

# Guidance Document Rollout

*May 26, 2004*



GOVERNMENT OF  
NEWFOUNDLAND  
AND LABRADOR

**Management of Contaminated Sites**



# Why A New Guideline ?

1. Recent Canada Wide Standards for hydrocarbons.
2. Need to provide more contaminated site assessment guidance.
3. Need for harmony with other Atlantic site processes.
4. Need to provide a formal structure for site management.



# Guideline Requirements

*The new guideline had to ensure the following:*

1. Protection of human health and the environment.
2. Cover new contaminants and situations.
3. The Polluter Pays.
4. The Site Professional providing the technical expertise and final documentation is responsible for the results of their work.
5. There is a clear process and final documentation for each site remediated under the process.



# The Parties Involved

1. The government regulator. (GSC or PPD)
2. The person responsible.
3. The Site Professional
4. Homeowners
5. Lawyers
6. Bankers



# Guideline Layout

Internal and External Versions

Four Step Process

Process Flow Chart

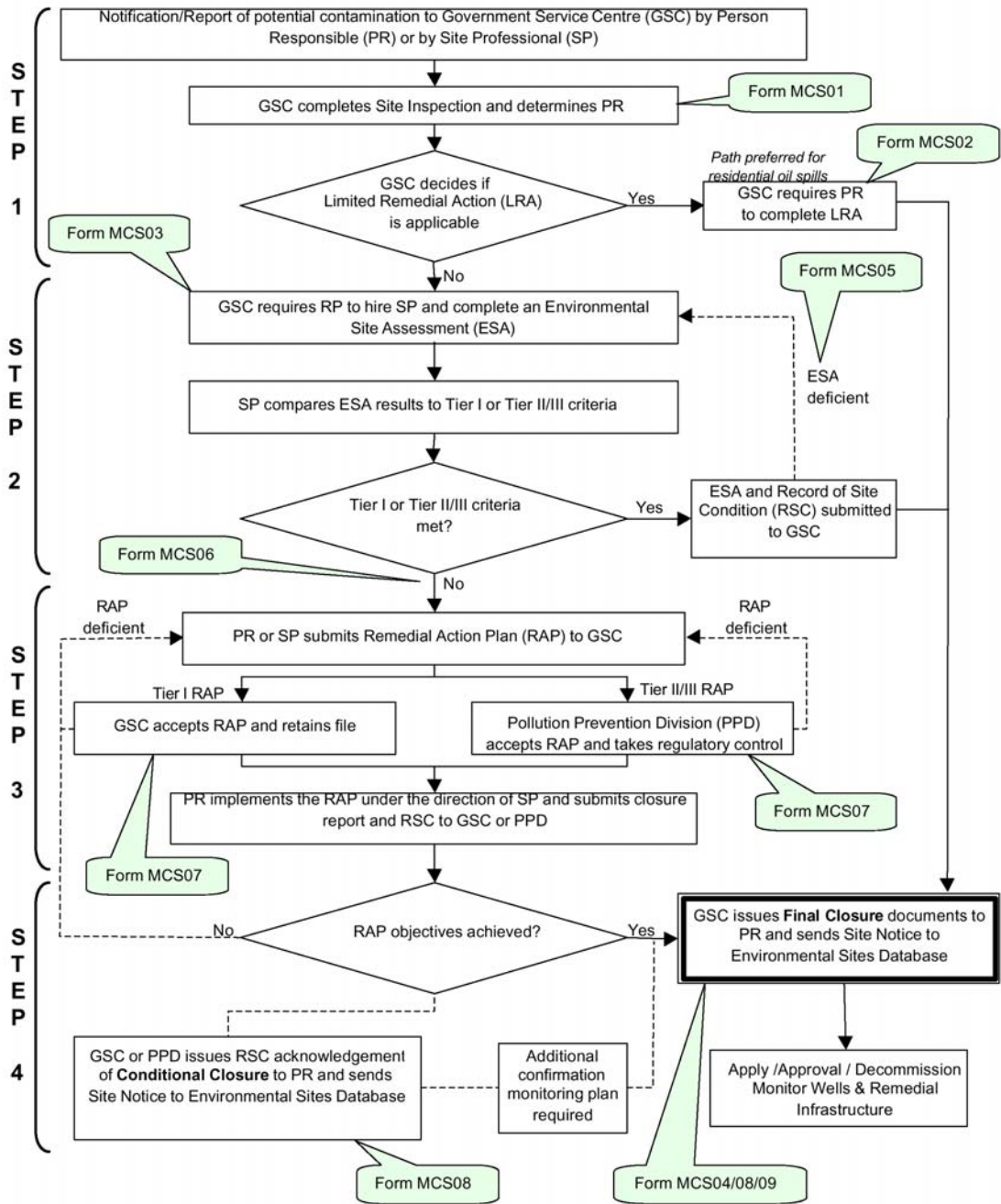
Tier 1 Lookup Tables (cleanup numbers)

Nine forms to document the process activities

Assignment of responsibilities



# Newfoundland & Labrador Contaminated Site Management Process



# Process Steps Versus Tiers

## Management (Process Steps)

### Mandatory to follow

Step 1 – Initial Actions

Step 2 – Site Assessment

Step 3 – Remedial Action Planning

Step 4 – Remediation and Closure

## Technical (Tiers)

### Choice of Polluter

Tier 1 – Government supplied cleanup numbers

Tier 2 – Site Professional risk assessment using Atlantic RBCA

Tier 3 – Site Professional risk assessment using more complex methods



# Tiers 1, 2 and 3

- Tier 1** – Normally used for smaller problems where clean up cost is reasonable. May not need a Site Professional.
- Tier 2** – Simplest form of risk assessment. Site Professional uses pre-approved Atlantic RBCA computer program. May be for small or large sites.
- Tier 3** – More complex risk assessment. Atlantic RBCA cannot manage all the issues. Ecological risk assessors or computer modelers may be required by the Site Professional.



