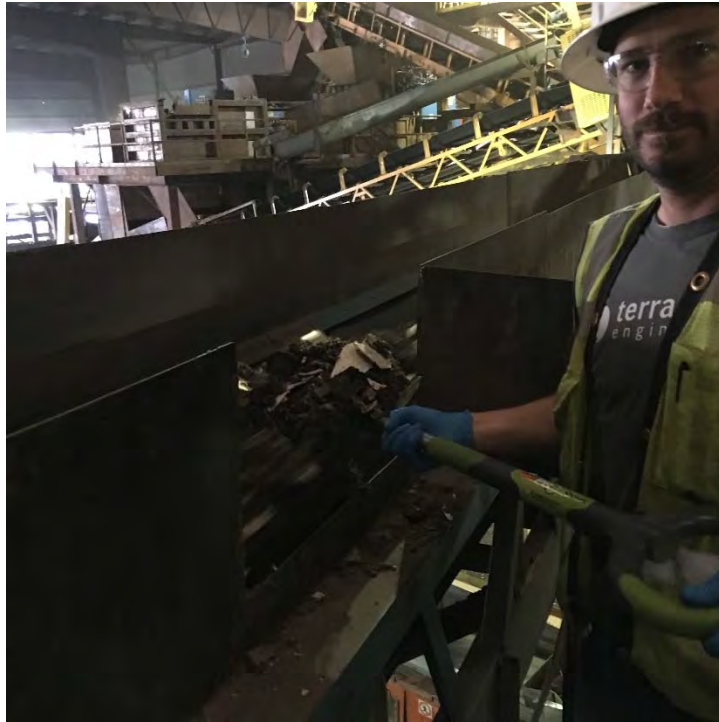
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SSP-4H-2-U	17-02-0911-2	solid	2/08/17
SSP-4H-3-U	17-02-0911-3	solid	2/08/17
SSP-4H-4-U	17-02-0911-4	solid	2/08/17
SSP-4-1-H	17-02-0911-5	solid	2/08/17
SSP-4-2-H	17-02-0911-6	solid	2/08/17
SSP-4-3-H	17-02-0911-7	solid	2/08/17
SSP-4-4-H	17-02-0911-8	solid	2/08/17
SSP-4H-5-U	17-02-0911-9	solid	2/08/17
SSP-4H-6-U	17-02-0911-10	solid	2/08/17
SSP-4H-7-U	17-02-0911-11	solid	2/08/17
SSP-4H-8-U	17-02-0911-12	solid	2/08/17
SSP-4-5-H	17-02-0911-13	solid	2/08/17
SSP-4-6-H	17-02-0911-14	solid	2/08/17
SSP-4-7-H	17-02-0911-15	solid	2/08/17
SSP-4-8-H	17-02-0911-16	solid	2/08/17

***END OF REPORT***

**APPENDIX B-IV**  
**PILOT STUDY**  
**PHOTO LOG**

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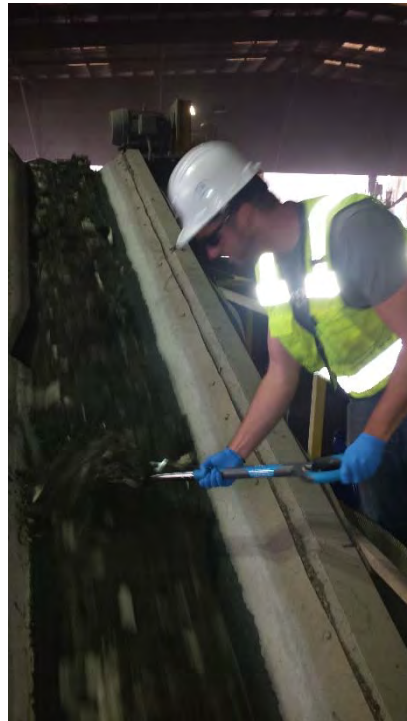




Photograph 1:  
Collection of a half-hourly sample of untreated MSR.

Location: SA Recycling, Anaheim, CA


Date: 7/19/2016

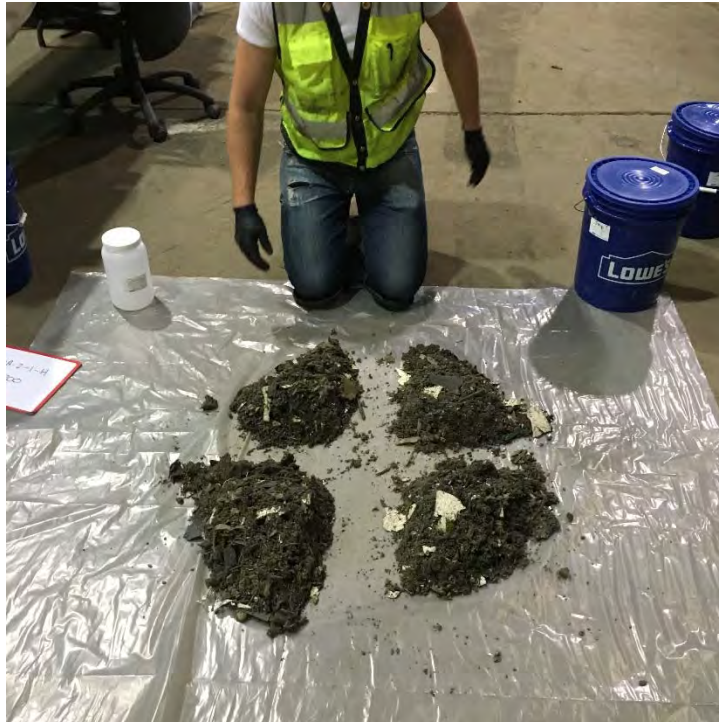


Photograph 2:  
Collection of a half-hourly sample of treated MSR.

Location: SA Recycling, Anaheim, CA

Date: 7/6/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 1</b></p>



Photograph 3: MSR was collected into a 5-gallon bucket and placed onto clean plastic sheeting. Coning and quartering was performed.

Location: SA Recycling, Anaheim, CA


Date: 7/18/2016



Photograph 4: A sample of MSR with a volume of approximately 0.5 gallon.

Location: SA Recycling, Anaheim, CA

Date: 7/18/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 2</b></p>

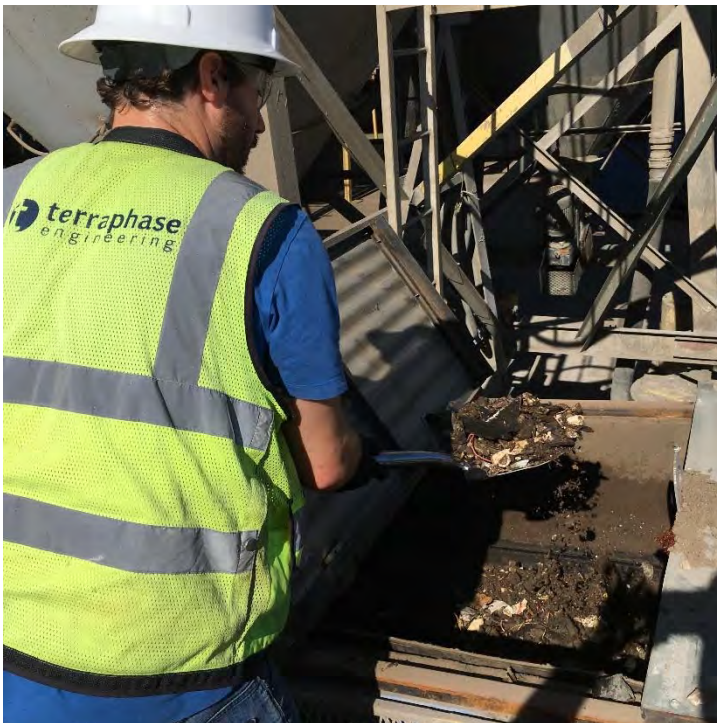




Photograph 5: Metal fragments that were removed from a 0.5-gallon sample of MSR.

Location: SA Recycling, Anaheim, CA


Date: 7/18/2016



Photograph 6: Collection of a half-hourly sample of untreated MSR.

Location: SA Recycling, Bakersfield, CA

Date: 7/20/2016

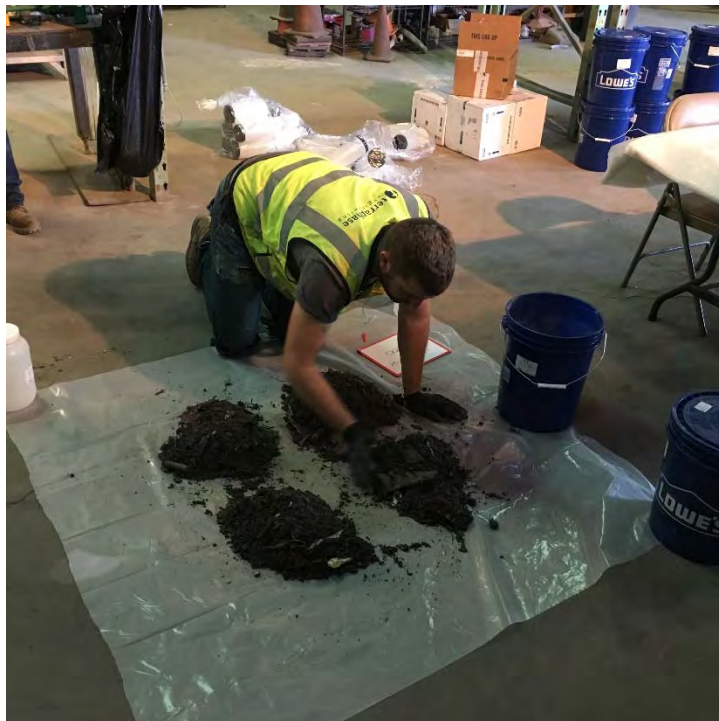
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	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 3</b></p>



Photograph 7:  
Collection of a half-hourly sample of treated MSR.

Location: SA Recycling, Bakersfield, CA


Date: 7/20/2016



Photograph 8: MSR was collected into a 5-gallon bucket and placed onto clean plastic sheeting. Coning and quartering was performed.

Location: SA Recycling, Bakersfield, CA

Date: 7/20/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 4</b></p>





Photograph 9: A sample of MSR with a volume of approximately 0.5 gallon.

Location: SA Recycling, Bakersfield, CA

Date: 8/4/2016



Photograph 10: Metal fragments that were removed from a 0.5-gallon sample of MSR.

Location: SA Recycling, Bakersfield, CA

Date: 8/4/2016

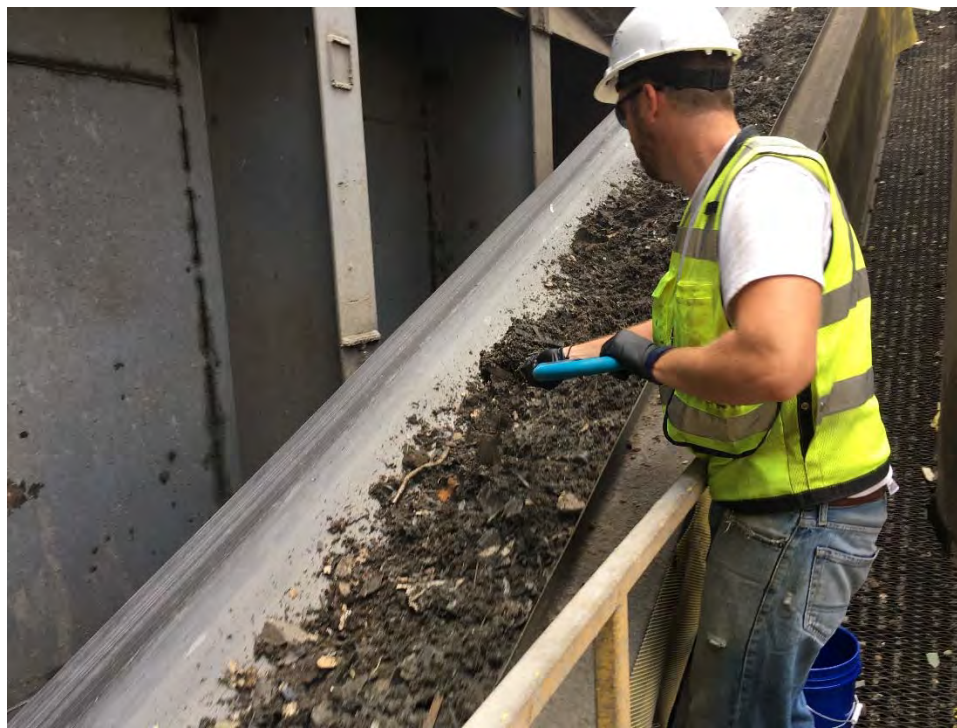
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	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 5</b></p>



Photograph 11:  
Collection of a half-  
hourly sample of  
untreated MSR.

Location: SA Recycling,  
Terminal Island, CA

Date: 7/15/2016



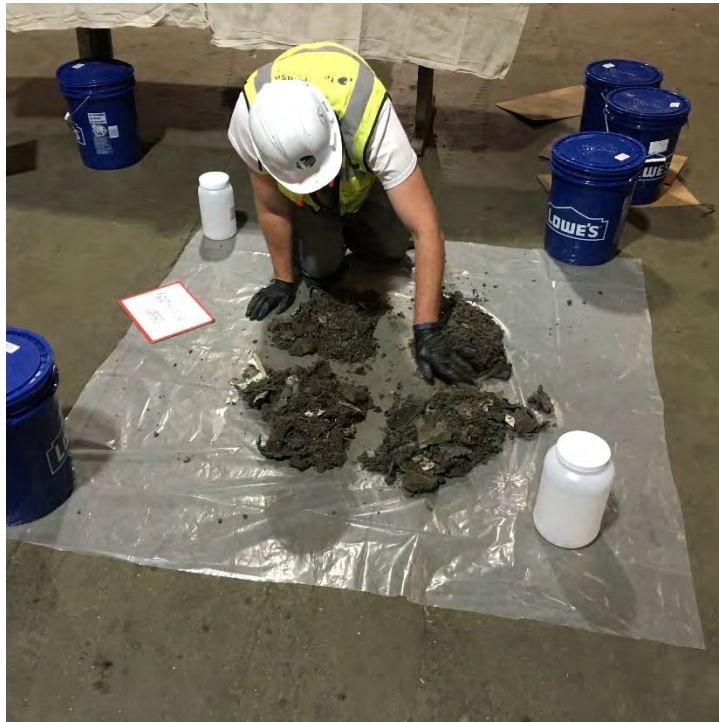
Photograph 12:  
Collection of a half-  
hourly sample of  
treated MSR.

Location: SA Recycling,  
Terminal Island, CA

Date: 7/15/2016

<p><b>SAFETY FIRST</b></p>	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 6</b></p>





Photograph 13: MSR was collected into a 5-gallon bucket and placed onto clean plastic sheeting. Coning and quartering was performed.

Location: SA Recycling, Terminal Island, CA


Date: 7/15/2016

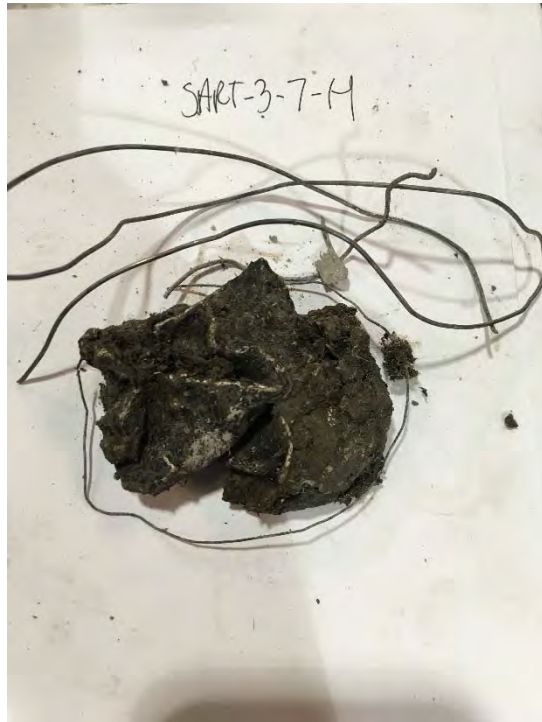


Photograph 14: A sample of MSR with a volume of approximately 0.5 gallon.

Location: SA Recycling, Terminal Island, CA

Date: 7/29/2016

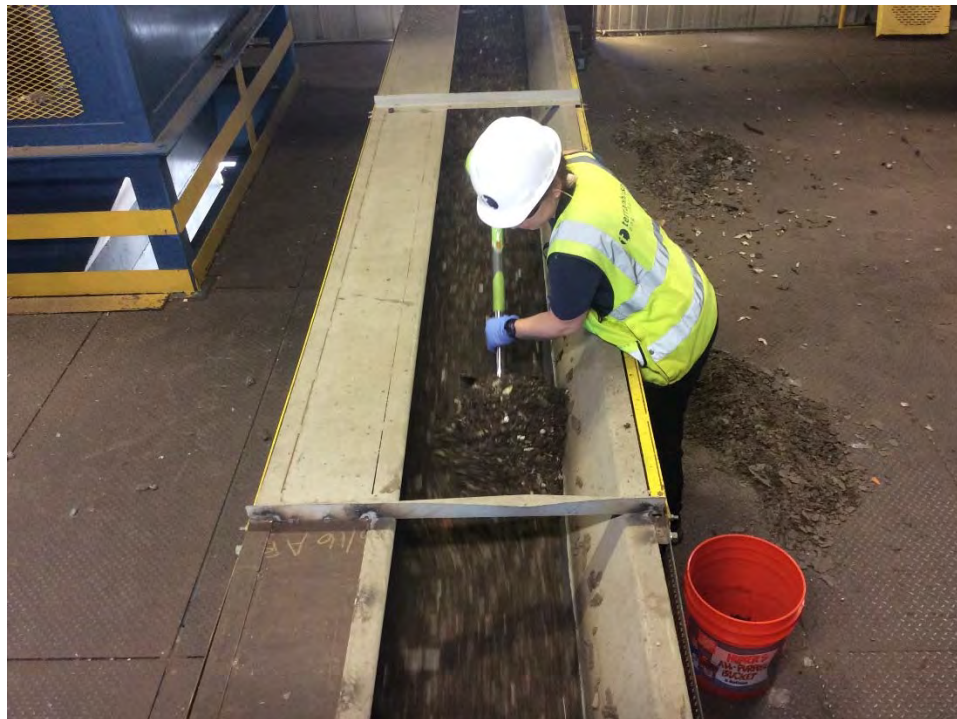
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	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 7</b></p>



Photograph 15: Metal fragments that were removed from a 0.5-gallon sample of MSR.

Location: SA Recycling, Terminal Island, CA


Date: 7/29/2016



Photograph 16: Collection of an hourly MSR sample from the "undersize" untreated stream.

Location: Sims Metal Management, Redwood City, CA

Date: 7/29/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 8</b></p>

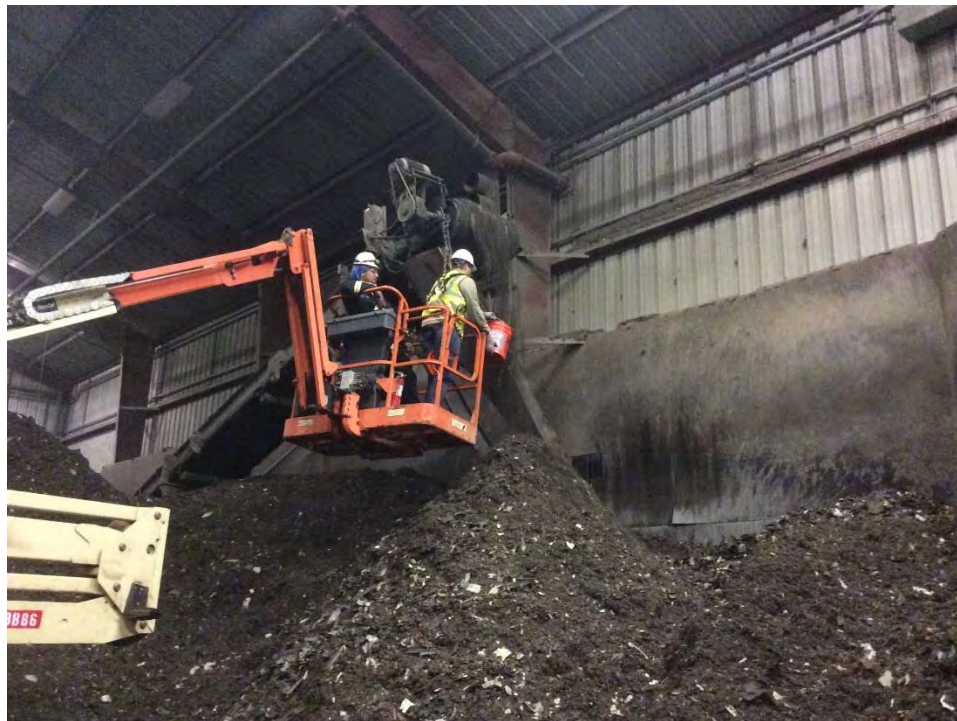




Photograph 17:  
Collection of an hourly MSR sample from the “oversize” untreated stream.

Location: Sims Metal Management, Redwood City, CA

Date: 7/29/2016



Photograph 18:  
Collection of an hourly sample of treated MSR.

Location: Sims Metal Management, Redwood City, CA

Date: 7/29/2016

<p><b>SAFETY FIRST</b></p>	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 9</b></p>





Photograph 19: MSR was collected into a 5-gallon bucket and placed onto clean plastic sheeting. Coning and quartering was performed.

Location: Sims Metal Management, Redwood City, CA


Date: 8/2/2016

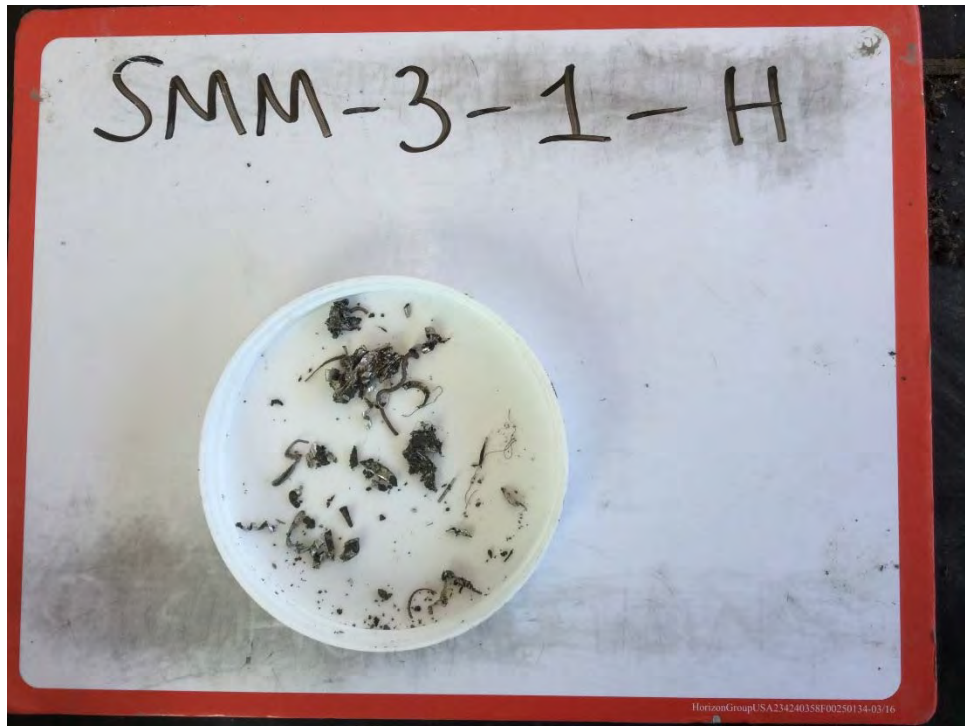


Photograph 20: A sample of MSR with a volume of approximately 0.5 gallon.

Location: Sims Metal Management, Redwood City, CA

Date: 8/2/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 10</b></p>



Photograph 21: Metal fragments that were removed from a 0.5-gallon sample of MSR.

Location: Sims Metal Management, Redwood City, CA


Date: 8/2/2016



Photograph 22: Collection of an hourly sample of untreated MSR.

Location: Schnitzer Steel Products, Oakland, CA,

Date: 7/19/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 11</b></p>





Photograph 23:  
Collection of an hourly sample of treated MSR. The treated MSR stockpile was cleared and the bucket of a skid-steer loader was positioned beneath the discharge stream for approximately one minute. A clean shovel was then used to transfer MSR from the loader to a clean 5-gal bucket.

Location: Schnitzer Steel Products, Oakland, CA,


Date: 7/19/2016



Photograph 24: MSR was collected into a 5-gallon bucket and placed onto clean plastic sheeting. Coning and quartering was performed.

Location: Schnitzer Steel Products, Oakland, CA,

Date: 7/20/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 12</b></p>

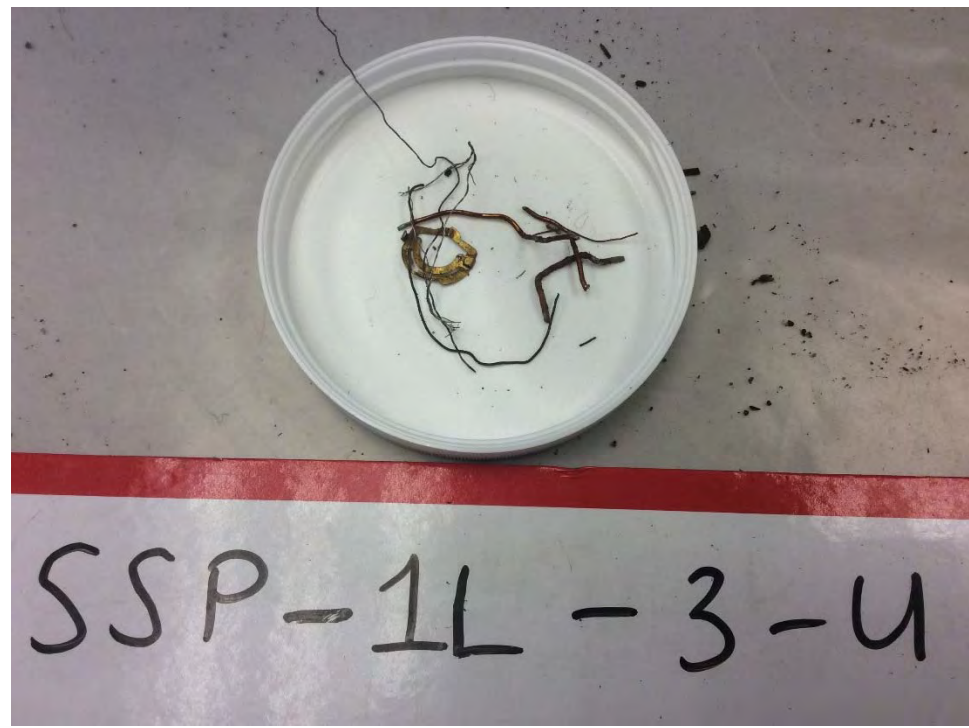




Photograph 25: A sample of MSR with a volume of approximately 0.5 gallon.

Location: Schnitzer Steel Products, Oakland, CA,


Date: 7/20/2016



Photograph 26: Metal fragments that were removed from a 0.5-gallon sample of MSR.

Location: Schnitzer Steel Products, Oakland, CA,

Date: 7/20/2016

<p><b>SAFETY FIRST</b></p> 	<p>CLIENT: Institute of Scrap Recycling Industries – California Chapter</p>	<p><b>PHOTO LOG</b></p>
	<p>PROJECT: MSR Treatability Study</p>	
	<p>PROJECT NUMBER: 0102.001.001</p>	<p><b>PAGE 13</b></p>



**APPENDIX C**  
**PILOT STUDY**  
**DTSC RESULTS**

---



**Table C1**  
**Comparison of Three-Day ISRI and DTSC WET Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Dosage	Untreated Wet Lead						Treated Wet Lead						Untreated Wet Zinc						Treated Wet Zinc					
			DTSC Avg	ISRI Avg	DTSC 90% UCL	DTSC 95% UCL	ISRI 90% UCL	ISRI 95% UCL	DTSC Avg	ISRI Avg	DTSC 90% UCL	DTSC 95% UCL	ISRI 90% UCL	ISRI 95% UCL	DTSC Avg	ISRI Avg	DTSC 90% UCL	DTSC 95% UCL	ISRI 90% UCL	ISRI 95% UCL	DTSC Avg	ISRI Avg	DTSC 90% UCL	DTSC 95% UCL	ISRI 90% UCL	ISRI 95% UCL
SARA	07/07/2016	H	69.0	35.3	76.7	79.0	40.0	41.4	2.73	11.5	3.87	4.32	17.5	20.2	658	403	699	712	433	441	170	144	208	219	219	252
SARA	07/06/2016	M	62.3	44.8	67.8	69.4	49.2	50.5	4.54	15.2	5.42	5.72	21.2	23.5	629	421	662	672	459	471	373	245	409	420	281	291
SARA	07/22/2016	L	59.1	42.7	64.3	65.8	48.4	50.0	11.2	30.4	19.9	23.8	36.1	38.1	694	308	744	759	333	340	489	251	528	540	271	277
SARB	07/20/2016	H	31.8	54.9	37.9	39.7	68.4	73.1	1.87	5.50	2.00	2.12	7.52	8.27	848	713	940	968	1270	1522	241	216	284	296	256	268
SART	07/15/2016	H	40.7	29.9	44.3	45.4	32.3	33.1	2.93	4.76	3.74	3.97	6.51	7.16	518	365	558	570	384	390	177	126	216	228	186	214
SMM	07/21/2016	H	62.6	62.2	73.8	77.1	72.2	75.2	8.57	29.5	12.3	14.1	37.3	40.1	1081	403	1193	1227	436	446	402	289	508	540	311	318
SMM	07/22/2016	L	51.8	45.3	60.0	62.5	52.2	54.5	10.1	34.3	13.6	14.9	37.9	39.0	1341	361	1439	1468	387	394	799	336	878	901	362	370
SSP	07/18/2016	H	48.7	55.9	52.3	53.3	63.5	65.7	3.91	15.9	5.13	5.80	24.3	27.6	1140	738	1235	1262	851	882	192	265	311	365	383	437
SSP	07/19/2016	M	28.1	38.3	34.5	36.4	40.4	41.1	2.79	21.3	3.60	3.85	25.1	26.3	1119	503	1207	1234	532	541	349	380	449	479	460	496
SSP	07/20/2016	L	52.5	49.0	56.4	57.7	59.2	62.0	19.5	40.3	25.3	27.6	44.2	45.5	1453	489	1573	1609	523	533	1037	440	1087	1103	462	468

**Notes:**

UCL = Upper Confidence Limit

WET = Waste Extraction Test

Avg = Average

Concentrations are reported in milligrams per liter (mg/L)

If one or more results were not detected above the laboratory reporting limit (RL), half of the RL was used as a proxy

**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)																						
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel
SARA	7/7/2016	1	H	1	217	73.1	ND	ND	1810	483	ND	ND	14.6	ND	89.7	174	25.9	17.7	8430	14800	754	435	4.38	1.82	13.6	11.2	116
SARA	7/7/2016	1	H	2	188	273	ND	ND	477	501	ND	ND	13.2	30.4	199	205	21.6	26.9	9490	17700	530	432	2.71	1.87	10.1	12.8	452
SARA	7/7/2016	1	H	3	149	67.5	ND	ND	579	382	ND	ND	16.3	10.8	283	375	34.9	24.2	2970	6440	770	447	61.8	72.5	17	12.9	219
SARA	7/7/2016	1	H	4	231	91.2	ND	ND	655	442	ND	ND	12	12	131	261	23.7	19.8	19100	17400	495	444	129	73	10.2	ND	103
SARA	7/7/2016	1	H	5	85.9	106	ND	ND	718	420	ND	ND	21	10.2	120	700	45.5	20.4	6930	11700	774	620	7.86	69.2	16.1	13.8	774
SARA	7/7/2016	1	H	6	271	160	ND	10.2	770	385	ND	ND	45	13.1	201	110	27.8	24.6	19400	10700	762	644	7.69	2.36	13.8	11.4	320
SARA	7/7/2016	1	H	7	165	117	ND	ND	709	446	ND	ND	23.6	17.9	121	57	43.6	18.6	11300	5300	1370	381	5.78	1.46	19	ND	149
SARA	7/7/2016	1	H	8	96.4	292	ND	ND	419	443	ND	ND	14	11	289	86	24.6	22.4	8500	10400	553	340	2.46	1.18	16.2	ND	200
SARA	7/7/2016	1	H	COMP	116	82	ND	ND	435	397	ND	ND	13.4	14.4	133	1070	27.6	31.4	15200	3000	1740	477	2.75	2.29	13.3	17	187
SARA	7/18/2016	2	H	1	60.9	93.8	ND	10.4	228	156	ND	ND	7.86	19.5	50.3	195	8.29	21.2	23000	9060	226	411	3.33	3.76	ND	9.01	64.6
SARA	7/18/2016	2	H	2	75.8	100	ND	ND	220	142	ND	ND	12.2	11.2	75.3	1350	14.4	25.5	1680	6220	573	435	5.65	2.22	8.59	28	187
SARA	7/18/2016	2	H	3	54	854	ND	11.5	244	197	ND	ND	17.4	8.17	501	279	23.5	11.8	8840	16300	668	426	7.54	3.34	18.4	10.5	273
SARA	7/18/2016	2	H	4	87.2	64.6	8.89	10.3	295	214	ND	ND	17.8	18.7	67.8	75.1	19.2	10	12700	10100	752	389	5.12	1.64	8.13	ND	85.4
SARA	7/18/2016	2	H	5	98.6	36.1	ND	13.1	325	157	ND	ND	15.6	12.2	172	116	21	15.1	11200	3800	763	590	4.94	6.79	11.1	8.2	137
SARA	7/18/2016	2	H	6	73	72	ND	11.2	320	172	ND	ND	16.6	12.4	1290	803	21.8	22.7	5210	10000	736	484	12.8	2.46	9.79	12.9	659
SARA	7/18/2016	2	H	7	48.5	84.4	ND	7.72	250	180	ND	ND	13.8	9.01	119	891	19.3	19.1	3060	8940	713	455	4.35	2.04	9.53	19.5	95.2
SARA	7/18/2016	2	H	8	68	104	ND	8.13	269	167	ND	ND	11.8	7.83	610	721	39.9	13.1	4480	1310	601	389	7.13	1.81	13.5	16.1	309
SARA	7/18/2016	2	H	COMP	161	53.5	ND	10.8	279	184	ND	ND	15.5	10.2	376	701	30	16.3	4080	7590	768	507	7.48	2.72	18.2	15	243
SARA	7/27/2016	3	H	1	53.7	74.1	7.04	10.9	273	362	ND	ND	ND	7.89	1240	53.6	22.5	13.3	56800	6300	478	413	2.25	2.68	34.9	9.86	732
SARA	7/27/2016	3	H	2	138	77.3	ND	11.8	343	316	ND	ND	ND	ND	106	38.9	7.86	18.3	11400	17200	274	283	6.55	2.55	9.46	7.73	74.4
SARA	7/27/2016	3	H	3	69.6	48.7	ND	8.18	227	283	ND	ND	6.68	ND	771	55.5	11.6	9.3	4570	9570	280	370	5.07	2.44	13.5	10.1	353
SARA	7/27/2016	3	H	4	37.6	115	ND	7.95	429	291	ND	ND	8.27	7.41	83.1	104	17.4	11.4	36800	18000	558	458	5.63	2.97	11.7	16.4	68
SARA	7/27/2016	3	H	5	100	151	ND	ND	281	326	ND	ND	ND	ND	354	48.2	8.85	10.2	5430	33600	222	227	2.58	2.55	7.23	ND	158
SARA	7/27/2016	3	H	6	196	103	ND	ND	436	326	ND	ND	ND	ND	535	42	10.5	11.5	23000	4790	199	239	3.47	1.6	12.9	9.39	255
SARA	7/27/2016	3	H	7	137	114	ND	8.48	387	235	ND	ND	ND	8.1	54.5	69.2	11.6	14.6	31500	2310	243	316	1.44	1.35	7.51	11.2	50.3
SARA	7/27/2016	3	H	8	94.1	79.1	ND	7.07	534	313	ND	ND	11.2	9.12	97.3	68.6	11.8	13.2	25100	10900	228	249	2.28	1.29	9.11	8.37	66.7
SARA	7/27/2016	3	H	COMP	135	133	ND	7.52	470	381	ND	ND	10	ND	197	131	17.9	9.28	7570	12800	564	267	5.28	1.24	18.2	20.2	147
SARA	7/6/2016	1	M	1	172	346	ND	ND	383	383	ND	ND	ND	ND	77.2	77.2	14.2	14.2	8920	8920	494	494	2.22	5.65	ND	ND	81.5
SARA	7/6/2016	1	M	2	76.3	286	ND	ND	423	247	ND	ND	13.4	ND	227	276	21.7	16.4	12400	32600	558	356	3.34	3.33	12.8	ND	163
SARA	7/6/2016	1	M	3	89	149	ND	ND	512	456	ND	ND	10.6	11.6	66.3	91.2	19.7	21.8	6590	5530	564	536	1.84	7.54	13.4	12.2	95.5
SARA	7/6/2016	1	M	4	177	45.6	ND	10.1	839	277	ND	ND	ND	10.1	183	104	15.4	16.6	10800	9400	358	374	1.81	4.35	11	13.1	137
SARA	7/6/2016	1	M	5	113	84.1	ND	ND	545	367	ND	ND	13.1	10.6	855	131	32.4	18.1	18000	3670	664	380	7.48	7.13	94	ND	897
SARA	7/6/2016	1	M	6	135	87.4	7/6/2016	ND	594	519	ND	ND	10.1	ND	243	73.9	19.2	ND	10300	12000	516	345	2.04	2.72	16.5	13.2	117
SARA	7/6/2016	1	M	7	215	101	ND	ND	656	308	ND	ND	16.8	11.2	87.9	176	25.6	19.5	8650	13800	996	660	12.8	2.46	20.1	21.3	148
SARA	7/6/2016	1	M	8	80.4	170	ND	ND	622	441	ND	ND	15.3	14.1	113	177	20.5	23.2	2890	7910	768	502	5.12	4.94	14.2	11.7	134
SARA	7/6/2016	1	M	COMP	118	134	ND	ND	537	370	ND	ND	11.6	9.86	160	188	23.5	14.3	13300	12200	602	422	3.75	6.79	15.2	11.2	140
SARA	7/19/2016	2	M	1	50.9	107	ND	ND	361	271	ND	ND	7.37	11	72.9	236	13.3	15.8	5980	38800	503	456	n/a	n/a	10.1	12.7	117
SARA	7/19/2016	2	M	2	114	88.6	ND	ND	497	349	ND	ND	9.59	8.93	72.7	154	23.6	39.6	7760	5470	733	638	n/a	n/a	13.5	12.6	88.7
SARA	7/19/2016	2	M	3	111	95.9	ND	ND	540	367	ND	ND	13.1	7.79	97.8	279	24.8	21.4	5950	5350	923	733	n/a	n/a	18.1	14.2	112
SARA	7/19/2016	2	M	4	81.8	42.6	ND	ND	353	272	ND	ND	ND	ND	165	1150	10	22.7	10800	6590	370	366	n/a	n/a	21.8	16.9	111
SARA	7/19/2016	2	M	5	178	103	ND	ND	276	319	ND	ND	ND	ND	63.7	90.1	11.5	14.2	19900	2090	435	433	n/a	n/a	8.97	11.4	61.3
SARA	7/19/2016	2	M	6	108	138	ND	ND	396	582	ND	ND	11.6	8.76	215	122	27	25.8	4430	19100	666	476	n/a	n/a	15.5	12.7	146
SARA	7/19/2016	2	M	7	91.1	112	ND	ND	637	268	ND	ND	8.82	ND	153	362	22.4	17.9	12400	5740	522	422	n/a	n/a	10.2	28.8	91.2
SARA	7/19/2016	2	M	8	121	47.9	ND	ND	383	322	ND	ND	ND	ND	110	265	12.5	17.7	10800	19000	1730	456	n/a	n/a	11.9	13.4	70
SARA	7/19/2016	2	M	COMP	41.4	64.4	ND	ND	256	254	ND	ND	14.8	7.52	42.1	157	11.7	21.1	14700	12300	446	353	n/a	n/a	8.78	14.3	55.2
SARA	7/26/2016	3	M	1	172	66.2	33.3	17.8	166	363	ND	ND	8.46	10.8	104	202	10.6	33.5	2220	5240	416	916	n/a	n/a	7.57	16.2	64.9
SARA	7/26/2016	3	M	2	57.9	233	25.1	12.9	290	353	ND	ND	11.7	13.2	334	843	71.1	21.4	3550	16400	500	640	n/a	n/a	11.2	36	189
SARA	7/26/2016	3	M	3	82.4	5905	16.9	15.9	258	278	ND	ND	14.8	13.7	188	125	27.2	32.1	1730	725	895	818	n/a	n/a	14.7	13.4	125
SARA	7/26/2016	3	M	4	98.6	95.7	18.6	8.74	379	138	ND	ND	18.9	6.76	168	278	34.5	15.8	1280	7580	1050	685	n/a	n/a	18.2	10.3	161
SARA	7/26/2016	3	M	5	95.7	296	58.5	22.7	310	357	ND	ND	11.2	10.2	121	248	21.9	17	2440	16400	619	610	n/a	n/a	10.4	19.8	64.7
SARA	7/26/2016	3	M	6	78.8	101	16.3	40.7	492	267	ND	ND	15.8	7.77	288	227	26.5	22.4	2140	6250	809	456	n/a	n/a	27.5	11.5	239
SARA	7/26/2016	3	M	7	88.8	142	25.4	18	422	346	ND	ND	14.3	8.85	133	177	26.2	14.8	10100	10200	898	584	n/a	n/a	13.2	19.3	113
SARA	7/26/2016	3	M	8	96.9	114	22.2	38.6	357	373	ND	ND	9.69	14.5													

