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APGO Response to “Guideline for Phase II Environmental Site Assessments in Ontario” Version 1.0 Revised March 22, 2006

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The Association of Professional Geoscientists of Ontario (APGO) is pleased to respond to the Ministry of the Environments document *Guideline for Phase II Environmental Site Assessments in Ontario*. This response has been prepared by the APGO Environmental Sub-Committee on Professional Practice. The APGO is the regulatory body that oversees the practice of professional geoscience in Ontario, as empowered by the *Professional Geoscientists Act 2000*.

Our review is a result of a workshop of APGO members convened in Toronto on July 12, 2006 and subsequent reviews by APGO members. The workshop was attended by professional geoscientists working in industry, government, conservation authorities and consulting.

Overall comments are provided followed by detailed comments on a section by section basis. In some instances, general comments are provided that pertain to all of the section.

GENERAL COMMENTS

We commend the Ministry for preparing the guideline to help in assuring that acceptable procedures are followed for conducting Phase II environmental site assessments (ESA). The guideline serves as a good reference tool for those persons or groups (i.e. property owners or municipalities) that are not familiar with the details of professional geoscience practices. However, for the Qualified Person, the guideline is too prescriptive and does not give enough consideration to professional judgment and site specific conditions. Professional judgment can provide equally effective but more economically efficient studies.

The Ministry has other models for ensuring compliance with a regulation that are worth considering. For one regulation, the Ministry has taken the approach of producing training documents for practitioners and then fact sheets for the general public. Another model is source protection guidance modules that emphasize results rather than methodology.

In many places in the Phase 2 guideline, the word “shall” is used thereby dictating a specific method as opposed to the use of the “could” with the final method selected based on professional judgment. Although the use of professional judgment and Qualified Persons is pointed out in the guideline Preface, this distinction between adherence to the guideline and use of professional judgment is not as evident in the remainder of the document.

The use of the guideline is for Record of Site Condition assessments. This needs to be better clarified throughout the document. Without such clarification, the guidelines could become the “norm” for all Phase II assessments regardless of whether it is for an RSC or not.

Surface water is often a requirement in Phase II assessments. This has not been addressed in the guidelines.

DETAILED COMMENTS

Preface

1st paragraph second sentence.

This guideline provides *guidance on generally accepted practice* (italics added) for planning a Phase II ESA, sampling methods for soil and groundwater, quality assurance/quality control procedures, data interpretation and reporting for purposes of filing a Record of Site Condition (RSC).

The sentence should be reworded to say ...” guidance on what the Ministry of the Environment considers acceptable practice...” The use of “generally accepted” is a judgment that the Ministry may not be able to properly define.

Paragraph 3. The CSA Standard must be complied with at all times but the CSA Standard is much less specific than the MOE guideline. Does the QP have the option of following the CSA Standard or the MOE Guideline in cases of conflict between the two?

Section 1 Introduction

Paragraph 5.

It is important to note that this guideline does not take into account site-specific conditions or the development of improved practices in conducting Phase II ESAs and is not a substitute for the use of good professional judgment in conducting Phase II ESAs.

It is pointed out that the guideline does not take into account improved practices and that they are not a substitute for good professional judgment. If the QP deviates from the practices outlined in the guideline, do the methods have to be justified and documented on the reasons for the deviation? The QP must be provided flexibility for conducted the assessments. There is a concern that deviations from the guidelines may mean increased liability to the QP by those that say the Phase 2 assessment does not follow the prescriptive elements of the guideline.

Section 3 Phase II Environmental Site Assessments

There are some concerns that the approach advocated does not comply with the CSA requirements. Phase II ESAs are often iterative in their approach and that the final Phase II ESA submitted may be an accumulation of multiple investigations.

1st paragraph.

It is important that provisions for feedback be incorporated in the planning stage to allow for additional sampling, as appropriate, based on the interpretation of results. The activities, findings and conclusions of the Phase II ESA should be clearly documented in a Phase II ESA report.

Is the MOE looking for specific feedback on the planning stage or just the feedback determined by the QP, the client and the municipality?

4th paragraph.

