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MEMO

TO	Francesco Di Stefano, Environment Agency
FROM	Environmental Resources Management Limited
DATE	4th November 2025
REFERENCE	0792240, Application reference EPR/CP3225SW/A001
SUBJECT	Aldbrough Hydrogen Pathfinder Permit Application - RFI Response – Water Quality Assessment

Response to EA Duly Making – Water Quality Assessment

SSE Hornsea Limited (SSE) submitted a bespoke environmental permit application for the Aldbrough Hydrogen Pathfinder (AHP) facility, located at SSE's Albrough Gas Storage Site at Garton Road, East Riding of Yorkshire on 1st July 2025.

Following submission, the Environment Agency issued an information request as part of their duly making checks. Part of the request related to the **water quality assessment**. The specific requirements were listed in Point 8 of the request:

a) *Review and clarify the material balance calculation undertaken to work out the concentrations of substances in the demin plant effluent: with reference to the application document titled 'Aldbrough Hydrogen Pathfinder H1 Assessment to Water Workbook', we note that the concentrations of Stream B (columns K and L of tab '1.Sample Analysis') were calculated by multiplying the concentrations of the cavern dewatering stream* times 2.7. *We are not clear on the assumptions behind, nor on the relationship between the demin effluent concentrations and those of the dewatering brine, given that the borehole water is used as feedstock for the demineralisation plant.*

b) *If any changes arise out of this review, submit updated H1 assessment and modelling and update the application 'Supporting information document', as required.*

c) *Advise whether any chemicals used on-site (as per MSDS list requested in item 2.a.) ends up in the discharge effluent. If this is the case, update the water quality assessment to include these chemicals.*

This technical note has been prepared by ERM on behalf of SSE, to provide the information requested by the Environment Agency. In this note, Section and Table references refer to report '*Aldbrough Hydrogen Pathfinder – Supporting Information Document – Final for Issue 18.04.25'* and '*Appendix F – H1 Workbook_Water Emissions_AHP Phase 1&2 24.10.25'*.

Material balance/concentration calculations

There will be two main discharge streams from the facility:

- Stream A: Cavern dewatering, comprising abstracted water that has been used to rewater ALD1 cavern combined with water for cooling and backflushing; and
- Stream B: Process effluent (RO reject) from the demineralisation plant.

During Phase 1 (expected to occur for the first 12 months), the discharge will comprise Stream A and Stream B. During Phase 2 (expected to occur after the first 12 months), the discharge will comprise Stream B only.

The composition of both streams is based on the composition of borehole water, which has been derived from three borehole samples collected in 2019. These have been taken from the following certificates of analysis provided in **Attachment A**.

- 19-58101-1 Aldbrough.pdf (sample dated 05/09/2019)
- 19-58688-1 Aldbrough.pdf (sample dated 09/09/2019)
- 19-59888-1 SSE Aldbrough.pdf (sample dated (16/09/2019)

Concentrations in the cavern discharge (Steam A) are assumed to be the same as those in the borehole water supply i.e. Column I and J in the H1 workbook, which represent the average/maximum abstracted borehole concentrations.

Concentrations in the RO reject (Stream B) are also calculated from the borehole water supply. Based on preliminary engineering design, the RO plant will have an incoming raw water supply of 10.5 m^3/h and a reject discharge rate of 3.9 m^3/h. It is assumed that all parameters found in the raw water supply (from borehole) will be concentrated up and discharged in the reject stream, i.e. concentrated by a factor of 2.7 (= 10.5/3.9).

The discharge concentration for Phase 1 has been calculated by combining Streams A and B. The discharge during Phase 2 comprises stream B (RO reject) only.