# Process Steps 1, 2, 3 and 4

Step 1 – Initial Actions

Step 2 – Site Assessment

Step 3 – Remedial Action Planning

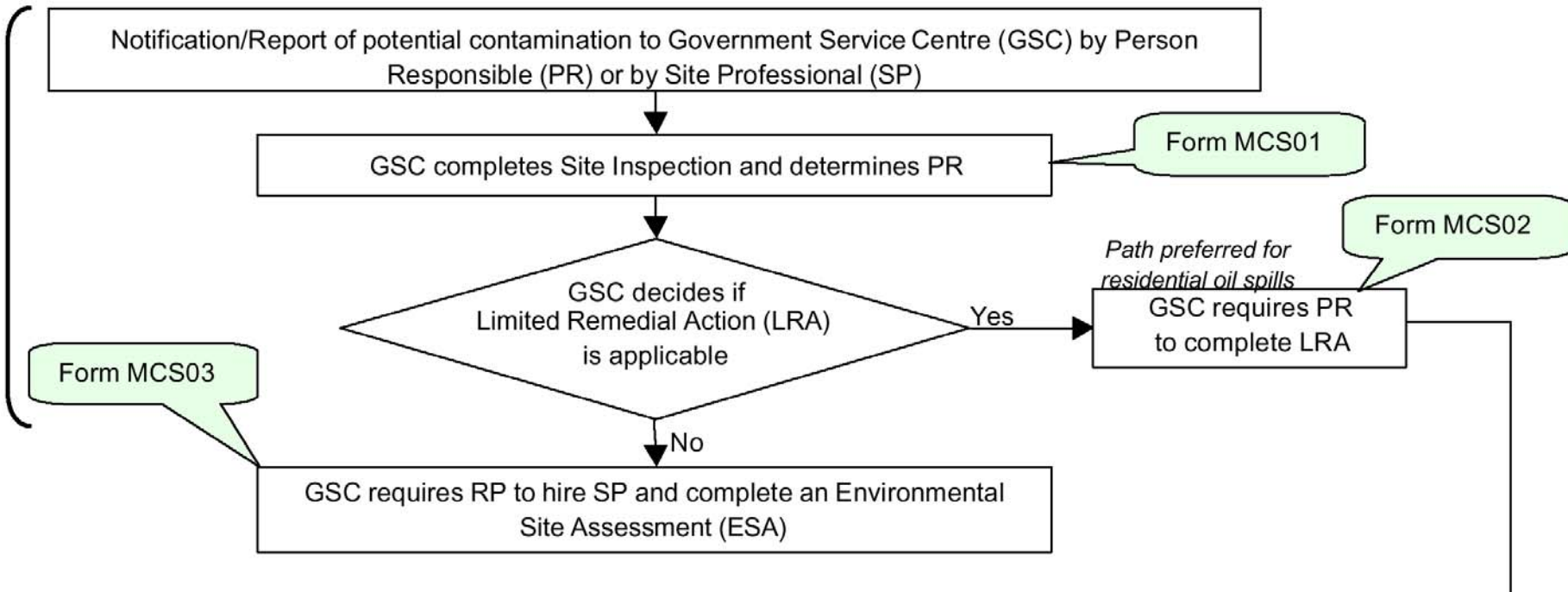
Step 4 – Remediation and Closure



# Step 1 – Initial Actions

## Newfoundland & Labrador Contaminated Site Management Process

STEP  
1



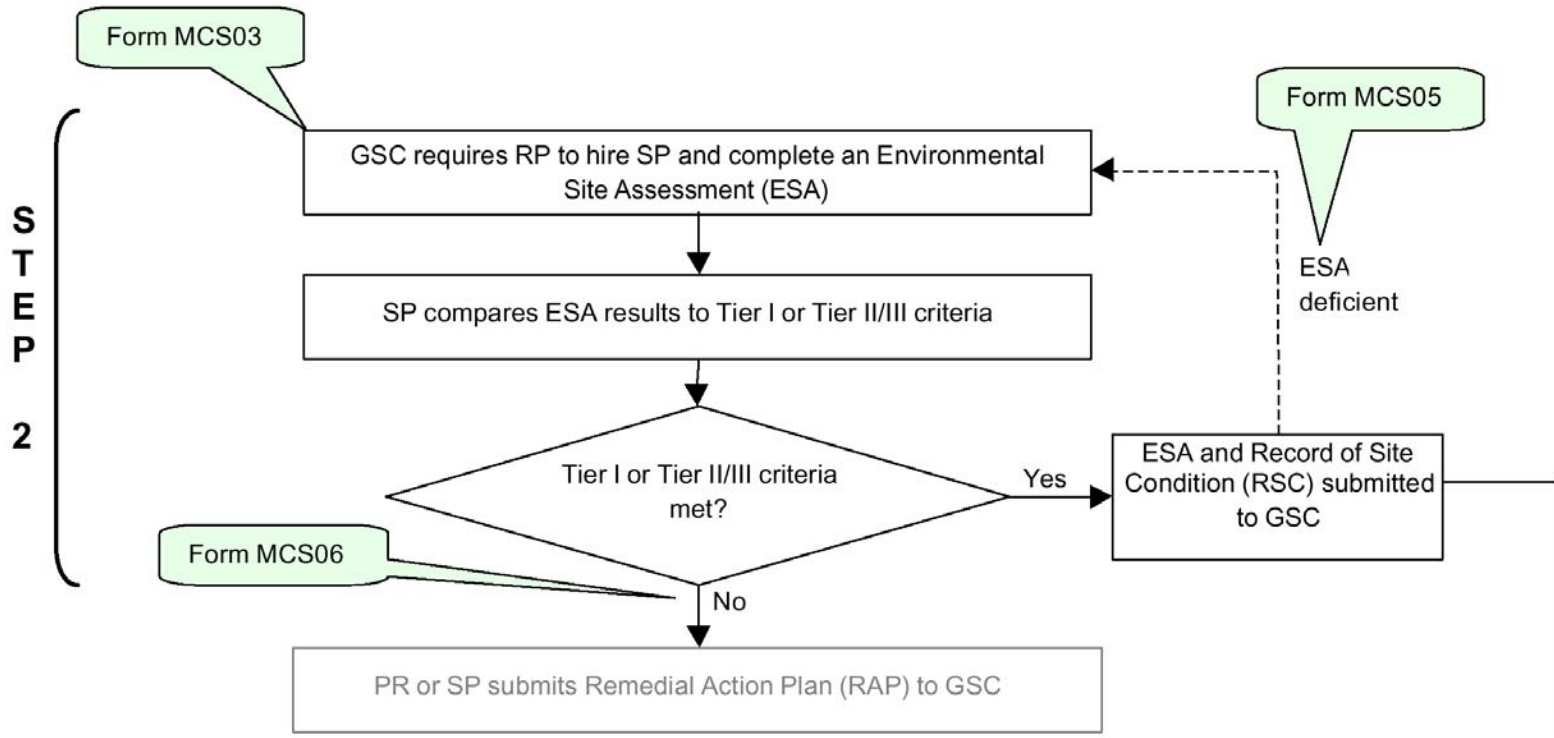
# Step 1 Documents

- MCS01** Records the initial government site inspection and is used to decide what path is taken.
- MCS02** Letter tells the person responsible to complete Limited Remedial Action.