When a Phase II ESA is to be conducted, the findings of the Phase I ESA for the property will provide an indication of the sampling locations to be included in the Phase II ESA and will provide direction for determining which chemical parameters from soil, groundwater or sediment samples to select for analysis at each sampling location included in the Phase II ESA

Most Phase I ESAs do not provide details regarding which specific samples or sampling points to analyze and the specific chemical parameters to be analyzed at these sampling points. The results of the Phase I ESA may be used as a basis to help in these determinations but the actual Phase I will not likely provide the specific details.

3.2 Planning Stage

Again, iterative nature of Phase II ESAs should be mentioned.

1st paragraph, last sentence.

Additional sampling may be needed if the initial Phase II ESA work indicates there may be other possible areas of contamination or other contaminants present.

Delineation of impacts, remedial requirements and other reasons can require additional sampling.

3.2.1 Study Objectives

It is not always the objective of a Phase II ESA to determine the extent of or to delineate contamination. Potential concerns with the bullet points on page 6 could be addressed by changing the last sentence of paragraph 1 from “these objectives normally include the following” to “these objectives often include the following”.

2nd paragraph, last sentence.

This information would then be used for purposes of site cleanup/remediation, or for purposes of conducting a risk assessment and developing, if appropriate, a risk mitigation or cleanup/remediation plan.

Change “this information would then be used for purposes of site cleanup...” to “this information could then”.

3.2.3. Preliminary Site Characterization

A summary of the preliminary site conceptualization characterization does not need to be presented in all Phase 2 ESAs work plans. The guideline states that the site characterization should be included in the final Phase 2 ESA report, but the suggested report format included on page 69-70, does not specifically mention site characterization.

3.2.4.3 Non-Intrusive Testing

An APGO member with extensive experience in non-intrusive testing offers the following revision of this section. The revisions are technical in nature and provide more clarification on the application of non-intrusive testing methods in environmental site assessments. The original intent and meaning of the section has not been significantly changed.

Any non-intrusive methods to be used during the field program should be described in the work plan.

Non-intrusive testing is the use of geophysical methods to locate underground features such as buried tanks, infrastructure, objects, bedrock, former excavations or contaminant plumes, without digging, drilling or the use of sampling probes. The use of such methods is often useful in guiding the location of the sampling points.

Depending upon the stage of investigation the following methods can be applied: electromagnetic (EM), Magnetic (M), ground penetrating radar (GPR), electrical resistivity and seismic methods. It is common to use more than one method for any investigation.

Electromagnetic devices generate EM fields that induce secondary EM fields in all material within its field of influence. The method relies on changes in the electrical conductivity of material. It is often used to detect USTs, other buried infrastructure and

in some cases former excavations and well defined inorganic contaminant plumes. There are various EM device designs suited to different depths of investigation or emphasis on metallic objects. Aboveground infrastructure can influence measurements.

Magnetic devices are passive instruments that rely on localized changes in earth's magnetic field. They are used less often because they are limited to ferromagnetic elements only (iron, nickel, cobalt).

Ground Penetrating Radar (GPR or Georadar) utilizes radar technology to obtain a near-continuous profile of the subsurface. The basic principle is to emit an electromagnetic impulse into the ground. This pulse will travel through the sub-surface and reflects off the boundaries of materials with differing dielectric constants (contrasts of EM impedances). The reflected pulse returns to the surface and is recorded by a receiver. Examples of radar reflecting boundaries included air/water (water table); water/earth (bathymetry); earth/metal, (UST or pipe locating); air/earth (void locating) and differing earth materials (stratigraphic profiles, including bedrock profiles). EM pulses are emitted very quickly (10 to 200 scans/second) so only by moving the antennas along a profile directly over the targets can the locations and depths be determined. The method is often used in areas congested with aboveground infrastructure including inside buildings.

Electrical resistivity is a method that involves injecting electrical current into the ground with two metal rods and measuring the electrical potential between two different metal rods. The measurements are repeated with different combinations of rods over an array of rods. The result is an inversion model of electrical resistivities of earth materials in 1, 2 or 3 dimensions to depths of a few meters to tens of meters. The method is used for geologic mapping and contaminant mapping.

