Human Health Risk Assessment
Process Overview

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What is a Human Health Risk Assessment (HHRA)?

• An estimate of the potential for health risk for a group of people
  ➢ Focused on protection
• For cleanups (corrective action):
  ➢ People contacting contamination and the possible negative health outcomes (e.g., cancer)
  ➢ Intended to be protective of people with the greatest contact and/or those most sensitive to the possible health effects
  ➢ May be overly protective for many people
What a HHRA is NOT

• Estimating risk is **NOT** the same as measuring health outcomes (i.e., disease).
  - **Is not** a health study
  - **Does not** identify specific individuals who are exposed to a chemical
  - **Does not** compare chemical levels in individuals or groups of people to health outcomes
  - **Does not** provide medical diagnoses
Typical Uses of HHRA for Cleanups

- **Michigan DEQ**
  - Develop generic cleanup criteria
  - Determine need for and develop site-specific cleanup criteria
- **U.S. EPA CERCLA/RCRA Programs**
  - Baseline HHRA to evaluate need for remediation/corrective action
  - Use for developing preliminary and final remediation/corrective action goals
Steps of an HHRA

- Identify concerns = **hazard identification**
  - What chemicals and what levels?
  - Where are they?
- Determine potential for contact with contamination = **exposure assessment**
- Potential for health effects from contamination = **toxicity assessment**
  - How much (dose)?
- Potential risk = **risk characterization**
  - Combine information on exposure and toxicity to determine risk
Identify Potential Concerns

• What are the potential contaminants?
  ➢ Evaluate chemicals used, manufactured, by-products and breakdown products for facility

• Where are they?
  ➢ Environmental media (soils, sediments, groundwater, surface water, fish, etc.)
  ➢ Location of contaminants (coordinates/depth)
  ➢ Contaminant concentrations
Dow’s Proposed HHRA Process

• Identify contaminants of potential concern (COPCs)

  ➢ Evaluation of list of chemicals of record manufactured/used/disposed by Midland Plant
    • Considered chemical/physical properties
    • Evaluated ability to measure
    • Did not have information on quantities
    • Ongoing process
  
  ➢ Collect concentration data in various media based on list
  
  ➢ Screen against MDEQ/U.S. EPA cleanup levels
Identifying COPCs

- Subset of Upper Tittabawassee River soils and sediment samples have been selected for extended chemical analyses
  - First set of data by end of May
- Dow’s consultants are evaluating the ability to measure potential contaminants in fish and wild game
Exposure Assessment

• Who has potential for exposure to contamination?
  ➢ Residents, fishermen, hunters, farmers, etc.

• What ways could they be exposed?
  ➢ Playing on contaminated soil, eating fish, eating game, eating farm products, etc.

• When/how often could they be exposed?
  ➢ Every day, once a week, etc.

• How much of the contaminant could get into people?
Dow’s Proposed HHRA Process

• Exposure assessment
  ➢ Evaluate many pathways (eating fish, eating game, soil contact, etc.), receptors (residents, farmers, fishermen, etc.) and land uses (residential, agricultural, recreational, etc.)
  ➢ Use U of M Dioxin Exposure Study Data as much as possible
  ➢ Collect additional concentration data (fish, game, etc.)
  ➢ Collect additional human activity data
Examples of Exposure Assessment Issues

• Population of concern
  ➢ Only those people with potential exposure (location or behavior based)
  ➢ Everyone in the area (population-based e.g., Midland/Saginaw County residents)

• Reasonable Maximum Exposure (RME)
  ➢ Example - people who eat a lot of contaminated fish, game, etc.
  ➢ RME vs. average exposure (may not eat any local fish)
Examples of Exposure Assessment Issues (Cont’d.)

• Determine relative importance of inputs into the exposure assessment = sensitivity analysis

• Additional data collection
  - Fish, game, possibly agricultural dust, etc.
  - Human activity survey

• Dietary exposure not related to local contamination

• Breast milk exposure to infants

• Percent of the contaminant contacted that is absorbed into the body = bioavailability
Toxicity Assessment

• What are the potential health effects?
  ➢ Human data
  ➢ Animal data
• Weight of evidence
• Dose evaluation
  ➢ Cancer
  ➢ Noncancer effects
  ➢ Human dose equivalent
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• Toxicity assessment
  ➢ Develop cancer value – dioxins/furans
  ➢ Develop noncancer value – dioxins/furans
  ➢ Reevaluate toxic equivalency factors (TEFs) - dioxins/furans
  ➢ Use probabilistic techniques
Risk Characterization

• Standard risk assessments
  ➢ Generic cleanup criteria
  ➢ Site-specific cleanup criteria
    • Similar to generic process
  ➢ Baseline risk assessment
    • Multi-pathway and multi-contaminant risk assessment
Dow’s Proposed HHRA Process

• Risk characterization
  ➢ Develop site-specific direct contact criteria
    – dioxins/furans
  ➢ Screening level risk assessment
    • Eliminate pathways and contaminants that don’t contribute significantly to estimated risk
  ➢ Probabilistic risk assessment
    • Determine pathways with unacceptable risk
Dow’s Proposed HHRA Peer Review Process

• Independent Science Advisory Panel
  ➢ For select topics/issues of controversy
  ➢ Site-specific soil direct contact criteria
  ➢ Final probabilistic risk assessment
  ➢ Other site-specific criteria?
  ➢ Not a decision-making body – advisory
Summary and Questions

Thank You