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The Ministry of Environmental Protection

Division of Industrial Wastewater & Contaminated Soils and fuels

Date: 19/03/18

File: Division guidelines

Ref: 5-15

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Version: 3 (Replace version 2 – date 24.03.16)

Professional Guidelines for Excavating, Sampling of Contaminated Soil Stockpiles or of Soil Suspected as Contaminated and Confirmation Sampling (Including large stockpiles sampling)



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1. Overview

Soil suspected of contamination is a soil which is, or has been in the past, the site, or near the site, of activity involving contaminant substances (such as hazardous materials, brines, sewage, explosives and oils). The need to characterize soil stockpiles arises in a broad range of sites where excavation activities are taking place or have taken place. This range includes soil rehabilitation works at contaminated sites, excavation at construction sites, excavation at industrial sites where repair or replacement works are being done on infrastructures, emergency activities etc. Soil stockpiles requiring characterization may differ greatly in volume, level of contamination, age, origin, and scope of the information existing as to their contamination.

As a rule, the Ministry's policy is that the soil has to be characterized prior to excavating it as a part of an historical survey and a soil survey, which includes undisturbed sampling. The default, therefore, is that the goal of the remediation of the soil will be determined prior to excavating it and there will not be a need for stockpile sampling. There are, however exceptions in which the Ministry will require sampling of stockpiles without a soil investigation, or in addition to a soil investigation. Following are some examples:

- Stockpiles which were excavated as a part of the exposing of underground equipment while performing ongoing maintenance and upgrading infrastructure.
- Stockpiles which were excavated in the past, without undergoing a preliminary soil survey, and therefore there is insufficient information as to the types and concentrations of the soil contaminants therein – in this case stockpile sampling is required to characterize the stockpile and if necessary to determine the destination to which it will be cleared.
- Stockpiles which were excavated after a considerable length of time has elapsed since the soil study as carried out, where during this period the soil characteristics may have changed.
- Cases in which during the excavation, a contamination was found in addition to the contamination which was found and delimited in the soil survey.
- Cases in which the soil survey did not include the required number of samples for the volume of stockpiles being cleared according to the table in section 4.3.

The professional guidelines which will be provided in this document refer to the method of preparing an excavation plan and for sampling stockpiles. Furthermore, the guidelines refer to verification sampling in the excavation pit, which is intended to examine whether additional contaminants have remained in the soil, or whether the excavation activities have indeed been completed.

It must be pointed out that the requirement to perform excavation or stockpile sampling shall be determined as a part of the enforcement of the Ministry's legal



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authority, including the Hazardous Substances Law, 1993, the Licensing of Businesses Law, 1968, and the Water Law, 1959. The professional guidelines which will be provided in this document form a professional aid. It contains details of the professional methodology for implementing the requirements.

2. Determining a remediation destination

- 2.1. Stockpiles of excavated soil are characterized prior to or after the fact. This is done primarily to determine the remediation destination. Remediation of contaminated soil includes remediation in different hierarchies, including disposal (for example to a landfill) and reclamation (such as incineration in a facility approved as a reclamation facility). The remediation destination may be an ex-situ site, other than the site where the soil was excavated. This may be a hazardous waste landfill, a mixed waste landfill, a biological remediation site, an incineration site etc. It is also possible that the remediation will be done in a designated area within the site from where the soil was excavated (on-site).
- 2.2. As mentioned above, the guiding principle is that determining the destination for treating the contaminated soil shall, to the extent possible, be based on a soil survey and preliminary characterization of the soil before excavating it. This principle has several exceptions as described above.
- 2.3. As a rule, determination of the remediation destination, shall be done according to the maximum contamination value sampled in the stockpile. However the Ministry may approve, in appropriate cases, the determination of a remediation destination according to the average value in a stockpile or using another method.
- 2.4. Clearing contaminated soil from the excavation site is subject to the business licensing regulations (disposal of hazardous material waste), 1990, and to other regulatory arrangements concerning this issue.



