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Australia Sludge Demonstration for a Major Oil Company

A major worldwide oil company requested that OSE II be demonstrated on the treatment of their sludge. The oil company hand delivered the sludge to our distributor, who's field office was within walking distance to their site. Several representatives from the oil company periodically dropped by the demonstration area to view the progress OSE II was making on the remediation of the sludge.

The oil company was interested in finding a solution for handling their sludge produced in operations. Currently the sludge is decanted into hazardous waste hauling trucks, to be disposed of hundreds of kilometers away, which is extremely costly.

The sludge was placed in an aquarium, where a sample was extracted to see the starting point of the sludge TPH. The starting point was 340,000mg/l and 360,000 mg/l in two of the measurements, this is quite elevated, but not as elevated as other trials and clean ups OSE II has handled.

OSE II was applied at a mixing ratio of 50 to 1 or 2%, and then applied 1 to 1 to the sludge with the mixed OSE II and natural water. 22 days after the initial application of OSE II, samples were extracted, and the TPH was reduced to 16,000 mg/l and 17,000 mg/l, down from 340,000 mg/l, and 360,000 mg/l; this is over a 95% reduction in TPH, once again great results.

The sludge was sampled 55 days after applying OSE II, where the results showed 1400 mg/l and 1300 mg/l which is over a 99% reduction in TPH.

As a result, the oil company has decided to incorporate OSE II into their system to reduce the sludge on site rather than paying the hazardous waste haulers projecting very significant cost savings.

OSE II and natural water mixture showed how effective OSE II is at remediating even high TPH sludge of 90%, and over 95% within 55 days. This allows oil companies to produce a

zero footprint while carry out oil and gas operations; this is protecting the environment!
OSE II emulates Mother Nature's own process to convert hazardous wastes to a safe end
point of CO2 and water.

Steven Pedigo

CEO OSEI Corporation



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First Test Document

Initial Test and 22 day tests

Certificate of Analysis MFF0198

Client Details

Client Hilbs & Associates Pty Ltd
Contact George Dervusoski
Address PO Box 4266, HOMEBUSH, NSW, 2140

Sample Details

Your Reference S13167
Number of Samples 2 Sludge
Date Samples Received 13/06/2024
Date Instructions Received 13/06/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for soils and on an as received basis for other matrices.

Report Details

Date Results Requested by 17/06/2024
Date of Reissue 07/10/2024 - This report supercedes previous report, see amendment history for details

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Authorisation Details

Results Approved By Tianna Milburn, Senior Chemist

Laboratory Manager Pamela Adams

Your Reference: S13167
Revision: R-01 Certificate of Analysis Generated: 07/10/2024 14:35

Certificate of Analysis MFF0198

Report Amendment History

Revision	Reason for Amendment
R-01	This report supercedes MFF0198_R00 do to sample matrix change.

Certificate of Analysis MFF0198

Samples in this Report

EnviroLab ID	Sample ID	Matrix	Date Sampled	Date Received
MFF0198-01	Sludge 1-Untreated	Sludge	13/06/2024	13/06/2024
MFF0198-02	Sludge 2-22 days post treatment	Sludge	13/06/2024	13/06/2024

Certificate of Analysis MFF0198

Semi-volatile TRH (Sludge)

EnviroLab ID Your Reference	Units	PQL	MFF0198-01 Sludge 1-Untreated	MFF0198-02 Sludge 2-22 days post treatment
Date Sampled				
			13/06/2024	13/06/2024
TRH C10-C14*	mg/kg	50	9200	<500
TRH C15-C28*	mg/kg	100	340000	16000
TRH C29-C36*	mg/kg	100	63000	2900
TRH >C10-C16*	mg/kg	50	34000	1400
TRH >C16-C34 (F3)*	mg/kg	100	360000	17000
TRH >C34-C40 (F4)*	mg/kg	100	22000	1200
<i>Surrogate o-Terphenyl*</i>	%		## [1]	## [1]

Certificate of Analysis MFF0198

Result Comments

Identifier	Description
[1]	Surrogate recovery is outside routine acceptance criteria (60-140%) as a result of the high concentration of analyte(s) in the sample.

Certificate of Analysis MFF0198

Method Summary

Method ID	Methodology Summary
ORG-020_OIL	Oil samples are diluted with solvent and analysed by GC-FID. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).

