



**APPENDIX 2**  
**Atlantic RBCA Version 2**

**MINIMUM REQUIREMENTS AND REFERENCE GUIDELINES**  
**FOR**  
**ENVIRONMENTAL ASSESSMENTS OF PETROLEUM IMPACTED SITES**  
**IN ATLANTIC CANADA**

*ATLANTIC PARTNERSHIP IN RBCA IMPLEMENTATION*

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## INTRODUCTION

This document presents the guideline for conducting an environmental assessment on petroleum hydrocarbon impacted sites in the Atlantic Provinces. This guideline has been established under the mandate of the Atlantic Partnership in Risk Based Corrective Action (RBCA) Implementation (PIRI) committee and is to be used in conjunction with the current version of the Atlantic RBCA software and relevant supporting documentation ([www.atlanticrbca.com](http://www.atlanticrbca.com)). It also applies to sites that will be evaluated with other risk-based models or programs.

This guideline represents formal acceptance, by the Atlantic Provincial Environment Departments, of risk based approaches to site assessment and remediation. However, to use such risk-based methods, the proponent will require an increased level of investigative effort relative to previous requirements as mandated by governments during the generic criteria regulatory regime. A detailed understanding of the nature, extent and fate of contamination will be required. **Also, the site professional must confirm site conditions relative to the default input assumptions used for deriving the Tier I Lookup Tables. The Atlantic Provincial Environment Departments consider an increased level of professionalism directed towards assessments to be essential for their endorsement of site-specific, risk-based remediation goals.**

This document is intended to describe the minimum level of effort required to complete assessments such that the Atlantic RBCA software or other appropriate models can be used and ultimately accepted by the regulatory agencies. **If the minimum requirements are not achieved, the appropriate regulatory agency can reject any submission.**

It is understood that assessments are completed in various phases; this is consistent with the RBCA process, which will typically require revisitation and ongoing enhancement of assessment information. Furthermore, since the basis of the RBCA process in Atlantic Canada must be strongly grounded in scientific principles, assessments will be required to evaluate the limits of contaminant migration to ensure the protection of human health and sensitive ecological receptors. While notification requirements for third parties of impacts on their property will vary by provincial jurisdiction the PIRI committee endorses the principal of notification of third parties where there is a probable or potential adverse impact to safety or health of people. **Also notification of third parties will be required when there is a probable or potential adverse impact to valued ecological receptors or a current or potential future potable water source.** Notification to be based on current or reasonable expectation of onsite and adjacent land use. **It is also emphasized that assessment requirements will ultimately be site-specific, and that the following minimum requirements may be insufficient for many sites.**

## ***PURPOSE***

The purpose of this document is to describe the minimum requirements for assessing petroleum-impacted sites in Atlantic Canada. It provides guidance for data required to generate Atlantic RBCA Tier 1 Risk-Based Screening Levels and Tier 2 Site Specific Target Levels.

**The objectives of collecting assessment data are to characterize: 1) the nature and extent of soil and groundwater contamination in three dimensions 2) potential migration pathways and 3) potential receptors. These characterizations must be achieved with an acceptable level of certainty.**

The guidelines presented herein are intended to be the minimum requirements for collection of such data at typical sites; **for more complicated or sensitive sites it may be necessary to increase the scope of the assessment to achieve an acceptable level of certainty.**

## **GENERAL REPORTING REQUIREMENTS**

It is acknowledged that assessment report formats may vary between individual companies. However, regardless of format, certain general requirements will apply.

The report should commence with a detailed executive summary. The body of the report will present the assessment information and will typically contain the following sections.

### **Basic Site Information**

The following background site information is to be included in an assessment report:

#### **Site Location**

- Province
- City/Town
- Street Address
- Property Identification Number
- Urban or Municipal Authority Contact

#### **Land Use, Buildings & Underground Services, Land Use, Buildings & Underground Services (obtained through non-intrusive site inspection and available site information)**

- On-Site
- Off-Site (within 150m unless significant environmental concern exists at greater distance)

- ❑ Depth, location and type of underground services (i.e. natural gas, sewer, water, telephone, cable TV, fibre optic cables, etc.)
- ❑ Reasonable foreseeable future land use (on-site)