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3. The Excavation

3.1. Treating soil gases

When underground construction is being planned for residential purposes, or for industry and commerce, or if it is an above-ground building designated as residential, and if the soil contains gases in concentrations exceeding by 1000 times (3 orders of magnitude) the tier 1 values as determined in the IRBCA¹ document, then the soil must be treated, in addition to protecting the structure, prior to the construction. For example, for TCE, the IRBCA has determined a penetration value into a residential structure of 76.9 micrograms per cubic meter. Therefore the concentrations in the soil must be reduced to the maximum concentration of 76,900 micrograms per cubic meter prior to the construction and protection. The pre-remediation, combined with the protection, will ensure better safeguarding of public health in accordance with the precautionary principle.

3.2. Prior to the excavation

An excavation plan must be submitted to the contaminated soils coordinator in the relevant district for approval. The plan must be submitted according to the scope required as will be detailed below. The scope of the plan will be determined according to the characteristics of the excavation, which include the characteristics of the contaminated soil and the length of time the soil will be stockpiled within the area of the site being excavated.

3.3. Basic plan

A basic plan will be required in any case of excavating contaminated soil, or soil suspected of being contaminated, and will include the following information:

- Findings of historical survey (in case this refers to fuel contamination – the fuel type must be proven), the findings of a soil survey and delimitation of the contamination, on which the excavation is based.
- Name of the company carrying out the excavation.
- Name of the excavation supervisor. Should a soil survey be conducted, preference will be given to having the supervisor being the professional entity that carried out the soil investigation (hereinafter – “excavation manager”).

¹ In table 7-2(a) in the column entitled Indoor Inhalation of Vapor Emissions



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- The excavation plan presented on a map and an estimate of the quantity of excavated soil (cubic meters).
- Expected number of stockpiles and their estimated volume.
- Description and location of the surface on which the stockpiles will be stacked in the field including measures of preventing secondary contamination – waterproofing and roofing.
- Details of the stockpile sampling plan, which shall include the following parameters: contaminants to be identified, number of samples, location of sample taking, sampling type (discrete/composite), analysis methods, all according to the guidelines for stockpile sampling as will be presented in this document.

3.3.1. Extended plan

An extended plan shall include the basic plan and additions as detailed below. An extended plan will be required if the excavation has the cumulative characteristics listed below, or following a requirement from the superintendent:

- Total concentration of VOC in the stockpile is greater than 100 milligrams / kg in the soil or 100 milligrams per cubic meter active soil gas or the sum total of all the contaminants in the soil exceeds 0.5%.
- Stockpile volume is greater than 1000 cubic meters.
- The stockpile in the field will be fed for a period of more than 90 days.
- In addition to the requirements in the basic plan, the extended plan will also contain the following information:
 - Running of the AERMOD air dispersion model (the steady-state plume model) to assess concentrations of contaminants from a range of emission sources (point sources, area or volume sources).
 - According to the results from running the model, and if the finding will be that there is a likelihood that contaminated particles or gases might be transported beyond the boundaries of the site, the plan shall include measures which will be taken to prevent and minimize air pollution and a monitoring plan.

After the plan is approved by the Ministry of Environmental Protection, the district contaminated soils coordinator shall be informed of the date of the excavation, at least 7 business days ahead of its execution. If this lead time is not practical, then the coordinator shall be contacted and informed of the precise date of the removal at least 3 days in advance.



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3.4. Performing the excavation