Certificate of Analysis MFF0198

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis MFF0198

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: > 10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QA/QC tables for details (available on request); < 10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, EnviroLab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary MFF0198

Client Details

Client Hibbs & Associates Pty Ltd
Your Reference S13167
Date Issued 07/10/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers

Matrix Spike

Yes

No Outliers

Surrogates / Extracted Internal Standards

No

Surrogates / Extracted ISTD Outliers Exist - See detailed list below

QC Frequency

No

QC Frequency Outliers Exist - See detailed list below

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary MFF0198

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
STRH Oil	1	13/06/2024	14/06/2024	15/06/2024	Yes
	2	13/06/2024	14/06/2024	16/06/2024	Yes

Outliers: Surrogate / Extracted Internal Standards

ORG-020_OIL | Semi-volatile TRH (Matrix) | Batch BFF2111

Sample ID	Analyte	% Limits	% Recovery
MFF0198-01	o-Terphenyl	60 - 140	# # [1]
MFF0198-02	o-Terphenyl	60 - 140	# # [1]

Outliers: QC Frequency

ORG-020_OIL | Semi-volatile TRH (Oil) | Batch BFF2111

Analysis	QC Type	Expected	Reported
STRH	Duplicate	1	0

Quality Control MFF0198

ORG-020_OIL | Semi-volatile TRH (Oil) | Batch BFF2111

Analyte	Units	PQL	Blank	LCS %
TRH C10-C14	mg/kg	50	<50	117
TRH C15-C28	mg/kg	100	<100	94.0
TRH C29-C36	mg/kg	100	<100	107
TRH >C10-C16	mg/kg	50	<50	89.6
TRH >C16-C34 (F3)	mg/kg	100	<100	96.6
TRH >C34-C40 (F4)	mg/kg	100	<100	111
<i>Surrogate α-Terphenyl</i>	%		93.7	94.4

Batch QC Comments: [2]

QC Comments

Identifier	Description
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[2] Unable to perform all QC according to our internal guidelines on a non-routine matrix.

Your Reference:
Revision: R-01

S13167
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Second Test Document

55 day Tests



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ph +61 3 9763 2500
melbourne@envirolab.com.au
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Certificate of Analysis MFG0290

Client Details

Client Hibbs & Associates Pty Ltd
Contact George Dervusoski
Address PO Box 4266, HOME BUSH, NSW, 2140

Sample Details

Your Reference S13167
Number of Samples 2 Sludge, 3 Soil
Date Samples Received 16/07/2024
Date Instructions Received 16/07/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for soils and on an as received basis for other matrices.

Report Details

Date Results Requested by 23/07/2024
Date of Reissue 07/10/2024 - This report supersedes previous report, see amendment history for details

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Authorisation Details

Results Approved By Tianna Milburn, Senior Chemist
Laboratory Manager Pamela Adams

Your Reference: S13167
Revision: R-02 Certificate of Analysis Generated: 07/10/2024 14:40

Certificate of Analysis MFG0290

Report Amendment History

Revision	Reason for Amendment
R-01	This work order supersedes MFG0290_R00 due to report only containing results for sludge samples.
R-02	This report supersedes MFG0290_R01 due to removing unlisted soil sample

Certificate of Analysis MFG0290

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
MFG0290-04	Sample 01	Sludge	16/07/2024	16/07/2024
MFG0290-05	Sample 02	Sludge	16/07/2024	16/07/2024

Certificate of Analysis MFG0290

Semi-volatile TRH (Sludge)

EnviroLab ID	Units	PQL	MFG0290-04 Sample 01 16/07/2024	MFG0290-05 Sample 02 16/07/2024
Your Reference				
Date Sampled				
TRH C10-C14	mg/kg	50	<50	<50
TRH C15-C28	mg/kg	100	1900	1400
TRH C29-C36	mg/kg	100	210	<100
Total +ve TRH C10-C36	mg/kg	50	2100	1400
TRH >C10-C16	mg/kg	50	190	160
TRH >C16-C34 (F3)	mg/kg	100	1900	1300
TRH >C34-C40 (F4)	mg/kg	100	<100	<100
Total +ve TRH >C10-C40	mg/kg	50	2100	1500
<i>Surrogate o-Terphenyl</i>	%		103	100

Certificate of Analysis MFG0290

Method Summary

Method ID

Methodology Summary

ORG-020

Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEMM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLS Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).

