



Phase 2 Environmental Site Assessment Protocol

Adopted by the Minister of Environment

Pursuant to the Contaminated Sites Regulations

Adopted by the Minister of Environment,
Hon. Sterling Belliveau, on July 3, 2013, effective as of July 6, 2013

Document No.: PRO-400

Revision: July 6, 2013

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1 OBJECTIVES

The *Phase 2 Environmental Site Assessment Protocol* describes the Phase 2 Environmental Site Assessment (ESA) requirements referred to in Section 15(1)(b) of the *Contaminated Sites Regulations*. This *Phase 2 Environmental Site Assessment Protocol* must also be followed as part of the limited remediation option pursuant to the *Contaminated Sites Regulations* where a record of site conditions being sought for an L2 or L3 Limited Remediation.

The objectives of this protocol are to identify requirements to:

- a) Confirm the presence of contamination at a site based on a Phase 1 Environmental Site Assessment (ESA), performed in accordance with protocol PRO-300, *Phase 1 Environmental Site Assessment Protocol*
- b) Conduct intrusive site investigations
- c) Delineate the extent of contamination vertically, horizontally, and laterally in soil, groundwater, surface water, and sediment to applicable Tier 1 Environmental Quality Standards (EQS) as determined using the protocol PRO-100, *Notification of Contamination Protocol*
- d) Provide the required information to the Minister within the time frames specified in the *Contaminated Sites Regulations* for conducting a Phase 2 ESA
- e) Acquire sufficient site information to develop a remedial action plan
- f) Report information in a Phase 2 ESA report, including a summary checklist submission, CHK-400: Phase 2 Environmental Site Assessment Checklist.

The *Phase 2 Environmental Site Assessment Protocol* is intended for use by a site professional, the qualifications for which are as defined in Section 5 of the *Contaminated Sites Regulations*.

2 DEFINITIONS

Atlantic RBCA: means the current versions of Atlantic Risk Based Corrective Action guidance documents including the Petroleum Hydrocarbon Impacted Sites User Guidance and software modelling tool, Guidance for Soil Vapour and Indoor Air Monitoring Assessments from Atlantic RBCA and Guidelines for Laboratories as published by the Atlantic Partnership in RBCA Implementation committee.

Conceptual Site Model: means a description of the type and extent of contamination, which identifies the pathways for contaminant migration and potential receptors

Contamination: means a substance or substances present in soil, groundwater, sediment, or surface water at concentrations exceeding Tier 1 Environmental Quality Standards from protocol PRO-100, *Notification of Contamination Protocol*

Intrusive Investigation: means an investigation to obtain data on the physical and chemical properties of soil, groundwater, sediment, surface water, indoor air, sub-slab vapour, and soil vapour through monitoring and sampling

3 SITE ASSESSMENT REQUIREMENTS

All areas on, in, or under a site where contamination is present at a property undergoing a Phase 2 ESA must be assessed laterally, vertically, and horizontally for each substance present in soil, ground water, or sediment on, in, or under the site. Site assessment requirements are detailed in Sections 3.1 to 3.4, which follow.

3.1 Intrusive Investigation

An intrusive investigation must involve the following:

- a) Identification of the presence and location of contamination by soil sampling at least one location for every potential source area. Testing methods must enable the acquisition of samples at appropriate depths and locations, using methods and equipment that prevent cross contamination, provide reliable results, and are standardized. All field sampling methods used must be documented and reported.
- b) Evaluation of groundwater to determine the direction of flow, velocity, hydraulic gradient, and elevation, by the placement of at least 3 drilled boreholes on the property and the installation of monitoring wells within the boreholes. All field methods, calculations, and measurements used must be documented and reported.
- c) Determination of whether free product in soil or groundwater exists at a site. Free product is as defined in Figure 1 of protocol PRO-100, *Notification of Contamination Protocol*.
- d) Determination of the horizontal extent of soil contamination on and off the property for each contaminant, which is to be described in text and also shown on a site plan.
- e) Determination of the vertical extent of soil contamination on and off the property, including the maximum depth at which contamination was identified, and confirmation that the vertical depth of contamination has been determined, using site profiles and available site information as appropriate.

- f) Determination of the horizontal and vertical extent of groundwater contamination that exceeds the applicable Tier 1 EQS from protocol PRO-100, *Notification of Contamination Protocol* on and off the property for each contaminant, which is to be described in text and also shown on a site plan.
- g) Determination of any sediment or surface water contamination that exceeds applicable Tier 1 EQS from protocol PRO-100, *Notification of Contamination Protocol* on and off the property for each contaminant, which is to be demonstrated on a graphical site plan.