- 3.4.1. The excavation shall be carried out under the responsibility and supervision of the person responsible for the excavation, who will instruct the personnel carrying out the excavation on everything said in these guidelines and he shall supervise the execution of the guidelines throughout the duration of the excavation, stacking, and removal.
- 3.4.2. Each center of contamination (as defined in the soil survey) shall be excavated and stacked separately (unless the contaminant is the same and the contamination levels are such that they require removal to the same type of site – toxic waste / mixed waste / biological remediation / dry waste / incineration). Stockpiles must be separated based on contamination level – according to the limit concentrations for acceptance at the destination for removal. **It is forbidden to excavate or mix contaminated soil with non-contaminated soil** or with soil which is contaminated with other contaminants or with soil contaminated with the same contaminant at a concentration requiring removal to different destinations or between soils of different types even if they are contaminated with the same kinds of contaminants and at the same concentrations.
- 3.4.3. Despite the requirement to separate stockpiles by their source and by the concentration of the contamination expected in them, it is often necessary to merge stockpiles (for example – in refueling stations). The Ministry is permitted to approve in advance the merging of stockpiles due to site constraints, and on condition that the contaminants are of the same class and on condition that they are designated for the same remediation destination. In this case the removal destination will be the more demanding of the removal destinations for the different stockpiles.
- 3.4.4. Contaminated soil shall be stacked, in the absence of a different authorization from the entity in charge in the Ministry, up to a maximum height of **4 meters**, such that there will be no secondary contamination caused by runoff or by wind-borne particles. The stockpiles shall be laid on waterproof polyethylene sheets, 1 mm thick as a minimum, and they shall



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be covered with similar sheets immediately following the excavation until their removal. The edges of the sheet shall be anchored along the fringes of the stockpiles in such a way that will prevent the stockpiles from being exposed to the air and to rain. If the person at the Ministry approving the excavation is convinced there are no volatile or semi-volatile contaminants in the stockpile, that the area does not experience strong winds, and that exposing the stockpile does not involve any other environmental hazard, then he will be able to approve leaving the stockpile uncovered.

3.4.5. Classification of the contamination level in the soils being excavated shall be done as per the excavation plans, however if the field findings are not compatible with the excavation plan, the person in charge of the excavation is permitted to classify according to the contamination level as per the field findings, including classification according to the PID instrument reading, the odor, the moisture content, etc., all while keeping the Ministry's representative informed and in coordination with the representative.

3.4.6. The soil must be sampled at the site from which it was excavated prior to transferring it to a receiving site, unless the Ministry has authorized abstention from the said sampling.

3.4.6.1. Each stockpile designated to remain on site for over a week must be photographed.

3.5. Signs

Each stockpile must be signed in a clearly visible location in clear, legible lettering to state the source of the contamination, contaminant types and the desired disposal site: dry waste, mixed or toxic waste, and the name of the entity responsible for the disposal

3.6. Fencing

In case the excavation is being carried out in an open area accessible to the general public, the area of the excavation and the stockpiles must be fenced and signposted in such a way as to prevent the public from accessing the excavation and the contaminated soil. These guidelines do not replace any other legal instructions regarding safety and hygiene.

3.7. Dwell time



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Contaminated soil designated for the toxic waste site in Ramat Hovav must be disposed of in accordance with the business licensing regulations (disposal of hazardous material waste), 1990.

4. **Stockpile sampling + submittal of workplan**

Sampling of stockpile soil is performed in order to characterize the chemical composition of a soil pile, required to determine the appropriate disposal site. The preferred process of soil characterization is by performing a soil investigation, prior to excavation and stockpiling. However, there are instances where stockpile sampling is required. These instances can be divided into 3 main groups:

- a. Sampling of stockpiled soil which has not undergone prior investigation – As a general rule, and as mentioned above, excavation of soil should not be performed without prior investigation. However, such events do occur, in instances such as following spills and hazardous materials events, or excavation of soil in an area which is not suspected of soil contamination.
- b. Completion of characterization of stockpiled soil by performing analyses in addition to those performed in soil investigation – According to Ministry guidelines, the number of analyses performed in a soil investigation may be lower than the number required in the guidelines for stockpile sampling, as detailed in the present document. In such cases, the scope of soil sampling and analyses should be completed within the stockpiled soil after excavation, to the extent required by the stockpile sampling guidelines. Additionally, certain field findings following excavation may justify performing additional sampling. It should be noted that in such a case, the disposal/treatment site shall be chosen according to the stricter concentrations (stockpile vs. soil investigation).
- c. Sampling of stockpiled contaminated soil after treatment – after treatment of stockpiles, the piles should be sampled in order to characterize the residual level of contamination remaining in the pile after treatment, and to determine the final receiving site for the treated soil.

