Appendix 8-3: Sediment Chemistry Results

ORIEL WINDFARM
OFFSHORE RENEWABLE ENERGY

rps
A TETRA TECH COMPANY

JERA NEX BP

ESB Energy for generations

ORIEL WIND FARM PROJECT

Environmental Impact Assessment Report – Addendum
Appendix 8-3: Sediment Chemistry Results

MDR1520C
EIAR–
Appendix 8-3 Addendum
A1 C01
December 2025

rpsgroup.com

Oriel Windfarm Limited

Oriel Wind Farm DaS Sediment Chemistry Survey

Jake Shiel, Aisling Hearty

AQUAFACT Ref:P15722

February 2025

COMMERCIAL IN CONFIDENCE

Client: **Oriel Windfarm Limited**

Address: **Digital Office Centre**

Balheary Road

Swords, Co. Dublin

Ireland

Reference no: **P15722**

Date of issue: **07/02/2025**

AQUAFACT contact: Dr Eddie McCormack

Position: Associate Director

E-mail: Eddie@aquafact.ie

Telephone: +353 (0) 91 756812

Website: www.aquafact.ie

Address: AQUAFACT International Services Ltd,

9A Liosban Business Park,

Tuam Road,

Galway,

Ireland.

H91 K120

Registered in Ireland: No. 493496

Tax Reference Number: 9773384O

Tax Clearance Number: 559674

Table of Contents

Table of Figures

List of Tables

LIST OF APPENDICES

Appendix 1: [Pre-Dredging Analytical Requirements]

Appendix 2: [Grab Sample Images]

Appendix 3: [SOCOTEC Laboratory Report]

Appendix 4: [Radiochemical Laboratory Report]

Appendix 5: [EPA Sediment Chemistry Results]

Report Approval Sheet

Client	**Park Wind**
Report Title	**Oriel Windfarm DaS Sediment Chemistry Report**
Job Number	**P15722**
Report Status	**Final**
Issue Date	**07/02/2025**

Rev	Status	Issue Date	Document File Name	Author (s)	Approved by:
1	Draft	14/01/2025	Oriel Windfarm_Park Wind_Sediment Chemistry_JS18112024	Jake Shiel	Aisling Hearty
2	Draft	21/01/2025	Oriel Windfarm_Park Wind_Sediment Chemistry_v2	Jake Shiel, Aisling Hearty	Eddie McCormack
3	Draft	23/01/2025	Oriel Windfarm_Park Wind_Sediment Chemistry_v3	Jake Shiel, Aisling Hearty	Eddie McCormack
4	Draft	23/01/2025	Oriel Windfarm_Park Wind_Sediment Chemistry_v4	Jake Shiel, Aisling Hearty	Eddie McCormack
5	Final	07/02/2025	Oriel Windfarm_Park Wind_Sediment Chemistry_Final	Caitriona McMahon	Eddie McCormack

1. Introduction

As part of the pre-dredging analytical requirements issued by the Marine Institute (see **Appendix 1**: Pre-Dredging Analytical Requirements), Oriel Windfarm Limited are required to sample surface sediment from eight locations within the licensed area (FS007383, granted 17 May, 2023) off the coast of County Louth.

These stations were selected by the Marine Institute based on the area of seabed which could be disturbed by the proposed wind farm installation activities, and which will be the subject of a future Dumping at Sea Permit application. The analysis required for these samples is provided in **Table 2.1**and **Table 2.2**. AQUAFACT (APEM Group) were commissioned by Oriel Windfarm Ltd to carry out the sediment monitoring survey.

2. Materials and Methods

2.1 Sampling Requirements

On the 17th of September 2024, 8 sediment stations were sampled for physical and chemical analysis. The parameters required for analysis are laid out in **Table 2.1**.

Table 2.1: List of parameters for analysis.

Parameter Code	Parameter
1	Visual Inspection
2	Water Content
3	Granulometry
4.a	Total Organic Carbon
4.b	Carbonate
4.c	Mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
4.d	organochlorines including -HCH (Lindane) and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, and 180).
4.e	Total Extractable Hydrocarbons
4.f	Tributyltin (TBT) and dibutyltin (DBT)
4.g	Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 – cd pyrene, Naphthalene, Phenanthrene, Pyrene

The Marine Institute (MI) chose 8 station locations representative of the distribution of both the proposed activities and seabed sediment type across the offshore wind farm and export cable corridor areas. AQUAFACT in consultation with the MI proposed to relocate some of the stations identified by the MI for survey. This followed analysis of a substrate groundtruthing exercise carried out by Parkwind which identified the seabed sediment type across the development area. In order for full DaS sediment chemistry analysis to be possible, the sediment type should be of a finer grain size that medium sand (<2mm). As some of the stations originally selected were on coarser substrate, the MI agreed to the new station locations which still maintained a good representative selection. The coordinates of each of the eight sampling stations surveyed and the analysis required are displayed in **Table 2.2**. The positions of these sites are shown in **Figure 2.1.**

Table 2.2: Station coordinates and parameters required for analysis.

Station	Latitude	Longitude	Parameters for Analysis
ST01	53.85497	-6.24472	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
ST02	53.85732	-6.22958	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
ST03	53.87157	-6.18420	1, 2, 3, 4a, 4b, 4c
ST04	53.88903	-6.13595	1, 2, 3, 4a, 4b, 4c
ST05	53.93522	-6.07565	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4g
ST06	53.91333	-6.09503	1, 2, 3, 4a, 4b, 4c
ST07	53.89202	-6.05117	1, 2, 3, 4a, 4b, 4c
ST08	53.94005	-6.04463	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4g

2.2 Sampling Procedure

Samples were taken from the Irish Commercial Charter Boat vessel the Ros Aine using AQUAFACT's 0.1m^2 stainless steel Day Grab from the eight stations listed in **Table 2.2**. The grab was deployed from the A-frame of the vessel using a winch. Upon retrieval of the grab, a digital image was taken through the grab window and then the sediment transferred to a stainless-steel tray positioned beneath the grab jaws. Another image was then taken. These images are available in **Appendix 2: Grab Sample Images** The sediment was subsequently transferred to the appropriate containers for analysis. This included 3x500ml plastic tubs and 2x amber jars with tinfoil barriers on the lids for each station. The remaining sediment was transferred to a 5L bucket for radiochemical analysis. All equipment was washed and decontaminated with Decon-90 between grab stations. The positions for the eight sampling stations are shown in **Figure 2.1**.

Figure 2.1: Sediment sampling locations in Dundalk Bay on the 17th of September 2024.

2.3 Sample Processing

On return to the AQUAFACT premises, sediment samples for each location were sent via courier to the SOCOTEC Laboratories in Burton on Trent. Two kilogrammes of wet sediment from each station were couriered to the EPA Office of Radiation Protection and Environmental Monitoring for Radiochemical analysis. **Table 2.3** shows the analysis method for each parameter.

Table 2.3: Methods f Analysis for each parameter.

