Mercury Wastewater Problem at Medical Facilities

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Mercury Environmental Problem

- Bioaccumulation
- Biomagnification
- Concentration in the muscle tissue
Sources

- Natural
  - Volcanoes
  - Minerals
- Manmade (air)
  - Coal combustion
  - Chlorine alkali processing
  - Waste incineration
  - Metal processing
Mercury Health Effects

- Deteriorates nervous system
- Impairs hearing, speech, vision, and gait
- Causes involuntary muscle movements
- Corrodes skin and mucous membranes
- Causes chewing and swallowing to become difficult
EPA’s Strategy for Mercury Problem

- Reduce air emissions
  - Linking air sources with water quality impacts
- Revise water quality criteria
  - More protective of human health
- Purse voluntary reductions in industry
- Develop acceptable disposal methods for mercury hazardous waste
Mercury Wastewater Restrictions

• Local waterway identified as being impaired
  – Not meeting State water quality standards

• Leads to development of TMDL
  – Restricts contaminant loading to waterway
  – Distributes acceptable load among sources

• End result: more stringent wastewater discharge limits
Recent TMDL

- 12 ng/L, federal criterion
  - freshwater, chronic

- 2.8 ng/L, instream WQS
  - result of TMDL

- 2.8 ng/L, Hg discharge limit

- 36-73 ng/L, monitored WW discharge concentration
MEDCOM’s Perspective

- Concern: more stringent Hg limits result in Army WW non-compliance and impact on medical operations
  - WRAMC
- Need: evaluation of potential Hg problem
- Actions include:
  - Sampling WW discharges
  - Evaluating Hg sources
We Monitored ...

- 3 medical centers
- 1 former medical center
- 6 dental clinics, or combination dental / health clinics
- 1 health clinic
1st – Contamination from Sources

- Preferred Solution: Source Reduction Strategies
- Hospital Mercury Reduction Plan
  - Identify sources of mercury contamination
  - Evaluate handling and disposal techniques
  - Eliminate mercury containing products
  - Establish purchasing policies
  - Educate staff
Typical Mercury Sources in Medical Facilities

- **Hospital devices**
  - Batteries, thermometers, blood pressure monitors

- **Laboratory products**
  - Stains, reagents, and soaps

- **Dental clinics**
  - Dental amalgam

- **Other devices**
  - Lamps, electrical instruments
2nd – Residual Plumbing Contamination

- Preferred Solution: mercury removal through cleaning or replacement
  - Sumps and traps
  - Piping
  - Receiving WW manholes

- If this doesn’t work?
  - Pretreatment
Dental Amalgam

- Composition: 42-52% mercury
- Accounts for 75% of dental restorations
- Advantages over alternatives
  - Strength and durability
  - Ease of placement
  - Lower cost
Dental Wastewater Technology

- Amalgam separation devices
- ISO standard certified
  - 95% particle removal
- Primary technology – sedimentation
  - 95-99% Hg removal
- Polishing treatment – filtration and ion exchange
  - Approaching 99.9% Hg removal
Navy Problems
Plans

- Concentrate efforts on dental facilities
  - Expand knowledge base
  - Investigate promising technologies for Army application
  - Evaluate available commercial treatment systems in typical Army setting
Questions