



Raising the Bar on Environmental Standards - What does the Future Hold for Brownfields?

Standards & Risk Assessment

Elliot A. Sigal, B.Sc., QP_{RA}

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Intrinsic Environmental Sciences Inc.

- Scientific consulting firm specializing in:
 - human and ecological risk assessment
 - toxicology
 - scientific peer review
 - risk communication
- Over 30 Scientists in five offices across Canada (Mississauga, Guelph and Ottawa in Ontario)
- 5 QP_{RA}; 3 DABT; 8 Ph.D.

Elliot A. Sigal, B.Sc., QP_{RA}

Executive Vice President, Senior Toxicologist

- 19 Years of experience in risk assessment and toxicology, specializing in human health related issues
- Member of the Society of Toxicology (SOT)
- Senior project management and regulatory liaison
- QP_{RA} responsible for 10+ RA under O. Reg. 153/04 and hundreds outside this regulation
- External reviewer of human health risk assessment, toxicology and risk assessment policy for the MOE
- Contact Info:
 - esigal@intrinsikscience.com
 - 905-364-7800 ext. 222
 - www.intrinsikscience.com

O. Reg. 153/04

- Ontario Regulation governing the redevelopment of Brownfield properties in Ontario
- Establishes the level of clean-up (remediation) and risk management needed prior to redevelopment
- The Regulation is currently undergoing an extensive update with draft changes currently posted to the EBR

The Proposed Amendments

- Enhanced Record of Site Condition (RSC) Integrity
 - clear rules for completion of Phase One and Phase Two environmental site assessments
 - a regulated timeline to support the submission and filing process for RSCs
- Liability Protection and Off-Site Migration from the RSC Property
- Strengthened Soil and Ground Water Site Condition Standards
- A Streamlined Risk Assessment Approach
- Complementary Technical Regulatory Amendments
- Transition Provisions

Strengthened Soil and Ground Water Site Condition Standards

- All standards contained in O. Reg. 153 were reviewed and updated as necessary
- Standards were updated to reflect up to date science including toxicology and exposure modelling, as well as consideration of additional exposure pathways and receptor groups
- Not all updated standards are more stringent

Updated Standards

- Approximately 25% of the updated soils standards and 50% of the updated groundwater standards are less stringent
- A handful have remained the same
- Remainder have become more stringent
- Standards for some of the most common contaminants have decreased substantially

Some Examples (from Table 3a)

Contaminant	Proposed soil (ug/g)	1996 soil (ug/g)	Proposed GW (ug/L)	1996 GW (ug/L)
Arsenic	18	20	1900	480
Benzene	0.06	5.3	15	1900
B(a)P	0.3	1.2	0.81	1.9
Lead	120	200	25	32
PH F2	98	150	100	-
PH F3	300	400	500	-
PCE	3.8	0.45	1.9	5
TCE	0.061	1.1	1.9	50
Vinyl Chloride	0.0021	0.003	0.2	0.5

Approaches to Meeting the Standards

- Two common approaches to meeting the standards
 - ‘Dig and dump’ or remedial measures
 - Removal of all soils not meeting the standard
 - Disposal off-site
 - Natural attenuation of groundwater following source removal
 - Establishment of alternate ‘property specific standards’
 - Requires use of risk assessment (modified generic or conventional) and possibly risk management

Streamlined Risk Assessment

- Modified generic; Tier II RA
- Intended to facilitate the use of risk assessment in a timely and efficient manner
 - will expedite process for some sites
- Allows the QP_{RA} to:
 - modify several generic risk assessment parameters
 - utilized simple risk management assumptions
 - use the Ministry's exposure model to calculate Property Specific Standards