Method	Sample and Fraction Size	Method Summary
Total Solids	Wet Sediment	Calculation (100%-Moisture Content). Moisture content determined by drying a portion of the sample at 120°C to constant weight.
Particle Size analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Air dried and sieved to <2mm	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Carbonate	Air dried and sieved to <2mm	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7

Method	Sample and Fraction Size	Method Summary
Metals	Air dried and sieved to <2mm	Microwave assisted HF/Boric extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Polychlorinated Biphenyls (PCBs)	Air dried and sieved to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.
Organochlorine Pesticides (OCPs)	Air dried and sieved to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.
Radiological Testing		High resolution Gama Spectrometry with appropriate density correction.

3. Results

This section will deal with the results of the sediment chemistry analysis. The full laboratory report from SOCTEC is available in **Appendix 3: SOCOTEC Laboratory** Report.

3.1 Visual Analysis

Table 3.1 shows the visual inspection information, which includes colour and sediment type.

Table 3.1: Visual Analysis of sediment

Station	Description
ST01	Light brown slightly gravelly SAND. Gravel mainly consists of shell fragments
ST02	Light brown mottled grey SAND
ST03	Brown mottled grey sandy SILT
ST04	Brown mottled grey SILT
ST05	Light brown slightly gravelly SAND
ST06	Brown slightly gravelly SAND
ST07	Brown mottled grey SILT
ST08	Brown mottled grey slightly gravelly silty SAND. Gravel mainly consists of shell fragments

3.2 Physico-Chemical Analysis

The physico-chemical parameters analysed are displayed in **Table 3.2**. The water content and density values ranged from 2.62Mg/m^3 (ST04) to 2.67Mg/m^3 (ST05) for density and from 20.4% (ST05) to 44.3% (ST04) for moisture content.

Table 3.2 shows the Granulometry results broken down into % gravel (>2mm), sand (63-2000µm) and silt (<63µm). Gravel percentages ranged from 0% (ST03&07) to 2.78% (ST05). Sand ranged from 99.97% (ST01) to 26.42% (ST04). Silt ranged from 0% (ST01) to 72.79% (ST07). The full laboratory is available in **Appendix 3: SOCOTEC Laboratory** Report.

The Total Organic Carbon (TOC) results ranged from 0.10% m/m in Station 06 to 1.25% m/min Station 04, while Carbonate results ranged from 3.62% m/m in Station 01 to 8.13% m/m in Station 05.

Table 3.2: Physico-chemical results of each station.

Station	Total Moisture @120°C %	Density Mg/m3	Gravel (>2mm) %	Sand (63-2000 µm) %	Silt (<63 µm) %	TOC %m/m	Carbonate Equivalent (%CO3) %m/m
ST01	27.6	2.65	0.03	99.97	0.00	0.17	3.62
ST02	27.1	2.66	0.66	94.85	4.49	0.13	6.20
ST03	29.2	2.65	0.00	56.01	43.99	0.64	7.06
ST04	44.3	2.62	1.10	26.42	72.49	1.25	6.55
ST05	20.4	2.67	2.78	92.89	4.33	0.15	8.13
ST06	26.8	2.66	0.50	93.61	5.89	0.10	4.15
ST07	33.6	2.64	0.00	27.21	72.79	0.81	7.82
ST08	21.9	2.66	0.97	84.78	14.25	0.16	5.37

3.3 Contaminant Groups

3.3.1 Trace Metals

Table 3.3 shows the metal results, along with the upper and lower guidance values for Annex I metals (Cronin *et al.*, 2006; Marine Institute, 2019). Arsenic and Nickel lower-level limits have been updated to reflect the guideline addendum (Marine Institute, 2019). There was one marginal exceedance of the lower-level limit for Arsenic for station 5 which produced a level of 27.2mg/Kg. This is well below the upper level limit or 70 mg/kg. No other exceedance was recorded.

Table 3.3: Metal results and guidance values.

Determinant mg/kg	Lower Level	Upper Level	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08
As	20	70	7.45	7.57	8.59	13.4	27.2	15.8	12.5	10.5
Cd	0.7	4.2	0.06	0.08	0.13	0.16	0.06	0.06	0.15	0.05
Cr	120	370	21.4	53.9	59.6	72.9	40.9	30.4	61.5	36.0
Cu	40	110	4.5	4.4	9.4	15.6	6.2	4.8	13.5	3.9
Pb	60	218	8.8	8.6	19.0	31.4	16.6	13.2	24.6	11.3
Hg	0.2	0.7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ni	40	60	8.7	12.0	16.6	28.0	17.7	13.0	22.2	12.8
Zn	160	410	27.2	29.4	54.4	90.7	38.0	29.8	73.8	32.6
Al	N/A	N/A	18500	19600	30400	49200	26300	19700	44700	22500
Li	N/A	N/A	16.5	15.4	30.8	55.6	19.4	14.5	42.7	16.3

3.3.2 Organochlorines and PCBs

Table 3.4 show the organochlorines including ɣ-HCH (Lindane) and PCB results, along with the upper and lower guidance values for Annex I organochlorines and PCBs (Cronin *et al.,* 2006). All PCBs, HCB and ɣ-HCH were below the guidance level at all stations.

Table 3.4: Organochlorine and PCB results and guidance values.

Determinant µg/Kg (Dry Weight)	Lower Level	Upper Level	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08
AHCH	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BHCH	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
GHCH	0.3	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DIELDRIN	N/A	N/A	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<0.1
HCB	0.3	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DDE	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1
DDT	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DDD	N/A	N/A	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	0.16	<0.1
PCB28	1	180	<0.08	<0.08	0.09	0.16	<0.08	<0.08	0.14	<0.08
PCB52	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
PCB101	1	180	<0.08	<0.08	<0.08	0.08	<0.08	<0.08	0.10	<0.08
PCB118	1	180	<0.08	<0.08	<0.08	0.19	<0.08	<0.08	0.15	<0.08
PCB138	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.09	<0.08
PCB153	1	180	<0.08	<0.08	<0.08	0.12	<0.08	<0.08	0.10	<0.08
PCB180	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

3.3.3 Total Extractable Hydrocarbons

Table 3.5 shows the total extractable hydrocarbon results, along with the lower guidance values for Hydrocarbons (Cronin *et al.,* 2006). Values ranged from 0.00145g/kg (ST01) to 0.0453mg/kg (ST04). All were below the lower guidance level.

Table 3.5: Total Extractable Hydrocarbon results and guidance values.

Determinant g/Kg (Dry Weight)	Lower Level	Upper Level	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08
TEH	1	N/A	0.00145	0.0035	0.0202	0.0453	0.00264	0.00196	0.0264	0.00406

3.3.4 Tributylin (TBT) and Dibutylin (DBT)

Table 3.6 shows the TBT and DBT results, along with the Annex I upper and lower guidance values for sum of DBT and TBT (Cronin *et al.,* 2006). Sum of DBT and TBT was below the limits of detection and the lower-level limit for all stations.

Table 3.6: Tributylin and Dibutylin results and guidance values.

