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Federal Contaminated Sites Action Plan (FCSAP)

Ecological Risk Assessment Guidance and Site Closure for the FCSAP Program



Remediation Technologies Symposium

**Banff, AB, October 18, 2012
Murray Heap
Environment Canada**

Outline

- 1) FCSAP Overview
- 2) Environmental Risk Assessment Overview
- 3) **FCSAP ERA Guidance**

Federal Contaminated Sites Action Plan

Overview

- Sites on lands owned or leased by the GoC, or on non-federal lands where GoC has accepted full responsibility for the contamination.
- Result of past practices in government operations—Leaking fuel storage tanks, PCB spills, heavy metal contamination, etc.
- Federal Contaminated Sites Inventory



Federal Contaminated Sites Action Plan Overview

Highlights

- \$3.5 billion, 15-year program established in 2005
- Reduce and manage risks to human health and the environment
- Reduce federal liabilities
- Secondary benefits



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Federal Contaminated Sites Action Plan Overview

Highlights

- 10 Step Process
- NCSCS Classification
- 2011-2016 –Phase 2 of FCSAP
- focus is on remediation of high priority sites



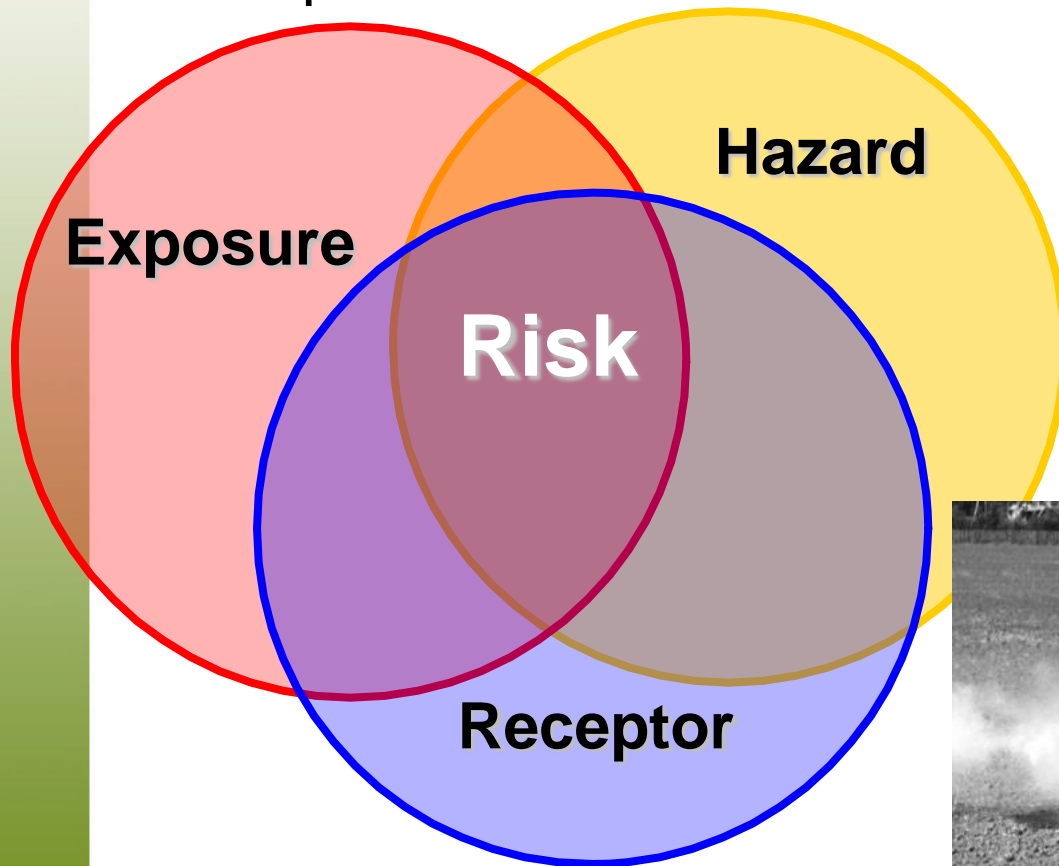
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Ecological Risk Assessment Overview