Seismic methods can include but not limited to reflection, refraction, multi-channel analysis of surface wave (MASW) or resonance imaging (TISAR). In very general terms a seismic source can be an impact device or a vibration-generating device and the various types of waves that can be generated are measured by vibration monitoring devices. The method is generally used for geologic mapping.

3.2.4.4 Intrusive Testing

Last sentence.

All boreholes and wells must be properly abandoned when no longer required for further sampling and/or monitoring.

A reference to Regulation 903 could be added here regarding borehole and monitoring well abandonment.

3.2.5.2 Utility Locations

Most public utility locating companies prefer not to meet with investigators or cannot at least provide a specific time to meet. If this is to become the preferred method, then input from public utility providers should be obtained by the MOE prior to recommending that project staff meet with the utility locators. In addition, some utility providers do not provide on site locates and private locators must be used. Consideration could be given to adding a sentence noting that utility clearance forms should be on site during the subsurface work.

3.3.2 Groundwater Sampling

The report indicates that “more than three wells would normally be needed to demonstrate that flow direction is uniform”. Frequently three wells are sufficient especially on smaller sites.

3.3.5.1 Analytical Protocols

Rather than indicating that sampling requirements be discussed with the laboratory, this should be revised to say that “Sampling details, such as sample containers, sample volumes and applicable protocols can be discussed with the laboratory prior to sampling”.

3.3.5.2 Laboratory Accreditation

Last bullet.

- **Any laboratory standard that may have been developed by the Standards Counsel of Canada for a parameter set out in the Ministry publication “Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the *Environmental Protection Act*” dated March 9, 2004.**

A typographical error, please change “Counsel” to “Council”.

3.4 Interpretation and Evaluation Stage

1st paragraph, last sentence

In order to make such a conclusion, however, the interpretation and evaluation would also have to consider whether the sampling and site assessment work was sufficient and done properly.

The statement that “site assessment work was sufficient and done properly”. An explanation of “properly” is required. Does this mean in complete compliance with the draft document or is general compliance sufficient?

3.4.1 Data Analysis and Interpretation

The draft acknowledges that the process of sampling is iterative and more than one sampling program is often required. This concept should be noted elsewhere in the report.

The draft suggests that impacted areas can be determined quite precisely. This is not always the case. The word “estimated” would be more appropriate than “determined” or other wording since conditions between boreholes are interpreted.

Section 4 Soil Sampling

At the July 12, 2006 meeting, the consensus among the P.Geo.s present was that Section 4 was too prescriptive. The information provided in Section 4 is useful but would be better presented in an appendix or in a companion document outlining sampling methods commonly used for Phase 2 investigations.

Some specific concerns were that the soil and groundwater sampling procedures are too prescriptive and frequently can not be adhered to. The MOE must ensure that the procedures advocated are both practical and feasible. Different techniques and decontamination procedures are acceptable and even sometimes required when sampling pristine areas and highly contaminated sites. In some cases, a Phase 2 ESA will be conducted to find gross levels of contamination and it is not significant if the F1 fraction of petroleum hydrocarbons in soil is 2000 µg/g or 2002 µg/g.

4.1.2 Staged Sampling

1st paragraph, 3rd sentence

A one stage sampling plan results in all samples being collected and analyzed in one survey.

The guideline uses the phrase “all samples being collected and analyzed” implies that all samples that are collected are also analyzed. This is not usually the case and some clarification is suggested.

1st paragraph, 5th sentence

From the results of the initial sampling, additional sampling scheme can be planned to define more precisely the areas of concern

A typographical error. The word “scheme” should be changed to “schemes”.

4.2.1.1 Manual Samplers (Surface Soil)

It is probably advisable but it is not really necessary to use stainless steel equipment when collecting surface soil samples. If non-stainless steel equipment contributes to cross contamination, then all subsurface equipment should be stainless steel too (which is not the case).

3rd paragraph.

Augering devices are not considered suitable for samples to be analyzed for volatiles, due to soil disturbance, and the possibility for cross-contamination between layers.

The word “generally” should be added so that the sentence reads “augering devices are generally not considered suitable ...”.

4.2.1.2.1 Split-Spoon (Split-Barrel) Sampler

The draft indicates that an instrument should be used to remove the soil from the split spoon sampler. The word “should” should be replaced with “may”. The use of “should” is too strong as this implies that the use of a glove is inappropriate. The use of additional equipment means additional risk of cross contamination.

