

A vertical sidebar on the left side of the slide. It features a globe at the top with a green arrow pointing right. Below the globe is a vertical strip of several small, grayscale portraits of diverse people. The background of the slide is white with large green shapes and a dark blue horizontal bar.

Using the RBCA Tool in Urban Redevelopment Projects



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Environmental Concerns at Brownfields

- Impaired soil, water, or air conditions from historical use

- Land uses:
 - Waste storage/disposal
 - Manufacturing/industrial
 - Transportation/rail
 - Petroleum
 - Mining
 - Agribusiness



What is Risk-Based Corrective Action (RBCA)?

- ➔ The application of risk assessment to remediation efforts
- ➔ A flexible technically defensible framework developed by ASTM W 1739-95 – Risk-Based Corrective Action for Petroleum Release Sites

What is Atlantic Risk-Based Corrective Action (ARBCA)?

- Based on ASTM Standard
- Toxicity data for petroleum hydrocarbons revised to meet Health Canada Standards
- Customized for typical Atlantic Canada site conditions

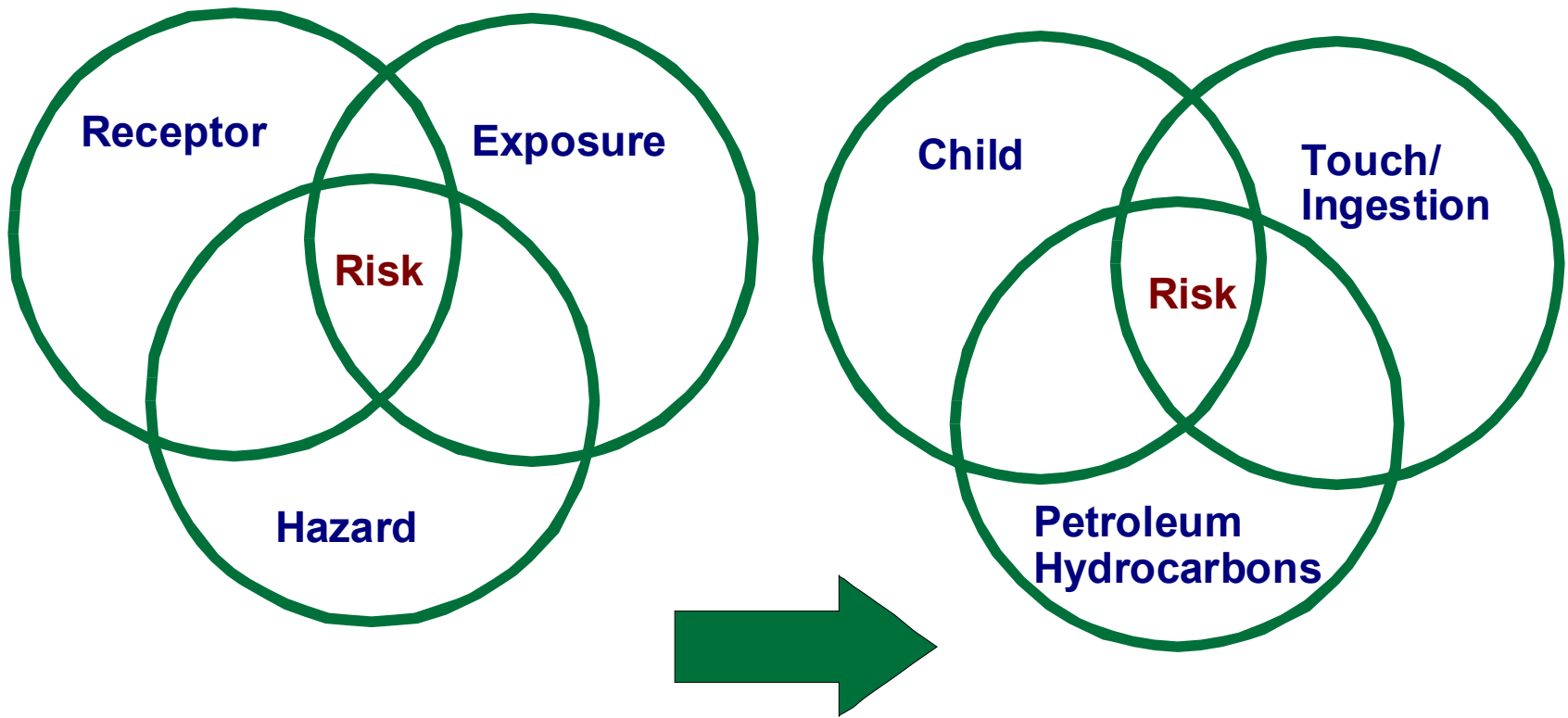
Key Drivers of ARBCA

- Traditional corrective action is too slow
- All sites:
 - do not pose the same level of risk
 - do not require the same level of remediation
- Risk assessment assumptions should affect remediation decisions
 - future land use
 - toxicity of chemicals

What are the benefits of ARBCA?

- Streamlines the corrective action process
- Accepted by all four Atlantic Provinces
- Tiered Approach
- Software supported
 - Ability to customize defaults and equations
- Assessment and remediation activities are site specific
- Has potential to lower costs

The Principle of Risk



RISK ASSESSMENT OBJECTIVES

- Data Collection and Evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

RISK ASSESSMENT OBJECTIVES

- **Data Collection and Evaluation**
- Exposure Assessment
- Toxicity Assessment
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DATA COLLECTION & EVALUATION

- Environmental Site Assessments (ESAs) completed to:
- Identify potential chemicals of concern
 - Separate the chemical data by medium (soil, water, and air)

What are ESAs?

Focus on:

Land Uses



Site Improvements

Past, Present & Future

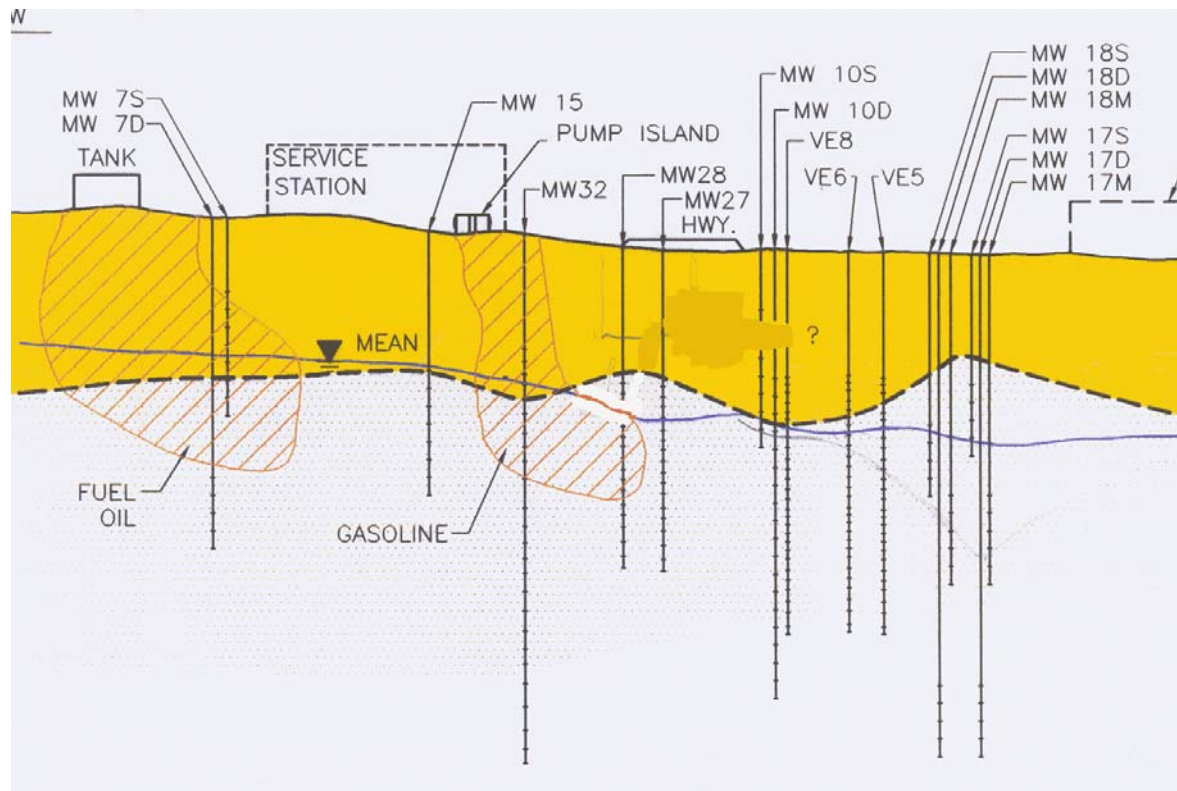


Contaminants & Related Risk

Benefits of ESAs?

- Used in ARBCA process to visualize relationships between
 - source areas
 - exposure pathways
 - receptors