Updated H1 assessment

The H1 assessment has been updated to clarify the basis of the calculations. There is no change to the calculated discharge concentrations or assessment. The updated H1 assessment is provided in file *'Appendix F – H1 Workbook_Water Emissions_AHP Phase 1&2 24.10.25'.*

Clarification on chemicals that may be present in the discharge

The Reverse Osmosis (RO) plant will use chemicals including antiscalants and sodium bisulphite to protect membranes and improve efficiency of the system. The chemicals will be used in low concentrations and are designed to be consumed or neutralised during the treatment process. Two of the substances proposed to be used are considered to be hazardous to the environment (based on their SDSs): Sodium Hypochlorite and Carbohydrazine, Sodium Hypochlorite, when used correctly, breaks down into salt (sodium chloride), water and oxygen. Note that Sodium Hypochlorite is the main component of household bleach. Carbohydrazine (commonly used in water treatment) acts as an oxygen scavenger, reacting with dissolved oxygen to form nitrogen, carbon dioxide and water. When dosed correctly, residual chemicals are expected to be negligible and have therefore not been considered any further in the water emissions risk assessment.

Other chemicals used during Cleaning in Place will not feed into the RO reject stream as this effluent will be collected and disposed of offsite via a third party.

At present, it is unlikely that any chemical additives such as biocides will be added to the borehole water during cavern rewatering, and no additional chemicals are anticipated to be present in the discharge stream during Phase 1. UV treatment of the borehole water for cavern rewatering is proposed, as an alternative to biocides, to minimise bacterial activity in the cavern. Biocides are only expected to be injected between the cemented well casing and cavern storage (within cavern annulus fluid along with KD40 and an Oxygen Scavenger) during remediation of the cavern for rewatering, and will not be coming into contact with the cavern water. Should there be any changes to the design, such as the use of additives, an updated assessment will be provided to demonstrate no significant impact on emissions to water, and this will be agreed with the Environment Agency in advance of operation.

ATTACHMENT A – BOREHOLE WATER CERTIFICATES OF ANALYSIS

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Analytical Report Number : 19-58101

Project / Site name:	Aldbrough	**Samples received on:**	05/09/2019
Your job number:		**Samples instructed on:**	05/09/2019
Your order number:	12203925	**Analysis completed by:**	12/09/2019
Report Issue Number:	1	**Report issued on:**	12/09/2019
Samples Analysed:	2 water samples		

Signed: K. Lewicka

Katarzyna Lewicka
Head of Reporting Section
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-58101

Project / Site name: Aldbrough

Your Order No: 12203925

Lab Sample Number				1308875	1308876			
Sample Reference				SPF	ABH1S			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				04/09/2019	05/09/2019			
Time Taken				1500	1230			
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.4	7.2			
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	1100	3800			
Total Cyanide	µg/l	10	ISO 17025	-	< 10			
Sulphate as SO_4	mg/l	0.045	ISO 17025	87.9	640			
Chloride	mg/l	0.15	ISO 17025	110	820			
Total Phosphate as PO_4	µg/l	62	ISO 17025	-	86			
Fluoride	µg/l	50	ISO 17025	790	-			
Ammonium as NH_4	µg/l	15	ISO 17025	910	1300			
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	-	2.61			
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	-	2.45			
Nitrate as N	mg/l	0.01	ISO 17025	0.30	0.51			
Nitrate as NO_3	mg/l	0.05	ISO 17025	1.33	2.24			
Nitrite as N	µg/l	1	ISO 17025	10	5.0			
Nitrite as NO_2	µg/l	5	ISO 17025	34	16			
Alkalinity	mgCaCO3/l	3	NONE	-	480			
Alkalinity	mgCaCO3/l	3	ISO 17025	620	500			
Total Suspended Solids	mg/l	2	ISO 17025	-	25			
Total Dissolved Solids (Gravimetric)	mg/l	4	ISO 17025	760	-			
Bromine	mg/l	0.05	NONE	-	0.27			
Hardness - Total	mgCaCO3/l	1	ISO 17025	311	-			
Bicarbonate	mgHCO3/l	10	NONE	-	< 10			
Heavy Metals / Metalloids								
Lithium (dissolved)	µg/l	1	NONE	-	22			
Iron (total)	mg/l	0.004	ISO 17025	2.2	-			
Aluminium (dissolved)	µg/l	1	ISO 17025	-	4.5			
Arsenic (dissolved)	µg/l	0.15	ISO 17025	-	1.02			
Barium (dissolved)	µg/l	0.06	ISO 17025	-	11			
Boron (dissolved)	µg/l	10	ISO 17025	-	500			
Cadmium (dissolved)	µg/l	0.02	ISO 17025	-	< 0.02			
Calcium (dissolved)	mg/l	0.012	ISO 17025	71	150			
Chromium (dissolved)	µg/l	0.2	ISO 17025	-	< 0.2			
Copper (dissolved)	µg/l	0.5	ISO 17025	9.6	8.1			
Iron (dissolved)	mg/l	0.004	ISO 17025	1.6	1.0			
Lead (dissolved)	µg/l	0.2	ISO 17025	-	0.2			
Magnesium (dissolved)	mg/l	0.005	ISO 17025	32	82			
Manganese (dissolved)	µg/l	0.05	ISO 17025	380	20			
Mercury (dissolved)	µg/l	0.05	ISO 17025	-	< 0.05			
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	-	1.4			
Nickel (dissolved)	µg/l	0.5	ISO 17025	-	0.7			
Potassium (dissolved)	mg/l	0.025	ISO 17025	7.9	32			
Selenium (dissolved)	µg/l	0.6	ISO 17025	-	10			
Sodium (dissolved)	mg/l	0.01	ISO 17025	120	550			
Strontium (dissolved)	µg/l	1	NONE	-	6900			
Tin (dissolved)	µg/l	0.2	ISO 17025	-	< 0.20			
Zinc (dissolved)	µg/l	0.5	ISO 17025	-	44			