- MCS03** Letter tells the person responsible to hire a Site Professional and complete a Site Assessment.



# Step 2 – Site Assessment

## Newfoundland & Labrador Contaminated Site Management Process



# Step 2 Documents

**MCS03** Letter tells the person responsible to hire a Site Professional and complete a Site Assessment.

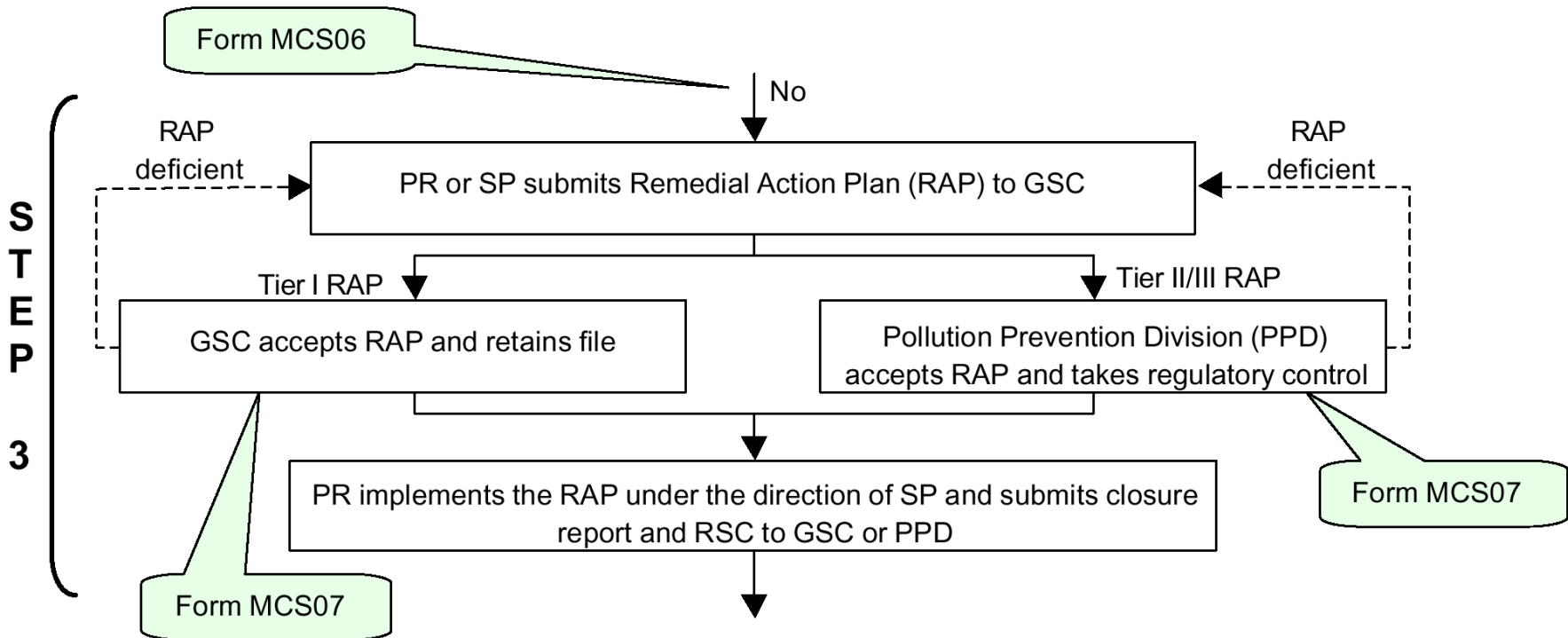
**MCS05** Records the government review of the Site Assessment and the decision for the next action.

