HUMAN HEALTH RISK ASSESSMENT FOR THE FLIN FLON/CREIGHTON AREA

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Flin Flon Air Quality Public Meeting (Healthy Flin Flon Meeting)
Monday, October 1, 2007

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Executive Vice President, Senior Scientist

- Member of the Society of Toxicology (SOT)
- 17 Years of Experience in risk assessment and toxicology, specializing in human health related issues
- Senior project management and regulatory liaison
- External reviewer of human health risk assessment, toxicology and risk assessment policy for the MOE and Health Canada
- Technical lead for the HHRA portion of the Sudbury Soils Study, the Deloro study
- Assisted MOE with Port Colborne assessment

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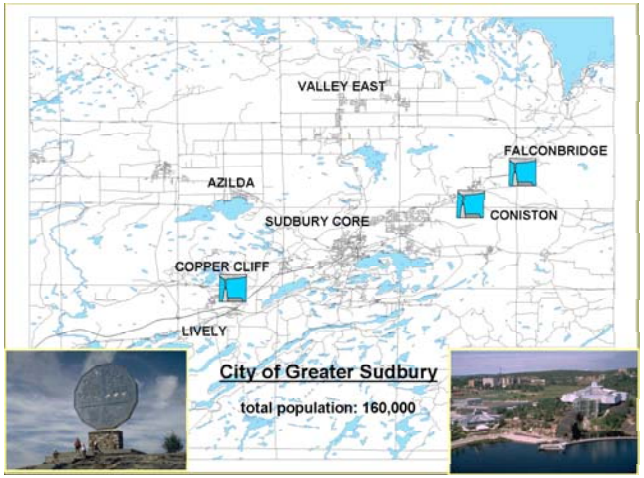

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SCIENCE INTEGRITY KNOWLEDGE

Intrinsik Environmental Sciences Inc.

- Established as the environmental sciences division of CanTox Inc. in the Mid-80's
- Operated as Cantox Environmental Inc. between 1998 and 2007
- On April 1, 2007, company name changed to Intrinsik Environmental Sciences Inc.
  - Four Canadian offices in Calgary, Mississauga, Ottawa and Halifax
  - We are the same private company with the same ownership and leadership, but elected to change our company name to one which represents our expanded strengths and capabilities in toxicology and risk assessment.
  - We have worked in all provinces and Territories of Canada, the United States, Germany, Spain, Italy, Uruguay, Chile, Mexico, Egypt, Bermuda, and Malaysia
- We also added Health Sciences division to our organization. **Intrinsik Health Sciences Inc**. is a new consultancy whose focus is to address toxicology and regulatory concerns associated with the development of products such as pharmaceuticals, biologics, medical devices, consumer products, natural health products and cosmetics.

Mining Smelting Experience

- Intrinsik is currently conducting human health and ecological risk assessments around several smelter sites in Canada
  - Sudbury, Ontario
  - Belldune, NB
  - Dalhousie, NB
  - Argentia, NFLD
  - Teck Cominco smelter in Trail, British Columbia
- Historical Mining/Smelting projects have included:
  - Deloro, Ontario
  - Wawa, Ontario
  - Port Colborne, ON
- Intrinsik is an active member of the Mining Association of Canada, and participates in Environment Committee meetings.

What is a Risk Assessment?

- In the broadest form, a “risk assessment” is:

  “The process of establishing information regarding acceptable levels of a risk and/or levels of risk for an individual, group, society, or the environment.“

- Beyond our everyday use, risk assessment (and ultimately risk management) is used in a variety of different fields, including:

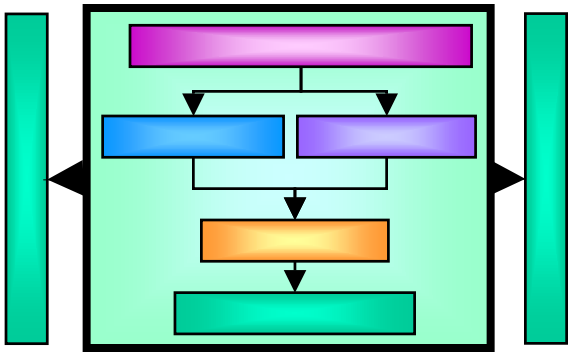
  - Bioterrorism
  - Business and Investment
  - Engineering
  - Environment and Ecology
  - Health
  - Law and Policy
  - Natural Hazards
  - Politics
  - Sociology and Psychology
  - Technology
  - Toxicology
  - Transportation

- Ultimately, the scope and intent of a risk assessment depends on the needs of the user.