**Historic Site Background Historic Information (obtained from available site information)**

- ❑ Length of time in petroleum use
- ❑ Petroleum product stored (gasoline, diesel, furnace oil, used oil, etc.)
- ❑ Age, type and construction of petroleum storage and distribution system (single/double wall, steel/fiberglass, monitoring equipment, etc.)
- ❑ Location of previous storage and distribution equipment (aboveground and underground)
- ❑ Ownership of petroleum storage and distribution equipment
- ❑ Previous spills or leaks
- ❑ Previous remediation (complete/incomplete)
- ❑ Previous owners and uses of properties

**Regional Drainage, Geology and Hydrogeology, Drainage, Geology, Hydrogeology (obtained from available regional information sources)**

- ❑ Surface drainage pattern
- ❑ Surficial and bedrock geology (specific physical characteristics to be included)
- ❑ Groundwater flow regimes (directions, position of site in relation to regime, etc.)
- ❑ Groundwater recharge/discharge zones
- ❑ Aquifer types (bedrock, sand & gravel, confined, unconfined, etc.)
- ❑ Groundwater and surface water use in the local area

**Local Drainage, Geology and Hydrogeology and Water Use (obtained through non-intrusive site inspection, intrusive site investigation and available site information)**

- ❑ Surface drainage pattern
- ❑ Surficial and bedrock geology (specific physical characteristics to be included)
- ❑ Groundwater flow regimes (directions, position of site in relation to regime, etc.)
- ❑ Groundwater recharge/discharge zones
- ❑ Aquifer types (bedrock, sand & gravel, confined, unconfined, etc.)
- ❑ Groundwater and surface water use in the local area
- ❑ Grain size analyses (if proposing fine-grained soil criteria)
- ❑ Water table depth and elevations (relative to local datum)
- ❑ Groundwater hydraulic gradient

**Potential Receptors (obtained through on-site and off-site inspection)**

- ❑ On-Site
- ❑ Off Site
- ❑ Sensitive (incl. Private and municipal drinking water, basement sumps, sensitive surface waters etc.)
- ❑ Known on-site or off-site impacts to receptors

### **Extent of Contamination (obtained through intrusive testing)**

- ❑ Free product
- ❑ Soil
- ❑ Groundwater
- ❑ Lateral and vertical
- ❑ Vapours

## **MINIMUM SITE ASSESSMENT REQUIREMENTS**

### **Intrusive Testing Locations and Information**

- ❑ Testing methods and techniques are expected to be consistent with current day professional standards. Regardless of the method/techniques used, all efforts should be made to minimize the spread of contamination as a result of activities conducted during the site assessment.
- ❑ Field screening techniques are considered to be acceptable if they are well founded in theory, capable of calibrating measurements to relative or absolute levels of contamination, verifiable in regard to procedures and results and finally, if results of such techniques can be correlated to laboratory results.
- ❑ Test locations should provide an adequately detailed description of the nature, extent and fate of contamination in three dimensions. They should also provide information on potential subsurface contaminant migration pathways. The following should be considered minimum specifications:
  - ❑ Initial assessment phase: Minimum of 1 borehole or test pit per potential source area - typically at least 3-5 locations except for very small sites. Potential source test areas include but are not limited to tanks, lines, pump islands, loading areas, drum filling areas, previous underground installations and areas of visible staining. At a typical service station with 1 tank nest, 1 set of lines, 1 pump island, and 1 waste oil tank, this would equate to **4 source test locations**.
  - ❑ Any soil & groundwater contaminant plume(s) associated with the site should be delineated to a concentration that is protective of human health considering current land uses or reasonably foreseeable future land uses.
  - ❑ On sites where it cannot be confirmed through historical records that previous tanks and lines have been removed, an appropriate survey (geophysical or otherwise) may be required prior to drilling, to determine whether such tanks and lines may be present.
  - ❑ Sufficient test locations to determine the direction of groundwater flow on-site. ***Minimum of 3 groundwater monitoring wells or piezometers installed in drilled boreholes.*** Shallow wells are to be screened across the water table to intercept

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floating product. Bedrock monitoring wells may be required to assess potable water sources and **multilevel installation of piezometers to assess vertical groundwater gradient may be advisable in some circumstances.**

*Construction standards are to follow current day professional standards. **In that regard, while it was considered an acceptable practice in the past, monitoring wells should no longer to be installed in test pits.***

- All soil test locations should extend to the bottom of the contaminated soil zone, to the seasonal low water table level, or to bedrock, whichever is shallower.
- Soil samples will be collected continuously to allow for complete soil characterization (e.g. continuous split spoon sampling method).
- All wells will be monitored for the presence of free product.
- Check on-site and off-site manholes and interceptors (or other similar pathways) for hydrocarbons (liquid, vapors).