The following guidelines discuss the sampling of stockpiled soil, distinguishing between small piles (<1,000 cubic meters) and large piles (>1,000 cubic meters). These guidelines are applicable to all stockpile types mentioned above. It should be noted that, in most cases, treated soil is usually piled in large stockpiles. It should also be noted that when treatment is being performed as part of pilot testing, the sampling frequency may be higher than detailed in the present guidelines, according to the professional considerations of the MPE.



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5. Workplan for Stockpile sampling

Prior to stockpile sampling, a sampling workplan shall be submitted to the MPE, as required by law. It should be noted that when a workplan for an excavation is submitted, if it is already known that pile sampling will be required, a stockpile sampling workplan must be submitted as part of the excavation workplan.

A stockpile sampling work plan must include all the parameters detailed below:

5.1. Timing of the stockpile sampling

The stockpiles must be sampled as soon as possible after they have been excavated and no later than two days after excavation. Furthermore, at the ex-situ remediation site, sampling must be performed on the incoming stockpiles within 4 days after the arrival of the soil.

5.2. Sampling type – discrete sampling versus composite sampling

5.2.1. Discrete sampling – sampling directly from the stockpile, required for volatile and semi-volatile contaminants including: TPH, TPH-GRO, TPH-DRO, BTEX, VOC, S-VOC, MTBE, chlorinated hydrocarbons PAHs.

5.2.2. Composite sampling – consists of taking 20 discrete samples of the same size (about 100 milliliters) and merging them into a single vessel for blending to form a homogeneous sample. Such sampling will be done, if at all, only for non-volatile parameters, such as: heavy distillates, fuel oil, heavy metals.

Restriction to composite sample: a composite sample presents an average value of the contamination in a stockpile and it must be remembered that the actual value may be higher or lower than the result of this sample. A composite sample is not suitable and should not be done in the following cases:

- When the soil has a high clay content, it is difficult to blend the sample and therefore it will not be representative.
- It is expressly forbidden to do a composition for sampling volatiles or semi-volatiles.
- When in the course of the excavation, soil is excavated with a heterogeneous grains size and with a variable organic matter content, all being stacked in the same stockpile (according to the type of contaminant and its concentration), a composite sample is not representative since the concentration of the contaminant may vary according to the grain size and the organic matter content. It is important to perform a visual check of the soil being excavated and if its



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characteristics change, then composite sampling must not be performed. (Source:Department of Environmental Protection, Government of Western Australia, Development of Sampling and Analysis Programs).

5.3. Number of samples and sampling type according to the volume of the stockpile

The minimum number of soil samples are presented below for a soil volume of less than 1000 cubic meters. As stated earlier, a soil survey must be performed prior to embarking on the excavation, and according to its findings to determine the remediation destinations, and to arrange the disposal permits accordingly. However, if not **all** of the samplings required in the table have been performed prior to the excavation, then the stockpile must be sampled to complete the number of samples required.

5.3.1. For a soil stockpile stored in bulk -

Table 1 – Number of samples and sampling type for bulk stockpiles

	Non volatile	For volatiles and semi-volatiles including TPH (except if proven to the Ministry at a high level of certainty that this is a substance which is non-volatile or semi-volatile)
Stockpile volume in cubic meters	Composite sample – containing 20 merged Discrete samplings	Discrete sampling
Up to 25	3 composite samples, all of which (3) will be sent for analysis	10 discrete samplings of which the 3 samples with the highest PID readings in head space tests – will be sent for analysis
25 to 100	In addition to what has been said about the first 25 Cu.m., 1 additional composite sampling must be made for every additional 25 Cu.m., which will be sent to the laboratory	In addition to what has been said regarding the first 25 Cu.m., 10 additional discrete samplings must be made for every additional 25 cubic meters, of which the 2 samples with the highest PID readings in head space tests – will be sent for analysis



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	Non volatile	For volatiles and semi-volatiles including TPH (except if proven to the Ministry at a high level of certainty that this is a substance which is non-volatile or semi-volatile)
100 to 1,000	In addition to what has been said about the first 100 Cu.m. (6 composite samplings to be sent to the laboratory), 1 additional composite sampling must be made for every additional 100 Cu.m., which will be sent to the laboratory.	In addition to what has been said regarding the first 100 Cu.m. (40 discrete samplings of which 9 will be sent for analysis), 10 additional discrete samplings must be made for every additional 100 cubic meters, of which the 1 sample with the highest PID readings in head space tests – will be sent for analysis.
Above 1,000	see section 4.6 which discussed the sampling of large piles	

Remarks -

- * The Ministry is permitted to determine a different number of samplings than what has been specified in the above table according to the Ministry's professional discretion.