What is a Risk Assessment? (Continued)

- The U.S. EPA defines “risk assessment” as:

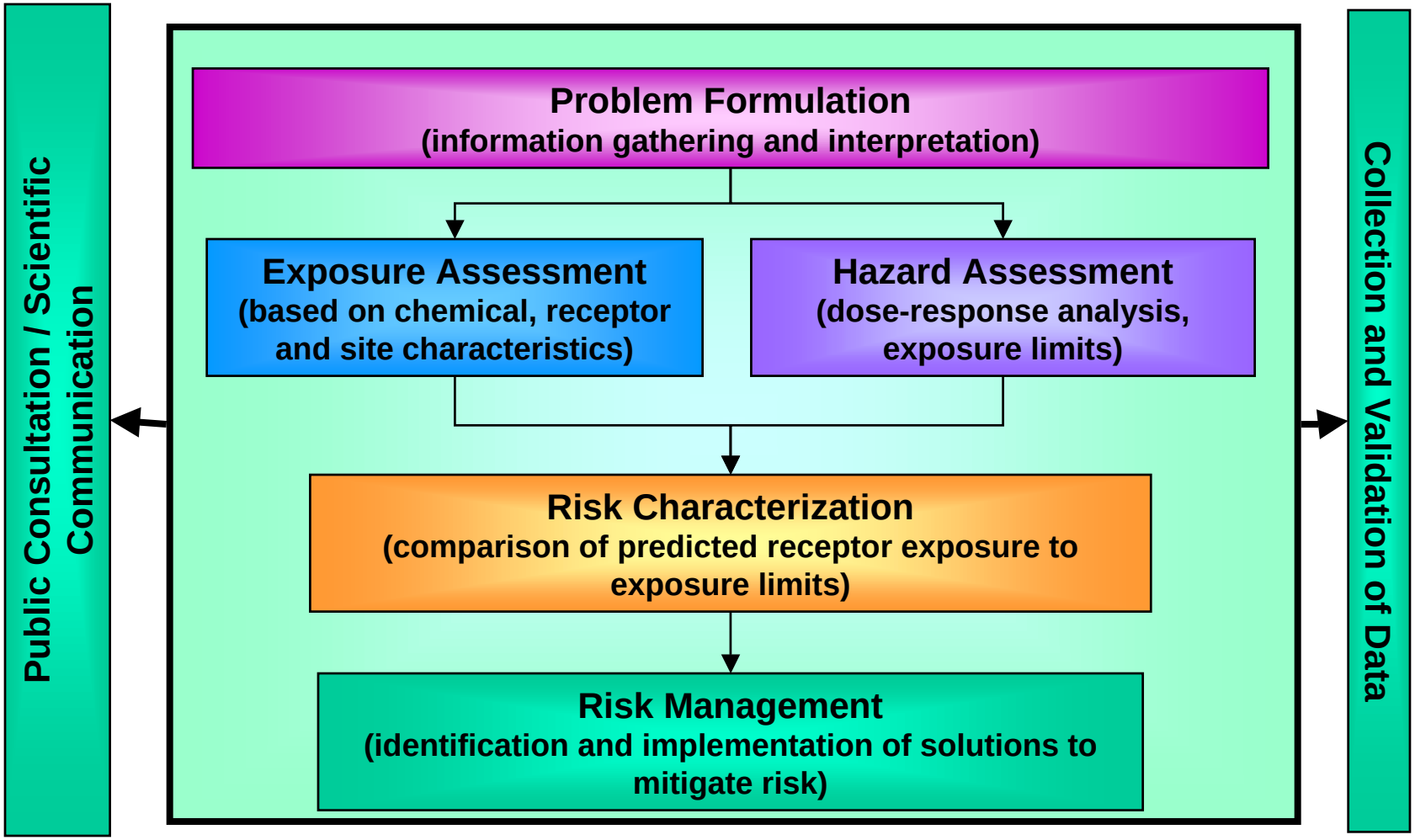
“*A qualitative or quantitative evaluation of the environmental and/or health risk resulting from exposure to a chemical or physical agent (pollutant); combines exposure assessment results with toxicity assessment results to estimate risk.*”



Benefits of Risk Assessment to the Flin Flon/Creighton Area

- technically defensible, practical solutions based on good science and common sense
- methods to determine an area-specific “safe” level of metals in soil
- identification of priority chemicals, groups of people and/or ecological species most at risk, and how they become at risk from contact with metals in the environment
- CCME Guidelines were developed to protect all people and species, all of the time, for all conditions – they are not specific to conditions in the Flin Flon/Creighton area

