



Human Health Risk Assessment REMASCO Gasifier Installations Kingsville ON

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REMASCO Open House - Monday August 22, 2011

Human Health Risk Assessment (HHRA)

- Human health risk assessment is a scientific process that is used to estimate the likelihood that a population may experience adverse health effects as a result of exposure to particular chemicals in the environment.



- It considers the following factors:
- How dangerous a chemical is known to be;
- How sensitive people are to the chemical;
- How a person might come into contact with the chemical such as swallowing, breathing, or skin contact as well how often and how long they are exposed; and,
- How much of the chemical a person is exposed to.



HHRA Study Objectives

Objective : The primary goals of the current assessment were to evaluate the potential incremental impacts of projected emissions (*i.e.*, from stack) from the gasification facilities proposed for the Kingsville area, and to determine the health implications to potentially sensitive individuals living, working, or playing in the surrounding communities, under “worst case” exposure conditions. While this assessment has focused primarily on inhalation risks related to ground-level air concentrations predicted throughout the area, it also evaluated the potential risks associated with deposition of particulates onto soils and home gardens in the surrounding area

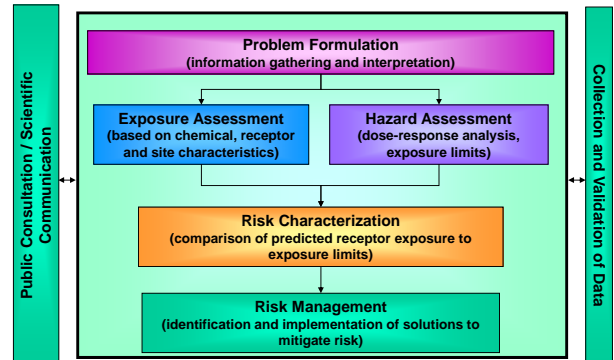


HHRA Study Scope

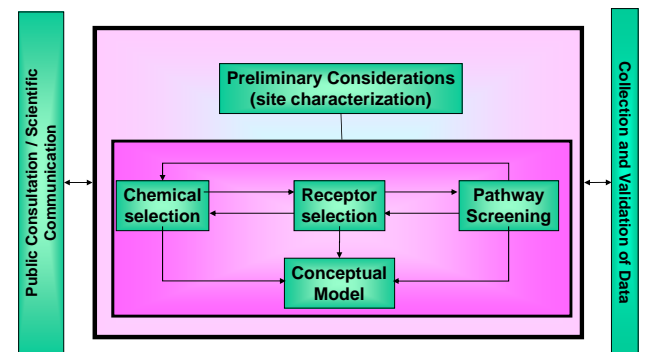
- Exposure to 14 chemicals of concern (criteria air contaminants, metals, dioxins, volatile organic compounds and PAHs);
- Three exposure routes (oral, dermal, inhalation);
- Several exposure scenarios including workers at the greenhouse facilities, residential (with vegetable gardens); milk consumers; greenhouse vegetable consumer
- Multiple sources of exposure (air, soil, diet);
- Both cancer and non-cancer health effects;
- Five life stages (infant, toddler, child, adolescent, adult) and lifetime;
- Thirteen (13) sensitive receptor locations (nearby residential, schools, farms).



Human Health Risk Assessment



Problem Formulation



Sensitive Receptor Locations



- Agriville Residential
- Southshore Residential S
- Kingsville Residential
- District School
- Ruthven School
- Southshore Residential N

- Recreation Complex
- Seniors Residence
- Colisanti Facility
- Asparagus Crop Land
- Apple Orchard
- Vineyards
- Residence S of Seacliff



Exposure Pathways

The ways that people may be exposed to chemicals in the environment, and may include:



INGESTION



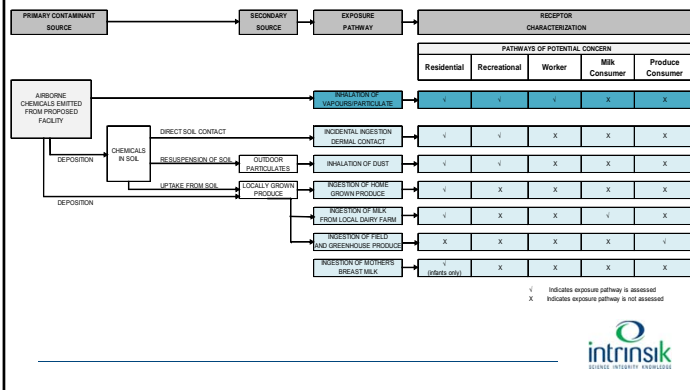
DERMAL CONTACT



INHALATION



Exposure Pathways



Chemicals of Concern

Criteria Air Contaminants	Inorganics	Volatile Organics	Carcinogenic PAHs
Sulphur Dioxide (SO ₂) Nitrogen Oxides (NO _x) Hydrogen Chloride PM10 PM2.5	Arsenic Cadmium Chromium (III) Lead Mercury (Inorganic)	Vinyl Chloride Benzene	Dioxins & Furans