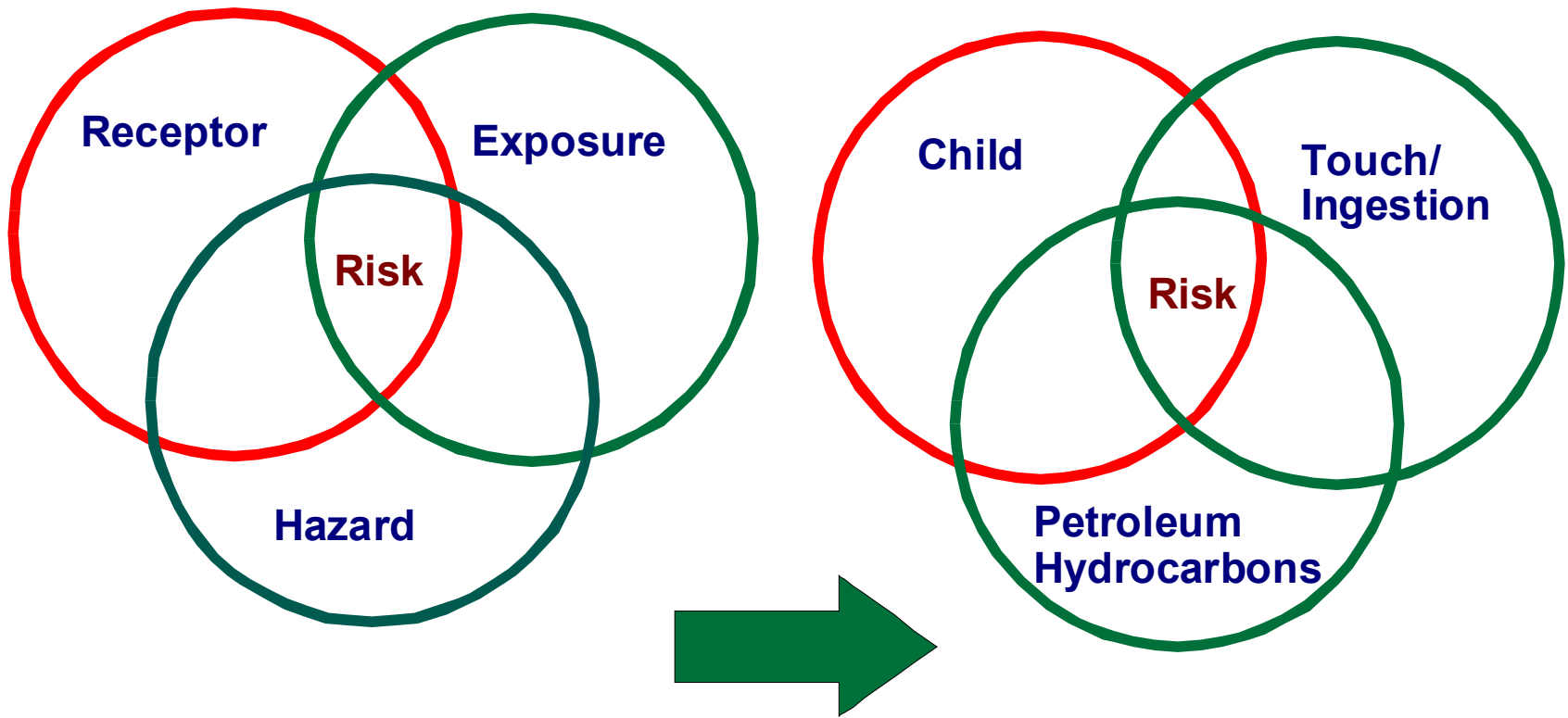
Environmental Site Assessment



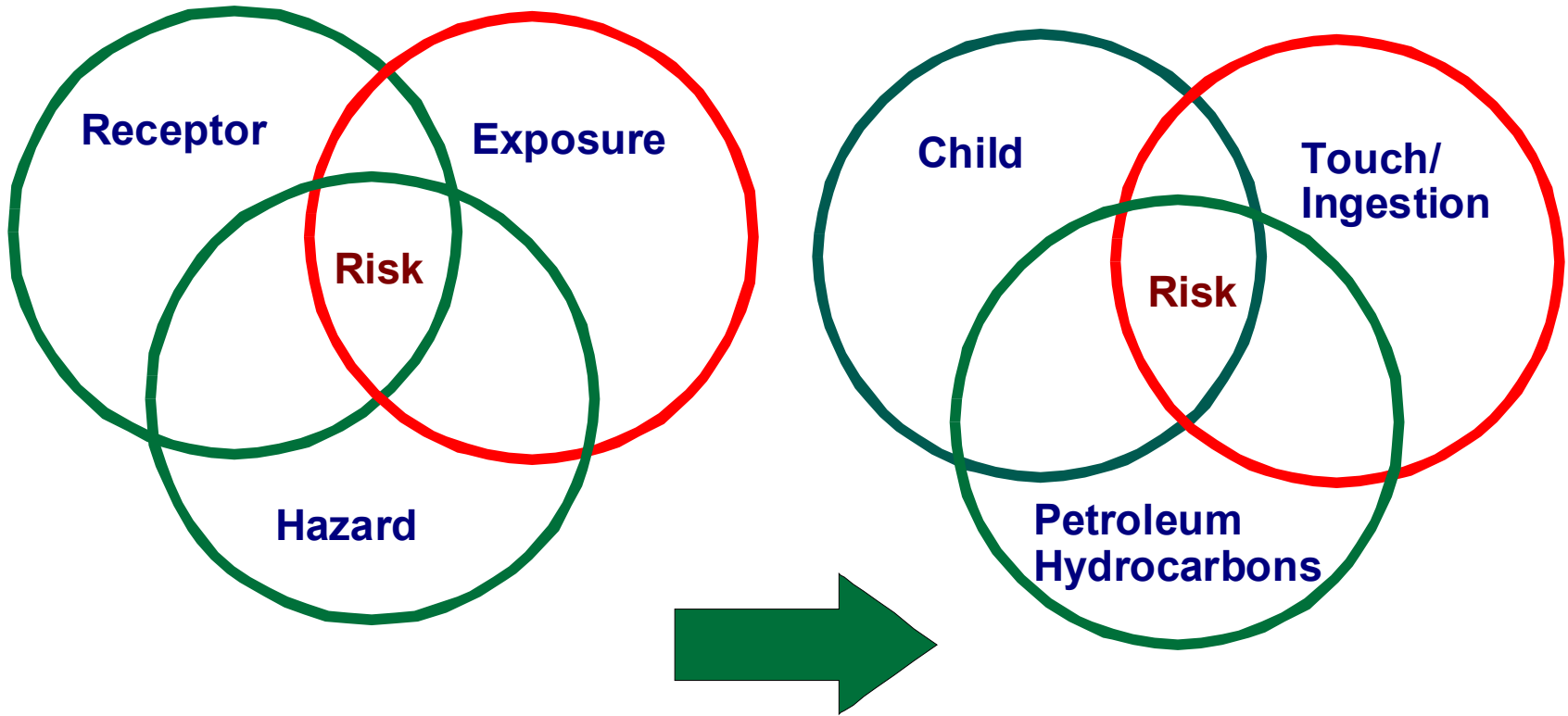
RISK ASSESSMENT OBJECTIVES

- Data Collection and Evaluation
- **Exposure Assessment**
- Toxicity Assessment
- Risk Characterization