Human Health Risk Assessment



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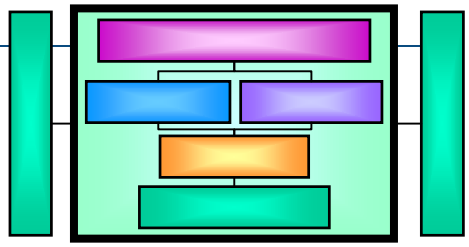
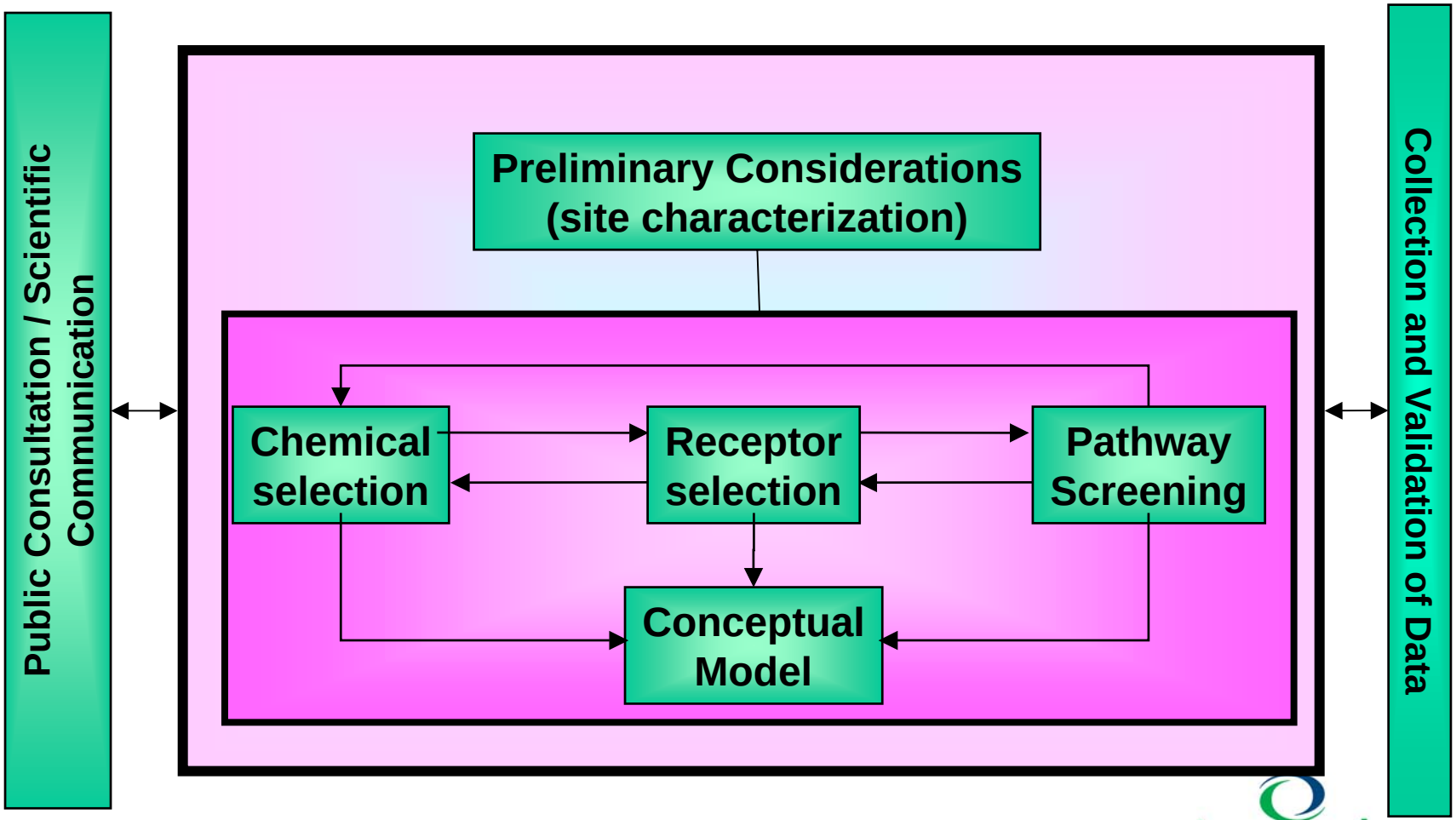
Problem Formulation





