

IZVEŠTAJ O ISPITIVANJU¹ br. 76033010

Beograd, 06.08.2026. godine

¹ Izveštaj se ne sme umnožavati bez odobrenja ANAHM Laboratorije. Kopija ovog izveštaja nije zvanični dokument.
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Anahem doo Beograd je odgovoran za sve podatke iskazane u izveštaju o ispitivanju osim za one dobijene od korisnika ispitivanja.
Anahem doo Beograd se odriče odgovornosti na validnost rezultata za čije iskazivanje su korišćeni podaci dobijeni od korisnika.

1 OPŠTI PODACI O OVLAŠĆENOM PRAVNOM LICU KOJE JE OBAVILO ISPITIVANJE

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2 OPŠTI PODACI O OPERATERU

Naziv: VEOLIA WASTE VINČA OPERATOR DOO
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3 PLAN, MESTO I VREME MERENJA

Cilj ispitivanja	Izrada Izveštaja o ispitivanju uzoraka dioksina/furana (PCDD/PCDF) sa sistema za kontinualno uzorkovanje proizvođača TCR TECORA.
Lokacija ispitivanja	EFW Vinča - postrojenje za energetske iskorišćenje komunalnog otpada
Parametri ispitivanja	Dioksini/furani (PCDD/PCDF)

4 ZAKONSKA REGULATIVA, PRIMENJENI STANDARDI

- Zakon o zaštiti vazduha ("Sl. glasnik RS", br. 51/2025);
- Uredba o merenjima emisija zagađujućih materija u vazduh iz stacionarnih izvora zagađivanja ("Sl. glasnik RS", br. 5/2016 i 10/2024);
- Uredba o tehničkim i tehnološkim uslovima za projektovanje, izradnju, opremanje i rad postrojenja i vrstama otpada za termički tretman otpada, granične vrednosti emisije i njihovo praćenje („Sl. glasnik RS”, br. 103/2023).

4.1 Opis postupka uzorkovanja i analize

Kontinualno merenje koncentracija navedenih parametara zagađenja podrazumeva postupak uzorkovanja sistemom za kontinualno uzorkovanje proizvođača TCR TECORA (DECS - Dioxin Emission Continuous Sampling) uz praćenje parametara stanja otpadnog gasa pomoću automatizovanog kontrolnog sistema (kontrolne jedinice). Uzorkovanje se obavlja u emiteru (dimnjaku) kotla - insineratora (postrojenja za insineraciju otpada) u skladu sa zahtevima metode EN 1948-1. Uzorci se nakon predviđenog perioda uzorkovanja dalje transportuju na analizu u laboratoriju akreditovanog inostranog ugovarača ALS, Češka.

Napomena: Izveštaj akreditovane laboratorije ALS je sastavni deo ovog Izveštaja i nalazi se u prilogu.

Postrojenje	Постројење за инсинерацију отпада
Tip	Insineracija otpada
Proizvođač	CNIM (LICENCOR)
Gorivo	Komunalni otpad

Tehnički podaci o emiteru	
Merno mesto	Emiter (dimnjak) insineratora otpada
Visina emitera	60,5 m
Prečnik emitera	2,35 m
Tip emitera	Čelični
Položaj	Vertikalni
Oblik poprečnog preseka	Kružni
GPS koordinate	N 44.77982° E 20.58761°



Slika br. 1

4.2 Opis tehnološkog procesa postrojenja za energetska iskorišćenje komunalnog otpada EfW Vinča

Tehnološki proces rada EfW postrojenja sastoji se iz više osnovnih tehnoloških celina, operacija i aktivnosti:

- Prijem, skladištenje i priprema otpada za insineraciju,
- Insineracija otpada,
- Prečišćavanje dimnog gasa,
- Tretman šljake,
- Solidifikacija letećeg pepela i čvrstog ostatka od prečišćavanja dimnog gasa,
- Iskorišćenje energije dobijene sagorevanjem otpada.

Za funkcionisanje osnovnih tehnoloških celina, EfW postrojenje je opremljeno sledećim pratećim tehnološkim celinama i sistemima:

- Pogon za proizvodnju demineralizovane vode,
- Sistem za proizvodnju komprimovanog - instrumentalnog i procesnog vazduha,
- Sistem za skladištenje i distribuciju dizel goriva,
- Sistem taložnika za reciklovanje drenažnih tokova iz procesa.

Kotlovsko postrojenje podrazumeva kotao sa pripadajućom opremom i pomoćnim sistemima i uređajima koji omogućavaju normalno funkcionisanje kotla od ulaza otpada do ispuštanja dimnih gasova i ulaza napojne vode do izlaza pregrejane pare. Kotlovsko postrojenje obuhvata:

- Sistem za sagorevanje otpada,
- Sistem za odvođenje i separaciju šljake,
- Sistem napojne kotlovske vode,
- Kotao (parni bubanj i ogrevne površine kotla - isparivači, pregrejači i ekonomajzeri),
- Sistem vazduha za sagorevanje,
- Dimni trakt kotla,

- Sistem pomoćnih, dizel gorionika, za start i zaustavljanje kotla i obezbeđivanje parametara (temperature) insineracije;
- Finalni ekonomajzer, za predgrevanje povratnog kondenzata,
- Ostalu opremu i uređaje.