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5.3.2. For a soil stockpile stored in packages (“bales”) -

For a soil stockpile **stored in packages** on the ground – soil which was excavated and stored in sacks (1-cubic-meter bale sacks) or in other packages of the same volume on the ground, these will be sampled differently than stockpiles for which the guidelines have been provided above. This is due to the difficulty in characterizing the soil and visually inspecting it. The sacks must be sampled according to the following guidelines:

- For every **3 sacks, one composite sample** will be taken, which will represent the three sacks. If the entity in charge in the Ministry will be presented with satisfactory proof that the soil stored in the different sacks is identical and that it was excavated from the same spot, and provided there are more than 10 storage sacks, the Ministry will be able to permit merging of **one composite** sampling for 5 sacks.
- The person sampling the stockpile must perform a field sampling for each sack (description, odor, color and PID measurement), number each sack and document it in the records. In case the field samplings yield PID readings greater than 20 PPM, then a VOC analysis must be performed in addition to those planned. If a sack, or group of sacks, is found with soil “deviating” from the field findings, compared with the rest of the sacks, then these must be marked with a **different** color and the sampling of these sacks must be done separately. To the extent that the deviation characteristics are similar in multiple sacks, it is possible to perform a joint composite sampling for the deviating sacks.
- In the field, the “deviating” sacks must be separated from the rest of the sacks.

5.4. Method of sampling stockpiles and performing analyses

- 5.4.1. The soil sampling will be done by a sampling laboratory which has been accredited for soil sampling from the Laboratory Accreditation Authority (hereinafter – “accredited sampler”). The sampler will familiarize himself with the contamination at the site, and he will be supported throughout by a professional consultant who knows the conditions at the site and the findings in it. All of the laboratory tests must be done by a laboratory accredited for the required analyses.
- 5.4.2. Sampling procedures will be carried out according to the guidelines from the Ministry concerning the conduct of soil



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- surveys and according to the accreditation documents of the soil sampler.
- 5.4.3. Quality control – from stockpiles of 100 cubic meters and above, 10% of the samples must be sent for splitting to different laboratories for quality control purposes.
- 5.4.4. The soil stockpiles will be divided, visually, into a grid compatible with the number of samples that must be collected. The sample will be collected from the center of the cell and around its circumference and at depths of at least 30 cm into the stockpile and down to the bottom, and in a manner representative of the entire stockpile. Samples must not be taken from the surface of the stockpile.
- 5.4.5. In order to determine the number of samples required, the volume of the soil in the stockpile must be estimated. For this, the volume planned for excavation must be multiplied by an expansion factor of 1.25. For example – if an excavation of 10 cubic meters is planned, then the stockpile will be 12.5 cubic meters.
- 5.4.6. For stockpiles at a site, which were created while excavating in an area suspected as contaminated for the sake of routine operation and maintenance, including piping maintenance (not in cases of failure or leaks), the stockpile that has been excavated must be sampled, when the field findings raise suspicion that the soil is contaminated. It must be clear that in the event that the concentrations of contaminants in a stockpile exceed the limit values, it must not be returned to its place without superintendent approval. Additionally, in case of disposal of the stockpile, a sampling is always required according to the superintendent requirements as a part of the request for manager permission for disposal.
- 5.4.7. It should be noted that excavated soil with values not exceeding the very strict levels (2017 VSLs), but with field findings such as odor, color, remains of trimmings/prunings, nylon, plastic etc.. which indicate the presence of contamination or of foreign objects, shall not be disposed of for any purpose, but only after MPE has confirmed that the soil does not require a manager permission for disposal.