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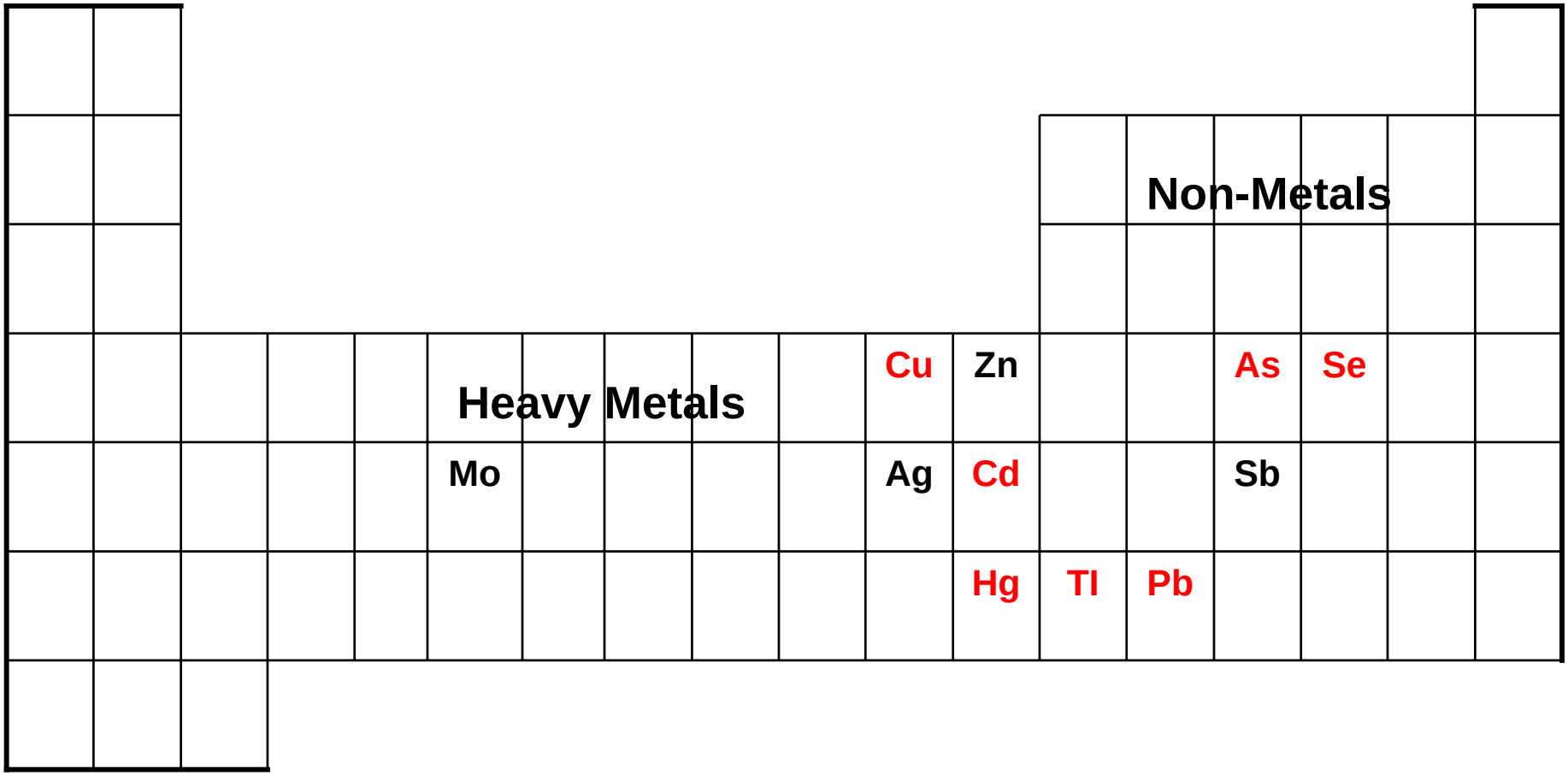
Objectives Of Problem Formulation

- Identify and collect existing information
- Identify and describe chemicals to be evaluated
- Identify groups of people and ecological species to be evaluated
- Identify past, existing and future land, water and air uses
- Address regulatory, policy and societal issues
- Fill data gaps with additional data collection

Selection of Contaminants of Concern



XX – elevated relative to concentrations measured in the Cranberry Portage reference area

XX – exceed health based CCME guideline

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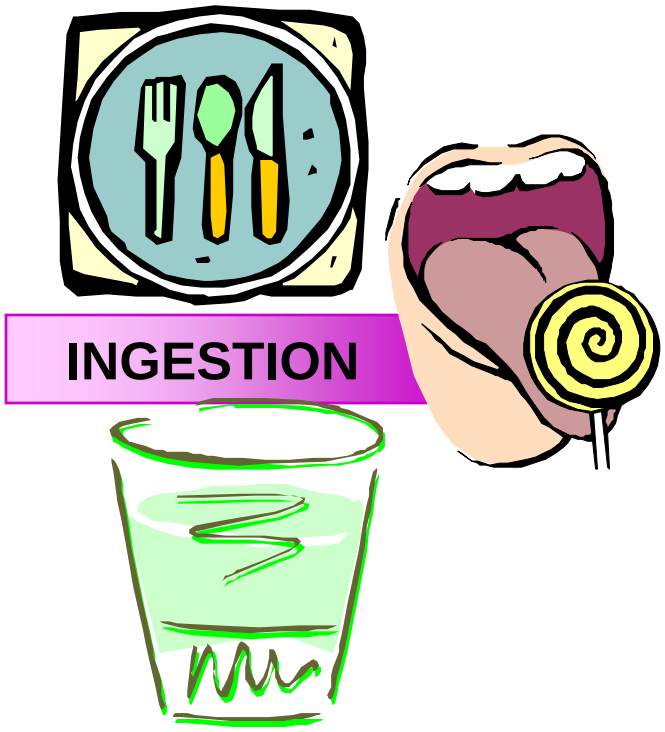
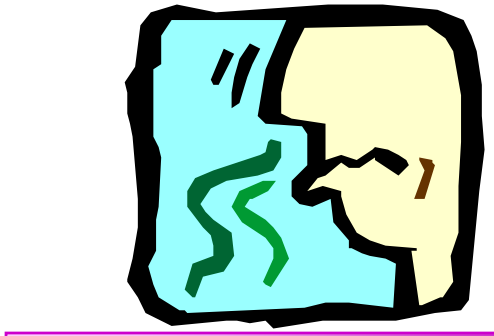
EXPOSURE ROUTES