**MCS06** Letter to the person responsible advising them to prepare a Remedial Action Plan.



# Step 3 – Remedial Action Planning

## Newfoundland & Labrador Contaminated Site Management Process



# Step 3 Documents

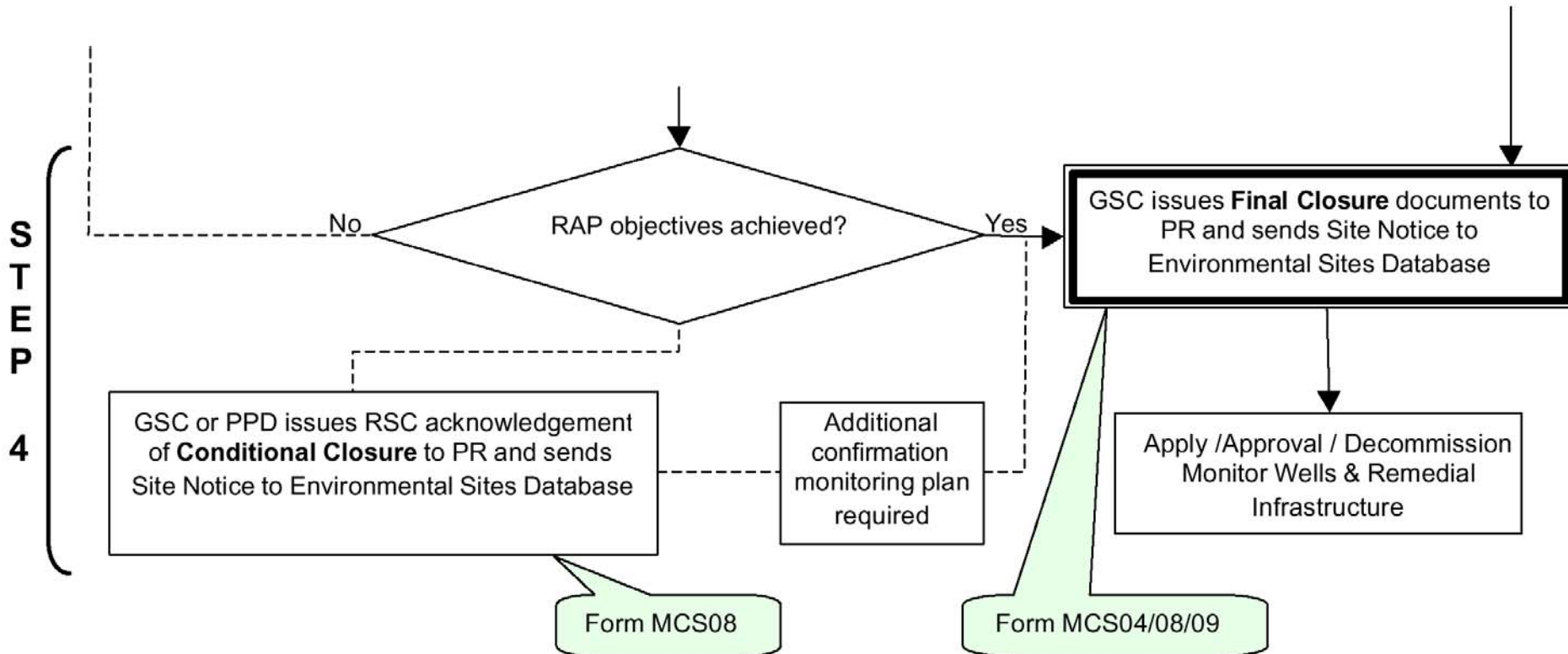
**MCS06** Letter to the person responsible advising them to prepare a Remedial Action Plan.

**MSC07** Letter to the person responsible that the Remedial Action Plan submitted is satisfactory and should be implemented.



# Step 4 – Remediation and Closure

## Newfoundland & Labrador Contaminated Site Management Process



# Step 4 Documents

- MCS04** Records the government inspection and sign off for a Limited Remedial Action Cleanup.
- MCS08** GSC or PPD issues acknowledgement of Record of Site Condition for Conditional Closure or Final Closure.
- MCS09** GSC or PPD sends Site Notice to Environmental Sites Database stating remedial work has been completed on the property.



# Type I and Type II Closure

## Unconditional Closure

Clean up done so there are no restrictions on how the property can be used except specifying residential or commercial occupancy.

## Conditional Closure

Clean up done that limits property use such as where buildings can be, no drinking water wells, etc Also applies if engineered controls are used to limit risk like mechanical ventilation, asphalt soil cover, groundwater pumping systems, etc.



# Appendix A - References

**Provides references used in preparation of the Site Management Process for Site Professionals or government representatives.**



# Site Professional - Appendix B

**The requirements for a Site Professional who signs a Record of Site Condition are:**

1. Professional Engineer or Geoscientist in NF.
2. Have environmental liability insurance.



# Appendix C - Record of Site Condition

Pages 1 to 4 are a statement by the Site Professional detailing the cleanup values used for the site, the acceptable land use, any off-site impacts and that the site is suitable for the intended land use. It states if special controls are required to control risk.

Page 5 is the single page used by the government to acknowledge to the person responsible that the contaminated site process has been completed to the government's satisfaction.



# Decommissioning - Appendix D

After completing the Site Management process, the person responsible must:

- (a) Apply to the province to decommission the monitor wells and other remedial infrastructure.
- (b) Upon approval, decommission the infrastructure according to Appendix D.



# Appendix E – Ecological Guidance

**Provides additional direction to Site Professionals assessing ecological impacts and risk at Tier 2 or Tier 3.**



# Appendix F – Government Forms

(internal version only)

Contains the nine forms used in the process by government representatives.

- 5 forms
- 4 letters

Electronic copies in Corel WordPerfect and MS Word are available from PPD.



# Appendix G – Tier 1 Lookup Tables

(internal version only)

## Before using Tier 1 Lookup Tables check for:

1. No free product in soil or water
2. Site conditions are close to default values such as depth to groundwater, soil thickness, type of floors and floor cracking in concrete.
3. Drinking water can have no taste or odour.
4. No offensive indoor or outdoor air odours.
5. Latest updates to Tier I criteria available from [www.ccme.ca](http://www.ccme.ca) and [www.atlanticrbca.com](http://www.atlanticrbca.com)



# Summary Responsibilities

**Person responsible** – take action to protect human health and the environment, follow the process and prove it.

**Province** – Select the person responsible, monitor the timely performance through the process, sign off when satisfactory, enter site in the Environmental Sites Database. Direct the Limited Remedial Action if chosen.

