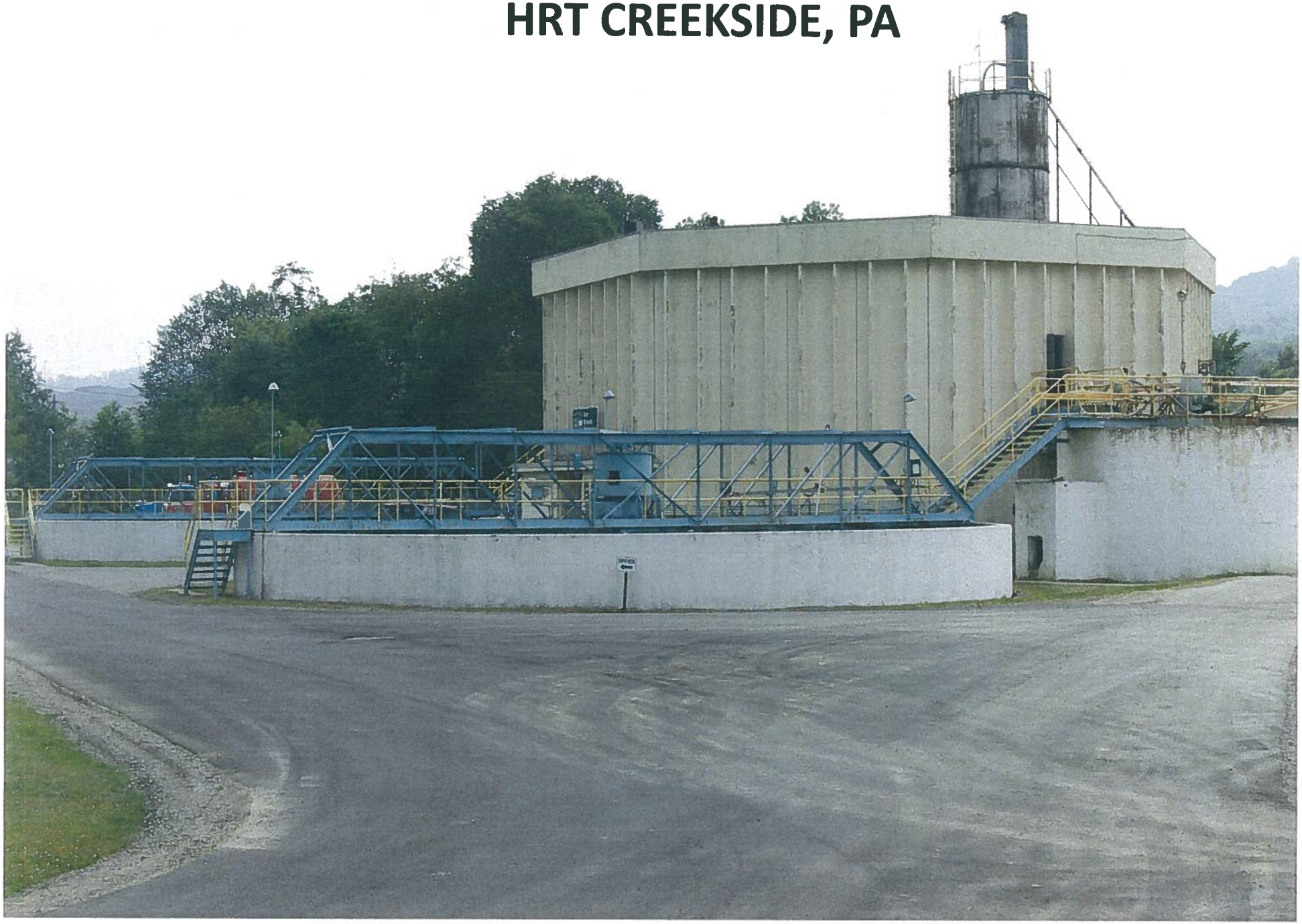

April 7, 2010
Hart Resource Technologies
Pennsylvania Brine Treatment
Marcellus Shale Water Treatment