The Components of Risk:



Ecological Risk Assessment Overview

- Scientific and technical process that evaluates the likelihood that adverse effects will occur or are occurring as a result of exposure to one or more stressors (CSMWG 1997)
- CCME (1996) identified commonalities among several definitions
 - Prediction of the probability of adverse effects
 - Concept of exposure-response relationships



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3) FCSAP Risk Assessment Guidance

- **Federal Interim Groundwater Guidelines (2010)**
- Tool for Risk Assessment Validation (TRAV) as part of Site Closure Tool
- Ecological Risk Assessment Guidance
- Site Characterization Guidance



Interim Federal Groundwater Guidelines

- Final version released May 2010, updated version to be released in fall 2012
- “Interim” guidelines should be used on FCSAP sites until CCME develops groundwater guidelines
- To be used in conjunction with Health Canada Drinking Water Guidelines
- Available by request from **fcsap.pascf@ec.gc.ca**



Interim Federal Groundwater Guidelines

- Interim Tier 1 and Pathway Specific Tier 2 Groundwater Guidelines for:
 - metals
 - hydrocarbons
 - halogenated aliphatics
 - chlorinated aromatics
 - phenols
 - pesticides
 - other organics
- 3 different land uses: agricultural (incl. wildlands), residential/parkland and commercial/industrial)
- Separate values for fine/coarse soil
- Applies to groundwater at > 10m distance to surface water
- Guidelines do not include drinking water protection!



Interim Federal Groundwater Guidelines

- **Based on Specific Pathways:**

- For all land uses:**

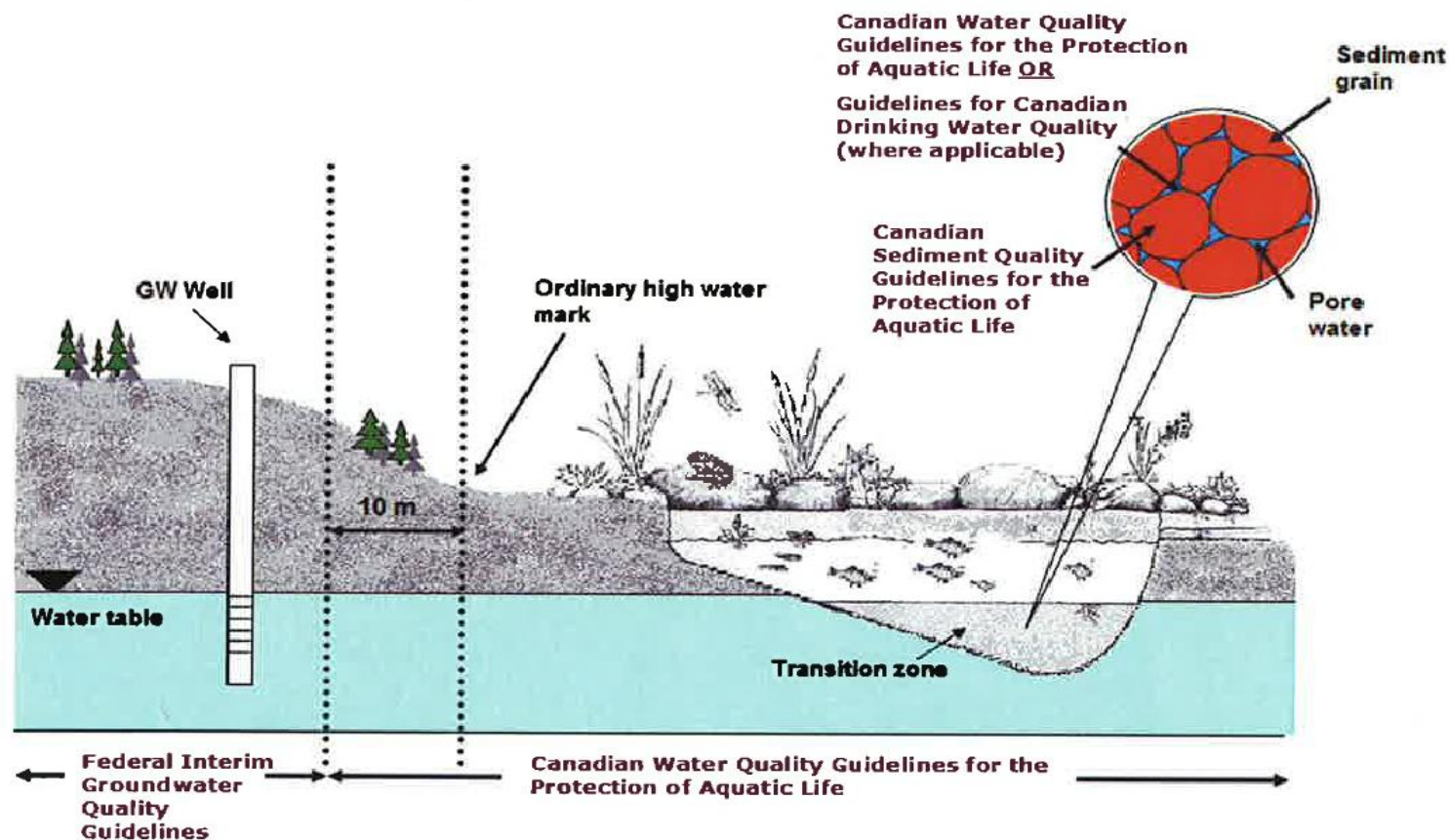
- Groundwater flow to surface water and exposure to aquatic life
 - Direct contact of soil organisms to groundwater
 - Vapour generation and human inhalation