Kotao je vertikalne konstrukcije sa optimizovanom rekuperacijom energije, sistemom za redukciju azotnih oksida u ložištu i Martinovom pokretnom rešetkom. Rešetka je projektovana za kontinualni rad sa DTM u opsegu od 6.000 kJ/kg do 12.000 kJ/kg i sagorevanje različitih vrsta otpada. Maksimalni kapacitet sagorevanja iznosi 49,4 t/h otpada čija je DTM između 6.000 kJ/kg i 7.500 kJ/kg (MCR+), odnosno 43,6 t/h kada se koristi otpad čija je DTM 8.500 kJ/kg (MCR). Projektna donja toplotna moć - DTM pri maksimalnom trajnom kapacitetu (MCR) iznosi 8.500 kJ/kg.

Kotao i prateća oprema su po tipu i kvalitetu prilagođeni za spaljivanje (insineraciju) komunalnog otpada ispunjavaju zahteve u pogledu protoka pare za turbinsko postrojenje, kao i ostale zahteve u pogledu pare u samom postrojenju.

Kotao je dizajniran i izrađen u skladu sa EN12952 i sa odgovarajućom CE oznakom o usaglašenosti proizvoda. Na početku tehnološkog procesa rade se doziranje otpada u postrojenje, koje se vrši usipnim kanalom koji se sastoji od usipnog levka i padnog kanala. Otpad se dozira pomoću automatizovanog klipnog dodavača direktno na rešetku ložišta (tipa „Martin“). Otpad, koji se potiskuje gravitaciono u padnoj šahti, rastresa se pomoću klipa, čime se postiže ujednačena distribucija goriva na rešetki. Ciklus doziranja otpada je povezan sa sistemom za regulaciju sagorevanja.

Aktivan i stabilan proces sagorevanja, u kome sve faze procesa primarnog sagorevanja (sušenje, gasifikacija, potpala i sagorevanje) učestvuju istovremeno i uzastopno, odvija se na prednjem delu rešetke. Nakon sagorevanja otpada, nastaje šljaka.

Kotao je vertikalna sa prirodnom cirkulacijom, jednim bubnjem i ovešenom čeličnom konstrukcijom. Sastoji se od 4 vertikalna prolaza:

- Prvi prolaz: ozračena komora za sagorevanje, vertikalni prolaz
- Drugi prolaz: vertikalni prolaz sa isparivačkim paketima
- Treći prolaz: vertikalni prolaz sa isparivačkim paketom i pregrejačima
- Četvrti prolaz: vertikalni prolaz sa paketima zagrejača vode

Iz kotlovske bubnja voda struji kroz negrejane spusne cevi i napojne cevi do donjih kolektora isparivačke sekcije i dalje delimično isparava u grejnim isparivačkim cevima (panelima i snopovima). Tako dobijena smeša voda/para struji preko usponskih cevi i vraća se do bubnja, gde se odvija proces separacije tj. odvajanja vode od pare. Na izlazu iz parnog kotla postavljen je krajnji ekonomajzer (spoljni ekonomajzer) za potrebe hlađenja dimnih gasova do 140°C pre ulaska u suvi reaktor - suvi reakcioni kanal. Za potrebe drenaže i pražnjenja kotla biće obezbeđen sistem za pražnjenje. Startni rezervoar pod pritiskom dobija alternativno paru/kondenzat iz linije duvača gara tokom zagrevanja ovih linija, i prilikom startovanja kotla koristi se za održavanje nivoa u bubnju. Drugo odvajanje se vrši u atmosferskom rezervoaru. Parna faza se šalje u atmosferu.

4.3 Opis sistema za kontinualno uzorkovanje

Sistem za kontinualno uzorkovanje proizvođača TCR TECORA (DECS - Dioxin Emission Continuous Sampling) u CEMS kontejneru postrojenja EFW - Vinča se sastoji iz 2 Tecora DECS ormana:

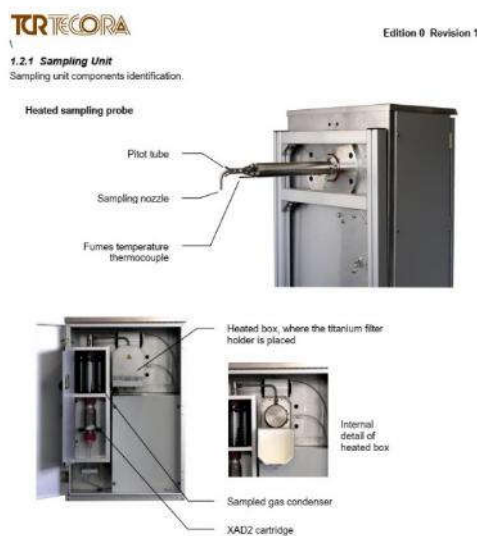
- Radni: Model - DECS, S/N - CU2040001
- Rezervni: Model - DECS, S/N - CU2040001



