



Badger Army Ammunition Plant ***Understanding Risk & Army Actions***

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Army Environmental Command delivers environmental services and solutions
to enable Army readiness and sustainability

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Purpose

- Explain human health risk assessment (HHRA) in plain language
- Correlate Army Actions under the Defense Environmental Restoration Program (DERP) to risk levels



Human Health Risk Assessment

- **What is Risk Assessment?**
 - Mathematical model
 - Evaluates relationship between contaminants and potential health effects
- **Four Primary Components**
 - Hazard Identification (what chemicals of concern)
 - Exposure Assessment (how much and for how long)
 - Toxicity Assessment (what are the effects)
 - Risk Characterization (combines the above for decisions)



Human Health Risk Assessment

- **Hazard Identification**

- Based on environmental sampling
- In early stages, compared to generic screening values
- Refined over time based on trends and/or emerging concerns

- **Exposure Assessment**

- How people are exposed to contaminants (pathways)
- EPA determines default exposure factors for most pathways
- Army utilizes EPA default exposure factors to characterize how residents are exposed to tap water (both for drinking, washing and bathing)
- Based on nationally recognized exposure factors for tapwater and adjusted for age-specific factors



Human Health Risk Assessment

- **Toxicity Assessment**

- Literature or research based evaluation of effects
- Utilizes nationally peer-reviewed data for cancer-slope factors and reference doses for toxic effects
- Some chemicals do not have sufficient toxicity data to assess

- **Risk Characterization**

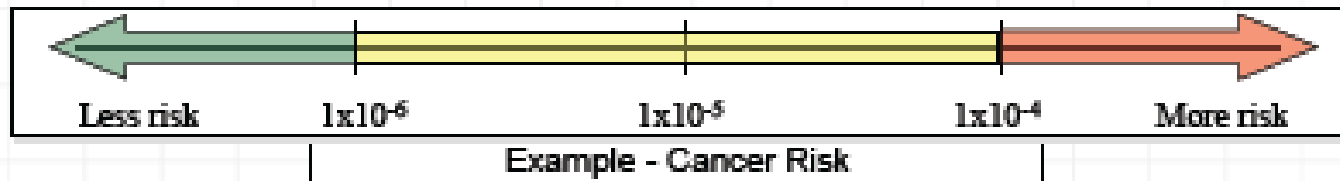
- Necessary step for determining Army response actions
- Comparison of chemicals present against toxicity data
- Determine probability of excess cancer (risk range) or exceedance of reference doses (hazard index)
- Unacceptable range defined as 1 in 10,000 (1×10^{-4}) probability of cancer or Hazard Index (HI) greater than 1.0



Human Health Risk Assessment

Interpreting Risk Estimates

- ◆ **“Acceptable”**
 - ◆ Noncancer effects <1
 - ◆ Cancer risk <1 in a million
- ◆ **“Generally acceptable”**
 - ◆ Noncancer hazards at or near 1
 - ◆ Cancer risk between 1 in a million and 1 in ten thousand
 - ◆ Other factors to consider include other findings and laws
- ◆ **“Significant”**
 - ◆ Noncancer hazards >1 , or cancer risk >1 in ten thousand
 - ◆ May include contributors summing to HQ <1 , CR <1 in ten thousand



Info - Risk Assessment
IART Briefing 7/25/04

Massachusetts Military Reservation Impact Area Review Team



Army Response Actions

- Past response actions of varying intensity based on risk:
 - Soil actions ranged from active treatment (SVE, Bioremediation, Excavation) to capping/covering to prevent surface exposure and/or continued leaching to groundwater
 - Groundwater interim action for PBG consisted of extraction and treatment to reduce contaminant levels minimize further off-post transport
- Future actions for remaining groundwater contamination also must be proportional to risk