**Site Professional** – follow the process, provide technical expertise, advise actions necessary including emergency action, complete the Record of Site Condition.



**Table A**  
**Default Parameters Used to Develop Tier I Screening Levels for Group 1 Chemicals (Hydrocarbons)**

Parameter	Residential Land Use	Commercial/Industrial Land Use
Thickness of clean surface soil below building floor (metres)	1.0	1.0
Zone of impacted sub-surface soil below building floor (metres)	1.0 to 3.0	1.0 to 3.0
Depth to groundwater (metres)	3.0	3.0
Floor to ceiling room height (metres)	4.88 (Note 1)	3.0
Crack fraction (floor/wall) (% of surface area)	0.00067 (0.067%)	0.00062 (0.062%)
Building Occupant	Toddler	Adult

The following notes apply to the next six tables.

- Notes: (fg / cg) fine grained soil value / coarse grained soil value (if different)
- (1) CEQG Soil Quality Guidance document Human Health (SQG<sub>HH</sub>)
  - (2) CEQG Soil Quality Guidance document Ecological (SQG<sub>E</sub>)
  - (3) CCME 1991 Interim Canadian Environmental Quality Criteria for Contaminated Sites
  - (4) CCME Canada Wide Standard - Petroleum Hydrocarbons (CWS-PHC)
  - (5) CCME Canada Wide Standard - Petroleum Hydrocarbons (CWS-PHC) - soil contact value, lower values apply for protection of aquatic life, see reference document.
  - (6) Guidance documents for Canadian Drinking Water Quality
  - (7) Consult Canadian Environmental Quality Guidance documents for chemicals not listed here
  - (8) British Columbia Regulation 375/96 Schedule 6 adjusted for 10x dilution factor
  - (9) Atlantic RBCA Reference Documentation for Petroleum Impacted Sites, Version 1.0, 1999.
  - (10) CEQG – Protection of Aquatic Life

**TABLE 1: SURFACE SOIL (0 - 1.0 m) - HUMAN HEALTH (mg/kg)**

LAND USE		Agricultural	Residential/ Parkland	Commercial	Industrial	
Chemical	Groundwater Use / Soil					
<b>Group 1 Chemicals of Concern - Petroleum Hydrocarbons</b>						
Benzene	Potable (fg / cg)	0.005 / 0.01 (9)				
	Non-potable (fg / cg)	0.05 (1)	0.5 (1)	5.0 (1)		
Toluene	Potable (fg / cg)	0.06 / 0.10 (9)				
	Non-potable (fg / cg)	0.1 (1)	0.8 (1)	0.8 (1)	0.8 (1)	
Ethylbenzene	Potable (fg / cg)	0.015 / 0.02 (9)				
	Non-potable (fg / cg)	0.1 (1)	1.2 (1)	20.0 (1)		
Xylenes	Potable (fg / cg)	1.8 / 2.4 (9)				
	Non-potable (fg / cg)	5.0 (1)	5.0 (1)	17.0 (1)	20.0 (1)	
Gasoline	Potable (fg / cg)	No value Tier III required for non-human receptors	140/39 (9)		520/450 (9)	
	Non-potable (fg / cg)		330/39 (9)		10,000/450 (9)	
Diesel / #2 Oil	Potable (fg / cg)		220 / 140 (9)		840/7400 (9)	
	Non-potable (fg / cg)		4400/140 (9)		7700/7400 (9)	
#6 Oil	Potable (fg / cg)		970 / 690 (9)		4700 / 10,000 (9)	
	Non-potable (fg / cg)		8300/690 (9)		10,000/10,000 (9)	
<b>Group 2 Chemicals of Concern – PAH Compounds</b>						
Benzo(a)pyrene	Potable & Non-potable (fg / cg)	0.1 (1)	0.7 (1)	0.7 (1)	0.7 (1)	
Naphthalene	Potable & Non-potable (fg / cg)	0.1 (1)	0.6 (1)	22 (1)	22 (1)	
<b>Group 3 Chemicals of Concern – Heavy Metals (inorganic)</b>						
Arsenic	Potable & Non-potable (fg / cg)	12.0 (1)		12.0 (1)		
Barium		750.0 (1)	500.0 (1)	2000.0 (1)		
Cadmium		1.4 (1)	14.0 (1)	49.0 (1)	192.0 (1)	
Chromium (total)		220.0 (1)		630.0 (1)	2300.0 (1)	
Chromium (hex)		0.4 (1)		1.4 (1)		
Copper		1100.0 (1)		4000.0 (1)	16000.0 (1)	
Lead		140 (1)		260 (1)	740 (1)	
Mercury		6.6 (1)		24.0 (1)	99.0 (1)	
Nickel		50.0 (1)		50.0 (1)		
Thallium		1.0 (1)		1.0 (1)		
Vanadium		130.0 (1)		130.0 (1)		
Zinc		200 (1)		360 (1)		
<b>Group 4 Chemicals of Concern – Non-chlorinated Organic Compounds</b>						
Phenol	Potable & Non-potable (fg / cg)	3.8 (1)		3.8 (1)		
Ethylene glycol		No CEQG or provincial Tier I criteria				
cyanide (free)		29.0 (1)		107.0 (1)	420.0 (1)	
<b>Group 5 Chemicals of Concern – Chlorinated Organic Compounds</b>						
PCB	Potable & Non-potable (fg / cg)	0.5 (1)	1.3 (1)	33.0 (1)		
Tetrachloroethylene		0.2 (1)		0.5 (1)	0.6 (1)	
Trichloroethylene		0.1 (1)	3.0 (1)	31.0 (1)		
Pentachlorophenol		7.6 (1)		7.6 (1)		
<b>Group 6 Chemicals of Concern – Pesticides</b>						
DDT	Potable & Non-potable (fg / cg)	0.7 (1)		12.0 (1)		

This table is not limiting. Generally, the most commonly encountered COC are included. Refer to the latest version CEQG and Atlantic PIRI documentation for other COC.

