

Maanahkiainen – vuoden 2024 tulokset sedimenttinäytteenotosta

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AI	10.1.2025	Lopullinen versio, lisätty laboratoriotiedot	APL	TM	OH
Versio	Päivämäärä	Kuvaus	Laatija	Tarkastaja	Hyväksyjä
			Dokumentin otsikko: Maanahkiainen – vuoden 2024 tulokset sedimenttinäytteenotosta		
Asiakas: Ramboll ja Rajakiiri Oy					
Luode Consulting Oy yhteyshenkilö: Antti Lindfors			Dokumentin nimi: Maanahkiainen tarkkailuraportti 2024 sedimentti Luode-A1.pdf		
Työn toteuttaja: Luode Consulting Oy					

Maanahkiainen – vuoden 2024 tulokset sedimenttinäytteenotosta					
Versio	Laatija	Päivämäärä	Kuvaus	Tarkastaja	Hyväksyjä
01	Antti Lindfors	16.10.2024	Versio kommenteille	TM	OH
02	Antti Lindfors	6.11.2024	Asiakkaan kommenttien mukaan täydennetty versio	TM	OH
A	Antti Lindfors	14.11.2024	Lopullinen versio käyttöön	TM	OH
AI	Antti Lindfors	10.1.2025	Lopullinen versio käyttöön, lisätty laboratoriotodistukset liitteeksi	TM	OH

SISÄLLYSLUETTELO

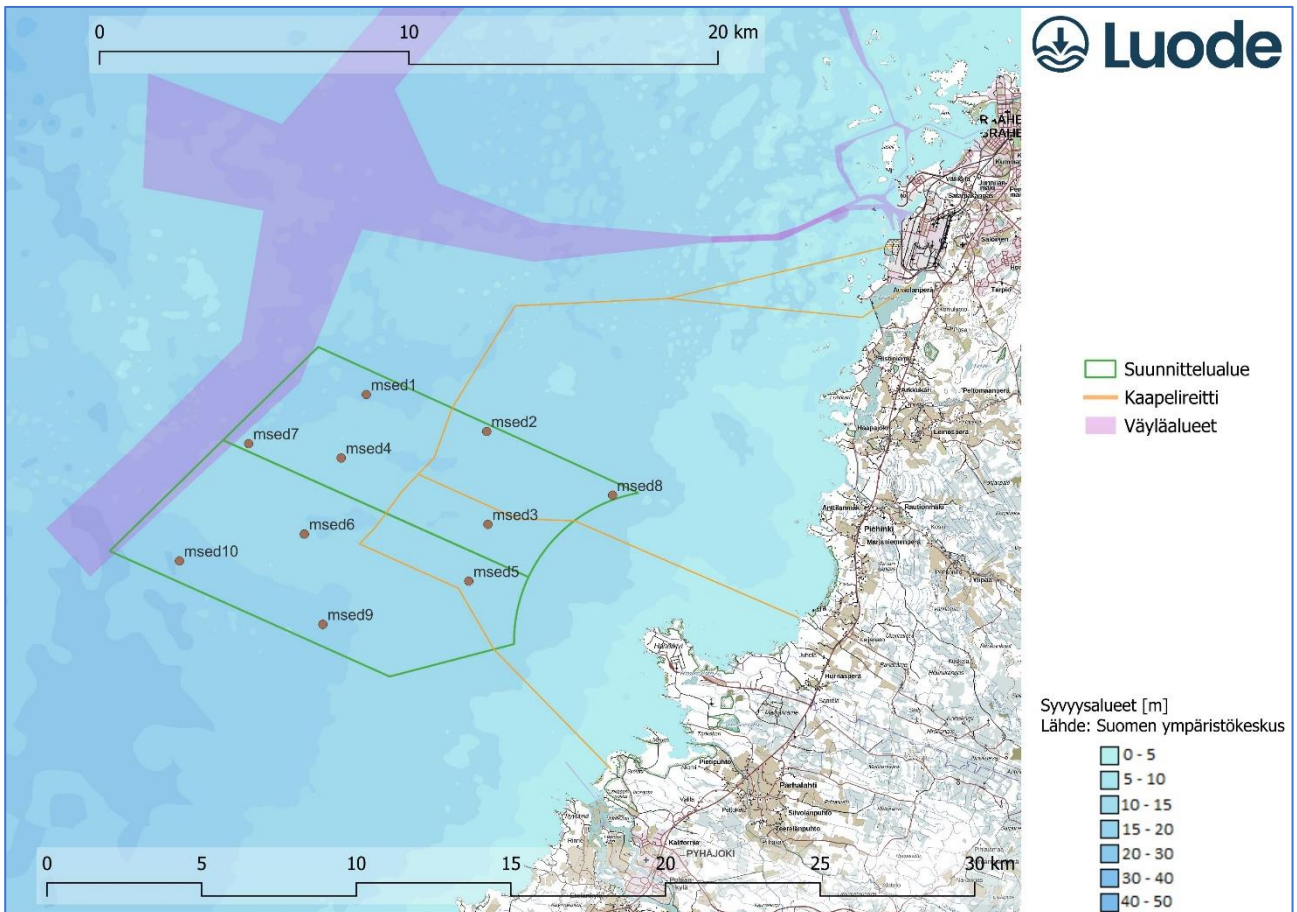
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1 Johdanto

Rajakiiri Oy suunnittelee Raahan edustan merialueelle sijoittuvaa merituulivoima-aluetta. Alueesta on tehty varaussopimus Metsähallituksen kanssa. Tässä raportissa esitetyt tulokset liittyvät hankkeen ympäristötutkimusten ja rakentamissuunnitelmien päivitykseen ja luovat taustamateriaalia hankkeen teknistä suunnittelua varten. Hankeen YVA on tehty 2009–2011 ja voimassa olevat osayleiskaavat hyväksytyt 2013. Alueen osayleiskaavat päivitetään tässä yhteydessä, koska alueelle suunniteltavien voimaloiden koko on kasvanut ja sijoittelu muuttunut. Raportissa esitetään suunnittelualan sedimenttinäytteenoton tulokset avovesikaudella 2024 kerättyjen näytteiden perusteella.

2 Alueella tehdyt toimenpiteet

Maanahkaisen tuulivoima-alueen suunnittelualueella suoritettiin elokuussa 2024 sedimenttinäytteenottoa (Kuva 1). Suunnittelualueelta otettiin sedimenttinäytteitä kaikkiaan kymmenestä paikasta. Näytteenotto kohdistettiin GTK:lta saadun pohjanlaatuaineiston perusteella suunnittelualueella oleviin pehmeisiin pohjiin (ks. Liitekartta raportin lopussa). Näytteenoton suoritti Luode Consulting Oy:n henkilöstö. Työ tehtiin kahdessa osassa siten, että alueelta otettiin erikseen erillisnäytteet pintasedimentistä, minkä lisäksi syvempien kerrosten yleistä pilaantuneisuutta selvitettiin koko suunnittelualueelta kerättyjen kokoomanäytteiden avulla. Kokoomanäytteet muodostettiin samoilta pisteiltä kerätyistä näytteistä kuin erillisnäytteet.



Kuva 1. Maanahkaisen Suunnittelualue ja vuoden 2024 sedimenttinäytepisteet.

3 Sedimenttinäytteenotto ja normalisointi

Sedimenttinäytteenoton tarkoituksena oli selvittää sedimenttien laatua, haitta-ainepitoisuuksia ja läjityskelpoisuutta tulevia vesistöitä varten. Erillisiä näytteitä pintasedimenteistä otettiin alueen sedimenttien kovuudesta johtuen Van Veen - tyyppisellä kahmarinäytteenottimella.

Kokoomanäytteet otettiin Piston corer -tyyppisellä putkinäytteenottimella, mikä pehmeissä paikoissa mahdollisesti näytteiden saannin parhaimmillaan aina 100 cm tavoitesyvyydelle saakka. Alueen pehmeämmät sedimentit löytyvät suunnittelualan itäreunalta.

Työohjelman mukaan metallipitoisuudet analysoitiin ylimmän 0-10 cm kerroksen erillisnäytteistä. Näytteistä analysoitiin metallit ja kokonaisriikki. Erillisiä näytteitä ei normalisoitu.

Muita haitta-aineita sekä sedimentin fysikaalisia ominaisuuksia analysoitiin kerroksittain kokoomanäytteestä. Kokoomanäyte muodostettiin 30 cm kerroksista ja

samaan näytteeseen yhdistettiin kaikkiaan kymmenen näytepisteen sedimentit. Analysoitavaksi toimitetut näytekерrokset olivat 0–30 cm, 30–60 cm ja 60–100 cm. Näytepisteet olivat samat kuin erillisnäytteiden pisteet. Alueen sedimentit olivat pääosin hiekkaisia, minkä johdosta yli 30 cm kerroksia saatiin kerättyä vain kolmelta paikalta. Alimman analysoitavan näytekерroksen paksuus määräytyy sedimentin pehmeiden mukaan, alle 5 cm paksuisia näytteitä ei otettu mukaan niiden huonon edustavuuden takia.

Tutkimusohjelman mukaisesti kokoomanäytteistä määritettiin seuraavat analyysit:

- savipitoisuus ja raekokojakauma aerometrisesti/seulomalla määritettynä
- kuiva-ainepitoisuus ja hehkutushäviö
- vesipitoisuus ja irtotiheys
- metallit ja kokonaisriikki (typpihappouutto)
- orgaaniset tinayhdisteet (tributyylitina ja trifenyylitina)
- PCB-yhdisteet (kongeneerit 28, 52, 101, 118, 138, 153, 180)
- PAH-yhdisteet
- öljyhiilivedyt C10–C40
- PCDD–PCDF–PCB
- kokonaisfosfori ja -typpi
- TOC

Raportin lopun liitteistä löytyvät yksityiskohtaisemmat tiedot käytetyistä menetelmistä, laboratorioista sekä tutkimustodistukset.

3.1 Aistinvaraiset havainnot

Sedimenttinäytteet analysoitiin aistinvaraisesti hajun ja värin osalta heti näytteenottohetkellä (Taulukko 1a ja 1b). Hajun perusteella voidaan arvioida pohjan happiolosuhteita hapettomissa olosuhteissa esiintyvän rikkivedyn avulla. Valokuvat näytteistä on esitetty taulukossa 2. Erillisnäytteiden pintakerros oli hapekas, mikä näkyy hyvin myös kuvissa. Osassa näytteissä esiintyi silti rikkivedyn hajua.