The guideline advocates removing any smeared soil on the outer layer of the core to limit the potential for cross contamination. This is not necessary as the sample has been obtained over a limited depth range and the scrapping of soil will likely allow for a greater loss of volatiles than if the sample was collected immediately. If notable staining is present then the outer layer of the sample should be removed.

The use of special VOC sampling equipment is not necessary to obtain good quality samples. The use of special VOC equipment introduces delays in soil sampling with the inherent loss of VOCs and increases the risk of cross contamination. Opening the split spoon completely is a necessity in order to describe the soil lithology and it is only then that it can be determined if there has been a change in lithology and/or if there are significant variations in conditions over the length of the sample. The use of a corer as recommended in the guideline could contribute to the collection of composite samples for VOC analysis and the use of composite samples for VOC analysis is not recommended.

Please note the typo in this section where it is stated that “ there should be no zero headspace”. This sentence should be revised to indicate that there should be “zero headspace”

4.2.1.2.5 Soil Sampling Principles for Test Pits

The number of samples depends on various factors and the need to sample is the judgment of the Qualified Person.

2nd bullet.

- **If contamination is detected in the borehole samples based on field screening observations or measurements, the sample with the suspected highest contamination should be selected for laboratory analysis. In addition, a sample from the first suspected non-impacted interval underneath the contaminated zone should be selected for laboratory analysis, in order to provide vertical delineation of the contamination.**

The MOE should not specify the number of samples to be analyzed and which samples. In some cases, the sample with the highest headspace reading does not require analysis but samples suspected of having concentrations close to the MOE Standards for a suspected contaminant should be analyzed. The Qualified Person should be given the flexibility to select the most appropriate samples for analysis.

4.2.1.3 Mechanical Excavation

1st paragraph, 2nd sentence

Test pit samples are considered to be “disturbed,” but are generally suitable for chemical analysis.

We suggest that “Test pit samples are considered to be “disturbed”” be changed to “test pit samples are often considered...”, as undisturbed samples can be collected directly from the walls of shallow test pits.

The guideline states that soil from an excavation should not come into contact with the bucket of the backhoe or excavator. Presumably, the MOE is concerned about the potential for cross contamination. However, if soil is taken from the middle of a bucket, the depth of the sample is not known and there could be about 0.5 m difference between the true depth of the sample and the estimated sample depth. It is important to consider all variables in collecting soil samples. Solely being concerned with cross contamination to the extent that hinders accurate measurements results in a poor sampling program.

Soil samples from the teeth of the bucket are more representative than those obtained from soil within the bucket because not only is the depth more likely to be known but the sample has had less opportunity to come in contact with other soil. Soil chunks at the teeth can be broken and soil that was not in direct contact with the teeth need not be included in the sample sent for analysis.

4.2.1.3.1 Soil Sampling Principles for Test Pits

2nd paragraph.

In cases where contaminated soils are not encountered, the test pit should be advanced to the maximum depth achievable with the backhoe or excavator (typically, just over 5 metres below grade); or in cases where contaminants are less dense than water (e.g. petroleum hydrocarbons), until the borehole (underline added) has been advanced 1 metre below the lowest expected seasonal water table level (if practical); or until refusal is reached; or until unstable soil conditions and/or the collapse of the test pits walls make further excavation unsafe and/or unfeasible; whichever condition is satisfied first.

A typographical error. There is a reference to borehole in this paragraph and it is likely that this should be changed to test pit.

In sampling for metals and contaminated fill, it is possible that test pits would not have to be excavated to the full depth as suggested. Especially if a building is to be constructed on the site, for foundation purposes, deep test pits are discouraged. The paragraph should be revised to reflect that deep test pits may not be required. If laboratory analyses of test pit samples indicate that metal contamination has not been delineated by test pitting, then in such a situation a borehole sampling program could be necessary..

4th paragraph, 2nd sentence

If there is no significant difference of visual/olfactory contamination and/or soil classification observed within the 0.5 to 1.0 metre length of the sampling interval, then a single composite sample should be taken from each distinct zone of the sampling interval.