Slika br. 2 - Tecora DECS orman



Slika br. 3 - Izgled unutrašnjosti jednog Tecora DECS ormana



Slika br. 4 - komponente jedinice za uzorkovanje Tecora DECS sistema

1.1 Rezultati određivanja masenih koncentracija dioksina/furana (PCDD/PCDF)

Period uzorkovanja	30.01.2026. godine - 27.02.2026. godine			
Identifikaciona oznaka uzorka	Oznaka operatera: 25			
	Oznaka laboratorije ALS: PR2643357001			
	Oznaka laboratorije ANAHM: 76033010 01			
Normalizovana zapremina suvog otpadnog gasa provučena kroz sistem za uzorkovanje tokom perioda uzorkovanja i svedena na vrednost referentnog O ₂ od 11% (Nm ³) *Napomena: podatak dobijen od operatera	1590			
Parametar ispitivanja	Jedinica	Masena koncentracija		
2378-TCDD	ng/Nm ³	< 0,00001		
12378-PeCDD	ng/Nm ³	0,00002	±	30%
123478-HxCDD	ng/Nm ³	0,00005	±	30%
123678-HxCDD	ng/Nm ³	0,00013	±	30%
123789-HxCDD	ng/Nm ³	0,00009	±	30%
1234678-HpCDD	ng/Nm ³	0,00075	±	30%
OCDD	ng/Nm ³	0,00101	±	30%

Parametar ispitivanja	Jedinica	Masena koncentracija		
2378-TCDF	ng/Nm ³	0,00002	±	30%
12378-PeCDF	ng/Nm ³	0,00005	±	30%
23478-PeCDF	ng/Nm ³	0,00013	±	30%
123478-HxCDF	ng/Nm ³	0,00008	±	30%
123678-HxCDF	ng/Nm ³	0,00009	±	30%
123789-HxCDF	ng/Nm ³	0,00001	±	30%
234678-HxCDF	ng/Nm ³	0,00013	±	30%
1234678-HpCDF	ng/Nm ³	0,00026	±	30%
1234789-HpCDF	ng/Nm ³	0,00003	±	30%
OCDF	ng/Nm ³	0,00012	±	30%
TEQ-Lowerbound	ng/Nm ³	0,00014	±	30%
I-TEQ-Upperbound	ng/Nm ³	0,00015	±	30%
WHO-TEQ-Upperbound	ng/Nm ³	0,00013	±	30%

1.2 Rezultati određivanja masenih koncentracija dioksina/furana (PCDD/PCDF)

Period uzorkovanja	27.02.2026. godine - 27.03.2026. godine			
Identifikaciona oznaka uzorka	Oznaka operatera: 26			
	Oznaka laboratorije ALS: PR2643357002			
	Oznaka laboratorije ANAHEM: 76033010 02			
Normalizovana zapremina suvog otpadnog gasa provučena kroz sistem za uzorkovanje tokom perioda uzorkovanja i svedena na vrednost referentnog O ₂ od 11% (Nm ³) *Napomena: podatak dobijen od operatera	1453,3			
Parametar ispitivanja	Jedinica	Masena koncentracija		
2378-TCDD	ng/Nm ³	< 0,00001		
12378-PeCDD	ng/Nm ³	< 0,00001		
123478-HxCDD	ng/Nm ³	0,00004	±	30%
123678-HxCDD	ng/Nm ³	0,00008	±	30%
123789-HxCDD	ng/Nm ³	0,00005	±	30%
1234678-HpCDD	ng/Nm ³	0,00042	±	30%
OCDD	ng/Nm ³	0,00047	±	30%

Parametar ispitivanja	Jedinica	Masena koncentracija		
2378-TCDF	ng/Nm ³	0,00002	±	30%
12378-PeCDF	ng/Nm ³	0,00005	±	30%
23478-PeCDF	ng/Nm ³	0,00008	±	30%
123478-HxCDF	ng/Nm ³	0,00005	±	30%
123678-HxCDF	ng/Nm ³	0,00006	±	30%
123789-HxCDF	ng/Nm ³	< 0,00001		
234678-HxCDF	ng/Nm ³	0,00006	±	30%
1234678-HpCDF	ng/Nm ³	0,00010	±	30%
1234789-HpCDF	ng/Nm ³	< 0,00002		
OCDF	ng/Nm ³	0,00005	±	30%
TEQ-Lowerbound	ng/Nm ³	0,00008	±	30%
I-TEQ-Upperbound	ng/Nm ³	0,00008	±	30%
WHO-TEQ-Upperbound	ng/Nm ³	0,00008	±	30%

1.3 Upoređivanje rezultata ispitivanja sa graničnim vrednostima emisije (GVE)

<i>Period uzorkovanja</i>		30.01.2026. godine - 27.02.2026. godine			
Identifikaciona oznaka uzorka		Oznaka operatera: 25			
		Oznaka laboratorije ALS: PR2643357001			
		Oznaka laboratorije ANAHM: 76033010 01			
<i>Parametar</i>	<i>Jedinica</i>	<i>Masena koncentracija</i>			<i>Granična vrednost emisije (GVE)</i>
I-TEQ-Upperbound (PCDD/PCDF)	ng/Nm ³	0,00015	±	30%	0,06 ng/Nm ³

<i>Period uzorkovanja</i>		27.02.2026. godine - 27.03.2026. godine			
Identifikaciona oznaka uzorka		Oznaka operatera: 26			
		Oznaka laboratorije ALS: PR2643357002			
		Oznaka laboratorije ANAHM: 76033010 02			
<i>Parametar</i>	<i>Jedinica</i>	<i>Masena koncentracija</i>			<i>Granična vrednost emisije (GVE)</i>
I-TEQ-Upperbound (PCDD/PCDF)	ng/Nm ³	0,00008	±	30%	0,06 ng/Nm ³

*GVE definisane u Prilogu 2, Deo II_Postrojenja za energetska iskoriscenje netretiranog komunalnog otpada Uredbe o tehničkim i tehnološkim uslovima za projektovanje, izradnju, opremanje i rad postrojenja i vrstama otpada za termički tretman otpada, granične vrednosti emisije i njihovo praćenje („Sl. glasnik RS”, br. 103/2023).