Taulukko 1A. Sedimenttinäyteasemien näytepaikat ja vesisyvyydet. H=harmaa, M=musta, R=ruskea, haju 0=ei hajua, 1=lievä, 2=selvä haju ja 3=voimakas haju, Hi=Hiekka, Sa=Savi

Asematunnus	Lat WGS-84 [°]	Lon WGS-84 [°]	Vedensyvyys [m]	0-10cm / pintanäyte	Väri	Haju
MSED-1	64.5993	24.0533	24	Pinta Van Veen Hi	R	0
MSED-2	64.5902	24.1358	19	Pinta Van Veen Hi/Sa	R	0
MSED-3	64.5633	24.1394	18	Pinta Van Veen Hi	R	0
MSED-4	64.5806	24.0384	17	Pinta Van Veen Hi	R	0
MSED-5	64.5467	24.1282	17	Pinta Van Veen Hi	R	0
MSED-6	64.5581	24.0160	20	0-10cm HI	R	0
MSED-7	64.5835	23.9756	21	0-10 cm Hi	R	0
MSED-8	64.5734	24.2225	15	0-10 cm Hi/Sa	R	1
MSED-9	64.5322	24.03129	24	0-10 cm Hi	R	1
MSED-10	64.5486	23.9327	31	0-10 cm HI	R	2

Taulukko 1B. Kokoomanäyteasemien näytepaikat ja vesisyvyydet. TH=tumman harmaa, H=harmaa, M=musta, R=ruskea, haju 0=ei hajua, 1=lievä, 2=selvä haju ja 3=voimakas haju, Hi=Hiekka, Sa=Savi

Asematunnus	Lat WGS-84 [°]	Lon WGS-84 [°]	Vedensyvyys [m]	0-30 cm	30-60cm	60-100cm
MSED-1	64.5993	24.0533	24	R, 0, Hi	-	-
MSED-2	64.5902	24.1358	19	R, 0, Hi	-	-
MSED-3	64.5633	24.1394	18	R/H, 0, Sa	H, 1, Sa	H, 1, Sa
MSED-4	64.5806	24.0384	17	R, 0, Hi		
MSED-5	64.5467	24.1282	17	R, 0, Hi/Sa	H, 0, Sa	H, 0, Sa
MSED-6	64.5581	24.0160	20	R, 0, Hi		
MSED-7	64.5835	23.9756	21	R, 0, Hi		
MSED-8	64.5734	24.2225	15	R, 0, Hi/Sa	H, 1, Sa	H, 1, Sa
MSED-9	64.5322	24.03129	24	R, 0, Hi		
MSED-10	64.5486	23.9327	31	R, 0, Hi/Sa		

Taulukko 2. Valokuvat näytteistä. Kuvien merkintä viittaa Taulukon 1 ja Kuvan 1 mukaisiin näytepaikkoihin.

MSED-1



MSED-2



MSED-3



MSED-4



MSED-5



MSED-6



MSED-7



MSED-8



MSED-9



MSED-10

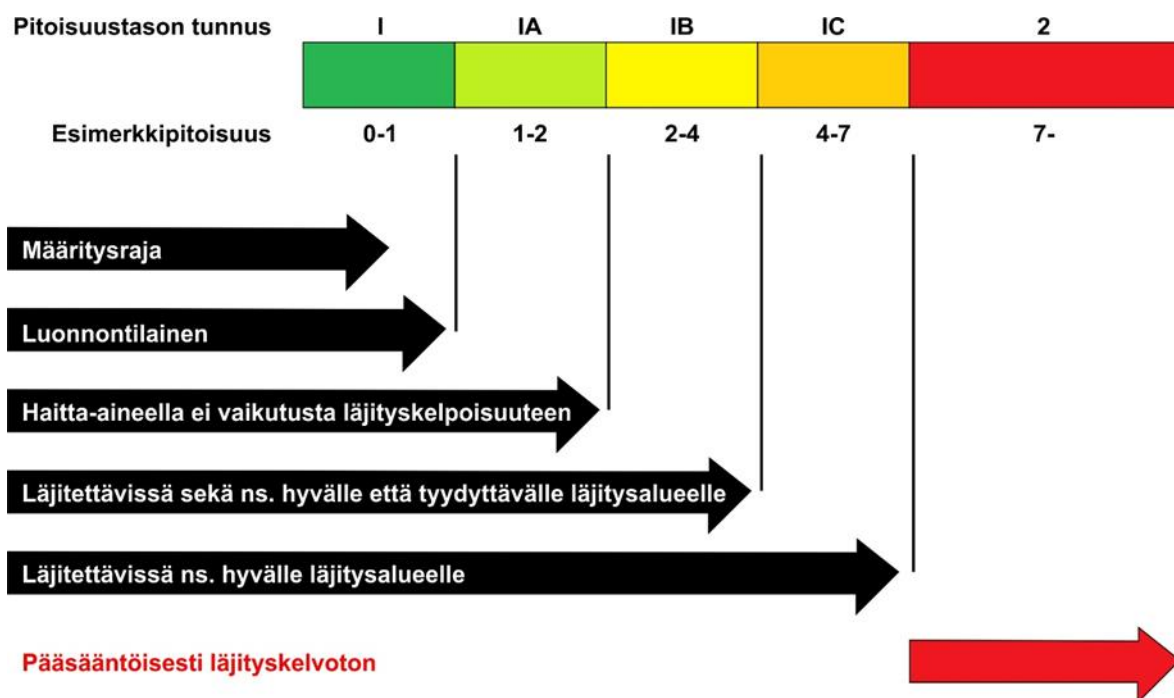


4. Tulokset ja johtopäätökset

Taulukossa 3. on esitetty erillisnäytteistä analysoidut laboratoriotulokset. Erillisnäytteitä ei tutkimusohjelman mukaisesti normalisoitu vaan niistä määritettiin vain metalli- ja rikkipitoisuudet.

Kokoomanäytteiden normalisoidut pitoisuudet on esitetty liitetaulukoissa raportin lopussa. Normalisoinnilla tarkoitetaan analyysituloksien muuttamista standardi savi- ja orgaanisen aineen pitoisuuksiin, jolloin haitta-ainepitoisuuksia voidaan verrata annettuihin raja-arvoihin.

Haitalliset aineet ovat sitoutuneet saveen ja orgaaniseen ainekseen, jolloin sen normalisoinnilla varmistetaan näytteiden vertailukelpoisuus. Normalisointi on rutiinitoimenpide ruoppaus- ja läjitysmassojen analysoinnissa. Sedimenttinäytteiden tulokset luokiteltiin Sedimenttien ruoppaus- ja läjitysohjeen (YM, 2015) mukaisesti viiteen luokkaan (Kuva).



Kuva 2. Sedimenttien haitta-aineille annettujen ohjeellisten pitoisuustasojen merkitys meriläjityskelpoisuuden arvioinnissa. Ruoppaus- ja läjitysohjeen mukaisesti (YM 2015).

Taulukko 3. Erillisnäytteiden normalisoimattomat tulokset.

	Yksikkö	MSED-1	MSED-2	MSED-3	MSED-4	MSED-5	MSED-6	MSED-7	MSED-8	MSED-9	MSED-10
Kuiva-ainepitoisuus @ 105°C	%	72	85	53.2	73.6	77.3	71.2	76.8	70.8	71.7	60.5
Antimoni	mg/kg k.a.	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Arseeni	mg/kg k.a.	7.2	3.55	7.08	0.81	2.26	2.56	2.11	2.79	3.29	11
Barium	mg/kg k.a.	10.1	9.65	82.2	5.62	6.67	8.55	7.4	32.1	25.1	20.2
Beryllium	mg/kg k.a.	0.087	0.095	0.372	0.044	0.061	0.079	0.044	0.152	0.116	0.185
Kadmium	mg/kg k.a.	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Kromi	mg/kg k.a.	4.39	15.2	23.2	3.49	3.9	6.88	2.5	11.9	17.3	10.4
Koboltti	mg/kg k.a.	2.16	3.38	6.6	0.98	1	1.72	1.26	3.02	3.69	3.85
Kupari	mg/kg k.a.	1.66	3.94	14.1	0.76	2.08	1.66	1.42	5.17	10.6	5.24
Rauta	mg/kg k.a.	4640	6460	16900	2790	2530	3870	2510	9290	7780	9780
Lyijy	mg/kg k.a.	2	1.6	5.2	1.1	1.5	1.1	<1.0	2.3	2	3.9
Litium	mg/kg k.a.	2.9	5.5	21.9	1.9	2.5	4.3	2.7	7.8	11	7
Mangaani	mg/kg k.a.	90.2	81.8	301	69.6	30	77.9	85.9	155	115	139
Elohopea	mg/kg k.a.	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
Molybdeeni	mg/kg k.a.	<0.40	<0.40	7.53	<0.40	<0.40	<0.40	<0.40	1.95	<0.40	<0.40
Nikkeli	mg/kg k.a.	<5.0	11.5	14.9	<5.0	<5.0	<5.0	<5.0	7.5	10.7	6.3
Fosfori	mg/kg k.a.	230	238	444	261	336	142	127	346	349	590
Hopea	mg/kg k.a.	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	mg/kg k.a.	5.21	4.22	17.1	4.29	3.99	3.56	2.39	8.64	6.88	11.6
Tallium	mg/kg k.a.	<0.50	<0.50	0.73	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tina	mg/kg k.a.	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadiini	mg/kg k.a.	5.66	7.42	26.2	5.1	4.19	4.52	3.38	12.8	12.9	12.3
Sinkki	mg/kg k.a.	15.3	17.3	41.6	6.3	9	10.3	6.4	21.7	19.8	26.9
Rikki	mg/kg k.a.	39	39	4800	<30	39	45	<30	4040	145	185

Kokoomanäytteiden perusteella alueella esiintyy ruoppaus- ja läjitysohjeessa esitettyjen raja-arvojen ylittäviä pitoisuuksia ainoastaan ylimmän 0–30 cm kerroksen dioksiini ja furaanipitoisuuksissa. Kohonneita dioksiini- ja furaanipitoisuuksia esiintyy yleisesti koko Perämeren alueella. Pitoisuudet olivat tasolla 1B, mikä mahdollistaa massojen läjityksen mereen.

Muuten kaikki analysoidut pitoisuudet jäivät tasolle 1 tai 1A. 60–100 cm kokoomanäytteen normalisoitu kuparipitoisuus oli 37 mg/kg kiintoainetta ja ylitti siten juuri pitoisuustason 1A (raja-arvo 35 mg/kg), mutta ohjeen mukaisesti kyseisellä pitoisuudella ei ole vaikutuksia läjityskelpoisuuteen.

Irtotiheyden perusteella massat eivät ole myöskään eroosioherkkiä, minkä puolesta ne voidaan läjittää mereen. Liitteessä 3 on esitetty kokoomanäytteistä määritetyt raekokojakaumat.

Liite 1. Taulukko 4. Kokoomanäytteiden normalisoidut tulokset.