**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)											TOTAL PCBs (mg/kg)		
					Treated Nickel	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Total PCBs	Treated Total PCBs	
SARA	7/7/2016	1	H	1	117	ND	ND	ND	ND	ND	ND	ND	ND	45.4	8080	4430	ND	ND
SARA	7/7/2016	1	H	2	435	ND	ND	11.2	ND	ND	ND	ND	ND	28.8	4300	4040	ND	ND
SARA	7/7/2016	1	H	3	423	ND	ND	ND	ND	ND	ND	ND	ND	44	6260	4160	ND	ND
SARA	7/7/2016	1	H	4	173	ND	ND	ND	ND	ND	ND	ND	ND	30	4090	3620	ND	ND
SARA	7/7/2016	1	H	5	182	ND	ND	12.6	ND	ND	ND	ND	ND	28.4	7320	3830	ND	ND
SARA	7/7/2016	1	H	6	172	ND	ND	ND	ND	ND	ND	ND	ND	36.4	6460	5460	ND	ND
SARA	7/7/2016	1	H	7	71	ND	ND	ND	ND	ND	ND	ND	ND	35	10500	3880	ND	ND
SARA	7/7/2016	1	H	8	87.5	ND	ND	ND	10.2	ND	ND	ND	ND	33.1	5740	3840	ND	ND
SARA	7/7/2016	1	H	COMP	468	ND	ND	ND	ND	ND	ND	ND	ND	37.9	5040	4400	ND	ND
SARA	7/18/2016	2	H	1	163	9.09	10	ND	ND	ND	ND	ND	ND	21.3	1940	3780	ND	ND
SARA	7/18/2016	2	H	2	656	ND	7.94	10.4	ND	ND	ND	ND	ND	27.2	4050	3410	ND	ND
SARA	7/18/2016	2	H	3	341	7.51	ND	ND	9.23	ND	ND	ND	ND	31.7	4870	2230	ND	ND
SARA	7/18/2016	2	H	4	47	11.8	ND	ND	ND	ND	ND	ND	ND	19.3	4420	1900	ND	ND
SARA	7/18/2016	2	H	5	95.6	ND	ND	ND	ND	ND	ND	ND	ND	32.8	4110	3640	ND	ND
SARA	7/18/2016	2	H	6	532	6.72	12.3	ND	ND	ND	ND	ND	ND	39.7	4490	2810	ND	ND
SARA	7/18/2016	2	H	7	777	ND	8.1	14.3	10.3	ND	ND	ND	ND	29.4	3880	3130	ND	ND
SARA	7/18/2016	2	H	8	277	6.9	ND	7.85	9.13	ND	ND	ND	ND	25.7	3500	1850	ND	ND
SARA	7/18/2016	2	H	COMP	445	6.17	8.55	38.9	ND	ND	ND	ND	ND	32.3	4730	2670	ND	ND
SARA	7/27/2016	3	H	1	62.8	ND	ND	7.11	ND	ND	ND	ND	7.22	18.8	5440	3270	ND	ND
SARA	7/27/2016	3	H	2	230	ND	ND	19.5	ND	ND	ND	ND	ND	17.2	2370	2480	ND	ND
SARA	7/27/2016	3	H	3	53.3	ND	ND	ND	ND	ND	ND	ND	8.28	21.3	2490	3380	ND	ND
SARA	7/27/2016	3	H	4	79.5	ND	ND	ND	ND	ND	ND	ND	6.71	23.5	4130	3640	ND	ND
SARA	7/27/2016	3	H	5	305	ND	ND	ND	ND	ND	ND	ND	ND	13.9	1830	1860	ND	ND
SARA	7/27/2016	3	H	6	53.2	ND	ND	ND	ND	ND	ND	ND	ND	22	1810	2760	ND	ND
SARA	7/27/2016	3	H	7	71.4	ND	ND	ND	ND	ND	ND	ND	ND	24.8	2880	3610	ND	ND
SARA	7/27/2016	3	H	8	264	ND	ND	ND	9.19	ND	ND	ND	ND	20.7	2720	2520	ND	ND
SARA	7/27/2016	3	H	COMP	75.1	ND	ND	ND	ND	ND	ND	ND	ND	18.6	5740	2490	ND	ND
SARA	7/6/2016	1	M	1	81.5	ND	ND	ND	ND	ND	ND	ND	ND	27.6	4800	5530	ND	ND
SARA	7/6/2016	1	M	2	161	ND	ND	16.7	ND	ND	ND	ND	ND	26	7120	3990	ND	ND
SARA	7/6/2016	1	M	3	123	ND	ND	11.7	ND	ND	ND	ND	ND	40.9	5570	7990	ND	ND
SARA	7/6/2016	1	M	4	99.3	ND	ND	ND	ND	ND	ND	ND	ND	34.9	5100	5410	ND	ND
SARA	7/6/2016	1	M	5	108	ND	ND	ND	ND	ND	ND	ND	ND	28.7	7660	5330	ND	ND
SARA	7/6/2016	1	M	6	280	ND	ND	34.5	ND	ND	ND	ND	ND	23.8	6490	2790	ND	ND
SARA	7/6/2016	1	M	7	236	ND	ND	ND	ND	ND	ND	ND	ND	33	8430	5560	ND	ND
SARA	7/6/2016	1	M	8	148	ND	ND	ND	ND	ND	ND	ND	ND	35.9	5670	4860	ND	ND
SARA	7/6/2016	1	M	COMP	108	ND	ND	ND	ND	ND	ND	ND	ND	30.4	6280	4180	ND	ND
SARA	7/19/2016	2	M	1	119	ND	ND	ND	ND	ND	ND	ND	ND	26.5	2950	2790	n/a	n/a
SARA	7/19/2016	2	M	2	463	ND	ND	ND	ND	ND	ND	ND	11.7	19.2	4780	4120	n/a	n/a
SARA	7/19/2016	2	M	3	135	ND	ND	ND	7.66	ND	ND	ND	8.32	31.1	12200	4250	n/a	n/a
SARA	7/19/2016	2	M	4	554	ND	ND	ND	7.29	ND	ND	ND	ND	22.4	2660	2760	n/a	n/a
SARA	7/19/2016	2	M	5	106	ND	ND	ND	8.87	ND	ND	ND	ND	29.6	2950	2800	n/a	n/a
SARA	7/19/2016	2	M	6	207	ND	ND	15.9	12.1	ND	ND	ND	ND	20.8	5540	5970	n/a	n/a
SARA	7/19/2016	2	M	7	184	ND	ND	ND	ND	ND	ND	ND	ND	38.4	5660	3360	n/a	n/a
SARA	7/19/2016	2	M	8	152	ND	ND	ND	ND	ND	ND	ND	ND	18.6	3240	11900	n/a	n/a
SARA	7/19/2016	2	M	COMP	126	ND	ND	ND	ND	ND	ND	ND	ND	54.9	3390	3260	n/a	n/a
SARA	7/26/2016	3	M	1	209	ND	ND	ND	10.3	ND	ND	ND	ND	42.2	2070	3040	n/a	n/a
SARA	7/26/2016	3	M	2	679	ND	ND	ND	23.6	ND	ND	6.5	33.8	2450	3130	n/a	n/a	
SARA	7/26/2016	3	M	3	122	ND	ND	ND	ND	ND	ND	9.21	29.6	5200	4930	n/a	n/a	
SARA	7/26/2016	3	M	4	152	ND	ND	ND	ND	ND	ND	12.4	16.9	6480	2830	n/a	n/a	
SARA	7/26/2016	3	M	5	187	ND	ND	ND	9.29	ND	ND	ND	ND	21.9	3590	3130	n/a	n/a
SARA	7/26/2016	3	M	6	125	ND	ND	ND	ND	ND	ND	8.54	27.4	6450	3400	n/a	n/a	
SARA	7/26/2016	3	M	7	213	ND	ND	31.1	ND	ND	ND	9.58	25.2	5370	3240	n/a	n/a	
SARA	7/26/2016	3	M	8	142	ND	ND	ND	ND	ND	ND	5.82	31.3	4330	5200	n/a	n/a	
SARA	7/26/2016	3	M	COMP	89.8	ND	ND	ND	ND	ND	ND	9.27	22.6	5780	2630	n/a	n/a	



**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)																						
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel
SARA	7/22/2016	1	L	1	61.7	90.6	ND	ND	291	306	ND	ND	13.6	12.4	103	81.7	26.5	26.2	5560	8160	647	544	n/a	n/a	13.5	14.7	104
SARA	7/22/2016	1	L	2	122	112	ND	ND	414	354	ND	4.45	17.8	11.6	82.9	172	23	20	7380	27100	690	499	n/a	n/a	13.5	13.1	121
SARA	7/22/2016	1	L	3	99.3	62.1	ND	8.23	386	381	ND	ND	18.1	13.9	151	89.2	31.2	24.5	13900	1630	826	697	n/a	n/a	17.6	15.6	194
SARA	7/22/2016	1	L	4	122	64.9	ND	ND	454	218	ND	ND	13.2	6.61	116	179	23.3	13	2030	6950	731	307	n/a	n/a	15.5	9.36	94
SARA	7/22/2016	1	L	5	64.8	217	ND	ND	260	301	ND	ND	7.21	8.94	316	444	18.9	115	9030	10700	246	415	n/a	n/a	11.6	13.6	186
SARA	7/22/2016	1	L	6	109	118	ND	ND	430	377	ND	ND	12.9	12.6	497	230	21.7	20.2	3580	22300	481	495	n/a	n/a	22.3	16.9	304
SARA	7/22/2016	1	L	7	96.8	95.3	ND	7.64	376	394	ND	ND	15.5	10.8	153	163	65.5	20.8	5450	6850	671	501	n/a	n/a	14.9	14	132
SARA	7/22/2016	1	L	8	74.9	132	ND	ND	600	466	ND	ND	17	11.9	166	79.2	22.7	38.5	3910	9260	610	365	n/a	n/a	16.8	10.6	130
SARA	7/22/2016	1	L	COMP	121	72.6	ND	ND	467	265	ND	ND	16.5	13.3	254	634	30.4	24.8	8040	10500	770	580	n/a	n/a	21.1	25.3	258
SARA	7/26/2016	2	L	1	111	137	ND	ND	325	350	ND	ND	7.99	ND	256	301	15.9	13.6	12500	8130	700	357	n/a	n/a	21.9	48.6	483
SARA	7/26/2016	2	L	2	91.8	38.2	8.24	ND	473	431	ND	ND	8.62	7.13	156	98	19.4	15.6	78000	4790	530	527	n/a	n/a	14.8	12.2	173
SARA	7/26/2016	2	L	3	74.8	88	ND	ND	371	327	ND	ND	11	ND	101	71.6	19.6	11.6	6000	7890	597	324	n/a	n/a	12.9	6.83	119
SARA	7/26/2016	2	L	4	184	305	ND	ND	403	193	ND	ND	7.39	ND	91	61	11.7	9.45	7470	15700	363	405	n/a	n/a	9.41	9.39	136
SARA	7/26/2016	2	L	5	110	182	ND	ND	432	436	ND	ND	ND	9.59	78.9	176	16.1	15.1	37900	9550	272	377	n/a	n/a	8.99	9.75	74.2
SARA	7/26/2016	2	L	6	64.4	71.6	ND	ND	398	218	ND	ND	11.7	ND	80.7	128	15.3	10.6	3540	12800	541	321	n/a	n/a	14	11.3	93.8
SARA	7/26/2016	2	L	7	81	95.7	ND	ND	227	144	ND	ND	10.3	ND	297	67.7	12.9	8.13	2900	1310	450	293	n/a	n/a	10.7	8.42	133
SARA	7/26/2016	2	L	8	74.3	84.4	ND	9.19	266	257	ND	ND	8.18	ND	102	72.7	15.8	20.6	6700	8080	919	545	n/a	n/a	10.2	12.3	88.7
SARA	7/26/2016	2	L	COMP	44.3	63.1	ND	6.4	255	206	ND	ND	8.73	8.6	127	83.9	10.1	14.2	11800	2770	381	487	n/a	n/a	9.07	10.7	102
SARA	7/25/2016	3	L	1	42.5	72.8	ND	8.79	168	288	ND	ND	ND	11.5	1510	152	19.2	21.7	6370	22000	327	682	n/a	n/a	8.41	13.3	63.4
SARA	7/25/2016	3	L	2	80.7	113	ND	ND	400	257	ND	ND	11.9	13.6	170	244	18.9	17.9	15200	14400	536	382	n/a	n/a	15.4	11.8	194
SARA	7/25/2016	3	L	3	249	373	ND	ND	234	273	ND	ND	9.77	8.14	338	483	14.3	14.1	12400	7300	518	506	n/a	n/a	12	18.5	178
SARA	7/25/2016	3	L	4	50.5	106.6	ND	ND	269	323	ND	ND	9.78	9.9	441	326	18.4	17.6	7330	2550	449	526	n/a	n/a	14.6	15.5	215
SARA	7/25/2016	3	L	5	69	63.7	ND	7.18	558	328	ND	ND	10.7	7.58	121	162	16.5	27.3	7940	5030	718	690	n/a	n/a	13.4	17.3	97.1
SARA	7/25/2016	3	L	6	66.8	144	ND	ND	312	353	1.91	ND	10.6	11	152	459	20.1	35.3	8240	3380	634	639	n/a	n/a	13.1	20.9	138
SARA	7/25/2016	3	L	7	55.7	43.2	ND	ND	389	238	ND	ND	13.7	7.78	335	232	24	14.8	9070	12100	848	483	n/a	n/a	18.6	14.4	231
SARA	7/25/2016	3	L	8	61.5	93	ND	6.57	491	243	ND	ND	13.9	9.59	484	326	25.5	37.5	2810	5760	599	539	n/a	n/a	19.8	19.4	286
SARA	7/25/2016	3	L	COMP	68.7	52.8	ND	ND	385	273	ND	ND	14	10.4	517	230	24.6	16	3470	11300	669	491	n/a	n/a	23.8	12.7	247
SARB	7/20/2016	1	H	1	258	ND	ND	ND	384	261	ND	ND	ND	ND	5500	188	92.6	99.8	8810	9780	1060	740	2.75	2.12	ND	ND	3290
SARB	7/20/2016	1	H	2	76.6	ND	ND	ND	389	233	ND	ND	ND	ND	661	240	ND	29.3	10400	3630	1300	1520	3.16	1.86	ND	ND	721
SARB	7/20/2016	1	H	3	ND	ND	ND	ND	414	302	ND	ND	ND	ND	186	734	ND	144	39900	23000	1260	862	3.29	2.36	ND	ND	258
SARB	7/20/2016	1	H	4	ND	ND	ND	ND	415	126	ND	ND	ND	ND	233	219	ND	ND	7660	20800	1470	821	3.29	2.89	ND	ND	357
SARB	7/20/2016	1	H	5	ND	ND	ND	ND	379	134	ND	ND	ND	ND	746	586	494	ND	6480	5360	2120	1530	4.13	2.86	ND	ND	571
SARB	7/20/2016	1	H	6	ND	ND	ND	ND	495	147	ND	ND	ND	ND	294	1180	51.4	ND	4570	15000	1950	1290	3.84	3.05	ND	93.9	350
SARB	7/20/2016	1	H	7	119	ND	ND	ND	360	155	ND	ND	ND	ND	894	200	219	ND	14800	3710	1820	1010	3.9	2.67	ND	ND	629
SARB	7/20/2016	1	H	8	ND	58.2	ND	ND	381	108	ND	ND	ND	ND	241	1660	ND	40.4	15500	3220	1520	1050	4.5	2.86	ND	ND	387
SARB	7/20/2016	1	H	COMP	ND	ND	ND	ND	278	137	ND	ND	ND	ND	283	479	57.5	ND	6900	4000	1790	1040	3.57	2.37	ND	ND	510
SARB	7/28/2016	2	H	1	76.6	105	15.4	13.4	746	406	ND	ND	24.6	17.1	459	613	35.9	32	12400	8470	616	545	3.29	2.02	39.1	30.8	321
SARB	7/28/2016	2	H	2	119	89.5	9.31	15.5	724	221	ND	ND	13.8	20	111	228	17.5	23.9	15500	10700	482	604	0.652	1.98	20.8	24.1	128
SARB	7/28/2016	2	H	3	158	244	ND	8.08	775	427	ND	ND	13.5	13.6	192	513	24.7	19.3	14600	8730	477	503	1.62	14.6	23	18.9	231
SARB	7/28/2016	2	H	4	233	221	16.5	12.8	603	324	ND	ND	21.9	15.9	698	128	26	18.2	8540	12200	562	542	1.24	1.89	34.5	20.7	384
SARB	7/28/2016	2	H	5	127	104	ND	16.4	466	214	ND	ND	11.3	18.2	1180	225	145	48.7	33900	2720	604	534	1.52	1.73	50.7	22.7	547
SARB	7/28/2016	2	H	6	50.8	90.2	12.7	13	603	310	ND	ND	20.3	17.5	256	234	53	31	12000	17900	524	861	5.9	2.01	28.7	28.2	354
SARB	7/28/2016	2	H	7	59.9	147	12.7	7.71	210	544	ND	ND	27.4	15.3	225	338	178	28.8	10500	17900	736	454	2.58	2.41	24.7	28.2	191
SARB	7/28/2016	2	H	8	158	114	ND	10.4	817	412	ND	ND	32.4	68.7	250	644	22.5	49.6	16300	19800	394	687	2.06	2.81	22.2	34.9	203
SARB	7/28/2016	2	H	COMP	97.5	255	10.3	10.1	452	407	ND	ND	13.8	10.3	510	123	20.1	18.1	14100	16000	510	561	1.88	1.5	32.9	14.8	269
SARB	8/4/2016	3	H	1	138	81.4	9.48	18.9	471	379	ND	ND	31.9	17.5	165	116	28.5	35	14300	7020	1670	769	3.33	2.52	20	19.5	552
SARB	8/4/2016	3	H	2	233	130	ND	21.3	407	463	ND	ND	13.9	23.7	151	340	29.9	43.5	7510	23600	530	770	1.66	2.2	13	25.6	182
SARB	8/4/2016	3	H	3	143	145	11.3	14.9	496	399	ND	ND	25.5	22.6	196	853	84.9	46.5	13300	6500	891	5460	2.23	1.69	21.5	26.6	197
SARB	8/4/2016	3	H	4	179	119	17	16.5	408	317	ND	ND	23.9	21.5	219	160	171	40.4	27600	7980	679	809	2.11	2.1	26.1	18.5	247
SARB	8/4/2016	3	H	5	110	116	ND	19.5	510	346	ND	ND	17.5	21.2	826	232	24.3	59.4	11700	6780	2560	652	2.7	2.15	19.5	23.9	429
SARB	8/4/2016	3	H	6	168	127	9.91	16.4	568	458	ND	ND	26.2	46.1	954	555	57.3	114	25000	6750	782	810	5.5	2.07	77.9	25.5	713
SARB	8/4/2016	3	H	7	168	134	8.48	18.1	672	383	ND	ND	34.3	28.1	1400	341	3250	29.4	15000	57000	838	652	0.724	3.41	275	34.1	2690
SARB	8/4/2016	3	H	8	120	91.7	12.8	18	438	287	ND	ND	24.4	23.2	278	642	309	31.2	13800	16900	724	2320	2.55	2.15	25	26.8	208
SARB	8/4/2016	3	H	COMP	139																						



**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)											TOTAL PCBs (mg/kg)	
					Treated Nickel	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Total PCBs	Treated Total PCBs
SARA	7/22/2016	1	L	1	92.9	ND	ND	ND	ND	ND	ND	ND	18	5630	4540	n/a	n/a
SARA	7/22/2016	1	L	2	137	ND	ND	ND	9.12	ND	ND	6.85	20.8	6030	3980	n/a	n/a
SARA	7/22/2016	1	L	3	275	ND	ND	7.7	ND	ND	7.34	23.2	7360	6380	n/a	n/a	
SARA	7/22/2016	1	L	4	117	ND	ND	ND	ND	ND	ND	10.8	5830	3670	n/a	n/a	
SARA	7/22/2016	1	L	5	256	ND	ND	ND	8.62	ND	ND	ND	33.8	3040	4540	n/a	n/a
SARA	7/22/2016	1	L	6	266	ND	ND	ND	ND	ND	ND	6.94	18.3	6030	4850	n/a	n/a
SARA	7/22/2016	1	L	7	137	ND	ND	9.82	ND	ND	ND	6.65	29	6010	4510	n/a	n/a
SARA	7/22/2016	1	L	8	85	ND	ND	ND	ND	ND	ND	ND	18.4	5800	3200	n/a	n/a
SARA	7/22/2016	1	L	COMP	739	ND	ND	11.2	ND	ND	ND	7.24	26.2	7670	5710	n/a	n/a
SARA	7/26/2016	2	L	1	238	ND	ND	ND	38.9	ND	ND	ND	22.3	4300	3230	n/a	n/a
SARA	7/26/2016	2	L	2	115	ND	ND	11.1	ND	ND	ND	18.8	ND	4360	3920	n/a	n/a
SARA	7/26/2016	2	L	3	91.1	ND	ND	ND	ND	ND	ND	ND	19.5	4500	2340	n/a	n/a
SARA	7/26/2016	2	L	4	50.7	ND	ND	ND	ND	ND	ND	ND	12	3880	3620	n/a	n/a
SARA	7/26/2016	2	L	5	114	ND	ND	41.2	ND	ND	ND	ND	13.3	3610	3160	n/a	n/a
SARA	7/26/2016	2	L	6	104	ND	ND	ND	17.7	ND	ND	ND	22.1	4770	3240	n/a	n/a
SARA	7/26/2016	2	L	7	65.2	ND	ND	ND	ND	ND	ND	ND	14.1	2880	1960	n/a	n/a
SARA	7/26/2016	2	L	8	331	ND	ND	ND	ND	ND	ND	ND	31	4830	3150	n/a	n/a
SARA	7/26/2016	2	L	COMP	90.1	ND	ND	ND	6.24	ND	ND	ND	27.9	3420	3680	n/a	n/a
SARA	7/25/2016	3	L	1	218	ND	ND	ND	ND	ND	ND	ND	16.6	2500	5740	n/a	n/a
SARA	7/25/2016	3	L	2	95	ND	ND	ND	7.92	ND	ND	7.05	22.2	5040	3860	n/a	n/a
SARA	7/25/2016	3	L	3	267	ND	ND	ND	ND	ND	ND	6.53	15.1	3330	2990	n/a	n/a
SARA	7/25/2016	3	L	4	177.3	ND	ND	ND	ND	ND	ND	6.92	14	3620	4250	n/a	n/a
SARA	7/25/2016	3	L	5	193	ND	ND	7	ND	ND	ND	ND	14.1	4670	4210	n/a	n/a
SARA	7/25/2016	3	L	6	493	ND	ND	6.92	7.81	ND	ND	6.87	16.7	4720	5280	n/a	n/a
SARA	7/25/2016	3	L	7	328	ND	ND	14.6	ND	ND	ND	7.35	13.7	5840	3800	n/a	n/a
SARA	7/25/2016	3	L	8	187	ND	ND	ND	ND	ND	ND	8.43	16.8	6280	4350	n/a	n/a
SARA	7/25/2016	3	L	COMP	159	ND	ND	ND	ND	ND	ND	9.45	16.8	6070	3910	n/a	n/a
SARB	7/20/2016	1	H	1	221	ND	ND	ND	ND	ND	ND	ND	ND	8960	7120	ND	ND
SARB	7/20/2016	1	H	2	240	ND	ND	ND	ND	ND	ND	ND	ND	11100	6610	ND	ND
SARB	7/20/2016	1	H	3	373	ND	ND	ND	ND	ND	ND	ND	ND	9490	11700	ND	ND
SARB	7/20/2016	1	H	4	350	ND	ND	ND	ND	ND	ND	ND	ND	13600	8180	ND	ND
SARB	7/20/2016	1	H	5	601	ND	ND	ND	ND	ND	ND	ND	ND	15500	9660	ND	ND
SARB	7/20/2016	1	H	6	909	ND	ND	ND	ND	ND	ND	ND	ND	15600	11000	ND	ND
SARB	7/20/2016	1	H	7	318	ND	ND	ND	ND	ND	ND	ND	ND	15300	10400	ND	ND
SARB	7/20/2016	1	H	8	889	ND	ND	ND	ND	ND	ND	ND	34	13300	7810	ND	ND
SARB	7/20/2016	1	H	COMP	400	ND	ND	ND	ND	ND	ND	ND	ND	15000	10600	ND	ND
SARB	7/28/2016	2	H	1	325	ND	ND	ND	ND	ND	ND	31.6	39	8600	6380	ND	ND
SARB	7/28/2016	2	H	2	220	ND	ND	ND	41.2	ND	ND	14.3	42.4	6240	8480	ND	ND
SARB	7/28/2016	2	H	3	593	ND	ND	14.4	ND	ND	ND	20.3	28.9	7250	8380	ND	ND
SARB	7/28/2016	2	H	4	181	ND	ND	ND	13.7	ND	ND	20.6	39.2	8420	6580	ND	ND
SARB	7/28/2016	2	H	5	200	ND	ND	71.7	ND	ND	ND	20.6	47.5	3520	6400	ND	ND
SARB	7/28/2016	2	H	6	256	ND	ND	12.6	20.1	ND	ND	23.4	38.3	7280	6320	ND	ND
SARB	7/28/2016	2	H	7	269	8.68	ND	17.8	8.81	ND	ND	39.9	18.5	8270	5950	ND	ND
SARB	7/28/2016	2	H	8	396	ND	ND	ND	744	ND	ND	14.5	35.2	10000	5920	ND	ND
SARB	7/28/2016	2	H	COMP	91	ND	ND	ND	ND	ND	ND	27.2	22	5730	5300	ND	ND
SARB	8/4/2016	3	H	1	149	ND	ND	9.74	ND	ND	ND	14.6	51.6	6870	6400	ND	ND
SARB	8/4/2016	3	H	2	415	ND	ND	9.37	13.2	ND	ND	9	38.3	4920	7270	ND	ND
SARB	8/4/2016	3	H	3	716	ND	ND	18.1	8.33	ND	ND	16.4	33.4	7430	6030	ND	ND
SARB	8/4/2016	3	H	4	167	ND	ND	19.3	8.92	ND	ND	15.3	40.7	5930	5330	ND	ND
SARB	8/4/2016	3	H	5	550	ND	ND	13.7	25.6	ND	ND	14.3	34.4	4290	5660	ND	ND
SARB	8/4/2016	3	H	6	429	ND	ND	ND	12.5	ND	ND	21.6	41	16300	8740	ND	ND
SARB	8/4/2016	3	H	7	300	ND	ND	ND	9.54	ND	ND	152	34.7	8310	5240	ND	ND
SARB	8/4/2016	3	H	8	380	10	ND	12.3	9.4	ND	ND	24.1	37.8	6230	5330	ND	ND
SARB	8/4/2016	3	H	COMP	159	ND	ND	71.5	ND	ND	ND	20.9	31.6	10600	5480	ND	ND

**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)																						
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel
SART	7/15/2016	1	H	1	103	97.9	ND	ND	249	172	ND	ND	ND	ND	73.7	432	6.13	10.5	19200	8690	197	221	1.55	1.82	8.88	11.2	109
SART	7/15/2016	1	H	2	76	46.8	ND	ND	335	146	ND	ND	8.66	ND	97.8	241	13.1	10	3630	5230	383	239	4.28	2.21	14.5	13.7	67.1
SART	7/15/2016	1	H	3	64.1	92.3	ND	ND	288	149	ND	ND	6.91	ND	69.7	70.1	12.4	9.3	4500	462	385	289	2.47	2.01	12.4	10.4	71.9
SART	7/15/2016	1	H	4	48.5	81.8	ND	ND	342	194	ND	ND	7.08	8.41	83.3	78.4	12.1	10.5	9890	6660	341	282	2.58	1.97	12.9	13.2	72.1
SART	7/15/2016	1	H	5	106	153	ND	ND	317	255	ND	ND	7.11	ND	73.5	172	12.8	20.2	4180	7300	357	251	2.84	1.88	13.7	22.4	86.6
SART	7/15/2016	1	H	6	85	67.3	ND	ND	337	132	ND	ND	ND	ND	49.8	69.5	9.66	10.1	1030	962	308	301	2.92	2.99	10.2	11.4	47.5
SART	7/15/2016	1	H	7	95.2	34.6	ND	ND	337	139	ND	ND	6.64	ND	277	165	10.6	10	9870	1720	305	248	2.7	1.43	10.8	13.7	78.3
SART	7/15/2016	1	H	8	112	74.2	ND	ND	246	97.9	ND	ND	6.18	ND	67.1	59.3	9.26	9.36	2840	1420	332	333	2.83	1.3	9.28	11.8	50.9
SART	7/15/2016	1	H	COMP	34.8	77.3	ND	ND	218	180	ND	ND	6.77	ND	152	45.4	10.5	8.11	789	5160	313	244	2.18	1.76	10.8	7.94	51.3
SART	7/21/2016	2	H	1	45.6	43	ND	ND	253	84.4	ND	ND	ND	ND	46.2	52	ND	ND	2550	5640	177	136	1.69	0.767	6.21	7.07	79.1
SART	7/21/2016	2	H	2	40.7	63.8	8.4	12.2	243	90.4	ND	ND	6.49	7.74	186	96.4	12	10	992	6170	320	269	7.93	1.43	12.7	12	157
SART	7/21/2016	2	H	3	48.3	33.7	ND	12.1	154	54.1	ND	ND	ND	ND	53.8	56.6	8.81	9.42	2420	1920	241	239	1.97	1.44	9.04	10.7	103
SART	7/21/2016	2	H	4	108	105	9.6	11.4	229	52.1	ND	ND	5.85	ND	74.9	53.4	9.48	20.8	3310	3110	276	210	2.04	1.28	9.42	8.82	61.8
SART	7/21/2016	2	H	5	35.6	40.2	ND	7.43	217	38.4	ND	ND	ND	ND	70.6	72.5	10.8	ND	1200	2120	329	143	3.96	1.6	10.3	NDN	61.7
SART	7/21/2016	2	H	6	72.1	25.9	ND	7.14	169	82	ND	ND	ND	ND	43.2	132	11.4	7.36	4500	2810	256	239	1.85	2.35	NDN	8	38.4
SART	7/21/2016	2	H	7	58.6	70	ND	9.44	140	92.8	ND	ND	ND	ND	20.7	105	ND	8.48	3240	4390	120	236	2.56	1.27	NDN	9.19	19.8
SART	7/21/2016	2	H	8	40.3	74.8	ND	10.4	267	64.7	ND	ND	6.5	7.08	475	68	12.5	20.4	2620	1730	355	297	1.5	1.94	13.3	11.2	69
SART	7/21/2016	2	H	COMP	92	118	6.44	10.2	320	68.6	ND	ND	7.03	6.84	72.9	54.6	11.4	10.71	10700	3150	334	274	2.56	1.55	12.4	10.2	63.5
SART	7/29/2016	3	H	1	83.9	44.3	ND	17.3	409	155	ND	ND	7.55	8.58	389	80.1	21.5	14.6	41400	11800	305	213	1.91	2.04	38.4	38.8	282
SART	7/29/2016	3	H	2	41.5	140	12.1	12.7	335	210	ND	ND	9.06	11.1	152	66.3	22	13	2360	622	374	402	2.26	2.56	16.4	14	120
SART	7/29/2016	3	H	3	410	64.5	8.1	11.2	440	224	ND	ND	7.74	12.1	245	96	12.4	11.3	3260	8090	368	315	2.15	2.2	12.9	13.2	78.8
SART	7/29/2016	3	H	4	163	84.5	8.31	18.5	487	192	ND	ND	10.3	11.6	237	125	26.8	616	8140	11700	470	337	2.72	1.41	51.8	12.5	334
SART	7/29/2016	3	H	5	69.2	57.6	9.68	12	452	242	ND	ND	57.3	11.9	355	98.3	18.4	30.5	11400	8260	545	346	3.42	2	47.1	13	323
SART	7/29/2016	3	H	6	101	55.1	12.5	17.7	446	250	ND	ND	15.1	11.5	233	88.2	21.9	13.9	4370	2180	648	404	3.63	2.4	20.6	13.8	300
SART	7/29/2016	3	H	7	64.7	50.5	55.9	12.4	384	212	ND	ND	11.2	11.9	148	124	13.4	12.9	6000	1470	434	420	1.67	1.46	13.6	13.5	120
SART	7/29/2016	3	H	8	113	52.2	9.01	15	423	140	ND	ND	17	11.9	169	70.5	18.1	12	4600	1620	572	328	2.87	1.69	21.6	13.7	138
SART	7/29/2016	3	H	COMP	246	69.9	9.5	11.1	540	186	ND	ND	22.1	9.62	168	58	19.4	12.3	3970	2950	607	289	2.37	1.66	19.5	10.1	156
SMM	7/21/2016	1	H	1	ND	28	ND	ND	715	293	ND	ND	ND	27.3	685	840	88	69.8	19800	13100	1150	1140	2.84	2.73	ND	ND	925
SMM	7/21/2016	1	H	2	ND	ND	ND	ND	226	325	ND	ND	ND	ND	625	351	86.5	50.2	6200	8320	1340	1610	2.1	2.56	ND	ND	540
SMM	7/21/2016	1	H	3	27.5	ND	ND	ND	335	220	ND	ND	ND	ND	203	227	52.8	51	10600	28500	2280	2220	2.83	1.7	ND	ND	670
SMM	7/21/2016	1	H	4	ND	ND	ND	ND	610	408	ND	ND	ND	ND	2100	995	66	56	44000	14500	2560	2050	4.32	3.22	120	ND	990
SMM	7/21/2016	1	H	5	ND	33.3	ND	ND	744	313	ND	ND	ND	ND	1900	335	97.4	ND	13400	32800	1840	1270	2.71	0.951	ND	ND	1050
SMM	7/21/2016	1	H	6	ND	89.3	ND	ND	547	428	ND	ND	ND	ND	138	149	277	29.3	11700	10900	822	583	1.71	0.843	ND	ND	214
SMM	7/21/2016	1	H	7	63	32.8	ND	ND	785	818	ND	ND	ND	ND	1230	860	80	56.5	11600	20700	1470	1050	1.86	1.68	ND	43.3	910
SMM	7/21/2016	1	H	8	35.5	ND	ND	ND	800	140	ND	ND	ND	ND	891	370	45.4	33.5	15100	5380	2450	593	0.881	0.941	ND	ND	663
SMM	7/21/2016	1	H	COMP	ND	45.2	ND	ND	145	315	ND	ND	ND	ND	263	682	55	47.7	8150	5700	1240	1320	1.74	1.73	ND	ND	338
SMM	7/28/2016	2	H	1	117	57.6	27.1	ND	371	549	ND	ND	ND	ND	389	398	53.2	125	18800	8590	2080	2340	0.73	0.765	ND	ND	301
SMM	7/28/2016	2	H	2	224	ND	ND	ND	1230	318	ND	ND	ND	ND	540	301	39.2	60.1	14500	14000	2310	716	1.38	0.928	ND	ND	429
SMM	7/28/2016	2	H	3	26.5	29.1	ND	ND	328	419	ND	ND	ND	ND	360	639	32	31.6	8230	1010	628	514	1.08	1.28	ND	ND	258
SMM	7/28/2016	2	H	4	116	138	ND	ND	268	337	ND	ND	ND	ND	1190	286	220	26.6	31600	32400	872	1560	1.71	1.22	ND	ND	975
SMM	7/28/2016	2	H	5	59.5	39.1	ND	ND	715	240	ND	ND	ND	ND	363	226	36.8	66.2	22400	4920	1430	758	1.17	0.989	ND	ND	348
SMM	7/28/2016	2	H	6	109	52.7	ND	ND	618	361	ND	ND	25	ND	255	244	34	54.5	31500	17900	843	414	1.49	0.483	ND	ND	353
SMM	7/28/2016	2	H	7	331	122	ND	ND	314	326	ND	ND	ND	ND	1060	149	92.8	995	8430	16700	1720	5440	1.73	0.957	ND	ND	780
SMM	7/28/2016	2	H	8	169	84.8	ND	ND	359	217	8.54	ND	ND	ND	653	181	35.4	ND	25400	17500	4800	1870	2.28	1.04	ND	ND	379
SMM	7/28/2016	2	H	COMP	92.7	56	ND	ND	358	159	ND	ND	ND	ND	293	194	42.6	28.1	16000	39400	1310	933	1.15	0.897	ND	ND	311
SMM	8/2/2016	3	H	1	83.4	97.7	ND	ND	431	226	ND	ND	ND	ND	134	851	ND	35.6	7790	23200	1150	1920	2.04	1.13	ND	77.9	171
SMM	8/2/2016	3	H	2	25.5	55.3	40.3	ND	150	340	ND	ND	ND	ND	765	116	45.5	ND	6780	3250	2130	705	1.86	1.15	61	ND	743
SMM	8/2/2016	3	H	3	29.3	49.8	ND	ND	396	368	ND	ND	ND	ND	194	543	ND	28.5	2630	8610	338	656	1.89	2.02	ND	421	159
SMM	8/2/2016	3	H	4	51.6	ND	ND	ND	831	250	ND	ND	ND	ND	149	318	ND	37.6	19600	22700	982	666	1.39	1.25	ND	ND	147
SMM	8/2/2016	3	H	5	43.5	27.6	ND	ND	490	146	ND	ND	ND	ND	810	298	43.3	ND	18300	4960	835	912	2.24	1.66	ND	ND	590
SMM	8/2/2016	3	H	6	28.5	61.1	ND	ND	161	188	ND	ND	ND	ND	661	924	27	38.8	6730	14400	556	799	0.8	1.39	61.8	ND	563
SMM	8/2/2016	3	H	7	39.5	34.8	27.8	ND	196	123	ND	ND	ND	ND	1530	328	66.3	172	21900	20900	1560	496	7.72	0.743	34.3	ND	908
SMM	8/2/2016	3	H	8	53.8	59.6	ND	ND	585	461	ND	ND	ND	ND	428	859	31.8	72.6	21400	35800	1120	839	1.13	1.14	ND	ND	966
SMM	8/2/2016	3	H	COMP	116	ND	ND	ND	574																		

