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גרסה: 1

נספח א' - רשימת שיטות דיגום ואנליזה

נספח זה הינו חלק מהנחיות מקצועיות לביצוע סקר קרקע

(בתוקף החל- 1.6.2016)

מסמך זה כולל:

- טבלה של כלל שיטות דיגום ואנליזה
- טבלה 2 הכוללת בקורות איכות
- רשימה סטנדרטית של VOC
- רשימה סטנדרטית של SVOCs



Analytical Parameter	Homogenization ⁽¹⁾ Allowed?	Allowable Sampling Methods ⁽²⁾	Method(s)	Required Container Type	Required Preservation	Holding Time	Additional Comments
VOCs (including BTEX/MTBE)	No	Direct push, Hollow stem auger, Spiral auger with conditions in regulations	Preparation method: EPA 5021 Analytical method: EPA 8260B (low-concentration ⁽³⁾)	One 22-mL clear glass vial with PTFE-lined septum and crimp-cap or screw-cap + 100-250 ml glass jar with Teflon-lined cap	Vial: add 10 mL matrix modifying solution ⁽⁴⁾ Vial & Jar: Cool, 4°C±2	14 days to analysis	Need about 2-gram sample (or until line marked on vial by the analytical lab). Must be collected with core-sampler. Transfer sample to vial and jar within 2 minutes of exposure to air.
			Preparation method: EPA 5021 Analytical method: EPA 8260B (High-concentration ⁽³⁾)	Two 22-mL clear glass vials with PTFE-lined septum and crimp-cap or screw-cap + 100-250 ml glass jar with Teflon-lined cap	Vial 1: add 10ml of methanol + Vial 2: add 10 mL matrix modifying solution ⁽⁴⁾ Vials & Jar: Cool, 4°C±2	In methanol - 48 hours to analysis In matrix modifying solution - 14 days to analysis	Need about 2-gram sample (or until line marked on vial by the analytical lab). Must be collected with core-sampler. Transfer sample to vial and jar within 2 minutes of exposure to air.

Analytical Parameter	Homogenization ⁽¹⁾ Allowed?	Allowable Sampling Methods ⁽²⁾	Method(s)	Required Container Type	Required Preservation	Holding Time	Additional Comments
SVOCs (including PAHs) PCBs Pesticides	Yes	Direct push, Hollow stem auger, Bucket auger, Hand auger, Power auger, Spiral auger with conditions in regulations	EPA 8270C	100-250 ml glass jar with Teflon-lined cap with no air space <u>or</u> Inert liner sealed on both ends	Cool, 4°C±2	14 days to extraction; 40 days from extraction to analysis	Standard measurement for SVOCs does not include PCBs and pesticides
TPH-DRO and TPH-ORO (C ₁₀ -C ₄₀)	No	Direct push, Hollow stem auger, Bucket auger, Hand auger, Spiral auger with conditions in regulations	EPA 8015	100-250 ml glass jar with Teflon-lined cap with no air space <u>or</u> Inert liner sealed on both ends	Cool, 4°C±2	14 days to extraction; 40 days from extraction to analysis	Glass jar should be completely packed
TPH-GRO (C ₆ -C ₁₀)	No	Direct push, Hollow stem auger, Spiral auger with conditions in regulations	Preparation method: EPA 5021 Analytical method: EPA 8015	22-mL clear glass vial with PTFE-lined septum and crimp-cap or screw-caps + 100-250 ml glass jar with Teflon-lined cap	Vial: add 10 mL matrix modifying solution ⁽⁴⁾ Cool, 4°C±2	14 days to analysis	Need about 2-gram sample (or until line marked on vial by the analytical lab) Must be collected with core-sampler Transfer sample to vial and jar within 2 minutes of exposure to air