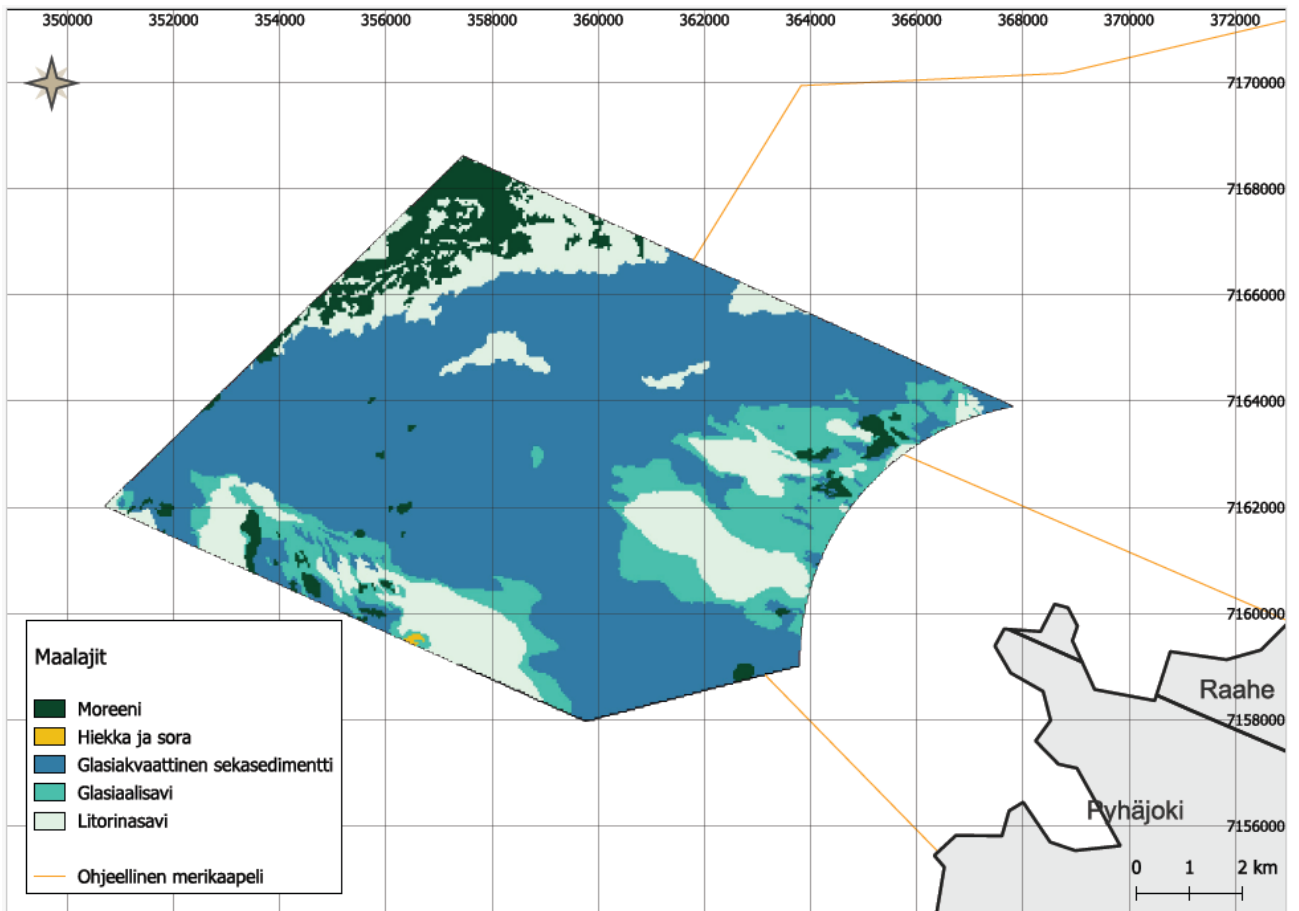
NORMALISOIDUT PITOISUUDET		pitoisuustaso 1	pitoisuustaso 1A	pitoisuustaso 1B	pitoisuustaso 1C	pitoisuustaso 2	MSED-TOT	MSED-TOT	MHSED-TOT	
							0-30 cm	30-60 cm	60-100 cm	
APUPARAMETRIT		EI NORMALISOITU								
Kuiva-ainepitoisuus	(%)						69	49	51	
Kokonaistyyppi (N TOT)	(mg/kg k.a.)						1300	1700	1100	
Fosfori (P)	(mg/kg k.a.)						340	700	690	
Savipitoisuus	(% k.a.)						0.77	29	29	
Kuiva-aineen orgaaninen osuus	(% k.a.)						1.9	7	5.1	
DOC	% k.a.						0.65	2.6	1.54	
irtotiheys (märkätiheys)	t/m ³						1.7	1.4	1.4	
Rikki	mg/kg k.a.						1960	8740	8930	
METALLIT JA PUOLIMETALLIT										
Arseeni (As)	(mg/kg k.a.)	<15	15-50	50-70		>70	7	6.7	6.4	
Lyijy (Pb)	(mg/kg k.a.)	<40	40-80	80-100	100-200	>200	4.5	10	11	
Kromi (Cr)	(mg/kg k.a.)	<65	65-270			>270	24	44	42	
Nikkeli (Ni)	(mg/kg k.a.)	<45	45-50	50-60		>60	25	24	26	
Elohopea (Hg)	(mg/kg k.a.)	<0.1	0.1-0.6	0.6-0.8	0.8-1	>1	m.r.	m.r.	m.r.	
Kadmium (Cd)	(mg/kg k.a.)	<0.5	0.5-2.5			>2.5	m.r.	m.r.	0.18	
Kupari (Cu)	(mg/kg k.a.)	<35	35-50	50-70	70-90	>90	13	29	37	
Sinkki (Zn)	(mg/kg k.a.)	<170	170-360	360-500		>500	52	73	74	
ORGANOTINAYHDISTEET										
Tributyyylitina	(µg/kg k.a.)	<5	5-30	30-100	100-150	>150	m.r.	m.r.	m.r.	
Trifenyyylitina	(µg/kg k.a.)	<2	2-10	10-20	20-30	>30	m.r.	m.r.	m.r.	
PCB										
PCB 28	(µg/kg k.a.)	<2	2-4	4-10	10-30	>30	m.r.	m.r.	m.r.	
PCB 52	(µg/kg k.a.)	<2	2-4	4-10	10-30	>30	m.r.	m.r.	m.r.	
PCB 101	(µg/kg k.a.)	<2	2-4	4-10	10-30	>30	m.r.	m.r.	m.r.	
PCB 118	(µg/kg k.a.)	<2	2-4	4-10	10-30	>30	m.r.	m.r.	m.r.	
PCB 138	(µg/kg k.a.)	<2	2-4	4-10	10-30	>30	m.r.	m.r.	m.r.	
PCB 153	(µg/kg k.a.)	<2	2-4	4-10	10-30	>30	m.r.	m.r.	m.r.	
PCB 180	(µg/kg k.a.)	<2	2-4	4-10	10-30	>30	m.r.	m.r.	m.r.	
PAH -yhdisteet										
Naftaleeni	(µg/kg k.a.)	<20	20-250	250-2500		>2500	m.r.	m.r.	m.r.	
Fenantreeni	(µg/kg k.a.)	<20	20-500	500-5000		>5000	m.r.	m.r.	m.r.	
Antraseeni	(µg/kg k.a.)	<20	20-500			>500	m.r.	m.r.	m.r.	
Fluoranteeni	(µg/kg k.a.)	<20	20-200	200-2000		>2000	m.r.	m.r.	m.r.	
Pyreeni	(µg/kg k.a.)	<20	20-280	280-2800		>2800	m.r.	m.r.	m.r.	
Bentso(a)antraseeni	(µg/kg k.a.)	<20	20-100	100-1000		>1000	m.r.	m.r.	m.r.	
Kryseeni	(µg/kg k.a.)	<20	20-300	300-3000		>3000	m.r.	m.r.	m.r.	
Bentso(b+k)fluoranteeni	(µg/kg k.a.)	<20	20-250	250-2500		>2500	m.r.	m.r.	m.r.	
Bentso(a)pyreeni	(µg/kg k.a.)	<20	20-450	450-4500		>4500	m.r.	m.r.	m.r.	
Indeno(1,2,3-cd)pyreeni	(µg/kg k.a.)	<20	20-100	100-1000		>1000	m.r.	m.r.	m.r.	
Bentso(ghi)peryleeni	(µg/kg k.a.)	<20	20-100	100-1000		>1000	m.r.	m.r.	m.r.	
ÖLJYHIILIVEDYT										
C10-C40	(mg/kg k.a.)	<100	100-300	300-1500		>1500	m.r.	m.r.	m.r.	
DIOKSINIT JA FURAAINIT										
PCDD/F ylä	(ng/kg k.a.)	<5	5-10	10-30	30-60	>60	20	5.7	7.9	

k.a. = kiintoaine

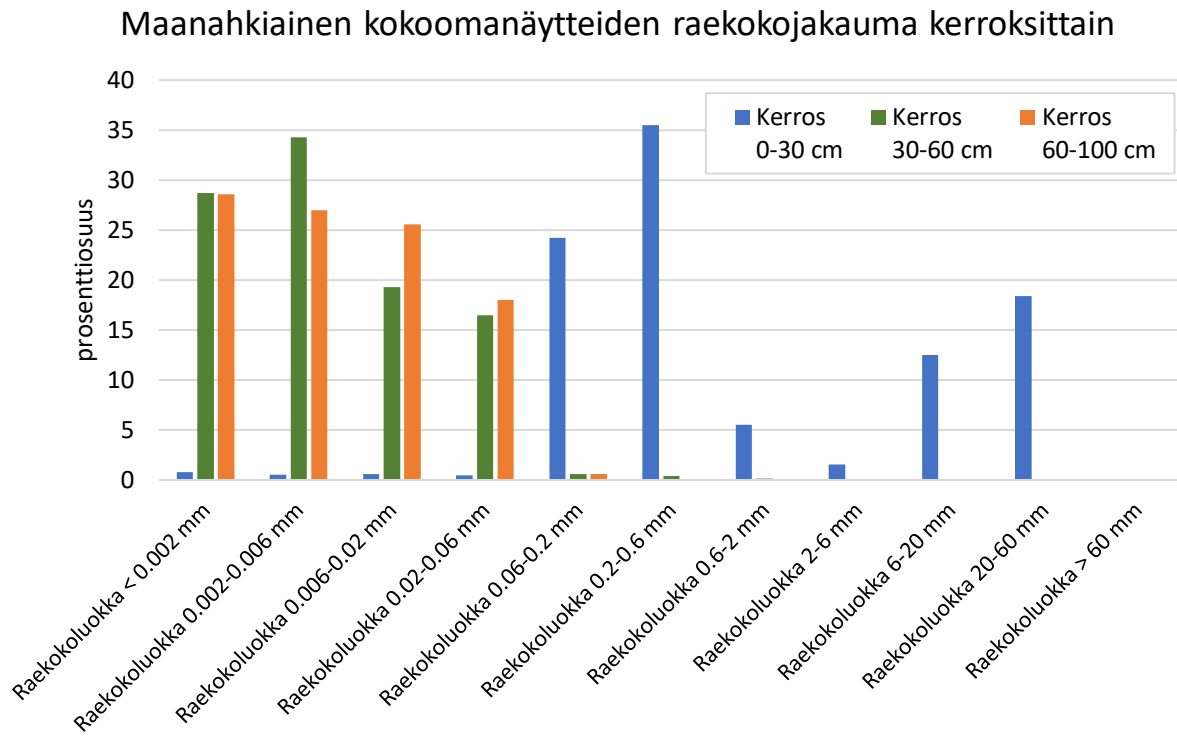
e.m. = ei määritetty

m.r. = alle määrittämissrajat

Liite 2. GTK toimittamasta aineistosta laadittu maalajikartta (Kuva Ramboll).



Liite 3. Raekokojakaumat.



Seuraavilla sivuilla on esitetty laboratoriotodistukset, käytetyt laboratoriot sekä menetelmätiedot.

Test report ID 15854 v.2

Customer Antti Lindfors
Luode Consulting Oy
Sandfallintie 85, 21600 Parainen, Suomi

Assignment Measurlabs provided sediment analyses as requested by the customer. Analyses were performed by an ISO/IEC 17025 accredited external service provider. Methods that were used are accredited on sediment, excluding bulk density.

Laboratory Organotin compounds:
Accreditation number: 2030
Accreditation body: SWEDAC

Other analyses:
Accreditation number: 1163
Accreditation body: CAI

Samples Sampling was performed by the customer on 29/08/2024 (dd/mm/yyyy)

Sample name	Depth			Matrix
MSED-1				Sediment
MSED-2				Sediment
MSED-3				Sediment
MSED-4				Sediment
MSED-5				Sediment
MSED-6				Sediment
MSED-7				Sediment
MSED-8				Sediment
MSED-9				Sediment
MSED-10				Sediment
MSED TOT	0 - 30 cm	30 - 60 cm	60 - 100 cm	Sediment

Samples received 02/09/2024 (dd/mm/yyyy)

Results The results presented on the next page(s) relate to the tested samples only.

Attachment(s) Results ID 15854 - MSED 1-10, MSED TOT (pages 1 - 4)

The original test report

Summary of the results 2024

Reporting

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This test report ID 15854 v.2 replaces the test report ID 15854 submitted earlier. The original test report has been attached to the test report.