**Table C2**  
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**Pilot Study**  
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Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)											TOTAL PCBs (mg/kg)		
					Treated Nickel	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Total PCBs	Treated Total PCBs	
SART	7/15/2016	1	H	1	208	ND	ND	ND	ND	ND	ND	ND	ND	13.8	3450	2010	ND	ND
SART	7/15/2016	1	H	2	123	ND	ND	10.8	ND	ND	ND	ND	ND	19.5	3910	2410	ND	ND
SART	7/15/2016	1	H	3	61.1	ND	ND	ND	ND	ND	ND	ND	ND	18.2	3460	2700	ND	ND
SART	7/15/2016	1	H	4	71.8	ND	ND	ND	ND	ND	ND	ND	ND	17.9	3010	2780	ND	ND
SART	7/15/2016	1	H	5	112	ND	ND	ND	ND	ND	ND	ND	ND	15.1	3580	2260	ND	ND
SART	7/15/2016	1	H	6	58.3	ND	ND	ND	ND	ND	ND	ND	ND	28.7	3060	2600	ND	ND
SART	7/15/2016	1	H	7	94.6	ND	ND	11.3	ND	ND	ND	ND	ND	38	2750	2230	ND	ND
SART	7/15/2016	1	H	8	113	ND	ND	ND	ND	ND	ND	ND	ND	23.1	2480	1930	ND	ND
SART	7/15/2016	1	H	COMP	45.7	ND	ND	ND	ND	ND	ND	ND	ND	16.4	2920	2050	ND	ND
SART	7/21/2016	2	H	1	32	6.55	ND	ND	ND	ND	ND	ND	ND	10.8	1630	1250	ND	ND
SART	7/21/2016	2	H	2	77.7	10.7	10.1	8.65	ND	ND	ND	6.89	29.2	3060	2540	ND	ND	
SART	7/21/2016	2	H	3	64.2	5.75	7.28	ND	ND	ND	ND	ND	33.2	2380	2210	ND	ND	
SART	7/21/2016	2	H	4	43.4	7.34	7.96	ND	ND	ND	ND	ND	28	2490	1980	ND	ND	
SART	7/21/2016	2	H	5	44.1	6.61	ND	ND	ND	ND	ND	ND	12.5	3080	1280	ND	ND	
SART	7/21/2016	2	H	6	40	ND	ND	ND	ND	ND	ND	ND	16.8	1810	2020	ND	ND	
SART	7/21/2016	2	H	7	78.2	ND	6.96	10.6	ND	ND	ND	ND	21.3	1240	2190	ND	ND	
SART	7/21/2016	2	H	8	58.2	8.49	7.86	8.71	7.11	ND	ND	ND	26.3	3060	2620	ND	ND	
SART	7/21/2016	2	H	COMP	73.5	10.7	9.61	ND	ND	ND	ND	6.73	26.4	3030	2460	ND	ND	
SART	7/29/2016	3	H	1	47.9	11.1	8.65	ND	ND	ND	ND	9.72	48.1	2880	2190	ND	ND	
SART	7/29/2016	3	H	2	72	10.6	9.1	ND	ND	ND	ND	12.7	31.7	3280	3380	ND	ND	
SART	7/29/2016	3	H	3	92.3	9.56	9.38	11.5	19.7	ND	ND	11	25.9	3150	3150	ND	ND	
SART	7/29/2016	3	H	4	100	10.9	22.8	6.49	7.84	ND	ND	13.6	37	4390	3050	ND	ND	
SART	7/29/2016	3	H	5	93.5	14.3	11.3	ND	ND	ND	ND	15.6	23.7	5570	3040	ND	ND	
SART	7/29/2016	3	H	6	72.8	13.3	11.6	ND	ND	ND	ND	18	27.8	5620	3420	ND	ND	
SART	7/29/2016	3	H	7	96.8	9.97	9.34	ND	ND	ND	ND	10.2	31.4	3760	3030	ND	ND	
SART	7/29/2016	3	H	8	82.9	10.4	9.87	11.3	16.9	ND	ND	13.5	38.4	5580	2850	ND	ND	
SART	7/29/2016	3	H	COMP	61.3	11.8	7.76	9.24	ND	ND	ND	16.1	22.2	5050	2480	ND	ND	
SMM	7/21/2016	1	H	1	545	ND	ND	ND	ND	ND	ND	ND	25.3	15200	12200	ND	ND	
SMM	7/21/2016	1	H	2	455	ND	ND	ND	ND	ND	ND	ND	26.8	9750	9910	ND	ND	
SMM	7/21/2016	1	H	3	535	ND	ND	ND	ND	ND	ND	ND	30.2	12400	10400	ND	ND	
SMM	7/21/2016	1	H	4	740	ND	ND	ND	ND	ND	ND	ND	50.5	12600	17600	ND	ND	
SMM	7/21/2016	1	H	5	230	ND	ND	ND	ND	ND	ND	ND	39	15800	8630	ND	ND	
SMM	7/21/2016	1	H	6	181	ND	ND	ND	ND	ND	ND	ND	53.3	11700	9260	ND	ND	
SMM	7/21/2016	1	H	7	595	ND	ND	ND	ND	ND	ND	ND	36.3	18300	12200	ND	ND	
SMM	7/21/2016	1	H	8	308	ND	ND	ND	ND	ND	ND	ND	61.8	10600	6280	ND	ND	
SMM	7/21/2016	1	H	COMP	480	ND	ND	ND	ND	ND	ND	33.3	39	10400	11400	ND	ND	
SMM	7/28/2016	2	H	1	391	ND	ND	ND	ND	ND	ND	ND	29.3	6100	8640	ND	ND	
SMM	7/28/2016	2	H	2	3610	ND	ND	ND	ND	ND	ND	ND	54.3	7160	4080	ND	ND	
SMM	7/28/2016	2	H	3	399	ND	ND	ND	ND	ND	ND	ND	31.8	4780	5360	ND	ND	
SMM	7/28/2016	2	H	4	219	ND	ND	ND	ND	ND	ND	ND	31.9	17700	5700	ND	ND	
SMM	7/28/2016	2	H	5	219	ND	ND	28.8	ND	ND	ND	ND	33.4	9080	7180	ND	ND	
SMM	7/28/2016	2	H	6	269	ND	ND	ND	ND	ND	ND	ND	ND	12500	6050	ND	ND	
SMM	7/28/2016	2	H	7	2190	ND	ND	ND	ND	ND	ND	ND	29.1	10100	7020	ND	ND	
SMM	7/28/2016	2	H	8	204	ND	ND	ND	ND	ND	ND	ND	37.6	11600	4690	ND	ND	
SMM	7/28/2016	2	H	COMP	251	ND	ND	ND	ND	ND	ND	ND	38.4	9370	8410	ND	ND	
SMM	8/2/2016	3	H	1	1110	ND	ND	ND	ND	ND	ND	ND	26.3	11700	10700	ND	ND	
SMM	8/2/2016	3	H	2	117	ND	ND	ND	ND	ND	ND	ND	34.8	16300	5780	ND	ND	
SMM	8/2/2016	3	H	3	531	ND	ND	ND	ND	ND	ND	ND	27.5	7490	8440	ND	ND	
SMM	8/2/2016	3	H	4	306	ND	ND	ND	ND	ND	ND	ND	28.3	8190	9570	ND	ND	
SMM	8/2/2016	3	H	5	238	ND	ND	ND	ND	ND	ND	ND	56.4	11800	7570	ND	ND	
SMM	8/2/2016	3	H	6	528	ND	ND	ND	ND	ND	ND	35.3	ND	6710	11200	ND	ND	
SMM	8/2/2016	3	H	7	263	ND	ND	29	ND	ND	ND	ND	35.1	12000	6560	ND	ND	
SMM	8/2/2016	3	H	8	498	ND	ND	ND	ND	ND	ND	ND	28.8	9560	5280	ND	ND	
SMM	8/2/2016	3	H	COMP	537	ND	ND	ND	ND	ND	ND	ND	42.9	9070	11500	ND	ND	

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**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)																							
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel	
SMM	7/22/2016	1	L	1	62.8	ND	ND	ND	648	253	ND	ND	ND	ND	665	461	59.3	50.1	19000	5530	1620	1630	n/a	n/a	ND	ND	525	
SMM	7/22/2016	1	L	2	ND	ND	ND	ND	475	360	ND	ND	ND	ND	465	566	50	60.1	27800	24300	2950	1000	n/a	n/a	ND	ND	388	
SMM	7/22/2016	1	L	3	ND	44.8	ND	ND	823	380	ND	ND	ND	ND	438	338	164	41.5	16000	4030	3530	1160	n/a	n/a	ND	ND	368	
SMM	7/22/2016	1	L	4	32.6	71.9	ND	ND	721	581	ND	ND	ND	ND	373	516	63.1	56.3	11500	9490	1330	1240	n/a	n/a	ND	ND	346	
SMM	7/22/2016	1	L	5	ND	29.8	ND	ND	823	420	ND	ND	ND	ND	663	776	39.3	34.3	8060	11600	1880	1360	n/a	n/a	ND	ND	1060	
SMM	7/22/2016	1	L	6	54	28.3	ND	ND	1190	1200	ND	ND	ND	ND	853	533	44.3	39.3	3930	31000	933	538	n/a	n/a	ND	ND	515	
SMM	7/22/2016	1	L	7	ND	ND	ND	ND	683	172	ND	ND	ND	ND	458	234	50.3	38.5	23400	7080	1350	2140	n/a	n/a	ND	ND	365	
SMM	7/22/2016	1	L	8	42.3	77.1	ND	ND	490	693	ND	ND	ND	ND	495	671	44.3	44	7410	8230	1390	998	n/a	n/a	ND	42.3	320	
SMM	7/22/2016	1	L	COMP	139	42.1	ND	ND	641	776	ND	ND	105	ND	808	265	47	35.1	15200	9510	1530	976	n/a	n/a	ND	ND	536	
SMM	7/29/2016	2	L	1	157	36.3	ND	ND	473	204	ND	ND	ND	ND	701	488	71.6	34	7410	6830	2400	690	n/a	n/a	ND	ND	573	
SMM	7/29/2016	2	L	2	ND	40.9	ND	ND	481	250	ND	ND	ND	40.2	526	239	70.9	30.9	6690	20000	2020	2310	n/a	n/a	ND	ND	531	
SMM	7/29/2016	2	L	3	45.5	111	ND	ND	573	536	ND	ND	ND	ND	528	558	84.5	40	5900	23700	3130	1120	n/a	n/a	ND	ND	615	
SMM	7/29/2016	2	L	4	ND	44.4	ND	ND	473	500	ND	ND	ND	ND	121	308	241	71.5	64	2750	10100	1890	1520	n/a	n/a	ND	ND	418
SMM	7/29/2016	2	L	5	41.9	82.9	ND	ND	664	482	ND	ND	ND	ND	371	661	66.4	62	5370	25400	2350	914	n/a	n/a	ND	33.9	474	
SMM	7/29/2016	2	L	6	52.6	39.9	ND	ND	687	549	ND	ND	50.9	ND	554	815	47.6	67.5	5240	25600	1500	1610	n/a	n/a	78.5	48.9	456	
SMM	7/29/2016	2	L	7	33.6	55.7	ND	ND	384	409	ND	ND	ND	ND	1070	901	64.7	2110	4210	4620	1150	765	n/a	n/a	54.9	46.4	632	
SMM	7/29/2016	2	L	8	52.1	ND	ND	ND	448	296	7.52	ND	ND	ND	1320	564	69.1	276	5960	44100	734	614	n/a	n/a	207	69.2	1050	
SMM	7/29/2016	2	L	COMP	66.6	28.5	ND	ND	411	603	ND	ND	ND	ND	974	689	46.3	48.8	23800	30300	1630	984	n/a	n/a	46.3	28	631	
SMM	8/3/2016	3	L	1	166	197	ND	ND	595	298	ND	ND	ND	ND	3200	630	104	39.8	43300	54800	1100	3850	n/a	n/a	64	ND	2450	
SMM	8/3/2016	3	L	2	114	87	ND	ND	648	146	ND	ND	ND	ND	708	293	39.5	29.3	29500	58800	1300	2530	n/a	n/a	28.8	ND	458	
SMM	8/3/2016	3	L	3	93	161	ND	ND	494	91.7	ND	ND	ND	ND	709	1640	56.1	46.8	34600	10800	870	812	n/a	n/a	26.8	41.1	391	
SMM	8/3/2016	3	L	4	96.3	105	ND	ND	598	188	ND	ND	ND	ND	1030	2930	39.8	91.2	14300	2470	1380	977	n/a	n/a	54.6	303	1030	
SMM	8/3/2016	3	L	5	57.2	59	ND	ND	662	340	ND	ND	ND	ND	326	458	32.1	44.8	31100	12400	1040	1170	n/a	n/a	ND	28	286	
SMM	8/3/2016	3	L	6	59.3	62.7	ND	ND	530	139	ND	ND	ND	ND	324	705	42.5	42.9	21200	5990	1270	1170	n/a	n/a	578	ND	271	
SMM	8/3/2016	3	L	7	133	70	58.9	ND	328	120	ND	ND	ND	ND	930	288	51.7	28.6	20300	3360	1080	574	n/a	n/a	42.6	351	1450	
SMM	8/3/2016	3	L	8	133	115	ND	ND	373	336	ND	ND	ND	ND	856	1830	40	75.7	5650	23900	1110	1040	n/a	n/a	31	77.5	385	
SMM	8/3/2016	3	L	COMP	121	38	ND	ND	505	308	ND	ND	ND	ND	638	383	35.3	37.5	35500	4950	993	938	n/a	n/a	ND	ND	373	
SSP	7/18/2016	1	H	1	189	84.8	ND	ND	990	743	ND	ND	ND	ND	183	209	ND	ND	37800	9440	699	793	1.56	1.02	ND	ND	142	
SSP	7/18/2016	1	H	2	157	113	ND	ND	1060	1040	ND	ND	ND	ND	278	564	ND	ND	34500	10000	528	634	1.6	1.14	ND	ND	320	
SSP	7/18/2016	1	H	3	114	82.4	ND	ND	870	648	ND	ND	ND	ND	508	184	295	ND	8400	18200	1830	583	1.36	1.97	ND	ND	355	
SSP	7/18/2016	1	H	4	97.9	109	ND	ND	1220	864	ND	ND	ND	ND	156	138	ND	ND	23200	11300	879	473	2.18	0.938	ND	ND	167	
SSP	7/18/2016	1	H	5	63.8	96.6	ND	ND	585	643	ND	ND	ND	ND	141	484	27.1	ND	18800	17300	1000	728	4.13	1.52	ND	ND	162	
SSP	7/18/2016	1	H	6	185	49	ND	ND	1040	585	ND	ND	ND	ND	177	224	ND	ND	5340	21900	657	879	1.41	1.64	ND	ND	179	
SSP	7/18/2016	1	H	7	185	104	ND	ND	782	948	ND	ND	ND	ND	128	125	ND	ND	7050	17000	812	585	2.88	0.923	ND	ND	146	
SSP	7/18/2016	1	H	8	162	52.6	ND	ND	870	872	ND	ND	ND	ND	343	424	33.8	ND	10200	5360	788	476	1.77	0.933	ND	ND	139	
SSP	7/18/2016	1	H	COMP	95.7	77.4	ND	ND	477	707	ND	ND	ND	ND	215	129	ND	ND	21200	10400	606	639	1.41	1.6	ND	ND	188	
SSP	7/25/2016	2	H	1	200	64.9	ND	ND	752	828	ND	ND	ND	ND	193	224	ND	ND	13800	7820	1130	496	3.31	1.15	ND	ND	222	
SSP	7/25/2016	2	H	2	78.3	109	ND	ND	509	751	ND	ND	ND	ND	246	102	ND	ND	8590	4640	985	498	2.34	1.1	ND	ND	175	
SSP	7/25/2016	2	H	3	76.7	112	ND	ND	733	329	ND	ND	ND	ND	282	394	383	ND	32900	8100	868	869	1.98	2.09	ND	59.1	443	
SSP	7/25/2016	2	H	4	144	ND	ND	ND	790	847	ND	ND	ND	ND	444	468	ND	ND	13300	16800	939	735	2.13	2.78	ND	ND	241	
SSP	7/25/2016	2	H	5	279	50.3	ND	ND	825	632	ND	ND	ND	ND	191	219	ND	ND	10800	15700	949	756	1.83	1.3	ND	ND	166	
SSP	7/25/2016	2	H	6	77.2	60.7	ND	ND	497	828	ND	ND	ND	ND	399	521	ND	ND	11200	7820	1300	605	1.25	0.873	ND	27.1	287	
SSP	7/25/2016	2	H	7	63.4	53.3	ND	ND	449	602	ND	ND	ND	ND	234	294	ND	ND	12600	12100	636	821	1.55	1.17	ND	ND	165	
SSP	7/25/2016	2	H	8	65.8	84.4	ND	ND	928	675	ND	ND	ND	ND	1010	189	51.2	ND	13000	22000	962	456	2.3	1.43	97	ND	572	
SSP	7/25/2016	2	H	COMP	99.4	74.4	ND	ND	441	579	ND	ND	ND	ND	251	282	ND	ND	15500	11300	3150	758	1.83	1.13	ND	ND	282	
SSP	8/1/2016	3	H	1	68	ND	ND	ND	778	118	ND	ND	ND	ND	388	458	60.5	25.3	11700	20900	963	1440	5.25	2.62	ND	ND	270	
SSP	8/1/2016	3	H	2	69.3	ND	ND	ND	698	58.5	ND	ND	ND	ND	1400	182	44	ND	15000	2720	990	595	3.71	2.1	35	ND	700	
SSP	8/1/2016	3	H	3	64.8	64.2	ND	ND	965	226	ND	ND	ND	ND	543	317	42	46.7	30500	21000	1580	837	3.69	2.76	31.5	ND	380	
SSP	8/1/2016	3	H	4	59.8	258	ND	ND	510	433	ND	ND	ND	ND	925	175	88.8	ND	3450	3330	1440	658	4.06	2.48	ND	ND	578	
SSP	8/1/2016	3	H	5	178	37.8	ND	ND	282	112	ND	ND	ND	ND	477	348	43.2	27.3	2000	15500	4200	998	4.12	3.08	ND	ND	382	
SSP	8/1/2016	3	H	6	145	ND	ND	ND	690	236	ND	ND	ND	ND	593	257	31.3	260	26000	14000	1230	2950	3.87	2.27	47.3	ND	453	
SSP	8/1/2016	3	H	7	293	26.8	ND	ND	870	288	ND	ND	ND	ND	154	320	ND	30	5430	13500	1070	1550	2.9	2.71	233	ND	120	
SSP	8/1/2016	3	H	8	46.3	ND	ND	ND	338	219	ND	ND	ND	ND	1240	179	36.8	ND	11300	5780	1160	1200	4.18	1.86	ND	ND	715	
SSP	8/1/2016	3	H	COMP	50.5	84.8	ND	ND	398	315	ND	ND	ND	ND	425	455	32.3	ND	22300	4780	1740	750	3.56	2.05	ND	ND	538	

**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)											TOTAL PCBs (mg/kg)	
					Treated Nickel	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Total PCBs	Treated Total PCBs
SMM	7/22/2016	1	L	1	566	ND	ND	32	ND	ND	ND	ND	42.3	17400	14800	n/a	n/a
SMM	7/22/2016	1	L	2	703	ND	ND	ND	ND	ND	ND	ND	ND	17600	10300	n/a	n/a
SMM	7/22/2016	1	L	3	325	ND	ND	ND	ND	ND	ND	ND	ND	10700	10900	n/a	n/a
SMM	7/22/2016	1	L	4	481	ND	ND	ND	ND	ND	ND	ND	26	16800	18700	n/a	n/a
SMM	7/22/2016	1	L	5	533	ND	ND	ND	ND	ND	ND	ND	ND	19000	14500	n/a	n/a
SMM	7/22/2016	1	L	6	418	ND	ND	ND	28.5	ND	ND	ND	33.3	21600	11900	n/a	n/a
SMM	7/22/2016	1	L	7	250	ND	ND	ND	ND	ND	ND	ND	36.3	24200	11700	n/a	n/a
SMM	7/22/2016	1	L	8	530	ND	ND	ND	ND	ND	ND	ND	38.8	7580	8080	n/a	n/a
SMM	7/22/2016	1	L	COMP	346	ND	ND	37	ND	ND	ND	ND	33.3	16200	12200	n/a	n/a
SMM	7/29/2016	2	L	1	375	ND	ND	ND	ND	ND	ND	ND	53	16000	6430	n/a	n/a
SMM	7/29/2016	2	L	2	254	ND	ND	ND	ND	ND	ND	ND	38.4	22400	8690	n/a	n/a
SMM	7/29/2016	2	L	3	1040	ND	ND	ND	26.3	ND	ND	ND	ND	28000	18400	n/a	n/a
SMM	7/29/2016	2	L	4	351	ND	ND	ND	101	ND	ND	ND	ND	18500	16400	n/a	n/a
SMM	7/29/2016	2	L	5	465	ND	ND	ND	ND	ND	ND	ND	ND	18400	7640	n/a	n/a
SMM	7/29/2016	2	L	6	527	ND	ND	ND	ND	ND	ND	ND	36.4	17000	9150	n/a	n/a
SMM	7/29/2016	2	L	7	602	ND	ND	ND	109	ND	ND	27.1	40.9	17200	7450	n/a	n/a
SMM	7/29/2016	2	L	8	414	ND	ND	ND	ND	ND	ND	ND	35.6	12000	9350	n/a	n/a
SMM	7/29/2016	2	L	COMP	456	ND	ND	ND	ND	ND	ND	ND	37.3	16900	9740	n/a	n/a
SMM	8/3/2016	3	L	1	458	ND	ND	ND	ND	ND	ND	ND	ND	17600	16300	n/a	n/a
SMM	8/3/2016	3	L	2	231	ND	ND	ND	ND	ND	ND	ND	ND	18700	8880	n/a	n/a
SMM	8/3/2016	3	L	3	716	ND	ND	ND	ND	ND	ND	ND	ND	15500	17700	n/a	n/a
SMM	8/3/2016	3	L	4	1830	ND	ND	ND	ND	ND	ND	ND	ND	10700	9370	n/a	n/a
SMM	8/3/2016	3	L	5	453	ND	ND	ND	ND	ND	ND	ND	ND	11500	18200	n/a	n/a
SMM	8/3/2016	3	L	6	484	ND	ND	60.8	ND	ND	ND	ND	46.7	11300	10300	n/a	n/a
SMM	8/3/2016	3	L	7	206	ND	ND	ND	ND	ND	ND	ND	37.1	15500	10300	n/a	n/a
SMM	8/3/2016	3	L	8	1060	ND	ND	ND	ND	ND	ND	ND	ND	14800	11800	n/a	n/a
SMM	8/3/2016	3	L	COMP	355	ND	ND	ND	ND	ND	ND	ND	27.3	10600	17100	n/a	n/a
SSP	7/18/2016	1	H	1	178	ND	ND	ND	ND	ND	ND	ND	43.2	8820	6000	ND	ND
SSP	7/18/2016	1	H	2	621	ND	ND	ND	ND	ND	ND	ND	46.8	6230	6540	ND	ND
SSP	7/18/2016	1	H	3	163	ND	ND	ND	ND	ND	ND	25.3	45.7	7850	6330	ND	ND
SSP	7/18/2016	1	H	4	130	ND	ND	ND	ND	ND	ND	ND	48.8	10600	6390	ND	ND
SSP	7/18/2016	1	H	5	276	ND	ND	ND	ND	ND	ND	ND	54.7	12000	6700	ND	ND
SSP	7/18/2016	1	H	6	206	ND	ND	ND	ND	ND	ND	ND	48.7	6300	6110	ND	ND
SSP	7/18/2016	1	H	7	144	ND	ND	ND	70.3	ND	ND	ND	35	9980	6480	ND	ND
SSP	7/18/2016	1	H	8	607	ND	ND	ND	ND	ND	ND	ND	40.4	9260	5720	ND	ND
SSP	7/18/2016	1	H	COMP	118	ND	ND	ND	ND	ND	ND	ND	47.6	7740	7320	ND	ND
SSP	7/25/2016	2	H	1	176	ND	ND	ND	ND	ND	ND	ND	ND	12300	6020	ND	ND
SSP	7/25/2016	2	H	2	113	ND	ND	ND	ND	ND	ND	ND	ND	12200	11400	ND	ND
SSP	7/25/2016	2	H	3	364	ND	ND	ND	ND	ND	ND	ND	ND	14200	10200	ND	ND
SSP	7/25/2016	2	H	4	305	ND	ND	ND	ND	ND	ND	ND	ND	11100	10300	ND	ND
SSP	7/25/2016	2	H	5	188	ND	ND	ND	ND	ND	ND	ND	ND	10700	8870	ND	ND
SSP	7/25/2016	2	H	6	339	ND	ND	ND	ND	ND	ND	ND	33.7	10400	5520	ND	ND
SSP	7/25/2016	2	H	7	235	ND	ND	ND	ND	ND	ND	ND	ND	8200	13700	ND	ND
SSP	7/25/2016	2	H	8	316	ND	ND	ND	ND	ND	ND	ND	ND	11600	5560	ND	ND
SSP	7/25/2016	2	H	COMP	229	ND	ND	ND	ND	ND	ND	ND	ND	9080	8110	ND	ND
SSP	8/1/2016	3	H	1	290	ND	ND	ND	ND	ND	ND	ND	40.3	16900	15800	n/a	n/a
SSP	8/1/2016	3	H	2	173	ND	ND	ND	ND	ND	ND	ND	70.5	17700	7280	n/a	n/a
SSP	8/1/2016	3	H	3	250	ND	ND	ND	ND	ND	ND	ND	41.7	18900	10900	n/a	n/a
SSP	8/1/2016	3	H	4	132	ND	ND	ND	ND	ND	ND	ND	27.8	18800	7380	n/a	n/a
SSP	8/1/2016	3	H	5	270	ND	ND	ND	ND	ND	ND	ND	47.8	21500	11600	n/a	n/a
SSP	8/1/2016	3	H	6	239	ND	ND	ND	ND	ND	ND	ND	39.5	18000	11400	n/a	n/a
SSP	8/1/2016	3	H	7	255	ND	ND	ND	ND	ND	ND	ND	52	8680	14200	n/a	n/a
SSP	8/1/2016	3	H	8	143	ND	ND	ND	ND	ND	ND	ND	67.3	14200	7850	n/a	n/a
SSP	8/1/2016	3	H	COMP	270	ND	ND	ND	ND	ND	ND	ND	43.5	24000	7600	n/a	n/a



**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)																						
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel
SSP	7/19/2016	1	M	1	99.8	57.5	ND	ND	1030	635	ND	ND	9.01	ND	93.6	83.5	27.6	43.8	27200	19100	420	323	n/a	n/a	14.3	11.1	101
SSP	7/19/2016	1	M	2	197	61.8	ND	ND	690	717	ND	ND	ND	8.12	125	139	11.6	100	13100	9190	286	762	n/a	n/a	36.3	19.3	123
SSP	7/19/2016	1	M	3	105	46.7	ND	ND	912	761	ND	ND	14.8	ND	123	222	22.6	10.5	28100	8100	736	225	n/a	n/a	38	13.9	147
SSP	7/19/2016	1	M	4	102	169	ND	ND	951	623	ND	ND	8.53	8.41	447	300	20.7	21.8	29200	10700	542	2070	n/a	n/a	50.7	20.4	305
SSP	7/19/2016	1	M	5	169	73.9	ND	ND	530	640	ND	ND	11	ND	145	122	13.8	10.8	14800	34300	617	289	n/a	n/a	18.6	11.9	127
SSP	7/19/2016	1	M	6	124	552	ND	ND	715	551	ND	ND	13.9	11.4	896	271	37.6	34.4	36200	9460	903	849	n/a	n/a	30.7	46.3	801
SSP	7/19/2016	1	M	7	319	92.2	ND	ND	735	203	ND	ND	10.9	18.6	149	388	53.2	16.3	42500	19200	554	427	n/a	n/a	19.3	31.2	354
SSP	7/19/2016	1	M	8	73.5	108	ND	ND	698	508	ND	ND	9.82	17.1	167	114	14.5	16.3	17700	9450	650	509	n/a	n/a	21.9	15.8	119
SSP	7/19/2016	1	M	COMP	241	112	9.43	ND	849	484	ND	ND	ND	67	439	94.8	19.4	12.2	21300	15200	459	402	n/a	n/a	17.6	13	122
SSP	7/26/2016	2	M	1	134	72.6	ND	ND	806	713	ND	ND	ND	ND	974	278	25.8	88.1	8610	1600	886	683	n/a	n/a	ND	ND	603
SSP	7/26/2016	2	M	2	163	118	ND	ND	1200	846	ND	ND	ND	ND	345	446	37	26.5	2750	5760	1110	663	n/a	n/a	ND	ND	258
SSP	7/26/2016	2	M	3	37	ND	97.8	ND	650	293	ND	ND	ND	ND	568	430	43.8	33.8	6300	2500	1600	1030	n/a	n/a	28.8	ND	535
SSP	7/26/2016	2	M	4	112	95.4	ND	ND	759	829	ND	ND	ND	ND	901	1010	56.1	34.8	8390	10700	1750	2630	n/a	n/a	29.8	ND	601
SSP	7/26/2016	2	M	5	43.3	89.8	ND	ND	698	189	ND	ND	ND	ND	300	1680	41.8	41.3	9380	4700	1240	873	n/a	n/a	ND	ND	385
SSP	7/26/2016	2	M	6	38	51.1	ND	ND	916	376	ND	ND	ND	ND	403	360	73.3	145	4350	5280	1440	974	n/a	n/a	ND	ND	375
SSP	7/26/2016	2	M	7	31.8	48.3	ND	ND	378	218	ND	ND	ND	ND	478	593	54	36.8	8300	7680	1690	1120	n/a	n/a	33	29.3	440
SSP	7/26/2016	2	M	8	88.4	62.8	ND	ND	365	438	ND	ND	ND	ND	1000	438	46.3	27.5	8910	15400	1210	675	n/a	n/a	47.1	ND	578
SSP	7/26/2016	2	M	COMP	91.9	ND	ND	ND	904	328	ND	ND	ND	ND	618	418	37.3	32.5	5630	6730	1060	1020	n/a	n/a	ND	ND	341
SSP	8/4/2016	3	M	1	ND	93.3	ND	ND	309	488	ND	ND	ND	ND	1220	470	ND	59.5	69400	7590	1360	1200	n/a	n/a	ND	ND	814
SSP	8/4/2016	3	M	2	73.3	49.9	ND	ND	940	252	ND	ND	ND	ND	290	184	ND	ND	11500	9100	1930	828	n/a	n/a	36	ND	192
SSP	8/4/2016	3	M	3	269	137	ND	ND	644	299	ND	ND	ND	ND	166	696	39.7	32.9	53900	4790	696	1170	n/a	n/a	ND	ND	502
SSP	8/4/2016	3	M	4	169	44.8	ND	ND	244	217	ND	ND	ND	ND	1190	165	57.2	ND	8740	8130	902	753	n/a	n/a	ND	ND	607
SSP	8/4/2016	3	M	5	224	53.6	ND	ND	414	332	ND	ND	ND	ND	329	349	ND	ND	28400	16800	788	1060	n/a	n/a	25.9	ND	232
SSP	8/4/2016	3	M	6	184	118	ND	ND	636	200	ND	ND	ND	ND	173	197	65.9	ND	23700	1690	526	637	n/a	n/a	ND	ND	218
SSP	8/4/2016	3	M	7	116	114	ND	ND	594	190	ND	ND	ND	ND	225	207	30.7	41.8	11500	6610	822	1490	n/a	n/a	ND	ND	183
SSP	8/4/2016	3	M	8	167	305	ND	ND	757	206	ND	ND	ND	ND	498	515	ND	26.5	48300	3450	921	682	n/a	n/a	ND	ND	346
SSP	8/4/2016	3	M	COMP	155	63.8	ND	ND	587	241	ND	ND	ND	ND	247	613	30.1	25	8050	14000	1230	725	n/a	n/a	ND	ND	214
SSP	7/20/2016	1	L	1	93.3	78.5	ND	ND	486	494	ND	ND	12.8	9.05	430	131	26.7	17.8	24600	15200	689	696	n/a	n/a	30	17.4	291
SSP	7/20/2016	1	L	2	207	244	ND	ND	660	377	ND	ND	12.6	8.99	152	193	34.1	16.3	24700	11100	697	462	n/a	n/a	30.8	18.1	150
SSP	7/20/2016	1	L	3	219	277	ND	ND	572	498	ND	ND	16.5	ND	161	129	27.1	20.6	22800	6020	689	6520	n/a	n/a	27.5	18.4	156
SSP	7/20/2016	1	L	4	153	80	ND	ND	696	523	ND	ND	16.2	9.38	330	213	33.9	18.9	36900	5660	835	639	n/a	n/a	28.8	24.3	322
SSP	7/20/2016	1	L	5	297	159	ND	ND	462	596	ND	ND	9.4	8.68	147	176	14.4	14.3	25100	10500	606	655	n/a	n/a	23.1	34.2	121
SSP	7/20/2016	1	L	6	183	204	ND	ND	577	599	ND	ND	ND	ND	158	149	15.2	12.6	22400	6760	505	408	n/a	n/a	25.6	17.3	109
SSP	7/20/2016	1	L	7	159	65.6	ND	ND	511	488	ND	ND	ND	9.69	257	195	21.7	20.9	33900	5770	724	688	n/a	n/a	22.5	75.4	130
SSP	7/20/2016	1	L	8	64.1	499	ND	ND	1650	653	ND	ND	9.69	10.7	217	327	27.8	18	12700	12000	535	801	n/a	n/a	36.9	29.4	119
SSP	7/20/2016	1	L	COMP	282	143	ND	ND	408	451	ND	ND	8.87	9.78	1763	183	31	15.6	24200	9570	516	916	n/a	n/a	54.3	27.6	926
SSP	7/27/2016	2	L	1	42	49.3	ND	ND	9.6	358	ND	ND	ND	ND	813	526	41.3	41	7080	6260	2600	876	n/a	n/a	40	28.3	533
SSP	7/27/2016	2	L	2	37.8	27	ND	ND	458	300	ND	ND	ND	ND	490	548	703	36.3	4630	1240	1490	2220	n/a	n/a	ND	ND	458
SSP	7/27/2016	2	L	3	65.8	36.8	ND	ND	498	303	ND	ND	ND	ND	418	506	79.8	44.3	7180	3280	1720	1450	n/a	n/a	ND	ND	368
SSP	7/27/2016	2	L	4	53.3	37.8	ND	ND	608	265	ND	ND	ND	ND	625	275	51.8	34.3	3400	3150	2980	1360	n/a	n/a	ND	ND	485
SSP	7/27/2016	2	L	5	44.1	ND	ND	ND	486	273	ND	ND	ND	ND	639	463	48.6	37.5	7610	3100	1830	1010	n/a	n/a	ND	ND	581
SSP	7/27/2016	2	L	6	85.3	34.3	ND	ND	543	368	ND	ND	ND	ND	878	351	48.3	28.5	10100	32100	1850	1450	n/a	n/a	46.3	ND	653
SSP	7/27/2016	2	L	7	28.5	87.2	ND	ND	538	298	ND	ND	ND	46.6	798	504	58.3	38.8	2250	3060	4580	1750	n/a	n/a	26.3	ND	606
SSP	7/27/2016	2	L	8	ND	129	ND	ND	328	398	ND	ND	ND	ND	828	383	60.3	48.1	6760	7290	1780	1530	n/a	n/a	30.8	ND	541
SSP	7/27/2016	2	L	COMP	91.8	54.8	ND	ND	540	407	ND	ND	ND	ND	630	708	44.5	228	10500	4420	1460	1350	n/a	n/a	ND	58	473
SSP	8/5/2016	3	L	1	201	44	ND	ND	296	162	ND	ND	ND	ND	311	174	31.6	ND	32600	75500	1390	937	n/a	n/a	ND	ND	1510
SSP	8/5/2016	3	L	2	96.5	108	ND	ND	225	186	ND	ND	162	ND	418	784	41.8	109	25000	8890	1240	933	n/a	n/a	ND	31.7	393
SSP	8/5/2016	3	L	3	135	57.2	ND	ND	448	198	ND	ND	ND	ND	270	221	26	31.1	16500	11400	1020	1050	n/a	n/a	ND	ND	242
SSP	8/5/2016	3	L	4	212	122	ND	ND	336	123	24.3	ND	ND	ND	239	493	30.8	26.8	34800	10800	1150	1890	n/a	n/a	ND	ND	263
SSP	8/5/2016	3	L	5	ND	43.8	ND	ND	268	360	ND	ND	ND	ND	2260	268	ND	25	37500	21800	716	873	n/a	n/a	ND	ND	363
SSP	8/5/2016	3	L	6	88.1	59.2	ND	ND	356	201	ND	ND	ND	ND	162	264	ND	25.1	21200	13900	906	1000	n/a	n/a	ND	ND	197
SSP	8/5/2016	3	L	7	79.9	77.3	ND	ND	368	100	ND	ND	ND	ND	203	1350	ND	54.4	73900	2340	652	2400	n/a	n/a	ND	ND	239
SSP	8/5/2016	3	L	8	348	111	ND	ND	247	151	ND	ND	ND	ND	440	2490	37.8	40.9	27300	13900	2360	1010	n/a	n/a	ND	56.1	345
SSP	8/5/2016	3	L	COMP	158	101	ND	ND	335	132	ND	ND	ND	ND	458	1620	28.3	33.4	22300	9910	1050	839	n/a	n/a	ND	27.2	298

**Notes and abbreviations**  
PCB = polychlorinated biphenyl  
COMP = composite sample  
ND = not detected  
n/a = not analyzed  
Concentrations are presented in milligrams per kilogram (mg/kg)  
Detected concentrations are **bolded**