**TABLE 2: SUB-SURFACE SOIL (> 1.0 m) - HUMAN HEALTH (mg/kg)**

LAND USE		Agricultural	Residential/ Parkland	Commercial	Industrial	
Chemical	Groundwater Use / Soil					
Group 1 Chemicals of Concern - Petroleum Hydrocarbons						
Benzene	Potable (fg / cg)	0.01 (9)				
	Non-potable (fg / cg)	0.05 (1)	0.5 (1) / 0.3	3.8 / 1.4		
Toluene	Potable (fg / cg)	0.06 / 0.10 (9)				
	Non-potable (fg / cg)	0.1 (1)	0.8 (1)	0.8 (1)		
Ethylbenzene	Potable (fg / cg)	0.015 / 0.2 (9)				
	Non-potable (fg / cg)	0.1 (1)	1.2 (1)	20.0 (1)		
Xylenes	Potable (fg / cg)	1.8 / 2.4 (9)				
	Non-potable (fg / cg)	5.0 (1)	5.0 (1)	17.0 (1)	20.0 (1)	
Gasoline	Potable (fg / cg)	No value Tier III required for non-human receptors	140/39 (9)		520/450 (9)	
	Non-potable (fg / cg)		330/39 (9)		10,000/450 (9)	
Diesel / #2 Oil	Potable (fg / cg)		220 / 140 (9)		840/7400 (9)	
	Non-potable (fg / cg)		4400/140 (9)		7700/7400 (9)	
#6 Oil	Potable (fg / cg)		970 / 690 (9)		4700 / 10,000 (9)	
	Non-potable (fg / cg)		8300/690 (9)		10,000/10,000 (9)	
Group 2 Chemicals of Concern - PAH Compounds						
Benzo(a)pyrene	Potable & Non-potable	0.1 (1)	0.7 (1)	0.7 (1)	0.7 (1)	
Naphthalene	(fg / cg)	0.1 (1)	0.6 (1)	22.0 (1)	22.0 (1)	
Group 3 Chemicals of Concern - Heavy Metals (inorganic)						
Arsenic	Potable & Non-potable (fg / cg)	12.0 (1)		12.0 (1)		
Barium		750.0 (1)	500.0 (1)	2000.0 (1)		
Cadmium		1.4 (1)	14.0 (1)	49.0 (1)	192.0 (1)	
Chromium (total)		220.0 (1)		630.0 (1)	2300.0 (1)	
Chromium (hex)		0.4 (1)		1.4 (1)		
Copper		1100.0 (1)		4000.0 (1)	16000.0 (1)	
Lead		140 (1)		260 (1)	740 (1)	
Mercury		6.6 (1)		24.0 (1)	99.0 (1)	
Nickel		50.0 (1)		50.0 (1)		
Thallium		1.0 (1)		1.0 (1)		
Vanadium		130.0 (1)		130.0 (1)		
Zinc		200 (1)		360 (1)		
Group 4 Chemicals of Concern - Non-chlorinated Organic Compounds						
Phenol	Potable & Non-potable (fg / cg)	3.8 (1)		3.8 (1)		
Ethylene glycol		No CEQG or provincial Tier I criteria				
cyanide (free)		29.0 (1)		107.0 (1)	420.0 (1)	
Group 5 Chemicals of Concern - Chlorinated Organic Compounds						
PCB	Potable & Non-potable (fg / cg)	0.5 (1)	1.3 (1)	33.0 (1)		
Tetrachloroethylene		0.2 (1)		0.5 (1)	0.6 (1)	
Trichloroethylene		0.1 (1)	3.0 (1)		31.0 (1)	
Pentachlorophenol		7.6 (1)		7.6 (1)		
Group 6 Chemicals of Concern - Pesticides						
DDT	Potable & Non-potable (fg / cg)	0.7 (1)		12.0 (1)		

This table is not limiting. Generally, the most commonly encountered COC are included. Refer to the latest version CEQG and Atlantic PIRI documentation for other COC.