On Friday, 10 January 2025, issued by

Meeri Rantanen

Meeri Rantanen
Project Manager

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Measurlabs

Teollisuuskatu 33
00510 Helsinki
Finland



Results begin from the next page

Project: ID 15854 Luode Consulting Oy

Sample Matrix: Sediment

Sampling Date: 29.08.2024

Samples Received: 02.09.2024

External ISO/IEC 17025 accredited laboratory	Method	Unit	MSED-1	MSED-2	MSED-3	MSED-4	MSED-5	MSED-6	MSED-7	MSED-8	MSED-9	MSED-10	MSED-TOT 0-30 cm	MSED-TOT 30-60 cm	MHSED-TOT 60-100 cm
Dry matter @ 105°C (organotins)	Gravimetric / CSN ISO 11465, CSN	%											68.5	49	51.3
Dry matter @ 105°C	EN 12880, CSN EN 14346: 2007, CSN 46 5735 & SS-EN 15934:2012 ed 1. (accredited)	%	72	85	53.2	73.6	77.3	71.2	76.8	70.8	71.7	60.5	66.1	45.6	51.5
Moisture		%											33.9	54.4	48.5
Bulk Density (Wet Density)	Håkanson, L. & M. Jansson, 1983. Principles of Lake Sedimentology. Springer-Verlag. 313 p. (non accredited)	t/m³											1.66	1.35	1.43
Total Nitrogen	Spectrophotometric / CSN ISO 11261 (accredited)	mg/kg DW											1340	1720	1100
PCB 28	GC-MS / US EPA Method 429, US EPA Method 1668, US EPA Method 3550 (accredited)	mg/kg DW											<0.00010	<0.00010	<0.00010
PCB 52		mg/kg DW											<0.00010	<0.00010	<0.00010
PCB 101		mg/kg DW											<0.00010	<0.00017	<0.00010
PCB 118		mg/kg DW											<0.00010	<0.00010	<0.00010
PCB 138		mg/kg DW											<0.00010	<0.00010	<0.00010
PCB 153		mg/kg DW											<0.00010	<0.00010	<0.00010
PCB 180		mg/kg DW											<0.00010	<0.00010	<0.00010
Sum of 7 PCBs		mg/kg DW											<0.00070	<0.00077	<0.00070
PCB 77	HRGC -HRMS or HRGC-MS/MS / US EPA Method 1668A, CSN EN 16190 (accredited)	ng/kg DW											<110	400	260
PCB 81		ng/kg DW											<17	<18	<8.8
PCB 105		ng/kg DW											<120	430	300
PCB 114		ng/kg DW											<13	<28	<15
PCB 118		ng/kg DW											<260	<730	<370
PCB 123		ng/kg DW											<13	<12	<8
PCB 126		ng/kg DW											<20	<18	<8.4
PCB 156		ng/kg DW											<38	140	100
PCB 157		ng/kg DW											<15	24	<8.9
PCB 167		ng/kg DW											<18	<51	<30
PCB 169		ng/kg DW											<32	<37	<9.1
PCB 170		ng/kg DW											<260	1000	660
PCB 180		ng/kg DW											<380	1400	990
PCB 189		ng/kg DW											<21	87	48
TEQ (dl-PCB) - lower		ng/kg DW											0	0.06	0.039
TEQ (dl-PCB) - upper		ng/kg DW											0.91	0.97	0.98
Loss on Ignition @ 550°C	Gravimetric / CSN EN 15935, CSN EN 13039, CSN 72 0103, CSN 46 5735 (accredited)	% DW											1.93	6.97	5.08
Fraction < 0.002 mm	Suspension density and sieve analysis /	%											0.772	28.7	28.6
Fraction > 60 mm	CSN EN ISO 17892-4; CSN	%											<0.010	<0.010	<0.010
Fraction 20-60 mm	EN 933-1; CSN EN 933-2;	%											18.4	<0.010	<0.010
Fraction 6-20 mm	BS ISO 11277; pokyn TOM 23/1 (accredited)	%											12.5	<0.010	<0.010

Project: ID 15854 Luode Consulting Oy

Sample Matrix: Sediment

Sampling Date: 29.08.2024

Samples Received: 02.09.2024

External ISO/IEC 17025 accredited laboratory	Method	Unit	MSED-1	MSED-2	MSED-3	MSED-4	MSED-5	MSED-6	MSED-7	MSED-8	MSED-9	MSED-10	MSED-TOT 0-30 cm	MSED-TOT 30-60 cm	MHSED-TOT 60-100 cm
Fraction 2-6 mm		%											1.55	<0.010	<0.010
Fraction 0.6-2 mm		%											5.5	0.114	<0.010
Fraction 0.2-0.6 mm		%											35.5	0.41	0.086
Fraction 0.06-0.2 mm		%											24.2	0.615	0.579
Fraction 0.02-0.06 mm		%											0.461	16.5	18
Fraction 0.006-0.02 mm		%											0.58	19.3	25.6
Fraction 0.002-0.006 mm		%											0.504	34.3	27
Total Organic Carbon	IR / CSN ISO 10694, CSN EN 13137:2002, CSN EN 15936 (accredited)	% DW											0.65	2.6	1.54
Antimony	Total metals	mg/kg DW	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	ICP-AES /	mg/kg DW	7.2	3.55	7.08	0.81	2.26	2.56	2.11	2.79	3.29	11	3.89	6.74	6.32
Barium	US EPA Method 200.7, CSN EN ISO 11885, US EPA Method 6010, SM 3120 (accredited)	mg/kg DW	10.1	9.65	82.2	5.62	6.67	8.55	7.4	32.1	25.1	20.2	29.7	125	136
Beryllium		mg/kg DW	0.087	0.095	0.372	0.044	0.061	0.079	0.044	0.152	0.116	0.185	0.173	0.798	0.774
Cadmium		mg/kg DW	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16
Chromium	Mercury: Fluorescence spectrometer / CSN EN ISO 17852, ISO 16772:2004 (accredited)	mg/kg DW	4.39	15.2	23.2	3.49	3.9	6.88	2.5	11.9	17.3	10.4	12.5	47.4	44.6
Cobalt		mg/kg DW	2.16	3.38	6.6	0.98	1	1.72	1.26	3.02	3.69	3.85	3.28	11.2	13.6
Copper		mg/kg DW	1.66	3.94	14.1	0.76	2.08	1.66	1.42	5.17	10.6	5.24	5.84	29.7	36.4
Iron		mg/kg DW	4640	6460	16900	2790	2530	3870	2510	9290	7780	9780	8340	33500	35800
Lead		mg/kg DW	2	1.6	5.2	1.1	1.5	1.1	<1.0	2.3	2	3.9	2.8	10.4	10.7
Lithium		mg/kg DW	2.9	5.5	21.9	1.9	2.5	4.3	2.7	7.8	11	7	9.6	55.2	52.3
Manganese		mg/kg DW	90.2	81.8	301	69.6	30	77.9	85.9	155	115	139	160	430	492
Mercury		mg/kg DW	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010
Molybdenum		mg/kg DW	<0.40	<0.40	7.53	<0.40	<0.40	<0.40	<0.40	1.95	<0.40	<0.40	1.03	1.32	2.07
Nickel		mg/kg DW	<5.0	11.5	14.9	<5.0	<5.0	<5.0	<5.0	7.5	10.7	6.3	7.7	26.2	29.2
Phosphorus		mg/kg DW	230	238	444	261	336	142	127	346	349	590	337	699	689
Silver		mg/kg DW	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium		mg/kg DW	5.21	4.22	17.1	4.29	3.99	3.56	2.39	8.64	6.88	11.6	8.95	34	33.3
Thallium		mg/kg DW	<0.50	<0.50	0.73	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tin		mg/kg DW	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium		mg/kg DW	5.66	7.42	26.2	5.1	4.19	4.52	3.38	12.8	12.9	12.3	12.5	51	49.7
Zinc		mg/kg DW	15.3	17.3	41.6	6.3	9	10.3	6.4	21.7	19.8	26.9	20.7	76.8	76
Sulphur	ICP-AES / US EPA Method 200.7, CSN EN ISO 11885, US EPA Method 6010, SM 3120 (accredited)	mg/kg DW	39	39	4800	<30	39	45	<30	4040	145	185	1960	8740	8930
Naphthalene	GC-MS or GC-MS-MS / US EPA Method 8270D; US EPA Method 8082A; CSN EN 17503; ISO 18287; ISO 18475; CSN EN 17322 (accredited)	mg/kg DW											<0.010	<0.010	<0.010
Acenaphthylene		mg/kg DW											<0.010	<0.010	<0.010
Acenaphthene		mg/kg DW											<0.010	<0.010	<0.010
Fluorene		mg/kg DW											<0.010	<0.010	<0.010
Phenanthrene		mg/kg DW											<0.010	<0.010	<0.010
Anthracene		mg/kg DW											<0.0100	<0.0100	<0.0100

Project: ID 15854 Luode Consulting Oy

Sample Matrix: Sediment

Sampling Date: 29.08.2024

Samples Received: 02.09.2024

External ISO/IEC 17025 accredited laboratory	Method	Unit	MSED-1	MSED-2	MSED-3	MSED-4	MSED-5	MSED-6	MSED-7	MSED-8	MSED-9	MSED-10	MSED-TOT 0-30 cm	MSED-TOT 30-60 cm	MHSED-TOT 60-100 cm
Fluoranthene		mg/kg DW											<0.010	<0.010	<0.010
Pyrene		mg/kg DW											<0.010	<0.010	<0.010
Benzo(a)anthracene		mg/kg DW											<0.010	<0.010	<0.010
Chrysene		mg/kg DW											<0.010	<0.010	<0.010
Benzo(b)fluoranthene		mg/kg DW											<0.010	<0.010	<0.010
Benzo(k)fluoranthene		mg/kg DW											<0.010	<0.010	<0.010
Benzo(a)pyrene		mg/kg DW											<0.0100	<0.0100	<0.0100
Indeno(1.2.3.cd)pyrene		mg/kg DW											<0.010	<0.010	<0.010
Dibenz(a,h)anthracene		mg/kg DW											<0.010	<0.010	<0.010
Benzo(g,h,i)perylene		mg/kg DW											<0.010	<0.010	<0.010
Sum of 16 PAH		mg/kg DW											<0.160	<0.160	<0.160
2378-TCDD	HRGC-HRMS / US EPA Method 1613B, CSN EN 16190 (accredited)	ng/kg DW											<1	<1.5	<1.3
12378-PeCDD		ng/kg DW											<1.6	<2.2	<1.9
123478-HxCDD		ng/kg DW											<5.5	<3.9	<5.1
123678-HxCDD		ng/kg DW											<4.8	<3.7	<5.2
123789-HxCDD		ng/kg DW											<5.2	<4.1	<5.8
1234678-HpCDD		ng/kg DW											<14	<13	<31
OCDD		ng/kg DW											<75	<65	<90
2378-TCDF		ng/kg DW											<1.2	<1.3	<1.4
12378-PeCDF		ng/kg DW											<1.7	<1.9	<2
23478-PeCDF		ng/kg DW											<1.9	<2.4	<2.3
123478-HxCDF		ng/kg DW											<4.3	<4	<3.7
123678-HxCDF		ng/kg DW											<4.4	<3.8	<4
123789-HxCDF		ng/kg DW											<5.6	<6	<5
234678-HxCDF		ng/kg DW											<4.5	<4.5	<4.1
1234678-HpCDF		ng/kg DW											<32	<13	<9.4
1234789-HpCDF		ng/kg DW											<11	<10	<3.2
OCDF		ng/kg DW											<30	<57	<31
TEQ-Lowerbound		ng/kg DW											0	0	0
TEQ-Upperbound		ng/kg DW											4	4	4
C10 - C21 Fraction	GC-FID / ČSN EN 14039; ČSN EN ISO 16703; ČSN P CEN ISO/TS 16558-2; US EPA Method 8015; US EPA Method 3550 (accredited)	mg/kg DW											<10	<10	<10
C21 - C40 Fraction		mg/kg DW											<10	<10	15
C10 - C40 Fraction		mg/kg DW											<20	<20	<20

Project: ID 15854 Luode Consulting Oy

Sample Matrix: Sediment

Sampling Date: 29.08.2024

Samples Received: 02.09.2024

External ISO/IEC 17025 accredited laboratory	Method	Unit	MSED-1	MSED-2	MSED-3	MSED-4	MSED-5	MSED-6	MSED-7	MSED-8	MSED-9	MSED-10	MSED-TOT 0-30 cm	MSED-TOT 30-60 cm	MHSED-TOT 60-100 cm
	GC-ICP-MS / SS-EN	µg/kg DW											<1	<1	<1
	ISO 23161:2018 (accredited)	µg/kg DW											<1	<1	<1



This certificate replaces any previous certificate with the same number.