Reference is made to the use of composite soil samples in this paragraph. The sentence should be clarified to exclude the use of composite soil samples for VOC analysis.

5th paragraph

Samples should not be taken near the edges of the metal backhoe/excavator bucket.

It is not known why samples should **not** be taken near the teeth of the bucket when the depth of such samples is more accurately estimated and such samples are less subject to mixing and cross contamination. Sampling from the middle of the bucket increases the risk of cross-contamination, results in homogenization of samples (not desirable for VOC analysis) and introduces uncertainties regarding the depth and sample interval.

The guideline states that one sample per test pit should be submitted for chemical analysis. The number of samples submitted should be at the discretion of the Qualified Person. The MOE should not specify what samples should be analyzed. In the case of hydrocarbon impacts, the sample with the highest headspace reading is not always analyzed. For example, a sample with an oily odour but with a low headspace reading may be analyzed in preference to one without an oily odour but with a higher headspace. The draft guidelines are too restrictive in providing options for the Qualified Person to select samples appropriate to the purpose of the investigation.

It may not always be feasible due to site restrictions to separate impacted and non-impacted soil and there should be provision in this paragraph that adherence to this methodology may not always be feasible. We understand, however, that sampling may indicate impacts above Standards and then the whole pile would require disposal.

Several references are made to a field log book within the draft report. A statement should be included in the draft that the use of forms such as field borehole logs, field test pit logs and field sampling forms are also acceptable.

4.2.2.1 Composite Sampling

1st bullet.

- **For surface or near surface soils, samples should be collected from within a two-metre radius, with a minimum of 10 cores or grab samples constituting the composite sample for analysis from each depth increment. For sites where surface soil is expected to remain on site, the 0 to 5 centimetres depth should be sampled separately from materials at greater depth, since this is the soil that will contribute most to exposure of future site users to any potential contamination.**

A minimum of 10 cores or grab samples to make a composite sample is likely a greater number than is necessary in order to provide a representative composite sample. In cases where only 50 grams of sample is required, this means that samples of no more than 5 grams be composited. A sample of 5 grams is very small and may not be representative. More leeway should be provided to the Qualified Person in deciding on appropriate sampling details.

4.2.2.2 Soil Texture (Grain Size)

A grain size analysis should not always be required, even when assessing petroleum hydrocarbon concentrations at a site. If the concentrations of petroleum hydrocarbons meet both the coarse and fine and medium textured standards, then a grain size analysis for field confirmation should not be required.

Last sentence

ASTM Standard D2488-00 (Visual-Manual Procedure for Description and Identification of Soils) should be referenced for more information on field characterization of soil. In conducting field characterization of potentially contaminated soil, however, appropriate safety procedures should be used (e.g.

soil screening for VOCs in place of direct or close contact).

The sentence should be revised to indicate that ASTM Standard D2488-00 or other generally used procedures should be referenced for more information.

4.2.2.3 Soil Screening (Visual and Physical Observations)

1st paragraph. first sentence

Soil screening is carried out to guide the selection of the number, location, and depth of soil samples that will be collected for laboratory analysis.

We suggest that “collected for laboratory analysis” be changed to “submitted for laboratory analysis”..

4.2.2.4 Soil Screening Instruments for VOCs

The guideline notes that weathered fuels are often more easily discernible by visual observation than by instrumental screening procedures. This statement acknowledges that the analysis of the sample with the highest headspace is not always required, although this option is not included in section 4.2.1.3.1

4.2.2.4.6 VOC Screening Methodology

The guideline indicates that the manufacturer’s recommended procedures should be followed. Some manufacturers do not require daily calibration of the instrument but the MOE guideline indicates that daily calibration should be performed in the field.

The soil screening procedure has been revised from the previous procedure. An explanation of why this method is preferred would be useful.

3rd bullet.

- **Allow the soil/vapours to equilibrate at least 15 minutes, at a minimum of 15°C. In winter the measurement may be conducted in a vehicle with the heater on. This will allow the VOCs to equilibrate between the soil (and pore water) and headspace. The time and temperature restrictions are recommended to ensure consistency of readings between samples;**

Presumably the reference to 15°C means ambient temperature. In winter the soil sample may still be frozen.

