



Non Potable Water Substitution and Reuse in the Field

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Surface Water and Wastewater

USACHPPM

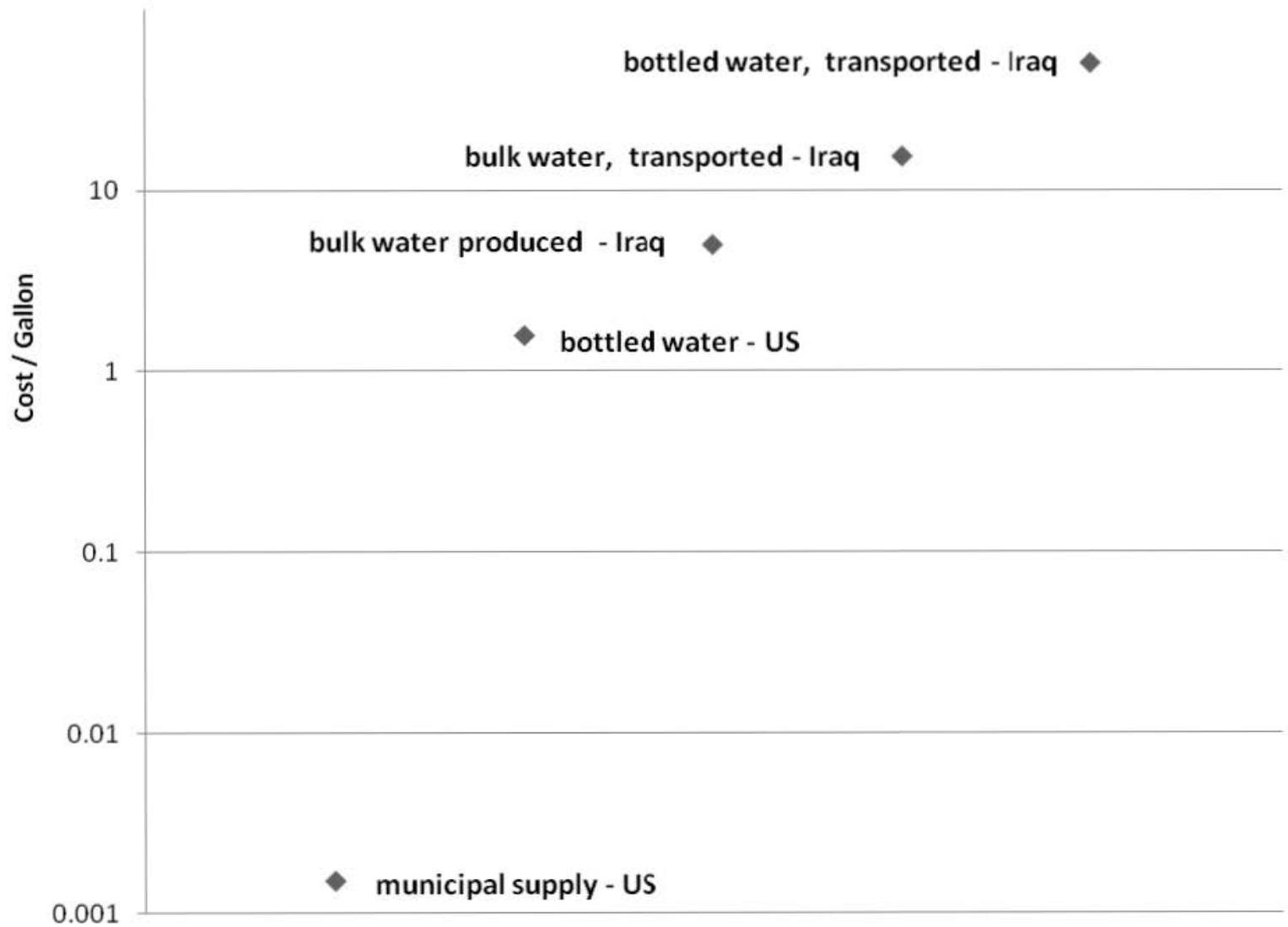
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Water Cost



Potable Water

Water that is safe to drink



Insufficient Amount of Potable Water

- Replace potable water with non potable water in those applications that don't require potable water quality