3.2 Geological, Hydrogeological, and Hydrological Information

The Phase 2 ESA report must contain a written summation of the following hydrogeological and hydrological components:

- a) description of regional drainage, geology, and hydrogeology, including:
 - (i) surface drainage patterns
 - (ii) surficial and bedrock geology (specific physical characteristics to be included)
 - (iii) groundwater flow regimes, such as directions and position of site in relation to regime
 - (iv) aquifer types, such as bedrock, sand and gravel, confined, and unconfined
 - (v) groundwater and surface water use in the local area
- b) description of local drainage, geology, hydrogeology, and water use (obtained through non-intrusive site inspection, intrusive site investigation, and available site information), including:
 - (i) surface drainage patterns
 - (ii) surficial and bedrock geology (site specific physical characteristics to be included)
 - (iii) groundwater flow regimes, such as site specific directions and position of site in relation to regime
 - (iv) presence of known groundwater recharge/discharge zones
 - (v) aquifer types
 - (vi) groundwater and surface water use on and off the property in the local area
 - (vii) water table depth and elevations
 - (viii) groundwater hydraulic gradient
 - (ix) groundwater velocity

3.3 Laboratory Analysis

Appropriate laboratory analyses must be conducted for samples collected. The following must be part of the analyses:

- a) Laboratories performing analysis must be accredited to ISO/IEC 17025 standards (and subsequent revisions) by the Standards Council of Canada (SCC) or the Canadian Association of Laboratory Accreditation (CALA). All routinely required analyses must appear on the laboratories certificate.
- b) All sampling and analysis must be in accordance with laboratory-approved recommendations concerning sample containers, storage, and preservation.
- c) Selection of laboratory analytical methods that are appropriate to ensure adequate conformance to data quality objectives, assessment endpoints (ecological or human health), and method/reportable detection limits.
- d) In the case of petroleum hydrocarbons, analysis must conform to Atlantic RBCA Guidelines for Laboratories, Tier I and Tier II Petroleum Hydrocarbon Methods (latest revisions).
- e) For all other contaminants, the analytical methods recommended are those in the latest guidance from CCME concerning sampling, analysis, and data management for contaminated sites.

3.4 Conceptual Site Model

Conceptual site models must include descriptions of the following:

- a) contamination source, identifying the type, location, and extent of contamination on or off the site
- b) relevant pathways for the contamination to migrate or create exposure conditions on or off the site
- c) receptors (human or ecological) that might be exposed to the contamination

4 REPORTING

4.1 Phase 2 ESA Report Content

A Phase 2 ESA report must include:

- a) cover page title that identifies a Phase 2 ESA, the site location, site owner(s), and site name, if applicable
- b) project background description
- c) basic site information, including physical address, PID, and GPS coordinates if available
- d) summary of the results and findings of the Phase 1 ESA
- e) summary of all work and field activities conducted at the site as part of the Phase 2 ESA program, including those resulting from the Phase 1 ESA findings

- f) the conceptual site model
- g) description of geological, hydrogeological, and hydrological information as required by this protocol
- h) description of results obtained from the intrusive investigation as required by this protocol
- i) table(s) of analytical results for the site with exceedance values/data highlighted
- j) choice and rationale for the sampling program
- k) site plans showing the site location, location of sample points, groundwater elevation maps, location(s) of samples exceeding applicable criteria, locations where contaminant concentrations exceed background values, and all spatial information represented on a scaled diagram
- l) results of all analyses displayed in a table and compared to relevant environmental quality standards, with supporting rationale
- m) clear and concise conclusions
- n) list of any references and supporting documentation used in the preparation of the Phase 2 ESA report
- o) complete test pit, borehole stratigraphic, and monitoring well installation logs
- p) borehole drilling practices
- q) excavating practices
- r) soil sampling procedures
- s) monitoring well installation, development, and groundwater sampling procedures
- t) interpretation and evaluation of the information and results from the site investigation that identifies and describes any contamination (and wastes) found at the site including location, possible sources for this contamination, and concentration and potential pathways and receptors of concern
- u) QA/QC procedures
- v) copies of laboratory analytical data sheets
- w) site professional sign-off, with original or electronic signatures, and a stamp/seal confirming the findings and conclusions contained in the report
- x) completed CHK-400: Phase 2 Environmental Site Assessment checklist

5 REQUESTS FOR TIME EXTENSIONS

To request a time extension for the filing of a Phase 2 ESA, in accordance with Section 15(1b) of the *Contaminated Sites Regulations*, form FRM-400, Request for Time Extension Form provided in the appendix to this protocol must be completed in entirety by a Site Professional. Form 400,

Request for Time Extension, and the minimum supporting documentation prescribed therein must be submitted to the Minister within 150 days of filing form FRM-100, Notification of Free Product or Contamination.

Acceptable submissions will result in an alternate date for completion of the Phase 2 ESA. The revised date to complete the Phase 2 ESA will be issued in writing by the Administrator or Inspector in accordance with the *Contaminated Sites Regulations*.

APPENDICES

Checklist CHK-400 Phase 2 Environmental Site Assessment Report Checklist