Spreadsheet System Overview

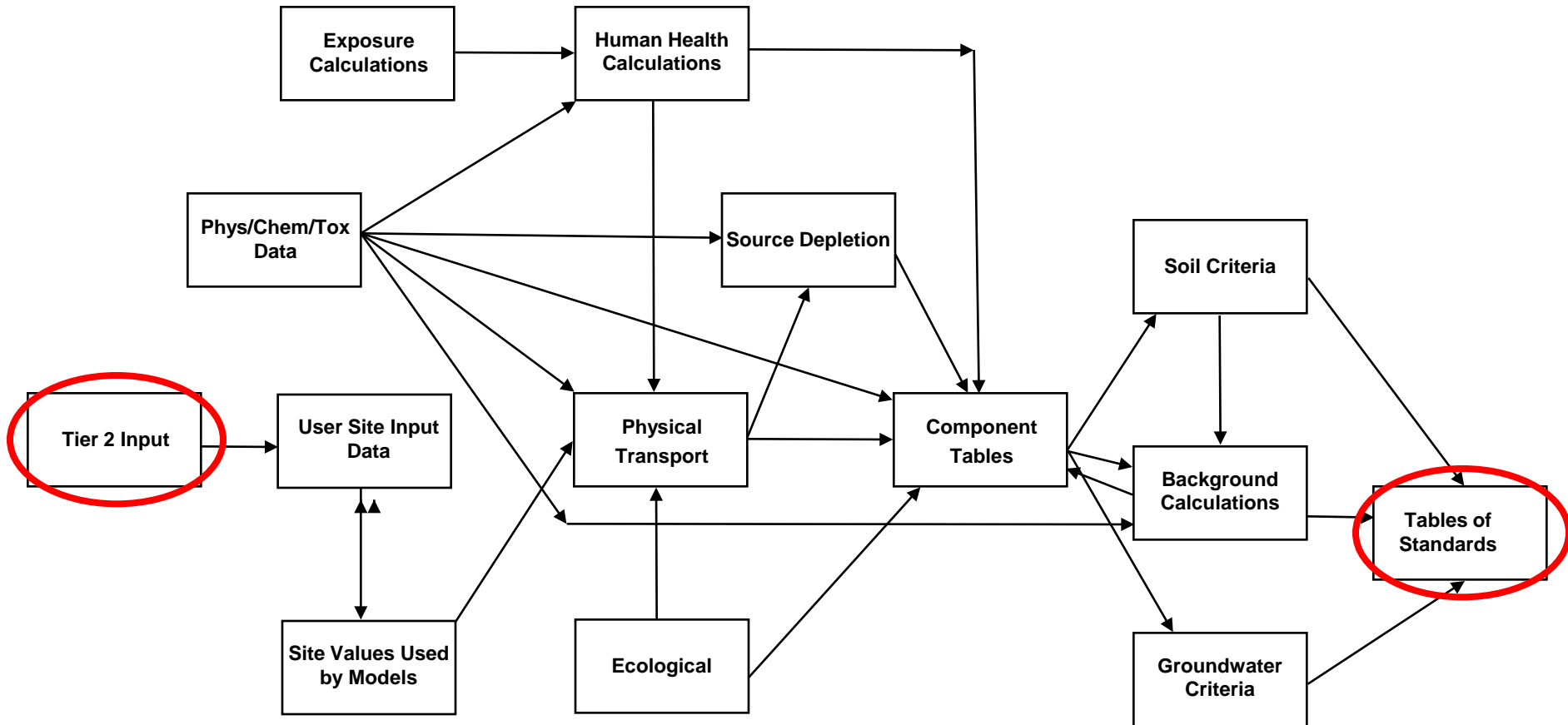


Figure provided by MOE at practitioners workshop

Conceptual Model

Conceptual Model: Component Approach

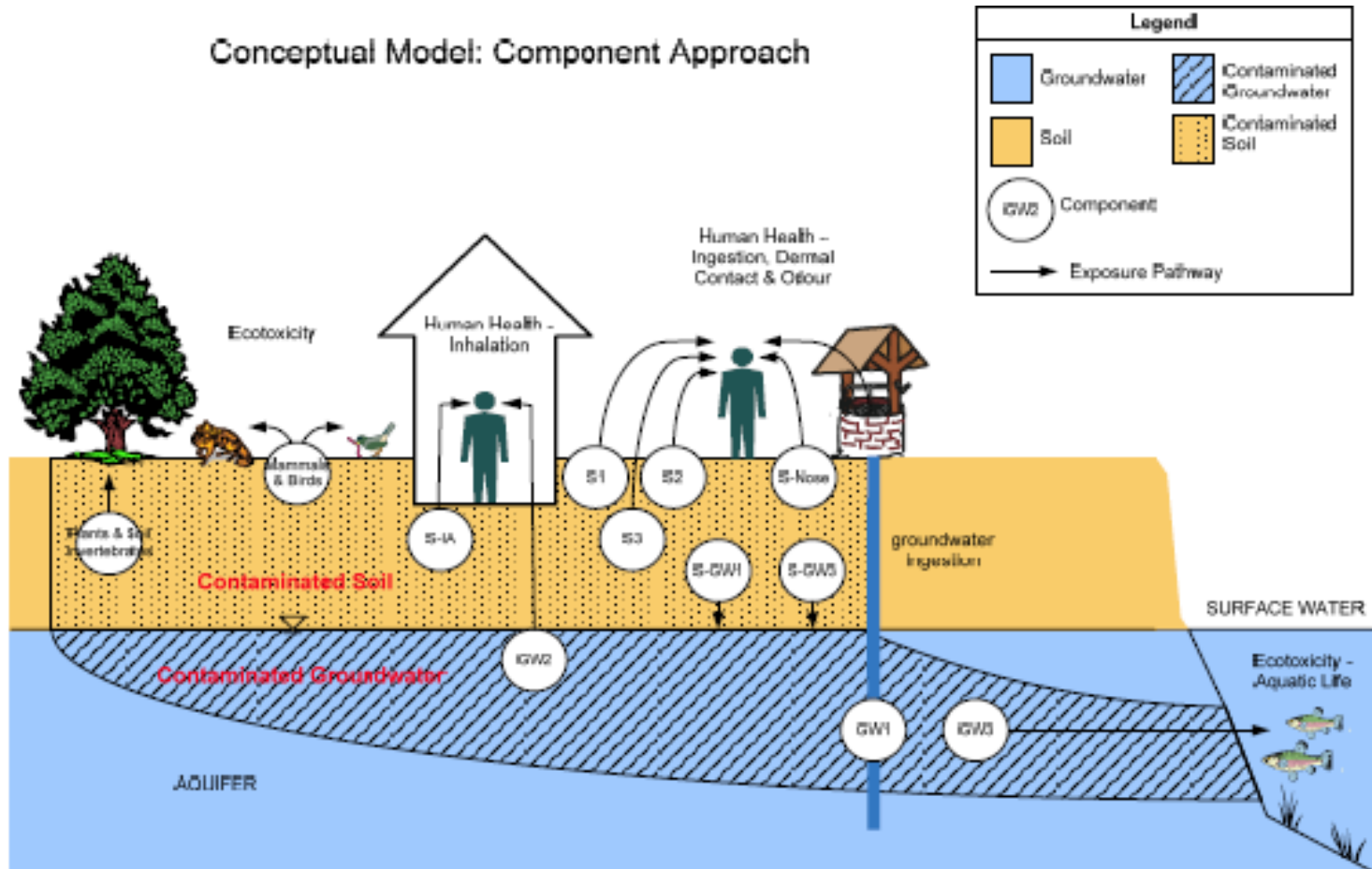


Figure provided in MOE Rationale Document (2008)

Proposed Tier II Modifications

- Soil type
- Soil bulk density
- Fraction of Organic Carbon
- Distance to surface water
- Depth to water table
- Hydraulic conductivity
- Hydraulic gradient
- Removal of pathways deemed incomplete due to naturally occurring conditions

Simplified Risk Management

- MOE designated and published Risk Management Measures (RMM):
 - Capping with clean fill and/or asphalt/concrete
 - Modified Ecological Protection
 - High density urban development (i.e., condominium vs. single family)
 - Removal of incomplete exposure pathways
- Use of the MOE published RMM will result in an expedited RSC process since EBR posting will not be necessary
- The use of any risk management measure will still require a CPU