- Rezultati merenja koncentracija izmerenih parametara ispitivanja su svedeni na suv otpadni gas i normalne uslove ($t=273,15^{\circ}\text{K}$; $p=101,3\text{ kPa}$);
- Rezultati merenja se odnose samo na navedeno postrojenje u uslovima merenja definisanim od strane naručioca ispitivanja.



Izradio:

Rukovodilac laboratorije za
ispitivanje vazduha

Aleksandar Jeremić, dipl.hem.

m.p.

Latinka Slavković Beškoski, dipl. fiz.hem.

Prilog 1: Izveštaj laboratorije ALS br. PR2643357



CERTIFICATE OF ANALYSIS

Work Order	: PR2643357	Issue Date	: 24-Apr-2026
Customer	: ANAHM DOO	Laboratory	: ALS Czech Republic, s.r.o.
Contact	: Milos Stevanovic	Contact	: Client Service
Address	: Mocartova 10 11000 Belgrade Serbia	Address	: Na Harfe 336/9 Prague 9 - Vysocany 190 00 Czech Republic
E-mail	: stevanovic.milos@anahem.org	E-mail	: customer.support@alsglobal.com
Telephone	: ----	Telephone	: +420 226 226 228
Project	: Emission, Soli, Waste, Water	Page	: 1 of 2
Order number	: ----	Date Samples	: 13-Apr-2026
		Received	
		Quote number	: PR2022ANADO-RS0001 (CZ-205-22-0768)
Site	: ----	Date of test	: 13-Apr-2026 - 24-Apr-2026
Sampled by	: customer	QC Level	: ALS CR Standard Quality Control Schedule

General Comments

This report shall not be reproduced except in full, without prior written approval from the laboratory. The laboratory is not responsible for the sample data supplied by the customer and their impact on the validity of the result. The laboratory declares that the test results relate only to the listed samples. If "ALS" is not included in the test report in the "Sampled by" section, then the results refer to the sample as received.

Responsible for accuracy

Signatories
Lubomir Pokorny

Position
Country Manager

Testing Laboratory No. 1163
Accredited by CAI according to
CSN EN ISO/IEC 17025:2018



The company is certified according to ČSN EN ISO 14001 (Environmental management systems) and ČSN ISO 45001 (Occupational health and safety management systems)

Issue Date : 24-Apr-2026
Page : 2 of 2
Work Order : PR2643357
Customer : ANAHEM DOO



Analytical Results

Sub-Matrix: **EMISSIONS**

Client sample ID

7603301001
Sampling period
is 30.01.2026 -
27.02.2026

7603301002
Sampling period
is 27.02.2026, -
27.03.2026

Laboratory sample ID

PR2643357001

PR2643357002

Client sampling date / time

[13-Apr-2026]

[13-Apr-2026]

Parameter	Method	LOR	Unit	Result	MU	Result	MU	Result	MU
PCDDs and PCDFs (Dioxins and Furans)									
2378-TCDD	A-DFHMS02	-	ng/sample	<0.005	---	<0.0038	---	---	---
12378-PeCDD	A-DFHMS02	-	ng/sample	0.0350	± 30.0%	<0.0094	---	---	---
123478-HxCDD	A-DFHMS02	-	ng/sample	0.0810	± 30.0%	0.0520	± 30.0%	---	---
123678-HxCDD	A-DFHMS02	-	ng/sample	0.210	± 30.0%	0.110	± 30.0%	---	---
123789-HxCDD	A-DFHMS02	-	ng/sample	0.140	± 30.0%	0.0680	± 30.0%	---	---
1234678-HpCDD	A-DFHMS02	-	ng/sample	1.20	± 30.0%	0.610	± 30.0%	---	---
OCDD	A-DFHMS02	-	ng/sample	1.60	± 30.0%	0.680	± 30.0%	---	---
2378-TCDF	A-DFHMS02	-	ng/sample	0.0330	± 30.0%	0.0250	± 30.0%	---	---
12378-PeCDF	A-DFHMS02	-	ng/sample	0.0730	± 30.0%	0.0690	± 30.0%	---	---
23478-PeCDF	A-DFHMS02	-	ng/sample	0.200	± 30.0%	0.110	± 30.0%	---	---
123478-HxCDF	A-DFHMS02	-	ng/sample	0.130	± 30.0%	0.0770	± 30.0%	---	---
123678-HxCDF	A-DFHMS02	-	ng/sample	0.140	± 30.0%	0.0820	± 30.0%	---	---
123789-HxCDF	A-DFHMS02	-	ng/sample	0.0200	± 30.0%	<0.018	---	---	---
234678-HpCDF	A-DFHMS02	-	ng/sample	0.210	± 30.0%	0.0910	± 30.0%	---	---
1234678-HpCDF	A-DFHMS02	-	ng/sample	0.420	± 30.0%	0.150	± 30.0%	---	---
1234789-HpCDF	A-DFHMS02	-	ng/sample	0.0510	± 30.0%	<0.023	---	---	---
OCDF	A-DFHMS02	-	ng/sample	0.190	± 30.0%	0.0790	± 30.0%	---	---
TEQ-Lowerbound	A-DFHMS02	-	ng/sample	0.23	---	0.12	---	---	---
TEQ-Upperbound	A-DFHMS02	-	ng/sample	0.24	---	0.13	---	---	---