**TABLE 3: GROUNDWATER - HUMAN HEALTH (mg/L)**

LAND USE		Agricultural	Residential/ Parkland	Commercial	Industrial
Chemical	Groundwater Use				
<b>Group 1 Chemicals of Concern - Petroleum Hydrocarbons</b>					
Benzene	Potable (fg / cg)	0.005 (6)			
	Non-potable (fg / cg)	No value	8.9 / 1.0 (9)	20 / 6.9 (9)	
Toluene	Potable (fg / cg)	0.024 (6)			
	Non-potable (fg / cg)	No value	20 (9)	20 (9)	
Ethylbenzene	Potable (fg / cg)	0.0024 (6)			
	Non-potable (fg / cg)	No value	20 (9)	20 (9)	
Xylenes	Potable (fg / cg)	0.300 (6)			
	Non-potable (fg / cg)	No value	20 (9)	20 (9)	
Gasoline	Potable (fg / cg)	No value Tier III required for non-human receptors	4.4 (9)	19 (9)	
	Non-potable (fg / cg)		20 / 12 (9)	20 (9)	
Diesel / #2 Oil	Potable (fg / cg)		3.2 (9)	15 (9)	
	Non-potable (fg / cg)		20 (9)	20 (9)	
#6 Oil	Potable (fg / cg)		7.8 (9)	20 (9)	
	Non-potable (fg / cg)		20 (9)	20 (9)	
<b>Group 2 Chemicals of Concern - PAH Compounds</b>					
Benzo(a)pyrene	Potable & Non-potable (fg / cg)	No value. Tier III required for non-human receptors	0.00001 (6)		
Naphthalene			No guidance document		
<b>Group 3 Chemicals of Concern - Heavy Metals (inorganic)</b>					
Arsenic	Potable & Non-potable (fg / cg)	No value Tier III required for non-human receptors	0.025 (6)		
Barium			1.0 (6)		
Cadmium			0.005 (6)		
Chromium (total)			0.05 (6)		
Chromium (hex)			No guidance document		
Copper			1.0 (6)		
Lead			0.010 (6)		
Mercury			0.001 (6)		
Nickel			No guidance document		
Thallium			No guidance document		
Vanadium			No guidance document		
Zinc			5.0 (6)		
<b>Group 4 Chemicals of Concern - Non-chlorinated Organic Compounds</b>					
Phenol			No guidance document		
Ethylene glycol cyanide (free)	Potable & Non-potable (fg / cg)	No value. Tier III required for non-human receptors	No guidance document		
			0.2 (6)		
<b>Group 5 Chemicals of Concern - Chlorinated Organic Compounds</b>					
PCB			No guidance document		
Tetrachloroethylene	Potable & Non-potable (fg / cg)	No value Tier III required for non-human receptors	0.03 (6)		
Trichloroethylene			0.05 (6)		
Pentachlorophenol			0.06 (6)		
<b>Group 6 Chemicals of Concern - Pesticides</b>					
DDT	Potable & Non-potable (fg / cg)	No value. Tier III required for non-human receptors	No Guidance document		

This table is not limiting. Generally, the most commonly encountered COC are included. Refer to the latest version CEQG and Atlantic PIRI documentation for other COC.

**TABLE 4: SOIL (0 to 1.5 metres depth) - ECOLOGICAL HEALTH (mg/kg)**

LAND USE		Agricultural	Residential/ Parkland	Commercial	Industrial
Chemical	Soil Type				
Group 1 Chemicals of Concern - Petroleum Hydrocarbons					
Benzene	(fg / cg)	0.05 (2)	0.5 (2)	5.0 (2)	5.0 (2)
Toluene	(fg / cg)	0.1 (2)	0.8 (2)	0.8 (2)	0.8 (2)
Ethylbenzene	(fg / cg)	0.1 (2)	1.2 (2)	20 (2)	20 (2)
Xylenes	(fg / cg)	0.1 (2)	1.0 (2)	21 (2)	21 (2)
TPH >C6-C10	(fg / cg)	260.0 (4) / 130.0 (4)		660.0 (4) / 330.0 (5)	
TPH >C10-C16	(fg / cg)	900.0 (4) / 450.0 (5)		1500.0 (4) / 760.0 (5)	
TPH >C16-C34	(fg / cg)	800.0 (4) / 400.0 (4)		2500.0 (4) / 1700.0 (4)	
TPH >C34	(fg / cg)	5600.0 (4) / 2800.0 (4)		6600.0 (4) / 3300.0 (4)	
Group 2 Chemicals of Concern - PAH Compounds					
Benzo(a)pyrene	(fg / cg)	0.1 (2)	0.7 (2)	0.7 (2)	0.7 (2)
Naphthalene		0.1 (2)	0.6 (2)	1.4 (2)	1.4 (2)
Group 3 Chemicals of Concern - Heavy Metals (inorganic)					
Arsenic	(fg / cg)	17.0 (2)		26.0 (2)	
Barium		750.0 (3)	500.0 (3)	2000.0 (3)	
Cadmium		3.8 (2)	10.0 (2)	22.0 (2)	
Chromium (total)		64.0 (2)		87.0 (2)	
Chromium (hex)		0.4 (2)		1.4 (2)	
Copper		63.0 (2)		91.0 (2)	
Lead		70.0 (2)	300.0 (2)	600.0 (2)	
Mercury		12.0 (2)		50.0 (2)	
Nickel		50.0 (2)		50.0 (2)	
Thallium		1.0 (2)	1.4 (2)	3.6 (2)	
Vanadium		130.0 (2)		130.0 (2)	
Zinc		200.0 (2)		360.0 (2)	
Group 4 Chemicals of Concern - Non-chlorinated Organic Compounds					
Phenol	(fg / cg)	20.0 (2)		128.0 (2)	
Ethylene glycol		960.0 (2)		960.0 (2)	
cyanide (free)		0.9 (2)		8.0 (2)	
Group 5 Chemicals of Concern - Chlorinated Organic Compounds					
PCB	(fg / cg)	1.3 (2)		33.0 (2)	
Tetrachloroethylene		0.1 (3)	0.2 (2)	0.5 (2)	0.6 (2)
Trichloroethylene		0.1 (3)	3.0 (2)	31.0 (2)	
Pentachlorophenol		11.0 (2)		28.0 (2)	
Group 6 Chemicals of Concern - Pesticides					

This table is not limiting. Generally, the most commonly encountered COC are included. Refer to the latest version CEQG and Atlantic PIRI documentation for other COC.