CERTIFICATE OF ANALYSIS

Work Order	: HL2403973	Quote number	: OF220997
Amendment	: 1		
Client	: Measur Oy	Project	: ID 15854
Contact	: Mirva Hirvi	Purchase Order	: ID 15854
Address	: Teollisuuskatu 33 00510 Helsinki Finland	Sampler	: Customer company
E-mail	: mirva.hirvi@measurlabs.com	Site	: ----
Telephone	: ----	No. of samples received	: 13
		No. of samples analysed	: 13
		Date Samples Received	: 2024-09-02 10:49
		Date Analysis Commenced	: 2024-09-03
Page	: 1 of 25	Issue Date	: 2024-09-27 15:28

General Comments

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

This certificate represents the original certificate and may not be modified or reproduced other than in full, except with the prior written approval of the issuing lab. The results apply only to the material that has been identified, received, and tested. The laboratory has no responsibility for information in this certificate that has been provided by the customer, or results that may be affected by such information. Regarding the laboratory's liability in relation to assignment, please refer to our website <http://www.alsglobal.fi>

Workorder Comments

Sample(s) HL2403973/012, method S-SMLGMS02 - LOR for particular sample(s) raised due to matrix interference.

Sample for the method S-TOC1-IR is dried at 105 °C and pulverized prior to analysis.

Korvaava analyysitodistus 1. Muutos: näytenimet korjattu asiakkaan pyynnön mukaisesti.

Attachment number 1 is an integral part of the certificate of analysis.

Signatories	Position
Jari Hautala	Country Manager

Laboratory	: ALS Finland Oy	Webpage	: www.alsglobal.fi
Address	: Ruosilankuja 3 A 00390 Helsinki Finland	E-mail	: asiakaspalvelu.hki@alsglobal.com
		Telephone	: +358 10 470 1200



Analytical Results

Sub-Matrix: **SEDIMENT**

Client sample ID

Laboratory sample ID
 Client sampling date / time

MSED-1
Sedimenti

HL2403973-001

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	72.0	± 3.63	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	7.20	± 1.44	mg/kg DW	0.50	S-METAXAC1	PR
Barium	10.1	± 2.02	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.087	± 0.017	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	4.39	± 0.88	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	2.16	± 0.43	mg/kg DW	0.10	S-METAXAC1	PR
Copper	1.66	± 0.33	mg/kg DW	0.10	S-METAXAC1	PR
Iron	4640	± 929	mg/kg DW	3.0	S-METAXAC1	PR
Lead	2.0	± 0.4	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	2.9	± 0.6	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	90.2	± 18.0	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	<5.0	----	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	230	± 46.0	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	5.21	± 1.04	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	5.66	± 1.13	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	15.3	± 3.0	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	39	± 8	mg/kg DW	30	S-METAXAC2	PR

Sub-Matrix: **SEDIMENT**

Client sample ID

 Laboratory sample ID
 Client sampling date / time

MSED-2
Sedimenti
 HL2403973-002
 2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	85.0	± 4.28	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	3.55	± 0.71	mg/kg DW	0.50	S-METAXAC1	PR
Barium	9.65	± 1.93	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.095	± 0.019	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	15.2	± 3.04	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	3.38	± 0.68	mg/kg DW	0.10	S-METAXAC1	PR
Copper	3.94	± 0.79	mg/kg DW	0.10	S-METAXAC1	PR
Iron	6460	± 1290	mg/kg DW	3.0	S-METAXAC1	PR
Lead	1.6	± 0.3	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	5.5	± 1.1	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	81.8	± 16.4	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	11.5	± 2.3	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	238	± 47.6	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	4.22	± 0.84	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	7.42	± 1.48	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	17.3	± 3.4	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	39	± 8	mg/kg DW	30	S-METAXAC2	PR

Sub-Matrix: **SEDIMENT**

Client sample ID

MSED-3**Sedimenti**

Laboratory sample ID

HL2403973-003

Client sampling date / time

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	53.2	± 2.69	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	7.08	± 1.42	mg/kg DW	0.50	S-METAXAC1	PR
Barium	82.2	± 16.4	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.372	± 0.074	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	0.13	± 0.02	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	23.2	± 4.64	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	6.60	± 1.32	mg/kg DW	0.10	S-METAXAC1	PR
Copper	14.1	± 2.82	mg/kg DW	0.10	S-METAXAC1	PR
Iron	16900	± 3380	mg/kg DW	3.0	S-METAXAC1	PR
Lead	5.2	± 1.0	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	21.9	± 4.4	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	301	± 60.2	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	7.53	± 1.51	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	14.9	± 3.0	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	444	± 88.8	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	17.1	± 3.42	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	0.73	± 0.15	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	26.2	± 5.25	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	41.6	± 8.3	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	4800	± 960	mg/kg DW	30	S-METAXAC2	PR



Page : 5 of 25
 Work Order : HL2403973 Amendment 1
 Client : Measur Oy

Sub-Matrix: **SEDIMENT**

Client sample ID

Laboratory sample ID
 Client sampling date / time

MSED-4
Sedimentti

HL2403973-004
 2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	73.6	± 3.71	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	0.81	± 0.16	mg/kg DW	0.50	S-METAXAC1	PR
Barium	5.62	± 1.12	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.044	± 0.009	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	3.49	± 0.70	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	0.98	± 0.20	mg/kg DW	0.10	S-METAXAC1	PR
Copper	0.76	± 0.15	mg/kg DW	0.10	S-METAXAC1	PR
Iron	2790	± 558	mg/kg DW	3.0	S-METAXAC1	PR
Lead	1.1	± 0.2	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	1.9	± 0.4	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	69.6	± 13.9	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	<5.0	----	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	261	± 52.2	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	4.29	± 0.86	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	5.10	± 1.02	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	6.3	± 1.3	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	<30	----	mg/kg DW	30	S-METAXAC2	PR



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 Client : Measur Oy

Sub-Matrix: **SEDIMENT**

Client sample ID

Laboratory sample ID
 Client sampling date / time

MSED-5
Sedimenti

HL2403973-005

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	77.3	± 3.89	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	2.26	± 0.45	mg/kg DW	0.50	S-METAXAC1	PR
Barium	6.67	± 1.33	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.061	± 0.012	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	3.90	± 0.78	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	1.00	± 0.20	mg/kg DW	0.10	S-METAXAC1	PR
Copper	2.08	± 0.42	mg/kg DW	0.10	S-METAXAC1	PR
Iron	2530	± 507	mg/kg DW	3.0	S-METAXAC1	PR
Lead	1.5	± 0.3	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	2.5	± 0.5	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	30.0	± 5.99	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	<5.0	----	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	336	± 67.3	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	3.99	± 0.80	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	4.19	± 0.84	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	9.0	± 1.8	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	39	± 8	mg/kg DW	30	S-METAXAC2	PR

Sub-Matrix: **SEDIMENT**

Client sample ID

 Laboratory sample ID
 Client sampling date / time
MSED-6**Sedimenti**

HL2403973-006

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	71.2	± 3.59	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	2.56	± 0.51	mg/kg DW	0.50	S-METAXAC1	PR
Barium	8.55	± 1.71	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.079	± 0.016	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	6.88	± 1.38	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	1.72	± 0.34	mg/kg DW	0.10	S-METAXAC1	PR
Copper	1.66	± 0.33	mg/kg DW	0.10	S-METAXAC1	PR
Iron	3870	± 775	mg/kg DW	3.0	S-METAXAC1	PR
Lead	1.1	± 0.2	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	4.3	± 0.9	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	77.9	± 15.6	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	<5.0	----	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	142	± 28.5	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	3.56	± 0.71	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	4.52	± 0.90	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	10.3	± 2.0	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	45	± 9	mg/kg DW	30	S-METAXAC2	PR

Sub-Matrix: **SEDIMENT**

Client sample ID

 Laboratory sample ID
 Client sampling date / time

MSED-7
Sedimenti
 HL2403973-007
 2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	76.8	± 3.87	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	2.11	± 0.42	mg/kg DW	0.50	S-METAXAC1	PR
Barium	7.40	± 1.48	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.044	± 0.009	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	2.50	± 0.50	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	1.26	± 0.25	mg/kg DW	0.10	S-METAXAC1	PR
Copper	1.42	± 0.28	mg/kg DW	0.10	S-METAXAC1	PR
Iron	2510	± 503	mg/kg DW	3.0	S-METAXAC1	PR
Lead	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	2.7	± 0.5	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	85.9	± 17.2	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	<5.0	----	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	127	± 25.5	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	2.39	± 0.48	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	3.38	± 0.68	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	6.4	± 1.3	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	<30	----	mg/kg DW	30	S-METAXAC2	PR



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Sub-Matrix: **SEDIMENT**

Client sample ID

Laboratory sample ID
 Client sampling date / time

MSED-8
Sedimenti

HL2403973-008

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	70.8	± 3.57	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	2.79	± 0.56	mg/kg DW	0.50	S-METAXAC1	PR
Barium	32.1	± 6.42	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.152	± 0.030	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	11.9	± 2.38	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	3.02	± 0.60	mg/kg DW	0.10	S-METAXAC1	PR
Copper	5.17	± 1.03	mg/kg DW	0.10	S-METAXAC1	PR
Iron	9290	± 1860	mg/kg DW	3.0	S-METAXAC1	PR
Lead	2.3	± 0.4	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	7.8	± 1.6	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	155	± 31.0	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	1.95	± 0.39	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	7.5	± 1.5	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	346	± 69.2	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	8.64	± 1.73	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	12.8	± 2.56	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	21.7	± 4.3	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	4040	± 809	mg/kg DW	30	S-METAXAC2	PR

Sub-Matrix: **SEDIMENT**

Client sample ID

MSED-9**Sedimenti**

Laboratory sample ID

HL2403973-009

Client sampling date / time

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	71.7	± 3.61	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	3.29	± 0.66	mg/kg DW	0.50	S-METAXAC1	PR
Barium	25.1	± 5.02	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.116	± 0.023	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	17.3	± 3.45	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	3.69	± 0.74	mg/kg DW	0.10	S-METAXAC1	PR
Copper	10.6	± 2.12	mg/kg DW	0.10	S-METAXAC1	PR
Iron	7780	± 1560	mg/kg DW	3.0	S-METAXAC1	PR
Lead	2.0	± 0.4	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	11.0	± 2.2	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	115	± 23.0	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	10.7	± 2.1	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	349	± 69.8	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	6.88	± 1.38	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	12.9	± 2.59	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	19.8	± 4.0	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	145	± 29	mg/kg DW	30	S-METAXAC2	PR