When sampling date is not provided by the client, the laboratory determines it for procedural reasons, then it is equal to the date of receipt of the sample to the laboratory and is displayed in brackets. Measurement uncertainty is expressed as expanded measurement uncertainty with coverage factor $k = 2$, representing 95% confidence level.

Key: LOR = Limit of reporting; MU = Measurement Uncertainty. The MU does not include sampling uncertainty.

Brief Method Summaries

Analytical Methods	Method Descriptions
Location of test performance: <i>Cacke 261 Pardubice Czech Republic 530 02</i>	
A-DFHMS02	CZ_SOP_D06_06_174 (CSN FN 1948-2, CSN FN 1948-3) Determination of polychlorinated dibenzo-p-dioxins and dibenzofuranes in emission samples by isotope dilution method using HRGC-HRMS and calculation of TEQ parameters from measured values. The samples were stored in laboratory in the darkness and under temperature <4°C. Actual LOQ are noticed in the attachment.

The symbol "*" for the method indicates a test outside the scope of accreditation of the laboratory or subcontractor. If the UNICO-SUB code is stated in the method table, this only informs that the tests have been performed by a subcontractor and the results are given in an annex to the test report, including information on test accreditation. If the lab used for matrix outside the scope of accreditation or non-standard sample matrix procedure specified in the accredited method and issues non-accredited results, this fact is stated on the title page of this protocol in the section "Notes". If the test report shows the results of subcontracting, the place of performance of the test is outside the laboratories of ALS Czech Republic, s.r.o.

The method for calculating of the summation parameters is available on request in the customer service.

The end of the certificate of analysis

Attachment no. 1 to the Certificate of Analysis for work order PR2643357

Sample: 7603301001

ALS SAMPLE ID: PR2643357/ 001

Measurement results PCDD/Fs:

Sample: 7603301001					
Final extract [μl]:				60	
Injection volume [μl]:				4	
Acquisition date [d.m.y h:m]:				21/4/26 13:38	
2,3,7,8-PCDD/Fs	Result [ng/sample]	Limit of Detection [ng/sample]	Limit of Quantification [ng/sample]	I-TEFs	I-TEQ Upperbound [ng/sample]
2,3,7,8-TCDD	< 0.005	0.0015	0.005	1	0.005
1,2,3,7,8-PeCDD	0.035	0.0028	0.0092	0.5	0.017
1,2,3,4,7,8-HxCDD	0.081	0.0035	0.012	0.1	0.0081
1,2,3,6,7,8-HxCDD	0.21	0.0035	0.012	0.1	0.021
1,2,3,7,8,9-HxCDD	0.14	0.0035	0.012	0.1	0.014
1,2,3,4,6,7,8-HpCDD	1.2	0.0058	0.019	0.01	0.012
OCDD	1.6	0.011	0.036	0.001	0.0016
2,3,7,8-TCDF	0.033	0.0011	0.0035	0.1	0.0033
1,2,3,7,8-PeCDF	0.073	0.0022	0.0074	0.05	0.0037
2,3,4,7,8-PeCDF	0.2	0.0022	0.0074	0.5	0.098
1,2,3,4,7,8-HxCDF	0.13	0.002	0.0068	0.1	0.013
1,2,3,6,7,8-HxCDF	0.14	0.002	0.0068	0.1	0.014
1,2,3,7,8,9-HxCDF	0.02	0.002	0.0068	0.1	0.002
2,3,4,6,7,8-HxCDF	0.21	0.002	0.0068	0.1	0.021
1,2,3,4,6,7,8-HpCDF	0.42	0.0059	0.02	0.01	0.0042
1,2,3,4,7,8,9-HpCDF	0.051	0.0059	0.02	0.01	0.00051
OCDF	0.19	0.0081	0.027	0.001	0.00019
I-TEQ-Lowerbound					0.23
I-TEQ-Mediumbound					0.23
I-TEQ-Upperbound					0.24
PCDDs	Result [ng/sample]		PCDFs	Result [ng/sample]	
Tetra-CDDs	5.5		Tetra-CDFs	2.9	
Penta-CDDs	6.7		Penta-CDFs	2.1	
Hexa-CDDs	8.6		Hexa-CDFs	1.5	
Hepta-CDDs	2.4		Hepta-CDFs	0.67	
OCDD	1.6		OCDF	0.19	

I-TEF according to NATO.

Limits of quantification are defined as the amount of analyte producing a signal with $S/N \geq 10$.

The limit of detection is defined as the amount of analyte producing a signal with $S/N \geq 3$.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double ($k=2$) relative standard deviation (RSD%), and corresponds to 95% confidence interval.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

Results marked with "<" are below limit of quantification.

"Lowerbound" and "Upperbound" are levels defined in Regulation 2017/644 and EN 1948-4.