**Table C2**  
**DTSC Individual Total Metals and PCBs Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	TOTAL METALS (mg/kg)											TOTAL PCBs (mg/kg)	
					Treated Nickel	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Total PCBs	Treated Total PCBs
SSP	7/19/2016	1	M	1	72.5	ND	ND	ND	13.5	ND	ND	ND	50.8	6550	3420	n/a	n/a
SSP	7/19/2016	1	M	2	101	ND	ND	ND	ND	ND	ND	10.1	53.6	5500	5410	n/a	n/a
SSP	7/19/2016	1	M	3	124	ND	ND	ND	ND	ND	ND	12	16.8	11000	3470	n/a	n/a
SSP	7/19/2016	1	M	4	185	ND	ND	ND	ND	ND	ND	10.6	30.1	7710	6290	n/a	n/a
SSP	7/19/2016	1	M	5	153	ND	ND	8.09	ND	ND	ND	7.98	18.2	6540	4930	n/a	n/a
SSP	7/19/2016	1	M	6	269	ND	ND	ND	11	ND	ND	17	31.8	11000	7930	n/a	n/a
SSP	7/19/2016	1	M	7	310	ND	ND	ND	ND	ND	ND	8.74	36.9	8070	6990	n/a	n/a
SSP	7/19/2016	1	M	8	90.8	ND	ND	17.1	ND	ND	ND	8.27	40.3	7090	5290	n/a	n/a
SSP	7/19/2016	1	M	COMP	86.4	ND	19.4	ND	ND	ND	ND	13.7	34.6	6080	4870	n/a	n/a
SSP	7/26/2016	2	M	1	175	ND	ND	ND	ND	ND	ND	ND	ND	11000	10600	n/a	n/a
SSP	7/26/2016	2	M	2	247	ND	ND	ND	ND	ND	ND	ND	ND	16400	17600	n/a	n/a
SSP	7/26/2016	2	M	3	345	ND	ND	ND	ND	ND	ND	ND	51.1	21400	14800	n/a	n/a
SSP	7/26/2016	2	M	4	598	ND	ND	ND	ND	ND	ND	ND	ND	23800	15900	n/a	n/a
SSP	7/26/2016	2	M	5	618	ND	ND	ND	ND	ND	ND	ND	42.3	20200	12500	n/a	n/a
SSP	7/26/2016	2	M	6	426	ND	ND	ND	ND	ND	ND	ND	34	26500	18200	n/a	n/a
SSP	7/26/2016	2	M	7	400	ND	ND	ND	ND	ND	ND	ND	39.8	27800	17500	n/a	n/a
SSP	7/26/2016	2	M	8	268	ND	ND	ND	ND	ND	ND	ND	32.3	21100	9780	n/a	n/a
SSP	7/26/2016	2	M	COMP	258	ND	ND	ND	ND	ND	ND	ND	40.8	17000	14700	n/a	n/a
SSP	8/4/2016	3	M	1	351	ND	ND	ND	ND	ND	ND	ND	ND	19000	11900	n/a	n/a
SSP	8/4/2016	3	M	2	159	ND	ND	ND	ND	ND	ND	ND	41.1	9600	11200	n/a	n/a
SSP	8/4/2016	3	M	3	354	ND	ND	ND	ND	ND	ND	ND	ND	8330	15900	n/a	n/a
SSP	8/4/2016	3	M	4	142	ND	ND	ND	ND	ND	ND	ND	37	18600	10100	n/a	n/a
SSP	8/4/2016	3	M	5	249	ND	ND	ND	ND	ND	ND	ND	ND	10700	10900	n/a	n/a
SSP	8/4/2016	3	M	6	162	ND	ND	ND	ND	ND	ND	ND	56.9	10500	10800	n/a	n/a
SSP	8/4/2016	3	M	7	285	ND	ND	ND	ND	ND	ND	ND	48.6	11800	18300	n/a	n/a
SSP	8/4/2016	3	M	8	315	ND	ND	ND	ND	ND	ND	ND	42	9580	8150	n/a	n/a
SSP	8/4/2016	3	M	COMP	360	ND	ND	ND	31.3	ND	ND	ND	26.5	17300	10500	n/a	n/a
SSP	7/20/2016	1	L	1	165	ND	ND	ND	8.16	ND	ND	16.6	25.7	10400	9120	n/a	n/a
SSP	7/20/2016	1	L	2	141	ND	ND	14.1	ND	ND	ND	15.2	19.2	10200	7360	n/a	n/a
SSP	7/20/2016	1	L	3	540	ND	ND	ND	ND	ND	ND	12.8	14.6	12700	7630	n/a	n/a
SSP	7/20/2016	1	L	4	167	ND	ND	ND	ND	ND	ND	13.8	27.3	13600	9670	n/a	n/a
SSP	7/20/2016	1	L	5	146	ND	ND	ND	ND	ND	ND	10.3	18.8	8470	8100	n/a	n/a
SSP	7/20/2016	1	L	6	96.9	ND	ND	66.2	ND	ND	ND	8.61	19.8	8170	6800	n/a	n/a
SSP	7/20/2016	1	L	7	214	ND	ND	ND	ND	ND	ND	11.5	49.3	7720	8540	n/a	n/a
SSP	7/20/2016	1	L	8	161	ND	ND	ND	ND	ND	ND	17.8	16.6	8630	9870	n/a	n/a
SSP	7/20/2016	1	L	COMP	121	ND	ND	ND	ND	ND	ND	12.4	25.1	7410	7350	n/a	n/a
SSP	7/27/2016	2	L	1	395	ND	ND	ND	ND	ND	ND	ND	ND	18700	12400	n/a	n/a
SSP	7/27/2016	2	L	2	395	ND	ND	ND	ND	ND	ND	ND	28	22200	17800	n/a	n/a
SSP	7/27/2016	2	L	3	370	ND	ND	ND	ND	ND	ND	ND	ND	28800	19500	n/a	n/a
SSP	7/27/2016	2	L	4	253	ND	ND	ND	ND	ND	ND	ND	ND	25800	20100	n/a	n/a
SSP	7/27/2016	2	L	5	388	ND	ND	ND	ND	ND	ND	ND	27.5	24400	16900	n/a	n/a
SSP	7/27/2016	2	L	6	232	ND	ND	ND	ND	ND	ND	ND	ND	22400	11600	n/a	n/a
SSP	7/27/2016	2	L	7	388	ND	ND	ND	ND	ND	ND	ND	25.1	26800	18700	n/a	n/a
SSP	7/27/2016	2	L	8	376	ND	ND	ND	ND	ND	ND	ND	ND	22000	19800	n/a	n/a
SSP	7/27/2016	2	L	COMP	661	ND	ND	ND	ND	ND	ND	ND	ND	23000	21800	n/a	n/a
SSP	8/5/2016	3	L	1	203	ND	ND	ND	ND	ND	ND	ND	ND	19200	15500	n/a	n/a
SSP	8/5/2016	3	L	2	457	ND	ND	ND	ND	ND	ND	ND	ND	23200	11400	n/a	n/a
SSP	8/5/2016	3	L	3	276	ND	ND	ND	ND	ND	ND	ND	ND	14900	23700	n/a	n/a
SSP	8/5/2016	3	L	4	280	ND	ND	ND	ND	ND	ND	ND	ND	16300	12500	n/a	n/a
SSP	8/5/2016	3	L	5	230	ND	ND	ND	35	ND	ND	ND	ND	24000	11100	n/a	n/a
SSP	8/5/2016	3	L	6	253	ND	ND	ND	ND	ND	ND	ND	ND	11200	14500	n/a	n/a
SSP	8/5/2016	3	L	7	838	ND	ND	ND	45.6	ND	ND	ND	ND	9200	21100	n/a	n/a
SSP	8/5/2016	3	L	8	1500	ND	ND	ND	ND	ND	ND	ND	ND	17100	11000	n/a	n/a
SSP	8/5/2016	3	L	COMP	804	ND	ND	ND	ND	ND	ND	ND	ND	16000	12100	n/a	n/a

**Notes and abbreviations**  
PCB = polychlorinated biphenyl  
COMP = composite sample  
ND = not detected  
n/a = not analyzed  
Concentrations are presented in milligrams per kilogram (mg/kg)  
Detected concentrations are **bolded**

**Table C3**  
**DTSC Individual WET and TLCP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)																											
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel	Treated Nickel	Untreated Selenium	Treated Selenium		
SARA	7/7/2016	1	H	1	0.99	ND	ND	0.534	5.23	ND	ND	ND	0.988	ND	1.99	0.96	1.43	ND	0.714	ND	41.3	ND	ND	ND	ND	ND	3.89	0.534	ND	ND		
SARA	7/7/2016	1	H	2	0.844	ND	ND	0.554	4.98	ND	ND	ND	1.32	ND	1.94	1.05	1.48	0.428	0.762	ND	37.1	1.13	ND	ND	ND	ND	4.82	1.19	ND	ND		
SARA	7/7/2016	1	H	3	0.83	ND	ND	0.648	5.33	ND	ND	ND	1.29	ND	2.06	1.55	1.97	ND	1.41	ND	38.7	0.926	ND	ND	ND	0.42	ND	4.81	0.686	ND	ND	
SARA	7/7/2016	1	H	4	0.756	ND	ND	0.592	5.92	ND	ND	ND	1.5	ND	2.8	1.61	1.88	ND	4.38	ND	44.3	0.922	ND	ND	ND	0.44	ND	4.95	0.768	ND	ND	
SARA	7/7/2016	1	H	5	0.636	ND	ND	ND	5.55	1.2	ND	ND	1.49	ND	2.05	11.5	2.1	0.746	1.7	0.714	42.4	4.81	ND	2.41	0.442	ND	5.58	1.96	ND	ND		
SARA	7/7/2016	1	H	6	0.862	ND	ND	0.478	5.24	ND	ND	ND	1.65	0.426	4	1.22	2.08	0.5	6.01	3.57	62.6	6.55	ND	ND	ND	0.536	ND	6.44	1.46	ND	ND	
SARA	7/7/2016	1	H	7	0.866	ND	ND	0.688	5.2	ND	ND	ND	1.45	ND	2.15	0.976	2.09	ND	2.93	0.444	57.5	1.38	ND	ND	ND	0.418	ND	4.88	0.97	ND	ND	
SARA	7/7/2016	1	H	8	0.458	ND	ND	0.602	4.12	ND	ND	ND	1.11	ND	2.2	1.28	1.36	ND	1.86	ND	36.3	1.13	ND	ND	ND	0.428	ND	3.33	0.956	ND	ND	
SARA	7/7/2016	1	H	COMP	0.808	ND	ND	0.544	4.92	ND	ND	ND	1.34	ND	1.66	2.19	1.86	ND	2.29	ND	51.3	2.08	ND	ND	ND	0.452	ND	4.14	1.05	ND	ND	
SARA	7/18/2016	2	H	1	1.8	0.624	0.746	0.936	5.34	ND	ND	ND	1.91	0.53	2.88	1.37	1.91	0.488	3.8	1.6	78.1	3.73	ND	ND	ND	0.706	0.456	6.12	1.47	1.01	ND	
SARA	7/18/2016	2	H	2	1.69	0.548	0.696	0.97	5.42	ND	ND	ND	2.06	ND	2.35	0.908	1.76	ND	3.73	1.73	95.2	1.67	ND	ND	ND	0.584	ND	5.23	0.734	ND	ND	
SARA	7/18/2016	2	H	3	1.81	1.01	0.694	0.466	5.52	ND	ND	ND	2.1	ND	2.25	0.426	1.85	ND	6.41	1.56	88	ND	ND	ND	ND	0.582	ND	5.66	0.538	ND	ND	
SARA	7/18/2016	2	H	4	1.75	ND	0.714	0.942	6.17	ND	ND	ND	1.83	ND	2.04	0.82	1.94	ND	2.11	0.7	106	0.74	ND	ND	ND	0.576	ND	5.46	0.686	ND	ND	
SARA	7/18/2016	2	H	5	1.99	0.556	0.64	1.1	5.35	ND	ND	ND	2.03	ND	4.49	1.04	1.96	ND	2.22	1.74	109	2.39	ND	ND	ND	0.574	ND	6.44	0.91	ND	ND	
SARA	7/18/2016	2	H	6	1.8	ND	0.754	0.792	5.67	ND	ND	ND	2.28	ND	2.34	0.612	2.69	ND	6	1.3	129	0.48	ND	ND	ND	0.684	ND	6.64	0.536	ND	ND	
SARA	7/18/2016	2	H	7	1.84	ND	0.672	0.912	5.64	ND	ND	ND	2.07	ND	2.22	1.47	2.04	ND	3.2	1.25	106	1.19	ND	ND	ND	0.64	ND	6.14	0.67	1.01	ND	
SARA	7/18/2016	2	H	8	2.03	ND	0.78	0.672	5.44	ND	ND	ND	2.13	ND	4.19	0.628	2.21	ND	4	2.92	117	ND	ND	ND	ND	0.788	ND	6.41	0.484	1.04	ND	
SARA	7/18/2016	2	H	COMP	3.42	ND	0.722	0.532	5.51	ND	ND	ND	2.16	ND	2.26	0.622	3.44	ND	9.25	1.91	121	ND	ND	ND	ND	0.686	ND	7.1	0.568	ND	ND	
SARA	7/27/2016	3	H	1	0.962	0.698	0.522	0.924	3.47	1.71	ND	ND	0.95	0.564	1.11	1.33	0.846	0.524	3.53	3.92	55.8	7.77	ND	ND	ND	0.458	0.44	3.27	1.88	ND	ND	
SARA	7/27/2016	3	H	2	1.5	0.56	0.754	1.11	5.04	ND	ND	ND	1.57	ND	2.67	1.86	1.41	ND	3.42	1.76	72.1	3.14	ND	ND	ND	0.92	0.636	4.97	1.4	ND	ND	
SARA	7/27/2016	3	H	3	1.5	0.444	0.866	1.18	4.99	ND	ND	ND	1.27	ND	2.01	1.88	1.27	ND	1.96	1.24	70.2	1.98	ND	ND	ND	0.828	0.602	5.01	1.06	ND	ND	
SARA	7/27/2016	3	H	4	1.73	0.83	0.996	1.22	5.28	1.1	ND	ND	1.51	ND	4.68	5.28	1.48	0.432	1.84	0.818	78.3	8.42	ND	ND	ND	0.96	0.604	6.56	2.02	ND	ND	
SARA	7/27/2016	3	H	5	1.04	0.858	0.568	1	3.69	2.35	ND	ND	0.916	ND	1.13	1.8	0.982	0.494	0.814	ND	48.8	5.16	ND	ND	ND	0.524	0.428	3.49	1.78	ND	ND	
SARA	7/27/2016	3	H	6	1.4	0.638	0.632	1.15	4.94	1.63	ND	ND	1.23	ND	9.9	1.61	1.39	0.628	1.69	0.684	50.6	4.88	ND	ND	ND	0.608	0.456	4.64	2.08	ND	ND	
SARA	7/27/2016	3	H	7	1.39	0.628	0.556	1.07	4.1	ND	ND	ND	1.22	ND	2.48	1.42	1.86	ND	1.44	1.93	45.8	1.8	ND	ND	ND	0.606	0.476	4.19	0.998	ND	ND	
SARA	7/27/2016	3	H	8	1.4	0.56	0.578	1.2	4.19	ND	ND	ND	1.19	0.444	1.52	3.27	1.36	ND	1.31	4.23	46	4.45	ND	ND	ND	0.614	0.566	4.35	1.53	ND	ND	
SARA	7/27/2016	3	H	COMP	1.58	0.622	0.73	1.06	5.36	ND	ND	ND	1.61	0.402	2.28	4.73	1.69	ND	2.42	3.01	77.6	6.69	ND	ND	ND	0.896	0.508	5.57	1.58	ND	ND	
SARA	7/6/2016	1	M	1	0.678	0.638	ND	0.528	4.7	1.46	ND	ND	0.754	ND	1.94	2.6	1.26	0.534	ND	ND	24.6	3.97	ND	ND	ND	ND	ND	3.58	1.74	ND	ND	
SARA	7/6/2016	1	M	2	0.756	ND	ND	0.578	4.09	ND	ND	ND	0.972	ND	2.36	1.07	1.18	ND	1.29	ND	36.4	2.29	ND	ND	ND	0.418	ND	3.79	1.35	ND	ND	
SARA	7/6/2016	1	M	3	0.842	ND	ND	0.646	4.29	ND	ND	ND	0.89	ND	1.53	1.24	1.16	ND	1.75	0.536	46.3	2.28	ND	ND	ND	ND	ND	3.59	1.18	ND	ND	
SARA	7/6/2016	1	M	4	0.65	ND	ND	0.632	4.74	ND	ND	ND	0.894	ND	2.29	1.27	1.27	ND	0.582	ND	39.4	0.94	ND	ND	ND	0.484	ND	4.53	0.738	ND	ND	
SARA	7/6/2016	1	M	5	0.664	ND	ND	0.49	4.8	ND	ND	ND	1.23	ND	2.56	1.5	1.61	0.412	1.57	ND	48.6	2.21	ND	ND	ND	0.492	ND	4.71	1.56	ND	ND	
SARA	7/6/2016	1	M	6	0.984	ND	ND	0.434	4.45	1.58	ND	ND	0.828	ND	4.16	1.23	1.23	ND	0.506	ND	33.5	2.26	ND	ND	ND	ND	0.42	4.01	1.25	ND	ND	
SARA	7/6/2016	1	M	7	1.36	ND	ND	0.554	5.82	ND	ND	ND	1.31	ND	1.98	1.37	1.3	ND	ND	ND	65.7	1.79	ND	ND	ND	0.49	ND	4.56	1.15	ND	ND	
SARA	7/6/2016	1	M	8	0.766	ND	ND	0.602	4.34	ND	ND	ND	1.11	ND	1.54	2.12	1.1	ND	0.928	ND	44.2	2.07	5.52	2.03	ND	ND	3.77	1.07	ND	ND		
SARA	7/6/2016	1	M	COMP	1.06	0.522	ND	0.582	4.57	1.01	ND	ND	1	ND	2.07	2.26	1.26	0.44	1.2	ND	40.1	4.31	ND	ND	ND	0.4	ND	3.3	1.66	ND	ND	
SARA	7/19/2016	2	M	1	0.722	0.434	ND	0.44	4.03	0.702	ND	ND	0.936	ND	1.63	1.7	1.4	0.402	ND	ND	53.1	2.74	n/a	n/a	ND	0.45	ND	3.37	1.2	ND	ND	
SARA	7/19/2016	2	M	2	0.902	0.682	ND	ND	4.86	2.24	ND	ND	1.28	0.538	2.42	2.1	1.48	1.02	3.7	ND	69.1	5.8	n/a	n/a	ND	0.668	0.616	3.9	3.13	ND	ND	
SARA	7/19/2016	2	M	3	2.91	0.824	ND	ND	4.89	0.9	ND	ND	1.03	0.426	2.79	1.45	1.12	0.496	3.52	ND	62.8	5.95	n/a	n/a	ND	0.548	0.474	3.88	1.92	ND	ND	
SARA	7/19/2016	2	M	4	0.628	0.552	ND	ND	4.97	1.19	ND	ND	1.18	0.476	2.11	1.5	1.37	0.612	2.98	3.11	72.6	9.26	n/a	n/a	ND	0.656	0.466	4.26	2.29	ND	ND	
SARA	7/19/2016	2	M	5	2.04	0.44	ND	0.414	4.25	1.798	ND	ND	1.01	ND	1.74	1.32	1.27	0.478	2.22	ND	57.1	2.79	n/a	n/a	ND	0.544	0.44	3.42	1.55	ND	ND	
SARA	7/19/2016	2	M	6	0.912	0.664	ND	ND	4.86	1.84	ND	ND	1.14	0.478	9.52	4.35	2.46	1.05	6.24	0.772	55.5	6.78	n/a	n/a	ND	0.486	0.482	3.78	2.61	ND	ND	
SARA	7/19/2016	2	M	7	1	0.432	ND	0.468	6.57	0.716	ND	ND	1.12	ND	5.21	1.38	1.75	ND	2.76	3.3	52	2.88	n/a	n/a	ND	0.444	ND	4.17	1.28	ND	ND	
SARA	7/19/2016	2	M	8	0.756	0.53	ND	ND	4.78	1.75	ND	ND	0.72	ND	1.52	5.27	1.33	0.762	1.72	ND	82.9	4.64	n/a	n/a	ND	0.444	0.424	3.11	2.14	ND	ND	
SARA	7/19/2016	2	M	COMP	0.694	0.53	ND	ND	5.19	0.964	ND	ND	0.992	ND	2.04	1.6	1.69	0.544	1.21	ND	55.7	2.34	n/a	n/a	ND	0.58	0.4	4.56	1.72	ND	ND	
SARA	7/26/2016	3	M	1	0.986	ND	2.77	0.632	3.33	0.648	ND	ND	1.46	ND	3.38	1.77	1.32	ND	4	ND	66.1	2.65	n/a	n/a	ND	0.616	ND	3.05	1	ND	ND	
SARA	7/26/2016	3	M	2	0.836	0.55	7.87	0.652	4.36	0.928	ND	ND	1.83	ND	3.27	2.41	5.42	ND	1.51	ND	91.4	3.16	n/a	n/a	ND	0.83	ND	3.79	1.04	ND	ND	
SARA	7/26/2016	3	M	3	1.74	0.716	0.84	0.																								



**Table C3**  
**DTSC Individual WET and TCLP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)								TCLP (mg/L)																
					Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	
SARA	7/7/2016	1	H	1	ND	ND	ND	ND	ND	2.63	521	0.604	ND	ND	ND	ND	0.3	ND	ND	ND	2.01	ND	ND	1.09	ND	ND	ND	ND	
SARA	7/7/2016	1	H	2	ND	ND	ND	ND	ND	2.42	476	220	ND	ND	ND	ND	0.45	ND	ND	ND	4.77	ND	ND	0.534	ND	ND	ND	ND	
SARA	7/7/2016	1	H	3	ND	ND	ND	ND	ND	2.71	603	19.6	ND	ND	ND	ND	0.47	ND	ND	ND	5	ND	ND	ND	ND	ND	ND	ND	
SARA	7/7/2016	1	H	4	ND	ND	ND	ND	ND	2.41	559	93.7	ND	ND	ND	ND	0.35	ND	ND	ND	1.87	ND	ND	ND	ND	ND	ND	ND	
SARA	7/7/2016	1	H	5	ND	ND	ND	ND	ND	2.12	590	350	ND	ND	ND	ND	0.47	ND	ND	ND	1.17	ND	ND	ND	ND	ND	ND	ND	
SARA	7/7/2016	1	H	6	ND	ND	ND	ND	ND	2.12	656	314	ND	ND	ND	ND	0.43	ND	ND	ND	1.63	ND	ND	ND	ND	ND	ND	ND	
SARA	7/7/2016	1	H	7	ND	ND	ND	ND	ND	2.5	758	170	ND	ND	ND	ND	0.34	ND	ND	ND	1.19	ND	0.43	ND	ND	ND	ND	ND	
SARA	7/7/2016	1	H	8	ND	ND	ND	ND	ND	2.48	456	128	ND	ND	ND	ND	0.38	ND	ND	ND	1.23	ND	ND	ND	ND	ND	ND	ND	
SARA	7/7/2016	1	H	COMP	ND	ND	ND	ND	ND	2.43	533	227	ND	ND	ND	ND	0.49	ND	ND	ND	6.32	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	1	ND	ND	ND	ND	0.43	2.46	766	330	ND	ND	ND	ND	0.392	ND	ND	ND	1.23	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	2	ND	ND	ND	ND	ND	2.48	700	37.6	ND	ND	ND	ND	0.358	ND	ND	ND	1.29	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	3	ND	ND	ND	ND	0.42	2.12	852	0.738	ND	ND	ND	ND	0.813	ND	ND	ND	5.29	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	4	ND	ND	ND	ND	ND	2.47	678	7.11	ND	ND	ND	ND	0.488	ND	ND	ND	7.05	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	5	ND	ND	ND	ND	ND	2.86	725	52.6	ND	ND	ND	ND	0.368	ND	ND	ND	0.899	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	6	ND	ND	ND	ND	0.452	2.38	883	1.42	ND	ND	ND	ND	0.784	ND	ND	ND	11.7	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	7	ND	ND	ND	ND	0.418	2.44	686	16.4	ND	ND	ND	ND	0.364	ND	ND	ND	0.89	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	8	ND	ND	ND	ND	0.506	2.7	868	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARA	7/18/2016	2	H	COMP	ND	ND	ND	ND	0.41	3.01	833	0.514	ND	ND	ND	ND	0.398	ND	ND	ND	0.691	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	1	ND	ND	ND	ND	ND	1.78	422	269	ND	ND	ND	ND	0.265	ND	ND	ND	2.12	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	2	ND	ND	ND	ND	ND	2.76	888	329	ND	ND	ND	ND	0.334	ND	ND	ND	0.97	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	3	ND	ND	ND	ND	ND	2.79	795	192	ND	ND	ND	ND	0.331	ND	ND	ND	1.56	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	4	ND	ND	ND	ND	ND	2.15	854	419	ND	ND	ND	ND	0.352	ND	ND	ND	1.67	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	5	ND	ND	ND	ND	ND	1.83	419	322	ND	ND	ND	ND	0.363	ND	ND	ND	1.54	0.254	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	6	ND	ND	ND	ND	ND	2.22	552	324	ND	ND	ND	ND	0.301	ND	ND	ND	1.92	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	7	ND	ND	ND	ND	ND	2.49	611	193	ND	ND	ND	ND	0.393	ND	ND	ND	1.06	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	8	ND	ND	ND	ND	ND	2.52	473	280	ND	ND	ND	ND	0.389	ND	ND	ND	0.859	ND	ND	ND	ND	ND	ND	ND	
SARA	7/27/2016	3	H	COMP	ND	ND	ND	ND	ND	2.26	855	329	ND	ND	ND	ND	0.412	ND	ND	ND	1.43	ND	ND	ND	ND	ND	ND	ND	
SARA	7/6/2016	1	M	1	ND	ND	ND	ND	ND	2.02	688	482	ND	ND	ND	ND	0.25	ND	ND	ND	2.37	ND	ND	ND	ND	ND	ND	ND	
SARA	7/6/2016	1	M	2	ND	ND	ND	ND	ND	2.14	594	288	ND	ND	ND	ND	0.37	ND	ND	ND	0.9	ND	ND	ND	ND	ND	ND	ND	
SARA	7/6/2016	1	M	3	ND	ND	ND	ND	ND	2.59	521	274	ND	ND	ND	ND	0.44	ND	0.21	ND	6.4	ND	ND	ND	ND	ND	ND	ND	
SARA	7/6/2016	1	M	4	ND	ND	ND	ND	ND	2.17	700	91.7	ND	ND	ND	ND	0.45	ND	0.23	ND	5.34	ND	ND	ND	ND	ND	ND	ND	
SARA	7/6/2016	1	M	5	ND	ND	ND	ND	ND	2.24	803	415	ND	ND	ND	ND	0.52	ND	0.28	ND	5.04	ND	ND	ND	ND	ND	ND	ND	
SARA	7/6/2016	1	M	6	ND	ND	ND	ND	ND	1.84	646	285	ND	ND	ND	ND	0.29	ND	ND	ND	2.04	ND	ND	0.442	ND	ND	ND	ND	
SARA	7/6/2016	1	M	7	ND	ND	ND	ND	ND	2.19	806	308	ND	ND	ND	ND	0.59	ND	0.2	ND	9.14	ND	ND	ND	ND	ND	ND	ND	
SARA	7/6/2016	1	M	8	ND	ND	ND	ND	ND	2.32	519	232	ND	ND	ND	ND	0.42	ND	ND	ND	4.3	ND	ND	0.574	ND	ND	ND	ND	
SARA	7/6/2016	1	M	COMP	ND	ND	ND	ND	ND	2.11	561	334	ND	ND	ND	ND	0.35	ND	ND	ND	1.38	ND	ND	ND	ND	ND	ND	ND	
SARA	7/19/2016	2	M	1	ND	ND	ND	ND	ND	2.24	450	248	ND	ND	0.981	0.945	0.673	0.286	0.224	ND	16.7	0.939	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	2	ND	ND	ND	ND	ND	1.65	597	679	ND	ND	0.57	0.61	0.353	0.331	ND	ND	1.49	1.16	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	3	ND	ND	ND	ND	ND	2.28	530	404	ND	ND	0.543	0.571	0.379	ND	ND	ND	1.44	0.336	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	4	ND	ND	ND	ND	ND	2.11	645	434	ND	ND	0.578	0.575	0.353	ND	ND	ND	2.24	0.469	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	5	ND	ND	ND	ND	ND	2.41	561	358	ND	ND	0.585	0.569	0.322	ND	ND	ND	1.91	0.219	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	6	ND	ND	ND	ND	ND	1.82	685	580	ND	ND	0.673	0.66	0.375	0.26	ND	ND	2.19	0.558	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	7	ND	ND	ND	ND	ND	2.55	802	331	ND	ND	0.844	0.604	0.465	ND	0.34	ND	7.05	ND	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	8	ND	ND	ND	ND	ND	1.78	534	531	ND	ND	0.866	0.695	0.345	ND	ND	ND	13.3	0.815	n/a	n/a	ND	ND	ND	ND	
SARA	7/19/2016	2	M	COMP	ND	ND	ND	ND	ND	1.96	656	437	ND	ND	0.677	0.97	0.268	ND	ND	ND	3.58	0.387	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	1	ND	ND	ND	ND	ND	2.59	340	214	ND	ND	ND	ND	0.547	ND	ND	ND	2.27	ND	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	2	ND	ND	ND	ND	ND	2.55	504	215	ND	ND	ND	ND	0.511	0.539	ND	ND	2.24	ND	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	3	ND	ND	ND	ND	ND	1.99	708	447	ND	ND	ND	ND	0.567	0.563	0.258	ND	1.8	0.617	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	4	ND	ND	ND	ND	ND	1.49	803	419	ND	ND	ND	ND	0.615	0.464	0.318	ND	0.842	1.56	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	5	ND	ND	ND	ND	ND	2.5	637	383	ND	ND	ND	ND	0.597	0.532	ND	ND	0.701	0.456	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	6	ND	ND	ND	ND	ND	2.52	609	402	ND	ND	ND	ND	0.525	0.454	ND	ND	1.04	0.405	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	7	ND	ND	ND	ND	ND	2.13	764	437	ND	ND	ND	ND	0.521	0.501	ND	ND	1.06	0.337	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	8	ND	ND	ND	ND	ND	2.08	658	505	ND	ND	0.586	0.559	0.383	ND	ND	ND	1.09	0.395	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	3	M	COMP	ND	ND	ND	ND	ND	2.42	708	416	ND	ND	ND	ND	0.44	ND	ND	ND	2.01	0.208	n/a	n/a	ND	ND	ND	ND	
SARA	7/22/2016	1	L	1	ND	ND	ND	ND	ND	1.53	644	673	ND	ND	ND	ND	0.455	ND	ND	ND	1.46	ND	n/a	n/a	ND	ND	ND	ND	
SARA	7/22/2016	1	L	2	ND	ND	ND	ND	ND	1.62	836	461	ND	ND	ND	ND	0.601	0.738	0.242	0.212	ND	6.41	0.571	n/a	n/a	ND	ND	ND	ND
SARA	7/22/2016	1	L	3	ND	ND	ND	ND	ND	1.88	1020	763	ND	ND	ND	ND	0.574	0.76	0.369	0.221	ND	7.74	0.928	n/a	n/a	ND	ND	ND	ND
SARA	7/22/2016	1	L	4	ND	ND	ND	ND	ND	1.28	730	547	ND	ND	ND	ND	0.697	0.399	0.214	ND	1.15	1.6	n/a	n/a	ND	ND	ND	ND	
SARA	7/22/2016	1	L	5	ND	ND	ND	ND	ND	2.34	60																		

**Table C3**  
**DTSC Individual WET and TLCP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)																											
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel	Treated Nickel	Untreated Selenium	Treated Selenium		
SARA	7/26/2016	2	L	1	1.19	0.826	ND	ND	4.66	2	ND	ND	0.812	ND	1.72	1.21	1.16	0.582	0.716	ND	68.2	3.88	n/a	n/a	0.554	ND	4.52	1.74	ND	ND		
SARA	7/26/2016	2	L	2	0.854	0.9	ND	ND	2.15	3.72	ND	ND	0.498	0.753	1.92	1.63	0.974	0.988	ND	ND	5.56	65.8	n/a	n/a	0.558	0.524	2.55	3.98	ND	ND		
SARA	7/26/2016	2	L	3	0.792	0.526	ND	ND	4.18	2.56	ND	ND	0.84	ND	1.26	3.21	0.976	0.642	0.666	ND	39.6	5.62	n/a	n/a	ND	ND	3.06	1.77	ND	ND		
SARA	7/26/2016	2	L	4	1.91	0.792	ND	0.528	5.24	2	ND	ND	1.23	0.418	4.22	1.66	1.27	0.672	ND	ND	68.5	6.85	n/a	n/a	0.732	0.412	5.01	2.01	ND	ND		
SARA	7/26/2016	2	L	5	1.25	1.1	ND	ND	5.01	3.69	ND	ND	0.968	ND	1.8	2.55	1.33	0.524	ND	ND	51.9	4.41	n/a	n/a	0.642	ND	3.85	1.59	ND	ND		
SARA	7/26/2016	2	L	6	0.946	0.562	ND	0.434	4.42	1.73	ND	ND	0.884	ND	1.46	3.82	0.842	0.516	1.04	ND	41.9	5.76	n/a	n/a	ND	ND	3.84	2.17	ND	ND		
SARA	7/26/2016	2	L	7	0.897	0.462	ND	ND	3.63	2.24	ND	ND	0.792	0.432	1.8	1.41	0.767	0.578	ND	ND	49.9	4.9	n/a	n/a	0.503	0.45	3.31	1.87	ND	ND		
SARA	7/26/2016	2	L	8	1.15	0.447	ND	0.607	7.18	0.635	ND	ND	1.18	ND	1.98	1.26	1.53	ND	1.19	ND	92.3	3.23	n/a	n/a	0.708	0.47	5.51	1.2	ND	ND		
SARA	7/26/2016	2	L	COMP	0.794	0.69	ND	0.424	4.14	1.69	ND	ND	0.856	0.428	1.47	1.88	1.01	0.658	ND	0.752	56.2	6.95	n/a	n/a	0.518	ND	3.73	1.84	ND	ND		
SARA	7/25/2016	3	L	1	1	1.04	ND	ND	3.54	3.2	ND	ND	0.778	0.842	46	1.96	2.16	1.05	0.894	ND	38.5	16.3	n/a	n/a	0.47	0.532	3.82	3.43	ND	ND		
SARA	7/25/2016	3	L	2	1.16	0.84	ND	0.454	4.85	1.12	ND	ND	1.42	ND	3.17	10.3	1.12	0.462	0.658	0.87	35.3	5.61	n/a	n/a	0.576	0.446	4.2	1.66	ND	ND		
SARA	7/25/2016	3	L	3	17.1	2.23	ND	0.456	4.53	2.29	ND	ND	1.46	0.68	2.2	2.15	1.1	0.694	0.87	ND	70.2	7.65	n/a	n/a	0.618	0.408	4.46	2.64	ND	ND		
SARA	7/25/2016	3	L	4	1.2	1.03	ND	ND	4.71	4.04	ND	ND	1.45	0.826	4.53	4.89	1.49	0.886	1.1	0.458	54.8	43.3	n/a	n/a	0.666	0.462	4.82	2.56	ND	ND		
SARA	7/25/2016	3	L	5	1.06	0.888	ND	0.614	5.02	2.33	ND	ND	1.36	0.546	2.91	2	1.28	0.714	1.43	ND	77.5	11.5	n/a	n/a	0.76	0.638	4.58	2.57	ND	ND		
SARA	7/25/2016	3	L	6	0.942	0.88	ND	0.532	5.42	3.24	ND	ND	1.52	0.558	2.79	2.48	2.02	1.02	0.454	ND	65.8	9.63	n/a	n/a	0.8	0.646	6.47	2.95	ND	ND		
SARA	7/25/2016	3	L	7	1.09	0.9	ND	0.56	5.97	2.46	ND	ND	1.86	0.44	2.87	2.26	1.99	0.856	1.09	ND	71.5	9.69	n/a	n/a	0.922	0.598	6.84	2.72	ND	ND		
SARA	7/25/2016	3	L	8	0.96	1.46	ND	0.568	4.91	2.67	ND	ND	1.3	0.68	2.99	5.37	1.29	1.03	2.11	1.48	54.4	13.8	n/a	n/a	0.782	0.64	4.49	3.35	ND	ND		
SARA	7/25/2016	3	L	COMP	1.06	0.894	ND	0.55	5.26	2.53	ND	ND	1.6	0.582	6.77	2.08	1.51	0.814	2.06	ND	72.3	10.8	n/a	n/a	0.822	0.584	4.97	2.92	ND	ND		
SARB	7/20/2016	1	H	1	1.82	ND	ND	ND	3.1	ND	ND	ND	ND	ND	2.12	1.6	ND	ND	ND	5.92	36.4	ND	0.049	0.0428	ND	ND	3.83	1.16	ND	ND		
SARB	7/20/2016	1	H	2	ND	ND	ND	ND	3.13	ND	ND	ND	ND	ND	2.05	1.26	1.1	ND	ND	ND	13.3	37.5	ND	ND	ND	ND	4.46	1.01	ND	ND		
SARB	7/20/2016	1	H	3	ND	ND	ND	ND	3.27	ND	ND	ND	1	ND	2.32	1.2	1.32	ND	ND	ND	23.8	40.4	ND	ND	0.0209	ND	4.81	ND	ND	ND		
SARB	7/20/2016	1	H	4	ND	ND	ND	ND	3.96	ND	ND	ND	ND	ND	2.35	1.19	ND	ND	ND	ND	11.2	37.3	ND	0.0523	ND	ND	3.97	ND	ND	ND		
SARB	7/20/2016	1	H	5	ND	ND	ND	ND	3.29	ND	ND	ND	1.46	ND	2.35	1.4	1.82	ND	ND	ND	26	85.3	ND	ND	ND	ND	6.4	ND	ND	ND		
SARB	7/20/2016	1	H	6	1.12	ND	ND	ND	3.55	ND	ND	ND	1.26	ND	2.03	1.5	1.3	ND	14.8	27.2	62.9	ND	ND	ND	ND	ND	5.46	1.25	ND	ND		
SARB	7/20/2016	1	H	7	ND	ND	ND	ND	3.27	ND	ND	ND	1	ND	2.1	1.47	4.14	ND	1.55	16.7	50.6	5.28	ND	0.0453	ND	ND	4.78	1.51	ND	ND		
SARB	7/20/2016	1	H	8	ND	ND	ND	ND	2.62	ND	ND	ND	1.09	ND	3.26	1.44	1.53	ND	ND	15.9	44	ND	ND	ND	ND	6.93	1.03	ND	ND			
SARB	7/20/2016	1	H	COMP	ND	ND	ND	ND	2.99	ND	ND	ND	1.56	ND	2.26	1.54	1.37	ND	1.46	17.1	62.2	ND	ND	ND	ND	ND	5.7	1.25	ND	ND		
SARB	7/28/2016	2	H	1	1.79	0.606	1.23	0.71	6.23	ND	ND	ND	0.458	ND	4.69	1.75	1.32	ND	ND	0.858	0.936	0.752	ND	ND	1.23	0.43	5.11	0.736	2.62	ND		
SARB	7/28/2016	2	H	2	2.04	0.408	1.62	0.444	7.47	ND	ND	ND	0.606	ND	4.78	1.63	1.55	ND	ND	1.21	16	ND	ND	ND	1.26	0.402	5.4	0.5	3.07	ND		
SARB	7/28/2016	2	H	3	1.68	1.07	1.06	0.668	5.99	1.11	ND	ND	ND	ND	4.85	2.65	1.22	0.456	ND	0.888	4.79	1.55	ND	ND	1.53	0.632	11.5	1.6	2.03	ND		
SARB	7/28/2016	2	H	4	1.9	0.688	1.07	0.694	6.33	ND	ND	ND	ND	ND	2.99	1.77	0.874	ND	ND	0.678	11.4	0.668	ND	ND	0.81	0.448	4.16	0.736	1.87	ND		
SARB	7/28/2016	2	H	5	1.92	0.928	1.1	0.768	5.44	ND	ND	ND	ND	ND	3.81	2.01	6.23	ND	ND	ND	1.24	0.89	ND	ND	1.1	0.426	4.95	0.776	2.29	ND		
SARB	7/28/2016	2	H	6	1.89	0.534	1.22	0.648	6.2	ND	ND	ND	0.456	ND	5.9	1.82	2.19	ND	ND	ND	1.07	ND	ND	ND	1.16	0.43	5.51	0.596	2.66	ND		
SARB	7/28/2016	2	H	7	0.494	1.78	0.622	1.13	ND	8.79	ND	ND	ND	0.466	1.69	4.34	ND	1.28	0.45	ND	0.54	0.756	ND	ND	ND	1.11	ND	4.62	ND	2.74		
SARB	7/28/2016	2	H	8	2.02	0.606	1.18	0.696	5.71	ND	ND	ND	0.438	ND	4.52	1.78	1.63	ND	ND	ND	10.4	0.58	ND	ND	1.05	0.456	5.16	0.764	2.46	ND		
SARB	7/28/2016	2	H	COMP	1.09	0.978	0.642	0.738	1.25	1.03	ND	ND	ND	ND	2.22	2.03	0.488	0.462	ND	ND	1.3	1.02	ND	ND	0.594	0.458	1.85	1.17	ND	ND		
SARB	8/4/2016	3	H	1	2.15	ND	0.776	0.544	6.03	ND	ND	ND	0.658	ND	3.8	1.13	2.11	ND	ND	1.46	36.2	ND	4.68	ND	1.26	0.454	5.46	0.484	2.24	ND		
SARB	8/4/2016	3	H	2	1.83	0.724	0.61	0.79	5.11	1.27	ND	ND	1.44	0.452	3.27	1.48	2.15	0.598	1.27	ND	50.7	1.89	ND	ND	0.782	0.57	4.64	1.62	1.49	ND		
SARB	8/4/2016	3	H	3	2.39	0.666	0.742	0.838	4.27	ND	ND	ND	2.21	0.524	6.84	1.27	5.99	0.472	3.19	0.644	46.7	2.89	2.25	ND	1.73	0.514	6.7	1.29	2.92	ND		
SARB	8/4/2016	3	H	4	1.89	0.55	0.63	0.89	4.96	ND	ND	ND	1.13	ND	3.46	1.61	4.86	ND	ND	0.458	54	1.66	ND	ND	0.834	0.416	4.32	0.934	1.75	ND		
SARB	8/4/2016	3	H	5	2.09	0.756	0.658	0.756	5.1	ND	ND	ND	1.03	0.426	4.1	3.1	1.9	0.578	0.488	ND	32.5	2.52	ND	ND	1.04	0.55	5.34	1.65	2.05	ND		
SARB	8/4/2016	3	H	6	2.78	0.532	0.878	0.86	7.09	ND	ND	ND	1.16	0.524	6.2	1.16	3.07	ND	0.482	ND	25.9	1.17	ND	ND	1.6	0.488	7.68	0.878	3.14	ND		
SARB	8/4/2016	3	H	7	2.54	0.72	0.932	0.744	6.08	1.19	ND	ND	1.38	0.44	4.78	1.52	3.12	0.586	3.09	ND	45.8	1.71	ND	ND	1.33	0.514	6.32	1.61	2.78	ND		
SARB	8/4/2016	3	H	8	1.94	0.878	0.638	0.81	4.63	2.09	ND	ND	1.28	0.408	3.5	2.51	9.38	0.702	0.404	ND	31.6	4.49	ND	ND	0.82	0.484	3.94	2.01	1.76	ND		
SARB	8/4/2016	3	H	COMP	2.22	0.66	0.996	0.906	6.07	ND	ND	ND	1.15	0.504	4.02	1.59	2.17	ND	ND	1.8	1.29	44.2	1.88	ND	ND	1.15	0.498	5.24	0.942	2.33	ND	
SART	7/15/2016	1	H	1	1.66	0.97	ND	ND	6.22	1.49	ND	ND	0.78	ND	3.17	2.36	1.11	0.49	2.39	1.83	44.7	5.37	ND	ND	0.732	0.484	5.41	2.86	ND	ND		
SART	7/15/2016	1	H	2	1	0.74	ND	0.47	5.12	ND	ND	ND	0.526	ND	2.48	1.45	0.904	ND	ND	ND	32.8	1.66	ND	ND	0.588	0.474	4.1	1.79	ND	ND		
SART	7/15/2016	1	H	3	1.24	0.888	ND	ND	5.99	ND	ND	ND	ND	ND	2.77	1.89	1.96	0.402	0.65	ND	35.2	2.26	ND	ND	0.742	0.508	8.52	1.97	ND	ND		
SART	7/15/2016	1	H	4	1.19	0.84	ND	0.416																								