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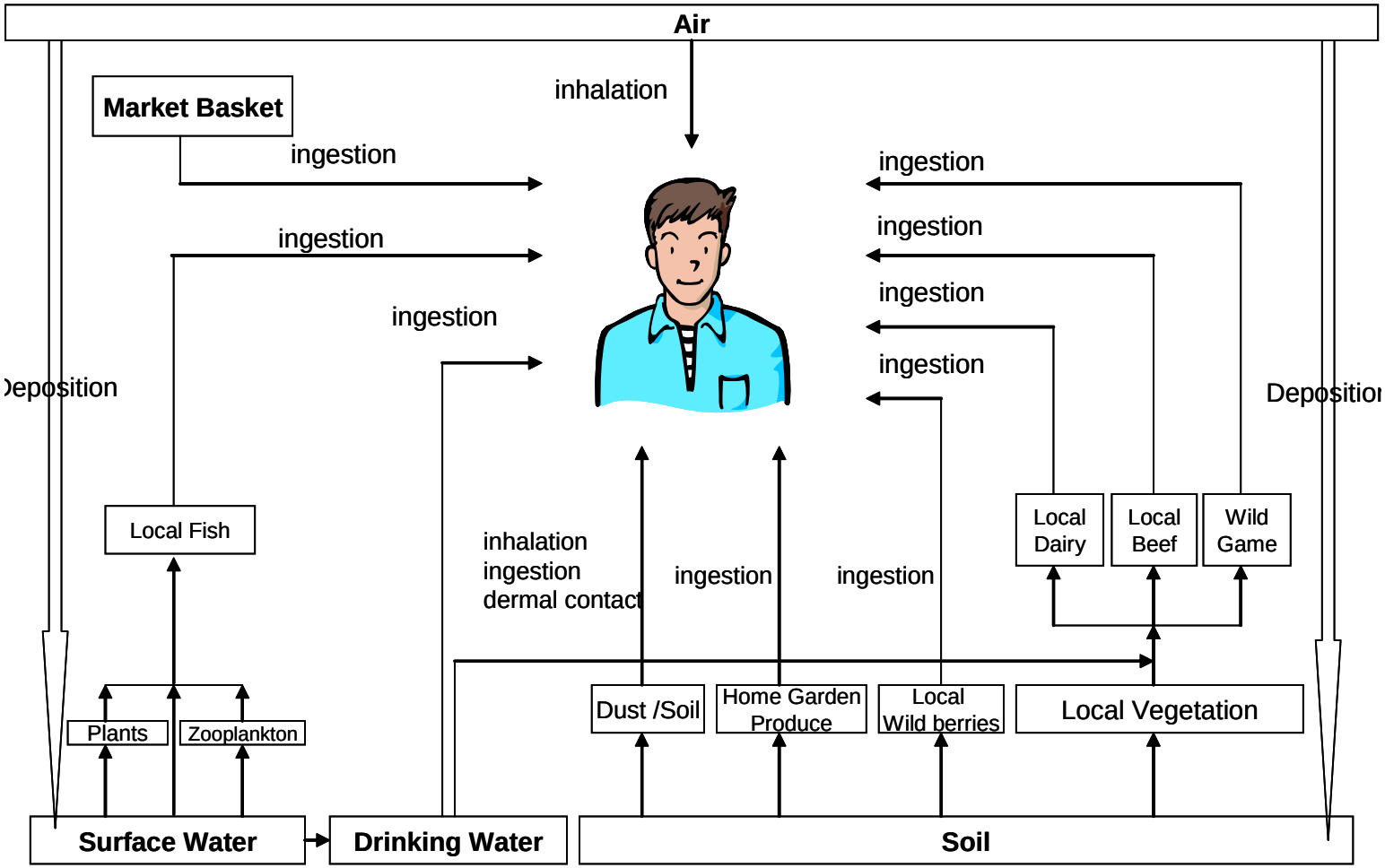
Exposure Assessment: Receptor and Pathway Characterization