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 19-58101

Project / Site name: Aldbrough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Water (by discreet analyser)	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	NONE
Ammonia as NH3 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Bromine in water	Bromine residuals reacts with DPD (N,N-diethyl-p-phenylenediamine) to form a pink colorwhich is proportional to the total bromine concentration. The measurement is determined colorimetrically by	Method 8016 by HACH.		W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-OES (total)	Determination of metals in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW (Al, Fe, Cu, Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025

Analytical Report Number : 19-58101

Project / Site name: Aldbrough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Total Phosphate in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by discrete analyser (colorimetry). Accredited matrices:	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-58688

Project / Site name:	Aldbrough	**Samples received on:**	09/09/2019
Your job number:		**Samples instructed on:**	09/09/2019
Your order number:		**Analysis completed by:**	13/09/2019
Report Issue Number:	1	**Report issued on:**	13/09/2019
Samples Analysed:	1 water sample		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-58688

Project / Site name: Aldbrough

Lab Sample Number				1311550				
Sample Reference				ABHC1				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				09/09/2019				
Time Taken				1000				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.2				
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	3900				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Sulphate as SO_4	µg/l	45	ISO 17025	575000				
Sulphate as SO_4	mg/l	0.045	ISO 17025	575				
Chloride	mg/l	0.15	ISO 17025	830				
Total Phosphate as PO_4	µg/l	62	ISO 17025	80				
Ammonium as NH_4	µg/l	15	ISO 17025	1200				
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	1.86				
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.00				
Nitrate as N	mg/l	0.01	ISO 17025	0.43				
Nitrate as NO_3	mg/l	0.05	ISO 17025	1.92				
Nitrite as N	µg/l	1	ISO 17025	1.1				
Nitrite as NO_2	µg/l	5	ISO 17025	< 5.0				
Alkalinity	mgCaCO3/l	3	ISO 17025	210				
Alkalinity	mgCaCO3/l	3	ISO 17025	170				
Total Suspended Solids	mg/l	2	ISO 17025	< 2.0				
Bromine	mg/l	0.05	NONE	0.31				
Bicarbonate	mgHCO3/l	10	NONE	< 10				
Heavy Metals / Metalloids								
Lithium (dissolved)	µg/l	1	NONE	22				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	95				
Aluminium (dissolved)	µg/l	1	ISO 17025	3.2				
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.70				
Barium (dissolved)	µg/l	0.06	ISO 17025	12				
Barium (dissolved)	mg/l	0.00006	ISO 17025	0.012				
Boron (dissolved)	µg/l	10	ISO 17025	510				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02				
Calcium (dissolved)	mg/l	0.012	ISO 17025	190				
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3				
Copper (dissolved)	µg/l	0.5	ISO 17025	6.4				
Iron (dissolved)	mg/l	0.004	ISO 17025	0.088				
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	95				
Manganese (dissolved)	µg/l	0.05	ISO 17025	32				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	1.1				
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.4				
Potassium (dissolved)	mg/l	0.025	ISO 17025	32				
Selenium (dissolved)	µg/l	0.6	ISO 17025	16				
Sodium (dissolved)	mg/l	0.01	ISO 17025	550				
Strontium (dissolved)	µg/l	1	NONE	8300				
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20				
Zinc (dissolved)	µg/l	0.5	ISO 17025	62				