HRT Management

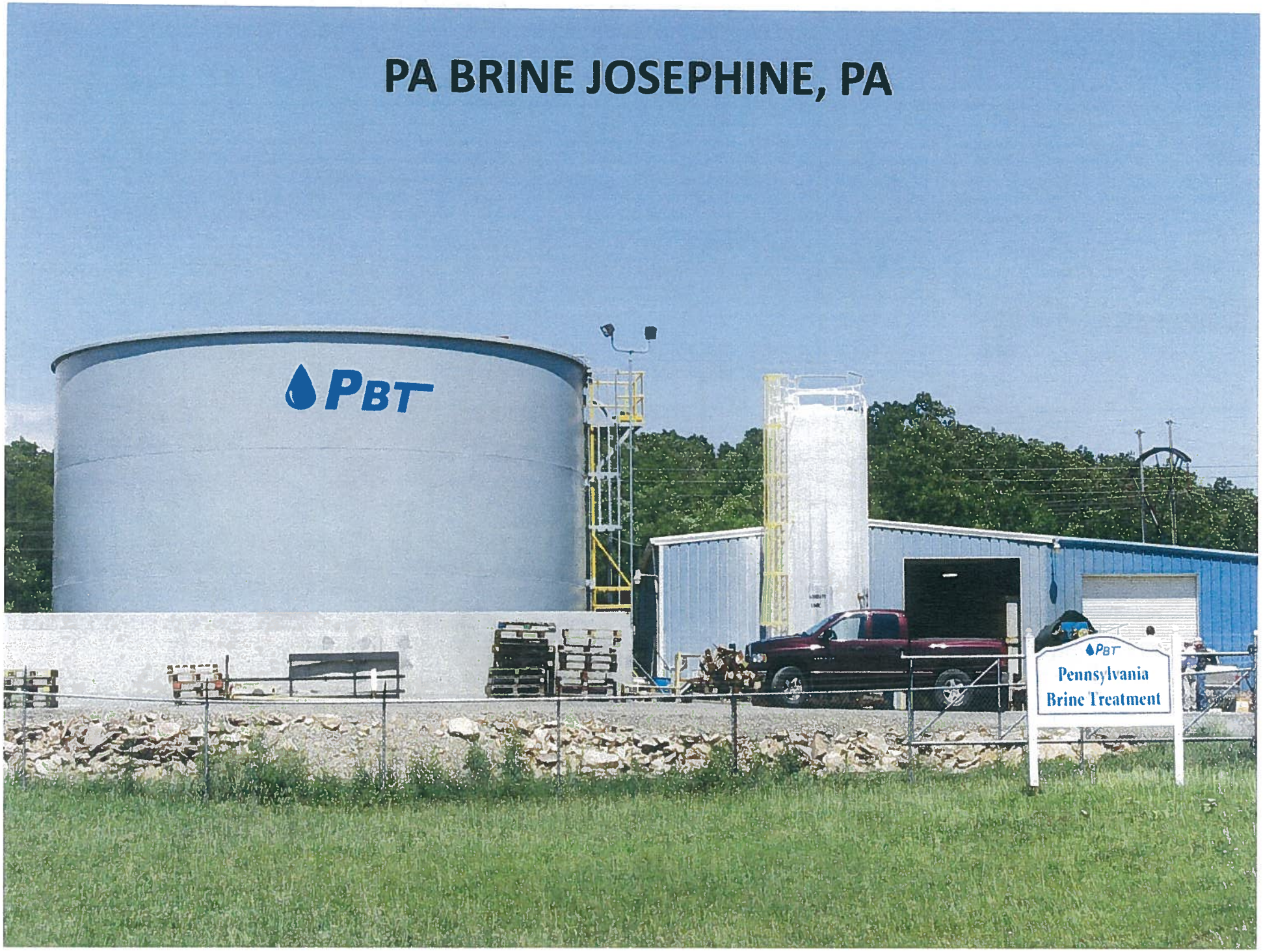
Trained and Experienced

- Active members in:
  - West Penn Energy Association
  - Independent Oil and Gas Association
  - Pennsylvania Oil and Gas Association
  - Chairman of Environmental Committee (Paul Hart '99-'03)
  - Member of Marcellus Shale Coalition
- Management Team Members each have 20 years experience in the Oil and Gas Industry
- Three NPDES treatment facilities currently in operation
  - Creekside, PA
  - Josephine, PA (Blairsville)
  - Franklin, PA
- Successfully crystallized brine water 1986-1992