Certificate of Analysis MFG0290

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

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analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis MFG0290

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: > 10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QA/QC tables for details (available on request); < 10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10xPQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary MFG0290

Client Details

Client Hibbs & Associates Pty Ltd
Your Reference S13167
Date Issued 07/10/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers

Matrix Spike

No

Matrix Spike Outliers Exist - See detailed list below

Surrogates / Extracted Internal Standards

Yes

No Outliers

QC Frequency

Yes

No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary MFG0290

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
STRH Soil	4-5	16/07/2024	18/07/2024	18/07/2024	Yes

Outliers: Matrix Spike

ORG-020 | Semi-volatile TRH (Soil) | Batch BFG3021

Sample ID	Analyte	% Limits	% Recovery
BFG3021-MS1#	TRH >C34-C40 (F4)	60 - 140	##[1]
BFG3021-MS1#	TRH C29-C36	60 - 140	##[1]

Quality Control MFG0290

ORG-020 | Semi-volatile TRH (Soil) | Batch BFG3021

Analyte	Units	PQL	Blank	Dup1		LCS %	Spike %
				BFG3021-DUP1# Samp QC RPD %	BFG3021-DUP2# Samp QC RPD %		
TRH C10-C14	mg/kg	50	<50	<50 <50 [NA]	<100 <100 [NA]	104	97.1
TRH C15-C28	mg/kg	100	<100	<100 <100 [NA]	<100 <100 [NA]	88.1	80.7
TRH C29-C36	mg/kg	100	<100	<100 <100 [NA]	<50 <50 [NA]	91.5	##[1]
TRH > C10-C16	mg/kg	50	<50	<50 <50 [NA]	<100 <100 [NA]	81.8	80.2
TRH > C16-C34 (F3)	mg/kg	100	<100	<100 <100 [NA]	<100 <100 [NA]	91.0	77.1
TRH > C34-C40 (F4)	mg/kg	100	<100	<100 <100 [NA]	<100 <100 [NA]	83.4	##[1]
Surrogate o-Terphenyl	%		97.4	96.2 96.2		96.2	106

Analyte	Units	PQL	Blank	Dup3		LCS %
				BFG3021-DUP3# Samp QC RPD %	BFG3021-DUP4# Samp QC RPD %	
TRH C10-C14	mg/kg	50	<50	<50 <50 [NA]		[NA]
TRH C15-C28	mg/kg	100	<100	<100 <100 [NA]		[NA]
TRH C29-C36	mg/kg	100	<100	<100 <100 [NA]		[NA]
TRH > C10-C16	mg/kg	50	<50	<50 <50 [NA]		[NA]
TRH > C16-C34 (F3)	mg/kg	100	117	<100 [NA] [2]		[NA]
TRH > C34-C40 (F4)	mg/kg	100	<100	<100 <100 [NA]		[NA]
Surrogate o-Terphenyl	%		91.1	90.6		[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-008 | Inorganics - Moisture (Soil) | Batch BFG3013

Analyte	Units	PQL	Blank	Dup1		LCS %
				BFG3013-DUP1# Samp QC RPD %	BFG3013-DUP2# Samp QC RPD %	
Moisture	%	0.1		23.3 26.6 13.3	12.1 11.0 9.17	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

[1] Spike recovery is outside routine acceptance criteria (60-140%), this may be due to suspected non-homogeneity and/or matrix interference effects. However, an acceptable recovery was achieved for the LCS.

[2] Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Your Reference: S13167
Revision: R-02 Certificate of Analysis Generated: 07/10/2024 14:40

- (ii) details of the testing laboratory's accreditation; and
- (c) certification signed by the relevant officers of—
 - (i) the manufacturer stating that a representative product sample was supplied for testing; and
 - (ii) the testing laboratory stating that the testing was done using generally accepted laboratory practices and that they believe the results are accurate.

Marine Protection Rules

Appendix 3 Bioremediation Agents

A3.1 Specification

Every bioremediation agent that the Director is considering whether to approve as an NZOSCA must—

- (a) undergo each of the tests prescribed, and meet any applicable standards specified, in Table 1 in Appendix 10; and
- (b) undergo each of the tests prescribed and meet any applicable standards specified, in column 3 of Table 2 in Appendix 11; and
- (c) undergo any discretionary test required by the Director, as provided for in column 3 of Table 2 in Appendix 11; and
- (d) have documentation issued that complies with clause A3.2; and
- (e) retain, when suitably stored in its original sealed containers in a temperature range of between -20°C and 50°C , the properties described in subclause (b) for a period of not less than two years commencing at the date of dispatch from the supplier.

A3.2 Documentation

Documentation of the tests referred to in clauses A3.1(a), A3.1(b), and A3.1(c) must be provided to the Director that comprise—

- (a) a copy of the test results and supporting data; and
- (b) in the case of the marine ecological toxicity test—
 - (i) the tests used, including—
 - (a) a full description of the test species and test methods; and
 - (b) acclimation procedures; and
 - (c) daily animal observations, feeding, and medium changes; and