

Mercury Wastewater Problem at Medical Facilities



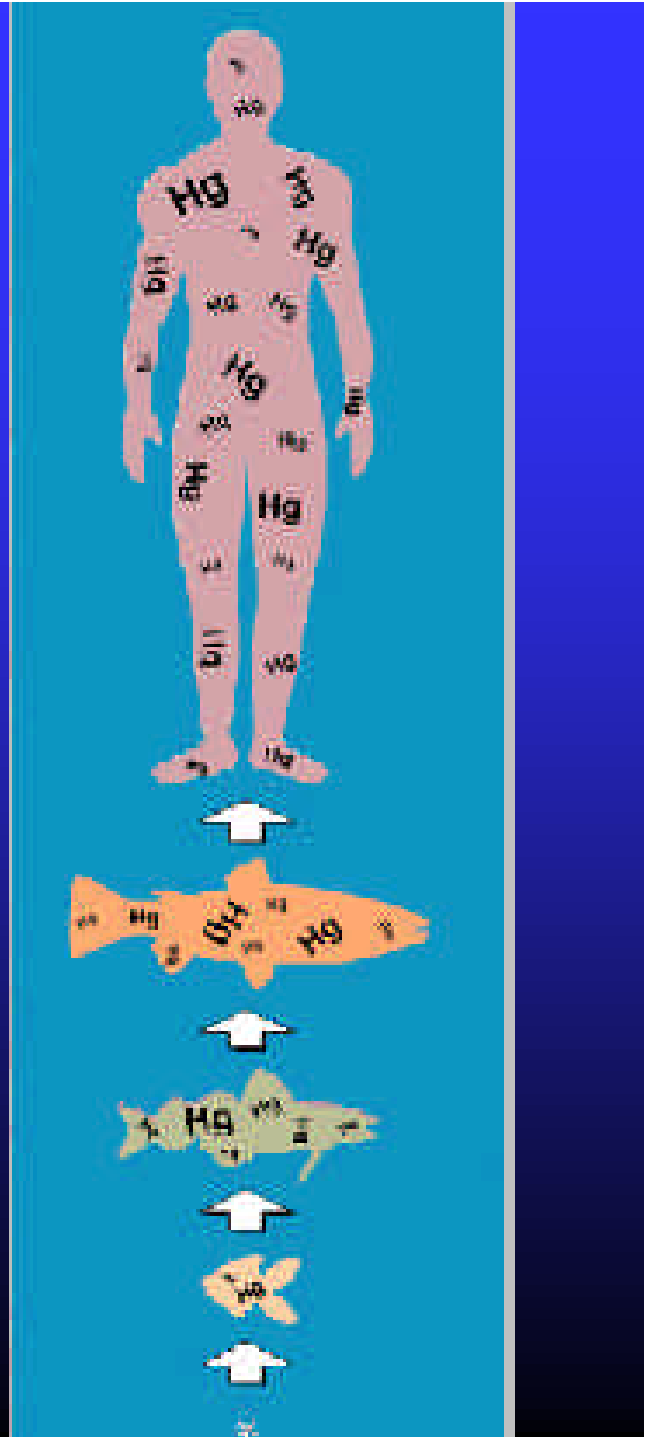
William F. Fifty P.E.