HRT CREEKSIDE, PA

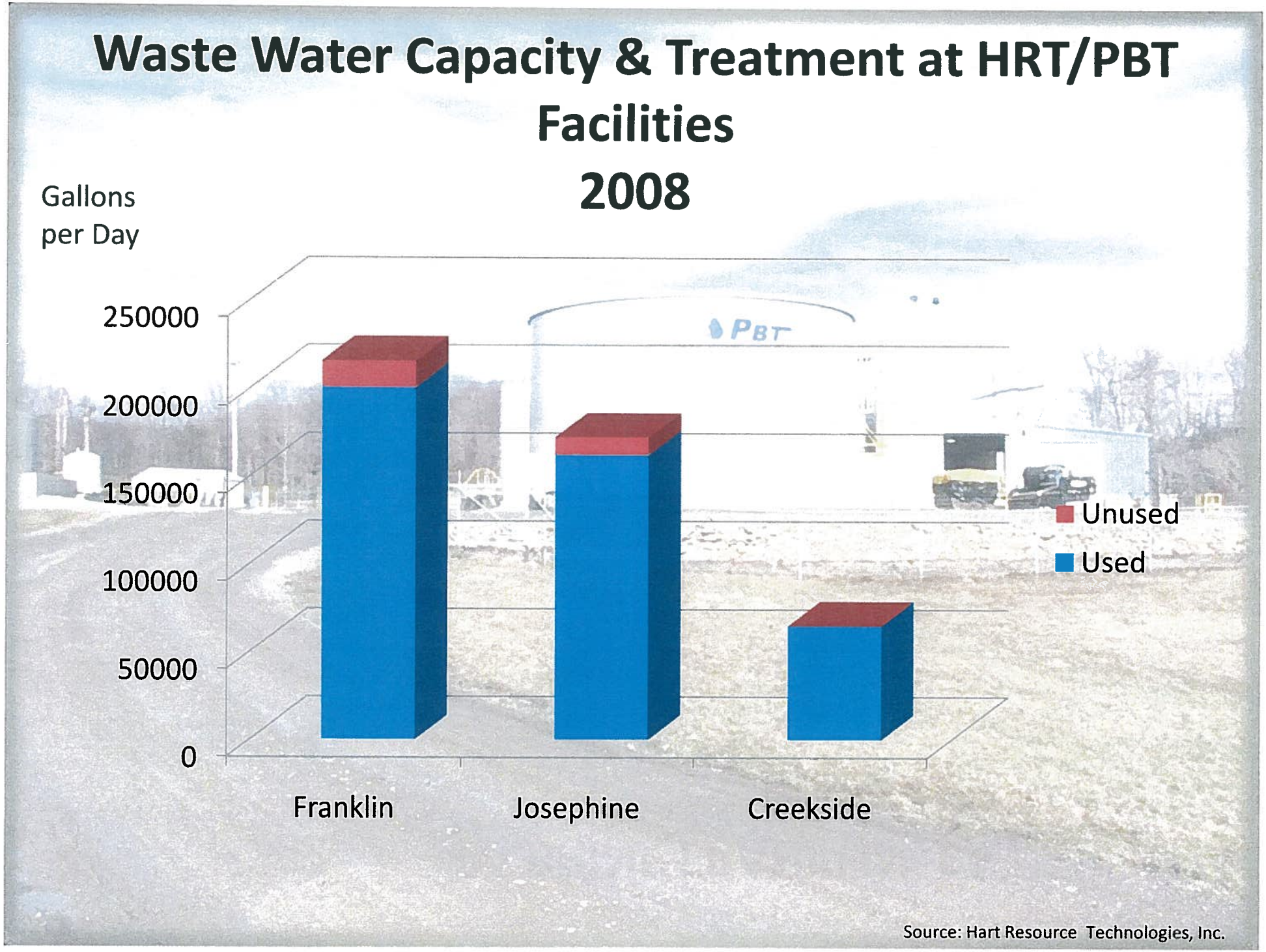


PA BRINE JOSEPHINE, PA



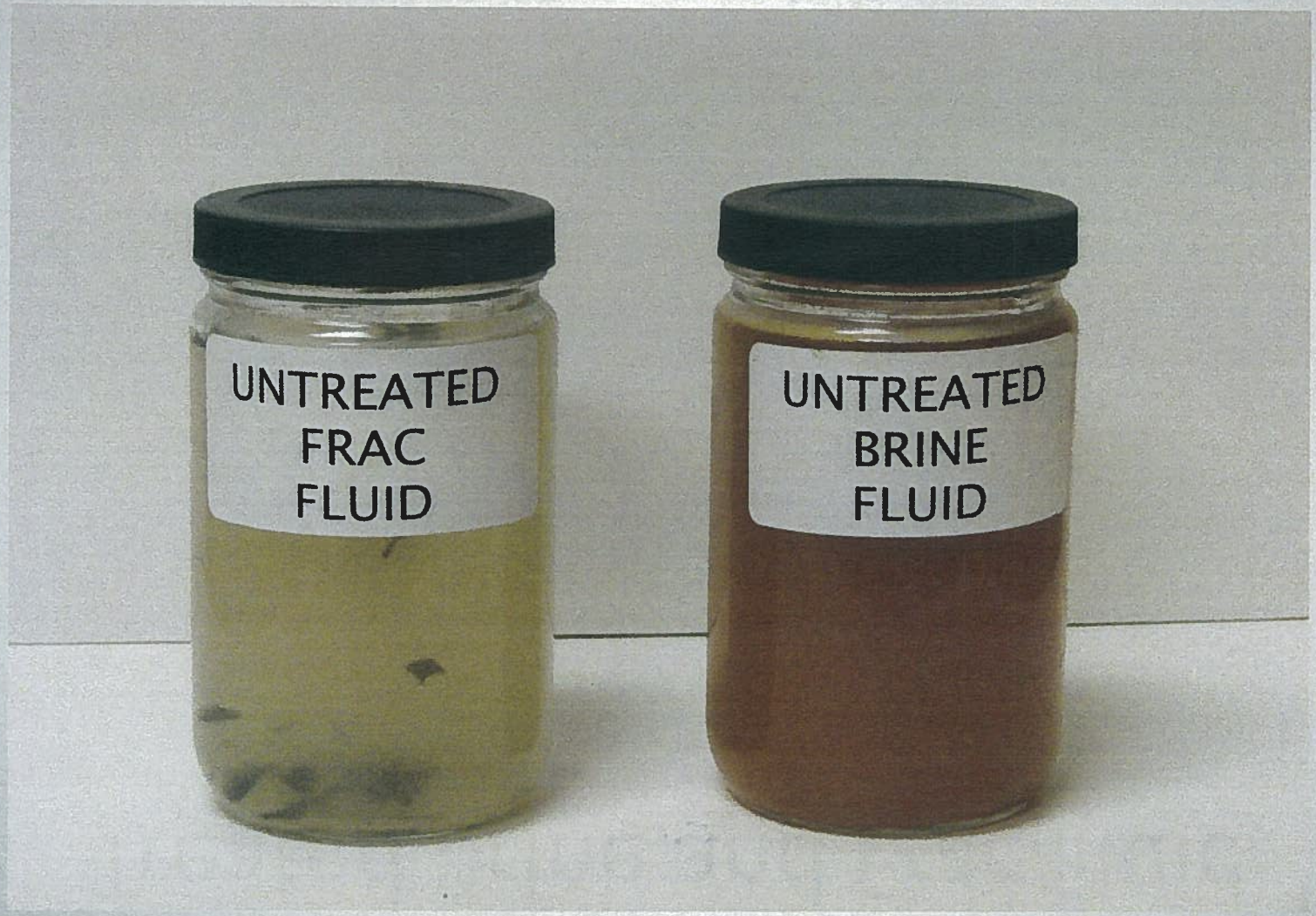
