

USER GUIDANCE FOR ALBERTA HYDROCARBON GUIDELINES

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PRESENTATIONS

- **Scientific Basis**

- ◆ *How the Guidelines Were Calculated*

- **User Guide**

- ◆ *Which Guidelines to Use*

- **Case Study 1**

- ◆ *Flare Pit*

- **Case Study 2**

- ◆ *Pipeline Break*

USER GUIDE PRESENTATION

- ***Regulatory Framework***
- ***Using Tier 1 Guidelines***
- ***Tier 2 and 3 Guidelines***

REGULATORY FRAMEWORK

- ***Closure Types***
- ***Regulatory Acknowledgement***
- ***Guideline Tiers***

CLOSURE TYPES

- ***Unconditional Closure***
 - ◆ **Types A and B Closure**
- ***Conditional Closure***
 - ◆ **Type C Closure**

REGULATORY ACKNOWLEDGEMENT

- **A - “Letter of Compliance”**
- **B - “Letter of Compliance (On-Site Management)”**
- **C - “Letter of Conditional Compliance**

GUIDELINE TIERS

- ***Tier 1 - Generic Guidelines***
- ***Tier 2 - Modified Generic Guidelines***
- ***Tier 3 - Site Specific Risk Assessment***

MANAGEMENT LEVELS

- ***Closure Type + Guideline Tier = Management Level***
- ***Tier 1***
- ***Tier 2A, 2B, 2C***
- ***Tier 3A, 3B, 3C***

USER GUIDE PRESENTATION

- ***Regulatory Framework***
- ***Using Tier 1 Guidelines***
- ***Tier 2 and 3 Guidelines***

USING TIER 1 GUIDELINES

- ***Most Sites Will Use Tier 1***
- ***Talk Focus is Tier 1***
 - ◆ **4 Tables**
 - ◆ **>1,000 Entries**
 - ◆ **How to Select Applicable Guidelines**
- ***Decision Tree***

TIER 1 DECISION TREE

1. Determine if Subsoil Applicable



2. Identify Soil Type



3. Select Land Use



4. Exclude Inapplicable Pathways



5. Select Smallest Remaining Guideline for Each Chemical

DETERMINE IF SUBSOIL APPLICABLE

- ***Subsoil Only Within 30 m of Wellhead at Tier 1***
- ***Otherwise Use Surface Soil Guidelines***

IDENTIFY SOIL TYPE

- ***Coarse***

- ◆ Median Grain Size > 75 mm

- ***Fine***

- ◆ Median Grain Size < 75 mm

- ***Sites With Both Types***

SELECT LAND USE

- ***Natural Area***
- ***Agricultural***
- ***Residential***
- ***Commercial***
- ***Industrial***

APPLICABLE GUIDELINE "BLOCK"

FINE SURFACE SOIL – AGRICULTURAL (mg/kg)

Pathway	B	T	E	X	B(a)P	F1	F2	F3	F4
Human									
<i>Ingestion</i>	1,200	22,000	10,000	RES	4.9	15,000	8,000	18,000	25,000
<i>Dermal</i>	2,700	RES	RES	RES	4.3	RES	RES	RES	RES
<i>Inhalation</i>	1.9	4,600	2,000	500	NA	940	5,200	NA	NA
<i>Groundwater</i>	0.073	0.86	0.19	25	NA	1,900	2,600	NA	NA
Ecological									
<i>Soil Contact</i>	14	300	450	1,200	F3	260	900	800	5,600
<i>Soil Ingestion</i>	33	1,800	1,200	4,900	F3	4,000	3,700	6,000	4,000
<i>Aquatic</i>	RES	RES	RES	RES	F3	TBD	TBD	NA	NA
<i>Groundwater</i>									
<i>Livestock</i>	RES	RES	RES	RES	F3	TBD	TBD	NA	NA
<i>Groundwater</i>									

NA = not applicable; RES = residual hydrocarbon formation; NC = not calculated; F3 = ecological endpoints for B(a)P included in F3 guideline; and TBD = to be determined

EXCLUDE INAPPLICABLE PATHWAYS

■ ***Human Drinking Water Pathway***

- ◆ **No Domestic Use Aquifer (DUA) in Hydraulic Connection**

■ ***Freshwater Aquatic Life Pathway***

- ◆ **No Creek etc. Within 300 m**

TIER 1 GUIDELINES

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Ingestion	1,200	22,000	10,000	RES	4.9	15,000	8,000	18,000	25,000
Dermal	2,700	RES	RES	RES	4.3	RES	RES	RES	RES
Inhalation	1.9	4,600	2,000	500	NA	940	5,200	NA	NA
Ecological									
Soil Contact	14	300	450	1,200	F3	260	900	800	5,600
Soil Ingestion	33	1,800	1,200	4,900	F3	4,000	3,700	6,000	4,000

NA = not applicable; RES = residual hydrocarbon formation; and, F3 = ecological endpoints for B(a)P included in F3 guideline.