A previous version of the soil screening procedure advocating at least 4 hours between sampling and the taking of the readings. The guideline now advocates that samples not be stored until the end of the day. A rationale for this should be provided.

Last paragraph, 1st sentence

The soil from the plastic bags should not be submitted for laboratory analysis.

Soil from plastic bags should be permitted for laboratory analysis. Frequently there is insufficient sample and it is often difficult to obtain sufficient sample to fill one 60 ml jar and part of one plastic bag. The procedure as advocated will result in poor quality sampling methods and inconsistent or the absence of combustible vapour readings. For QA/C purposes, the use of soil from plastic bags for chemical analysis may be required. It would be unfortunate if a Qualified Person was required to submit poor quality samples because of adherence to the draft guideline.

The use of a vehicle in winter to heat soil samples is not sufficient and given that some Phase 2 investigations are conducted in areas inaccessible to vehicles, the VOC procedures are not practical. A rationale should be provided as to why VOC analyses can not be conducted at one time, such as at the end of the day, provided samples have warmed to approximately room temperature in winter.

4.2.3.1 Handling of Soil Samples

The soil sample handling procedures contained in the draft attempts to minimize contact with the soil. The draft advocates only handling soil for very low regulatory limits with a stainless steel spoon.

However, only using a stainless steel spoon to pack a soil sample into a sample jar to leave no headspace is impractical. If this procedure is followed, then loss of VOCs will occur as the practice advocated will take several minutes.

In the past, the MOE has adopted a procedure to break the soil sample apart into fine particles and then pack the fine particles into a sample jar so that zero headspace is present. There should be some guidance regarding the loss of VOCs by breaking the soil sample down into particles, for example by crushing with a stainless steel spoon, in order to pack the samples into jars versus the inherent loss of VOCs that will occur during breaking the sample apart and the long period that the sample is exposed to air during the sample preparation period.

4.3.1 Manual Sampling Tools and Down-Hole Sampling Equipment

The mandatory use of water to clean sample tools likely is not required. While measures should be taken to reduce the risk of cross contamination, the use of water on some sites is excessive and in some circumstances may lead to increased risks of cross contamination. The use of water during periods of extreme cold introduces further concerns that outweigh the potential risk of cross contamination.

4.3.2 Down-Hole Drilling Equipment

The decontamination procedures advocated for down hole drilling equipment is excessive when investigations are being conducted on sites where contamination is not suspected. The procedures used will significantly lengthen the time required for such investigations without significantly reducing the risk of cross contamination. The potential for the improper disposal of large volumes of wash water should be considered.

4.3.3 Backhoe/Excavator Buckets

There is an inconsistency between decontamination procedures recommended for borehole equipment and that for excavators. The guideline recommends that the borehole equipment be brushed, washed with detergent, rinsed and steam cleaned whereas a bucket for an excavator need only be banged on the ground periodically. Section 4.3.3 suggests that the bucket only needs to be cleaned when advancing through a contaminated zone, whereas section 4.3.2 infers that strict decontamination procedures are recommended, regardless if the borehole is advanced through “clean” soil or contaminated soil. Decontamination procedures advocated in the draft document should be more consistent between similar pieces of equipment.

4.3.4.2 Equipment Cleaning Procedure

The guideline recommends the use of deionized water. It is suggested that the use of distilled water rather than deionized water is sufficient in most cases.

4.4 Field Records

The guideline recommends the use of a field notebook. The draft should also permit the use of field borehole logs and other forms to record field information.

Section 5 Groundwater Sampling

5.1 Design of a Groundwater Sampling Program

The guideline presents a good summary to determine the requirements of groundwater monitoring during a Phase 2 ESA. A similar summary would have been beneficial for inclusion in the preamble to the soil component of the Phase 2 ESA.

5.2.3 Groundwater Velocity

The estimation of groundwater velocity is not a required part of a Phase 2 ESA as defined by the MOE. Whether this estimate should be included as part of a Phase 2 is a judgment of the QP.

5.3.1.1 Borehole and Well Diameters

A reference to Ontario Regulation 903 may be appropriate for inclusion in this section. Also, the last sentence of the 2nd paragraph should be revised to indicate that wells of smaller diameter should generally be avoided...(underline added).