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5.5. Types of contaminants for testing

- 5.5.1. For in-situ stockpiles of a cumulative volume **less than 25 Cu.m. (about 41 tons)**, a TPH analysis must always be done and in addition, analyses for the main contaminant only, insofar as there is one. This means that wherever dealing with a site where the main contaminant is fuels, then a TPH test is sufficient without having to analyze secondary contaminants – VOC and metals. It must be clear that as a part of the in-situ investigations, prior to the excavation, analyses must be carried out for all of the potential contaminants in the soil.
- 5.5.2. For in-situ stockpiles of a cumulative volume **greater than 25 Cu.m.** – where the contamination source is unknown, samples must be sent to the laboratory for analysis as detailed in table 1, for the following parameters – metals TPH, VOC and SVOC. If the contamination source within the stockpile is known, based on an historical survey, a soil survey or any other information that can be obtained, then the number of analyses can be reduced, focusing on the primary contaminant and the secondary contaminants as detailed below:
- All of the samples will be sent for primary contaminant analysis (table 1) and 20% of the samples that have been sent for analysis at the laboratory must also be sent for secondary contaminant analysis.
 - Where the origin of the primary contaminant is from fuels (TPH would be regarded as a primary contaminant) – the number of contaminants will be determined according to table 1. At least 20% of the samples, which have been sent for the primary contaminant, must be sent for the secondary contaminants, including metals, in order to determine the destination and type of remediation.
 - Where the primary contaminant is not TPH or metals, at least 20% of the samples, which have been sent for the primary contaminant for TPH and metals analysis, in order to determine the destination and type of remediation.
 - In cases where samples are found with PID readings greater than 20 PPM, at least 20% of all of these samples must be sent for VOC and SVOC analyses. The samples which will be sent for



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analysis will be the samples suspected as being the most severely contaminated according to the field findings and from different areas in the stockpile.

When disposal of contaminated soil to a landfill site is requested, among other things as earth for topsoil, then the analyses must be completed according to appendix 6 of the primary limit values booklet, as per the manager's requirement.

5.6. Large stockpile sampling

- 5.6.1. When sampling large stockpiles, piles should be distinguished between homogeneous and non-homogeneous piles :
Homogeneous pile (uniform) – a soil pile which has undergone a treatment process, including a pre-treatment process homogenization of the pile such as washing or sifting or filtering etc.
Non-homogeneous pile (non-uniform) – a soil pile which has not been treated, or which has been treated but without prior complete homogenization, such as biological treatment, which includes turning over the pile vertically only.
- 5.6.2. Sampling frequency and analyses in large stockpiles shall be performed in accordance with table 2 below. Permission to perform analyses on fewer samples may be granted by Contaminated Soils and Fuel Division under the following conditions:
Field analysis of samples is performed using instruments which are included in the ISRAAC accreditation of the soil sampling personnel (e.g., PID, XRF)
Field measurements show low values, as detailed in Table 2 below.
Quality control sampling is performed in accordance with sampling accreditation.
- 5.6.3. Exemption from performing one or more of the parameters may be granted by Contaminated Soils and Fuel Division, and additional parameters may also be required, according to findings.



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Table 2 – Number of samples and sampling type for stockpiles larger than 1000 cubic meters

Sampling Frequency and Parameters for Measurement

Number of samples / parameters for measurement	Homogeneous Stockpile	Non-homogenous Stockpile
Field measurement – number of composite samples to be collected and field analyzed	100 : 1 For every 100 cu m, one composite sample composed of 10 sub-samples shall be collected and field analyzed	1 : 50 For every 50 cu m, one composite sample composed of 10 sub-samples shall be collected and field analyzed
Parameters for Field Measurements	VOCs field analysis using a calibrated PID Visual field findings – odor, color, texture.	
Laboratory – number of composite samples to be sent for laboratory analysis	1 : 200 For every 200 cu m, one composite sample (the most contaminated of composite samples collected, according to field measurements) shall be submitted for laboratory analysis.	1 : 100 For every 100 cu m, one composite sample (the most contaminated of composite samples collected, according to field measurements) shall be submitted for laboratory analysis.