- For agricultural land use only:**

- Groundwater use for irrigation
 - Groundwater use for livestock watering
 - Groundwater discharging to surface water and subsequent ingestion by wildlife



Interim Federal Groundwater Guidelines



Note: *Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses and the Guidelines for Canadian Drinking Water Quality may also be applicable where appropriate*



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Interim Federal Groundwater Guidelines

**TABLE 2 FEDERAL INTERIM GROUNDWATER QUALITY GUIDELINES
GENERIC GUIDELINES FOR RESIDENTIAL/PARKLAND LAND USE^a (mg/L)**

Note: Guidelines for Canadian Drinking Water Quality (Health Canada, 2008) may also apply
Guidelines may not apply if underlying assumptions are not met (see Section 4.2)

Parameters	Tier 1		Tier 2							
	Lowest Guideline		Water Use/Exposure Pathway							
			Inhalation	Soil Organisms Direct Contact		Freshwater Life ^b		Marine Life ^c		
Soil Type										
Parameters	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
Phenol	0.004	0.004	73,000	3,700	110	150	0.004	0.004	-	-
2,4,5-Trichlorophenol	0.063	0.063	-	-	-	-	0.063 ^{d,j}	0.063 ^{d,j}	-	-
2,4,6-Trichlorophenol	0.018	0.018	NGR	54	-	-	0.018	0.018	-	-
2,3,4,6-Tetrachlorophenol	0.001	0.001	NGR	NGR	-	-	0.001	0.001	-	-
Pentachlorophenol	0.0005	0.0005	NGR	NGR	0.87	0.88	0.0005	0.0005	-	-
Pesticides										
Aldicarb	0.001	0.001	-	-	-	-	0.001	0.001	0.00015	0.00015
Aldrin	0.003	0.003	-	-	-	-	0.003	0.003	-	-
Atrazine and metabolites	0.0018	0.0018	-	-	-	-	0.0018	0.0018	0.01 ^{h,i}	0.01 ^{h,i}
Azinphos-methyl	0.00001	0.00001	-	-	-	-	0.00001	0.00001	-	-
Bromacil	0.005	0.005	-	-	-	-	0.005	0.005	-	-
Bromoxynil	0.005	0.005	-	-	-	-	0.005	0.005	-	-