Exposure Assessment



Exposure Assessment



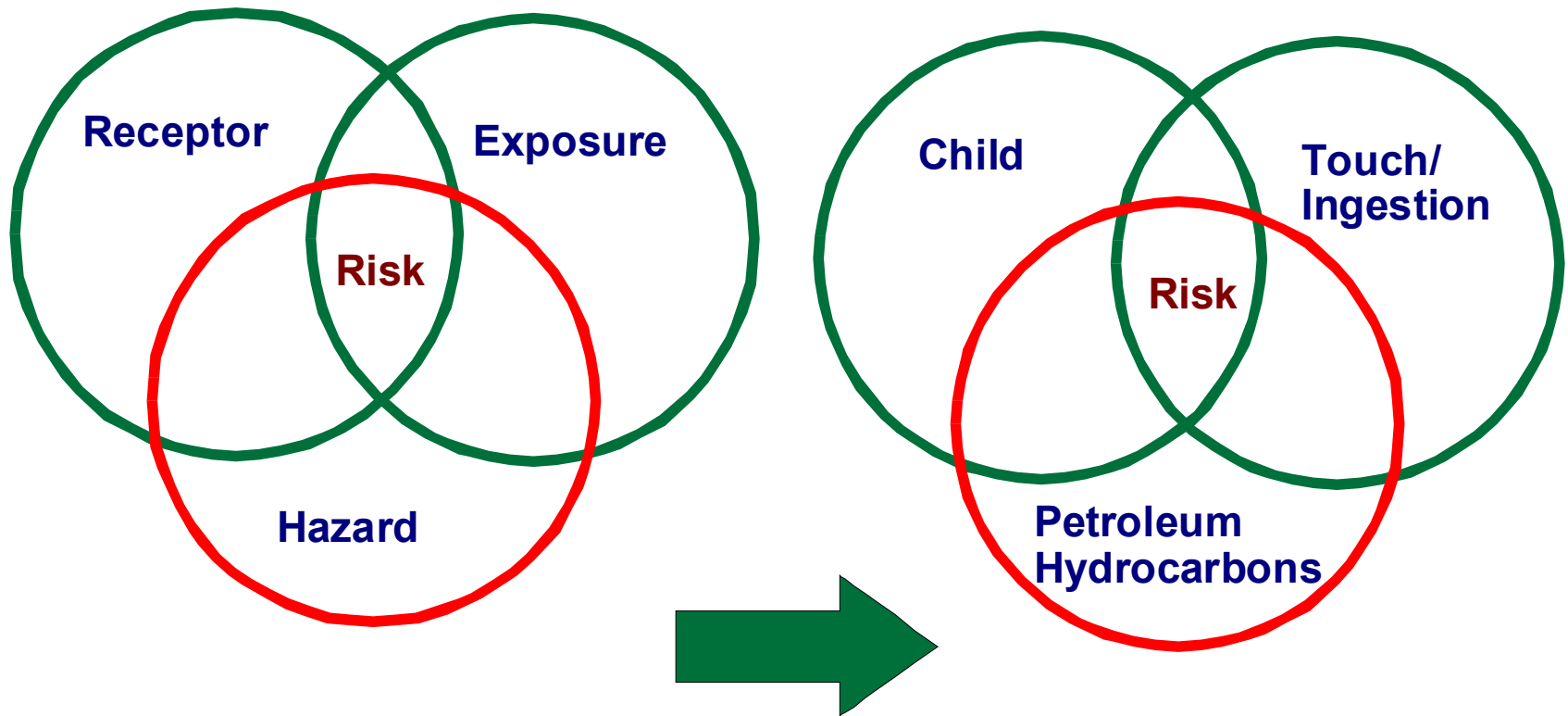
EXPOSURE ASSESSMENT

- Estimate the type and magnitude of human exposure to the chemicals of potential concern
- Consider both current and future exposures
- Three tasks:
 - Characterization of exposure setting
 - Identification of exposure pathways
 - Quantification of exposure concentrations

RISK ASSESSMENT OBJECTIVES

- Data Collection and Evaluation
- Exposure Assessment
- **Toxicity Assessment**
- Risk Characterization