5.3.1.4 Well Screen Slot Size and Filter Pack

A range of 0.3 to 0.6 m would be appropriate for extension of the filter pack above the well screen.

5.3.2 Well Installation

The draft recommends the use of hollow stem augers to install monitoring wells. Provision should also be made for the use of solid stem augers in those situations where ground conditions are appropriate. For example there are cases where the drill rig can not advance hollow stem augers or direct push equipment through very hard tills.

Latex, nitrile or cotton gloves are recommended. The use of vinyl gloves in some situations should also be permitted. .

5.3.2.1 Well Casing and Screen

The addition of at least 0.15 m of sand in the bottom of the well, a weep hole in the bottom of the well to drain perched water, hydration of bentonite chips is not always required.

5.3.2.3.1 Bentonite Plug

No details regarding the volume of water to be added to hydrate the bentonite plug nor what is a reasonable amount of time that the bentonite plug should be allowed to hydrate. The potential use of large volumes of water, especially in winter may cause logistical and/or non-compliance difficulties.

5.3.2.3.2 Annular Seal

No guidance on how much potable water should be added to hydrate every 50 to 100 centimetres of bentonite chips.

5.3.2.4.2 Flush Mount Casings

The guideline indicates that the hollow stems augers should be withdrawn until a specified depth. The paragraphs should be expanded to explain the next procedure, such as the addition of more sand or bentonite and when the augers can be withdrawn from the borehole. To permit the installation of a lock on the protective casing rather than the well, consideration should be given to revising the sentence to read: "A lockable protective casing and/or lockable well cap should be installed".

5.3.4.2 Monitoring the Well Development Process

2nd paragraph.

Well development typically requires the removal of three to ten well volumes of groundwater (or if low yielding, pumping the well until dry) up to three times over a one to two-day period (i.e. typically 10 to 30 well volumes).

The guideline indicates that the groundwater elevation should be allowed to reach static equilibrium before another round of pumping is initiated. However, in low yielding wells, such equilibrium may not occur within the one to two day period suggested.

The guideline indicates that field measurements should be recorded during the well development process. Consideration should be given to revising should to “may be recorded” or “often recorded” to provide more options in the well monitoring program.

5.3.5.1 Well Survey

The top of the well casing should not be notched as this could lead to a non-watertight seal in the case of wells installed in flush mount protectors. The presence of a permanent survey mark on top of the well casing could still be established using another technique, such as the use of a permanent marking pen. All elevations should be expressed relative to this mark and/or to the survey benchmark. The addition of “and/or” to the last sentence of section 5.3.5.1 is recommended as on construction projects, the elevation of the top of the casing may change during the course of a project.

5.4.1 Sampling Equipment

Peristaltic pumps should be included in the list of pumps potentially applicable for use during a Phase 2 ESA.

5.4.2.2 Water Level Measurement

3rd paragraph

The top of the well casing should be notched to indicate the exact point of measurement. To ensure reproducible data, all subsequent readings should be taken from the same notched point in the well casing.

Add the words “or otherwise referenced” to “the top of the well casing should be notched” so that other forms of identifying the reference point, other than a notch are acceptable.

Last paragraph.

Latex gloves should be worn during use of the groundwater level measurement equipment. Contact between the latex gloves and the measurement probe should be minimized. Any hydrocarbon contaminated gloves should be disposed of.

The use of vinyl or nitrile gloves should be permitted.

5.4.2.3 NAPL Layer Detection

The interface probe is designed to provide a relatively reliable thickness of NAPL.

3rd paragraph

The bailer is used to confirm the negative interface probe reading or, if a positive reading is obtained, to give a *rough estimate* (italics added) the thickness of the free product.

A typographical error. Please add the word “of” after “rough estimate”.

5.4.2.4 Well Purging

It is assumed that “field measurements” in this paragraph refers to values such as pH, temperature and conductivity, however, this should be clarified as field measurements also can refer to items such as depth to the groundwater, volume of water purged, etc.

5.4.2.4.1 Low-Flow Purging

Note that silt should not be filtered out of samples that are being sent for organics analysis

The sentence should be revised to state that samples for organic analysis should not be filtered, rather than inferring that filtering to remove particles other than silt is acceptable.