When Can a Streamlined RA NOT be Used

- Site designated environmentally sensitive
- Risk management other than the simplified RMM designated and published by the Ministry

What Can Be Expected From a Streamlined RA

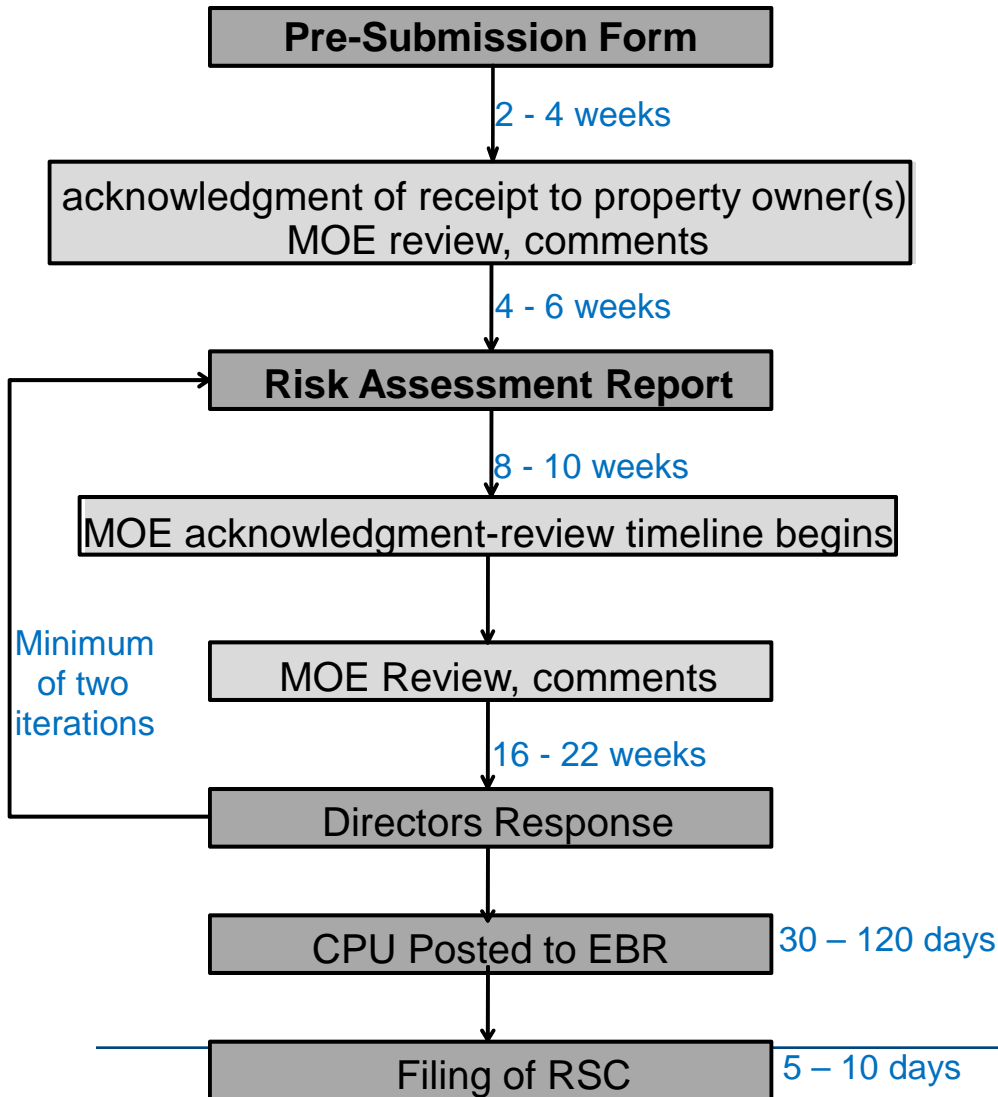
- Expedited RA review process
- Simplified RA and risk management
- Tier II will provide:
 - Property Specific Standards that may be less stringent than the generic while still ensuring the same level of protection
 - benefits will be limited due to constraints placed on the Tier II model by MOE (under review by Tier II Industry Advisory Group)
- If simplified RMM utilized, a CPU will still be required
- Comprehensive RA will still be necessary at many sites in many situations