Interim Federal Groundwater Guidelines

- **Update of Interim Groundwater Guidelines in Progress**
 - Address specifics in criteria for pathway elimination
 - Include updates to Ontario GW guidelines
 - Correct editorial errors in text and tables
 - Clarify analytical methods

Please forward your input/comments/suggestion to
fcsap.pascf@ec.gc.ca



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FCSAP Risk Assessment Guidance

- Federal Interim Groundwater Guidelines
- **Tool for Risk Assessment Validation (TRAV) as part of Site Closure Tool**
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FCSAP Site Closure Process

- FCSAP site closure tool – May 2012
- Spread sheet based tool to document that all work on the site (site assessment, risk assessment, remediation) was completed satisfactorily – Risk has been reduced to acceptable level – no further work is required.
- For sites that used risk assessment as part of their site management approach, TRAV provides assurance that RA meets a minimum standard

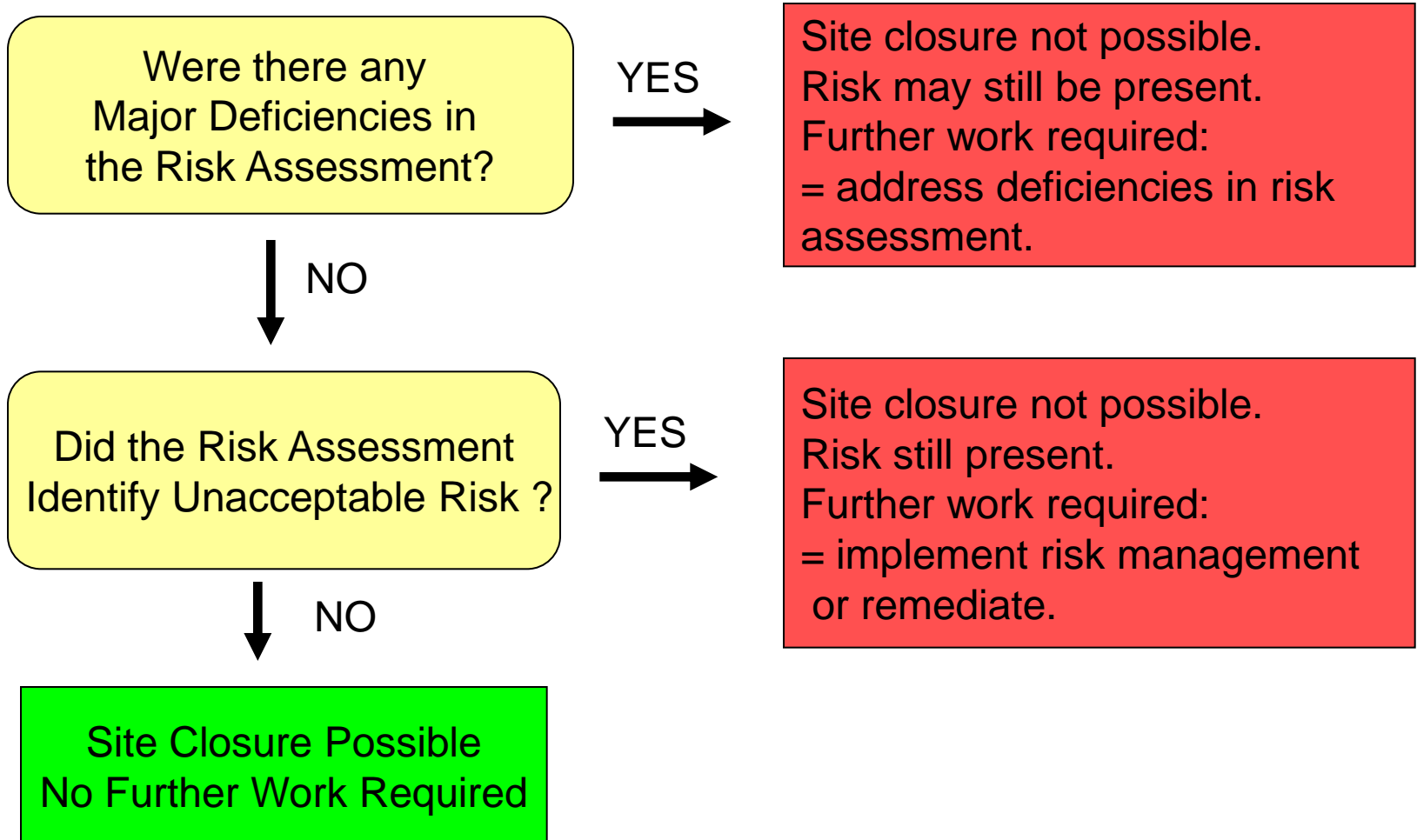


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Tool for Risk Assessment Validation



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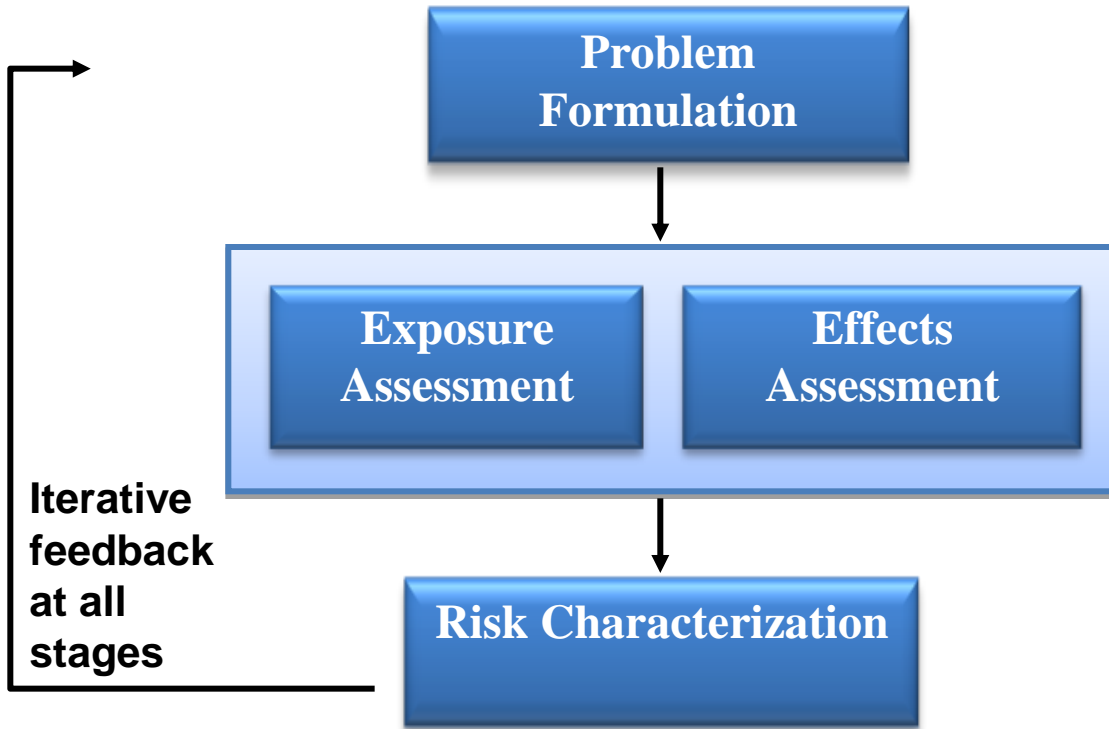