**Table C3**  
**DTSC Individual WET and TCLP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)								TCLP (mg/L)																
					Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	
SARA	7/26/2016	2	L	1	ND	ND	ND	ND	ND	1.53	647	295	ND	ND	ND	0.543	0.277	ND	ND	ND	7.15	0.531	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	2	ND	ND	ND	ND	1.48	ND	616	545	ND	ND	0.576	ND	0.265	0.283	ND	ND	1.73	4.98	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	3	ND	ND	ND	ND	ND	2.17	387	353	ND	ND	0.541	0.665	0.306	0.243	ND	ND	3.1	1.45	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	4	ND	ND	ND	ND	ND	1.4	681	489	ND	ND	0.506	0.592	0.341	0.218	ND	ND	1.34	1.58	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	5	ND	ND	ND	ND	ND	1.01	675	410	ND	ND	0.521	0.713	0.352	0.235	ND	0.212	0.879	2.35	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	6	ND	ND	ND	ND	ND	2.05	446	335	ND	ND	0.562	0.607	0.399	ND	ND	ND	3.35	0.465	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	7	ND	ND	ND	ND	ND	1.36	361	280	ND	ND	0.581	0.593	0.302	0.221	ND	ND	4.41	2.37	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	8	ND	ND	ND	ND	ND	2.64	699	224	ND	ND	ND	0.516	0.357	ND	ND	ND	2.84	0.382	n/a	n/a	ND	ND	ND	ND	
SARA	7/26/2016	2	L	COMP	ND	ND	ND	ND	ND	1.96	548	416	ND	ND	0.507	0.567	0.368	ND	ND	ND	2.43	0.497	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	1	ND	ND	ND	ND	ND	1.05	412	625	ND	ND	0.563	0.79	0.303	0.365	1.23	ND	2.7	2.53	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	2	ND	ND	ND	ND	ND	1.65	637	449	ND	ND	0.634	0.615	0.475	ND	ND	ND	1.83	0.305	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	3	ND	ND	ND	ND	ND	1.03	653	481	ND	ND	0.762	0.784	0.604	0.315	0.221	ND	10.8	2.37	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	4	ND	ND	ND	ND	ND	0.6	649	467	ND	ND	0.601	0.85	0.388	0.412	ND	0.302	2.55	4.31	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	5	ND	ND	ND	ND	ND	1.31	699	621	ND	ND	0.649	0.777	0.372	0.231	0.214	ND	11.2	1.62	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	6	ND	ND	ND	ND	ND	1.19	840	608	ND	ND	0.791	0.92	0.767	0.266	0.317	ND	6.72	1.96	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	7	ND	ND	ND	ND	ND	1.27	980	637	ND	ND	0.764	0.802	0.636	0.205	0.206	ND	7.07	1.23	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	8	ND	ND	ND	ND	ND	1.25	713	678	ND	ND	0.567	0.802	0.52	0.214	0.319	ND	5.88	1.28	n/a	n/a	ND	ND	ND	ND	
SARA	7/25/2016	3	L	COMP	ND	ND	ND	ND	ND	1.42	792	661	ND	ND	0.71	0.831	0.514	0.271	0.617	ND	7.21	1.74	n/a	n/a	ND	ND	ND	ND	
SARB	7/20/2016	1	H	1	ND	ND	ND	ND	ND	1.1	640	133	ND	ND	ND	ND	ND	ND	ND	ND	3.77	ND	ND	ND	ND	ND	ND	ND	
SARB	7/20/2016	1	H	2	ND	ND	ND	ND	ND	1.18	632	146	ND	ND	ND	ND	ND	ND	ND	ND	4.03	ND	ND	ND	ND	ND	ND	ND	
SARB	7/20/2016	1	H	3	ND	ND	ND	ND	ND	1.34	841	84.6	ND	ND	ND	ND	ND	ND	ND	ND	2.17	ND	ND	ND	ND	ND	ND	ND	
SARB	7/20/2016	1	H	4	ND	ND	ND	ND	ND	1.45	636	197	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	7/20/2016	1	H	5	ND	ND	ND	ND	ND	1.74	1340	102	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	7/20/2016	1	H	6	ND	ND	ND	ND	ND	1.55	973	281	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.24	2.47	ND	ND	ND	ND	ND	ND
SARB	7/20/2016	1	H	7	ND	ND	ND	ND	ND	1.72	959	331	ND	ND	ND	ND	ND	ND	ND	ND	2.71	ND	ND	ND	ND	ND	ND	ND	
SARB	7/20/2016	1	H	8	ND	ND	ND	ND	ND	1.46	1170	162	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	7/20/2016	1	H	COMP	ND	ND	ND	ND	ND	1.65	1070	250	ND	ND	ND	ND	ND	ND	ND	ND	4.65	ND	ND	ND	ND	ND	ND	ND	
SARB	7/28/2016	2	H	1	ND	ND	ND	ND	ND	1.91	1030	265	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	7/28/2016	2	H	2	ND	ND	ND	ND	0.474	1.95	872	2.22	ND	ND	ND	ND	0.226	ND	0.404	ND	0.625	ND	ND	ND	0.211	ND	ND	ND	
SARB	7/28/2016	2	H	3	ND	ND	ND	ND	ND	1.76	817	641	ND	ND	ND	ND	0.236	ND	0.406	ND	1.06	ND	ND	ND	ND	ND	ND	ND	
SARB	7/28/2016	2	H	4	ND	ND	ND	ND	ND	2.08	627	253	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	7/28/2016	2	H	5	ND	ND	ND	ND	ND	2.02	792	241	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	7/28/2016	2	H	6	ND	ND	ND	ND	ND	2.03	861	81.9	ND	ND	ND	ND	0.219	ND	0.496	ND	0.918	ND	ND	ND	0.228	ND	ND	ND	
SARB	7/28/2016	2	H	7	ND	ND	ND	ND	2.04	ND	40.4	802	ND	ND	ND	ND	ND	0.228	ND	0.328	ND	1	ND	ND	ND	ND	ND	ND	
SARB	7/28/2016	2	H	8	ND	ND	ND	ND	ND	1.83	774	287	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	7/28/2016	2	H	COMP	ND	ND	ND	ND	1.69	1.7	579	446	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	1	ND	ND	ND	ND	ND	2.47	910	0.614	ND	ND	ND	ND	0.32	ND	ND	ND	0.364	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	2	ND	ND	ND	ND	ND	1.63	502	470	ND	ND	ND	ND	0.625	ND	0.361	ND	2.74	ND	0.532	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	3	ND	ND	ND	ND	0.404	1.94	1620	396	ND	ND	ND	ND	0.226	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	4	ND	ND	ND	ND	ND	1.89	589	253	ND	ND	ND	ND	0.282	ND	ND	ND	0.538	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	5	ND	ND	ND	ND	ND	1.83	715	398	ND	ND	ND	ND	0.245	ND	ND	ND	0.295	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	6	ND	ND	ND	ND	0.402	2.06	1560	263	ND	ND	ND	ND	0.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	7	ND	ND	ND	ND	0.508	1.8	940	385	ND	ND	ND	ND	0.324	ND	ND	ND	0.224	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	8	ND	ND	ND	ND	ND	1.65	512	378	ND	ND	ND	ND	0.647	ND	0.475	ND	1.27	ND	ND	ND	ND	ND	ND	ND	
SARB	8/4/2016	3	H	COMP	ND	ND	ND	ND	ND	1.99	782	278	ND	ND	ND	ND	0.625	ND	0.411	ND	1.57	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	1	ND	ND	ND	ND	ND	1.9	664	373	ND	ND	ND	ND	0.264	ND	ND	ND	3.79	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	2	ND	ND	ND	ND	ND	2.47	460	276	ND	ND	ND	ND	0.288	ND	ND	ND	3.76	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	3	ND	ND	ND	ND	ND	2.57	493	268	ND	ND	ND	ND	0.309	ND	ND	ND	2.93	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	4	ND	ND	ND	ND	ND	2.21	535	305	ND	ND	ND	ND	0.311	ND	ND	ND	2.84	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	5	ND	ND	ND	ND	ND	1.88	605	314	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	6	ND	ND	ND	ND	ND	2.55	657	63.9	ND	ND	ND	ND	0.299	ND	ND	ND	2.67	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	7	ND	ND	ND	ND	ND	2.85	411	ND	ND	ND	ND	ND	0.202	ND	ND	ND	0.295	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	8	ND	ND	ND	ND	ND	2.62	586	9.27	ND	ND	ND	ND	ND	ND	ND	ND	0.281	ND	ND	ND	ND	ND	ND	ND	
SART	7/15/2016	1	H	COMP	ND	ND	ND	ND	ND	2.36	682	203	ND	ND	ND	ND	0.326	ND	0.286	ND	2.85	ND	ND	ND	ND	ND	ND	ND	
SART	7/21/2016	2	H	1	ND	ND	ND	ND	ND	2.1	392	250	ND	ND	ND	ND	ND	ND	ND	ND	0.339	ND	ND	ND	ND	ND	ND	ND	
SART	7/21/2016	2	H	2	ND	ND	ND	ND	ND	2.19	392	143	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SART	7/21/2016	2	H	3	ND	ND	ND	ND	ND	3.07	444	ND	ND	ND	ND	ND	0.216	ND	ND	ND	3.01	ND	ND	ND	ND	ND	ND	ND	
SART	7/21/2016	2	H	4	ND	ND	ND	ND	ND	2.54	421	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.41	ND	ND	ND	ND	ND	ND	ND	
SART	7/21/2016	2	H	5	ND	ND	ND	ND	2.78	2.61	6.08	0.552	ND																

**Table C3**  
**DTSC Individual WET and TLCP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)																											
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel	Treated Nickel	Untreated Selenium	Treated Selenium		
SART	7/29/2016	3	H	1	2.34	1.34	0.634	1.04	6.41	1.43	ND	ND	1.07	0.47	2.53	2.45	1.64	0.664	3.51	3.49	48.8	4.18	ND	ND	0.87	0.512	7.12	2	1.19	ND		
SART	7/29/2016	3	H	2	2.11	1.72	0.808	0.764	6.56	1.25	ND	ND	0.562	0.566	3.69	1.87	1.64	0.718	ND	3.44	48.3	6.12	ND	ND	0.926	0.584	6.9	2.66	1.23	ND		
SART	7/29/2016	3	H	3	3.58	1.38	0.6	0.73	6.35	1.11	ND	ND	0.62	0.438	10.4	3.31	2.02	0.568	ND	7.48	46.4	4.49	ND	ND	0.84	0.528	6.63	2.09	1.09	ND		
SART	7/29/2016	3	H	4	2.69	1.11	0.682	0.802	6.89	ND	ND	ND	0.536	ND	3.07	2.28	2.66	4.49	ND	1.64	55.2	1.23	ND	ND	0.99	0.402	8.13	1.1	1.27	ND		
SART	7/29/2016	3	H	5	2.49	2.12	0.728	0.736	7.12	2	ND	ND	1	0.75	4.19	2.67	2.24	1.24	1.1	5.05	58.2	8.47	ND	ND	1.08	0.724	7.57	3.54	1.43	ND		
SART	7/29/2016	3	H	6	2.72	2.01	0.844	0.73	7.07	2.77	ND	ND	0.618	0.962	8.21	2.59	1.96	0.808	ND	1.84	53.3	11.4	ND	ND	1.04	0.758	10.2	3.82	1.37	ND		
SART	7/29/2016	3	H	7	2.56	1.41	1.66	0.838	7.3	ND	ND	ND	0.68	0.458	3.85	2.01	1.58	0.43	ND	4.26	54.8	3.93	ND	ND	1.02	0.542	8.24	2.11	1.36	ND		
SART	7/29/2016	3	H	8	3.63	0.962	0.672	0.922	7.72	ND	ND	ND	0.882	ND	3.65	1.42	1.75	ND	ND	0.442	61.7	1.15	ND	ND	1.17	0.486	8.78	1.3	1.25	ND		
SART	7/29/2016	3	H	COMP	2.98	1.49	0.638	0.752	7.79	ND	ND	ND	1.15	0.502	3.41	2.72	1.52	ND	1	0.498	59.8	3.46	ND	ND	1.05	0.588	7.68	1.8	1.2	ND		
SMM	7/21/2016	1	H	1	ND	ND	ND	ND	1.28	ND	ND	ND	1.14	ND	4.04	2.1	2.8	1.47	ND	ND	25.7	4.23	ND	ND	ND	ND	8.22	3	ND	ND		
SMM	7/21/2016	1	H	2	ND	ND	ND	ND	ND	ND	ND	ND	1.64	ND	3.95	2.09	2.89	1.1	ND	ND	89.3	4.52	ND	ND	ND	ND	4.85	2.46	ND	ND		
SMM	7/21/2016	1	H	3	ND	ND	ND	ND	ND	8.51	ND	ND	1.69	1.18	2.46	1.97	2.71	1.05	ND	ND	59.7	6.44	ND	ND	ND	ND	5.24	2.21	ND	ND		
SMM	7/21/2016	1	H	4	ND	ND	ND	ND	3.23	ND	ND	ND	1.09	1.03	2.38	2.33	2.33	1.7	ND	ND	67.2	21.1	ND	ND	ND	ND	5.09	3.39	ND	ND		
SMM	7/21/2016	1	H	5	ND	ND	ND	ND	3.21	4.29	ND	ND	ND	ND	2.51	1.85	1.93	ND	ND	9.1	76.8	13	ND	ND	ND	ND	5.11	1.33	ND	ND		
SMM	7/21/2016	1	H	6	ND	ND	ND	ND	4.09	4.13	ND	ND	ND	ND	1.8	1.74	11.8	ND	ND	8.12	35.6	3.02	ND	ND	ND	ND	3.04	ND	ND	ND		
SMM	7/21/2016	1	H	7	ND	ND	ND	ND	4.67	5.79	ND	ND	ND	ND	2.65	1.79	1.89	ND	ND	ND	25.6	4.33	ND	ND	ND	ND	4.94	2.43	ND	ND		
SMM	7/21/2016	1	H	8	ND	ND	ND	ND	3.46	2.02	ND	ND	1.33	ND	1.61	1.5	1.5	ND	ND	6.43	43.8	1.52	ND	ND	ND	ND	3.23	ND	ND	ND		
SMM	7/21/2016	1	H	COMP	ND	ND	ND	ND	3.48	3.8	ND	ND	1.59	ND	4.48	2.22	2.16	ND	ND	4.69	54.6	8.89	ND	ND	ND	ND	4.75	1.18	ND	ND		
SMM	7/28/2016	2	H	1	ND	1.35	ND	ND	3.32	4.11	ND	ND	ND	ND	1.79	1.42	2.27	ND	1.29	1.19	167	30.9	ND	ND	ND	ND	3.5	1.79	ND	ND		
SMM	7/28/2016	2	H	2	1.24	ND	ND	ND	4.3	2.52	ND	ND	ND	ND	1.96	1.01	1.69	ND	1.22	30.4	112	2.49	ND	ND	ND	ND	3.49	ND	ND	ND		
SMM	7/28/2016	2	H	3	ND	ND	ND	ND	4.19	9.33	ND	ND	ND	ND	1.91	1.43	1.53	ND	1.41	10.1	38.8	4.81	ND	ND	ND	ND	3.09	1.32	ND	ND		
SMM	7/28/2016	2	H	4	ND	1.42	ND	ND	3.84	5.59	ND	ND	1.25	ND	1.91	1.26	2.07	ND	1.98	30.8	72.3	4.01	ND	ND	ND	ND	4.41	1.09	ND	ND		
SMM	7/28/2016	2	H	5	ND	ND	ND	ND	3.33	2.75	ND	ND	ND	ND	4.83	2.46	1.67	ND	1.22	13.1	52.9	2.71	ND	ND	ND	ND	5	1.07	ND	ND		
SMM	7/28/2016	2	H	6	ND	ND	ND	ND	4.22	21.4	ND	ND	ND	ND	2.33	1.6	1.52	ND	ND	ND	30.2	12.3	ND	ND	ND	ND	3.48	1.65	ND	ND		
SMM	7/28/2016	2	H	7	1	ND	ND	ND	3.24	13.2	ND	ND	1	ND	2.22	1.16	9.19	ND	ND	2.57	48.8	3.69	ND	ND	ND	ND	3.34	ND	ND	ND		
SMM	7/28/2016	2	H	8	ND	1.22	ND	ND	4.06	2.43	ND	ND	ND	ND	2.24	4.92	1.53	ND	ND	44.5	173	6.62	ND	ND	ND	ND	1.37	2.86	ND	ND		
SMM	7/28/2016	2	H	COMP	ND	ND	ND	ND	3.68	4.19	ND	ND	ND	ND	1.9	1.05	1.72	ND	1.25	32.6	62.3	2.43	ND	ND	ND	ND	3.78	ND	ND	ND		
SMM	8/2/2016	3	H	1	ND	1.72	ND	ND	4.04	5.67	ND	ND	ND	ND	2.5	2.07	1.19	ND	ND	1.15	78.5	12.4	ND	ND	ND	ND	1.26	4.83	2.37	ND	ND	
SMM	8/2/2016	3	H	2	ND	ND	ND	ND	3.75	8.26	ND	ND	ND	ND	5.01	3.9	1.24	ND	ND	10.2	81	9.79	ND	ND	ND	ND	5.32	1.97	ND	ND		
SMM	8/2/2016	3	H	3	ND	ND	ND	ND	4.2	5.81	ND	ND	ND	ND	2.41	1.91	1.69	ND	ND	14.7	31.2	3.61	ND	ND	ND	ND	2.03	4.38	1.26	ND	ND	
SMM	8/2/2016	3	H	4	ND	ND	ND	ND	3.84	6.49	ND	ND	ND	ND	2.33	4.02	1.28	ND	ND	ND	57.5	2.23	ND	ND	ND	ND	3.68	1.66	ND	ND		
SMM	8/2/2016	3	H	5	ND	ND	ND	ND	3.82	2.64	ND	ND	ND	ND	1.89	1.93	1.35	ND	ND	14.4	37.5	NDN	ND	ND	ND	ND	4.68	ND	ND	ND		
SMM	8/2/2016	3	H	6	ND	ND	ND	ND	3.58	2.44	ND	ND	ND	ND	1.31	2.1	ND	1.56	10.5	1.22	1.94	48	ND	ND	ND	ND	ND	ND	6.45	ND	ND	
SMM	8/2/2016	3	H	7	ND	ND	ND	ND	3.69	4.08	ND	ND	ND	ND	1.95	1.68	1.49	ND	ND	11.4	28	1.41	ND	ND	ND	ND	3.55	1.06	ND	ND		
SMM	8/2/2016	3	H	8	ND	ND	ND	ND	3.39	3.31	ND	ND	ND	ND	1.82	4.35	1.83	ND	1.66	7.76	68.4	1.47	ND	ND	ND	ND	4.36	1	ND	ND		
SMM	8/2/2016	3	H	COMP	ND	ND	ND	ND	3.81	5.7	ND	ND	ND	ND	2.55	3.3	1.38	ND	2.05	3.97	55.5	6.82	ND	ND	ND	ND	4.33	2.28	ND	ND		
SMM	7/22/2016	1	L	1	ND	ND	ND	ND	3.26	4.43	ND	ND	1.42	ND	2.75	2.92	2.7	ND	ND	ND	116	5.57	n/a	n/a	ND	ND	6.86	2.04	ND	ND		
SMM	7/22/2016	1	L	2	ND	ND	ND	ND	3.5	2.96	ND	ND	1.34	ND	2.64	2.42	2.07	1.33	ND	ND	87	26.5	n/a	n/a	ND	ND	6.58	3.11	ND	ND		
SMM	7/22/2016	1	L	3	ND	ND	ND	ND	4.08	5.33	ND	ND	ND	ND	2.17	2.9	3.91	1.18	1.51	ND	65.6	34	n/a	n/a	ND	ND	4.31	3.76	ND	ND		
SMM	7/22/2016	1	L	4	ND	ND	ND	ND	1.01	3.86	ND	ND	ND	ND	2.77	8.11	2.01	1.16	1.66	ND	81.4	11.1	n/a	n/a	ND	ND	6.46	3.22	ND	ND		
SMM	7/22/2016	1	L	5	ND	ND	ND	ND	4.94	6.62	ND	ND	1.13	ND	2.6	1.94	1.34	ND	ND	ND	118	10.9	n/a	n/a	ND	ND	5.26	2.22	ND	ND		
SMM	7/22/2016	1	L	6	ND	ND	ND	ND	6.56	6.61	ND	ND	ND	ND	2.4	2.01	1.51	ND	ND	ND	54.1	ND	n/a	n/a	ND	ND	5.58	1.78	ND	ND		
SMM	7/22/2016	1	L	7	ND	ND	ND	ND	5.4	4.05	ND	ND	1.04	ND	3.4	2.44	2.33	ND	1.87	ND	66.3	5.66	n/a	n/a	ND	ND	6.32	2.18	ND	ND		
SMM	7/22/2016	1	L	8	2.77	ND	ND	ND	3.66	4.49	ND	ND	1	ND	1.71	1.58	1.36	ND	1.98	ND	98.2	11.9	n/a	n/a	ND	ND	3.14	1.71	ND	ND		
SMM	7/22/2016	1	L	COMP	ND	2.21	ND	ND	4.42	2.58	ND	ND	1.15	ND	2.58	2.21	2.07	ND	ND	ND	100	2.37	n/a	n/a	ND	ND	7.26	2.17	ND	ND		
SMM	7/29/2016	2	L	1	ND	ND	ND	ND	3.73	4.14	ND	ND	ND	ND	2.31	1.14	2.89	ND	ND	18	32.6	2.46	n/a	n/a	ND	ND	6.17	ND	ND	ND		
SMM	7/29/2016	2	L	2	ND	ND	ND	ND	3.77	6.4	ND	ND	ND	ND	2.64	1.58	3.03	ND	ND	1.85	17.8	6.8	n/a	n/a	ND	ND	7.1	ND	ND	ND		
SMM	7/29/2016	2	L	3	ND	ND	ND	ND	3.43	3.46	ND	ND	ND	ND	3.45	1.77	2.45	1.12	ND	ND	22.4	31	n/a	n/a	ND	ND	7.71	2.06	ND	ND		
SMM	7/29/2016	2	L	4	ND	ND	ND	ND	3.89	4.48	ND	ND	ND	ND	3.01	3.48	1.75	2.7	ND	ND	27.8	12.4	n/a	n/a	ND	ND	7.23	2.11	ND	ND		
SMM	7/29/2016	2	L	5	ND	ND	ND	ND	4.01	4.3	ND	ND	ND	ND	2.67	2.27	2.33	1.25	ND	ND	34.2	17	n/a	n/a	ND	ND	7.26	2.61	ND	ND		
SMM	7/29/2016	2	L	6	ND	ND	ND	ND	5.9	6.42	ND	ND	ND	ND	1.96	1.6	2.34	1.15	ND	ND	16.9	8.21	n/a	n/a	3.09	2.89	4.71	1.65	ND	ND		
SMM	7/29/2016	2	L	7</																												

**Table C3**  
**DTSC Individual WET and TCLP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)								TCLP (mg/L)															
					Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver
SART	7/29/2016	3	H	1	ND	ND	ND	ND	ND	2.41	492	253	ND	ND	ND	ND	0.418	ND	ND	ND	3.89	ND	ND	0.474	ND	ND	ND	ND
SART	7/29/2016	3	H	2	ND	ND	ND	ND	ND	2.14	514	303	ND	ND	ND	ND	0.408	ND	ND	ND	3.5	ND	ND	1.26	ND	ND	ND	ND
SART	7/29/2016	3	H	3	ND	ND	ND	ND	ND	2.13	500	269	ND	ND	ND	ND	0.397	ND	0.651	ND	3.25	ND	ND	0.492	ND	ND	ND	ND
SART	7/29/2016	3	H	4	ND	ND	ND	ND	ND	2.42	620	106	ND	ND	ND	ND	0.218	ND	ND	ND	0.292	ND	ND	ND	ND	ND	ND	ND
SART	7/29/2016	3	H	5	ND	ND	ND	ND	ND	1.89	694	420	ND	ND	ND	ND	0.463	ND	ND	ND	3.55	ND	ND	1.49	ND	ND	ND	ND
SART	7/29/2016	3	H	6	ND	ND	ND	ND	ND	2.02	583	426	ND	ND	ND	ND	0.507	0.233	0.225	ND	3.35	ND	ND	2.81	ND	ND	ND	ND
SART	7/29/2016	3	H	7	ND	ND	ND	ND	ND	2.81	621	228	ND	ND	ND	ND	0.506	ND	ND	ND	3.86	ND	ND	0.724	ND	ND	ND	ND
SART	7/29/2016	3	H	8	ND	ND	ND	ND	ND	3.45	771	66.5	ND	ND	ND	ND	0.63	ND	ND	ND	3.78	ND	ND	ND	ND	ND	ND	ND
SART	7/29/2016	3	H	COMP	ND	ND	ND	ND	ND	2.53	565	233	ND	ND	ND	ND	0.48	ND	ND	ND	3.87	ND	ND	1.17	ND	ND	ND	ND
SMM	7/21/2016	1	H	1	ND	ND	ND	ND	ND	1.58	2130	902	ND	ND	ND	ND	1.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	2	ND	ND	ND	ND	ND	1.84	1410	865	ND	ND	ND	ND	1.46	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	3	ND	ND	ND	ND	ND	2.63	1640	663	ND	ND	ND	ND	1.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	4	ND	ND	ND	ND	ND	1.45	1130	1020	ND	ND	ND	ND	1.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	5	ND	ND	ND	ND	ND	2.34	1200	318	ND	ND	ND	ND	1.37	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	6	ND	ND	ND	ND	ND	2.51	1140	139	ND	ND	ND	ND	1.74	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	7	ND	ND	ND	ND	ND	1.29	1570	1150	ND	ND	ND	ND	1.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	8	ND	ND	ND	ND	ND	2.9	1100	45.3	ND	ND	ND	ND	1.34	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/21/2016	1	H	COMP	ND	ND	ND	ND	ND	2.1	1660	364	ND	ND	ND	ND	1.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	1	ND	ND	ND	ND	ND	1.55	707	283	ND	ND	ND	ND	1.95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	2	ND	ND	ND	ND	ND	1.42	630	6.37	ND	ND	ND	ND	3.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	3	ND	ND	ND	ND	ND	1.61	469	212	ND	ND	ND	ND	1.54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	4	ND	ND	ND	ND	ND	1.62	1030	57.1	ND	ND	ND	ND	1.44	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	5	ND	ND	ND	ND	ND	1.56	836	108	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	6	ND	ND	ND	ND	ND	1.58	1260	393	ND	ND	ND	ND	1.38	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	7	ND	ND	ND	ND	ND	1.76	1150	54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	8	ND	ND	ND	ND	ND	1.74	874	7.79	ND	ND	ND	ND	1.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	7/28/2016	2	H	COMP	ND	ND	ND	ND	ND	1.63	872	8.16	ND	ND	ND	ND	1.28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	1	ND	ND	ND	ND	ND	2.03	1400	691	ND	ND	ND	ND	1.41	ND	ND	ND	9.59	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	2	ND	ND	ND	ND	ND	2.11	1240	349	ND	ND	ND	ND	1.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	3	ND	ND	ND	ND	ND	2.27	1180	367	ND	ND	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	4	ND	ND	ND	ND	ND	2.05	660	682	ND	ND	ND	ND	1.47	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	5	ND	ND	ND	ND	ND	2.58	1250	1.35	ND	ND	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	6	ND	ND	ND	ND	ND	2.03	ND	114	1210	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	7	ND	ND	ND	ND	ND	2.36	900	93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	8	ND	ND	ND	ND	ND	2.51	929	29.1	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SMM	8/2/2016	3	H	COMP	ND	ND	ND	ND	ND	2.61	1130	411	ND	ND	ND	ND	ND	ND	ND	ND	2.81	ND	ND	ND	ND	ND	ND	ND
SMM	7/22/2016	1	L	1	ND	ND	ND	ND	ND	2.12	1340	764	ND	ND	ND	ND	1.36	ND	ND	ND	ND	ND	1.66	ND	n/a	n/a	ND	ND
SMM	7/22/2016	1	L	2	ND	ND	ND	ND	ND	1.1	1250	1020	ND	ND	ND	ND	1.21	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/22/2016	1	L	3	ND	ND	ND	ND	ND	ND	1130	819	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/22/2016	1	L	4	ND	ND	ND	ND	ND	1.02	1370	1120	ND	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/22/2016	1	L	5	ND	ND	ND	ND	ND	1.45	1600	994	ND	ND	ND	ND	1.58	ND	ND	ND	ND	ND	1.16	n/a	n/a	ND	ND	ND
SMM	7/22/2016	1	L	6	ND	ND	ND	ND	ND	1.84	1100	767	ND	ND	ND	ND	1.81	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/22/2016	1	L	7	ND	ND	ND	ND	ND	1.55	1200	947	ND	ND	ND	ND	1.08	ND	ND	ND	ND	ND	1.33	n/a	n/a	ND	ND	ND
SMM	7/22/2016	1	L	8	ND	ND	ND	ND	ND	1.04	534	580	ND	ND	ND	ND	1.08	ND	ND	ND	ND	ND	1.13	ND	n/a	n/a	ND	ND
SMM	7/22/2016	1	L	COMP	ND	ND	ND	ND	ND	1.85	1280	945	ND	ND	ND	ND	1.29	ND	ND	ND	ND	ND	1.63	ND	n/a	n/a	ND	ND
SMM	7/29/2016	2	L	1	ND	ND	ND	ND	ND	1.56	1420	14.6	ND	ND	ND	ND	1.63	ND	ND	ND	ND	ND	1.67	ND	n/a	n/a	ND	ND
SMM	7/29/2016	2	L	2	ND	ND	ND	ND	ND	1.74	1780	343	ND	ND	ND	ND	1.53	ND	ND	ND	ND	ND	1.5	ND	n/a	n/a	ND	ND
SMM	7/29/2016	2	L	3	ND	ND	ND	ND	ND	1.03	2070	1140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/29/2016	2	L	4	ND	ND	ND	ND	ND	ND	1610	799	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.05	ND	n/a	n/a	ND	ND
SMM	7/29/2016	2	L	5	ND	ND	ND	ND	ND	ND	1550	904	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.46	ND	n/a	n/a	ND	ND
SMM	7/29/2016	2	L	6	ND	ND	ND	ND	ND	1.26	1350	720	ND	ND	ND	ND	1.28	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/29/2016	2	L	7	ND	ND	ND	ND	ND	1.76	1360	304	ND	ND	ND	ND	1.11	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/29/2016	2	L	8	ND	ND	ND	ND	ND	1.75	1070	595	ND	ND	ND	ND	1.12	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	7/29/2016	2	L	COMP	ND	ND	ND	ND	ND	1.81	1440	410	ND	ND	ND	ND	1.21	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	8/3/2016	3	L	1	ND	ND	ND	ND	ND	1.23	2090	1210	ND	ND	ND	ND	1.22	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	8/3/2016	3	L	2	ND	ND	ND	ND	ND	2.21	1490	858	ND	ND	ND	ND	1.29	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	8/3/2016	3	L	3	ND	ND	ND	ND	ND	1.56	1400	1180	ND	ND	ND	ND	1.03	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	8/3/2016	3	L	4	ND	ND	ND	ND	ND	1.3	1090	825	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	8/3/2016	3	L	5	ND	ND	ND	ND	ND	1.67	817	948	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.85	ND	n/a	n/a	ND	ND
SMM	8/3/2016	3	L	6	ND	ND	ND	ND	ND	2.97	785	621	ND	ND	ND	ND	1.23	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND
SMM	8/3/2016	3	L	7	ND	ND	ND	ND	ND	2.87	1250																	