Toxicity Assessment



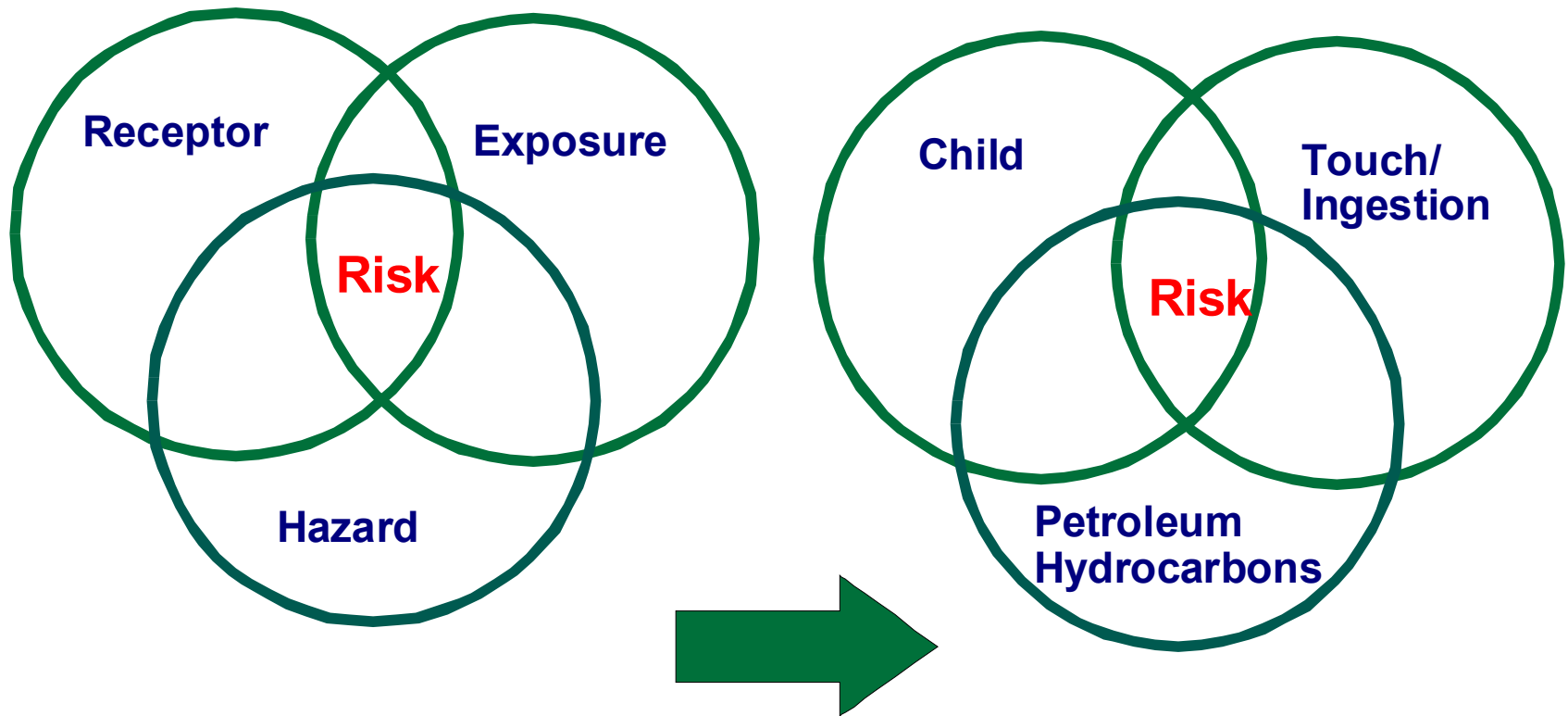
TOXICITY ASSESSMENT

- Identify potential adverse health effects of a may be grouped as either carcinogen or non-carcinogen contaminants (e.g.cancer, birth defects)
- Non-carcinogens or carcinogens.
 - For non-carcinogens, the reference dose (RfD) is used to express the daily exposure levels.
 - For carcinogens, the slope factor (SF) is used to express the potential risk level associated with their exposure.

RISK ASSESSMENT OBJECTIVES

- Data Collection and Evaluation
- Exposure Assessment
- Toxicity Assessment
- **Risk Characterization**

RISK CHARACTERIZATION



RISK CHARACTERIZATION

- The estimated cancer and non-cancer risks for all exposed pathways and land uses analyzed, and for all chemicals carried through the risk assessment.

ATLANTIC RBCA

- **Atlantic RBCA Tiered Approach to Corrective Action Objectives**
 - **Modified ASTM RBCA**
 - **Rational and flexible**
 - **Applicable for petroleum hydrocarbon contaminants**
 - **Tiers I, II and III**

ATLANTIC RBCA

→ Tier I: Look-up Tables

→ Tier 2: Plug-in Equations

– Site-specific Soil Parameters

- Bulk density
- Soil Particle density
- Water content
- Organic carbon fraction
- Hydraulic conductivity

- Tier 3: Commonly involves sufficient revisions to the ARBCA model default parameter which will require provincial approval

Tier I Evaluation

- Determine the Risk-Based Screening Levels (RBSLs)
 - Conservative, non-site specific concentrations of chemicals of concern
 - based on default assumptions about exposure factors and site characterizations
 - provincial criteria

Tier I Evaluation

- Compare maximum chemical concentrations to Risk-Based Screening Levels (RBSLs)
 - if concentrations are less than RBSLs, no further action may be required
- Evaluate ecological risks using Check List for Ecological Receptor Assessment

Tier II Evaluation

- ➔ Replace assumptions with site-specific information
- ➔ Additional data collection may be needed
 - alternate fate and transport model
 - more probable points of exposure
- ➔ Update site classification, site conceptual model, and pathway information

Tier III Evaluation

- ➔ Substantial increase in effort over Tier I and II
- ➔ Additional data collection may be needed
 - probabilistic evaluations
 - sophisticated fate and transport models
- ➔ Update site conceptual model