Determinant mg/Kg (Dry Weight)	Lower Level	Upper Level	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08
Dibutyltin (DBT)	N/A	N/A	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.005	<0.001
Tributyltin (TBT)	N/A	N/A	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001	<0.005	<0.001
∑DBT &TBT	0.1	0.5	<0.002	<0.01	<0.01	<0.01	<0.002	<0.002	<0.01	<0.002

3.3.5 Polycyclic Aromatic Hydrocarbons

Table 3.7 shows the PAH results and Annex I lower guidance values for sum of 16 PAH's. Sum of 16 PAH's was below the lower limit for all stations.

Table 3.7: Polycyclic Aromatic Hydrocarbon results and guidance values.

Determinant µg/Kg (Dry Weight)	Lower Level	Upper Level	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08
Acenaphthene	N/A	N/A	<1	<1	3.09	5.19	<1	<1	2.64	<1
Acenaphthylene	N/A	N/A	<1	<1	2.31	3.98	<1	<1	3.27	<1

Determinant µg/Kg (Dry Weight)	Lower Level	Upper Level	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08
Anthracene	N/A	N/A	<1	<1	5.13	10.70	<1	<1	8.47	<1
Benzo (a) anthracene	N/A	N/A	<1	<1	16.40	38.10	<1	<1	26.70	1.88
Benzo (a) pyrene	N/A	N/A	<1	<1	20.40	48.00	<1	<1	38.20	2.42
Benzo (b) fluoranthene	N/A	N/A	<1	1.83	30.00	68.50	1.69	1.77	55.50	4.65
Benzo (ghi) perylene	N/A	N/A	<1	<1	21.30	51.40	<1	<1	43.80	3.46
Benzo (k) fluoranthene ug kg^{-1}	N/A	N/A	<1	1.42	23.60	59.80	1.41	<1	47.30	3.52
Chrysene	N/A	N/A	<1	<1	23.50	50.60	<1	<1	37.00	2.77
Dibenz (a,h) anthracene	N/A	N/A	<1	<1	3.17	9.36	<1	<1	7.72	<1
Flourene	N/A	N/A	<1	<1	6.78	14.30	<1	<1	8.40	<1
Fluoranthene	N/A	N/A	<1	1.63	32.90	71.30	<1	<1	50.90	3.81
Indeno (1,2,3–cd) pyrene	N/A	N/A	<1	1.54	19.50	54.70	<1	1.49	44.70	3.82
Naphthalene	N/A	N/A	<1	<1	10.90	22.30	<1	<1	16.40	1.38
Phenanthrene	N/A	N/A	<1	<1	23.70	51.90	<1	<1	32.10	2.80
Pyrene	N/A	N/A	<1	1.54	29.80	62.00	<1	<1	46.20	3.09
∑ 16 PAH	4000	N/A	<1	7.96	272.48	622.13	3.10	3.26	469.30	33.60

3.4 Radiochemical Analysis

Table 3.8 shows the radiochemical results issued by the Office of Radiation Protection and Environmental Monitoring. The samples were prepared by placing an aliquot in a well-defined counting geometry and then measured on a high-resolution gamma spectrometer. Appropriate density corrections were applied to the resultant spectra to take account of the differences in sample density. Dry to wet weight ratio was determined for the sample. Results are quoted on a dry weight basis. The full report is available in **Appendix 4**: Radiochemical Lab Report.

Table 3.8: Radiochemical results

Determinant mg/Kg (Dry Weight)	ST01	ST02	ST03	ST04	ST05	ST06	ST07	ST08
K-40	265±4	273±4	384±5	483±7	244±4	231±4	523±7	310±4
I-131	Nd	Nd	Nd	Nd	Nd	Nd	Nd	Nd
Cs-134	Nd	Nd	Nd	Nd	Nd	Nd	Nd	Nd
Cs-137	1.69±0.02	3.2±0.09	7.3±0.1	13.1±0.2	0.59±0.02	0.96±0.03	12.3±0.2	2.38±0.03
Am-241	0.75±0.04	1.3±0.1	4.4±0.1	8.6±0.1	1.9±0.1	2.0±0.1	7.4±0.1	2.7±0.1
Ra-226	6.1±0.1	17.1±0.6	19.4±0.3	18.9±0.3	9.2±0.4	10.5±0.6	17.0±0.3	12.0±0.2
Pb-210	11.2±1.9	18.6±1.4	37.2±3.0	52.0±3.4	15.7±1.1	17.4±1.1	41.1±3.1	<8.3
Ra-228	6.4±0.2	15.5±0.4	21.0±0.5	22.5±0.5	11.1±0.3	9.5±0.3	21.7±0.5	12.8±0.3
U-235	0.33±0.01	0.93±0.08	1.17±0.05	1.1±0.01	0.54±0.06	0.38±0.05	1.01±0.03	0.66±0.02
U-238	8.2±0.4	24.5±0.9	29.4±0.9	28.7±0.9	14.5±0.6	13.4±0.6	26.5±0.8	17.1±0.6

Nd = Not detected

4. Conclusion

All sediments tested, were below the upper-level guidance values outlined in Cronin *et al*. (2006) and Marine Institute addendum (Marine Institute, 2019). According to Cronin *et al.* (2006) '*Lower level guidance values correspond to contaminant concentrations below which the sediment, if disposed at sea, is assumed to have a physical impact only. The upper level guidance values are set at concentrations above which adverse effects might be expected*.'

In other words, lower level guidance values present concentrations that are either a) at the upper end of the no-effect range or b) at background concentrations. Upper level guidance values are set at the **lower** end of the known range of effective concentrations *i.e.,* the lowest concentrations shown to have adverse effects on marine organisms.

There was only one marginal exceedance of the lower-level limit for Arsenic (20mg/kg) for station 5 which recorded a level of 27.2mg/kg. This is well below the upper-level limit or 70 mg/kg (which would be lower end of a range of concentrations that would have adverse effect). This is the only exceedance recorded. All other parameters tested were below the lower-level guidance values. As a result, the samples analysed passed the Phase 2 assessment (Cronin *et al.,* 2006) and were deemed suitable for dumping at sea. Phase 3 assessment (involving sampling at depth and further toxicity testing) is not required.

Radiochemical results were reported from the Office of Radiation Protection and Environmental Monitoring. The results of the analysis indicate that the dumping of the materials gathered from the eight stations at Oriel will not result in a radiological hazard.

5. References

Cronin, M., McGovern, E., McMahon, T. & R. Boelens. (2006). Guidelines for the assessment of dredge material for disposal in Irish waters. Marine Environmental and Health Series, No. 24, 2006.

EPA. 2011a. Dumping at Sea Permit Application Form. http://www.epa.ie/downloads/forms/lic/das/name,30266,en.html

EPA. 2011b. Dumping at Sea Application Guidance Note. http://www.epa.ie/downloads/forms/lic/das/DaSGuidanceV1.pdf

Marine Institute, (2019). Addendum to 2006 Guidelines for the Assessment of Dredged material in Irish Waters (Cronin et al.)