Surface Water and Wastewater Program

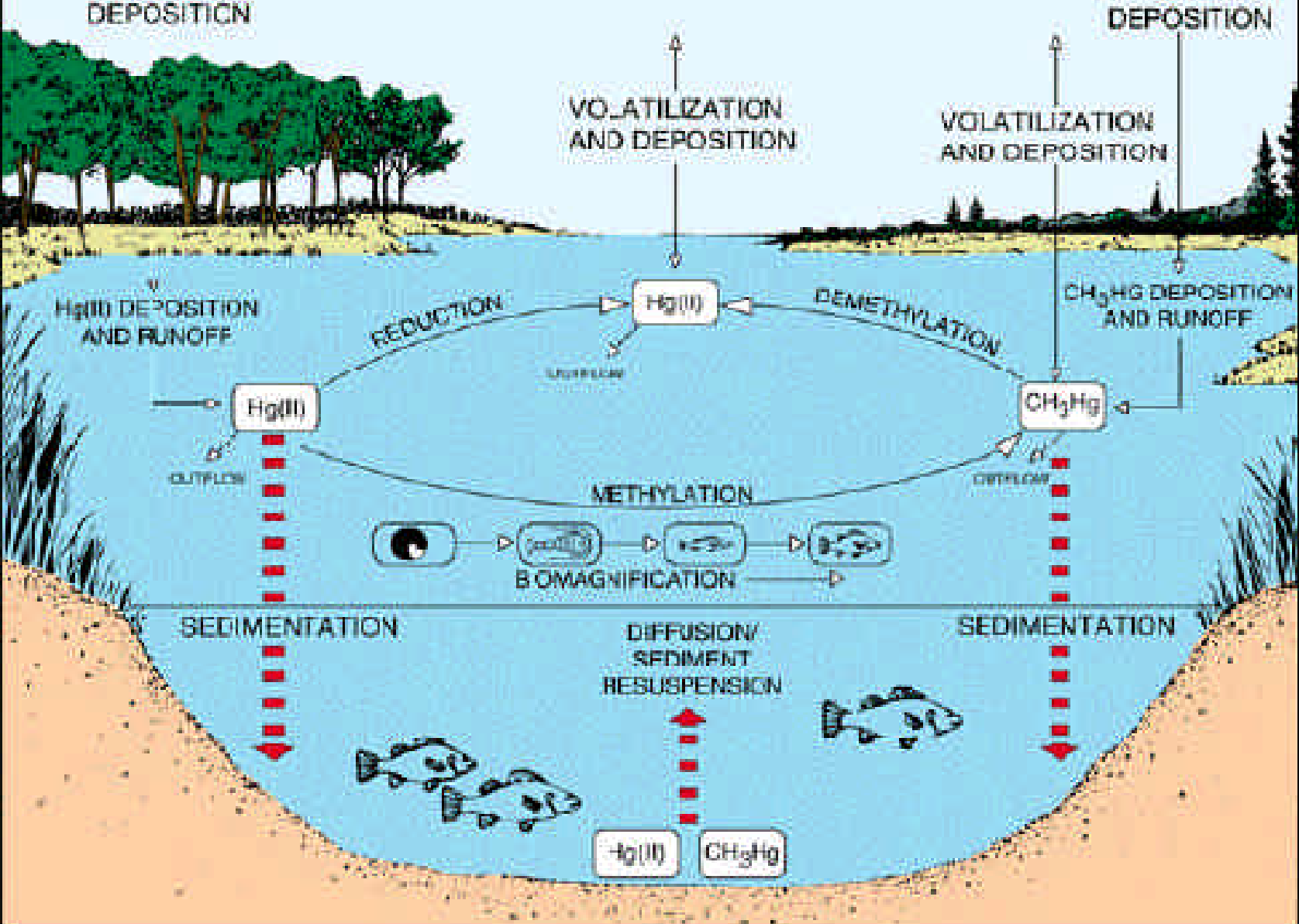
U.S. Army Center for Health Promotion and Preventive Medicine

Mercury Environmental Problem

- Bioaccumulation
- Biomagnification
- Concentration in the muscle tissue



AQUATIC MERCURY CYCLE

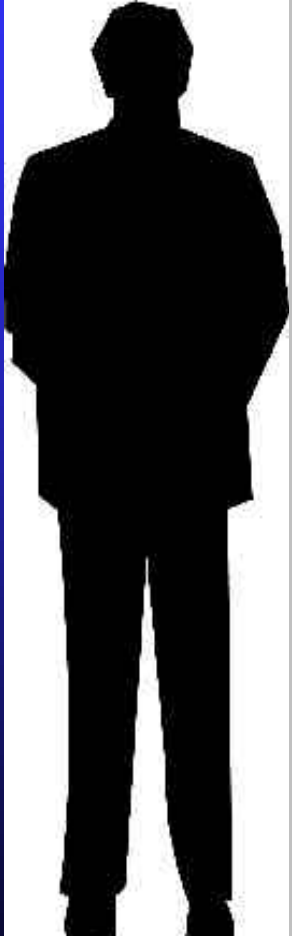


Sources

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



Mercury Health Ef



- 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
- Pursue 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

