CERTIFICATE OF ANALYSIS

Work Order	: **ES2315684**	Page	: 1 of 4
Client	: **WORMALD AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Mr Justin Morris	Contact	: Customer Services ES
Address	: 91 DERBY ST 2128	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: TRIDENT	Date Samples Received	: 11-May-2023 15:35
Order number	: ----	Date Analysis Commenced	: 15-May-2023
C-O-C number	: ----	Issue Date	: 17-May-2023 13:01
Sampler	: Justin Morris		
Site	:		
Quote number	: EN/333		
No. of samples received	: 2		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: PRODUCT (Matrix: PRODUCT)				Sample ID	TRIDENT	----	----	----	----
				Sampling date / time	11-May-2023 07:10	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2315684-002	--------	--------	--------	--------
					Result	----	----	----	----
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	mg/kg		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	mg/kg		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	mg/kg		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	mg/kg		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.02	mg/kg		<0.02	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	mg/kg		<0.02	----	----	----	----
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	mg/kg		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	mg/kg		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	mg/kg		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	mg/kg		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.02	mg/kg		<0.02	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	mg/kg		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	mg/kg		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05	mg/kg		<0.05	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05	mg/kg		<0.05	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05	mg/kg		<0.05	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	mg/kg		<0.05	----	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.05	mg/kg		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	mg/kg		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	mg/kg		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: PRODUCT (Matrix: PRODUCT)				Sample ID	TRIDENT	----	----	----	----
				Sampling date / time	11-May-2023 07:10	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2315684-002	--------	--------	--------	--------
					Result	----	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	mg/kg		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	mg/kg		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05	mg/kg		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05	mg/kg		<0.05	----	----	----	----
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	mg/kg		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	mg/kg		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	mg/kg		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	mg/kg		<0.05	----	----	----	----
EP231_TOP_P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.02	mg/kg		<0.02	----	----	----	----
^ Sum of TOP C7 - C14 as fluorine	----	0.02	mg/kg		<0.02	----	----	----	----
^ Sum of PFAS	----	0.02	mg/kg		<0.02	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **ES2315684**	Page	: 1 of 4
Client	: **WORMALD AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Mr Justin Morris	Contact	: Customer Services ES
Address	: 91 DERBY ST 2128	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: TRIDENT	Date Samples Received	: 11-May-2023
Order number	: ----	Date Analysis Commenced	: 15-May-2023
C-O-C number	: ----	Issue Date	: 17-May-2023
Sampler	: Justin Morris		
Site	:		
Quote number	: EN/333		
No. of samples received	: 2		
No. of samples analysed	: 1		

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **PRODUCT**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids (QCLot: 5051177)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	mg/kg	<0.02	----	----	----	----
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids (QCLot: 5051177)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	mg/kg	<0.1	----	----	----	----
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.05	mg/kg	<0.05	----	----	----	----
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.05	mg/kg	<0.05	----	----	----	----
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.05	mg/kg	<0.05	----	----	----	----
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	mg/kg	<0.05	----	----	----	----
EP231_TOP_C: Perfluoroalkyl Sulfonamides (QCLot: 5051177)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.05	mg/kg	<0.05	----	----	----	----
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	mg/kg	<0.05	----	----	----	----
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	mg/kg	<0.05	----	----	----	----
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	mg/kg	<0.05	----	----	----	----
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	mg/kg	<0.05	----	----	----	----
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.05	mg/kg	<0.05	----	----	----	----
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.05	mg/kg	<0.05	----	----	----	----
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5051177)								

Sub-Matrix: **PRODUCT**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5051177) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	mg/kg	<0.05	----	----	----	----
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	mg/kg	<0.05	----	----	----	----
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	mg/kg	<0.05	----	----	----	----
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	mg/kg	<0.05	----	----	----	----
EP231_TOP_P: PFAS Sums (QCLot: 5051177)								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Sum of TOP C7 - C14 as fluorine	----	0.02	mg/kg	<0.02	----	----	----	----
EP231X: Sum of PFAS	----	0.02	mg/kg	<0.02	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2315684**	Page	: 1 of 4
Client	: **WORMALD AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Mr Justin Morris	Telephone	: +61-2-8784 8555
Project	: TRIDENT	Date Samples Received	: 11-May-2023
Site	:	Issue Date	: 17-May-2023
Sampler	: Justin Morris	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **PRODUCT**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231_TOP_A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X (TOP)) TRIDENT	**11-May-2023**	**16-May-2023**	07-Nov-2023	✓	**17-May-2023**	07-Nov-2023	✓
EP231_TOP_B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X (TOP)) TRIDENT	**11-May-2023**	**16-May-2023**	07-Nov-2023	✓	**17-May-2023**	07-Nov-2023	✓
EP231_TOP_C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X (TOP)) TRIDENT	**11-May-2023**	**16-May-2023**	07-Nov-2023	✓	**17-May-2023**	07-Nov-2023	✓
EP231_TOP_D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X (TOP)) TRIDENT	**11-May-2023**	**16-May-2023**	07-Nov-2023	✓	**17-May-2023**	07-Nov-2023	✓
EP231_TOP_P: PFAS Sums							
HDPE (no PTFE) (EP231X (TOP)) TRIDENT	**11-May-2023**	**16-May-2023**	07-Nov-2023	✓	**17-May-2023**	07-Nov-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **PRODUCT**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB)							
PFAS in Foam Concentrate after Oxidation (TOP)	EP231X (TOP)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
PFAS in Foam Concentrate after Oxidation (TOP)	EP231X (TOP)	PRODUCT	In House: 0.5 g of a foam concentrate is made up to 500 mL in reagent water. A 5 mL aliquot digested with heat and persulfate under basic conditons following the method of Houtz et al. After digestion the sample is neutralised and 1 mL portion is further diluted with 1mL of the analytical solvent mixture. Isotopically labelled internals standards are added. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Total Oxidisable Precursor Digest for PFAS in Foam Concentrates	ORG70-P	PRODUCT	In house: 0.5 g of a foam concentrate is made up to 500 mL in reagent water. A 5 mL aliquot digested with heat and persulfate under basic conditons following the method of Houtz et al. After digestion the sample is neutralised and 1 mL portion is further diluted with the analytical solvent mixturel. Isotopically labelled internals standards are added prior to analysis.
Total Oxidisable Precursor Digest for PFAS	* ORG70-W	WATER	In-House with oxidation per Houtz, Erika F.; Sedlak, David L. (2012): Oxidative Conversion as a Means of Detecting Precursors to Perfluoroalkyl Acids in Urban Runoff. In Environmental Science & Technology 46 (17), pp. 9342¿9349: A 5 mL sample is digested with persulfate under alkaline conditions, neutralised and prepared for analysis per EP231.