6. Appendices

6.1 Appendix 1: Pre-Dredging Analytical Requirements

Marine Institute
Foras na Mara

Rinville
Oranmore
Co Galway
Tel: +353 91 387200

Richard Church
Environmental & Consents Manager
Park Wind
Digital Office Centre
Balheary Road
Swords, Co. Dublin

25 January, 2023

Dear Richard,

Details are given below of the recommended chemistry sampling and analysis for the operations for **Oriel Wind Farm**, based on your email confirming approximately 200,000m^3 of sediment to be plough dredged. Eight surface samples are recommended and should be analysed as indicated in Table 1 below. The proposed locations of the samples are in Figure 1.

In order that the integrity of the samples is not compromised, I recommend employing a Marine/Environmental Scientist to carry out the sampling on board the SI vessel.

You should provide your sampling contractor with a copy of this plan. I would particularly request that you draw their attention to **sections 3 and 4** below, which are fundamental to the quality of the analysis / results.

In order to achieve the sufficiently low limits of detection required for offshore sediment, please ensure that you use an analysing laboratory that is accredited and well experienced in the testing of marine sediment.

If you need clarification on anything, please don't hesitate to contact me.

Best regards,

MCronin

Margot Cronin
Marine Environment Chemist

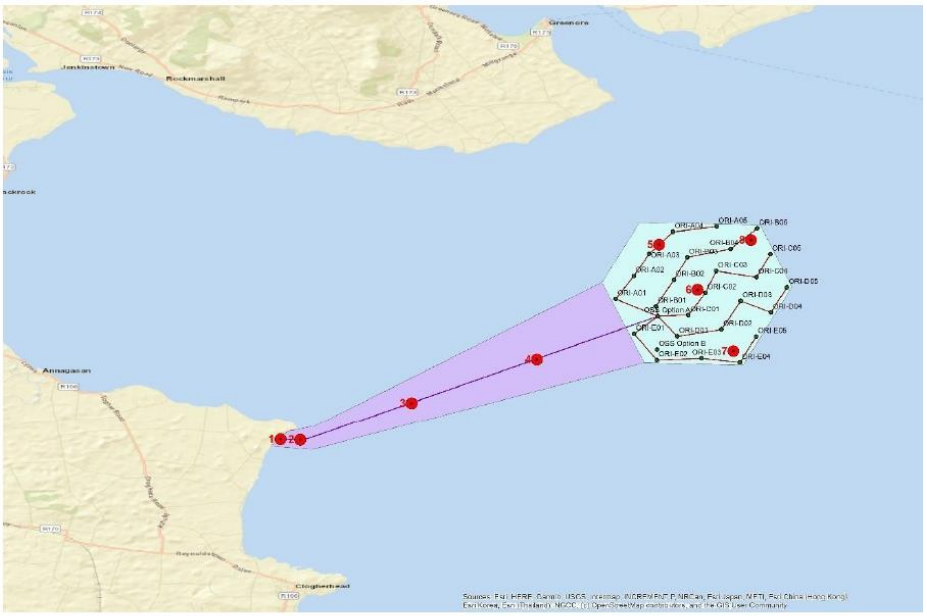

Figure 1. Sample locations for sediment chemistry, Oriel Windfarm

1.0 Sample location and analyses required:

Sample	Longitude (W)*	Latitude (N)*	Parameters for analysis
1	-6.24502	53.85505	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
2	-6.23664	53.85486	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
3	-6.18925	53.87066	1, 2, 3, 4a, 4b, 4c
4	-6.13595	53.88932	1, 2, 3, 4a, 4b, 4c
5	-6.08398	53.93824	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4g
6	-6.06761	53.91901	1, 2, 3, 4a, 4b, 4c
7	-6.05238	53.89293	1, 2, 3, 4a, 4b, 4c
8	-6.04495	53.94014	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4g

** Coordinates in WGS84*

2.0 Parameter Code:

1. Visual inspection, to include colour, texture, odour, presence of animals etc

2. Water content, density (taking into account sample collection and handling)
3. Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63μm fraction).
4. The following determinants in the sand-mud (< 2mm) fraction * :
   a) total organic carbon
   b) carbonate
   c) mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
   d) organochlorines including ⍰-HCH (Lindane) and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, and 180).
   e) total extractable hydrocarbons.
   f) tributyltin (TBT) and dibutyltin (DBT)
   g) Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 – cd pyrene, Naphthalene, Phenanthrene, Pyrene.
   h) Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species. (This requirement will depend on the results of the chemical analyses.)

**where the gravel fraction (> 2mm) constitutes a significant part of the total sediment, this should be taken into account in the calculation of the concentrations.*

3.0 Important notes:

3.1 Details of the methodologies used must be furnished with the results. This should include sampling, sub sampling and analytical methods used for each determinant

3.2 Appropriate marine CRM are to be analysed during each batch of analyses and the results to be reported along with sample results.

3.3 The required detection limits for the various determinants are given below.

Contaminant	Concentration	Units (dry wt)
Mercury	0.05	mg kg^{-1}
Arsenic	1.0	mg kg^{-1}
Cadmium	0.1	mg kg^{-1}
Copper	5.0	mg kg^{-1}
Lead	5.0	mg kg^{-1}
Zinc	10	mg kg^{-1}
Chromium	5.0	mg kg^{-1}

Contaminant	Concentration	Units (dry wt)
Nickel	15	mg kg^{-1}
Total extractable hydrocarbons	10.0	mg kg^{-1}
TBT and DBT (not organotin)	0.01	mg kg^{-1}
PCB – individual congener	1.0	µg kg^{-1}
OCP – individual compound	1.0	µg kg^{-1}
PAH – individual compound	20	µg kg^{-1}

4.0 Reporting requirements

Reports should include the following information

4.1 Results of testing should be reported in EPA spreadsheet format, which can be found here.

4.2 Spreadsheet results to include:

- 4.2.1 Tabulated geophysical/chemical test results
- 4.2.2 Clear expression of units
- 4.2.3 Indication of wet weight or dry weight basis
- 4.2.4 Location of samples in decimal degrees WGS84 (latitude/longitude).
- 4.2.5 Date of sampling
- 4.2.6 Treatment of samples and indication of sub sampling, compositing etc.
- 4.2.7 Summary method details
- 4.2.8 CRM results
- 4.2.9 QA /QC
- 4.2.10 Other quality assurance information (e.g. accreditation status)
- 4.2.11 Project details.

4.3 If determinant is not detected, report less than values, and indicate LoD/ LoQ used.

4.4 Testing laboratories may be asked to provide additional details of method performance including limit of detection, precision, bias.