Laboratory Parameters for Analysis

pH

Moisture Content

Metals (acid extraction) –

As primary contaminant – perform in all samples, unless XRF measurements are below threshold levels, in which case 20% of all samples are sufficient.

As secondary contaminant – analyze 20% of samples.

TPH in soil

TOC by method SM 5310B/EN1484 (for 50% of samples)

VOCs and SVOCs:

As primary contaminant – perform in all samples, unless PID measurements are below 20 ppm and no odor present, in which case 20% of all samples are sufficient.



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As secondary contaminant – analyze 20% of samples.

6. Confirmation sampling of the excavation pit

After all of the contaminated soil has been excavated, confirmation sampling must be conducted in the excavation pit. The sampling must be performed based on the soil survey and an earlier characterization of the soil being excavated, and based on the field findings. In cases where, based on the field findings (visual inspection, odor, color, PID readings), there remains a suspicion of contaminated soil on the surface of the pit (bottom and sides), then the excavation must be extended until uncontaminated soil is reached (based on the field findings). The confirmation sampling will consist of several stages:

6.1. Division of the excavation pit, walls and bottom, into sections of up to 2.5 X 2.5 meters. A discrete sampling must be made at the center of each section. For example -

- For a pit 5.0 meters long and wide and 2.5 meters deep, take 2 samples from each wall and 4 samples from the pit bottom.
- For a pit 6.0 meters long and wide and 2.5 meters deep, take 3 samples from each wall and 6 samples from the pit bottom.

In exceptional cases consisting of large-scale excavations (an area greater than 400 sq.m.) and deep (over 7.5 meters), a confirmation sampling plan must be submitted for Ministry approval. In these exceptional cases, the areas of the sections for sampling may be enlarged subject to the soil survey carried out prior to the excavation.

6.2. The sampling must be made at a depth of 30 cm using a gardening trowel or a manual sampler. In exceptional cases, due to safety constraints, it is permissible to sample from a soil stockpile while it is on the backhoe bucket at the time the pit walls or bottom are being excavated. In these cases, it is important to make sure that the first 30 cm have been cleared by the backhoe bucket.

6.3. In addition to sampling the sections, and if a layer of contaminated soil has been observed **in the pit walls** (which can be distinguished visually or due to the odor from the contaminants, etc.), sampling must be made from within the contaminated layer, as well as about 1 meter above it and 1 meter below it. These samples are in addition to the samples required due to the pit size.

6.4. **On the pit bottom**, in addition to the sampling at the 30 cm depth, sampling must also be done at a depth of 1 meter at 25% of the sampling



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points (and 3 samples as a minimum) at maximum spatial distribution such that a representative picture can be obtained.

- 6.5. All of the samples will be tested in the field visually and with a PID instrument. After that they will be transferred to an accredited laboratory for analysis of all the contaminant types which were required following the test run on the soil which had been excavated from that pit. In cases where a reading of more than 20 PPM is obtained on the PID instrument, in addition to the analyses already planned for that sample, analysis testing for VOC must be performed in an accredited laboratory.
- 6.6. As for **samples taken from the bottom of the excavation pit at 1 meter depth**, there is no need to perform analyses if the field tests have not indicated suspicion of contamination (PID reading of more than 20 PPM or exceptional odor and color).
- 6.7. However, the samples taken at 1 meter depth must be retained at the laboratory until the Ministry has approved the findings of the confirmation sampling. Retention of the samples will facilitate isolating the contamination, should one be found on the bottom of the pit (at a depth of 30 cm).
- 6.8. In cases where the soil excavation has been carried out in order to remove contaminated soil prior to construction, then an active TO-15 gas test must be performed to assess the need for protective measures in the structure, unless the superintendent has agreed otherwise in advance and in writing.
- 6.9. All of the actions and findings (including pit size, number of samples taken, field findings, exceptional findings, and method of sample collection) must be documented in the records and in the custody form as the case may be. On the custody form, the analyses required must be marked according to the known contamination. In addition, all of the excavation stages must be photographically documented.
- 6.10. The confirmation sampling must be done by an accredited sampler and subject to the instructions from the Ministry.



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