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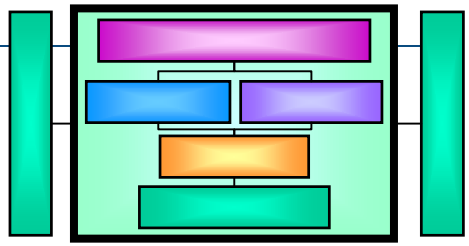
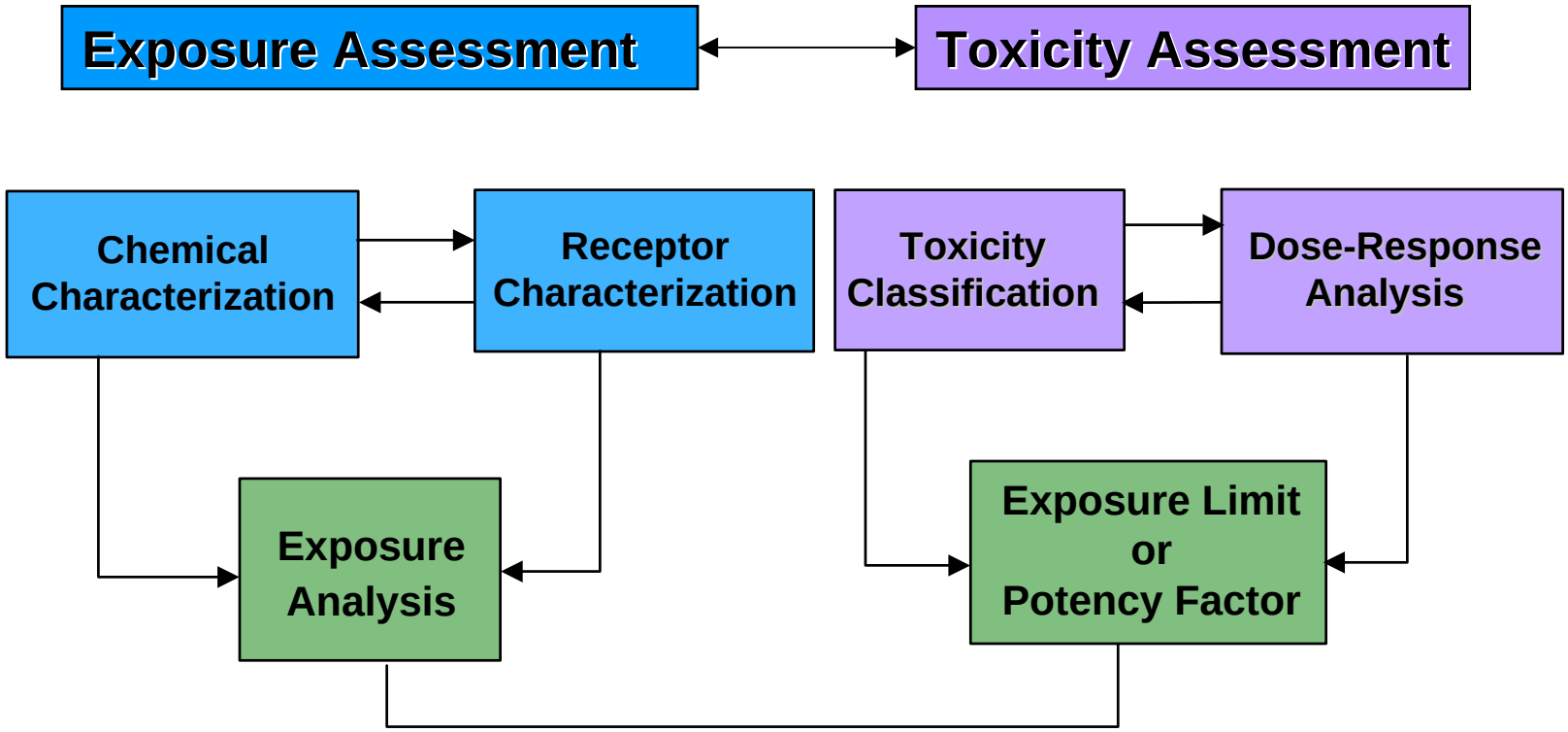
Exposure and Toxicity Analysis





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Exposure Assessment

- **How much of the chemical are people exposed to each day?**
- **Direct Analysis**
  - personal monitoring devices
  - measurement of chemicals in tissues (fat, hair, blood)
  - measurements of chemicals in internal organs or from whole bodies of animals and fish

- Not usually practical
- Requires a large number of volunteers to adequately reflect receptor variability

Useful tool to confirm contact with chemicals.

EXPOSURE ASSESSMENT

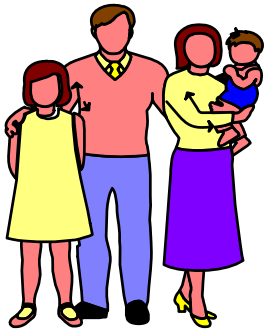
- **Modelling**

  Involves the estimation of daily dose based on the concentrations of chemicals in environmental samples (e.g., soil, air, vegetables, etc.)