TIER 1 GUIDELINES

FINE SURFACE SOIL – AGRICULTURAL (mg/kg)

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Human									
Ingestion	1,200	22,000	10,000	RES	4.9	15,000	8,000	18,000	25,000
Dermal	2,700	RES	RES	RES	4.3	RES	RES	RES	RES
Inhalation	1.9	4,600	2,000	500	NA	940	5,200	NA	NA
Ecological									
Soil Contact	14	300	450	1,200	F3	260	900	800	5,600
Soil Ingestion	33	1,800	1,200	4,900	F3	4,000	3,700	6,000	4,000

Tier 1 Guidelines Shaded and Boxed; NA = not applicable; RES = residual hydrocarbon formation; and, F3 = ecological endpoints for B(a)P included in F3 guideline

THE PAH QUESTIONS

- ***What are PAHs?***
- ***Do I Have to Analyze for Them?***
- ***Which Ones?***
- ***How to Express Them?***

WHAT ARE PAHs?

- ***Polycyclic Aromatic Hydrocarbons***
- ***Multiple Benzene Rings***
- ***Some Are Carcinogens***

DO I HAVE TO ANALYZE FOR THEM?

- ***3 Options***

- ◆ **Analyze and Characterize**
- ◆ **Take Few Worst Case Samples**
- ◆ **Screen Out**

- ***Have to Justify Your Choice***

WHICH ONES?

- **8 Carcinogenic PAHs**
 - ◆ **Listed in User Guide Table 2**

HOW TO EXPRESS THEM?

- ***Express Each as Equivalent Benzo(a)Pyrene***
- ***Based on Relative Carcinogenic Potency***
- ***Add to Get a Single Value***

GROUNDWATER GUIDELINES

■ ***Four Groundwater Uses***

- ◆ **Human Drinking Water**
- ◆ **Livestock Watering**
- ◆ **Freshwater Aquatic Life**
- ◆ **Wildlife Watering**

TIER 1 GROUNDWATER GUIDELINES

GROUNDWATER GUIDELINES (mg/L)

<i>Pathway</i>	<i>B</i>	<i>T</i>	<i>E</i>	<i>X</i>	<i>B(a)P</i>	<i>F1</i>	<i>F2</i>
<i>Human Drinking Water</i>	0.005	0.024	0.0024	0.3	0.00001	4.6	2.1
<i>Livestock Watering</i>	0.51	29	19	76	NA	62	57
<i>All Soils – Piezometers <10 m From Surface Water Body</i>							
<i>Freshwater Aquatic Life</i>	0.370	0.002	0.090	0.180	NA	TBD	TBD
<i>Wildlife Watering</i>	1.2	69	45	180	NA	150	140
<i>Coarse Soils – Piezometers >10 m From Surface Water Body</i>							
<i>Freshwater Aquatic Life</i>	0.53	0.021	4.8	3.3	NA	NG	NG
<i>Wildlife Watering</i>	1.8	NG	NG	NG	NA	NG	NG
<i>Fine Soils – Piezometers >10 m From Surface Water Body</i>							
<i>Freshwater Aquatic Life</i>	NG	NG	NG	NG	NG	NG	NG
<i>Wildlife Watering</i>	NG	NG	NG	NG	NG	NG	NG

NA = not applicable; NG = no guideline calculated; and, TBD = to be determined.

USER GUIDE PRESENTATION

- ***Regulatory Framework***
- ***Using Tier 1 Guidelines***
- ***Tier 2 and 3 Guidelines***

TIER 2 GUIDELINES

- ***Purpose - Allow Limited Flexibility***
- ***Same Protection Goals as Tier 1***
 - ◆ **Tier 2A - Customize Tier 1**
 - ◆ **(Tier 2B - Allow Passive On-Site Management)**
 - ◆ **(Tier 2C - Management of Off-Site Groundwater Plume)**

TIER 2A

■ ***Recalculate Tier 1 Guidelines***

- ◆ **Same Equations as Tier 1**
- ◆ **Replace Generic Parameters with Measured, Site-Specific Ones**
- ◆ **Limited Scope - See User Guide**

TIER 2B

- ***Not Available Yet***
- ***Will Allow For Passive, On-Site Management***
- ***Two Scenarios Envisioned:***
 - ◆ **Subsoil Guidelines (Except Within 30 m Offset)**
 - ◆ **Capped Sites**

TIER 2C

- ***Not Available Yet***
- ***Will Allow Conditional Closure***
- ***Co-Operative Approach From All Stakeholders***
- ***Scenario Envisioned:***
 - ◆ **Off-Site Groundwater Plume, Natural Attenuation Likely**

TIER 3 GUIDELINES

- ***Purpose - Allow Flexibility at Complex Sites***
- ***Same Protection Goals as Tier 1***
 - ◆ **Tier 3A - Site Specific Unconditional Guidelines**
 - ***May Include Site-Specific Toxicity***
 - ◆ **(Tier 3B - Allow Passive On-Site Management)**
 - ◆ **Tier 3C - Management Using Engineered/Institutional Controls**

SUMMARY

- ***Multiple Management Levels Available, but . . .***
- ***Most Sites Will Use Tier 1***
- ***Talk Showed How To Select Applicable Tier 1 Guidelines***