Human Receptors

- Hypothetical individuals (people) that may be exposed to the chemicals of concern;
- Have access to potentially contaminated media;
- May be likely to experience higher rates of exposure than other receptors;
- May be especially susceptible to the toxicity of the chemicals of concern;
- Are the subject of concern of the general public

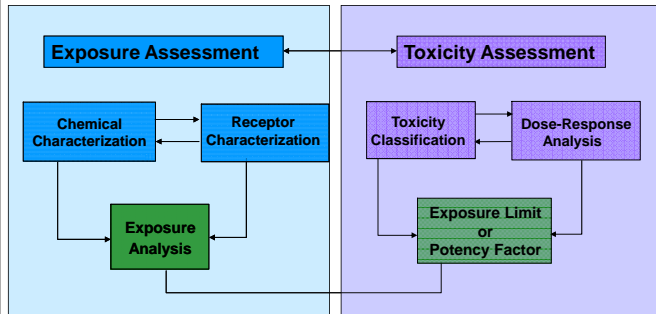


Exposure Scenarios

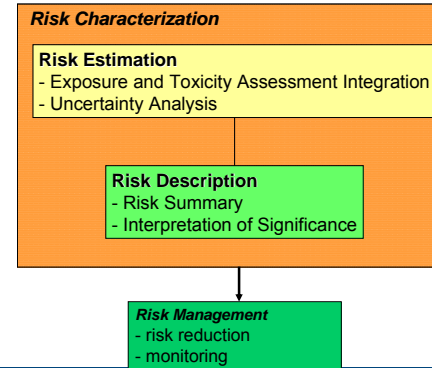
- Residential/Recreational
- Workers
- Milk/produce consumers
- Acute (short-term) and Chronic (long-term)
- Normal Operations and Upset Conditions
- Facility Impacts and Cumulative Impacts



Exposure and Hazard Assessment



Risk Characterization and Risk Management



SUMMARY OF HHRA RESULTS

	Acute & Chronic Inhalation	Multimedia	Additional Scenarios	Upset Conditions	Cumulative Effects
Criteria Air Contaminant	○			○	●
Inorganics	○	○	○	○	
VOCs	○	○	○	○	
PAHs	○	○	○	○	
Dioxins & Furans	○	○	○	○	
Mixtures	○	○	○	○	●

○ Negligible risk – no further investigation required
 ● Potential risk



Results

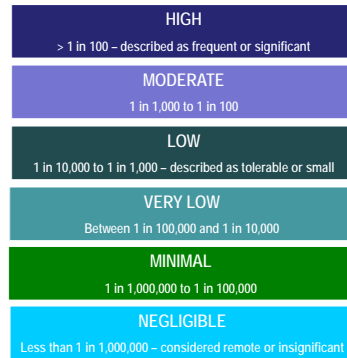
• Cumulative Assessment

- Evaluation of potential exposures under current and future cumulative conditions indicate marginal exceedances of the acute and chronic TRVs for NO_x and PM_{2.5} at several receptor locations.
- Mixture effects are also noted at several locations.
- In all cases, future cumulative risks with the proposed REMASCO facilities are equal to or lower than risks predicted under existing background conditions.
- There will be a net benefit to the installation and the operation of the REMASCO facilities.



Overall Results

- *The overall conclusion of the REMASCO HHRA is that the likelihood of health effects among Kingsville area residents from the operation of the REMASCO facilities is negligible*



Screening Level ERA

- Based on the comparison of predicted surface soil concentrations to ecological component values, no unacceptable impacts to plants, soil invertebrates, birds or mammals from exposure to chemicals in soil are expected.
- Based on comparison of predicted maximum air concentrations emitted from the proposed facilities to air quality guidelines and preliminary plant-specific benchmarks, no unacceptable impacts to plants are expected.



- Marginal exceedances of preliminary plant-specific benchmarks for nitrogen oxides were predicted at future cumulative air concentrations, overall, anticipated risks to plants would decrease compared with existing conditions.