"Mediumbound" is levels defined in Regulation 2017/644.

Attachment no. 1 to the Certificate of Analysis for work order PR2643357

Sample: 7603301001

ALS SAMPLE ID: PR2643357/ 001

Standards recovery:

Sample: 7603301001					
Final extract [µl]: 60					
Injection volume [µl]: 4					
Acquisition date [d.m.y h:m]: 21/4/26 13:38					
Extraction standard	Recovery [%]	Acceptable range [%]		Accept. rec. with respect to	
PCDDs		Basic	Extended	basic range	extended range
13C12 - 2,3,7,8-TCDD	77	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,7,8-PeCDD	75	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDD	85	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDD	88	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDD	56	40 - 130	20 - 150	YES	-
13C12 - OCDD	47	40 - 130	20 - 150	YES	-
PCDFs					
13C12 - 2,3,7,8-TCDF	69	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,7,8-PeCDF	73	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDF	91	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDF	81	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,6,7,8-HxCDF	80	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDF	49	40 - 130	20 - 150	YES	-
13C12 - OCDF	45	40 - 130	20 - 150	YES	-
Sampling standard	Recovery [%]	Acceptable range [%]		Rec. in range?	
13C12-1,2,3,7,8-PeCDF	99	> 50		YES	
13C12-1,2,3,7,8,9-HxCDF	98	> 50		YES	
13C12-1,2,3,4,7,8,9-HpCDF	99	> 50		YES	
37C14-2,3,7,8-TCDD	-	-		-	

Attachment no. 2 to the Certificate of Analysis for work order PR2643357

Sample: 7603301001

ALS SAMPLE ID: PR2643357/ 001

Measurement results PCDD/Fs:

Sample: 7603301001					
Final extract [µl]:				60	
Injection volume [µl]:				4	
Acquisition date [d.m.y h:m]:				21/4/26 13:38	
2,3,7,8-PCDD/Fs	Result [ng/sample]	Limit of Detection [ng/sample]	Limit of Quantification [ng/sample]	WHO-TEFs	WHO-TEQ Upperbound [ng/sample]
2,3,7,8-TCDD	< 0.005	0.0015	0.005	1	0.005
1,2,3,7,8-PeCDD	0.035	0.0028	0.0092	1	0.035
1,2,3,4,7,8-HxCDD	0.081	0.0035	0.012	0.1	0.0081
1,2,3,6,7,8-HxCDD	0.21	0.0035	0.012	0.1	0.021
1,2,3,7,8,9-HxCDD	0.14	0.0035	0.012	0.1	0.014
1,2,3,4,6,7,8-HpCDD	1.2	0.0058	0.019	0.01	0.012
OCDD	1.6	0.011	0.036	0.0003	0.00048
2,3,7,8-TCDF	0.033	0.0011	0.0035	0.1	0.0033
1,2,3,7,8-PeCDF	0.073	0.0022	0.0074	0.03	0.0022
2,3,4,7,8-PeCDF	0.2	0.0022	0.0074	0.3	0.059
1,2,3,4,7,8-HxCDF	0.13	0.002	0.0068	0.1	0.013
1,2,3,6,7,8-HxCDF	0.14	0.002	0.0068	0.1	0.014
1,2,3,7,8,9-HxCDF	0.02	0.002	0.0068	0.1	0.002
2,3,4,6,7,8-HxCDF	0.21	0.002	0.0068	0.1	0.021
1,2,3,4,6,7,8-HpCDF	0.42	0.0059	0.02	0.01	0.0042
1,2,3,4,7,8,9-HpCDF	0.051	0.0059	0.02	0.01	0.00051
OCDF	0.19	0.0081	0.027	0.0003	0.000056
WHO-TEQ-Lowerbound					0.21
WHO-TEQ-Mediumbound					0.21
WHO-TEQ-Upperbound					0.21
PCDDs	Result [ng/sample]		PCDFs	Result [ng/sample]	
Tetra-CDDs	5.5		Tetra-CDFs	2.9	
Penta-CDDs	6.7		Penta-CDFs	2.1	
Hexa-CDDs	8.6		Hexa-CDFs	1.5	
Hepta-CDDs	2.4		Hepta-CDFs	0.67	
OCDD	1.6		OCDF	0.19	

WHO 2005 TEF according to Van den Berg et al: Toxicological Sciences Advance Acces, 7 July 2006)

Limits of quantification are defined as the amount of analyte producing a signal with $S/N \geq 10$.

The limit of detection is defined as the amount of analyte producing a signal with $S/N \geq 3$.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double ($k=2$) relative standard deviation (RSD%), and corresponds to 95% confidence interval.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total WHO-TEQ is 20%.

Results marked with "<" are below limit of quantification.

"Lowerbound" and "Upperbound" are levels defined in Regulation 2017/644 and EN 1948-4.

"Mediumbound" is levels defined in Regulation 2017/644.