6.2 Appendix 2: Grab Sample Images

Plate 1: ST01 Oriel Windfarm 17/09/2024

Plate 2: ST02 Oriel Windfarm 17/09/2024

Plate 3: ST03 Oriel Windfarm 17/09/2024

Plate 4: ST04 Oriel Windfarm 17/09/2024

Plate 5: ST05 Oriel Windfarm 17/09/2024

Plate 6: ST06 Oriel Windfarm 17/09/2024

Plate 7: ST07 Oriel Windfarm 17/09/2024

Plate 8: ST08 Oriel Windfarm 17/09/2024

6.3 Appendix 3: SOCOTEC Laboratory Report

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR02461

Issue Version: 1

Customer: Aquafact, 9A Liobaun Business Park, Tuam Road, Galway

Customer Reference: Oriel Wind Farm

Date Sampled: 17-Sep-24

Date Samples Received: 26-Sep-24

Test Report Date: 22-Oct-24

Condition of samples: Ambient Satisfactory

Opinions and Interpretations expressed herein are outside the scope of our UKAS accreditation
The results reported relate only to the sample tested
The results apply to the sample as received

JNColbourne

Authorised by: Jane Colbourne

Position: Customer Service Specialist

UKAS TESTING
1252

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Method No	SUB_02*
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Visual Description**
ORIEL ST 01	MAR02461.001	Sediment	Light brown slightly gravelly SAND. Gravel mainly consists of shell fragments
ORIEL ST 02	MAR02461.002	Sediment	Light brown mottled grey SAND
ORIEL ST 03	MAR02461.003	Sediment	Brown mottled grey sandy SILT
ORIEL ST 04	MAR02461.004	Sediment	Brown mottled grey SILT
ORIEL ST 05	MAR02461.005	Sediment	Light brown slightly gravelly SAND
ORIEL ST 06	MAR02461.006	Sediment	Brown slightly gravelly SAND
ORIEL ST 07	MAR02461.007	Sediment	Brown mottled grey SILT
ORIEL ST 08	MAR02461.008	Sediment	Brown mottled grey slightly gravelly silty SAND. Gravel mainly consists of shell fragments

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	%	%	%	%	%	Mg/m3
		Method No	ASC/SOP/303	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*	SUB_02*
		Limit of Detection	0.2	0.2	N/A	N/A	N/A	N/A
		Accreditation	UKAS	UKAS	N	N	N	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Total Moisture @ 120°C**	**Total Solids**	**Gravel (>2mm)**	**Sand (63-2000 µm)**	**Silt (<63 µm)**	**Particle Density**
ORIEL ST 01	MAR02461.001	Sediment	27.6	72.4	0.03	99.97	0.00	2.65
ORIEL ST 02	MAR02461.002	Sediment	27.1	72.9	0.66	94.85	4.49	2.66
ORIEL ST 03	MAR02461.003	Sediment	29.2	70.8	0.00	56.01	43.99	2.65
ORIEL ST 04	MAR02461.004	Sediment	44.3	55.7	1.10	26.42	72.49	2.62
ORIEL ST 05	MAR02461.005	Sediment	20.4	79.6	2.78	92.89	4.33	2.67
ORIEL ST 06	MAR02461.006	Sediment	26.8	73.2	0.50	93.61	5.89	2.66
ORIEL ST 07	MAR02461.007	Sediment	33.6	66.4	0.00	27.21	72.79	2.64
ORIEL ST 08	MAR02461.008	Sediment	21.9	78.1	0.97	84.78	14.25	2.66
		Reference Material (% Recovery)	NA	NA	NA	NA	NA	NA
		QC Blank	NA	NA	NA	NA	NA	NA

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	% m/m	%m/m
		Method No	WSLM59*	ANC*
		Limit of Detection	0.02	0.12
		Accreditation	UKAS	No
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**TOC**	**Carbonate Equivalent (%CO3)**
ORIEL ST 01	MAR02461.001	Sediment	0.17	3.62
ORIEL ST 02	MAR02461.002	Sediment	0.13	6.20
ORIEL ST 03	MAR02461.003	Sediment	0.64	7.06
ORIEL ST 04	MAR02461.004	Sediment	1.25	6.55
ORIEL ST 05	MAR02461.005	Sediment	0.15	8.13
ORIEL ST 06	MAR02461.006	Sediment	0.10	4.15
ORIEL ST 07	MAR02461.007	Sediment	0.81	7.82
ORIEL ST 08	MAR02461.008	Sediment	0.16	5.37
		Reference Material (% Recovery)	91	99
		QC Blank	<0.02	<0.12

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ICPMS-MWSED*	ICPMS-MWSED*	ICPMS-MWSED*	ICPMS-MWSED*	ICPMS-MWSED*	ICPMS-MWSED*	ICPMS-MWSED*
		Limit of Detection	0.14	0.03	1	0.7	0.6	0.01	0.4
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Arsenic as As**	**Cadmium as Cd**	**Chromium as Cr**	**Copper as Cu**	**Lead as Pb**	**Mercury as Hg**	**Nickel as Ni**
ORIEL ST 01	MAR02461.001	Sediment	7.45	0.06	21.4	4.5	8.8	<0.01	8.7
ORIEL ST 02	MAR02461.002	Sediment	7.57	0.08	53.9	4.4	8.6	<0.01	12.0
ORIEL ST 03	MAR02461.003	Sediment	8.59	0.13	59.6	9.4	19.0	<0.01	16.6
ORIEL ST 04	MAR02461.004	Sediment	13.4	0.16	72.9	15.6	31.4	<0.01	28.0
ORIEL ST 05	MAR02461.005	Sediment	27.2	0.06	40.9	6.2	16.6	<0.01	17.7
ORIEL ST 06	MAR02461.006	Sediment	15.8	0.06	30.4	4.8	13.2	<0.01	13.0
ORIEL ST 07	MAR02461.007	Sediment	12.5	0.15	61.5	13.5	24.6	<0.01	22.2
ORIEL ST 08	MAR02461.008	Sediment	10.5	0.05	36.0	3.9	11.3	<0.01	12.8
Certified Reference Material 2702 (Measured Value)			39.21	0.825	288.6	99.95	113.2	0.383	66.64
Certified Reference Material 2702 (Certified Value)			45.3	0.817	352	117.7	132.8	0.447	75.4
Certified Reference Material 2702 (% Recovery)			83	81	88	86	87	82	95
QC Blank			<0.14	<0.03	<1	<0.7	<0.6	<0.01	<0.4

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ICPMS-MWSED*	ICPOES-MWSED*	ICPOES-MWSED*
		Limit of Detection	3.5	1750	2
		Accreditation	UKAS	UKAS	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Zinc as Zn**	**Aluminium as Al**	**Lithium as Li**
ORIEL ST 01	MAR02461.001	Sediment	27.2	18500	16.5
ORIEL ST 02	MAR02461.002	Sediment	29.4	19600	15.4
ORIEL ST 03	MAR02461.003	Sediment	54.4	30400	30.8
ORIEL ST 04	MAR02461.004	Sediment	90.7	49200	55.6
ORIEL ST 05	MAR02461.005	Sediment	38.0	26300	19.4
ORIEL ST 06	MAR02461.006	Sediment	29.8	19700	14.5
ORIEL ST 07	MAR02461.007	Sediment	73.8	44700	42.7
ORIEL ST 08	MAR02461.008	Sediment	32.6	22500	16.3
		Certified Reference Material 2702 (Measured Value)	418.2	71789	76.5
		Certified Reference Material 2702 (Certified Value)	485.3	84000	78.2
		Certified Reference Material 2702 (% Recovery)	87	91	98
		QC Blank	<3.5	<1750	<2