**Table C3**  
**DTSC Individual WET and TLCP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)																											
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel	Treated Nickel	Untreated Selenium	Treated Selenium		
SSP	7/18/2016	1	H	1	ND	ND	ND	ND	4.46	2.08	ND	ND	ND	ND	1.98	1.6	ND	ND	1.25	23.1	38.8	1.08	0.0249	ND	ND	ND	ND	3.49	1.03	ND	ND	
SSP	7/18/2016	1	H	2	ND	ND	ND	ND	3.83	2.97	ND	ND	ND	ND	1.88	1.54	ND	ND	1.1	15.3	31.7	ND	ND	ND	ND	1.6	2.81	NDN	ND	ND		
SSP	7/18/2016	1	H	3	ND	ND	ND	ND	5.48	2.47	ND	ND	ND	ND	1.91	1.36	1.6	ND	ND	22.7	9.61	ND	ND	ND	ND	2.3	NDN	ND	ND	ND		
SSP	7/18/2016	1	H	4	ND	ND	ND	ND	5.94	2.52	ND	ND	ND	ND	2.43	2.67	ND	ND	1.36	8.15	40.8	ND	ND	ND	ND	3.63	NDN	ND	ND	ND		
SSP	7/18/2016	1	H	5	ND	ND	ND	ND	6.17	1.98	ND	ND	ND	ND	2.58	2.27	ND	ND	ND	13.7	47.8	ND	ND	ND	ND	4.23	1.08	ND	ND	ND		
SSP	7/18/2016	1	H	6	ND	ND	ND	ND	5.17	2.12	ND	ND	ND	ND	2.76	1.78	ND	ND	2.34	28.9	42.4	ND	ND	ND	ND	3.55	1.13	ND	ND	ND		
SSP	7/18/2016	1	H	7	ND	ND	ND	ND	4.01	3.61	ND	ND	ND	ND	2.41	2.55	1.02	ND	ND	15.8	42.1	2.62	ND	ND	ND	4.41	1.4	ND	ND	ND		
SSP	7/18/2016	1	H	8	ND	ND	ND	ND	5.55	2.05	ND	ND	ND	ND	7.58	1.86	1.03	ND	2.11	19.1	47.1	ND	ND	ND	ND	4.17	1.12	ND	ND	ND		
SSP	7/18/2016	1	H	COMP	ND	1.29	ND	ND	5.27	1.87	ND	ND	ND	ND	4.45	1.85	1	ND	2.28	26.4	60.6	ND	ND	ND	ND	14.61	1.06	ND	ND	ND		
SSP	7/25/2016	2	H	1	ND	1.92	ND	ND	4.36	1.2	ND	ND	ND	ND	2.28	2.44	ND	ND	ND	12.7	45.8	5	ND	ND	ND	4.69	1.66	ND	ND	ND		
SSP	7/25/2016	2	H	2	ND	1.65	ND	ND	3.84	2.8	ND	ND	ND	ND	3.26	1.97	ND	ND	1.12	1.65	49.9	18.9	ND	ND	ND	4.34	2.49	ND	ND	ND		
SSP	7/25/2016	2	H	3	ND	1.85	ND	ND	4.25	1.56	ND	ND	ND	ND	2.9N	2.6	1.21	ND	2.99	ND	43.1	5.21	ND	ND	ND	5.53	2.25	ND	ND	ND		
SSP	7/25/2016	2	H	4	3.14	ND	ND	ND	2.92	3.69	ND	ND	ND	ND	4.94	2.48	1.13	ND	2.07	6.32	46.9	3.52	ND	ND	ND	5.29	1.48	ND	ND	ND		
SSP	7/25/2016	2	H	5	1.57	1.19	ND	ND	5.07	3.24	ND	ND	ND	ND	3.07	1.97	1.06	ND	1.25	1.93	48.4	2.9	ND	ND	ND	5.15	1.7	ND	ND	ND		
SSP	7/25/2016	2	H	6	ND	ND	ND	ND	3.24	2.2	ND	ND	ND	ND	3.07	1.7	1.2	ND	2.79	ND	55.1	8.54	ND	ND	ND	4.82	1.75	ND	ND	ND		
SSP	7/25/2016	2	H	7	ND	ND	ND	ND	3.77	2.9	ND	ND	ND	ND	2.16	2.56	ND	ND	3.71	1.35	41.5	24.8	ND	ND	ND	3.94	2.83	ND	ND	ND		
SSP	7/25/2016	2	H	8	ND	1.34	ND	ND	4.17	3.8	ND	ND	ND	ND	6.96	1.75	1.08	ND	ND	46.1	47.6	1.28	ND	ND	ND	5.08	1.25	ND	ND	ND		
SSP	7/25/2016	2	H	COMP	ND	ND	ND	ND	3.09	2.9	ND	ND	ND	ND	2.31	1.91	ND	ND	ND	ND	40.7	5.82	ND	ND	ND	4.42	2.05	ND	ND	ND		
SSP	8/1/2016	3	H	1	ND	ND	ND	ND	1.29	4.73	ND	ND	1.14	ND	4.07	1.83	19.3	ND	ND	8.29	61.1	1.5	ND	ND	ND	6.43	1.09	ND	ND	ND		
SSP	8/1/2016	3	H	2	ND	ND	ND	ND	4.35	1.31	ND	ND	ND	ND	4.73	2.84	5.3	ND	ND	10.3	68.5	ND	ND	ND	ND	6.39	1.08	ND	ND	ND		
SSP	8/1/2016	3	H	3	ND	ND	ND	ND	3.35	5.03	ND	ND	ND	ND	2.51	2.06	ND	ND	ND	8.37	46.2	2.11	ND	ND	ND	4.19	1.45	ND	ND	ND		
SSP	8/1/2016	3	H	4	ND	2.05	ND	ND	2.22	5.21	ND	ND	ND	ND	2.76	1.82	9.21	ND	ND	10.2	70.7	3.54	ND	ND	ND	5.21	1.62	ND	ND	ND		
SSP	8/1/2016	3	H	5	ND	ND	ND	ND	3.55	3.92	ND	ND	ND	ND	2.63	1.9	1.11	ND	1.22	8.64	53	2.94	ND	ND	ND	4.29	1.33	ND	ND	ND		
SSP	8/1/2016	3	H	6	ND	ND	ND	ND	2.56	4.23	ND	ND	ND	ND	2.86	1.95	1.19	ND	1.3	10	65.1	3.25	ND	0.0401	1.33	ND	5.78	1.26	ND	ND	ND	
SSP	8/1/2016	3	H	7	ND	ND	ND	ND	4.02	3.98	ND	ND	ND	ND	2.79	2.06	1.42	ND	ND	11.7	68.6	2.55	ND	ND	1.13	ND	5.59	1.1	ND	ND	ND	
SSP	8/1/2016	3	H	8	ND	ND	ND	ND	3.53	2.87	ND	ND	ND	ND	2.05	3.08	1.19	ND	ND	13.9	57.2	ND	ND	ND	ND	4.7	1.02	ND	ND	ND		
SSP	8/1/2016	3	H	COMP	ND	ND	ND	ND	1.76	3.4	ND	ND	ND	ND	2.57	1.52	1.01	ND	1.36	11	66	1.44	ND	ND	ND	4.42	1.1	ND	ND	ND		
SSP	7/19/2016	1	M	1	1.59	ND	0.402	ND	5.05	1.07	ND	ND	0.82	ND	2.59	1.76	0.968	ND	2.08	5.75	32.5	ND	n/a	n/a	0.726	0.42	3.33	0.798	0.856	ND		
SSP	7/19/2016	1	M	2	1.64	0.448	ND	ND	7.44	0.88	ND	ND	0.5	ND	1.73	1.4	0.622	ND	ND	0.778	24.1	ND	n/a	n/a	0.628	0.418	3.12	0.954	0.684	ND		
SSP	7/19/2016	1	M	3	1.9	0.832	0.482	ND	4.69	6.09	ND	ND	1.03	0.508	2.39	2	1.14	0.856	0.59	0.548	45.8	4.48	n/a	n/a	1.01	0.586	4.74	2.13	1.05	0.546		
SSP	7/19/2016	1	M	4	1.81	1.26	0.41	ND	4.95	6.59	ND	ND	0.972	0.466	2.54	2.38	1.36	0.554	0.98	0.564	56	8.29	n/a	n/a	1.01	0.682	4.72	2.64	1.08	0.638		
SSP	7/19/2016	1	M	5	1.74	0.964	0.458	ND	5.01	6.56	ND	ND	0.83	0.438	3.23	2.74	1.17	0.588	0.44	0.912	40	7.36	n/a	n/a	1.12	1.02	5.31	2.45	1.19	0.64		
SSP	7/19/2016	1	M	6	1.41	2.08	ND	ND	4.66	6.18	ND	ND	0.864	0.692	3.05	3.27	1.52	1.22	0.73	ND	40.7	7.84	n/a	n/a	0.964	1.35	4.63	3.66	1.2	0.954		
SSP	7/19/2016	1	M	7	1.73	0.956	0.44	ND	5.23	6.29	ND	ND	0.666	ND	2.81	5.26	1.09	0.586	ND	ND	45.8	4.96	n/a	n/a	0.912	0.772	4.76	2.55	1.19	0.672		
SSP	7/19/2016	1	M	8	1.64	0.914	0.416	ND	4.16	3.84	ND	ND	0.824	ND	5.65	6.65	1.03	ND	ND	ND	41.1	3.17	n/a	n/a	0.858	0.572	4.43	1.68	1.14	ND		
SSP	7/19/2016	1	M	COMP	1.99	0.662	ND	ND	4.14	2.92	ND	ND	0.616	ND	3.35	2.27	0.936	ND	ND	0.906	37.3	1.07	n/a	n/a	0.718	0.544	5.06	1.33	0.82	ND		
SSP	7/26/2016	2	M	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.37	ND	ND	1.13	ND	n/a	n/a	ND	ND	4.04	ND	ND	ND	ND	
SSP	7/26/2016	2	M	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	3.26	ND	ND	ND	ND	
SSP	7/26/2016	2	M	3	ND	ND	ND	ND	ND	1.44	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	3.5	ND	ND	ND	ND	
SSP	7/26/2016	2	M	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	ND	n/a	n/a	ND	ND	3.03	ND	ND	ND	ND	
SSP	7/26/2016	2	M	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.36	ND	n/a	n/a	ND	ND	3.81	ND	ND	ND	ND	
SSP	7/26/2016	2	M	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.67	ND	n/a	n/a	ND	ND	3.7	ND	ND	ND	ND	
SSP	7/26/2016	2	M	7	ND	ND	ND	ND	ND	1.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	n/a	n/a	ND	ND	4.4	ND	ND	ND	ND	
SSP	7/26/2016	2	M	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.62	ND	n/a	n/a	ND	ND	4.57	ND	ND	ND	ND	
SSP	7/26/2016	2	M	COMP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	3.2	ND	ND	ND	ND	
SSP	8/4/2016	3	M	1	ND	ND	ND	ND	2.7	2.66	ND	ND	ND	ND	3.05	3.06	1.38	ND	ND	ND	26	5.43	n/a	n/a	ND	ND	6.85	2.22	ND	ND	ND	
SSP	8/4/2016	3	M	2	ND	ND	ND	ND	2.55	3.43	ND	ND	ND	ND	3.27	1.74	1.33	ND	ND	1.31	90.8	2.77	n/a	n/a	ND	ND	5.91	1.48	ND	ND	ND	
SSP	8/4/2016	3	M	3	1.21	1.03	ND	ND	3.09	5.03	ND	ND	ND	ND	2.2	4.57	1.89	ND	ND	ND	35.8	8.44	n/a	n/a	ND	ND	4.24	2.96	ND	ND	ND	
SSP	8/4/2016	3	M	4	ND	ND	ND	ND	2.77	1.89	ND	ND	ND	ND	2.82	2.1	1.58	ND	ND	9.6	26.6	ND	n/a	n/a	ND	ND	5.2	1.33	ND	ND	ND	
SSP	8/4/2016	3	M	5	ND	ND	ND	ND	2.92	5.38	ND	ND	ND	ND	2.91	2.11	1.31	ND	ND	ND	56	6.19	n/a	n/a	ND	ND	6.73	1.47	ND	ND	ND	
SSP	8/4/2016	3	M	6	ND	ND	ND	ND	2.57	1.71	ND	ND	ND	ND	3.59	3.14	1.33	ND	ND	25.6	35.7	ND	n/a	n/a	ND	ND	6.51	ND	ND	ND	ND	
SSP	8/4/2016	3	M	7	ND	ND	ND	ND	2.63	3.9	ND	ND	ND	ND	3.65	2.3	1.52	ND	ND	1.36												

**Table C3**  
**DTSC Individual WET and TCLP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)								TCLP (mg/L)																
					Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver	
SSP	7/18/2016	1	H	1	ND	ND	ND	ND	ND	2.81	1040	6.39	ND	ND	ND	1.04	ND	ND	ND	ND	ND	5.37	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	2	ND	ND	ND	ND	ND	2.89	717	4.58	ND	ND	ND	1.51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	3	ND	ND	ND	ND	ND	2.07	3.21	766	1.79	ND	ND	ND	1.45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	4	ND	ND	ND	ND	ND	2.83	1010	4.23	ND	ND	ND	1.87	ND	ND	ND	ND	ND	4.43	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	5	ND	ND	ND	ND	ND	3.67	1130	2.08	ND	ND	ND	1.51	ND	ND	ND	ND	ND	4.51	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	6	ND	ND	ND	ND	ND	3.2	872	5.72	ND	ND	ND	1.94	ND	ND	ND	ND	ND	6.59	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	7	ND	ND	ND	ND	ND	2.56	987	216	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.38	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	8	ND	ND	ND	ND	ND	3.21	1010	2.41	ND	ND	ND	1.87	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SSP	7/18/2016	1	H	COMP	ND	ND	ND	ND	ND	3.27	1340	3.32	ND	ND	ND	1.82	ND	ND	ND	ND	ND	4.89	ND	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	1	ND	ND	ND	ND	ND	1.71	967	368	ND	ND	ND	1.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	2	ND	ND	ND	ND	ND	1.44	1220	498	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.16	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	3	ND	ND	ND	ND	ND	2	1010	516	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.98	ND	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	4	ND	ND	ND	ND	ND	1.88	1200	301	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	5	ND	ND	ND	ND	ND	2.23	928	304	ND	ND	ND	1.04	ND	ND	ND	ND	ND	1.61	ND	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	6	ND	ND	ND	ND	ND	2.07	1070	389	ND	ND	ND	1	ND	ND	ND	ND	ND	1.47	ND	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	7	ND	ND	ND	ND	ND	1.12	894	643	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.45	2.42	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	8	ND	ND	ND	ND	ND	1.99	1000	64.3	ND	ND	ND	1.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SSP	7/25/2016	2	H	COMP	ND	ND	ND	ND	ND	1.89	995	455	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	1	ND	ND	ND	ND	ND	2.04	2200	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.6	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	2	ND	ND	ND	ND	ND	2.86	1910	1.21	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.8	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	3	ND	ND	ND	ND	ND	2.34	1080	232	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.5	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	4	ND	ND	ND	ND	ND	2.36	1380	354	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.28	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	5	ND	ND	ND	ND	ND	2.49	1180	210	ND	ND	ND	ND	ND	ND	ND	ND	ND	21.3	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	6	ND	ND	ND	ND	ND	2.54	1560	191	ND	ND	ND	ND	ND	ND	ND	ND	ND	15.2	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	7	ND	ND	ND	ND	ND	2.24	1090	168	ND	ND	ND	ND	ND	ND	ND	ND	ND	13.3	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	8	ND	ND	ND	ND	ND	2.6	1140	2.43	ND	ND	ND	ND	ND	ND	ND	ND	ND	14.4	ND	ND	ND	ND	ND	ND	ND
SSP	8/1/2016	3	H	COMP	ND	ND	ND	ND	ND	2.59	1350	84.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	13.6	ND	ND	ND	ND	ND	ND	ND
SSP	7/19/2016	1	M	1	ND	ND	ND	ND	ND	4.1	627	1.05	ND	ND	0.66	1.45	ND	ND	ND	ND	ND	2.24	ND	n/a	n/a	ND	ND	ND	ND
SSP	7/19/2016	1	M	2	ND	ND	ND	ND	ND	3.55	602	3.67	ND	ND	0.562	1.31	0.218	ND	ND	ND	ND	1.23	ND	n/a	n/a	ND	ND	ND	ND
SSP	7/19/2016	1	M	3	ND	ND	ND	ND	ND	1.76	1010	479	ND	ND	0.455	0.725	0.284	0.225	ND	ND	4.62	0.562	n/a	n/a	ND	ND	ND	ND	
SSP	7/19/2016	1	M	4	ND	ND	ND	ND	ND	2.14	1020	665	ND	ND	0.525	0.686	0.295	ND	ND	ND	5.7	1.17	n/a	n/a	ND	ND	ND	ND	
SSP	7/19/2016	1	M	5	ND	ND	ND	ND	ND	2.45	1180	750	ND	ND	0.616	1.06	0.306	ND	0.265	ND	2.84	1.11	n/a	n/a	ND	ND	ND	ND	
SSP	7/19/2016	1	M	6	ND	ND	ND	ND	ND	1.87	913	1040	ND	ND	0.467	0.791	0.221	0.254	ND	ND	0.833	1.52	n/a	n/a	ND	ND	ND	ND	
SSP	7/19/2016	1	M	7	ND	ND	ND	ND	ND	2.54	1020	743	ND	ND	0.546	0.782	ND	ND	ND	ND	1.54	0.362	n/a	n/a	ND	ND	ND	ND	
SSP	7/19/2016	1	M	8	ND	ND	ND	ND	ND	3.62	949	429	ND	ND	0.409	0.997	0.312	ND	0.313	ND	4.66	0.369	n/a	n/a	ND	ND	ND	ND	
SSP	7/19/2016	1	M	COMP	ND	ND	ND	ND	ND	3.64	694	432	ND	ND	0.493	1.09	0.2	ND	ND	ND	1.04	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	1	ND	ND	ND	ND	ND	ND	932	148	ND	ND	ND	1.02	ND	ND	ND	ND	6.92	3.61	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	2	ND	ND	ND	ND	ND	ND	759	211	ND	ND	ND	1.05	ND	ND	ND	ND	4.75	1.49	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	3	ND	ND	ND	ND	ND	ND	843	ND	ND	ND	ND	2.17	ND	ND	ND	ND	6.97	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	4	ND	ND	ND	ND	ND	ND	871	202	ND	ND	ND	1.15	ND	ND	ND	ND	ND	1.66	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	5	ND	ND	ND	ND	ND	ND	878	ND	ND	ND	ND	1.43	ND	ND	ND	ND	5.02	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	6	ND	ND	ND	ND	ND	ND	884	20.2	ND	ND	ND	1.55	ND	ND	ND	ND	6.34	1.78	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	7	ND	ND	ND	ND	ND	ND	1170	8.35	ND	ND	ND	1.69	ND	ND	ND	ND	5.24	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	8	ND	ND	ND	ND	ND	ND	1080	42.5	ND	ND	ND	ND	ND	ND	ND	ND	3.39	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/26/2016	2	M	COMP	ND	ND	ND	ND	ND	ND	896	7.18	ND	ND	ND	1.74	ND	ND	ND	ND	6.14	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	1	ND	ND	ND	ND	ND	1.79	1480	1020	ND	ND	ND	ND	ND	ND	ND	ND	1.59	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	2	ND	ND	ND	ND	ND	2.86	1460	403	ND	ND	ND	ND	ND	ND	ND	ND	4.98	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	3	ND	ND	ND	ND	ND	1.55	1150	1140	ND	ND	ND	ND	ND	ND	ND	ND	4.8	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	4	ND	ND	ND	ND	ND	3.23	1620	130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	5	ND	ND	ND	ND	ND	2.26	1640	434	ND	ND	ND	ND	ND	ND	ND	ND	5.08	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	6	ND	ND	ND	ND	ND	3	1640	2.05	ND	ND	ND	ND	ND	ND	ND	ND	2.07	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	7	ND	ND	ND	ND	ND	2.52	1550	423	ND	ND	ND	ND	ND	ND	ND	ND	4.12	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	8	ND	ND	ND	ND	ND	2.92	1580	90.2	ND	ND	ND	ND	ND	ND	ND	ND	2.16	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/4/2016	3	M	COMP	ND	ND	ND	ND	ND	2.54	1440	376	ND	ND	ND	ND	ND	ND	ND	ND	3.54	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/20/2016	1	L	1	ND	ND	ND	ND	ND	2.07	967	846	ND	ND	0.45	0.663	0.26	0.274	ND	ND	0.694	1.8	n/a	n/a	ND	ND	ND	ND	
SSP	7/20/2016	1	L	2	ND	ND	ND	ND	ND	1.51	1320	916	ND	ND	0.469	0.704	0.216	0.316	ND	ND	0.529	2.4	n/a	n/a	ND	ND	ND	ND	
SSP	7/20/2016	1	L	3	ND	ND	ND	ND	ND	0.826	1310	872	ND	ND	0.554	0.729	0.249	ND	ND	ND	0.728	0.325	n/a	n/a	ND	ND	ND	ND	
SSP	7/20/2016	1	L	4	ND	ND	ND	ND	ND	1.76	1210	837	ND	ND	0.494	1.06	0.215	0.211	ND	ND	0.92	3.06	n/a	n/a	ND	ND	ND	ND	
SSP	7/20/2016	1	L	5	ND	ND	ND	ND	ND	0.836	963																		

**Table C3**  
**DTSC Individual WET and TLCP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)																											
					Untreated Antimony	Treated Antimony	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Beryllium	Treated Beryllium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Cobalt	Treated Cobalt	Untreated Copper	Treated Copper	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Molybdenum	Treated Molybdenum	Untreated Nickel	Treated Nickel	Untreated Selenium	Treated Selenium		
SSP	7/27/2016	2	L	1	ND	ND	ND	ND	<b>3.91</b>	<b>2.75</b>	ND	ND	ND	ND	<b>5.15</b>	<b>1.67</b>	<b>1.71</b>	ND	ND	ND	<b>49</b>	<b>11.9</b>	n/a	n/a	ND	ND	<b>7.69</b>	<b>3.56</b>	ND	ND		
SSP	7/27/2016	2	L	2	ND	ND	ND	ND	<b>5.12</b>	<b>4.88</b>	ND	ND	ND	ND	<b>2.9</b>	<b>1.92</b>	<b>10.8</b>	ND	ND	ND	<b>50.4</b>	<b>6.84</b>	n/a	n/a	ND	ND	<b>6.15</b>	<b>2.61</b>	ND	ND		
SSP	7/27/2016	2	L	3	ND	ND	ND	ND	<b>2.53</b>	<b>2.14</b>	ND	ND	ND	ND	<b>3.47</b>	<b>8.62</b>	<b>2.36</b>	ND	ND	ND	<b>61.6</b>	<b>5.84</b>	n/a	n/a	ND	ND	<b>7.75</b>	<b>2.55</b>	ND	ND		
SSP	7/27/2016	2	L	4	ND	ND	ND	ND	ND	<b>1.49</b>	ND	ND	ND	ND	<b>3.29</b>	<b>2.04</b>	<b>2.32</b>	ND	ND	ND	<b>50.2</b>	<b>7.32</b>	n/a	n/a	ND	ND	<b>7.29</b>	<b>3.3</b>	ND	ND		
SSP	7/27/2016	2	L	5	ND	ND	ND	ND	<b>3.06</b>	<b>4.12</b>	ND	ND	ND	ND	<b>3.08</b>	<b>1.91</b>	<b>1.78</b>	ND	ND	ND	<b>44.3</b>	<b>5.73</b>	n/a	n/a	ND	ND	<b>7.2</b>	<b>2.78</b>	ND	ND		
SSP	7/27/2016	2	L	6	<b>1.4</b>	ND	ND	ND	<b>2.47</b>	<b>1.76</b>	ND	ND	ND	ND	<b>3.56</b>	<b>2.86</b>	<b>1.63</b>	ND	ND	ND	<b>50.1</b>	<b>17.7</b>	n/a	n/a	ND	ND	<b>10.4</b>	<b>3.88</b>	ND	ND		
SSP	7/27/2016	2	L	7	ND	<b>1.31</b>	ND	ND	<b>3.39</b>	<b>1.55</b>	ND	ND	ND	ND	<b>4.14</b>	<b>2.91</b>	<b>1.72</b>	ND	ND	ND	<b>47.4</b>	<b>6.82</b>	n/a	n/a	ND	ND	<b>8.55</b>	<b>3.9</b>	ND	ND		
SSP	7/27/2016	2	L	8	ND	ND	ND	ND	<b>4.09</b>	ND	ND	ND	ND	ND	<b>4.24</b>	<b>2.53</b>	<b>1.54</b>	ND	ND	ND	<b>32.4</b>	<b>26.2</b>	n/a	n/a	ND	ND	<b>7.92</b>	<b>5.46</b>	ND	ND		
SSP	7/27/2016	2	L	COMP	ND	<b>1.06</b>	ND	ND	ND	<b>3.99</b>	ND	ND	ND	ND	<b>3.26</b>	<b>2.55</b>	<b>1.61</b>	<b>4.42</b>	ND	ND	ND	<b>41</b>	<b>9.86</b>	n/a	n/a	ND	ND	<b>7.64</b>	<b>3.96</b>	ND	ND	
SSP	8/5/2016	3	L	1	<b>1.81</b>	ND	ND	ND	<b>3.29</b>	<b>3.36</b>	ND	ND	ND	ND	<b>2.69</b>	<b>3.05</b>	<b>1.26</b>	ND	ND	ND	<b>68.8</b>	<b>12.7</b>	n/a	n/a	ND	ND	<b>8.02</b>	<b>3.56</b>	ND	ND		
SSP	8/5/2016	3	L	2	ND	ND	ND	ND	<b>1.52</b>	<b>3.79</b>	ND	ND	<b>1.77</b>	ND	<b>2.95</b>	<b>2.64</b>	<b>1.31</b>	<b>1.96</b>	ND	ND	<b>42.3</b>	<b>11.4</b>	n/a	n/a	ND	ND	<b>7.6</b>	<b>3.06</b>	ND	ND		
SSP	8/5/2016	3	L	3	<b>1.27</b>	ND	ND	ND	<b>3.04</b>	<b>3.24</b>	ND	ND	ND	ND	<b>2.67</b>	<b>3.16</b>	<b>1.19</b>	ND	ND	ND	<b>55</b>	<b>11.5</b>	n/a	n/a	ND	ND	<b>6.68</b>	<b>3.61</b>	ND	ND		
SSP	8/5/2016	3	L	4	ND	ND	ND	ND	<b>2.86</b>	<b>3.14</b>	ND	ND	ND	ND	<b>2.56</b>	<b>4.31</b>	<b>1.09</b>	ND	ND	ND	<b>42.9</b>	<b>9.53</b>	n/a	n/a	ND	ND	<b>6.76</b>	<b>3.48</b>	ND	ND		
SSP	8/5/2016	3	L	5	ND	ND	ND	ND	<b>3.16</b>	<b>2.92</b>	ND	ND	ND	ND	<b>4.4</b>	<b>3.19</b>	<b>1.26</b>	ND	ND	ND	<b>30.3</b>	<b>12.8</b>	n/a	n/a	ND	ND	<b>5.67</b>	<b>3.55</b>	ND	ND		
SSP	8/5/2016	3	L	6	ND	ND	ND	ND	<b>2.96</b>	<b>3.19</b>	ND	ND	ND	ND	<b>2.97</b>	<b>4.48</b>	<b>1.16</b>	ND	ND	ND	<b>49.8</b>	<b>14.4</b>	n/a	n/a	ND	ND	<b>5.84</b>	<b>3.19</b>	ND	ND		
SSP	8/5/2016	3	L	7	ND	ND	ND	ND	<b>3.22</b>	<b>2.96</b>	ND	ND	ND	ND	<b>2.57</b>	<b>3.17</b>	<b>1.1</b>	ND	ND	<b>5.7</b>	<b>47.4</b>	<b>25.8</b>	n/a	n/a	ND	ND	<b>5.3</b>	<b>3.93</b>	ND	ND		
SSP	8/5/2016	3	L	8	<b>2.95</b>	ND	ND	ND	<b>2.85</b>	<b>3.79</b>	ND	ND	ND	ND	<b>2.93</b>	<b>1.93</b>	<b>1.46</b>	ND	ND	ND	<b>94.5</b>	<b>10.1</b>	n/a	n/a	ND	ND	<b>7.1</b>	<b>2.41</b>	ND	ND		
SSP	8/5/2016	3	L	COMP	ND	ND	ND	ND	<b>2.86</b>	<b>4.27</b>	ND	ND	ND	ND	<b>4.06</b>	<b>2.25</b>	<b>1.24</b>	ND	ND	<b>5.86</b>	<b>54.3</b>	<b>15.2</b>	n/a	n/a	ND	ND	<b>6.49</b>	<b>3.07</b>	ND	ND		

**Notes and abbreviations**  
 COMP = composite sample  
 WET = Waste Extraction Test  
 TCLP = Toxicity Characteristic Leaching Procedure  
 ND = not detected  
 n/a = not analyzed  
 Concentrations are presented in milligrams per liter (mg/L)  
 Detected concentrations are **bolded**



**Table C3**  
**DTSC Individual WET and TLCP Metals Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Sample Date	Day	Dosage	Time	WET (mg/L)								TCLP (mg/L)															
					Untreated Silver	Treated Silver	Untreated Thallium	Treated Thallium	Untreated Vanadium	Treated Vanadium	Untreated Zinc	Treated Zinc	Untreated Arsenic	Treated Arsenic	Untreated Barium	Treated Barium	Untreated Cadmium	Treated Cadmium	Untreated Chromium	Treated Chromium	Untreated Lead	Treated Lead	Untreated Mercury	Treated Mercury	Untreated Selenium	Treated Selenium	Untreated Silver	Treated Silver
SSP	7/27/2016	2	L	1	ND	ND	ND	ND	ND	ND	<b>1910</b>	<b>1250</b>	ND	ND	ND	ND	<b>1.08</b>	ND	<b>1.15</b>	ND	<b>17.3</b>	<b>2.79</b>	n/a	n/a	ND	ND	ND	ND
SSP	7/27/2016	2	L	2	ND	ND	ND	ND	ND	<b>1.36</b>	<b>1690</b>	<b>1070</b>	ND	ND	ND	ND	ND	ND	<b>1.33</b>	ND	<b>19</b>	ND	n/a	n/a	ND	ND	ND	ND
SSP	7/27/2016	2	L	3	ND	ND	ND	ND	ND	<b>1.23</b>	<b>2030</b>	<b>1400</b>	ND	ND	ND	ND	<b>1.03</b>	ND	<b>1.22</b>	ND	<b>22.6</b>	ND	n/a	n/a	ND	ND	ND	ND
SSP	7/27/2016	2	L	4	ND	ND	ND	ND	ND	<b>1.08</b>	<b>2010</b>	<b>1190</b>	ND	ND	ND	<b>1.04</b>	ND	ND	<b>1.31</b>	ND	<b>21.2</b>	<b>11.4</b>	n/a	n/a	ND	ND	ND	ND
SSP	7/27/2016	2	L	5	ND	ND	ND	ND	ND	<b>1.5</b>	<b>2100</b>	<b>1140</b>	ND	ND	ND	ND	ND	<b>1.18</b>	ND	<b>26.2</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/27/2016	2	L	6	ND	ND	ND	ND	ND	<b>1810</b>	<b>1170</b>	ND	ND	ND	ND	<b>1.2</b>	ND	<b>1.01</b>	ND	<b>22.2</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/27/2016	2	L	7	ND	ND	ND	ND	ND	<b>2220</b>	<b>1230</b>	ND	ND	ND	ND	ND	ND	<b>1.46</b>	ND	<b>68.5</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/27/2016	2	L	8	ND	ND	ND	ND	ND	<b>2180</b>	<b>1330</b>	ND	ND	ND	ND	<b>1.2</b>	ND	<b>1.32</b>	ND	<b>22.5</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	7/27/2016	2	L	COMP	ND	ND	ND	ND	ND	<b>2050</b>	<b>1370</b>	ND	ND	ND	ND	<b>1.07</b>	ND	ND	ND	<b>31.3</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	1	ND	ND	ND	ND	ND	<b>1.32</b>	<b>1450</b>	<b>899</b>	ND	ND	ND	ND	ND	ND	ND	<b>7.48</b>	<b>1.18</b>	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	2	ND	ND	ND	ND	ND	<b>1.56</b>	<b>1650</b>	<b>833</b>	ND	ND	ND	ND	<b>2.72</b>	ND	ND	ND	<b>3.84</b>	ND	n/a	n/a	ND	ND	ND	ND
SSP	8/5/2016	3	L	3	ND	ND	ND	ND	ND	<b>1.19</b>	<b>1320</b>	<b>996</b>	ND	ND	ND	ND	ND	ND	ND	<b>7.08</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	4	ND	ND	ND	ND	ND	<b>1.9</b>	<b>1370</b>	<b>1090</b>	ND	ND	ND	ND	ND	ND	ND	<b>5.39</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	5	ND	ND	ND	ND	ND	<b>1.52</b>	<b>1220</b>	<b>1330</b>	ND	ND	ND	ND	ND	ND	ND	<b>5.95</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	6	ND	ND	ND	ND	ND	<b>1.27</b>	<b>1210</b>	<b>1020</b>	ND	ND	ND	ND	ND	ND	ND	<b>11</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	7	ND	ND	ND	ND	ND	<b>1.14</b>	<b>1200</b>	<b>1130</b>	ND	ND	ND	ND	ND	ND	ND	<b>7.03</b>	ND	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	8	ND	ND	ND	ND	ND	<b>1.42</b>	<b>1230</b>	<b>779</b>	ND	ND	ND	<b>1.02</b>	ND	ND	ND	<b>12.6</b>	<b>1.2</b>	n/a	n/a	ND	ND	ND	ND	
SSP	8/5/2016	3	L	COMP	ND	ND	ND	ND	ND	<b>1.43</b>	<b>1380</b>	<b>974</b>	ND	ND	ND	ND	ND	ND	ND	<b>7.78</b>	ND	n/a	n/a	ND	ND	ND	ND	

**Notes and abbreviations**  
 COMP = composite sample  
 WET - Waste Extraction Test  
 TCLP = Toxicity Characteristic Leaching Procedure  
 ND = not detected  
 n/a = not analyzed  
 Concentrations are presented in milligrams per liter (mg/L)  
 Detected concentrations are **bolded**



**Table C4**  
**Statistical Comparison of DTSC and ISRI Sample Results**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Facility	Dosage	Data Type	Matrix Type	WMW Test - Ho: ISRI = DTSC													
				Untreated							Treated						
				p-Value (adjusted for Ties)	reject H <sub>0</sub> ? (alpha = 5%)	DTSC versus ISRI (alpha = 5%)	reject H <sub>0</sub> ? (alpha = 10%)	DTSC versus ISRI (alpha = 10%)	DTSC AVG	ISRI AVG	p-Value (adjusted for Ties)	reject H <sub>0</sub> ? (alpha = 5%)	DTSC versus ISRI (alpha = 5%)	reject H <sub>0</sub> ? (alpha = 10%)	DTSC versus ISRI (alpha = 10%)	DTSC AVG	ISRI AVG
SARA	H	Pb	WET	1.97E-05	yes	DTSC > ISRI	yes	DTSC > ISRI	69.0	35.3	1.48E-04	yes	DTSC < ISRI	yes	DTSC < ISRI	2.73	11.5
SARA	H	Zn	WET	5.14E-07	yes	DTSC <> ISRI	yes	DTSC > ISRI	658	403	0.643	no	DTSC = ISRI	no	DTSC = ISRI	170	144
SARA	M	Pb	WET	0.00198	yes	DTSC > ISRI	yes	DTSC > ISRI	62.3	44.8	0.0103	yes	DTSC < ISRI	yes	DTSC < ISRI	4.54	15.2
SARA	M	Zn	WET	1.42E-05	yes	DTSC <> ISRI	yes	DTSC > ISRI	629	421	3.30E-03	yes	DTSC > ISRI	yes	DTSC > ISRI	373	245
SARA	L	Pb	WET	4.06E-04	yes	DTSC > ISRI	yes	DTSC > ISRI	59.1	42.7	3.67E-06	yes	DTSC < ISRI	yes	DTSC < ISRI	11.2	30.4
SARA	L	Zn	WET	1.26E-08	yes	DTSC <> ISRI	yes	DTSC > ISRI	694	308	1.08E-06	yes	DTSC > ISRI	yes	DTSC > ISRI	489	251
SARB	H	Pb	WET	0.0204	yes	DTSC < ISRI	yes	DTSC < ISRI	31.8	54.9	0.00771	yes	DTSC < ISRI	yes	DTSC < ISRI	1.87	5.5
SARB	H	Zn	WET	0.00166	yes	DTSC <> ISRI	yes	DTSC > ISRI	848	713	0.902	no	DTSC = ISRI	no	DTSC = ISRI	241	216
SART	H	Pb	WET	0.00198	yes	DTSC > ISRI	yes	DTSC > ISRI	40.7	29.9	0.274	no	DTSC = ISRI	no	DTSC = ISRI	2.93	4.76
SART	H	Zn	WET	5.18E-06	yes	DTSC <> ISRI	yes	DTSC > ISRI	518	365	0.265	no	DTSC = ISRI	no	DTSC = ISRI	177	126
SMM	H	Pb	WET	1	no	DTSC = ISRI	no	DTSC = ISRI	62.6	62.2	1.42E-05	yes	DTSC < ISRI	yes	DTSC < ISRI	8.57	29.5
SMM	H	Zn	WET	1.54E-07	yes	DTSC <> ISRI	yes	DTSC > ISRI	1081	403	0.959	no	DTSC = ISRI	no	DTSC = ISRI	402	289
SMM	L	Pb	WET	0.503	no	DTSC = ISRI	no	DTSC = ISRI	51.8	45.3	1.92E-07	yes	DTSC < ISRI	yes	DTSC < ISRI	10.1	34.3
SMM	L	Zn	WET	3.25E-09	yes	DTSC <> ISRI	yes	DTSC > ISRI	1341	361	1.2613E-06	yes	DTSC > ISRI	yes	DTSC > ISRI	799	336
SSP	H	Pb	WET	0.789	no	DTSC = ISRI	no	DTSC = ISRI	48.7	55.9	0.0356	yes	DTSC < ISRI	yes	DTSC < ISRI	3.91	15.9
SSP	H	Zn	WET	1.17E-05	yes	DTSC <> ISRI	yes	DTSC > ISRI	1140	738	0.0665	no	DTSC = ISRI	yes	DTSC > ISRI	192	265
SSP	M	Pb	WET	0.0649	no	DTSC = ISRI	yes	DTSC < ISRI	28.1	38.3	1.62E-06	yes	DTSC < ISRI	yes	DTSC < ISRI	2.79	21.3
SSP	M	Zn	WET	9.89E-09	yes	DTSC <> ISRI	yes	DTSC > ISRI	1119	503	0.343	no	DTSC = ISRI	no	DTSC = ISRI	349	380
SSP	L	Pb	WET	0.0328	yes	DTSC > ISRI	yes	DTSC > ISRI	52.5	49.0	6.60E-05	yes	DTSC < ISRI	yes	DTSC < ISRI	19.5	40.3
SSP	L	Zn	WET	2.86E-09	yes	DTSC <> ISRI	yes	DTSC > ISRI	1453	489	2.86E-09	yes	DTSC > ISRI	yes	DTSC > ISRI	1037	440

**Notes:**  
H<sub>0</sub> = null hypothesis  
AVG = Average  
STD DEV = Standard Deviation  
WET = Waste Extraction Test  
WMW = Wilcoxon-Mann-Whitney  
The WMW test was analyzed through ProUCL software provided by the EPA.  
The null hypothesis was set as ISRI sample concentrations are the same as DTSC sample concentrations.



**APPENDIX D**  
**REAGENT SPECIFICATIONS**

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# MATERIAL SAFETY DATA SHEET

PRODUCT NAME: HP TREATMENT

CR 4823

MANUFACTURER'S NAME: C. C. I.

ADDRESS: 3540 EAST 26<sup>TH</sup> STREET, VERNON, CALIF 90058

EMERGENCY TEL NO : 800-424-9300

TEL NO FOR INFORMATION : 800-767-9112

DATE REVISED : 02/09/09

## HAZARDOUS INGREDIENTS IDENTITY INFORMATION

Hazardous Components	CAS No	OSHA PEL	ACGH TLV	Other limits	%
Silicate	1312-76-1	N/Est	N/Est		5-10
<u>SARA Title III</u>	sec.302: Not listed				
	sec.313: listed	<u>Proposition 65:</u>	Not listed		
Phosphates	007320-34-5	5mg/m3 tp	N/Est		4-8
<u>SARA Title III</u>	sec.302: Not listed				
	sec.313: listed	<u>Proposition 65:</u>	Not listed		
Anionic & Cationic Surfactant Blend	Proprietary	N/Est	N/Est		10-15
<u>SARA Title III</u>	sec.302: Not listed				
	sec.313: listed	<u>Proposition 65:</u>	Not listed		

## PHYSICAL CHEMICAL CHARACTERISTICS

Boiling Point : 212 °F

Vapor pressure : 23

Vapor Density : < 1

Solubility in Water : Complete

Specific Gravity : 1.07

Percent Volatile by volume (%) : NA

Melting Point : ND

Evaporation Rate : < 1

Reactivity in water :

pH: 11.2

Appearance and Odor : Clear, very slight amber liquid. No appreciable

## FIRE AND EXPLOSION HAZARD DATA

Flash Point : None

Flammable limits : NA

LEL : NA

UEL : NA

Auto Ignition Temperature : NA

Extinguishing Media : Use any appropriate medium to extinguish surrounding fire.

Special Firefighting Procedures : None

Unusual Fire and Explosion Hazards : None

\* *NA = Not Applicable*

### **HEALTH HAZARD DATA**

Routes of Entry :      Inhalation :      Eyes : x      Skin : Ingestion :

Acute Health Hazards :

INHALATION : Mist or sprays may cause chest discomfort and coughing

EYES : Direct contact may cause eye irritation

SKIN : Prolonged or repeated contact will remove body oils from skin causing slight irritation

INGESTION : May cause nausea and vomiting by swallowing large amounts of product

Chronic Health Hazards : None known

Signs and Symptoms of Exposure :

EYES : Slight irritation and watering of eyes

SKIN : Dryness from defatting skin, chapped hands

INHALATION : NA

INGESTION : Nausea and headache

Medical Conditions Generally Aggravated by Exposure : None known

**EMERGENCY & FIRST AID PROCEDURES**    In all cases, contact physician immediately

INHALATION : Remove to fresh air. If irritation of respiratory system occurs or continues obtain medical attention

EYE CONTACT : Flush with running water for 15 minutes. If eye irritation occurs, obtain medical attention

SKIN CONTACT : Dry and defatted skin can result in dermatitis. If irritation persists obtain medical attention.

INGESTION : Give 2 glasses of water. Induce vomiting. Never give anything by mouth to an unconscious or convulsing person. obtain medical attention

### **TOXICITY DATA**

Carcinogenicity : NO

NTP ? : NO    IARC monographs ? : NO    OSHA Regulated ? : NO

Oral : ND

Dermal : ND

Inhalation : ND

### **REACTIVITY DATA**



Stability : Stable

Conditions to avoid : NA

Incompatibility (Materials to Avoid) : ND

Hazardous Decomposition or Byproducts : ND

Hazardous Polymerization : Will not occur

Conditions to avoid : NA

## **PRECAUTIONS FOR SAFE HANDLING AND USE**

Steps to be Taken in Case Material is Released or Spilled :

SMALL SPILLS : Flush to drain with water

LARGE SPILLS : Dike materials to prevent run-off. Absorb spill with absorbent material and place in suitable container or pick up material with vacuum truck. Flush spill area with water to remove any residue. Notify local, state and federal officials as required

Waste Disposal Method : Material that cannot be used or chemically reprocessed should be disposed of at an approved facility in accordance with any applicable regulations under the Resource Conservation and Recovery Act. Since product is biodegradable and phosphate free, often times it can be disposed of in sewer.

Note: State and local regulations may be more stringent than federal.

Precautions to Be Taken in Handling and Storing : Store in a cool, dry place, keep from freezing, keep container tightly closed when not in use.

Other Precautions : For industrial and institutional use only. Keep out of reach of children.

## **CONTROL MEASURES**

Respiratory protection (Specify type) : None needed.