Attachment no. 2 to the Certificate of Analysis for work order PR2643357

Sample: 7603301001

ALS SAMPLE ID: PR2643357/ 001

Standards recovery:

Sample: 7603301001					
Final extract [µl]: 60					
Injection volume [µl]: 4					
Acquisition date [d.m.y h:m]: 21/4/26 13:38					
Extraction standard	Recovery [%]	Acceptable range [%]		Accept. rec. with respect to	
PCDDs		Basic	Extended	basic range	extended range
13C12 - 2,3,7,8-TCDD	77	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,7,8-PeCDD	75	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDD	85	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDD	88	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDD	56	40 - 130	20 - 150	YES	-
13C12 - OCDD	47	40 - 130	20 - 150	YES	-
PCDFs					
13C12 - 2,3,7,8-TCDF	69	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,7,8-PeCDF	73	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDF	91	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDF	81	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,6,7,8-HxCDF	80	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDF	49	40 - 130	20 - 150	YES	-
13C12 - OCDF	45	40 - 130	20 - 150	YES	-
Sampling standard	Recovery [%]	Acceptable range [%]		Rec. in range?	
13C12-1,2,3,7,8-PeCDF	99	> 50		YES	
13C12-1,2,3,7,8,9-HxCDF	98	> 50		YES	
13C12-1,2,3,4,7,8,9-HpCDF	99	> 50		YES	
37C14-2,3,7,8-TCDD	-	-		-	

Attachment no. 3 to the Certificate of Analysis for work order PR2643357

Sample: 7603301002

ALS SAMPLE ID: PR2643357/ 002

Measurement results PCDD/Fs:

Sample: 7603301002					
Final extract [µl]:				60	
Injection volume [µl]:				4	
Acquisition date [d.m.y h:m]:				21/4/26 14:30	
2,3,7,8-PCDD/Fs	Result [ng/sample]	Limit of Detection [ng/sample]	Limit of Quantification [ng/sample]	I-TEFs	I-TEQ Upperbound [ng/sample]
2,3,7,8-TCDD	< 0.0038	0.0011	0.0038	1	0.0038
1,2,3,7,8-PeCDD	< 0.0094	0.0028	0.0094	0.5	0.0047
1,2,3,4,7,8-HxCDD	0.052	0.003	0.0099	0.1	0.0052
1,2,3,6,7,8-HxCDD	0.11	0.003	0.0099	0.1	0.011
1,2,3,7,8,9-HxCDD	0.068	0.003	0.0099	0.1	0.0068
1,2,3,4,6,7,8-HpCDD	0.61	0.0048	0.016	0.01	0.0061
OCDD	0.68	0.0075	0.025	0.001	0.00068
2,3,7,8-TCDF	0.025	0.00082	0.0027	0.1	0.0025
1,2,3,7,8-PeCDF	0.069	0.0016	0.0054	0.05	0.0035
2,3,4,7,8-PeCDF	0.11	0.0016	0.0054	0.5	0.055
1,2,3,4,7,8-HxCDF	0.077	0.0054	0.018	0.1	0.0077
1,2,3,6,7,8-HxCDF	0.082	0.0054	0.018	0.1	0.0082
1,2,3,7,8,9-HxCDF	< 0.018	0.0054	0.018	0.1	0.0018
2,3,4,6,7,8-HxCDF	0.091	0.0054	0.018	0.1	0.0091
1,2,3,4,6,7,8-HpCDF	0.15	0.0069	0.023	0.01	0.0015
1,2,3,4,7,8,9-HpCDF	< 0.023	0.0069	0.023	0.01	0.00023
OCDF	0.079	0.0058	0.019	0.001	0.000079
I-TEQ-Lowerbound					0.12
I-TEQ-Mediumbound					0.12
I-TEQ-Upperbound					0.13
PCDDs	Result [ng/sample]		PCDFs	Result [ng/sample]	
Tetra-CDDs	2.2		Tetra-CDFs	2.2	
Penta-CDDs	2.4		Penta-CDFs	1.8	
Hexa-CDDs	5.5		Hexa-CDFs	0.9	
Hepta-CDDs	1.3		Hepta-CDFs	0.26	
OCDD	0.68		OCDF	0.079	

I-TEF according to NATO.

Limits of quantification are defined as the amount of analyte producing a signal with $S/N \geq 10$.

The limit of detection is defined as the amount of analyte producing a signal with $S/N \geq 3$.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double ($k=2$) relative standard deviation (RSD%), and corresponds to 95% confidence interval.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

Results marked with "<" are below limit of quantification.

"Lowerbound" and "Upperbound" are levels defined in Regulation 2017/644 and EN 1948-4.

"Mediumbound" is levels defined in Regulation 2017/644.

Attachment no. 3 to the Certificate of Analysis for work order PR2643357

Sample: 7603301002

ALS SAMPLE ID: PR2643357/ 002

Standards recovery:

Sample: 7603301002					
Final extract [µl]: 60					
Injection volume [µl]: 4					
Acquisition date [d.m.y h:m]: 21/4/26 14:30					
Extraction standard	Recovery [%]	Acceptable range [%]		Accept. rec. with respect to	
PCDDs		Basic	Extended	basic range	extended range
13C12 - 2,3,7,8-TCDD	85	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,7,8-PeCDD	93	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDD	87	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDD	88	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDD	57	40 - 130	20 - 150	YES	-
13C12 - OCDD	57	40 - 130	20 - 150	YES	-
PCDFs					
13C12 - 2,3,7,8-TCDF	76	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,7,8-PeCDF	84	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDF	86	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDF	82	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,6,7,8-HxCDF	91	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDF	57	40 - 130	20 - 150	YES	-
13C12 - OCDF	54	40 - 130	20 - 150	YES	-
Sampling standard	Recovery [%]	Acceptable range [%]		Rec. in range?	
13C12-1,2,3,7,8-PeCDF	77	> 50		YES	
13C12-1,2,3,7,8,9-HxCDF	95	> 50		YES	
13C12-1,2,3,4,7,8,9-HpCDF	92	> 50		YES	
37C14-2,3,7,8-TCDD	-	-		-	