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Sub-Matrix: **SEDIMENT**

Client sample ID

Laboratory sample ID
 Client sampling date / time

MSED-10
Sedimenti

HL2403973-010

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	60.5	± 3.06	%	0.10	S-DRY-GRCI	PR
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	11.0	± 2.19	mg/kg DW	0.50	S-METAXAC1	PR
Barium	20.2	± 4.04	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.185	± 0.037	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	10.4	± 2.07	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	3.85	± 0.77	mg/kg DW	0.10	S-METAXAC1	PR
Copper	5.24	± 1.05	mg/kg DW	0.10	S-METAXAC1	PR
Iron	9780	± 1960	mg/kg DW	3.0	S-METAXAC1	PR
Lead	3.9	± 0.8	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	7.0	± 1.4	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	139	± 27.9	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	0.011	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	<0.40	----	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	6.3	± 1.3	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	590	± 118	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	11.6	± 2.32	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	12.3	± 2.45	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	26.9	± 5.4	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	185	± 37	mg/kg DW	30	S-METAXAC2	PR



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Sub-Matrix: **SEDIMENT**

Client sample ID

MSED-TOT 0-30 cm

Sedimenti

Laboratory sample ID

HL2403973-011

Client sampling date / time

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
OJ-19a (TBT&TPT)/LE						
Dry matter @ 105°C	68.5	± 2.00	%	1.00	TS-105	LE
S-BULKDENS/PR						
Bulk Density (Wet Density)	1.66 *	----	t/m ³	0.50	S-DENS-CC	CS
Loss on Ignition @ 550°C	1.93	± 0.12	% DW	0.10	S-LI550GR	CS
S-TOC1-IR-PREP/PR						
Dry matter @ 105°C	66.1	± 3.30	%	0.10	S-DRY-GRCI	CS
Inorganic compounds						
S-NTOT-PHO/PR						
Total Nitrogen as N	1340	± 269	mg/kg DW	50	S-NTOT-PHO	CS
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	3.89	± 0.78	mg/kg DW	0.50	S-METAXAC1	PR
Barium	29.7	± 5.94	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.173	± 0.035	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	12.5	± 2.51	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	3.28	± 0.66	mg/kg DW	0.10	S-METAXAC1	PR
Copper	5.84	± 1.17	mg/kg DW	0.10	S-METAXAC1	PR
Iron	8340	± 1670	mg/kg DW	3.0	S-METAXAC1	PR
Lead	2.8	± 0.6	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	9.6	± 1.9	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	160	± 32.0	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	1.03	± 0.20	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	7.7	± 1.5	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	337	± 67.3	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	8.95	± 1.79	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	12.5	± 2.50	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	20.7	± 4.1	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	1960	± 391	mg/kg DW	30	S-METAXAC2	PR
PCBs						
S-SMLGMS01-LY/PR						
PCB 28	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 52	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR



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Parameter	Result	MU	Unit	LOR	Method	Issuer
PCBs - Continued						
S-SMLGMS01-LY/PR						
PCB 101	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 118	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 153	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 138	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 180	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
Sum of 7 PCBs	<0.00070	----	mg/kg DW	0.00070	S-SMLGMS02	PR
Dioxines and furanes						
S-DFPCBHMS/PR						
2378-TCDD	<1	----	ng/kg DW	-	S-DFHMS03	PA
12378-PeCDD	<1.6	----	ng/kg DW	-	S-DFHMS03	PA
123478-HxCDD	<5.5	----	ng/kg DW	-	S-DFHMS03	PA
123678-HxCDD	<4.8	----	ng/kg DW	-	S-DFHMS03	PA
123789-HxCDD	<5.2	----	ng/kg DW	-	S-DFHMS03	PA
1234678-HpCDD	<14	----	ng/kg DW	-	S-DFHMS03	PA
OCDD	<75	----	ng/kg DW	-	S-DFHMS03	PA
2378-TCDF	<1.2	----	ng/kg DW	-	S-DFHMS03	PA
12378-PeCDF	<1.7	----	ng/kg DW	-	S-DFHMS03	PA
23478-PeCDF	<1.9	----	ng/kg DW	-	S-DFHMS03	PA
123478-HxCDF	<4.3	----	ng/kg DW	-	S-DFHMS03	PA
123678-HxCDF	<4.4	----	ng/kg DW	-	S-DFHMS03	PA
123789-HxCDF	<5.6	----	ng/kg DW	-	S-DFHMS03	PA
234678-HxCDF	<4.5	----	ng/kg DW	-	S-DFHMS03	PA
1234678-HpCDF	<32	----	ng/kg DW	-	S-DFHMS03	PA
1234789-HpCDF	<11	----	ng/kg DW	-	S-DFHMS03	PA
OCDF	<30	----	ng/kg DW	-	S-DFHMS03	PA
TEQ-Lowerbound	0	----	ng/kg DW	-	S-DFHMS03	PA
TEQ-Upperbound	4	----	ng/kg DW	-	S-DFHMS03	PA
Other parameters						
S-TOC1-IR-PREP/PR						
Total Organic Carbon	0.65	± 0.10	% DW	0.10	S-TOC1-IR	CS
Physical Parameters						
S-11F-DENS/PR						
Fraction < 0.002 mm	0.772	± 0.417	%	0.010	S-11F-DENS	CS
Fraction > 60 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 20-60 mm	18.4	± 4.60	%	0.010	S-11F-DENS	CS
Fraction 6-20 mm	12.5	± 3.12	%	0.010	S-11F-DENS	CS
Fraction 2-6 mm	1.55	± 0.388	%	0.010	S-11F-DENS	CS
Fraction 0.6-2 mm	5.50	± 1.38	%	0.010	S-11F-DENS	CS
Fraction 0.2-0.6 mm	35.5	± 8.88	%	0.010	S-11F-DENS	CS
Fraction 0.06-0.2 mm	24.2	± 6.06	%	0.010	S-11F-DENS	CS
Fraction 0.02-0.06 mm	0.461	± 0.143	%	0.010	S-11F-DENS	CS
Fraction 0.006-0.02 mm	0.580	± 0.180	%	0.010	S-11F-DENS	CS
Fraction 0.002-0.006 mm	0.504	± 0.156	%	0.010	S-11F-DENS	CS



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 Work Order : HL2403973 Amendment 1
 Client : Measur Oy

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters - Continued						
S-MOIST-GR/PR						
Moisture	33.9	± 1.70	%	0.10	S-DRY-GRCI	CS
Dioxin like PCB compounds						
S-DFPCBHMS/PR						
PCB 77	<110	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 81	<17	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 105	<120	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 114	<13	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 118	<260	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 123	<13	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 126	<20	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 156	<38	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 157	<15	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 167	<18	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 169	<32	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 170	<260	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 180	<380	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 189	<21	----	ng/kg DW	-	S-PCBHMS02	PA
TEQ (dl-PCB) - lower	0	----	ng/kg DW	-	S-PCBHMS02	PA
TEQ (dl-PCB) - upper	0.91	----	ng/kg DW	-	S-PCBHMS02	PA
PCB indicators						
S-DFPCBHMS/PR						
PCB 28	<82	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 52	<63	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 101	<96	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 118	<260	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 138	<210	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 153	<170	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 180	<380	----	ng/kg DW	-	S-PCBHMS04	PA
Total Polychlorinated biphenyls - 7 congeners - lower	0	----	ng/kg DW	-	S-PCBHMS04	PA
Total Polychlorinated biphenyls - 7 congeners - upper	1300	----	ng/kg DW	-	S-PCBHMS04	PA
Polycyclic Aromatics Hydrocarbons (PAHs)						
S-PAHGMS05/PR						
Naphthalene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Acenaphthylene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Acenaphthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Fluorene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Phenanthrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Anthracene	<0.0100	----	mg/kg DW	0.0100	S-PAHGMS05	PR
Fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Pyrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benz(a)anthracene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Chrysene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR



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 Client : Measur Oy

Parameter	Result	MU	Unit	LOR	Method	Issuer
Polycyclic Aromatics Hydrocarbons (PAHs) - Continued						
S-PAHGMS05/PR						
Benzo(b)fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(k)fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(a)pyrene	<0.0100	----	mg/kg DW	0.0100	S-PAHGMS05	PR
Indeno(1.2.3.cd)pyrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Dibenz(a,h)anthracene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(g,h,i)perylene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Sum of 16 PAH	<0.160	----	mg/kg DW	0.160	S-PAHGMS05	PR
Petroleum Hydrocarbons						
S-TPHFID05/PR						
C10 - C21 Fraction	<10	----	mg/kg DW	10	S-TPHFID05	PR
C21 - C40 Fraction	<10	----	mg/kg DW	10	S-TPHFID05	PR
C10 - C40 Fraction	<20	----	mg/kg DW	20	S-TPHFID05	PR
Sample Preparation						
P-OTC-S/LE						
Extraction	Yes	----	-	-	S-P46	LE
Organometallic compounds						
OJ-19a (TBT&TPT)/LE						
Tributyltin	<1	----	µg/kg DW	1	S-GC-46	LE
Triphenyltin	<1	----	µg/kg DW	1	S-GC-46	LE



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 Client : Measur Oy

Sub-Matrix: **SEDIMENT**

Client sample ID

MSED-TOT 30-60 cm

Sedimenti

Laboratory sample ID

HL2403973-012

Client sampling date / time

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
OJ-19a (TBT&TPT)/LE						
Dry matter @ 105°C	49.0	± 2.00	%	1.00	TS-105	LE
S-BULKDENS/PR						
Bulk Density (Wet Density)	1.35 *	----	t/m³	0.50	S-DENS-CC	CS
Loss on Ignition @ 550°C	6.97	± 0.35	% DW	0.10	S-LI550GR	CS
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	45.6	± 2.28	%	0.10	S-DRY-GRCI	CS
Inorganic compounds						
S-NTOT-PHO/PR						
Total Nitrogen as N	1720	± 346	mg/kg DW	50	S-NTOT-PHO	CS
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	6.74	± 1.35	mg/kg DW	0.50	S-METAXAC1	PR
Barium	125	± 25.0	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.798	± 0.160	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	<0.10	----	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	47.4	± 9.49	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	11.2	± 2.23	mg/kg DW	0.10	S-METAXAC1	PR
Copper	29.7	± 5.94	mg/kg DW	0.10	S-METAXAC1	PR
Iron	33500	± 6710	mg/kg DW	3.0	S-METAXAC1	PR
Lead	10.4	± 2.1	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	55.2	± 11.0	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	430	± 86.0	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	1.32	± 0.26	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	26.2	± 5.2	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	699	± 140	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	34.0	± 6.81	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	51.0	± 10.2	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	76.8	± 15.4	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	8740	± 1750	mg/kg DW	30	S-METAXAC2	PR
PCBs						
S-SMLGMS01-LY/PR						
PCB 28	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 52	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR