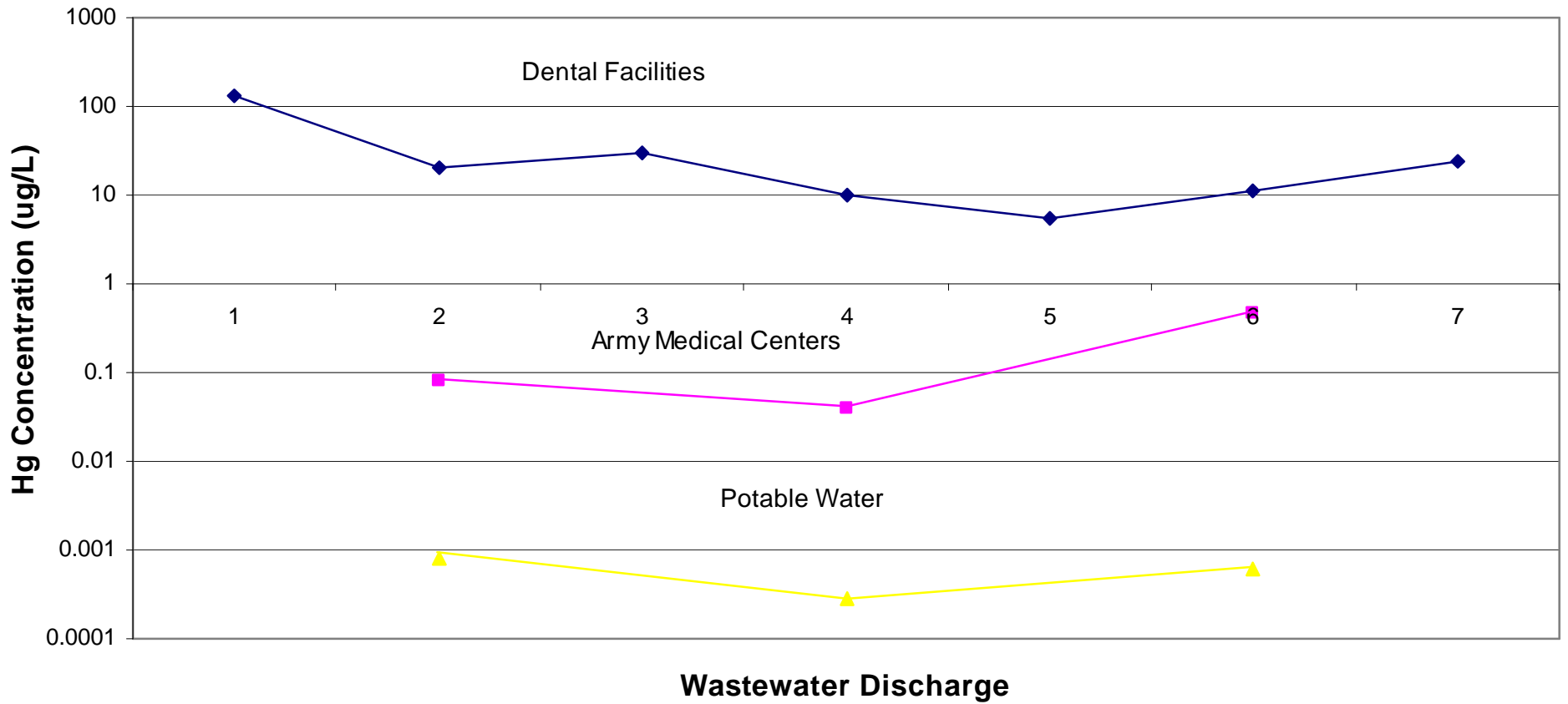


We Monitored ...