  Need to understand characteristics of who/what is being evaluated:

- Lifestyle and habits (e.g., what people or wildlife eat, how much time people spend indoors/outdoors, do species migrate)

- Physical characteristics (e.g., body weight, how much people or wildlife eat and drink)



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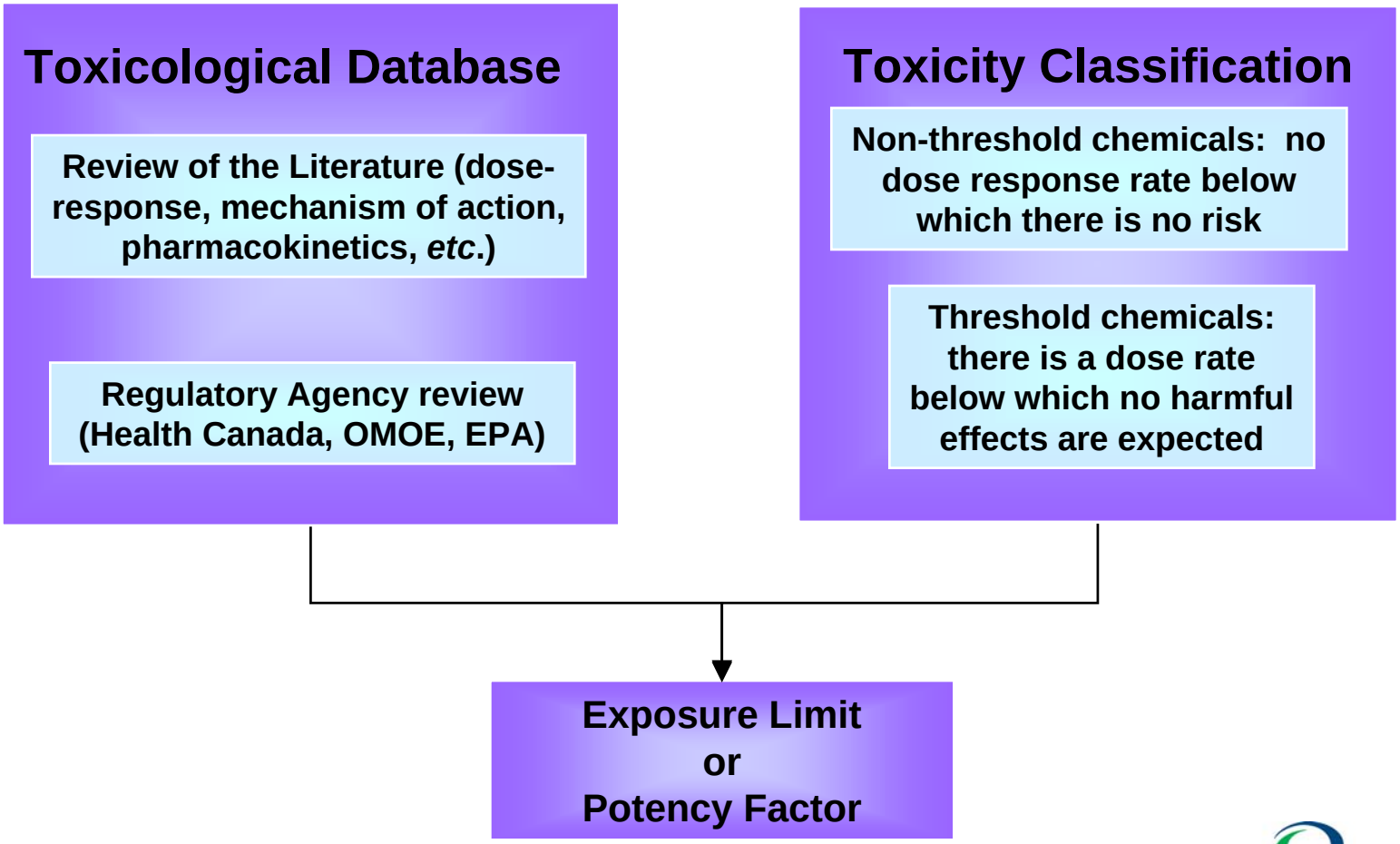
Hazard Assessment