**TABLE 5: SOIL ( > 1.5 metres depth) - ECOLOGICAL HEALTH (mg/kg)**

LAND USE		Agricultural	Residential/ Parkland	Commercial	Industrial	
Chemical	Soil Type					
<b>Group 1 Chemicals of Concern - Petroleum Hydrocarbons</b>						
Benzene	(fg / cg)	0.05 (2)	0.5 (2)	5.0 (2)	5.0 (2)	
Toluene	(fg / cg)	0.1 (2)	0.8 (2)	0.8 (2)	0.8 (2)	
Ethylbenzene	(fg / cg)	0.1 (2)	1.2 (2)	20 (2)	20 (2)	
Xylenes	(fg / cg)	0.1 (2)	1.0 (2)	21 (2)	21 (2)	
TPH >C6-C10	(fg / cg)	750.0 (4) / 350 (4)		1000 (4) / 700 (5)		
TPH >C10-C16	(fg / cg)	2200 (4) / 1500 (5)		3000 (4) / 2000 (5)		
TPH >C16-C34	(fg / cg)	3500 (4) / 2500 (4)		5000 (4) / 3500 (4)		
TPH >C34	(fg / cg)	10,000 (4) / 10,000 (4)		10,000 (4) / 10,000 (4)		
<b>Group 2 Chemicals of Concern - PAH Compounds</b>						
Benzo(a)pyrene	(fg / cg)	0.1 (2)	0.7 (2)	0.7 (2)	0.7 (2)	
Naphthalene	(fg / cg)	0.1 (2)	0.6 (2)	1.4 (2)	1.4 (2)	
<b>Group 3 Chemicals of Concern - Heavy Metals (inorganic)</b>						
Arsenic	(fg / cg)	17.0 (2)		26.0 (2)		
Barium		750.0 (3)	500.0 (3)	2000.0 (3)		
Cadmium		3.8 (2)	10.0 (2)		22.0 (2)	
Chromium (total)		64.0 (2)			87.0 (2)	
Chromium (hex)		0.4 (2)			1.4 (2)	
Copper		63.0 (2)			91.0 (2)	
Lead		70.0 (2)	300.0 (2)		600.0 (2)	
Mercury		12.0 (2)			50.0 (2)	
Nickel		50.0 (2)			50.0 (2)	
Thallium		1.0 (2)	1.4 (2)		3.6 (2)	
Vanadium		130.0 (2)			130.0 (2)	
Zinc		200.0 (2)			360.0 (2)	
<b>Group 4 Chemicals of Concern - Non-chlorinated Organic Compounds</b>						
Phenol	(fg / cg)	20.0 (2)		128.0 (2)		
Ethylene glycol		960.0 (2)		960.0 (2)		
cyanide (free)		0.9 (2)		8.0 (2)		
<b>Group 5 Chemicals of Concern - Chlorinated Organic Compounds</b>						
PCB	(fg / cg)	1.3 (2)		33.0 (2)		
Tetrachloroethylene		0.1 (3)	0.2 (2)	0.5 (2)	0.6 (2)	
Trichloroethylene		0.1 (3)	3.0 (2)		31.0 (2)	
Pentachlorophenol		11.0 (2)			28.0 (2)	
<b>Group 6 Chemicals of Concern - Pesticides</b>						
DDT	(fg / cg)	0.7 (1)		12.0 (1)		

This table is not limiting. Generally, the most commonly encountered COC are included. Refer to the latest version CEQG and Atlantic PIRI documentation for other COC.

**TABLE 6: SURFACE WATER - ECOLOGICAL HEALTH ( $\mu\text{g/L}$ )**

WATER TYPE	FRESHWATER	MARINE WATER
Chemical		
Group 1 Chemicals of Concern - Petroleum Hydrocarbons		
Benzene	370.0 (10)	110.0 (10)
Toluene	2.0 (10)	215.0 (10)
Ethylbenzene	90 (10)	25 (10)
Xylenes	No values	
TPH C6-C10 (excluding BTEX)	150.0 (8)	150.0 (8)
TPH C10-C19	50.0 (8)	50.0 (8)
TPH C19-C34	No value	
Group 2 Chemicals of Concern - PAH Compounds		
Benzo(a)pyrene	0.015 (10)	0.01 (8)
Naphthalene	1.1 (10)	1.4 (10)
Group 3 Chemicals of Concern - Heavy Metals (inorganic)		
Arsenic	5.0 (10)	12.5 (10)
Barium	1,000.0 (8)	1000.0 (8)
Cadmium	0.01 (10)	0.12 (10)
Chromium (total)	8.9 (10)	56.0 (10)
Chromium (hex)	1.0 (10)	1.5 (10)
Copper	2.0 - 4.0 (hardness dependent) (10)	2.0 - 9.0 (hardness dependent) (8)
Lead	1.0 - 7.0 (hardness dependent) (10)	4.0 - 16.0 (hardness dependent) (8)
Mercury	0.1 (10)	0.1 (8)
Nickel	25.0 - 150.0 (hardness dependent) (10)	25.0 - 150.0 (hardness dependent) (8)
Thallium	0.8 (10)	0.3 (8)
Vanadium	No value	
Zinc	30.0 (10)	30.0 (8)
Group 4 Chemicals of Concern - Non-chlorinated Organic Compounds		
Phenol	4.0 (10)	1.0 (8)
Ethylene glycol	192,000.0 (10)	No value
cyanide (free)	5.0 (10)	5.0 (8)
Group 5 Chemicals of Concern - Chlorinated Organic Compounds		
PCB	No value	
Tetrachloroethylene	111.0 (10)	No value
Trichloroethylene	21.0 (10)	No value
Pentachlorophenol	0.5 (10)	No value
Group 6 Chemicals of Concern - Pesticides		
DDT	0.001 (8)	0.001 (8)

Copper, lead and nickel have specific criteria dependent on water hardness. See page D-2 and reference (10) for freshwater or (8) for marine water for hardness – specific criteria.

This table is not limiting. Generally, the most commonly encountered COC are included. Refer to the latest version CEQG and Atlantic PIRI documentation for other COC.

**TABLE 7: MICROBIOLOGICAL PARAMETERS  
Maximum Acceptable Concentrations**

WATER TYPE	DRINKING WATER	RECREATIONAL WATER
Total Coliform Bacteria	0 per 100 ml	---
E.Coli	---	2000 per litre
Enterococci	---	350 per litre
Heterotrophic Plate Count (HPC)	500 colonies/ml	---
Protozoa	---	---
Viruses	---	---

(1) Data Source: Canadian Environmental Quality Guidelines CCME, 1999.

(2) No value