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 Client : Measur Oy

Parameter	Result	MU	Unit	LOR	Method	Issuer
PCBs - Continued						
S-SMLGMS01-LY/PR						
PCB 101	<0.00017	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 118	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 153	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 138	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 180	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
Sum of 7 PCBs	<0.00077	----	mg/kg DW	0.00070	S-SMLGMS02	PR
Dioxines and furanes						
S-DFPCBHMS/PR						
2378-TCDD	<1.5	----	ng/kg DW	-	S-DFHMS03	PA
12378-PeCDD	<2.2	----	ng/kg DW	-	S-DFHMS03	PA
123478-HxCDD	<3.9	----	ng/kg DW	-	S-DFHMS03	PA
123678-HxCDD	<3.7	----	ng/kg DW	-	S-DFHMS03	PA
123789-HxCDD	<4.1	----	ng/kg DW	-	S-DFHMS03	PA
1234678-HpCDD	<13	----	ng/kg DW	-	S-DFHMS03	PA
OCDD	<65	----	ng/kg DW	-	S-DFHMS03	PA
2378-TCDF	<1.3	----	ng/kg DW	-	S-DFHMS03	PA
12378-PeCDF	<1.9	----	ng/kg DW	-	S-DFHMS03	PA
23478-PeCDF	<2.4	----	ng/kg DW	-	S-DFHMS03	PA
123478-HxCDF	<4	----	ng/kg DW	-	S-DFHMS03	PA
123678-HxCDF	<3.8	----	ng/kg DW	-	S-DFHMS03	PA
123789-HxCDF	<6	----	ng/kg DW	-	S-DFHMS03	PA
234678-HxCDF	<4.5	----	ng/kg DW	-	S-DFHMS03	PA
1234678-HpCDF	<13	----	ng/kg DW	-	S-DFHMS03	PA
1234789-HpCDF	<10	----	ng/kg DW	-	S-DFHMS03	PA
OCDF	<57	----	ng/kg DW	-	S-DFHMS03	PA
TEQ-Lowerbound	0	----	ng/kg DW	-	S-DFHMS03	PA
TEQ-Upperbound	4	----	ng/kg DW	-	S-DFHMS03	PA
Other parameters						
S-TOC1-IR-PREP/PR						
Total Organic Carbon	2.60	± 0.39	% DW	0.10	S-TOC1-IR	CS
Physical Parameters						
S-11F-DENS/PR						
Fraction < 0.002 mm	28.7	± 15.5	%	0.010	S-11F-DENS	CS
Fraction > 60 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 20-60 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 6-20 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 2-6 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 0.6-2 mm	0.114	± 0.028	%	0.010	S-11F-DENS	CS
Fraction 0.2-0.6 mm	0.410	± 0.102	%	0.010	S-11F-DENS	CS
Fraction 0.06-0.2 mm	0.615	± 0.154	%	0.010	S-11F-DENS	CS
Fraction 0.02-0.06 mm	16.5	± 5.13	%	0.010	S-11F-DENS	CS
Fraction 0.006-0.02 mm	19.3	± 5.98	%	0.010	S-11F-DENS	CS
Fraction 0.002-0.006 mm	34.3	± 10.6	%	0.010	S-11F-DENS	CS



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 Work Order : HL2403973 Amendment 1
 Client : Measur Oy

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters - Continued						
S-MOIST-GR/PR						
Moisture	54.4	± 2.72	%	0.10	S-DRY-GRCI	CS
Dioxin like PCB compounds						
S-DFPCBHMS/PR						
PCB 77	400	± 120	ng/kg DW	-	S-PCBHMS02	PA
PCB 81	<18	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 105	430	± 129	ng/kg DW	-	S-PCBHMS02	PA
PCB 114	<28	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 118	<730	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 123	<12	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 126	<18	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 156	140	± 42.0	ng/kg DW	-	S-PCBHMS02	PA
PCB 157	24.0	± 7.20	ng/kg DW	-	S-PCBHMS02	PA
PCB 167	<51	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 169	<37	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 170	1000	± 300	ng/kg DW	-	S-PCBHMS02	PA
PCB 180	1400	± 420	ng/kg DW	-	S-PCBHMS02	PA
PCB 189	87.0	± 26.1	ng/kg DW	-	S-PCBHMS02	PA
TEQ (dl-PCB) - lower	0.06	----	ng/kg DW	-	S-PCBHMS02	PA
TEQ (dl-PCB) - upper	0.97	----	ng/kg DW	-	S-PCBHMS02	PA
PCB indicators						
S-DFPCBHMS/PR						
PCB 28	<250	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 52	<180	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 101	<270	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 118	<730	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 138	<900	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 153	<540	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 180	1400	± 420	ng/kg DW	-	S-PCBHMS04	PA
Total Polychlorinated biphenyls - 7 congeners - lower	1400	----	ng/kg DW	-	S-PCBHMS04	PA
Total Polychlorinated biphenyls - 7 congeners - upper	4300	----	ng/kg DW	-	S-PCBHMS04	PA
Polycyclic Aromatics Hydrocarbons (PAHs)						
S-PAHGMS05/PR						
Naphthalene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Acenaphthylene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Acenaphthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Fluorene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Phenanthrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Anthracene	<0.0100	----	mg/kg DW	0.0100	S-PAHGMS05	PR
Fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Pyrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benz(a)anthracene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Chrysene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR



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 Client : Measur Oy

Parameter	Result	MU	Unit	LOR	Method	Issuer
Polycyclic Aromatics Hydrocarbons (PAHs) - Continued						
S-PAHGMS05/PR						
Benzo(b)fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(k)fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(a)pyrene	<0.0100	----	mg/kg DW	0.0100	S-PAHGMS05	PR
Indeno(1.2.3.cd)pyrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Dibenz(a.h)anthracene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(g,h,i)perylene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Sum of 16 PAH	<0.160	----	mg/kg DW	0.160	S-PAHGMS05	PR
Petroleum Hydrocarbons						
S-TPHFID05/PR						
C10 - C21 Fraction	<10	----	mg/kg DW	10	S-TPHFID05	PR
C21 - C40 Fraction	<10	----	mg/kg DW	10	S-TPHFID05	PR
C10 - C40 Fraction	<20	----	mg/kg DW	20	S-TPHFID05	PR
Sample Preparation						
P-OTC-S/LE						
Extraction	Yes	----	-	-	S-P46	LE
Organometallic compounds						
OJ-19a (TBT&TPT)/LE						
Tributyltin	<1	----	µg/kg DW	1	S-GC-46	LE
Triphenyltin	<1	----	µg/kg DW	1	S-GC-46	LE



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 Client : Measur Oy

Sub-Matrix: **SEDIMENT**

Client sample ID

MSED-TOT 60-100 cm

Sedimenti

HL2403973-013

Laboratory sample ID
 Client sampling date / time

2024-08-29 00:00

Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters						
OJ-19a (TBT&TPT)/LE						
Dry matter @ 105°C	51.3	± 2.00	%	1.00	TS-105	LE
S-BULKDENS/PR						
Bulk Density (Wet Density)	1.43 *	----	t/m³	0.50	S-DENS-CC	CS
Loss on Ignition @ 550°C	5.08	± 0.26	% DW	0.10	S-LI550GR	CS
S-METAXAC2-PREP/PR						
Dry matter @ 105°C	51.5	± 2.58	%	0.10	S-DRY-GRCI	CS
Inorganic compounds						
S-NTOT-PHO/PR						
Total Nitrogen as N	1100	± 223	mg/kg DW	50	S-NTOT-PHO	CS
Metals / Major Cations						
S-MET2/PR						
Antimony	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Arsenic	6.32	± 1.26	mg/kg DW	0.50	S-METAXAC1	PR
Barium	136	± 27.2	mg/kg DW	0.20	S-METAXAC1	PR
Beryllium	0.774	± 0.155	mg/kg DW	0.010	S-METAXAC1	PR
Cadmium	0.16	± 0.03	mg/kg DW	0.10	S-METAXAC1	PR
Chromium	44.6	± 8.92	mg/kg DW	0.25	S-METAXAC1	PR
Cobalt	13.6	± 2.72	mg/kg DW	0.10	S-METAXAC1	PR
Copper	36.4	± 7.28	mg/kg DW	0.10	S-METAXAC1	PR
Iron	35800	± 7150	mg/kg DW	3.0	S-METAXAC1	PR
Lead	10.7	± 2.1	mg/kg DW	1.0	S-METAXAC1	PR
Lithium	52.3	± 10.4	mg/kg DW	1.0	S-METAXAC1	PR
Manganese	492	± 98.5	mg/kg DW	0.50	S-METAXAC1	PR
Mercury	<0.010	----	mg/kg DW	0.010	S-HG-AFSAC	PR
Molybdenum	2.07	± 0.41	mg/kg DW	0.40	S-METAXAC1	PR
Nickel	29.2	± 5.8	mg/kg DW	5.0	S-METAXAC1	PR
Phosphorus	689	± 138	mg/kg DW	5.0	S-METAXAC1	PR
Silver	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Strontium	33.3	± 6.66	mg/kg DW	0.10	S-METAXAC1	PR
Thallium	<0.50	----	mg/kg DW	0.50	S-METAXAC1	PR
Tin	<1.0	----	mg/kg DW	1.0	S-METAXAC1	PR
Vanadium	49.7	± 9.95	mg/kg DW	0.10	S-METAXAC1	PR
Zinc	76.0	± 15.2	mg/kg DW	1.0	S-METAXAC1	PR
S-METAXAC2-PREP/PR						
Sulphur	8930	± 1790	mg/kg DW	30	S-METAXAC2	PR
PCBs						
S-SMLGMS01-LY/PR						
PCB 28	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 52	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR



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 Client : Measur Oy

Parameter	Result	MU	Unit	LOR	Method	Issuer
PCBs - Continued						
S-SMLGMS01-LY/PR						
PCB 101	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 118	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 153	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 138	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
PCB 180	<0.00010	----	mg/kg DW	0.00010	S-SMLGMS02	PR
Sum of 7 PCBs	<0.00070	----	mg/kg DW	0.00070	S-SMLGMS02	PR
Dioxines and furanes						
S-DFPCBHMS/PR						
2378-TCDD	<1.3	----	ng/kg DW	-	S-DFHMS03	PA
12378-PeCDD	<1.9	----	ng/kg DW	-	S-DFHMS03	PA
123478-HxCDD	<5.1	----	ng/kg DW	-	S-DFHMS03	PA
123678-HxCDD	<5.2	----	ng/kg DW	-	S-DFHMS03	PA
123789-HxCDD	<5.8	----	ng/kg DW	-	S-DFHMS03	PA
1234678-HpCDD	<31	----	ng/kg DW	-	S-DFHMS03	PA
OCDD	<90	----	ng/kg DW	-	S-DFHMS03	PA
2378-TCDF	<1.4	----	ng/kg DW	-	S-DFHMS03	PA
12378-PeCDF	<2	----	ng/kg DW	-	S-DFHMS03	PA
23478-PeCDF	<2.3	----	ng/kg DW	-	S-DFHMS03	PA
123478-HxCDF	<3.7	----	ng/kg DW	-	S-DFHMS03	PA
123678-HxCDF	<4	----	ng/kg DW	-	S-DFHMS03	PA
123789-HxCDF	<5	----	ng/kg DW	-	S-DFHMS03	PA
234678-HxCDF	<4.1	----	ng/kg DW	-	S-DFHMS03	PA
1234678-HpCDF	<9.4	----	ng/kg DW	-	S-DFHMS03	PA
1234789-HpCDF	<3.2	----	ng/kg DW	-	S-DFHMS03	PA
OCDF	<31	----	ng/kg DW	-	S-DFHMS03	PA
TEQ-Lowerbound	0	----	ng/kg DW	-	S-DFHMS03	PA
TEQ-Upperbound	4	----	ng/kg DW	-	S-DFHMS03	PA
Other parameters						
S-TOC1-IR-PREP/PR						
Total Organic Carbon	1.54	± 0.23	% DW	0.10	S-TOC1-IR	CS
Physical Parameters						
S-11F-DENS/PR						
Fraction < 0.002 mm	28.6	± 15.5	%	0.010	S-11F-DENS	CS
Fraction > 60 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 20-60 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 6-20 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 2-6 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 0.6-2 mm	<0.010	----	%	0.010	S-11F-DENS	CS
Fraction 0.2-0.6 mm	0.086	± 0.021	%	0.010	S-11F-DENS	CS
Fraction 0.06-0.2 mm	0.579	± 0.145	%	0.010	S-11F-DENS	CS
Fraction 0.02-0.06 mm	18.0	± 5.58	%	0.010	S-11F-DENS	CS
Fraction 0.006-0.02 mm	25.6	± 7.95	%	0.010	S-11F-DENS	CS
Fraction 0.002-0.006 mm	27.0	± 8.38	%	0.010	S-11F-DENS	CS