Attachment no. 4 to the Certificate of Analysis for work order PR2643357

Sample: 7603301002

ALS SAMPLE ID: PR2643357/ 002

Measurement results PCDD/Fs:

Sample: 7603301002					
Final extract [µl]:				60	
Injection volume [µl]:				4	
Acquisition date [d.m.y h:m]:				21/4/26 14:30	
2,3,7,8-PCDD/Fs	Result [ng/sample]	Limit of Detection [ng/sample]	Limit of Quantification [ng/sample]	WHO-TEFs	WHO-TEQ Upperbound [ng/sample]
2,3,7,8-TCDD	< 0.0038	0.0011	0.0038	1	0.0038
1,2,3,7,8-PeCDD	< 0.0094	0.0028	0.0094	1	0.0094
1,2,3,4,7,8-HxCDD	0.052	0.003	0.0099	0.1	0.0052
1,2,3,6,7,8-HxCDD	0.11	0.003	0.0099	0.1	0.011
1,2,3,7,8,9-HxCDD	0.068	0.003	0.0099	0.1	0.0068
1,2,3,4,6,7,8-HpCDD	0.61	0.0048	0.016	0.01	0.0061
OCDD	0.68	0.0075	0.025	0.0003	0.0002
2,3,7,8-TCDF	0.025	0.00082	0.0027	0.1	0.0025
1,2,3,7,8-PeCDF	0.069	0.0016	0.0054	0.03	0.0021
2,3,4,7,8-PeCDF	0.11	0.0016	0.0054	0.3	0.033
1,2,3,4,7,8-HxCDF	0.077	0.0054	0.018	0.1	0.0077
1,2,3,6,7,8-HxCDF	0.082	0.0054	0.018	0.1	0.0082
1,2,3,7,8,9-HxCDF	< 0.018	0.0054	0.018	0.1	0.0018
2,3,4,6,7,8-HxCDF	0.091	0.0054	0.018	0.1	0.0091
1,2,3,4,6,7,8-HpCDF	0.15	0.0069	0.023	0.01	0.0015
1,2,3,4,7,8,9-HpCDF	< 0.023	0.0069	0.023	0.01	0.00023
OCDF	0.079	0.0058	0.019	0.0003	0.000024
WHO-TEQ-Lowerbound					0.093
WHO-TEQ-Mediumbound					0.1
WHO-TEQ-Upperbound					0.11
PCDDs	Result [ng/sample]		PCDFs	Result [ng/sample]	
Tetra-CDDs	2.2		Tetra-CDFs	2.2	
Penta-CDDs	2.4		Penta-CDFs	1.8	
Hexa-CDDs	5.5		Hexa-CDFs	0.9	
Hepta-CDDs	1.3		Hepta-CDFs	0.26	
OCDD	0.68		OCDF	0.079	

WHO 2005 TEF according to Van den Berg et al: Toxicological Sciences Advance Acces, 7 July 2006)

Limits of quantification are defined as the amount of analyte producing a signal with $S/N \geq 10$.

The limit of detection is defined as the amount of analyte producing a signal with $S/N \geq 3$.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double ($k=2$) relative standard deviation (RSD%), and corresponds to 95% confidence interval.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total WHO-TEQ is 20%.

Results marked with "<" are below limit of quantification.

"Lowerbound" and "Upperbound" are levels defined in Regulation 1717/644 and EN 1948-4.

"Mediumbound" is levels defined in Regulation 1717/644.

Attachment no. 4 to the Certificate of Analysis for work order PR2643357

Sample: 7603301002

ALS SAMPLE ID: PR2643357/ 002

Standards recovery:

Sample: 7603301002					
Final extract [µl]: 60					
Injection volume [µl]: 4					
Acquisition date [d.m.y h:m]: 21/4/26 14:30					
Extraction standard	Recovery [%]	Acceptable range [%]		Accept. rec. with respect to	
PCDDs		Basic	Extended	basic range	extended range
13C12 - 2,3,7,8-TCDD	85	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,7,8-PeCDD	93	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDD	87	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDD	88	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDD	57	40 - 130	20 - 150	YES	-
13C12 - OCDD	57	40 - 130	20 - 150	YES	-
PCDFs					
13C12 - 2,3,7,8-TCDF	76	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,7,8-PeCDF	84	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDF	86	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDF	82	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,6,7,8-HxCDF	91	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDF	57	40 - 130	20 - 150	YES	-
13C12 - OCDF	54	40 - 130	20 - 150	YES	-
Sampling standard	Recovery [%]	Acceptable range [%]		Rec. in range?	
13C12-1,2,3,7,8-PeCDF	77	> 50		YES	
13C12-1,2,3,7,8,9-HxCDF	95	> 50		YES	
13C12-1,2,3,4,7,8,9-HpCDF	92	> 50		YES	
37C14-2,3,7,8-TCDD	-	-		-	