### ***Sample Analysis***

- All soil samples will be screened in the field for soil VOC measurements. **Visual and olfactory observation information is required on well logs which are to be included in the report(s).**
- Chemical analyses are to be conducted on at least 1 soil samples per test pit or borehole location.
- Chemical analyses are to be conducted on at least one groundwater sample from each available well including any on-site water supply wells. (Note: Sampling may also be required for any nearby, off site potable water wells.)
- Chemical analyses will include benzene, ethylbenzene, toluene, xylenes (BTEX), and total petroleum hydrocarbons (TPH) on all samples. Residual toxicity (defined as the difference between TPH and BTEX) will be noted on the laboratory report.
- Analysis for site specific parameters may be required, depending on past or present use (e.g. Polycyclic Aromatic Hydrocarbons at sites impacted with heavy end hydrocarbons such as creosote, bunker C, motor oil, etc.).
- Depending on the particular province the assessment is being completed in; analysis of MTBE in groundwater samples may be required.
- Soil analysis should be based on total concentration rather than leachate values.
- TPH fractionation will be necessary in those instances where single values for TPH (Tier 1 Look Up Table, residual toxicity (TPH-BTEX)) are exceeded. In those cases, one sample (highest concentration) per release event or source, if different type, is required to be submitted for fractionation.

***Chemical analyses are to be completed in a manner consistent with the Atlantic PIRI Analytical Sub-Committee methodologies ([www.atlanticrbc.com](http://www.atlanticrbc.com)).***

- Grain size analyses are to be conducted on at least 1 sample per hydrogeologic unit if the fine-grained soil criteria are to be applied. (This needs to be verified)

### ***Quality Assurance / Quality Control***

- Except for small batches of soil samples (less than 5 samples), at least one blind duplicate should be analyzed per batch of samples submitted for quality assurance/quality control (QA/QC) purposes. For larger batches (greater than 10 samples), 10% duplicates should be analyzed. The QA/QC results should be presented and interpreted in the report.
- For groundwater samples, a blind duplicate and field blank sample should also be collected and analyzed with each batch of samples, regardless of the number of samples tested.
- Sampling and sample handling protocol must be consistent with accepted practices. In particular, samples for volatile organic must be collected such that there is no headspace in water samples and a minimum headspace in soil samples. Samples should be kept cool until they are delivered to the laboratory. ***Sample handling procedures should be verified with the receiving laboratory.***

### ***Occupational Health and Safety***

*Safety practices should be consistent with the requirements of the responsible party (e.g. Oil Company, etc.) and/or relevant Provincial requirements. As a minimum, it is expected that;*

- Field personnel must have adequate protective clothing such as hard hat, steel toe boots and gloves.
- Field personnel must have a working knowledge of the physical and chemical properties of the chemical hazards expected.
- Electrical hazards such as electrical wires, buried cables; natural gas lines must be identified before any assessment activities.

## ***DATA TO SUPPORT CHANGES TO DEFAULTS***

***For sites where the Atlantic RBCA Tier 1 Risk-Based Screening Levels are exceeded, the site proponent may elect to generate Tier 2 Site Specific Target Levels. Site specific data must replace default parameter values to support this approach. Replacement of any default values will require technical justification. Following are some examples of parameters that may be considered for replacement of default parameters. Additional information is available at [www.atlanticrbca.com](http://www.atlanticrbca.com).***

- In general, data used to describe the specific fate and transport characteristics of the site and data used to characterize the natural attenuation processes are required within the Atlantic RBCA model. Specific parameters are listed within the model output and are also found in several relevant references.
- A minimum of one hydraulic conductivity test must be conducted for each hydrogeologic unit to support changes to hydrogeological default parameters.
- Meteorological data collected at the site or the closest meteorological station to the site must be used to support changes to default climate parameters.
- Actual site measurements/knowledge must be provided to support changes to building or receptor characteristics & exposure parameters.