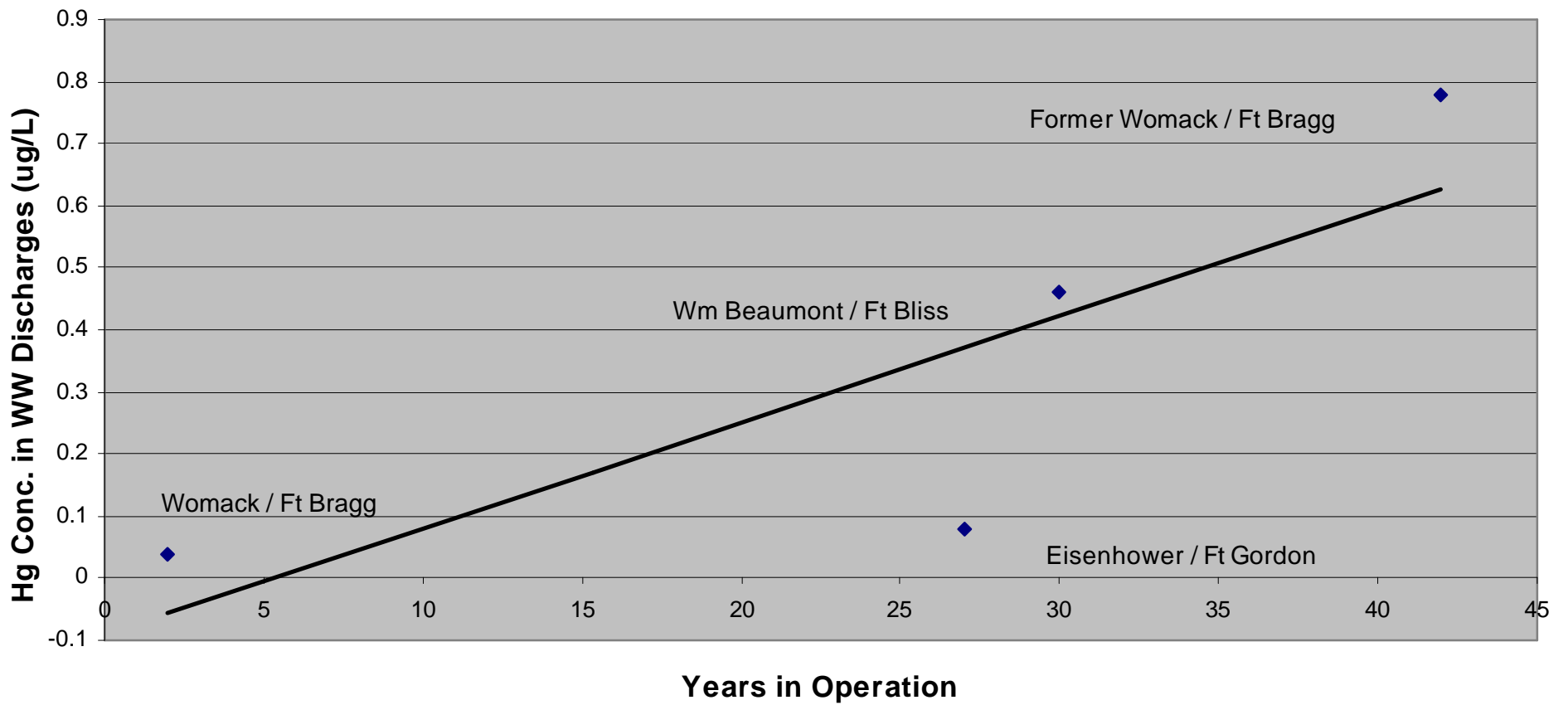
- 3 medical centers
- 1 former medical center
- 6 dental clinics, or combination dental / health clinics
- 1 health clinic