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	µg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
ORIEL ST 01	MAR02461.001	Sediment	<1	<1
ORIEL ST 02	MAR02461.002	Sediment	<5	<5
ORIEL ST 03	MAR02461.003	Sediment	<5	<5
ORIEL ST 04	MAR02461.004	Sediment	<5	<5
ORIEL ST 05	MAR02461.005	Sediment	<1	<1
ORIEL ST 06	MAR02461.006	Sediment	<1	<1
ORIEL ST 07	MAR02461.007	Sediment	<5	<5
ORIEL ST 08	MAR02461.008	Sediment	<1	<1
Certified Reference Material BCR-646 (Measured Value)			693	495
Certified Reference Material BCR-646 (Certified Value)			770	480
Certified Reference Material BCR-646 (% Recovery)			90	103
QC Blank			<1	<1

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
ORIEL ST 01	MAR02461.001	Sediment	<1	<1	<1	<1	<1	<1
ORIEL ST 02	MAR02461.002	Sediment	<1	<1	<1	<1	<1	1.83
ORIEL ST 03	MAR02461.003	Sediment	3.09	2.31	5.13	16.4	20.4	30.0
ORIEL ST 04	MAR02461.004	Sediment	5.19	3.98	10.7	38.1	48.0	68.5
ORIEL ST 05	MAR02461.005	Sediment	<1	<1	<1	<1	<1	1.69
ORIEL ST 06	MAR02461.006	Sediment	<1	<1	<1	<1	<1	1.77
ORIEL ST 07	MAR02461.007	Sediment	2.64	3.27	8.47	26.7	38.2	55.5
ORIEL ST 08	MAR02461.008	Sediment	<1	<1	<1	1.88	2.42	4.65
Certified Reference Material Nist 1941b (Measured Value)			26.9	60.6	120	214	200	363
Certified Reference Material Nist 1941b (Certified Value)			38.4	53.3	184	335	358	453
Certified Reference Material Nist 1941b (% Recovery)			70	114	65	64	56	80
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BKF***	**CHRYSENE***	**DBENZAH**	**FLUORANT**	**FLUORENE**
ORIEL ST 01	MAR02461.001	Sediment	<1	<1	<1	<1	<1	<1
ORIEL ST 02	MAR02461.002	Sediment	<1	1.42	<1	<1	1.63	<1
ORIEL ST 03	MAR02461.003	Sediment	21.3	23.6	23.5	3.17	32.9	6.78
ORIEL ST 04	MAR02461.004	Sediment	51.4	59.8	50.6	9.36	71.3	14.3
ORIEL ST 05	MAR02461.005	Sediment	<1	1.41	<1	<1	<1	<1
ORIEL ST 06	MAR02461.006	Sediment	<1	<1	<1	<1	<1	<1
ORIEL ST 07	MAR02461.007	Sediment	43.8	47.3	37.0	7.72	50.9	8.40
ORIEL ST 08	MAR02461.008	Sediment	3.46	3.52	2.77	<1	3.81	<1
Certified Reference Material Nist 1941b (Measured Value)			171	340	350	47.5	520	47.8
Certified Reference Material Nist 1941b (Certified Value)			307	225	399	53.0	651	85.0
Certified Reference Material Nist 1941b (% Recovery)			56	151	88	90	80	56
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**INDPYR**	**NAPTH**	**PHENANT**	**PYRENE**	**THC**
ORIEL ST 01	MAR02461.001	Sediment	<1	<1	<1	<1	1450
ORIEL ST 02	MAR02461.002	Sediment	1.54	<1	<1	1.54	3500
ORIEL ST 03	MAR02461.003	Sediment	19.5	10.9	23.7	29.8	20200
ORIEL ST 04	MAR02461.004	Sediment	54.7	22.3	51.9	62.0	45300
ORIEL ST 05	MAR02461.005	Sediment	<1	<1	<1	<1	2640
ORIEL ST 06	MAR02461.006	Sediment	1.49	<1	<1	<1	1960
ORIEL ST 07	MAR02461.007	Sediment	44.7	16.4	32.1	46.2	26400
ORIEL ST 08	MAR02461.008	Sediment	3.82	1.38	2.80	3.09	4060
Certified Reference Material Nist 1941b (Measured Value)			220	552	317	410	1261
Certified Reference Material Nist 1941b (Certified Value)			341	848	406	581	1400
Certified Reference Material Nist 1941b (% Recovery)			65	65	78	71	90~
QC Blank			<1	<1	<1	<1	<100

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	UKAS	UKAS	UKAS	UKAS	N*	N*	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB28**	**PCB52**	**PCB101**	**PCB118**	**PCB138**	**PCB153**	**PCB180**
ORIEL ST 01	MAR02461.001	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
ORIEL ST 02	MAR02461.002	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
ORIEL ST 03	MAR02461.003	Sediment	0.09	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
ORIEL ST 04	MAR02461.004	Sediment	0.16	<0.08	0.08	0.19	<0.08	0.12	<0.08
ORIEL ST 05	MAR02461.005	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
ORIEL ST 06	MAR02461.006	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
ORIEL ST 07	MAR02461.007	Sediment	0.14	<0.08	0.10	0.15	0.09	0.10	<0.08
ORIEL ST 08	MAR02461.008	Sediment	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Certified Reference Material Nist 1941b (Measured Value)			3.62	4.68	5.31	4.24	3.77	4.95	3.12
Certified Reference Material Nist 1941b (Certified Value)			4.52	5.24	5.11	4.23	3.60	5.47	3.24
Certified Reference Material Nist 1941b (% Recovery)			80	89	104	100	105	90	96
QC Blank			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**AHCH**	**BHCH**	**GHCH**	**DIELDRIN**	**HCB**	**DDE**	**DDT**	**DDD**
ORIEL ST 01	MAR02461.001	Sediment	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
ORIEL ST 02	MAR02461.002	Sediment	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
ORIEL ST 03	MAR02461.003	Sediment	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
ORIEL ST 04	MAR02461.004	Sediment	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	0.14
ORIEL ST 05	MAR02461.005	Sediment	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
ORIEL ST 06	MAR02461.006	Sediment	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
ORIEL ST 07	MAR02461.007	Sediment	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	0.16
ORIEL ST 08	MAR02461.008	Sediment	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Certified Reference Material Nist 1941b (Measured Value)			41.6	36.6	38.8	43.1	7.19	3.20	0.71	3.51
Certified Reference Material Nist 1941b (Certified Value)			40.0	40.0	40.0	40.0	5.83	3.22	1.12	4.66
Certified Reference Material Nist 1941b (% Recovery)			104	91	97	108	123	99	63	75
QC Blank			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR02461
Issue Version 1
Customer Reference Oriel Wind Farm