- Water Substitution

- Water Reuse



Considerations for Non Potable Water Substitution / Reuse

- Type of Source Water
- Quality of Source Water
- Application & Requirements



Source Waters

- Local Waters
 - Local water supplies
 - Ground water
 - Surface water
- Army Generated
 - Filtered water
 - ROWPU brine
 - Gray water
 - Treated wastewater



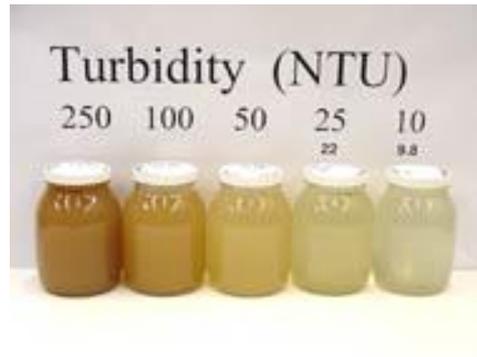
Source Water Quality

- What needs to be measured?
- What can be measured?
- Microbial quality
 - total coliforms, E. coli
 - IDEXX's Colilert, Quanti-Tray



Source Water Quality (II)

- Turbidity
 - Measurement for physical quality
 - Correlates well with disinfection requirements



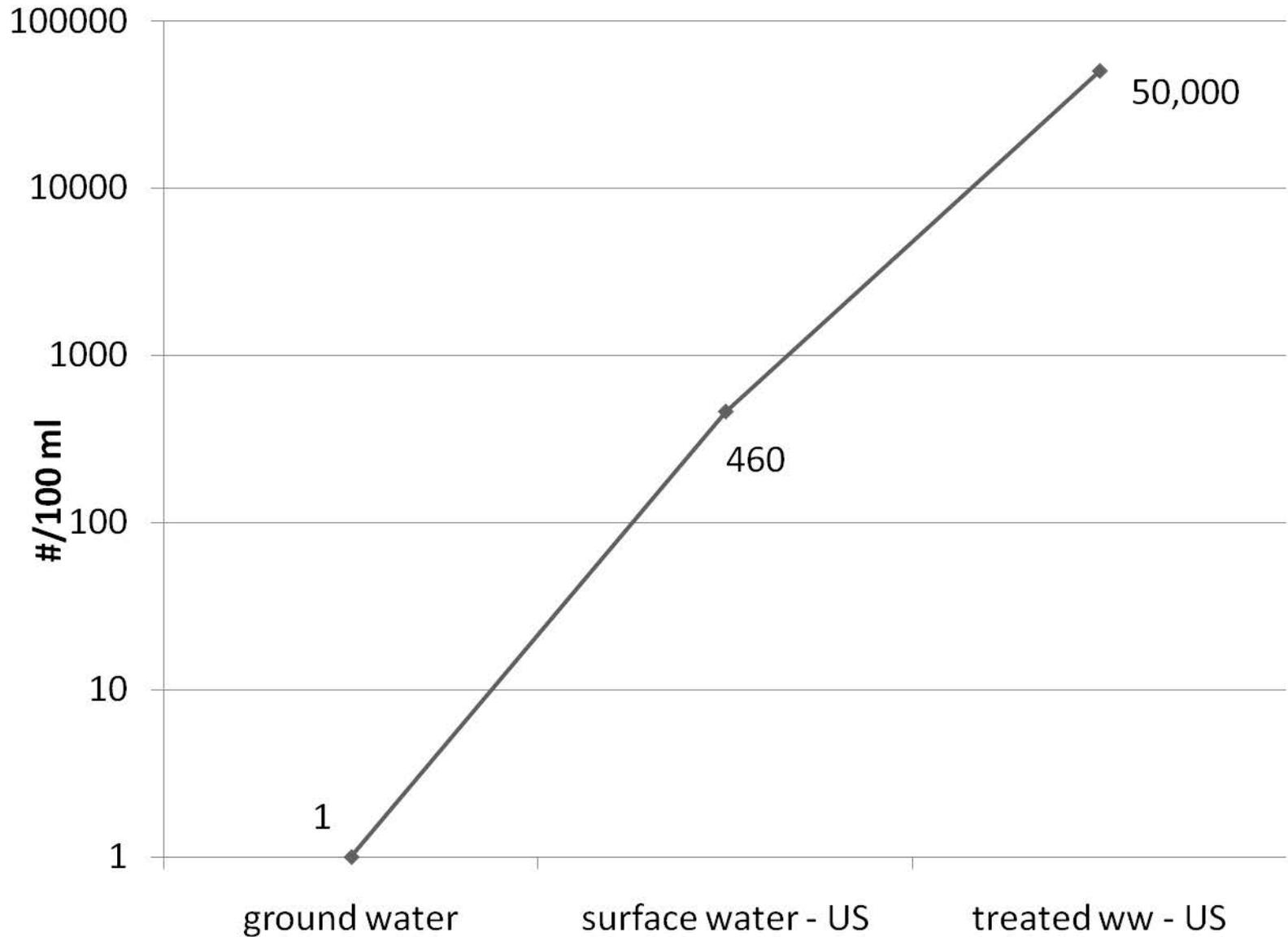
Applications for Substitution and Reuse

- Divided into two broad categories
 - Unrestricted use (high quality)
 - Minimal bacterial contamination
 - Body contact allowed
 - e.g., showering
 - Restricted/industrial use (lower quality)
 - Some bacterial contamination
 - Limited body contact/public exposure
 - e.g., construction activities

Guidelines for Water Substitution and Reuse



Total Coliform Concentrations



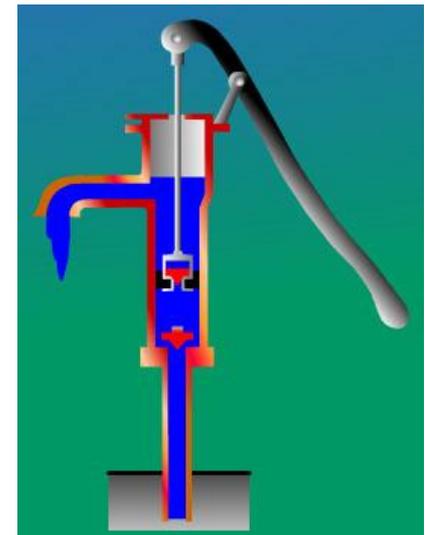
Guideline Classification

1. Ground water
2. Surface Water
 - To include filtered water and ROWPU brine
3. Treated Wastewater
 - To include gray water



Water Substitution Guidance – Ground Water

- Ground Water
 - Extremely low turbidity and bacterial contamination
 - Can be used directly for all non potable water applications
 - Exception: ground water under the direct influence of surface water



Surface Waters

EPA Criteria* for Bacteria in Recreational Fresh Water#