Medical Facilities



Army Medical Centers



1st – Contamination f 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

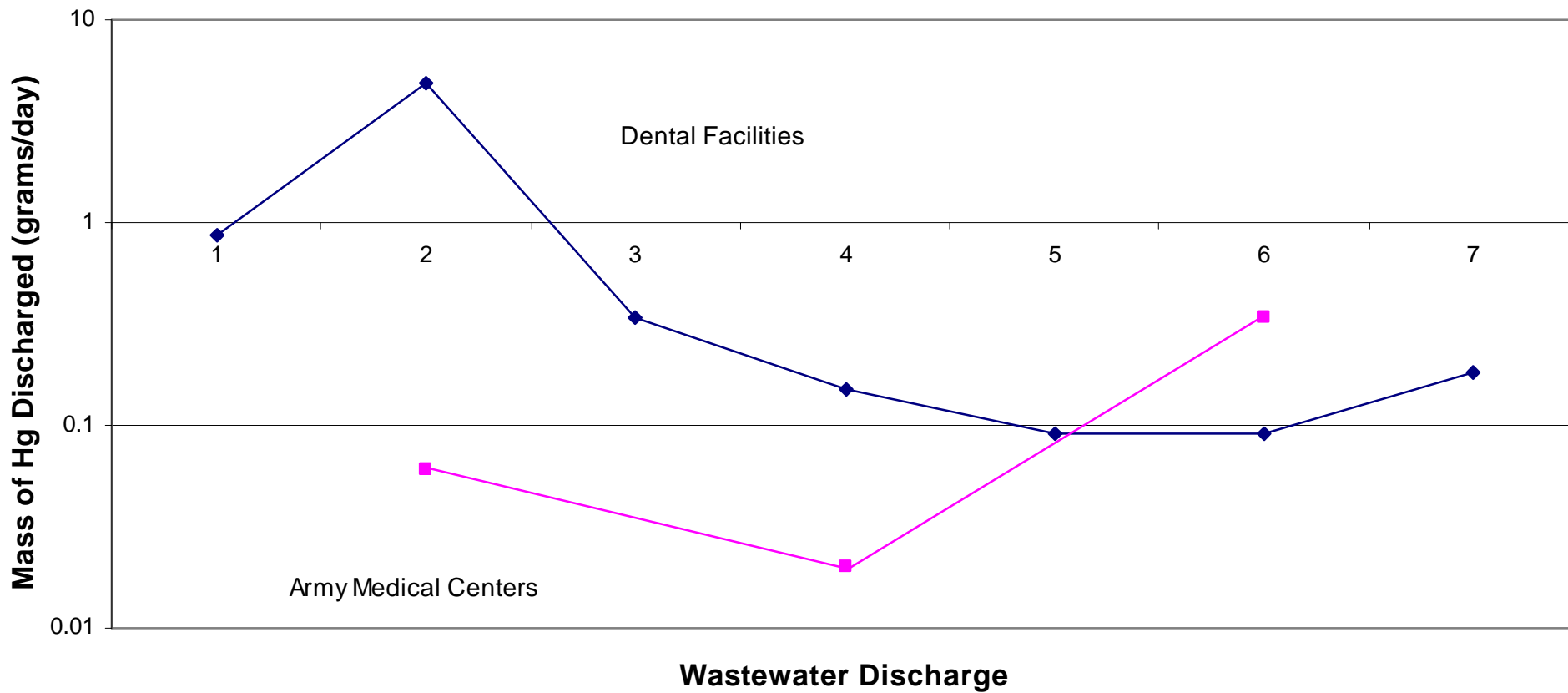


2nd – Residual Plumbing Contamination

- Preferred Solution: mercury removal through cleaning or replacement
 - Sumps and traps
 - Piping
 - Receiving WW manholes
- If this doesn't work?
 - Pretreatment