Analytical Parameter	Homogenization ⁽¹⁾ Allowed?	Allowable Sampling Methods ⁽²⁾	Method(s)	Required Container Type	Required Preservation	Holding Time	Additional Comments
Metals	Yes	Direct push, Hollow stem auger, Bucket auger, Hand auger, Power auger, Spiral auger with conditions in regulations	Acid: Preparation method: 3051A /3050B Analytical method: EPA 6010D, 6020A,	100-250 ml glass jar with Teflon-lined cap with no air space <u>or</u> Inert liner sealed on both ends <u>or</u> Polyethylene container	Cool, 4°C±2	28 days for mercury; 6 months for other metals	All sample containers must be demonstrated to be free of contamination at or below the reporting limit. Plastic and glass containers are both suitable. Must be consistent with EPA metal guidelines.
			Leaching: Preparation method: EN-12457-2 Analytical method: EPA 6010C, 6020A,				



Analytical Parameter	Homogenization ⁽¹⁾ Allowed?	Allowable Sampling Methods ⁽²⁾	Method(s)	Required Container Type	Required Preservation	Holding Time	Additional Comments
<p>1. Homogenization of samples submitted in a liner must be performed by the analytical laboratory</p> <p>2. Per the Israel regulations. NOTE: Scoop/trowel, hand auger, and bucket auger not allowed for VOCs and TPH-GRO; power auger and backhoe loader not allowed for VOCs, TPH-GRO, TPH-DRO and TPH-ORO</p> <p>3. Sampling laboratory must inform analytical laboratory of need for low-concentration (PID<20 ppm) VOC analyses, high-concentration (PID>20 ppm) VOC analyses, or both (will be dependent on whether concentrations of VOCs are unknown and/or what regulatory cleanup levels are being used at the site)</p> <p>4. Matrix Modifying Solution: Based on EPA 5021 June 2003, part 7.7 (180 gr NaCl to 500 ml water)</p>							



TABLE 2 FIELD SAMPLING QUALITY CONTROL ⁽⁵⁾			
QC Sample	Required Frequency	Applicable Analytical Parameters (Same as Table 1)	Required Sampling Containers/Preservation/Comments
Field Duplicates	1 per every 20 samples	All	The analysis lab will split the sample after homogenization, and conduct the analysis for both samples. (Not applicable for VOC and TPH-GRO.)
Split Samples	10% of the samples for each analytical parameter, when there are at least 10 samples	All	The split will be done in the field and samples will be sent to two different labs that will conduct the analysis under the same analytical methods. Split sample is not required for VOC and TPH-GRO. Ex: Total samples = 100 (35 TPH only; 60 TPH + metals; 5 metals + SVOC). You must split 9 TPH (from the 95 TPH samples), 6 metals, 0 SVOC
Background Samples	1 per Site	All	It is acceptable to take the background samples inside the contaminated site, but must be taken in an area that is far from the contaminated activities.



TABLE 2
 FIELD SAMPLING QUALITY CONTROL⁽⁵⁾

QC Sample	Recommended/Required Frequency	Applicable Analytical Parameters (Same as Table 1)	Required Sampling Containers/Preservation/Comments
Field Blank (analysis only if required)	1 per every 20 samples or 1 per site	All	It is important to take samples from workplace air, from representative points in the site. <u>VOC & TPH-GRO</u> : 22-mL clear glass vial should contain 10 mL matrix modifying solution ⁽⁴⁾ with PTFE-lined septum and crimp-cap or screw-caps. <u>SVOC, TPH-DRO, TPH-ORO</u> : 1-Liter amber glass bottle should contain water with Teflon-lined cap <u>Metals</u> : 500 mL polyethylene or glass bottle preserved with HNO ₃ to pH <2
Equipment Blank (analysis required only when reusable equipment is used)	1 per 20 samples for non-disposable sampling equipment	All	If the accredited worker who takes the samples conducts a validation test for the equipment cleaning process, he is exempt from taking samples for the equipment blank. (Validation test will be valid for 2 years). <u>VOC & TPH-GRO</u> : 22-mL clear glass vial with PTFE-lined septum and crimp-cap or screw-caps <u>SVOC, TPH-DRO, TPH-ORO</u> : 1-Liter amber glass vial with Teflon-lined cap <u>Metals</u> : 500 mL polyethylene or glass bottle preserved with HNO ₃ to pH <2