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 19-58688

Project / Site name: Aldbrough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Water (by discreet analyser)	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Bromine in water	Bromine residuals reacts with DPD (N,N-diethyl-p-phenylenediamine) to form a pink colorwhich is proportional to the total bromine concentration. The measurement is determined colorimetrically by	Method 8016 by HACH.		W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 19-58688

Project / Site name: Aldbrough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Total Phosphate in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by discrete analyser (colorimetry). Accredited matrices:	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-59888

Project / Site name:	SSE Aldbrough	**Samples received on:**	16/09/2019
Your job number:	SSE ALDBROUGH	**Samples instructed on:**	17/09/2019
Your order number:	12203925	**Analysis completed by:**	23/09/2019
Report Issue Number:	1	**Report issued on:**	23/09/2019
Samples Analysed:	1 water sample		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-59888

Project / Site name: SSE Aldbrough

Your Order No: 12203925

Lab Sample Number				1317266				
Sample Reference				ABHC2				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				16/09/2019				
Time Taken				0830				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.4				
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	3900				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Sulphate as SO_4	µg/l	45	ISO 17025	703000				
Sulphate as SO_4	mg/l	0.045	ISO 17025	703				
Chloride	mg/l	0.15	ISO 17025	840				
Total Phosphate as PO_4	µg/l	62	ISO 17025	86				
Ammonium as NH_4	µg/l	15	ISO 17025	1400				
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	1.85				
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	2.37				
Nitrate as N	mg/l	0.01	ISO 17025	0.48				
Nitrate as NO_3	mg/l	0.05	ISO 17025	2.13				
Nitrite as N	µg/l	1	ISO 17025	4.9				
Nitrite as NO_2	µg/l	5	ISO 17025	16				
Alkalinity	mgCaCO3/l	3	ISO 17025	52				
Alkalinity	mgCaCO3/l	3	ISO 17025	53				
Total Suspended Solids	mg/l	2	ISO 17025	5.0				
Bromine	mg/l	0.05	NONE	< 0.05				
Bicarbonate	mgHCO3/l	10	NONE	< 10				
Heavy Metals / Metalloids								
Lithium (dissolved)	µg/l	1	NONE	19				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	86				
Aluminium (dissolved)	µg/l	1	ISO 17025	< 1.0				
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.54				
Barium (dissolved)	µg/l	0.06	ISO 17025	10				
Boron (dissolved)	µg/l	10	ISO 17025	520				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02				
Calcium (dissolved)	mg/l	0.012	ISO 17025	140				
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Copper (dissolved)	µg/l	0.5	ISO 17025	2.4				
Iron (dissolved)	mg/l	0.004	ISO 17025	0.022				
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2				
Magnesium (dissolved)	mg/l	0.005	ISO 17025	86				
Manganese (dissolved)	µg/l	0.05	ISO 17025	16				
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05				
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	1.2				
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.1				
Potassium (dissolved)	mg/l	0.025	ISO 17025	30				
Selenium (dissolved)	µg/l	0.6	ISO 17025	16				
Sodium (dissolved)	mg/l	0.01	ISO 17025	570				
Strontium (dissolved)	µg/l	1	NONE	10000				
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20				
Zinc (dissolved)	µg/l	0.5	ISO 17025	51				

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 19-59888

Project / Site name: SSE Aldbrough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Water (by discreet analyser)	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Bromine in water	Bromine residuals reacts with DPD (N,N-diethyl-p-phenylenediamine) to form a pink colorwhich is proportional to the total bromine concentration. The measurement is determined colorimetrically by	Method 8016 by HACH.		W	NONE
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 19-59888

Project / Site name: SSE Aldbrough

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Total Phosphate in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by discrete analyser (colorimetry). Accredited matrices:	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.