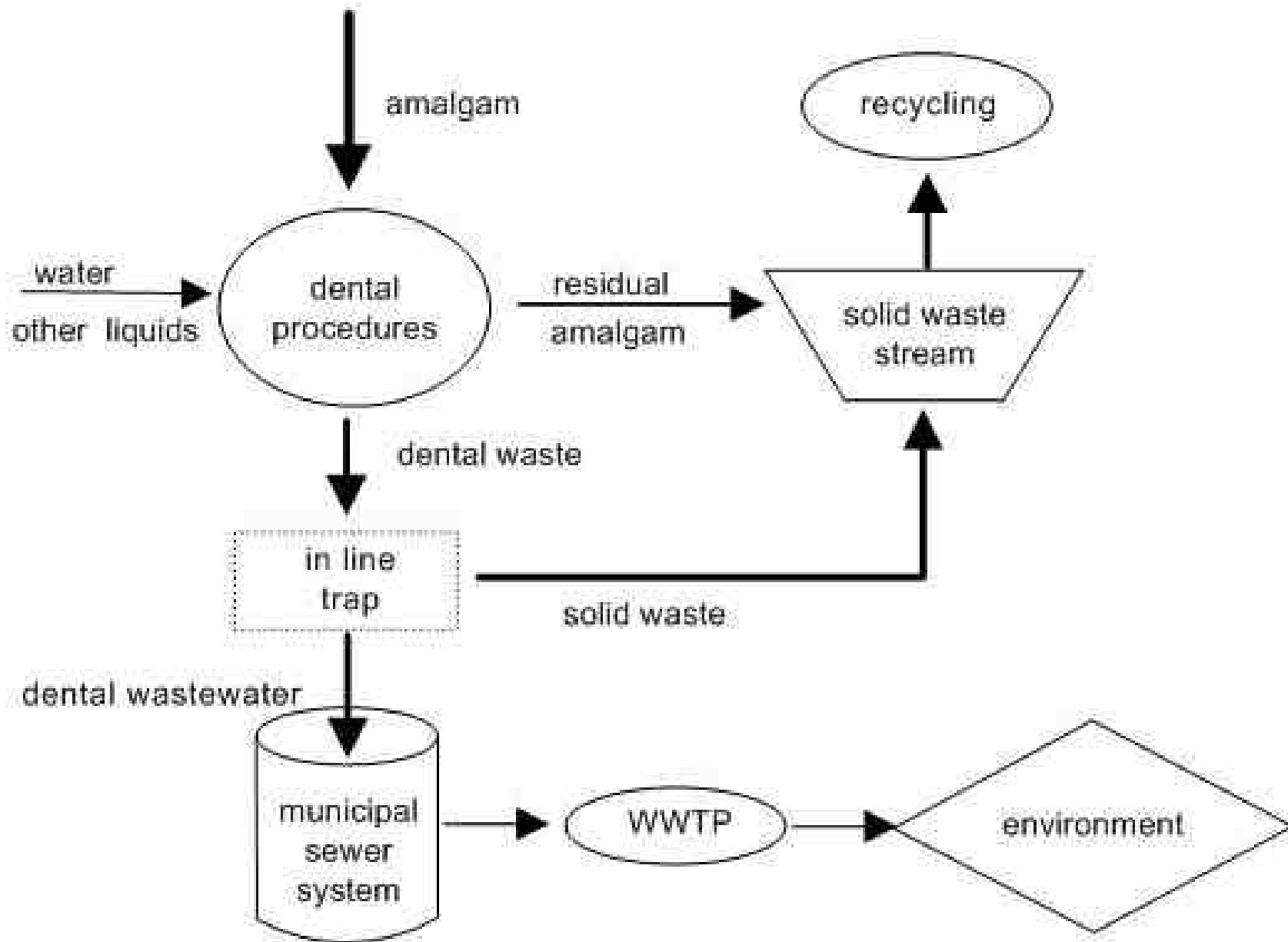
Medical Facilities



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 f

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



Questions