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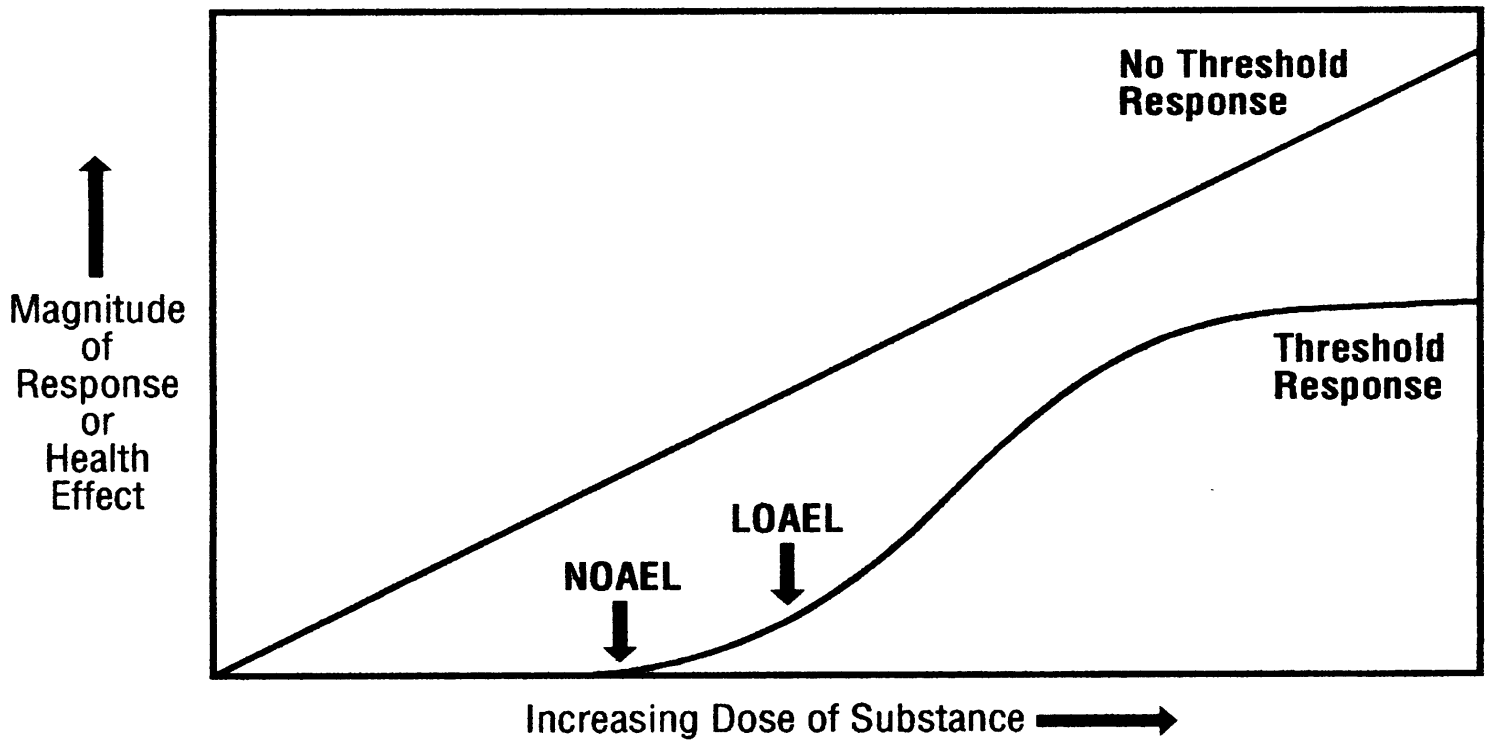
Toxicity Assessment

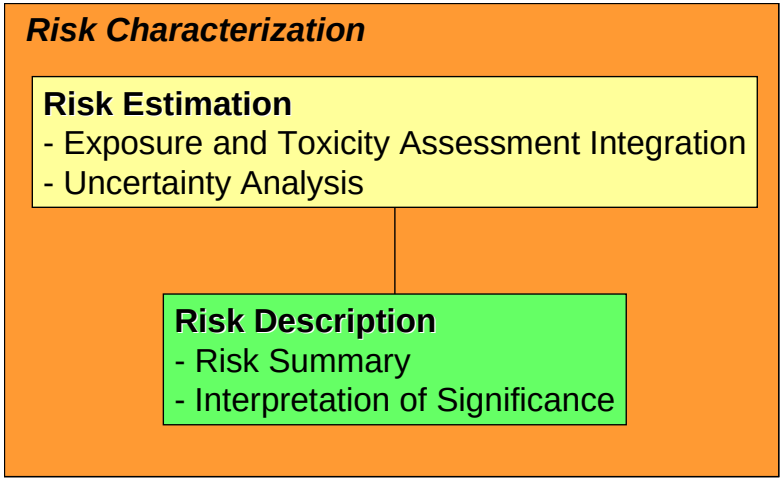


NOAEL - No Observed Adverse Effect Level - The level of exposure to a chemical at which no adverse effects are observed during studies with laboratory animals or in human epidemiological studies.

LOAEL - Lowest Observed Adverse Effect Level - The lowest level of exposure to a chemical at which adverse effects are observed during studies with laboratory animals or in human epidemiological studies.

Risk Characterization

- Interpretation of health risks
  - Quantitative
  - Qualitative



- Special considerations for Environmentally Sensitive Area
- Off-site health risks
- Discussion of uncertainties

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Thank You

Questions and Discussion

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