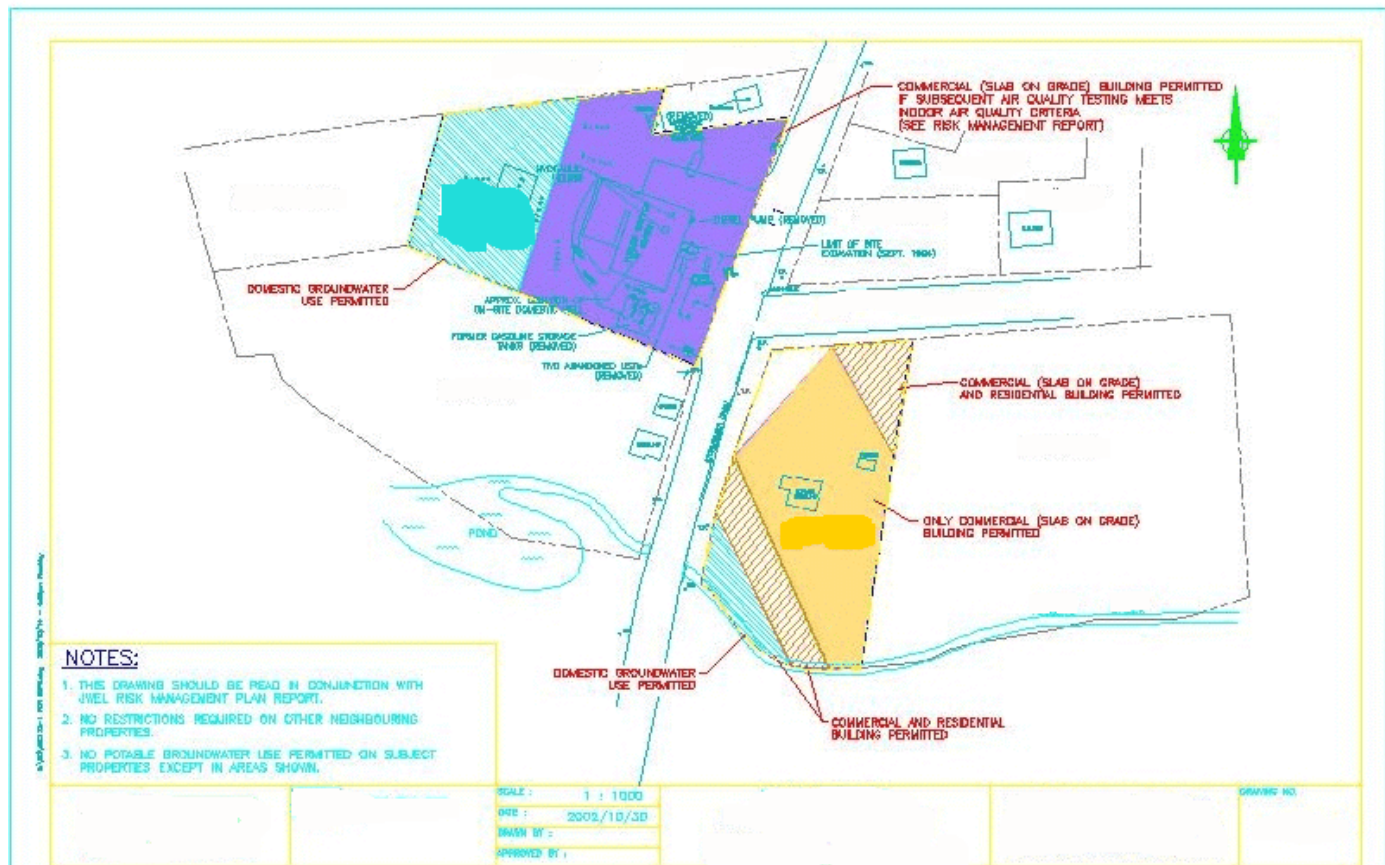
Remedial Action

- Goal – Reduce concentrations at point of exposure to acceptable levels
- May include:
 - Source removal
 - Treatment and containment
 - Elimination of exposure pathways
 - engineering controls
 - institutional controls

Remedial Action (Continued)

- Institutional / Engineering Controls
 - deed restrictions, restrictive covenants, or conservation easements, and caps or barriers
- Evaluate the risk of remedial action

Institutional Controls - Property Redevelopment



Stakeholders

→ Communication with stakeholders is important throughout the ARBCA process