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
WSLM59*	MAR02461.001-008	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ANC*	MAR02461.001-008	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ICPMS-MWSED*	MAR02461.001-008	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ICPOES-MWSED*	MAR02461.001-008	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SUB_01*	MAR02461.001-008	Analysis was conducted by an approved subcontracted laboratory.
SUB_02*	MAR02461.001-008	Analysis was conducted by an approved subcontracted laboratory.
ASC/SOP/301	MAR02461.002-004, .007	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/302	MAR02461.001-008	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (PCB138, PCB153) . These circumstances should be taken into consideration when utilising the data.
ASC/SOP/303/304	MAR02461.002-008	Benzo[k]fluoranthene is known to coelute with Benzo[j]fluoranthene and these peaks can not be resolved. It is believed Benzo[j]fluoranthene is present in these samples therefore it is suggested that the Benzo[k]fluoranthene results should be taken as a Benzo[k]fluoranthene (inc. Benzo[j]fluoranthene). Benzo[j]fluoranthene is not UKAS accredited. This should be taken into consideration when utilising the data.
ASC/SOP/303/304	MAR02461.002-008	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene).This should be taken into consideration when utilising the data.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Sample Contaminated through Damaged Packaging	N/A	N/A
D3	Sample Contaminated through Sampling	N/A	N/A
D4	Inappropriate Container/Packaging	N/A	N/A
D5	Damaged in Transit	N/A	N/A
D6	Insufficient Quantity of Sample	N/A	N/A
D7	Inappropriate Headspace	N/A	N/A
D8	Retained at Incorrect Temperature	N/A	N/A
D9	Lack of Date & Time of Sampling	N/A	N/A
D10	Insufficient Sample Details	N/A	N/A
D11	Sample integrity compromised or not suitable for analysis	N/A	N/A

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR02461
Issue Version	1
Customer Reference	Oriel Wind Farm

Method	Sample and Fraction Size	Method Summary
Total Solids	Wet Sediment	Calculation (100%-Moisture Content).Moisture content determined by drying a portion of the sample at 120°C to constant weight.
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Air dried and seived to <2mm	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Carbonate	Air dried and seived to <2mm	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Metals	Air dried and seived to <2mm	Microwave assisted HF/Boric extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.
Organochlorine Pesticides (OCPs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions

Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorcyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorcyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorcyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	DDD	p,p'-Dichlorodiphenyldichloroethane
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	DDE	p,p'-Dichlorodiphenyldichloroethylene
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	DDT	p,p'-Dichlorodiphenyltrichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		

6.4 Appendix 4: Radiochemical Lab Report

Laboratory Test Report

Report Date:	17th December 2023
Samples Tested on Behalf of:	Aquafact International Services Ltd
Laboratory Analysis:	High Resolution Gamma Spectrometry with appropriate density correction
Sample Type:	Marine Sediment
Date of Receipt:	26 September 2024
Date of Analysis	October - December 2024

Results:

ORM Reference	Client Reference	Coordinates	Nuclide	Activity Concentration (Bq/kg, dry)[1]
CT24000485	ST_1	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	265 ± 4 Nd Nd 1.69 ± 0.02 0.75 ± 0.04 6.08 ± 0.12 11.2 ± 1.9 6.35 ± 0.16 0.33 ± 0.01 8.2 ± 0.4
CT2400486	ST_02	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	273 ± 4 Nd Nd 3.17 ± 0.09 1.30 ± 0.07 17.1 ± 0.6 18.6 ± 1.4 15.5 ± 0.4 0.93 ± 0.08 24.5 ± 0.9

CT2400487	ST_3	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	384 ± 5 Nd Nd 7.32 ± 0.09 4.41 ± 0.08 19.4 ± 0.3 37.2 ± 3.0 21.0 ± 0.5 1.17 ± 0.05 29.4 ± 0.9
CT2400488	ST_4	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	483 ± 7 Nd Nd 13.1 ± 0.2 8.6 ± 0.1 18.9 ± 0.3 52.0 ± 3.4 22.5 ± 0.5 1.09 ± 0.05 28.7 ± 0.9
CT2400489	ST_5	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	244 ± 4 Nd Nd 0.59 ± 0.02 1.91 ± 0.06 9.23 ± 0.35 15.7 ± 1.1 11.1 ± 0.3 0.54 ± 0.06 14.5 ± 0.6
CT2400490	ST_6	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	231 ± 4 Nd Nd 0.96 ± 0.03 2.00 ± 0.06 10.5 ± 0.6 17.4 ± 1.1 9.49 ± 0.26 0.38 ± 0.05 13.4 ± 0.6

CT2400491	ST_7	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	523 ± 7 Nd Nd 12.3 ± 0.2 7.4 ± 0.1 17.0 ± 0.3 41.1 ± 3.1 21.7 ± 0.5 1.01 ± 0.03 26.5 ± 0.8
CT2400492	ST_8	n/a	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Pb-210 Ra-228 U-235 U-238	310 ± 4 Nd Nd 2.38 ± 0.03 2.67 ± 0.6 12.0 ± 0.2 < 8.3 12.8 ± 0.3 0.66 ± 0.2 17.1 ± 0.6

Note:
(1) Quoted uncertainties are ±1 SD counting statistics
(2) Nd = not detected

The Office of Radiation Protection and Environmental Monitoring received eight offshore grab sediment samples from off the coast of Co Louth.

The samples were prepared by placing an aliquot in a well-defined counting geometry and then measured on a high-resolution gamma spectrometer. Appropriate density corrections were applied to the resultant spectra to take account of the differences in sample density. Dry to wet weight ratio was determined for the sample. Results are quoted on a dry weight basis.

The results indicate that dumping of these materials at sea will not result in a radiological hazard.

Veronica Smith
Laboratory Manager

Notes:
- This report relates only to the samples tested.
- This report shall not be reproduced except in full, without the approval of the Agency

- The following scientific officers may sign test reports on behalf of the lab manager: Mr Simon O'Toole, Ms Olwyn Hanley.
- Where applicable, the number following the symbol ± is the combined standard uncertainty and not a confidence interval.

6.5 Appendix 5: EPA Sediment Chemistry Results

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	Company Name	Location	Sampling date (dd/mm/yyyy)	Sampling Location ID	Position Latitude (WGS84 decimal degrees)	Position Longitude (WGS84 decimal degrees)	Sampling depth below seabed m	Lab Report ID	Sample appearance (e.g. colour, texture, signs of life)
MAR02461.001	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 01	53.85497	-6.24472	0	MAR02461	Light brown slightly gravelly SAND. Gravel mainly consists of shell fragments
MAR02461.002	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 02	53.85732	-6.22958	0	MAR02461	Light brown mottled grey SAND
MAR02461.003	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 03	53.87157	-6.18420	0	MAR02461	Brown mottled grey sandy SILT
MAR02461.004	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 04	53.88903	-6.13595	0	MAR02461	Brown mottled grey SILT
MAR02461.005	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 05	53.93522	-6.07565	0	MAR02461	Light brown slightly gravelly SAND
MAR02461.006	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 06	53.91333	-6.09503	0	MAR02461	Brown slightly gravelly SAND
MAR02461.007	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 07	53.89202	-6.05117	0	MAR02461	Brown mottled grey SILT
MAR02461.008	SOCOTEC UK	Oriel Wind Farm	17/09/2024	ORIEL ST 08	53.94005	-6.04463	0	MAR02461	Brown mottled grey slightly gravelly silty SAND. Gravel mainly consists of shell