TABLE 2 FIELD SAMPLING QUALITY CONTROL ^[5]			
QC Sample	Required Frequency	Applicable Analytical Parameters	Required Sampling Containers/Preservation
Trip Blank (analysis only if required)	1 per cooler	VOC	Trip sample should be held in cooler with the samples. 22-mL clear glass vial should contain 10 mL matrix modifying solution ^[4] and about 2-grams clean soil with PTFE-lined septum and crimp-cap or screw-caps.
Cooler Temperature Blank	1 per cooler	All	Need ice volume of not less than 20% of cooler space volume. The ice will be held in a waterproof container. 125 mL glass or polyethylene container with water
Additional contaminate that exists in the sample and is not included in the lab list	10% of the samples (low-concentration and high-concentration)	VOC SVOC	If the difference between the total concentration of the compounds in the reported list and the total VOC/SVOCs is more than the order of magnitude, the lab should note the highest concentration that is not included in the lab's standard list (see standard list on next page). That concentration must be clearly noted on the lab report, and must be considered in the site investigation report.
5. Quality Control (QC) samples referenced in Israeli Regulations (Reference 122-09) included in table with "Frequencies Recommended/Required" in Regulations; actual number of QC samples will be dependent on project objectives and may vary from site to site.			

Standard list for VOC (GC-MS-HS)

	Cas.No.	Compound
1	75-35-4	1,1-Dichloroethylene
2	75-09-2	Methylene chloride
3	156-60-5	Trans-1,2-Dichloroethylene
4	75-34-3	1,1-Dichloroethane
5	156-59-2	Cis-1,2-Dichloroethylene
6	594-20-7	2,2-Dichloropropane
7	74-97-5	Bromochloromethane
8	67-66-3	Chloroform
9	71-55-6	1,1,1-Trichloroethane
10	107-06-2	1,2-Dichloroethane
11	563-58-6	1,1-Dichloropropene
12	71-43-2	Benzene
13	56-23-5	Carbontetrachloride
14	79-01-6	Trichloroethylene
15	78-87-5	1,2-Dichloropropane
16	74-95-3	Dibromomethane
17	75-27-4	Bromodichloromethane
18	108-88-3	Toluene
19	79-00-5	1,1,2-Trichloroethane
20	142-28-9	1,3-Dichloropropane
21	124-48-1	Dibromochloromethane
22	127-18-4	Tetrachloroethene
23	106-93-4	1,2-Dibromoethane
24	108-90-7	Chlorobenzene
25	630-20-6	1,1,1,2-Tetrachloroethane
26	100-41-4	Ethylbenzene
27	95-47-6	o-Xylene
28	106-42-3	p-Xylene
28	100-42-5	Styrene
29	108-38-3	m-Xylene
30	75-25-2	Bromoform
31	79-34-5	1,1,2,2-Tetrachloroethane
32	98-82-8	Isopropylbenzene(Cumene)
33	108-86-1	Bromobenzene
34	96-18-4	1,2,3-Trichloropropane
35	103-65-1	N-Propylbenzene
36	95-49-8	2-Chlorotoluene
37	106-43-4	4-Chlorotoluene
38	108-67-8	1,3,5-Trimethylbenzene

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39	98-06-6	Tert-Butylbenzene
40	95-63-6	1,2,4-Trimethylbenzene
41	541-73-1	1,3-Dichlorobenzene
42	135-98-8	sec-Butylbenzene
43	106-46-7	1,4-Dichlorobenzene
44	99-87-6	p-Isopropyltoluene
45	95-50-1	1,2-Dichlorobenzene
46	104-51-8	N-Butylbenzene
47	96-12-8	1,2-Dibromo-3-chloropropane
48	87-61-6	1,2,3-Trichlorobenzene
49	91-20-3	Naphthalene
50	87-68-3	Hexachlorobutadiene
51	120-82-1	1,2,4-Trichlorobenzene
52	1634-04-4	MTBE
53	74-83-9	BromoMethane
54	75-00-3	Chloroethane
55	74-87-3	Chloromethane
56	75-71-8	DiChloroDiFluoroMethane
60	10061-01-5	cis-1,3-Dichloropropene
61	10061-02-6	trans-1,3-Dichloropropene
62	78-93-3	Methyl Ethyl Ketone (MEK)
63	108-10-1	Methyl Isobutyl Ketone (MIBK)
65	75-01-4	Vinyl Chloride
66	75-65-0	TBA