Indicator	Geometric Mean Density [^]	Single Sample Maximum
Enterococci	33	62
E. coli	126	235

*Measured as bacterial densities (colony forming units) per 100 ml

#Based on an acceptable gastrointestinal illness rate of 8 per 1000 swimmers.

[^]Calculated with a minimum of five samples collected over a 30-day period.

Water Substitution Guidance – Surface Water

- Deployment situations
 - Surface waters
 - More heavily polluted
 - Sometimes open sewers
- Guidance



Application	Action
Unrestricted Use with Body Contact	Disinfect and use
Industrial / Restricted Use	Use directly

TB MED 577

Water Quality	Acceptable Activities
Disinfected Fresh Water	Centralized hygiene such as field showers Decontamination of personnel Retrograde cargo washing Heat casualty body cooling Graves registration personnel sanitation Well development
Fresh Water	Vehicle coolant Aircraft washing Pest control Field laundry Concrete construction Well drilling
Brackish and Seawater	Vehicle washing Electrical grounding Fire fighting CBRNE decontamination of materials

Treated Wastewater

- Significant bacterial contamination
- Federal and State reuse classifications
 - Level of treatment
 - Water quality standards
 - Monitoring schedule
 - Setback distance



Water Reuse Guidance – Treated Wastewater



- Guidance

Category	Wastewater Treatment	Turbidity (NTU)		E. coli (#/100 ml)	
		median value	single sample max	median value	single sample max
Unrestricted/ Body Contact	Tertiary	≤2	≤5	none	≤10
Restricted/ Industrial	Secondary	≤5	≤10	≤150	≤600

Final Thought

- Goal.....

Produce comprehensive Army
Policy for Water Substitution
and Reuse in the Field