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Parameter	Result	MU	Unit	LOR	Method	Issuer
Physical Parameters - Continued						
S-MOIST-GR/PR						
Moisture	48.5	± 2.42	%	0.10	S-DRY-GRCI	CS
Dioxin like PCB compounds						
S-DFPCBHMS/PR						
PCB 77	260	± 78.0	ng/kg DW	-	S-PCBHMS02	PA
PCB 81	<8.8	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 105	300	± 90.0	ng/kg DW	-	S-PCBHMS02	PA
PCB 114	<15	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 118	<370	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 123	<8	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 126	<8.4	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 156	100	± 30.0	ng/kg DW	-	S-PCBHMS02	PA
PCB 157	<8.9	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 167	<30	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 169	<9.1	----	ng/kg DW	-	S-PCBHMS02	PA
PCB 170	660	± 198	ng/kg DW	-	S-PCBHMS02	PA
PCB 180	990	± 297	ng/kg DW	-	S-PCBHMS02	PA
PCB 189	48.0	± 14.4	ng/kg DW	-	S-PCBHMS02	PA
TEQ (dl-PCB) - lower	0.039	----	ng/kg DW	-	S-PCBHMS02	PA
TEQ (dl-PCB) - upper	0.98	----	ng/kg DW	-	S-PCBHMS02	PA
PCB indicators						
S-DFPCBHMS/PR						
PCB 28	<170	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 52	<130	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 101	<170	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 118	<370	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 138	<530	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 153	<480	----	ng/kg DW	-	S-PCBHMS04	PA
PCB 180	990	± 297	ng/kg DW	-	S-PCBHMS04	PA
Total Polychlorinated biphenyls - 7 congeners - lower	990	----	ng/kg DW	-	S-PCBHMS04	PA
Total Polychlorinated biphenyls - 7 congeners - upper	2800	----	ng/kg DW	-	S-PCBHMS04	PA
Polycyclic Aromatics Hydrocarbons (PAHs)						
S-PAHGMS05/PR						
Naphthalene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Acenaphthylene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Acenaphthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Fluorene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Phenanthrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Anthracene	<0.0100	----	mg/kg DW	0.0100	S-PAHGMS05	PR
Fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Pyrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benz(a)anthracene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Chrysene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR



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Parameter	Result	MU	Unit	LOR	Method	Issuer
Polycyclic Aromatics Hydrocarbons (PAHs) - Continued						
S-PAHGMS05/PR						
Benzo(b)fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(k)fluoranthene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(a)pyrene	<0.0100	----	mg/kg DW	0.0100	S-PAHGMS05	PR
Indeno(1.2.3.cd)pyrene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Dibenz(a.h)anthracene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Benzo(g.h.i)perylene	<0.010	----	mg/kg DW	0.010	S-PAHGMS05	PR
Sum of 16 PAH	<0.160	----	mg/kg DW	0.160	S-PAHGMS05	PR
Petroleum Hydrocarbons						
S-TPHFID05/PR						
C10 - C21 Fraction	<10	----	mg/kg DW	10	S-TPHFID05	PR
C21 - C40 Fraction	15	± 4	mg/kg DW	10	S-TPHFID05	PR
C10 - C40 Fraction	<20	----	mg/kg DW	20	S-TPHFID05	PR
Sample Preparation						
P-OTC-S/LE						
Extraction	Yes	----	-	-	S-P46	LE
Organometallic compounds						
OJ-19a (TBT&TPT)/LE						
Tributyltin	<1	----	µg/kg DW	1	S-GC-46	LE
Triphenyltin	<1	----	µg/kg DW	1	S-GC-46	LE

The end of result part of the certificate of analysis



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Brief Method Summaries

Analytical Methods	Method Descriptions
S-GC-46	Determination of Organic Tin Compounds (OTC) in sludge and sediment by GC-ICP-MS according to SE-SOP-0036 (SS-EN ISO 23161:2018).
TS-105	Determination of dry weight (DW) according to SS-EN 15934:2012 ed 1.
S-11F-DENS	CZ_SOP_D06_07_120 (CSN EN ISO 17892-4; CSN EN 933-1; CSN EN 933-2; BS ISO 11277; pokyn TOM 23/1) Determination of graininess by the combined method of the suspension density, sieve analyses and calculation of permeability from measured values according to USBSC
*S-DENS-CC	Håkanson, L. & M. Jansson, 1983. Principles of Lake Sedimentology. Springer-Verlag. 313 p.
S-DRY-GRCI	CZ_SOP_D06_01_045 (CSN ISO 11465, CSN EN 12880, CSN EN 14346:2007), CZ_SOP_D06_07_046 (CSN ISO 11465, CSN EN 12880, CSN EN 14346:2007, CSN 46 5735) Determination of dry matter by gravimetry and determination of moisture by calculation from measured values.
S-LI550GR	CZ_SOP_D06_07_047.A (CSN EN 15935, CSN EN 13039, CSN 72 0103, CSN 46 5735) Determination of ash by gravimetry and calculation of loss on ignition from measured values.
S-NTOT-PHO	CZ_SOP_D06_07_102 (CSN ISO 11261) Determination of total nitrogen by modified Kjeldahl method by spectrophotometry.
S-TOC1-IR	CZ_SOP_D06_07_117 (Elementar Company methodology, CSN ISO 10694, CSN EN 13137:2002, CSN EN 15936) Determination of total carbon (TC), total organic carbon (TOC) by the combustion method with IR detection and calculation of total inorganic carbon (TIC), carbonates and organic matter from measured values.
S-DRY-GRCI	CZ_SOP_D06_01_045 (CSN ISO 11465, CSN EN 12880, CSN EN 14346:2007), CZ_SOP_D06_07_046 (CSN ISO 11465, CSN EN 12880, CSN EN 14346:2007, CSN 46 5735) Determination of dry matter by gravimetry and determination of moisture by calculation from measured values.
S-HG-AFSAC	CZ_SOP_D06_02_096 (CSN EN ISO 17852, ISO 16772:2004) - Determination of Mercury by Fluorescence Spectrometry. Sample was homogenized and mineralized by nitric acid in autoclave under high pressure and temperature prior to analysis.
S-METAXAC1	CZ_SOP_D06_02_001 (US EPA Method 200.7, CSN EN ISO 11885, US EPA Method 6010, SM 3120) - Determination of elements by atomic emission spectrometry with inductively coupled plasma and stoichiometric calculations of compounds concentration from measured values. Sample was homogenized and mineralized by nitric acid in autoclave under high pressure and temperature prior to analysis.
S-METAXAC2	CZ_SOP_D06_02_001 (US EPA Method 200.7, CSN EN ISO 11885, US EPA Method 6010, SM 3120) - Determination of elements by atomic emission spectrometry with inductively coupled plasma and stoichiometric calculations of compounds concentration from measured values. Sample was homogenized and mineralized by nitric acid in autoclave under high pressure and temperature prior to analysis.
S-PAHGMS05	CZ_SOP_D06_03_161 (US EPA Method 8270D; US EPA Method 8082A; ČSN EN 17503; ISO 18287; ISO 18475; ČSN EN 17322). Determination of semi volatile organic compounds by gas chromatography method with MS or MS/MS detection and calculation of semi volatile organic compounds sums from measured values
S-SMLGMS02	CZ_SOP_D06_03_181 (US EPA Method 429, US EPA Method 1668, US EPA Method 3550) Determination of semi volatile organic compounds by using gas chromatography method with MS detection and calculation of semi-volatile organic compounds sums from measured values
S-TPHFID05	CZ_SOP_D06_03_150 (ČSN EN 14039; ČSN EN ISO 16703; ČSN P CEN ISO/TS 16558-2; US EPA Method 8015; US EPA Method 3550) Determination of extractable substances in the range of hydrocarbons C10 – C40, their fractions by calculation from measured values using the gas chromatography method with FID detection
S-DFHMS03	CZ_SOP_D06_06_175 (US EPA Method 1613B, CSN EN 16190): Determination of tetra- to octa-chlorinated dioxins and furanes by isotope dilution method using HRGC-HRMS or HRGC-MS/MS and calculation of TEQ parameters from measured value. The samples were stored in laboratory in the darkness and under temperature <4°C. Actual LOQ are noticed in the annex.
S-PCBHMS02	CZ_SOP_D06_06_173 (US EPA Method 1668A, CSN EN 16190): Determination of polychlorinated biphenyls by isotope dilution method using HRGC-HRMS or HRGC-MS/MS and calculation of PCB sums and TEQ parameter from measured values. The samples were stored in laboratory in the darkness and under temperature <4°C. Actual LOQ are noticed in the annex.
S-PCBHMS04	CZ_SOP_D06_06_173 (US EPA Method 1668A, CSN EN 16190): Determination of polychlorinated biphenyls by isotope dilution method using HRGC-HRMS or HRGC-MS/MS and calculation of PCB sums and TEQ parameter from measured values. The samples were stored in laboratory in the darkness and under temperature <4°C. Actual LOQ are noticed in the annex.

Preparation Methods	Method Descriptions
S-P46	Prep method- OTC according to SE-SOP-0036 (SS-EN ISO 23161:2018).
*S-PPHOM.07	CZ_SOP_D06_07_P01 Preparation of solid samples for analysis (crushing, milling and pulverizing).
*S-PPHOM.03	CZ_SOP_D06_07_P01 Preparation of solid samples for analysis (crushing, milling and pulverizing).



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Preparation Methods	Method Descriptions
*S-PPHOM4	CZ_SOP_D06_07_P01 Preparation of solid samples for analysis (crushing, milling and pulverizing).
*S-PPHOM4_10	Preparation of solid samples for analysis (crushing).
*S-PPHOM0.3	CZ_SOP_D06_07_P01 Preparation of solid samples for analysis (crushing, milling and pulverizing).
*S-PPLYOF	Lyophilization of sample

Key: **LOR** = Limit of reporting represents the standard LOR for the respective parameters in each method. Note that limits of reporting may be affected if, e.g. additional dilution was required because of matrix effects, or the sample quantity was limited.

MU = Measurement Uncertainty

* = Symbol preceding any result indicates laboratory or subcontractor non-accredited test.

Measurement Uncertainty:

The uncertainty is given as extended uncertainty (according to the definition in "Guide to the Expression of Measurement", JCGM 100:2008 Corrected version 2010) calculated with a coverage factor of 2, which give level of approximately 95%. Measurement of uncertainty is reported only for detected substances with levels above the reporting limits.

The uncertainty from subcontractors is often given as extended uncertainty calculated with a coverage factor of 2. Contact the laboratory for further information.

Issuing lab

	Issuer
CS	The analysis is provided by ALS Czech Republic, s.r.o., Bendlova 1687/7 Ceska Lipa Czech Republic 470 01 Accredited by: CAI Accreditation Number: 1163, CSN EN ISO/IEC 17025:2018
LE	The analysis is provided by ALS Scandinavia AB Luleå, Aurorum 10 Luleå Sweden 977 75 Accredited by: SWEDAC Accreditation Number: 2030, ISO/IEC 17025
PA	The analysis is provided by ALS Czech Republic, s.r.o., V Raji 906 Pardubice - Zelene Predmesti Czech Republic 530 02 Accredited by: CAI Accreditation Number: 1163, CSN EN ISO/IEC 17025:2018
PR	The analysis is provided by ALS Czech Republic, s.r.o., Na Harfe 336/9 Prague 9 - Vysocany Czech Republic 190 00 Accredited by: CAI Accreditation Number: 1163, CSN EN ISO/IEC 17025:2018