Standard list for SVOCs (GC-MS-HS)

I	91-20-3	Naphthalene
2	208-96-8	Acenaphthylene
3	83-32-9	Acenaphthene
4	86-73-7	Fluorene
5	85-01-8	Phenanthrene
6	120-12-7	Anthracene
7	206-44-0	Fluoranthene
8	129-00-0	Pyrene
9	56-55-3	Benzo (a) anthracene
10	218-01-9	Chrysene
11	205-99-2	Benzo (b) fluoranthene
12	207-08-9	Benzo (k) fluoranthene
13	50-32-8	Benzo (a) pyrene
14	193-39-5	Indeno (1,2,3,-ed) pyrene
15	53-70-3	Dibenzo (a,h) anthracene
16	191-24-2	Benzo (g,h,i) perylene
17	90-13-1	1-Chloronaphthalene
18	91-58-7	2-Chloronaphthalene
19	91-57-6	2-Methylnaphthalene
20	108-95-2	Phenol
21	95-57-8	-2-Chlorophenol
22	95-48-7	2-Methyphenol
23	108-39-4	3-Methyphenol
24	106-44-5	4-Methyphenol
25	105-67-9	2,4-Dimethylphenol
26	88-75-5	2-Nitrophenol
27	120-83-2	2,4-Dichlorophenol
28	87-65-0	2,6-Dichlorophenol
29	59-50-7	4-Chloro-3-methylphenol
30	88-06-2	2,4,6-Trichlorophenol
31	95-95-4	2,4,5-Trichlorophenol
32	100-02-7	4-Nitrophenol
33	534-52-1	4-6-Dinitro-2-methylphenol
34	88-85-7	Dinoseb
35	131-11-3	Dimethyl phthalate
36	84-66-2	Diethyl phthalate
37	85-68-7	Butyl benzyl phthalate
38	84-74-2	Di-n-butyl phthalate
39	117-81-7	Bis (2-ethylhexyl) phthalate

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40	117-84-0	Di-n-octyl phthalate
41	111-91-1	Bis (2-chloroethoxy) methane
42	111-44-4	Bis (2-chloroethyl) ether
43	108-60-1	Bis (2-chloroisopropyl) ether
44	101-55-3	4-Bromophenyl phenyl ether
45	7005-72-3	4-Chlorophenyl phenyl ether
46	132-61-9	Dibenzofuran
47	62-53-3	Aniline
48	88-74-4	2-Nitroaniline
49	99-09-2	3-Nitroaniline
50	100-01-8	4-Nitroaniline
51	62-75-9	N-Nitrosodimethylamine
52	621-64-7	N-Nitrosodi-n-propylamine
53	98-95-3	Nitrobenzene
54	121-14-2	2,4-Dinitrotoluene
55	606-20-2	2,6-Dinitrotoluene
56	122-39-4	Diphenylamine
57	92-87-5	Benzidine
58	100-51-6	Benzyl alcohol
59	78-59-1	Isophorone
60	67-72-1	Hexachloroethane
61	98-86-2	Acetophenone
62	92-52-4	1,1'-Biphenyl
63	105-60-2	6-Caprolactam
64	86-74-8	Carbazole
65	106-47-8	4-Chloroaniline
66	51-28-5	2,4-Dinitrophenol
67	87-68-3	Hexachlorobutadiene
68	77-47-4	Hexachlorocyclopentadiene
69	87-86-5	Pentachlorophenol