Full Depth Potable, Residential - FOC = 0.01 in soil and 0.002 in aquifer
 +100m to surface water + underground parking garage and asphalt cap

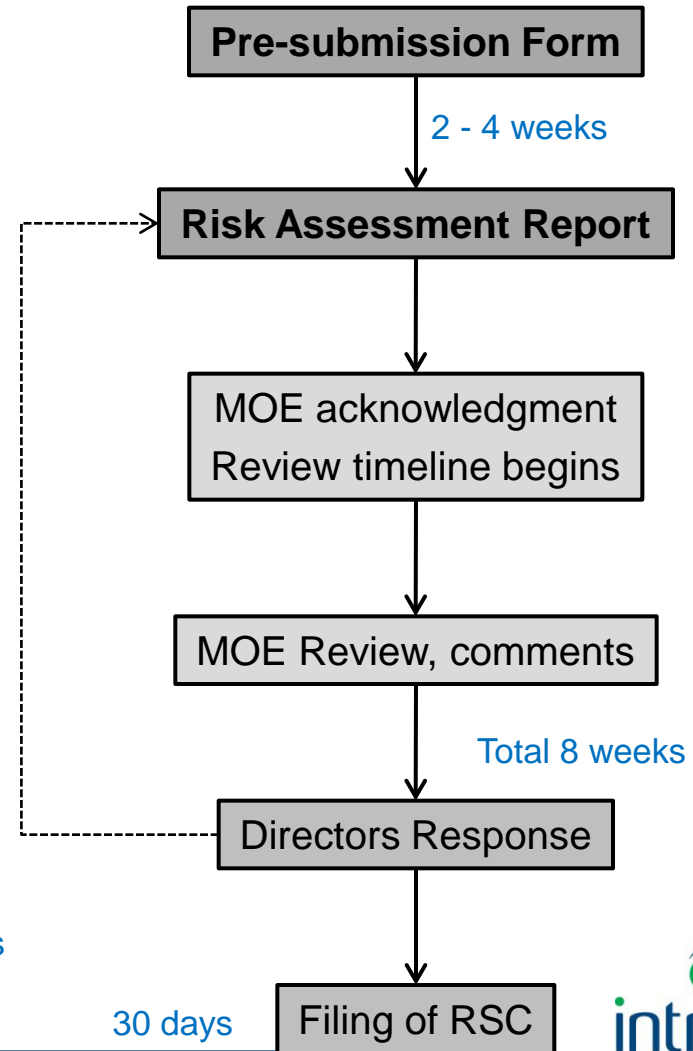
Contaminant	Tier 2 Standard	Generic Table 2 Standard
Benzene	(0.56) 1.2	(0.056) 0.06
Benzo(a)pyrene	3.6	0.3
Lead	1000	120
PHC F1	(220) 400	(65) 55
PHC F2	(210) 420	(150) 98
PHC F3	(650) 1300	(650) 300
PHC F4	(5000) 10000	(5000) 2800
PCBs	4.1	0.28
Tetrachloroethylene	(2.5) 2.1	(2.5) 1.9
Vinyl Chloride	(0.25) 0.033	(0.099) 0.0021
Xylene	(66) 62	(30) 3.1
Zinc	47000	340

How long does the Process take?

Comprehensive/Conventional RA



Streamlined RA



What do these changes mean

- Updated generic standards will likely result in more sites requiring remediation, risk assessment and/or risk management
- Due to costs and technical feasibility, RA and RM will need to be considered at a wider range of properties
- RA is a viable option; however, most sites will require some form of RM which will result in the need for a CPU
- The streamlined process will expedite the process although it will only be helpful at certain sites.