Ventilation : General room

Local Exhaust : None

Mechanical : None

Protective Gloves : None needed

Eye Protection : Safety glasses where splashing may occur

Other Protective Clothing or Equipment : None

Work Hygienic Practices : The recommendations described in this section are provided as general guidance for minimizing exposure when handling this product. Because use conditions will vary depending upon customer use conditions. Specific use safe handling should be developed by person knowledgeable of the intended use conditions and equipment.

## **DOT HAZARDOUS INFORMATION**

UN/NA : NA

Classification : NA

Proper Shipping Name : INDUSTRIAL WATER TREATMENT COMPOUND, NON D.O.T.  
REGULATED.

HMIS HEALTH RATING: 0-INSIGNIFICANT 1-SLIGHT, 2-MODERATE, 3-HIGH, 4-  
EXTREME

HMIS RATING FOR THIS PRODUCT:

TOXICITY : 1

FIRE : 0

REACTIVITY : 0

### **NOTICE**

All information, recommendations, and suggestions appearing herein concerning this product are based upon data obtained from the manufacturer and/or recognized technical sources; however, C.C.I. makes no warranty, representation or guaranty as to the accuracy, sufficiency or completeness of the material set forth herein. It is the user's responsibility to determine the safety, toxicity and suitability of his own use, handling and disposal of the product. Additional product literature may be available upon request. Since actual use by others is beyond our control, no warranty, express or implied is made by C.C.I. as to the effects of such use, the results to be obtained or the safety and toxicity of the product nor does C.C.I. assume any liability arising out of use by others of this product.

# MATERIAL SAFETY DATA SHEET

Date Revised: 02/13/2007

## I. PRODUCT IDENTIFICATION

**IDENTITY:** PV Cement

Classification:  
Silica Reactive Cement,  
Cement Stabilizer

Manufacturer: DIVERSIFIED MINERALS INC.  
1135 E. Wooley Rd.  
Oxnard CA, 93030  
(805) 247-1069 - Toll Free (888) 364-9595

Poison Center: (800) 356-3129

## II. PRODUCT FORMULA/INGREDIENTS

<u>Major Constituents:</u>	<u>CAS Numbers:</u>	<u>TLV</u>
3CaO-SiO <sub>2</sub>	11168-85-3	5 mg/m <sup>3</sup>
2CaO-SiO <sub>2</sub>	10034-77-2	5 mg/m <sup>3</sup>
3CaO-Al <sub>2</sub> O <sub>3</sub> -Fe <sub>2</sub> O <sub>3</sub>	12042-78-3	5 mg/m <sup>3</sup>
4CaO-Al <sub>2</sub> O <sub>3</sub> -Fe <sub>2</sub> O <sub>3</sub>	12068-35-8	5 mg/m <sup>3</sup>
CaSO <sub>4</sub> -0.5H <sub>2</sub> O	13397-24-5	5 mg/m <sup>3</sup>
Ca(OH) <sub>2</sub>	37247-91-9	5 mg/m <sup>3</sup>

Trace Elements: Trace amounts of naturally occurring materials might be detected during chemical analysis. Such as small amounts of MgO, K<sub>2</sub>OSO<sub>4</sub>, CaO and Na<sub>2</sub>SO<sub>4</sub> may be present.

## III. PHYSICAL DATA

Odor and Appearance:	Wet stone odor, gray fine powder.		
Boiling Point:	Not applicable	Evaporation Rate:	Not applicable
Vapor Pressure:	Not applicable	Specific Grav. (H <sub>2</sub> O = 1):	3.1
Water Solubility:	Slight (0.1 - 1.0%)	Melting Point:	Not available
Vapor Density (Air = 1):	Not applicable	Volatile by Volume:	0%
pH of Saturated Solution:	Approximately 12.0	Est. weight (per 1/ft <sup>3</sup> ):	80 - 94 lb/ft <sup>3</sup>

## IV. FIRE AND EXPLOSION DATA

Flash Point:	Not applicable
Flammable Limits:	Not applicable
Flammable/Combustible Liquid Classifications:	Not applicable
Extinguishing Media:	Not applicable
Unusual Fire or Explosion Hazards:	None
Auto-Ignition Temperature:	Not applicable
Special Fire-Fighting Procedures:	Not applicable

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**MATERIAL SAFETY DATA SHEET**

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**V. HEALTH HAZARDS**

**SUMMARY:** Inhalation of dust should be avoided. The constituents may cause irritation of eyes, skin, and respiratory tract. Ingestion may cause irritation of gastrointestinal tract.

**Threshold Limit Value (TLV):** Respirable Dust - 2 mg/m<sup>3</sup>. Total Dust - 10 mg/m<sup>3</sup>. 30 million Particles/ft<sup>3</sup>.

**Acute Health Effects:** Irritation of eyes, skin, nose, throat, and upper respiratory tract.

**Primary Entry Routes:** Inhalation or ingestion.

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**VI. REACTIVITY DATA**

**Chemical Incompatibility:** Strong acids and Fluorine.

**Decomposition Products:** Oxides and Carbon Dioxide.

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**VII. SPILL OR LEAK PROCEDURES**

**Procedures for Spills:** Avoid creation of excessive dust. Wear appropriate personal protective equipment as described in Section VIII, if potential for exposure to excessive dust concentrations.

**Waste Management:** Use for intended purpose, if possible, otherwise material should be disposed of in accordance with all federal, state, and local regulatory requirements. Take appropriate precautions to prevent excessive exposure to dust by transport or disposal site personnel.

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**VIII. SPECIAL PROTECTION INFORMATION**

**Goggles:** Tight-fitting safety goggles should be worn by persons handling this material where ventilation is inadequate.

**Skin Protection:** Use barrier creams, gloves, boots and clothing to protect the skin from prolonged contact.

**Respirator:** An appropriate NIOSH approved respirator should be worn where ventilation is inadequate or dust concentration may exceed TLV.

**Ventilation:** Use local or general exhaust ventilation to keep dust levels as low as possible.

**Other:** Engineering controls and operating procedures should be designed to reduce airborne dust concentrations to a minimum.

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<b>MATERIAL SAFETY DATA SHEET</b>
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**IX. SPECIAL PRECAUTIONS**

Storage Segregation Hazard Classes:	Alkaline
Special Handling Storage:	Avoid storage with incompatible materials noted in Section VI.
Special Workplace Engineering Controls:	Work practices should minimize dust. Refer to Section VIII.

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**X. ABBREVIATIONS**

OSHA - Occupational Safety & Health Administration	NTP - National Toxicology Program
NIOSH - National Institute for Occupational Safety & Health	CAS - Chemical Abstract Service
IARC - International Agency of Research on Cancer	TLV - Threshold Limit Values

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**Disclaimer of Liability Notice and Prop. 65 Notice:**

This MSDS was prepared, and is to be used only for this product. If this product is used as a component to, or in association with other product(s), or processes, this MSDS information may not be applicable. It is the responsibility of the User(s), or Final Recipient(s) of this product, to distribute this MSDS to employees and personnel.

The conditions or methods of handling, storage, and use of this product are beyond our control and may be beyond our knowledge. FOR THIS AND OTHER REASONS, DMI AND ASSOCIATED COMPANIES DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS OR DAMAGE, OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, OR USE OF THIS PRODUCT.

While PV Cement is not listed as a carcinogen by NTP, IARC, or OSHA. It may, however, contain trace metal compounds are listed on the NTP and IARC lists of carcinogens.

**Proposition 65 Notice:** **WARNING:** This product or area of its manufacture contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

NIOSH conducted a study, "The mortality of U.S. Portland Cement and Quarry Workers" (March 1985) which found: "There is no excess mortality from all causes of death, lung cancer, non-malignant respiratory disease, or ischemic heart disease" among workers studied.

This Warning required by section 25249.6 of the California Health and Safety Code.

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Prepared by: Diversified Minerals Inc., Technical Services Dept.

Telephone #: (888) DMI-9595



## SAFTEY DATA SHEET

Date prepared \_\_\_\_\_

Manufacturer: Envirokem Engineering Services, Inc.  
 4670 East Waterloo road  
 Stockton, CA 95205

Emergency Telephone Number: 925-683-0838, 209-365-7833

### 1. Product Description:

Product Name:	<b>METABOND MCX-90, N,R</b>
Chemical Description:	Proprietary Blend
Synonyms:	None

### 2. Hazardous Ingredients:

Chemicals :	CAS Number	Wt. %	OSHA PEL	ACGIH TLV
Water:	7732-18-5 <10		Not Established	Not Established
Silicic Acid, Sodium Salt:	1344.09-8 >70		Not Established	Not Established
Proprietary Ingredients:	>20		Not Established	Not Established

### 3. Physical and Chemical Properties:

Appearance:	Viscous liquid
Color:	Red to Hazy Liquid
Odor:	Odorless or Musty Odor
PH:	Approximately 12.3
PH (1% aqueous solution):	Approximately 10.9
Specific Gravity & 25 C:	1.49
Solubility in Water:	Completely Soluble
Freezing Point:	Not Determined
Vapor Pressure @ 20.C:	Not Determined
Vapor Density:	Not Determined

#### **4. Health and First Aid Data:**

##### Acute Effects of Overexposure

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Ingestion:	May cause irritation to mouth, esophagus, stomach and gastrointestinal tract.
Skin Absorption:	None currently known
Inhalation:	No health effects are known to occur from inhalation of this product. Inhalation of mist or spray may result in irritation to respiratory tract.
Eye Contact:	Slightly hazardous in case of eye contact (irritant)
Skin Contact:	Slightly hazardous in case of skin contact (irritant) Non-sensitizer for skin. Skin inflammation is characterized by itching, scaling, reddening or occasionally blistering
Chronic Effects of: Overexposure:	No chronic effects, either systemic or local are known. Not listed by NTP, IARC or OSHA as carcinogen.
Other Health Hazards:	None currently known.

##### Emergency and First aid Procedure

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Skin:	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash with water until material has been removed. Get medical attention.
Eyes:	Immediately flush eyes with plenty of water for at least 15 minutes If easy to do, remove contact lenses, if worn. Hold eyelids apart To ensure complete flushing. Do not attempt to neutralize with Chemical agents. Get medical attention.
Inhalation:	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:	If swallowed, DO NOT induce vomiting. Get medical attention Immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

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#### **5. Fire and Explosion Hazard:**

Flammable limits:	This material is noncombustible.
Extinguishing Media:	This material is compatible with all extinguishing media.
Hazard to fire-fighters:	Spilled material is very slippery. Dries to form glass film which Easily cuts skin.
Unusual Fire & Explosion Hazard:	None currently known.
Fire-fighting equipment:	The following protective equipment is recommended when this Material is present in the area of a fire: Chemical goggles, body- Covering protective clothing, chemical resistant gloves, rubber Boots and self-contained breathing devices equipped with full Face piece.

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## **6. Reactivity Data:**

Stability:	This material is stable under all conditions of use and storage.
Condition to avoid:	None.
Material to avoid:	Generates heat when mixed with acid. May react with ammonia Salts resulting in evolution of ammonia gas. Flammable hydrogen Gas may be produced on contact with aluminum, tin, lead and zinc.
Hazardous decomposition:	Hydrogen Carbon disulfide and dimethylamine may be generated
Products:	upon acidification.

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## **7. Spill and Disposal Procedure:**

Environmental Fate	This material is not persistent in aquatic systems, but its high ph When undiluted or un-neutralized is acutely harmful to aquatic life.
Small Spills	Absorb liquid with absorbent material.
Large Spills	Stop spill at source. Dike area of the spill to prevent spreading. Pump liquids into waste container. Remaining liquids can be absorbed.
Classification	Disposed material is not hazardous waste.
Disposal Method	Neutralize and landfill solids in accordance with federal, state and local regulations. Flush neutral liquid to sewer in accordance with federal, state and local regulations and permits.

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## **8. Exposure Controls / Personal Protection:**

Respiratory Protection:	Use a NIOSH-approved dust and mist respirator where spray mist occurs. Observe OSHA regulations for respirator use (29 C.F.R. 1910.134).
Skin Protection:	Wear body-covering protective clothing and gloves.
Eye Protection:	Contact lenses should not be used. Wear chemical goggles or face shield where contact with liquid is likely.
Engineering Control:	Use with adequate ventilation. Keep containers closed. Safety Showers and eyewash fountain should be within direct access.

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## **9. Special Precautions:**

Product Storing and Handling:	Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. Soiled clothing should be removed and laundered before use. Do not store product at high temperature or below freezing. Keep containers closed when not in use. Protect containers from physical damage.
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## **10. TRANSPORTATION INFORMATION:**

DOT UN shipping regulation: Not regulated as hazardous material for transportation.

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## **11. Regulatory Information:**

### SARA (Superfund Amendments and Reauthorization Act)

SARA 302: No components of this product are listed.  
SARA 312: Immediate (Acute) Health Hazard.  
SARA 313: Not a toxic chemical.

### CERCLA (Comprehensive Environmental Response and Liability Act)

CERCLA: No components of this product are present above the  
De minimus levels.

### TSCA (Toxic Substances Control Act) Applicability

TSCA: All components of this product are listed on the TSCA inventory.

### FDA (Food and Drug Administration)

FDA: This product is not approved for food contact uses.

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## **12. Special Precautions:**

Handling and Storing: Do not get in eyes, on skin or on clothing. Wash thoroughly after  
handling. Soiled clothing should be removed and laundered before  
reuse. Store below 120 F.

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The information on the Safety Data Sheet is believed to be accurate obtained from the manufacturer and/or recognized technical sources available to ENVIROKEM. This document is intended only as a guide to the appropriate precautions for handling a chemical by a person trained in chemical handling. ENVIROKEM makes no warranty whatsoever expressed or implied of merchantability of fitness for the particular purpose regarding the accuracy of such data or the results to be obtained from the use thereof. ENVIROKEM assumes no liability and responsibility for injury to recipient or third persons or for any damage to any property and recipient assumes all such risks.

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# Safety Data Sheet **Portland Cement**

## Section 1. Identification

<b>GHS product identifier:</b>	Portland Cement
<b>Chemical name:</b>	Calcium compounds, calcium silicate compounds, and other calcium compounds containing iron and aluminum make up the majority of this product.
<b>Other means of identification:</b>	Cement, ASTM Type I, II, III, V, Portland Limestone Cement, Plastic Cement, Hydraulic Cement, Oilwell Cement, Well Cement, Class G Cement, InterCem, Type L, CSA Type GU, GUb, GUL, MS, MH, MHL, HE, HEL, LH, LHL, HS
<b>Relevant identified uses of the substance or mixture and uses advised against:</b>	Building materials, construction, a basic ingredient in concrete.
<b>Supplier's details:</b>	300 E. John Carpenter Freeway, Suite 1645 Irving, TX 75062 (972) 653-5500
<b>Emergency telephone number (24 hours):</b>	<b>CHEMTREC: (800) 424-9300</b>

## Section 2. Hazards Identification

Overexposure to portland cement can cause serious, potentially irreversible skin or eye damage in the form of chemical (caustic) burns, including third degree burns. The same serious injury can occur if wet or moist skin has prolonged contact exposure to dry portland cement.

<b>OSHA/HCS status:</b>	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
<b>Classification of the substance or mixture:</b>	SKIN CORROSION/IRRITATION – Category 1 SERIOUS EYE DAMAGE/EYE IRRITATION – Category 1 SKIN SENSITIZATION – Category 1 CARCINOGENICITY/INHALATION – Category 1A SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) [Respiratory tract irritation] – Category 3

### GHS label elements

**Hazard pictograms:**



**Signal word:**

Danger

**Hazard statements:**

Causes severe skin burns and eye damage.  
May cause an allergic skin reaction.  
May cause respiratory irritation.  
May cause cancer.

**Precautionary statements:**

**Prevention:**

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust. Use outdoors in a well ventilated area. Wash any exposed body parts thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Contaminated clothing must not be allowed out of the workplace.

**Response:**

If exposed or concerned: Immediately get medical advice/attention if you feel unwell or irritation or rash occurs. If on skin: Wash with plenty of water. Take off contaminated clothing and wash it before reuse. If in eyes: Rinse continuously with water for several minutes. Remove contact lenses, if present and easy to do. If inhaled: Remove person to fresh air and keep comfortable for breathing. If swallowed: Rinse mouth. Do not induce vomiting.

**Storage:**

Restrict or control access to stockpile areas (store locked up). Engulfment hazard: To prevent burial or suffocation, do not enter a confined space, such as a silo, bulk truck or other storage container or vessel that stores or contains cement without an effective procedure for assuring

<b>Disposal:</b>	safety. Store in a well ventilated area. Keep container tightly closed. Dispose of contents/container in accordance with local/regional/national/international regulations.
<b>Hazards not otherwise classified (HNOC):</b>	None known
<b>Supplemental Information:</b>	Respirable Crystalline Silica (RCS) may cause cancer. Repeated inhalation of respirable crystalline silica (quartz) may cause lung cancer according to IARC and NTP; ACGIH states that it is a suspected cause of cancer. Other forms of RCS (e.g., tridymite and cristobalite) may also be present or formed under certain industrial processes.

### Section 3. Composition/information on ingredients

<b>Substance/mixture:</b>	Mixture
<b>Chemical Name:</b>	Calcium compounds, calcium silicate compounds, and other calcium compounds containing iron and aluminum make up the majority of this product.

### CAS number/other identifiers

Ingredient name	%	CAS number
Portland Cement	100%	65997-15-1
<b>The structure of Portland cement may contain the following in some concentration ranges:</b>		
Calcium oxide	A-B	1305-78-8
Quartz	C-D	14808-60-7
Hexavalent chromium*	E-F	18450-29-9
<b>Portland cement also contains gypsum, limestone and magnesium oxide in various concentrations. However, because these components are not classifiable as a hazard under Title 29 Code of Federal Regulations 1910.1200, they are not required to be listed in this section.</b>		
Gypsum	G-H	13397-24-5
Limestone	I-J	1317-65-3
Magnesium oxide	K-L	1309-48-4

Any concentration shown as a range is to protect confidentiality or is due to process variation.

\*Hexavalent chromium is included due to dermal sensitivity associated with the component.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

### Section 4. First aid measures

#### Description of necessary first aid measures

<b>Eye Contact:</b>	Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Chemical burns must be treated promptly by a physician.
<b>Inhalation:</b>	Seek medical help if coughing or other symptoms persist. Inhalation of large amounts of portland cement requires immediate medical attention. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If the individual is not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in a recovery position and get medical attention immediately. Maintain an open airway.
<b>Skin Contact:</b>	Get medical attention immediately. Heavy exposure to portland cement dust, wet concrete or associated water requires prompt attention. Quickly remove contaminated clothing, shoes, and leather goods such as watchbands and belts. Quickly and gently blot or brush away excess portland cement. Immediately wash thoroughly with lukewarm, gently flowing water and non-abrasive pH natural soap. Seek medical attention for rashes, burns, irritation, dermatitis and prolonged unprotected exposure to wet cement, cement mixtures or liquids from wet cement. Burns should be treated as caustic burns. Portland cement causes skin burns with little warning. Discomfort or pain cannot be relied upon to alert a person to

a serious injury. You may not feel pain or the severity of the burn until hours after the exposure. Chemical burns must be treated promptly by a physician. In the event of any complaints or symptoms, avoid further exposure. Get medical attention immediately. Call a poison center or physician. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING unless directed to do so by medical personnel. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Have victim drink 60 to 240 mL (2 to 8 oz.) of water. Stop giving water if the exposed person feels sick as vomiting may be dangerous. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

**Ingestion:**

---

## Most important symptoms/effects, acute and delayed potential acute health effects

**Eye contact:** Causes serious eye damage.  
**Inhalation:** May cause respiratory irritation.  
**Skin contact:** Causes severe burns. May cause an allergic skin reaction.  
**Ingestion:** May cause burns to mouth, throat and stomach.

---

## Over-exposure signs/symptoms

**Eye contact:** Adverse symptoms may include the following: pain, watering and redness.  
**Inhalation:** Adverse symptoms may include the following: respiratory tract irritation and coughing.  
**Skin contact:** Adverse symptoms may include the following: pain or irritation, redness and blistering may occur, skin burns, ulceration and necrosis may occur.  
**Ingestion:** Adverse symptoms may include the following: stomach pains.

---

## Indication of immediate medical attention and special treatment needed, if necessary

**Notes to physician:** Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.  
**Specific treatments:** Not applicable.  
**Protection of first-aiders:** No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

---

## Section 5. Fire-fighting measures

### Extinguishing media

**Suitable extinguishing media:** Use an extinguishing agent suitable for the surrounding fire.  
**Unsuitable extinguishing media:** Do not use water jet or water-based fire extinguishers.  
**Specific hazards arising from the chemical:** No specific fire or explosion hazard.  
**Hazardous thermal decomposition Products:** Decomposition products may include the following materials: carbon dioxide, carbon monoxide, sulfur oxides and metal oxide/oxides.  
**Special protective actions for fire-fighters:** Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.  
**Special protective equipment for fire-fighters:** Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

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## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel:** No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not

**For emergency responders:  
Environmental precautions:**

breathe dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.  
For personal protective clothing requirements, please see Section 8.  
Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has entered the environment, including waterways, soil or air. Materials can enter waterways through drainage systems.

**Methods and materials for containment and cleaning up**

**Small spill:**

Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of waste material by using a licensed waste disposal contractor.

**Large spill:**

Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place dust in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Large spills to waterways may be hazardous due to alkalinity of the product. Dispose of waste material using a licensed waste disposal contractor. Note: see section 1 for emergency contact information and Section 13 for waste disposal.

**Section 7. Handling and storage**

**Precautions for safe handling**

**Protective measures:**

Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure by obtaining and following special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe dust. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material and keep the container tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

**Advice on general occupational hygiene:**

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

**Conditions for safe storage, including any incompatibilities:**

A key to using the product safely requires the user to recognize that portland cement reacts chemically with water to produce calcium hydroxide which can cause severe chemical burns. Every attempt should be made to avoid skin and eye contact with cement. Do not get portland cement inside boots, shoes or gloves. Do not allow wet, saturated clothing to remain against the skin. Promptly remove clothing and shoes that are dusty or wet with cement mixtures. Launder/clean clothing and shoes before reuse. Do not enter a confined space that stores or contains portland cement unless appropriate procedures and protection are available. Portland cement can build up or adhere to the walls of a confined space and then release or fall suddenly (engulfment).

**Section 8. Exposure controls/personal protection**

**Control parameters**

**Occupational exposure limits**

Ingredient name	Exposure limits
-----------------	-----------------

<p><b>Cement, portland, chemicals</b></p>	<p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 1 mg/m<sup>3</sup> 8hours. Form: Respirable fraction</p> <p><b>NIOSH REL (United States, 6/2009)</b> TWA: 5 mg/m<sup>3</sup> 10 hours. Form: Respirable fraction TWA: 10 mg/m<sup>3</sup> 10 hours. Form: Total</p> <p><b>OSHA PEL (United States, 6/2010)</b> TWA: 5mg/m<sup>3</sup>. 8 hours. Form: Respirable fraction TWA: 15 mg/m<sup>3</sup>. 8 hours. Form: Total dust</p>
<p><b>Calcium oxide</b></p>	<p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 2 mg/m<sup>3</sup> 8 hours</p> <p><b>NIOSH REL (United States, 6/2009)</b> TWA: 2mg/m<sup>3</sup> 10 hours.</p> <p><b>OSHA PEL (United States, 6/2010)</b> TWA: 5 mg/m<sup>3</sup> 8 hours.</p>
<p><b>Limestone</b></p>	<p><b>NIOSH REL (United States, 6/2009)</b> TWA: 5 mg/m<sup>3</sup> 10 hours. Form: Respirable fraction TWA: 10 mg/m<sup>3</sup> 10 hours. Form: Total</p> <p><b>OSHA PEL (United States, 6/2010)</b> TWA: 5 mg/m<sup>3</sup> 8 hours. Form: Respirable fraction TWA: 15 mg/m<sup>3</sup> 8 hours. Form: Total dust</p>
<p><b>Magnesium oxide</b></p>	<p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 10 mg/m<sup>3</sup> 8 hours. Form: Inhalable fraction</p> <p><b>OSHA PEL (United States, 6/2010)</b> TWA: 15 mg/m<sup>3</sup> 8 hours. Form: Total particulates</p>
<p><b>Quartz</b></p>	<p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 0.025 mg/m<sup>3</sup> 8 hours. Form: Respirable fraction</p> <p><b>NIOSH REL (United States, 6/2009)</b> TWA: 0.05 mg/m<sup>3</sup> 10 hours. Form: Respirable dust</p> <p><b>OSHA PEL Z-3 (United States, 9/2005)</b> TWA: 10 mg/m<sup>3</sup> divided by % SiO<sub>2</sub> + 2: Respirable TWA: 30 mg/m<sup>3</sup> divided by % SiO<sub>2</sub> + 2: Total</p>
<p><b>Calcium sulfate (gypsum)</b></p>	<p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 10 mg/m<sup>3</sup> 8 hours. Form: Respirable fraction</p> <p><b>NIOSH REL (United States, 6/2009)</b> TWA: 5 mg/m<sup>3</sup> 8 hours. Form: Respirable fraction TWA: 10 mg/m<sup>3</sup> 8 hours. Form: Total dust</p> <p><b>OSHA PEL Z-1 (United States, 2/2006)</b> TWA: 5 mg/m<sup>3</sup> 8 hours. Form: Respirable fraction TWA: 15 mg/m<sup>3</sup> 8 hours. Form: Total dust</p>

**Appropriate engineering controls:**

Use only with adequate ventilation. If user operations generate dust, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

**Environmental exposure controls:**

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

**Individual protection measures**

<b>Hygiene measures:</b>	Clean water should always be readily available for skin and (emergency) eye washing. Periodically wash areas contacted by portland cement with a pH neutral soap and clean, uncontaminated water. If clothing becomes saturated with portland cement, garments should be removed and replaced with clean, dry clothing.
<b>Eye/face protection:</b>	To prevent eye contact, wear safety glasses with side shields, safety goggles or face shields when handling dust or wet cement. Wearing contact lenses when working with cement is not recommended.

## Skin protection

<b>Hand protection:</b>	Use impervious, waterproof, abrasion and alkali-resistant gloves. Do not rely on barrier creams in place of impervious gloves. Do not get portland cement inside gloves.
<b>Body protection:</b>	Use impervious, waterproof, abrasion and alkali-resistant boots and protective long-sleeved and long-legged clothing to protect the skin from contact with wet portland cement. To reduce foot and ankle exposure, wear impervious boots that are high enough to prevent portland cement from getting inside them. Do not get portland cement inside boots, shoes, or gloves. Remove clothing and protective equipment that becomes saturated with cement and immediately wash exposed areas of the body.
<b>Other skin protection:</b>	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved.
<b>Respiratory protection:</b>	Use properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product, and assigned protection factor of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

<b>Physical State:</b>	Solid. [Powder]	<b>Lower and Upper explosive flammable limits</b>	Not applicable
<b>Color:</b>	Gray or white	<b>Vapor pressure:</b>	Not applicable
<b>Odor:</b>	Odorless	<b>Vapor density:</b>	Not applicable
<b>Odor threshold:</b>	Not available	<b>Relative density:</b>	2.3 to 3.1
<b>pH:</b>	>11.5 [Conc. (% w/w): 1%]	<b>Solubility:</b>	Slightly soluble in water
<b>Melting point:</b>	Not available	<b>Solubility in water:</b>	0.1 to 1%
<b>Boiling point:</b>	>1000°C (>1832°F)	<b>Partition coefficient: n-octanol/water:</b>	Not applicable
<b>Flash point:</b>	Not flammable. Not combustible	<b>Auto-ignition temperature:</b>	Not applicable
<b>Burning time:</b>	Not available	<b>Decomposition temperature:</b>	Not available
<b>Burning rate:</b>	Not available	<b>SADT:</b>	Not available
<b>Evaporation Rate:</b>	Not applicable	<b>Viscosity:</b>	Not applicable
<b>Flammability (solid, gas):</b>	Not applicable		

## Section 10. Stability and reactivity

<b>Reactivity:</b>	Reacts slowly with water forming hydrated compounds, releasing heat and producing a strong alkaline solution until reaction is substantially complete.
<b>Chemical Stability:</b>	The product is stable.
<b>Possibility of hazardous reactions:</b>	Under normal circumstances of storage and use, hazardous reactions will not occur.
<b>Conditions to avoid:</b>	No specific data.
<b>Incompatible materials:</b>	Reactive or incompatible with the following materials: oxidizing materials, acids, aluminum and ammonium salt. Portland cement is highly alkaline and will react with acids to produce a violent, heat-generating reaction. Toxic gases or vapors may be given off depending on the acid involved. Reacts with acids, aluminum metals and ammonium salts. Aluminum powder and other alkali and alkaline earth elements will react in wet mortar or concrete, liberating hydrogen gas. Limestone ignites on contact with fluorine and is incompatible with acids, alum, ammonium salts, and magnesium. Silica reacts violently with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride yielding possible fire and/or explosions. Silicates dissolve readily in hydrofluoric acid producing a corrosive gas-silicon tetrafluoride.
<b>Hazardous decomposition products:</b>	Under normal conditions of storage and use, hazardous decomposition products should not be produced.



## Section 11. Toxicological information

### Information on toxicological effects

**Acute toxicity:** Portland Cement LD50/LC50 = Not available  
**Irritation/Corrosion:** **Skin:** May cause skin irritation. May cause serious burns in the presence of moisture.  
**Eyes:** Causes serious eye damage. May cause burns in the presence of moisture.  
**Respiratory:** May cause respiratory tract irritation.  
**Sensitization:** May cause sensitization due to the potential presence of trace amounts of hexavalent chromium.  
**Mutagenicity:** There are no data available.

**Carcinogenicity:**  
 Classification below:

Product/ingredient name	OSHA	IARC	ACGIH	NTP
Cement, portland, chemicals	-	-	A4	-
Quartz	-	1	A2	Known to be a human carcinogen.

**Reproductive toxicity:** There are no data available.  
**Teratogenicity:** There are no data available.

#### Specific target organ toxicity (single exposure)

Name	Category	Route of Exposure	Target Organs
Calcium oxide	Category 3	Inhalation and skin contact	Respiratory tract irritation, skin irritation
Cement, portland, chemicals	Category 3	Inhalation and skin contact	Respiratory tract irritation, skin irritation

#### Specific target organ toxicity (repeated exposure)

Name	Category	Route of Exposure	Target Organs
Quartz	Category 1	Inhalation	Respiratory tract and kidneys

**Aspiration hazard:** There are no data available.

### Information on the likely routes of exposure

**Potential acute health effects:** **Eye contact:** Causes serious eye damage.  
**Inhalation:** May cause respiratory irritation.  
**Skin contact:** Causes severe burns. May cause an allergic skin reaction.  
**Ingestion:** May cause burns to mouth, throat and stomach.

**Symptoms related to the physical, chemical and toxicological characteristics:** **Eye contact:** Adverse symptoms may include the following: pain, watering, redness.  
**Inhalation:** Adverse symptoms may include the following: respiratory tract irritation, coughing  
**Skin contact:** Adverse symptoms may include the following: pain or irritation, redness, blistering may occur, skin burns, ulcerations and necrosis may occur  
**Ingestion:** Adverse symptoms may include the following: stomach pains

**Delayed and immediate effects and also chronic effects from short and long term exposure:** **Short term exposure**  
 Potential immediate effects: No known significant effects or critical hazards.  
 Potential delayed effects: No known significant effects or critical hazards.

**Long term exposure**  
 Potential immediate effects: No known significant effects or critical hazards.



**Potential chronic health effects:** Potential delayed effects: No known significant effects or critical hazards.  
**General:** Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation. If sensitized to hexavalent chromium, a severe allergic dermal reaction may occur when subsequently exposed to very low levels.

**Carcinogenicity:** Portland cement is not classifiable as a human carcinogen. Crystalline silica is considered a hazard by inhalation. IARC has classified crystalline silica as a Group 1 substance, carcinogenic to humans. This classification is based on the findings of laboratory animal studies (inhalation and implantation) and epidemiology studies that were considered sufficient for carcinogenicity. Excessive exposure to crystalline silica can cause silicosis, a non-cancerous lung disease.

**Mutagenicity:** No known significant effects or critical hazards.

**Teratogenicity:** No known significant effects or critical hazards.

**Developmental effects:** No known significant effects or critical hazards.

**Fertility effects:** No known significant effects or critical hazards.

**Numerical measures of toxicity:** Acute toxicity estimates: There are no data available.

## Section 12. Ecological Information

### Toxicity

Product/ingredient name	Result	Species	Exposure
Calcium oxide	Chronic NOEC 100 mg/L Fresh water	Fish-Oreochromis niloticus-Juvenile (Fledgling, Hatchling, Weanling)	46 days

**Persistence and degradability:** There are not data available.  
**Bioaccumulative potential:** There are not data available.  
**Mobility in soil:** Soil/water partition coefficient (Koc): Not available.  
**Other adverse effects:** No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods:** The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Untreated waste should not be released to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe manner. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff, and contact with soil, waterways, drains and sewers.

## Section 14. Transportation information

	DOT Classification	IMDG	IATA
UN number	Not regulated	Not regulated	Not regulated
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	None	None	None
Additional information	-	-	-

**Special precautions for user:** Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.  
**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:** Not available.

## Section 15. Regulatory Information

**TSCA 6 final risk management:** Chromium, ion (Cr6+)  
**United States inventory (TSCA 8b):** Cements are considered to be statutory mixtures under TSCA. CAS 65997-15-1 is included on the TSCA inventory.  
**CERCLA:** This product is not listed as a CERCLA substance  
**Clean Air Act Section 112 (b): Hazardous Air Pollutants (HAPs) –** Not listed  
**Clean Air Act Section 602: Class I Substances -** Not listed  
**Clean Air Act Section 602: Class II Substances -** Not listed  
**DEA List I Chemicals: (Precursor Chemicals) –** Not listed  
**DEA List II Chemicals: (Essential Chemicals) –** Not listed

### SARA 311/312

**Classification:** Immediate (acute) health hazard  
 Delayed (chronic) health hazard

#### Composition/information on ingredients

Name	%	Fire Hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Calcium oxide	A-B	No	No	No	Yes	No
Quartz	>0.1	No	No	No	No	Yes
Chromium, ion (Cr6+)	<0.1	No	No	No	Yes	Yes

### SARA 313

	Product name	CAS number	%
Form R-Report requirements	Chromium, ion (Cr6+)	8540-29-9	<0.1

### State regulations

**Massachusetts:** The following components are listed: cement, portland, chemicals, limestone  
**New York:** None of the components are listed.  
**New Jersey:** The following components are listed: cement, portland, chemicals, gypsum, limestone  
**Pennsylvania:** The following components are listed: cement, portland, chemicals, gypsum, limestone

### California Prop. 65

**WARNING:** This product contains crystalline silica and chemicals (trace metals) known to the State of California to cause cancer, birth defects or other reproductive harm. California law requires the above warning in the absence of definitive testing to prove the defined risks do not exist.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Quartz	Yes	No	No	No
Chromium, ion (Cr6+)	Yes	Yes	0.001µg/day (inhalation)	8.2 micrograms/day (ingestion)

## International regulations

**International lists:** **Canadian Domestic Substances List (DSL):** Portland cement is included on the DSL.  
**Mexico Inventory (INSQ):** All components are listed or exempted.

## Section 16. Other Information

**Date of issue:** 06/01/2015  
**Version:** 06/01/2015  
**Revised Section(s):** N/Ap

### Notice to reader

While the information provided in this safety data sheet is believed to provide a useful summary of the hazards of portland cement as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product. In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with portland cement to produce portland cement products. Users should review other relevant material safety data sheets before working with this portland cement or working on portland cement products, for example, portland cement concrete.

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY Lehigh Hanson, except that the product shall conform to contracted specifications. The information provided herein was believed by the Lehigh Hanson to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for non-delivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

### Abbreviations

ACGIH — American Conference of Governmental Industrial Hygienists  
CAS — Chemical Abstract Service  
CERCLA — Comprehensive Emergency Response and Comprehensive Liability Act  
CFR — Code of Federal Regulations  
DOT — Department of Transportation  
GHS — Globally Harmonized System  
HEPA — High Efficiency Particulate Air  
IATA — International Air Transport Association  
IARC — International Agency for Research on Cancer  
IMDG — International Maritime Dangerous Goods  
NIOSH — National Institute of Occupational Safety and Health  
NOEC — No Observed Effect Concentration  
NTP — National Toxicology Program  
OSHA — Occupational Safety and Health Administration  
PEL — Permissible Exposure Limit  
REL — Recommended Exposure Limit  
RQ — Reportable Quantity  
SARA — Superfund Amendments and Reauthorization Act  
SDS — Safety Data Sheet  
TLV — Threshold Limit Value  
TPQ — Threshold Planning Quantity  
TSCA — Toxic Substances Control Act  
TWA — Time-Weighted Average  
UN — United Nations



**LEHIGH SOUTHWEST CEMENT COMPANY**  
**MATERIAL SAFETY DATA SHEET**  
**FOR**  
**PORTLAND CEMENT**

REVISED DATE: August, 2009

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**1. PRODUCT/COMPANY IDENTIFICATION**

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**Supplier:**  
Lehigh Southwest Cement Company  
12667 Alcosta Blvd. #400  
San Ramon, CA 94583  
Phone (925) 244-6500  
Fax (925) 244-6525  
**Contact Number:**  
**(USE SALES OFFICE PHONE NUMBER)**

**Chemical Family:** Calcium Compounds  
  
**Chemical Name and Synonyms:**  
Portland Cement (CAS # 65997-15-1), Hydraulic  
Cement Types I, I (WRA), II, III, V  
  
**Trade Name and Synonyms:**  
Lehigh Portland Cement Types I, II, III, V  
Lehigh Plastic Cement

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**2. EMERGENCY AND FIRST AID**

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<b>EMERGENCY INFORMATION:</b>	Portland cement is a light gray or white powder. When in contact with moisture in eyes or on skin, or when mixed with water, portland cement becomes highly caustic (pH > 12) and will damage or burn (as severely as third-degree) the eyes or skin. Inhalation may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system or may cause or may aggravate certain lung diseases or conditions. Use exposure controls or personal protection methods described in Section 10.
<b>EYES:</b>	Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.
<b>SKIN:</b>	Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.
<b>INHALATION:</b>	Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalation of large amounts of portland cement require immediate medical attention.
<b>INGESTION:</b>	Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.
<b>ACCIDENTIAL RELEASE MEASURES</b>	Clean up spilled material without causing it to become airborne

or mixed with water to limit potential harm. Wear appropriate personal protective equipment. Dispose of waste material according to local, state or federal regulations.