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	% Moisture	Particle size >2mm %	Particle size <2mm >63um %	Partic+B:Nle size <63um %	OC %	Carbonate %	Dry solids %	Al mg kg^{-1}	Cd mg kg^{-1}	Hg mg kg^{-1}	As mg kg^{-1}	Cr mg kg^{-1}	Cu mg kg^{-1}	Pb mg kg^{-1}	Ni mg kg^{-1}
MAR02461.001	27.6	0.03	99.97	0	0.17	3.62	72.4	18500	0.06	<0.01	7.45	21.4	4.5	8.8	8.7
MAR02461.002	27.1	0.66	94.85	4.49	0.13	6.2	72.9	19600	0.08	<0.01	7.57	53.9	4.4	8.6	12.0
MAR02461.003	29.2	0	56.01	43.99	0.64	7.06	70.8	30400	0.13	<0.01	8.59	59.6	9.4	19	16.6
MAR02461.004	44.3	1.1	26.42	72.49	1.25	6.55	55.7	49200	0.16	<0.01	13.4	72.9	15.6	31.4	28.0
MAR02461.005	20.4	2.78	92.89	4.33	0.15	8.13	79.6	26300	0.06	<0.01	27.2	40.9	6.2	16.6	17.7
MAR02461.006	26.8	0.5	93.61	5.89	0.1	4.15	73.2	19700	0.06	<0.01	15.8	30.4	4.8	13.2	13.0
MAR02461.007	33.6	0	27.21	72.79	0.81	7.82	66.4	44700	0.15	<0.01	12.5	61.5	13.5	24.6	22.2
MAR02461.008	21.9	0.97	84.78	14.25	0.16	5.37	78.1	22500	0.05	<0.01	10.5	36	3.9	11.3	12.8

Note: The above spreadsheet does not take into account the addendum to the 2006 guideline (Marine Institute, 2019) which raised the lower action levels Arsenic from 9mg kg^{-1} to 20mg kg^{-1} and for Nickel 21mg kg^{-1} to 40mg kg^{-1}. Therefore, although there are apparent exceedances for Mercury, Arsenic and Nickel, **the only exceedance is ST05 for Arsenic.**

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	Zn mg kg^{-1}	TEH g kg^{-1}	HCB (ug kg-1)	g-HCH (ug kg-1)	p,p' DDT (ug kg-1)	p,p' DDD (ug kg-1)	p,p' DDE (ug kg-1)	S DDX (ug kg-1)	TBT mg kg^{-1}	DBT mg kg^{-1}	PCB 028 ug kg^{-1}	PCB 052 ug kg^{-1}	PCB 101 ug kg^{-1}	PCB 138 ug kg^{-1}
MAR02461.001	27.2	0.00145	<0.1	<0.1	<0.1	<0.1	<0.1		<0.001	<0.001	<0.08	<0.08	<0.08	<0.08
MAR02461.002	29.4	0.0035	<0.1	<0.1	<0.1	<0.1	<0.1		<0.005	<0.005	<0.08	<0.08	<0.08	<0.08
MAR02461.003	54.4	0.0202	<0.1	<0.1	<0.1	<0.1	<0.1		<0.005	<0.005	0.0900	<0.08	<0.08	<0.08
MAR02461.004	90.7	0.0453	<0.1	<0.1	<0.1	0.14	<0.1		<0.005	<0.005	0.1600	<0.08	0.0800	<0.08
MAR02461.005	38	0.00264	<0.1	<0.1	<0.1	<0.1	<0.1		<0.001	<0.001	<0.08	<0.08	<0.08	<0.08
MAR02461.006	29.8	0.00196	<0.1	<0.1	<0.1	<0.1	<0.1		<0.001	<0.001	<0.08	<0.08	<0.08	<0.08
MAR02461.007	73.8	0.0264	<0.1	<0.1	<0.1	0.16	0.14		<0.005	<0.005	0.1400	<0.08	0.1000	0.0900
MAR02461.008	32.6	0.00406	<0.1	<0.1	<0.1	<0.1	<0.1		<0.001	<0.001	<0.08	<0.08	<0.08	<0.08

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	PCB 153 ug kg^{-1}	PCB 180 ug kg^{-1}	PCB 118 ug kg^{-1}	PAH Acenaphthene ug kg^{-1}	PAH Acenaphthylene ug kg^{-1}	PAH Anthracene ug kg^{-1}	PAH Benzo (a) anthracene ug kg^{-1}	PAH Benzo (a) pyrene ug kg^{-1}	PAH Benzo (b) fluoranthene ug kg^{-1}	PAH Benzo (ghi) perylene ug kg^{-1}	PAH Benzo (k) fluoranthene ug kg^{-1}	PAH Chrysene ug kg^{-1}	PAH Dibenz (a,h) anthracene ug kg^{-1}	PAH Flourene ug kg^{-1}	PAH Fluoranthene ug kg^{-1}	PAH Indeno (1,2,3–cd) pyrene ug kg^{-1}
MAR02461.001	<0.08	<0.08	<0.08	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MAR02461.002	<0.08	<0.08	<0.08	<1	<1	<1	<1	<1	1.83	<1	1.42	<1	<1	<1	1.63	1.54
MAR02461.003	<0.08	<0.08	<0.08	3.09	2.31	5.13	16.40	20.40	30.00	21.30	23.60	23.50	3.17	6.78	32.90	19.50
MAR02461.004	0.1200	<0.08	0.1900	5.19	3.98	10.70	38.10	48.00	68.50	51.40	59.80	50.60	9.36	14.30	71.30	54.70
MAR02461.005	<0.08	<0.08	<0.08	<1	<1	<1	<1	<1	1.69	<1	1.41	<1	<1	<1	<1	<1
MAR02461.006	<0.08	<0.08	<0.08	<1	<1	<1	<1	<1	1.77	<1	<1	<1	<1	<1	<1	1.49
MAR02461.007	0.1000	<0.08	0.1500	2.64	3.27	8.47	26.70	38.20	55.50	43.80	47.30	37.00	7.72	8.40	50.90	44.70
MAR02461.008	<0.08	<0.08	<0.08	<1	<1	<1	1.88	2.42	4.65	3.46	3.52	2.77	<1	<1	3.81	3.82

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code	PAH Naphthalene ug kg^{-1}	PAH Phenanthrene ug kg^{-1}	PAH Pyrene ug kg^{-1}											
MAR02461.001	<1	<1	<1											
MAR02461.002	<1	<1	1.54											
MAR02461.003	10.90	23.70	29.80											
MAR02461.004	22.30	51.90	62.00											
MAR02461.005	<1	<1	<1											
MAR02461.006	<1	<1	<1											
MAR02461.007	16.40	32.10	46.20											
MAR02461.008	1.38	2.80	3.09											

EPA Dumping at Sea Permit Application - Material Analysis Reporting Form (Version 1.0)
Sheet 3. Results

Sample ID code						
MAR02461.001						
MAR02461.002						
MAR02461.003						
MAR02461.004						
MAR02461.005						
MAR02461.006						
MAR02461.007						
MAR02461.008						