Ecological Risk Assessment Guidance

- **Comprehensive Ecological Risk Assessment Guidance**
- **Appendices = Technical Modules**
 - Module 1: Toxicity Test Selection & Interpretation
 - Module 2: Selection & Development of Toxicity Reference Values
 - Module 3: Standardization of Wildlife Receptor Characteristics
 - Module 4: Causality Assessment (DFO)



FCSAP Comprehensive ERA Guidance



FCSAP Comprehensive ERA Guidance

- Technical guidance for all phases of the ERA (problem formulation, exposure assessment, effects assessment risk characterization)
- Supplemental to CCME 1996, 1997 guidance
- Based on Weight of Evidence Approach to Ecological Risk Assessment
- Promotes identifying lines of evidence early and carrying them through in the risk assessment
- Promotes documenting that risk was addressed comprehensively (e.g. all receptors, all contaminants)



Ecological Risk Assessment Guidance

- **Module 1: Toxicity Test Selection and Interpretation**
-available
- **Module 2: Selection and Development of Toxicity Reference Values**
-available
- **Module 3: Standardization of Wildlife Receptor Characteristics**
-available
- **Module 4: Causality Assessment (DFO)**
-for public comment this fall
- **Module 5: Defining Background Conditions and using Background Concentrations in ERAs**
-under development



Technical Module 1: Selecting Toxicity Tests for ERAs

- Overview of Different Roles of Toxicity Testing in Ecological Risk Assessment (Line of Evidence, TRV development, etc.)
- Guidance on Interpretation of Toxicity Test Results in a Risk Assessment Weight-of-Evidence Framework
- **Guidance on Selecting Appropriate Toxicity Tests for Ecological Risk Assessment**
- *Format: Guidance Text and Interactive Excel Tables*



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Technical Module 1: Selecting Toxicity Tests for ERAs

- Demonstration of EXCEL Tables

[Toxicity Module Tables March 2010.xls](#)



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Technical Module 2:

TRV Selection and Development

- Overview of Different Types of Toxicity Reference Values (TRVs)
- Use of TRVs in Ecological Risk Assessments
- Guidance on how to select TRVs from published sources
- Guidance on derivation of site specific TRVs
- Planned: list of default TRVs for Screening Level Ecological Risk Assessments



Technical Module 2:

TRV Selection and Development

- **Guidance on selecting TRVs from published sources:**
 - Resource list for published TRVs (Table 1):
Includes: references, derivation methods, ecological endpoints, protection goals and acceptable effect levels inherent in TRV, advantages and limitations.
- **Guidance on developing site specific TRVs:**
 - TRVs developed from Literature Toxicity Testing
Table 2 provides list of sources for Literature Toxicity Data, discussion of do's and don'ts, uncertainty
 - TRVs developed by modifying Guidelines
Table 3 provides list of guideline derivation references
 - TRVs developed from Site Specific Toxicity Testing
Provides link to Module 1 (Toxicity Testing)



FCSAP Risk Assessment Guidance

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- **Site Characterization Guidance**



Site Characterization Guidance

- Update of CCME 1993 Site Characterization Guidance
- FCSAP funded the CCME soil quality task group to develop a new Site Characterization document including:
 - existing HC guidance (soil, groundwater, soil vapour, indoor air)
 - new guidance (sediment, surface water and biological tissues)
- Distribution for public review on CCME list serve – soon
- contact **fcsap.pascf@ec.gc.ca**

Guidance for ERA - Summary

- **Interim Federal Groundwater Guidelines**
- **Site Closure/Risk Assessment Validation Tool**
- **Comprehensive ERA Guidance & Technical Modules**
- **Site Characterization Guidance**

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FCSAP Guidance for ERA

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