### 3. COMPOSITION INFORMATION

**DESCRIPTION:**

This product consists of finely ground portland cement clinker mixed with a small amount of gypsum (calcium sulfate dihydrate). The portland cement clinker is made by heating to a high temperature a mixture of substances such as limestone, sand, clay and shale. Portland cement is essentially hydraulic calcium silicates contained in a crystalline mass, not separable into individual components. Major compounds are:

$3\text{CaO}\cdot\text{SiO}_2$	Tricalcium Silicate	CAS #12168-85-3
$2\text{CaO}\cdot\text{SiO}_2$	Dicalcium Silicate	CAS #10034-77-2
$3\text{CaO}\cdot\text{Al}_2\text{O}_3$	Tricalcium Aluminate	CAS #12042-78-3
$4\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Fe}_2\text{O}_3$	Tetracalcium aluminoferrite	CAS #12068-35-8
$\text{CaSO}_4\cdot 2\text{H}_2\text{O}$	Calcium Sulfate dihydrate (Gypsum)	CAS #7778-18-9 (CAS #13397-24-5)

### 4. HAZARDOUS INGREDIENTS

COMPONENT	OSHA PEL (8-Hour TWA)	ACGIH TLV-TWA (1995-1996)	NIOSH REL (8-Hour TWA)
<b>Portland Cement</b> (CAS #65997-15-1) 50 to 95% by weight	5 mg respirable dust/m <sup>3</sup> 15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	
<b>Calcium sulfate</b> (CAS #7778-18-9) [Gypsum (CAS #13397-24-5)] 0 to 10% by weight	5 mg respirable dust/m <sup>3</sup> 15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	
<b>Iron oxide</b> (CAS #1309-37-1) 0 to 15% by weight	10 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	
<b>Calcium carbonate</b> (CAS #1317-65-3) 0 to 5% by weight	5 mg respirable dust/m <sup>3</sup> 15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	
<b>Magnesium oxide</b> (CAS #1309-48-4) 0 to 5% by weight	15 mg total dust/m <sup>3</sup>	10 mg total dust/m <sup>3</sup>	
<b>Calcium oxide</b> (CAS #1305-78-8) 0 to 5% <sup>1</sup> by weight	5 mg/m <sup>3</sup>	2 mg/m <sup>3</sup>	
<b>Crystalline silica</b> (CAS #14808-60-7) 0 to 5% by weight	<u>10 mg of respirable dust/m<sup>3</sup></u> % SiO <sub>2</sub> + 2 <u>30 mg of total dust/m<sup>3</sup></u> % SiO <sub>2</sub> + 2 <u>250 million particles/ft<sup>3</sup></u> % SiO <sub>2</sub> + 5	0.05 mg respirable quartz/m <sup>3</sup>	0.05 mg respirable quartz dust/m <sup>3</sup>

**TRACE INGREDIENTS:**

Due to the use of substances mined from the earth's crust, trace amounts of naturally occurring, potentially harmful constituents may be detected during chemical analysis. Portland cement may contain up to 0.75% insoluble residue. A small amount of this residue includes free crystalline silica. Portland cement also may contain trace (<0.05%) amounts of chromium salts or compounds (including hexavalent chromium) or other metals (including nickel compounds) found to be hazardous or toxic in some chemical forms. These metals are present mostly as trace substitutions within the principal minerals. Other trace constituents may include potassium and sodium sulfate compounds.

<sup>1</sup> If Portland/Lime blended product "0 to 25%" values.

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## 5. HAZARD IDENTIFICATION

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### **POTENTIAL HEALTH EFFECTS:**

NOTE: Potential health effects may vary depending upon the duration and degree of exposure. To reduce or eliminate health hazards associated with this product, use exposure controls or personal protection methods as described in Section 10.

### **EYE CONTACT:**

(Acute/Chronic) Exposure to airborne dust may cause immediate or delayed irritation or inflammation of the cornea. Eye contact by larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness.

### **SKIN CONTACT:**

(Acute) Exposure to dry portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure.

(Chronic) Dry portland cement coming in contact with wet skin or exposure to wet portland cement may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns.

(Acute/Chronic) Some individuals may exhibit an allergic response upon exposure to portland cement. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers.

### **INHALATION:**

(Acute) Exposure to portland cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system. Pre-existing upper respiratory and lung diseases may be aggravated by inhalation of portland cement.

(Chronic) Inhalation exposure to free crystalline silica may cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease, and/or cause or aggravate other lung diseases or conditions.

### **INGESTION:**

(Acute/Chronic) Internal discomfort or ill effects are possible if large quantities are swallowed.

### **CARCINOGENIC POTENTIAL:**

Portland cement is not recognized as a carcinogen by NTP, OSHA, or IARC. However, it may contain trace amounts of heavy metals recognized as carcinogens by these organizations. In addition, IARC classifies crystalline silica, a trace constituent, as a known human carcinogen (Group I). NTP has characterized respirable silica as "reasonably anticipated to be a carcinogen." (See also Section 13.)

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## 6. PHYSICAL/CHEMICAL DATA

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APPEARANCE/ODOR:	Gray, white or colored powder, odorless	PHYSICAL STATE:	Solid (Powder)
BOILING POINT:	> 1000°C	MELTING POINT:	Not applicable
VAPOR PRESSURE:	Not applicable	VAPOR DENSITY:	Not applicable
pH (IN WATER) (ASTM D 1293-95)	12 to 13	SOLUBILITY IN WATER:	Slightly soluble (0.1% to 1.0%)
SPECIFIC GRAVITY (H <sub>2</sub> O = 1.0):	3.15	EVAPORATION RATE:	Not applicable

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## 7. FIRE AND EXPLOSION

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FLASH POINT:	None	LOWER EXPLOSIVE LIMIT:	None
AUTO IGNITION TEMPERATURE:	Not combustible	UPPER EXPLOSIVE LIMIT:	None
FLAMMABLE LIMITS	Not applicable	SPECIAL FIRE FIGHTING PROCEDURES:	None
EXTINGUISHING MEDIA:	Not combustible	UNUSUAL FIRE AND EXPLOSION HAZARDS:	None
HAZARDOUS COMBUSTION PRODUCTS:	None		

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## 8. STABILITY AND REACTIVITY DATA

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<b>STABILITY:</b>	Product is stable. Keep dry until used.
<b>CONDITIONS TO AVOID:</b>	Unintentional contact with water. Contact with water will result in hydration and produces (caustic) calcium hydroxide.
<b>INCOMPATIBILITY:</b>	Wet portland cement is alkaline. As such, it is incompatible with acids, ammonium salts and aluminum metal.
<b>HAZARDOUS DECOMPOSITION:</b>	Will not occur.
<b>HAZARDOUS POLYMERIZATION:</b>	Will not occur.

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## 9. PRECAUTIONS FOR HANDLING, STORAGE AND DISPOSAL

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<b>HANDLING AND STORAGE</b>	Keep dry until used. Handle and store in a manner so that airborne dust does not exceed applicable exposure limits. Use adequate ventilation and dust collection. Use exposure control and personal protection methods as described in Section 10.
<b>SPILL:</b>	Use dry clean-up methods that do not disperse dust into the air or entry into surface water. Material can be used if not contaminated. Place in an appropriate container for disposal or use. Avoid inhalation of dust and contact with skin and eyes. Use exposure control and personal protection methods as described in Section 10.



**DISPOSAL:**

Comply with all applicable local, state and federal regulations for disposal of unusable or contaminated materials. Dispose of packaging/containers according to local, state and federal regulations.

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**10. EXPOSURE CONTROLS/PERSONAL PROTECTION**

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**RESPIRATORY PROTECTION:**

Use local exhaust or general dilution ventilation to control dust levels below applicable exposure limits. Minimize dispersal of dust into the air.

If local or general ventilation is not adequate to control dust levels below applicable exposure limits or when dust causes irritation or discomfort, use MSHA/NIOSH approved respirators.

**EYE PROTECTION:**

Wear safety glasses with side shields or goggles to avoid contact with the eyes. In extremely dusty environments and unpredictable environments, wear tight-fitting unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when handling cement or cement containing products.

**SKIN PROTECTION:**

Wear impervious abrasion- and alkali-resistant gloves, boots, long-sleeved shirt, long pants or other protective clothing to prevent skin contact. Promptly remove clothing dusty with dry portland cement or clothing dampened with moisture mixed with portland cement, and launder before re-use. If contact occurs, wash areas contacted by material with pH neutral soap and water.

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**11. TRANSPORTATION DATA**

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Portland cement is not hazardous under U.S. DOT regulations.

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**12. TOXICOLOGICAL AND ECOLOGICAL INFORMATION**

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For a description of available, more detailed toxicological and ecological information, contact Lehigh Cement Company.

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**13. OTHER REGULATORY INFORMATION**

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Status under US OSHA Hazard Communication Rule 29 CFR 1910.1200:

Portland cement is considered a hazardous chemical under this regulation and should be included in the employer's hazard communication program.

Status under CERCLA/Superfund, 40 CFR 117 and 302:

Not listed.

Hazard Category under SARA (Title III), Sections 311 and 312:

Portland cement qualifies as a hazardous substance with delayed health effects.

Status under SARA (Title III), Section 313:

Maybe subject to reporting requirements under Section 313. Contact sales office for further information.

Status under TSCA (as of May 1997):	Some substances in portland cement are on the TSCA inventory list.
Status under the Federal Hazardous Substances Act:	Portland cement is a hazardous substance subject to statutes promulgated under the subject act.
Status under California Proposition 65:	This product contains crystalline silica, a substance known to the State of California to cause cancer. This product also may contain trace amounts of heavy metals known to the State of California to cause cancer, birth defects or other reproductive harm.

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## 14. OTHER INFORMATION

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This MSDS provides information on various types of portland cement products. A particular product's composition may vary from sample to sample. The information provided herein is believed by Lehigh Cement Company to be accurate at the time of preparation or prepared from sources believed to be reliable. Health and safety precautions in this data sheet may not be adequate for all individuals or situations. Users have the responsibility to comply with all laws and procedures applicable to the safe handling and use of the product, to determine the suitability of the product for its intended use, and to understand possible hazards associated with mixing portland cement with other materials. This product neither contains nor is directly manufactured with any controlled ozone depleting substances, Class I and II. SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY LEHIGH CEMENT COMPANY.

### ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
ft <sup>3</sup>	Cubic foot
IARC	International Agency for Research on Cancer
m <sup>3</sup>	Cubic meter
mg	Milligram
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
REL	Recommended Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average

**APPENDIX E**  
**STANDARD OPERATING PROCEDURES**

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**MEMORANDUM**

**TO:** Emily Mosen

**FROM:** Michael Choratch

**XC:**

**DATE:** 01-22-2016

**SUBJECT:** SOP for preparing metal shredder residue samples for Terraphase Engineering.

1. The as-received samples will be logged in (assigned a HRI number).
2. Each sample will be weighed.
3. Each sample will be screened at 2mm and both the plus and minus 2mm fractions will be weighed.
4. The plus 2mm sample will be frozen in liquid nitrogen then knife-milled in a single pass.
5. The milled sample will be screened at 2mm.
6. The plus 2mm from the first pass will be frozen in liquid nitrogen then knife-milled.
7. The milled sample will be screened at 2mm and any remaining plus 2mm material will be frozen and knife milled in a third pass (if necessary).
8. All minus 2mm products will be recombined, weighed, blended and packaged.
9. All weights will be emailed to the client at the completion of each batch.
10. After each sample we clean the mill with acetone and a wire brush to ensure decontamination.

**STANDARD OPERATING PROCEDURES**  
**METHOD 1320 MULTIPLE EXTRACTION PROCEDURE**

UnControlled Copy:

Issued to:

Approved by: Inorganic Supervisor

Approval Date: 12/02/2015

Effective Date: 12/02/2015

Printed Date:

Location:

Printed By:

## **1.0 SCOPE AND APPLICATION**

- 1.1 The Multiple Extraction Procedure (MEP) described in this method is designed to simulate the leaching that a waste will undergo from repetitive precipitation of acid rain on an improperly designed sanitary landfill. The repetitive extractions reveal the highest concentration of each constituent that is likely to leach in a natural environment. Method 1320 is applicable to liquid, solid, and multiphase samples.

## **2.0 SUMMARY OF METHOD**

- 2.1 Waste samples are extracted according to the Extraction Procedure Toxicity Test (Method 1310, Chapter 8) and analyzed for the constituents of concern listed in Chapter 7, Table 7-1: Maximum Concentration of Contaminants for Characteristic of EP Toxicity, using the 7000 and 8000 series methods. Then the solid portions of the samples that remain after application of Method 1310 are re-extracted nine times using synthetic acid rain extraction fluid. If the concentration of any constituent of concern increases from the 7th or 8th extraction to the 9th extraction, the procedure is repeated until these concentrations decrease.

## **3.0 INTERFERENCES**

- 3.1 Potential interferences that may be encountered during analysis are discussed in the appropriate analytical methods.

## **4.0 APPARATUS AND MATERIALS**

- 4.1 Refer to Method 1310.

## **5.0 REAGENTS**

- 5.1 Refer to Method 1310.

- 5.2 Sulfuric acid: nitric acid, 60/40 weight percent mixture: Cautiously mix 60 g of concentrated sulfuric acid with 40 g of concentrated nitric acid.

## **6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING**

- 6.1 Refer to Method 1310.

## **7.0 PROCEDURE**

- 7.1 Run the Extraction Procedure (EP) test in Method 1310
- 7.1.1 Landfill leachate will be used for all 10 extractions without pH modification for the modified procedure.

**STANDARD OPERATING PROCEDURES****METHOD 1320 MULTIPLE EXTRACTION PROCEDURE**

- 7.2 Analyze the extract for the constituents of interest.
- 7.3 Prepare a synthetic acid rain extraction fluid by adding the 60/40 weight percent sulfuric acid and nitric acid to distilled deionized water until the pH is  $3.0 \pm 0.2$ .
- 7.4 Take the solid phase of the sample remaining after the Separation Procedure of the Extraction Procedure and weigh it. Measure an aliquot of synthetic acid rain extraction fluid equal to 20 times the weight of the solid sample. Do not allow the solid sample to dry before weighing
- 7.5 Combine the solid phase sample and acid rain fluid in the same extractor as used in the EP and begin agitation. Record the pH within 5-10 min after agitation has been started.
- 7.6 Agitate the mixture for 24 hr, maintaining the temperature at 20-40EC (68-104EF). Record the pH at the end of the 24-hr extraction period.
- 7.7 Repeat the Separation Procedure as described in Method 1310.
- 7.8 Analyze the extract for the constituents of concern.
- 7.9 Repeat steps 7.4-7.8 eight additional times.
- 7.10 If, after completing the ninth synthetic rain extraction, the concentration of any of the constituents of concern is increasing over that found in the 7th and 8th extractions, then continue extracting with synthetic acid rain until the concentration in the extract ceases to increase.
- 7.11 Report the initial and final pH of each extraction and the concentration of each listed constituent of concern in each extract.

**8.0 QUALITY CONTROL**

- 8.1 All quality control data should be maintained and available for easy reference or inspection.
- 8.2 Employ a minimum of one blank per sample batch to determine if contamination or any memory effects are occurring.
- 8.3 All quality control measures suggested in the referenced analytical methods should be followed.

**9.0 METHOD PERFORMANCE**

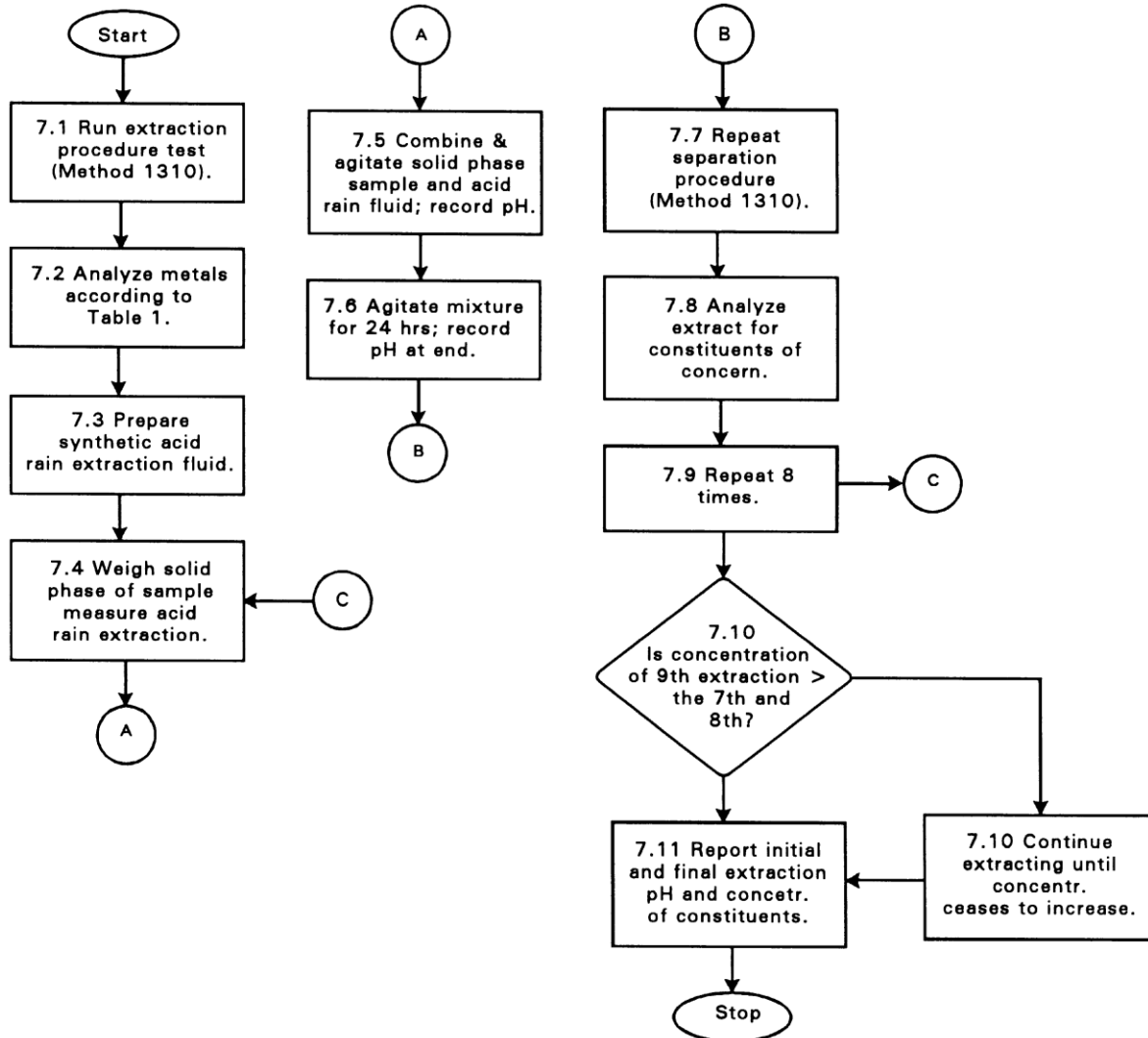
- 9.1 No data provided.

**10.0 REFERENCES**

- 10.1 None required

**STANDARD OPERATING PROCEDURES**  
**METHOD 1320 MULTIPLE EXTRACTION PROCEDURE**

**METHOD 1320**  
**MULTIPLE EXTRACTION PROCEDURE**





**STANDARD OPERATING PROCEDURES**  
**METHOD 1320 MULTIPLE EXTRACTION PROCEDURE**

UnControlled Copy:

Issued to:

Approved by: Inorganic Supervisor

Approval Date: 12/02/2015

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## 2.0 SUMMARY OF METHOD

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3.1 Potential interferences that may be encountered during analysis are discussed in the appropriate analytical methods.

## 4.0 APPARATUS AND MATERIALS

4.1 Refer to Method 1310.

## 5.0 REAGENTS

5.1 Refer to Method 1310.

5.2 Sulfuric acid: nitric acid, 60/40 weight percent mixture: Cautiously mix 60 g of concentrated sulfuric acid with 40 g of concentrated nitric acid.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Refer to Method 1310.

## 7.0 PROCEDURE

7.1 Run the Extraction Procedure (EP) test in Method 1310

7.2 Analyze the extract for the constituents of interest.

**STANDARD OPERATING PROCEDURES****METHOD 1320 MULTIPLE EXTRACTION PROCEDURE**

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- 7.4 Take the solid phase of the sample remaining after the Separation Procedure of the Extraction Procedure and weigh it. Measure an aliquot of synthetic acid rain extraction fluid equal to 20 times the weight of the solid sample. Do not allow the solid sample to dry before weighing
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- 7.6 Agitate the mixture for 24 hr, maintaining the temperature at 20-40EC (68-104EF). Record the pH at the end of the 24-hr extraction period.
- 7.7 Repeat the Separation Procedure as described in Method 1310.
- 7.8 Analyze the extract for the constituents of concern.
- 7.9 Repeat steps 7.4-7.8 eight additional times.
- 7.10 If, after completing the ninth synthetic rain extraction, the concentration of any of the constituents of concern is increasing over that found in the 7th and 8th extractions, then continue extracting with synthetic acid rain until the concentration in the extract ceases to increase.
- 7.11 Report the initial and final pH of each extraction and the concentration of each listed constituent of concern in each extract.

**8.0 QUALITY CONTROL**

- 8.1 All quality control data should be maintained and available for easy reference or inspection.
- 8.2 Employ a minimum of one blank per sample batch to determine if contamination or any memory effects are occurring.
- 8.3 All quality control measures suggested in the referenced analytical methods should be followed.

**9.0 METHOD PERFORMANCE**

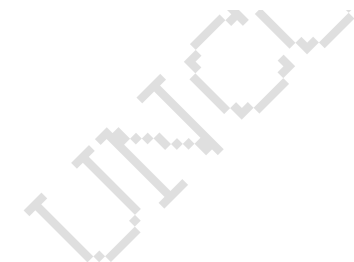
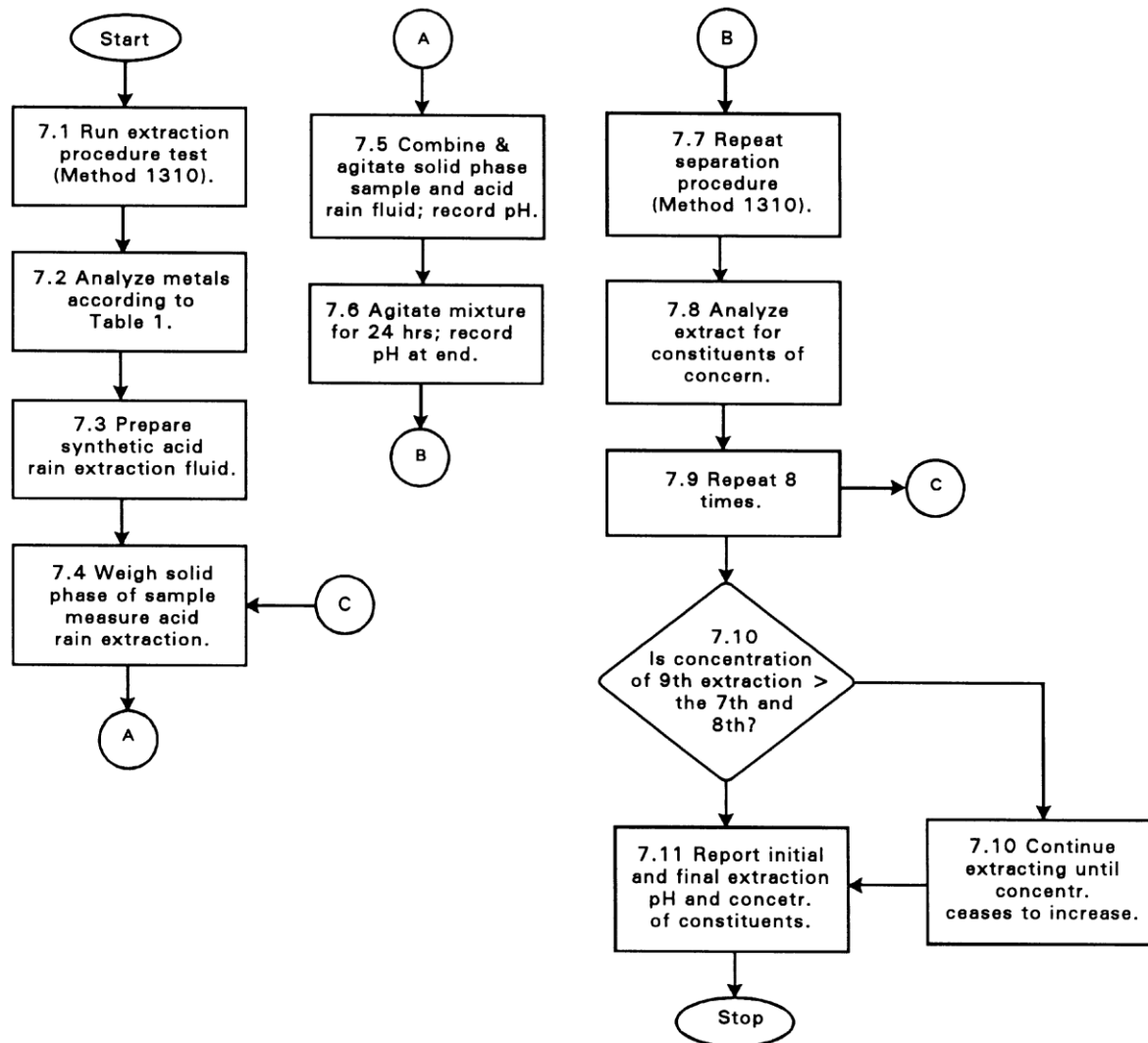
- 9.1 No data provided.

**10.0 REFERENCES**

- 10.1 None required

**STANDARD OPERATING PROCEDURES**  
**METHOD 1320 MULTIPLE EXTRACTION PROCEDURE**

**METHOD 1320**  
**MULTIPLE EXTRACTION PROCEDURE**



# COLLECTION OF UNTREATED METAL SHREDDER RESIDUE SAMPLES AT SIMS METAL MANAGEMENT, REDWOOD CITY

## 1.0 BACKGROUND AND PURPOSE

The following procedures will be implemented during the collection of untreated metal shredder residue (MSR) samples from the Sims Metal Management facility in Redwood City, California during the field-scale pilot test portion of the ongoing MSR treatability study.

Untreated MSR is separated into two streams at this facility; one stream comprises particles under 1.25 inches (“undersize”) and represents approximately 70% of the total MSR throughput; the remaining 30% comprises particles between 1.25 and 4.5 inches (“oversize”). These percentages are calculated based on weight data recorded from conveyor belt scales which measure the weight conveyed through each untreated stream. The belt scales are Beltway model 100 with GSE 665 display screens. The weight percentages can vary somewhat over time depending on the composition of infeed materials.

The purpose of this SOP is to describe the procedures that will be followed to collect untreated MSR samples from both the undersize and oversize streams, and combine the two samples at a ratio which is representative of the current ratio of undersize and oversize MSR throughput. It is anticipated that eight untreated samples will be collected each day of sampling, at a frequency of once per hour. The following procedure will not be performed on treated MSR samples at Sims because treated samples will be collected from a location after the two streams have been combined.

## 2.0 PROCEDURES

1. The percentages of undersize and oversize MSR will be determined for the day prior to sample collection.
  - a. A Sims technician will observe the following weight measurements and record them on the attached Untreated MSR Conveyor Belt Scale Log, or an equivalent log:
    - i. The weight totalizer reading from the belt scale located on the undersize stream at the beginning of the day
    - ii. The weight totalizer reading from the belt scale located on the oversize stream at the beginning of the day
    - iii. The weight totalizer reading from the belt scale located on the undersize stream at the end of the day
    - iv. The weight totalizer reading from the belt scale located on the oversize stream at the end of the day
  - b. A Terraphase sampler will calculate the throughput weight for each stream as follows:
    - i. For the undersize stream, the weight totalizer reading at the beginning of the day will be subtracted from the weight totalizer reading at the end of the day to determine the weight of undersize MSR which was conveyed during the day.
    - ii. For the oversize stream, the weight totalizer reading at the beginning of the day will be subtracted from the weight totalizer reading at the end of the day to determine the weight of oversize MSR which was conveyed during the day.

- c. The sampler will calculate the weight percentages as follows:
  - i. The weights of the undersize and oversize MSR conveyed during the day will be added to determine the total weight of the MSR conveyed during the day.
  - ii. The weight of the undersize MSR will be divided by the total weight and multiplied by 100 to determine the percentage of undersize MSR.
  - iii. The weight of the oversize MSR will be divided by the total weight and multiplied by 100 to determine the percentage of oversize MSR.
2. It will be assumed that the percentages calculated in Step 1 will be representative of the MSR conveyed at the beginning of the day of sample collection. At the time of the first sample, undersize and oversize MSR will be collected and subsequently combined at weight percentages equal to those calculated in Step 1. For example, if the percentage of oversize MSR is determined to be 32% of the total MSR weight, with the remaining 68% comprised of undersize MSR, a bucket will be filled with these percentages of MSR by performing the following steps.
  - a. The empty bucket will be placed on a portable field scale and the scale will be zeroed.
  - b. Approximately 2 kilograms (kg) of oversize MSR will be added to the bucket. The weight of the oversize MSR will be recorded.
  - c. The weight of the oversize MSR will be multiplied by 100 and divided by 32 in order to determine the desired total weight of MSR. Undersize MSR will be added to the bucket until the desired total weight is achieved.
    - i. For example, if the oversize MSR in the bucket has a weight of 2.130 kg, the desired total weight is  $2.130 \text{ kg} \times 100 \div 32 = 6.656 \text{ kg}$ .
3. For the subsequent hourly samples, Steps 1 and 2 will be repeated. Step 1 will be modified to include weight totalizer readings at the beginning and end of the previous *hour*. If the first sample is collected at 8:00 am, and prepared using the weight percentage calculated for the previous day, the 9:00 am sample will be prepared using the weight percentage calculated for the period of 8:00 am through 9:00 am.
4. After the desired weight percentage is achieved for a given sample, the sampler will proceed with remaining sampling activities such as coning and quartering to produce two replicate samples with a mass of at least 400 grams each, and removing extraneous elemental metal objects.



**APPENDIX F**  
**FIELD CALCULATIONS FOR COLLECTION OF UNTREATED METAL**  
**SHREDDER RESIDUE SAMPLES, SIMS FACILITY**

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**Field Calculations for Collection of Untreated Metal Shredder Residue Samples**

**Sims Facility**

**Pilot Study**

**Metal Shredder Residue Treatability Study**

Date	Day ID	Sample time	Reading time	Belt scales						Sample bucket					Comments
				Undersize		Oversize		Total since last reading (tons)	% Oversize	Desired oversize sample mass (g)	Actual oversize sample mass (g)	Desired total sample mass (g)	Actual total sample mass (g)	Confirm % Oversize	
				Totalizer (tons)	Change since last reading (tons)	Totalizer (tons)	Change since last reading (tons)								
7/21/2016	Day 1H	1415	(yesterday)	259		74.21		333.21	22.3%	1,227	1,214	5,444	5,456	22.3%	Sample not collected at 1815 due to downtime; no reading at 1900 due to downtime  Sample not collected at 2100 due to downtime; no reading at 2100 due to downtime
		1515	1500	27.1	27.1	5.5	5.5	32.6	16.9%	845	854	5,053	5,054	16.9%	
		1615	1600	54.8	27.7	12	6.5	34.2	19.0%	950	913	4,805	4,804	19.0%	
		1715	1700	83.8	29	19.3	7.3	36.3	20.1%	1,005	1,004	4,995	4,994	20.1%	
		1900	1800	113.2	29.4	25.2	5.9	35.3	16.7%	835	817	4,892	4,890	16.7%	
		2000	2000	130.4	17.2	31.5	6.3	23.5	26.8%	1,340	1,327	4,951	4,952	26.8%	
		2120	2000	130.4	--	31.5	--	--	26.8%	1,340	1,280	4,776	4,778	26.8%	
		2220	2200	157.8	27.4	43.5	12	39.4	30.5%	1,525	1,534	5,030	5,028	30.5%	
7/22/2016	Day 1L	1530	(yesterday)	178.4		50.8		229.2	22.2%	997	1,002	4,514	4,514	22.2%	
		1630	1600	27.1	27.1	5	5	32.1	15.6%	701	704	4,513	4,513	15.6%	
		1730	1700	69.2	42.1	12.6	7.6	49.7	15.3%	688	688	4,497	4,497	15.3%	
		1830	1800	115.3	46.1	21	8.4	54.5	15.4%	694	716	4,649	4,649	15.4%	
		1930	1900	155.7	40.4	31.6	10.6	51	20.8%	935	935	4,495	4,495	20.8%	
		2030	2000	193.7	38	43.8	12.2	50.2	24.3%	1,094	1,078	4,436	4,436	24.3%	
		2130	2100	235	41.3	55.8	12	53.3	22.5%	1,013	1,006	4,471	4,471	22.5%	
		2230	2200	267.8	32.8	65.7	9.9	42.7	23.2%	1,043	1,034	4,457	4,457	23.2%	
7/28/2016	Day 2H	1420	(yesterday)	426.7		129.7		556.4	23.3%	1,049	1,044	4,481	4,482	23.3%	
		1520	1500	21.7	21.7	6.5	6.5	28.2	23.0%	1,268	1,260	5,478	5,478	23.0%	
		1620	1600	45.1	23.4	13.1	6.6	30	22.0%	1,210	1,201	5,459	5,458	22.0%	
		1720	1700	65	19.9	20.5	7.4	27.3	27.1%	1,491	1,484	5,476	5,476	27.1%	
		1820	1800	88.7	23.7	29	8.5	32.2	26.4%	1,452	1,450	5,492	5,492	26.4%	
		1920	1900	112.5	23.8	38	9	32.8	27.4%	1,509	1,512	5,518	5,518	27.4%	
		2020	2000	134.1	21.6	47.1	9.1	30.7	29.6%	1,482	1,462	4,939	4,938	29.6%	
		2120	2100	151	16.9	54.6	7.5	24.4	30.7%	1,537	1,524	4,964	4,964	30.7%	

**Field Calculations for Collection of Untreated Metal Shredder Residue Samples**  
**Sims Facility**  
**Pilot Study**  
**Metal Shredder Residue Treatability Study**

Date	Day ID	Sample time	Reading time	Belt scales						Sample bucket					Comments
				Undersize		Oversize		Total since last reading (tons)	% Oversize	Desired oversize sample mass (g)	Actual oversize sample mass (g)	Desired total sample mass (g)	Actual total sample mass (g)	Confirm % Oversize	
				Totalizer (tons)	Change since last reading (tons)	Totalizer (tons)	Change since last reading (tons)								
7/29/2016	Day 2L	1400	(yesterday)	168.5		63.9		232.4	27.5%	1,237	1,228	4,465	4,466	27.5%	
		1500	1500	86.7	86.7	26.2	26.2	112.9	23.2%	1,044	1,050	4,526	4,526	23.2%	
		1600	1600	118.1	31.4	34.2	8	39.4	20.3%	914	916	4,512	4,512	20.3%	
		1700	1700	157	38.9	44.5	10.3	49.2	20.9%	942	940	4,498	4,498	20.9%	
		1800	1800	198	41	56.1	11.6	52.6	22.1%	1,103	1,104	4,995	4,994	22.1%	
		1900	1900	236.4	38.4	67.7	11.6	50	23.2%	1,160	1,166	5,026	5,026	23.2%	
		2000	2000	276.8	40.4	80.7	13	53.4	24.3%	1,217	1,220	5,021	5,021	24.3%	
		2100	2100	313.7	36.9	93.2	12.5	49.4	25.3%	1,265	1,262	4,988	4,988	25.3%	
8/2/2016	Day 3H	(yesterday)		311.3		107.2		418.5	25.6%	1,281	1,262	4,930	4,930	25.6%	
		1705	1705	20.9	20.9	10	10	30.9	32.4%	1,618	1,612	4,975	4,974	32.4%	
		1755	1755	38.3	17.4	17.6	7.6	25	30.4%	1,520	1,520	5,000	5,000	30.4%	
		1845	1845	61	22.7	27.4	9.8	32.5	30.2%	1,508	1,508	4,993	4,993	30.2%	
		1935	1935	75.2	14.2	36.1	8.7	22.9	38.0%	1,900	1,884	4,958	4,958	38.0%	
		2025	2025	87.5	12.3	44.7	8.6	20.9	41.1%	2,057	2,058	5,007	5,006	41.1%	
		2115	2115	99	11.5	51.6	6.9	18.4	37.5%	1,875	1,868	4,981	4,982	37.5%	
		2205	2205	112.8	13.8	59.4	7.8	21.6	36.1%	1,806	1,796	4,975	4,974	36.1%	
8/3/2016	Day 3L	1100	(yesterday)	115.1		60.7		175.8	34.5%	1,726	1,600	4,638	4,638	34.5%	no reading at 1600 due to downtime
		1200	1200	13	13	3.8	3.8	16.8	22.6%	1,131	1,134	5,018	5,018	22.6%	
		1300	1300	42.7	29.7	26.2	22.4	52.1	43.0%	2,150	2,146	4,991	4,992	43.0%	
		1400	1400	69.8	27.1	35.3	9.1	36.2	25.1%	1,257	1,242	4,948	4,948	25.1%	
		1500	1500	96	26.2	45	9.7	35.9	27.0%	1,351	1,354	5,015	5,016	27.0%	
		1700	1700	122.3	26.3	59.6	14.6	40.9	35.7%	1,785	1,786	5,003	5,004	35.7%	
		1800	1800	148	25.7	68.7	9.1	34.8	26.1%	1,307	1,318	5,050	5,050	26.1%	
		1900	1900	193.7	45.7	86.4	17.7	63.4	27.9%	1,396	1,386	4,968	4,968	27.9%	

**Field Calculations for Collection of Untreated Metal Shredder Residue Samples**

**Sims Facility**

**Pilot Study**

**Metal Shredder Residue Treatability Study**

Date	Day ID	Sample time	Reading time	Belt scales						Sample bucket					Comments
				Undersize		Oversize		Total since last reading (tons)	% Oversize	Desired oversize sample mass (g)	Actual oversize sample mass (g)	Desired total sample mass (g)	Actual total sample mass (g)	Confirm % Oversize	
				Totalizer (tons)	Change since last reading (tons)	Totalizer (tons)	Change since last reading (tons)								
1/24/2017	Day 4H	1330	(yesterday)	406		130		536	24.3%	1,213	1,226	5,045	5,045	24.3%	
		1430	1430	25.4	25.4	8.6	8.6	34	25.3%	1,265	1,265	5,000	5,000	25.3%	
		1530	1530	41.5	16.1	16	7.4	23.5	31.5%	1,417	1,400	4,444	4,442	31.5%	
		1630	1630	62.3	20.8	22.1	6.1	26.9	22.7%	1,020	1,022	4,502	4,503	22.7%	
		1730	1730	80	17.7	30.6	8.5	26.2	32.4%	1,460	1,440	4,444	4,444	32.4%	
		1830	1830	103.4	23.4	38.8	8.2	31.6	25.9%	1,168	1,178	4,548	4,549	25.9%	
		1930	1930	123.6	20.2	46.6	7.8	28	27.9%	1,254	1,259	4,513	4,515	27.9%	
		2030	2030	141	17.4	55.2	8.6	26	33.1%	1,488	1,488	4,495	4,495	33.1%	
1/25/2017	Day 1M	1100	(yesterday)	141		55.2		196.2	28.1%	1,266	1,270	4,520	4,520	28.1%	
		1200	1200	24	24	7	7	31	22.6%	1,016	1,025	4,535	4,535	22.6%	
		1300	1300	46	22	16	9	31	29.0%	1,306	1,306	4,503	4,503	29.0%	
		1400	1400	81.1	35.1	24.4	8.4	43.5	19.3%	869	874	4,528	4,528	19.3%	
		1500	1500	112.5	31.4	32	7.6	39	19.5%	877	880	4,513	4,514	19.5%	
		1600	1600	140.2	27.7	41	9	36.7	24.5%	1,104	1,100	4,490	4,490	24.5%	
		1700	1700	167.1	26.9	51.6	10.6	37.5	28.3%	1,272	1,272	4,495	4,494	28.3%	
		1800	1800	187.2	20.1	60.2	8.6	28.7	30.0%	1,348	1,350	4,500	4,500	30.0%	
1/26/2017	Day 4L	1100	(yesterday)	187.2		60.2		247.4	24.3%	1,095	1,074	4,420	4,418	24.3%	
		1200	1200	52.8	52.8	18.9	18.9	71.7	26.4%	1,186	1,186	4,492	4,492	26.4%	
		1300	1300	78.8	26	25.8	6.9	32.9	21.0%	944	955	4,548	4,550	21.0%	
		1400	1400	104	25.2	33	7.2	32.4	22.2%	1,000	1,003	4,518	4,519	22.2%	
		1500	1500	135.4	31.4	41.5	8.5	39.9	21.3%	959	975	4,577	4,575	21.3%	
		1600	1600	159.3	23.9	49.4	7.9	31.8	24.8%	1,118	1,122	4,524	4,524	24.8%	
		1700	1700	190	30.7	60	10.6	41.3	25.7%	1,155	1,155	4,494	4,492	25.7%	
		1800	1800	215.3	25.3	69.4	9.4	34.7	27.1%	1,219	1,216	4,487	4,487	27.1%	