Last paragraph. In most cases, the sampling method will be the same during the sampling program, however, the Qualified Person may want to vary sampling procedures to see if this affects the results and this option should be available to the Qualified Person. The quantity of water may also require variations to be made to the sampling program.

5.4.3.2 Sample Collection

In some cases, the collection of groundwater from excavations or test pits is required for disposal purposes and this portion of the guideline should be changed to reflect that the collection such samples is in conformance with recommended practices.

Many sampling protocols advocate the collection of VOC samples before the collection of samples for inorganic analysis. The draft guideline does not mention any order in which groundwater samples for various analyses should be collected.

5.4.3.3 Field Filtration

Previous guidance documents have permitted laboratory filtration of samples collected for metals. Consideration should be given to permitting this procedure or at least modifying the statement that samples for metals analysis should be field-filtered. Field filtration is sometimes difficult under inclement weather conditions and laboratory filtration may be preferred for sample quality purposes.

Section 6 Quality Assurance/Quality Control Program

6.1.2 Sample Labeling

There are too many items suggested for inclusion on the sample label, especially when small labels are required for vials. The second sentence should be revised to include that the sample labels “may include items such as”.

Some items such as the sampler’s initials and the required analysis are more appropriate for a chain of custody form. Other items such as the company name have not been included in the list of recommended items.

6.1.3 Packaging

The guideline indicates that sample containers should not be prepared for shipment in a field office trailer. A field office trailer is an appropriate place to prepare samples for shipment and the use of such a facility should not be discouraged. Preparing samples for shipment where there are tables, adequate lighting and appropriate temperatures is more appropriate than preparing sample shipment containers outdoors where conditions are less conducive.

6.1.4 Chain-of-Custody Records

Chain of custody forms should be completed only for those samples submitted to the analytical laboratory.

6.2 Field QA/QC Sampling

The number and type of QA/QC samples suggested in the draft is excessive for most investigations and is greater than the previous guidelines. Most investigations are not research oriented and as such the variability among samples is not as much a concern as when dealing with a research project. This is especially the case when high concentrations of contaminants are reported

The footnote makes reference to TPH but it should be PHC.

6.2.2 Field Blanks

A definition or explanation of “water of proper quality” should be provided.

Section 7 Phase II ESA Report

At the July 12 2006 meeting, the general consensus of the P.Geos. present was that this section on the Phase II report is not consistent with the rest of the draft guideline. This section does not provide the amount of detail that is found in other sections. For example, the first sentence in the second paragraph states that the conclusions of the Phase II report should “address initial aims” of the Phase II. This is correct but it is also vague. The “initial aims” include the purpose of the Phase II (RSC submission, commercial transaction, etc.) and requirements of the proponent.

7.2 Report Content

The first bullet should be revised to indicate that a summary of the results/finds of the Phase I ESA be included in the Phase 2 ESA. For the purpose of the Phase 2 ESA a complete listing of all findings of the Phase 1 ESA is not required in all cases.

page 69, 3rd bullet. Several items in the list of information are more often presented on the borehole logs rather than presented in tabular form . It should be noted that information presented on borehole logs is be equally acceptable.

page 69, 4th bullet.

However, cross-sections may not be needed are often not useful for smaller or less complex sites.

Please note the typo in the above sentence. The sentence starting with “However”, should have “and” added after “needed”

Table 3. The purpose of the ESA should be stated.

Table 3. There should be a distinction between all samples collected and all samples analyzed. Rationale tables need only be prepared for the samples analyzed, not collected. All sample locations should be indicated on a drawing but the sample depths should not be required on such a drawing. Sample depths are more appropriately shown on borehole and test pit logs.

Table 3. Analytical results tables are not always necessary, particularly if results can be adequately discussed in the text or if a table of exceedances is included.

Table 3. On page 7, section 3.2.3 of the guideline, it is recommended that the site characterization, as confirmed by the Phase 2 ESA be included in the Phase 2 ESA report. However, Table 3 does not specifically mention items that should be included in the report as part of the site characterization.

Thank you for this opportunity to comment on this important document.

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