PA BRINE FRANKLIN, PA

Waste Water Capacity & Treatment at HRT/PBT Facilities 2008



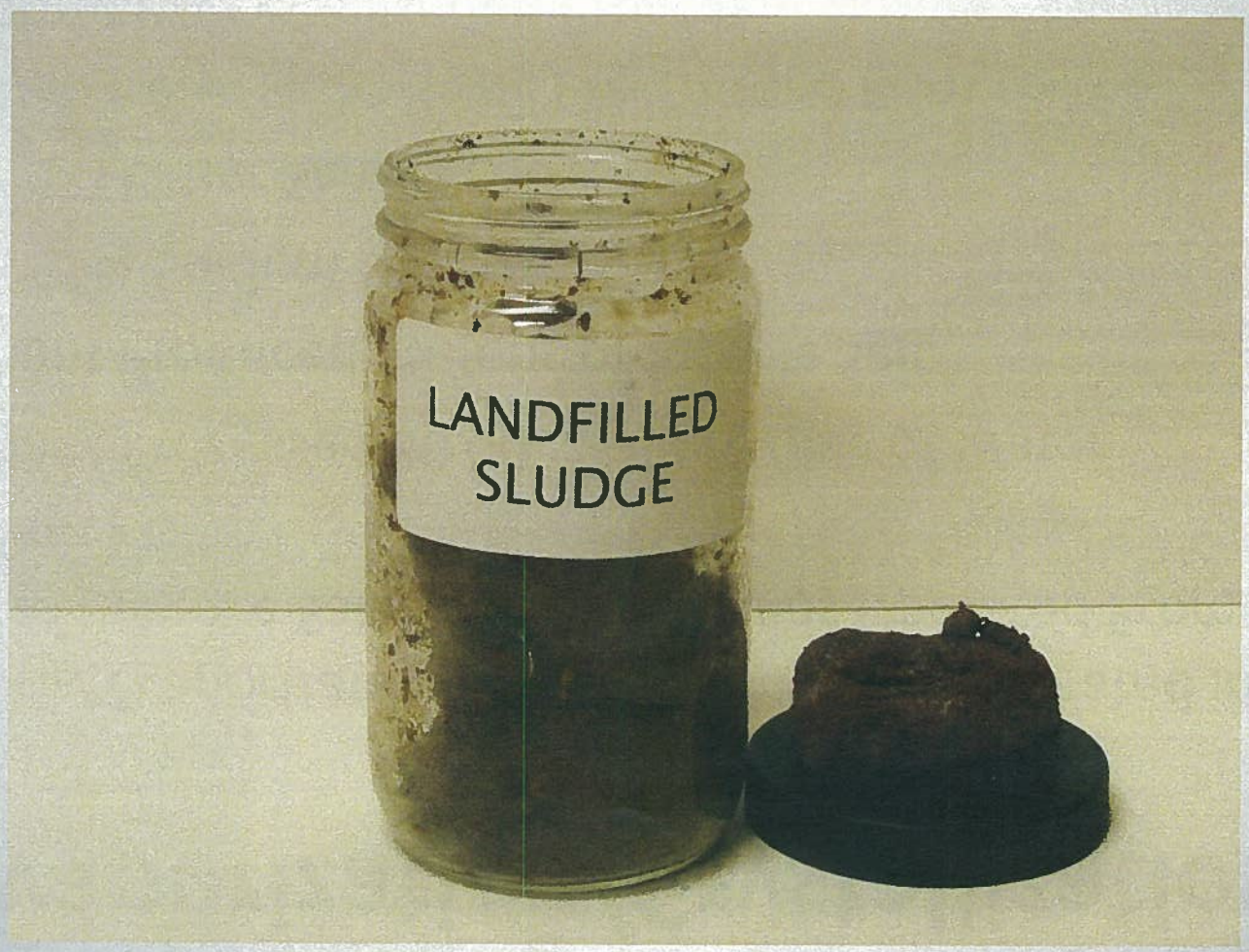
Source: Hart Resource Technologies, Inc.

Untreated Brine and Frac Fluid



Treated Brine and Frac Fluid

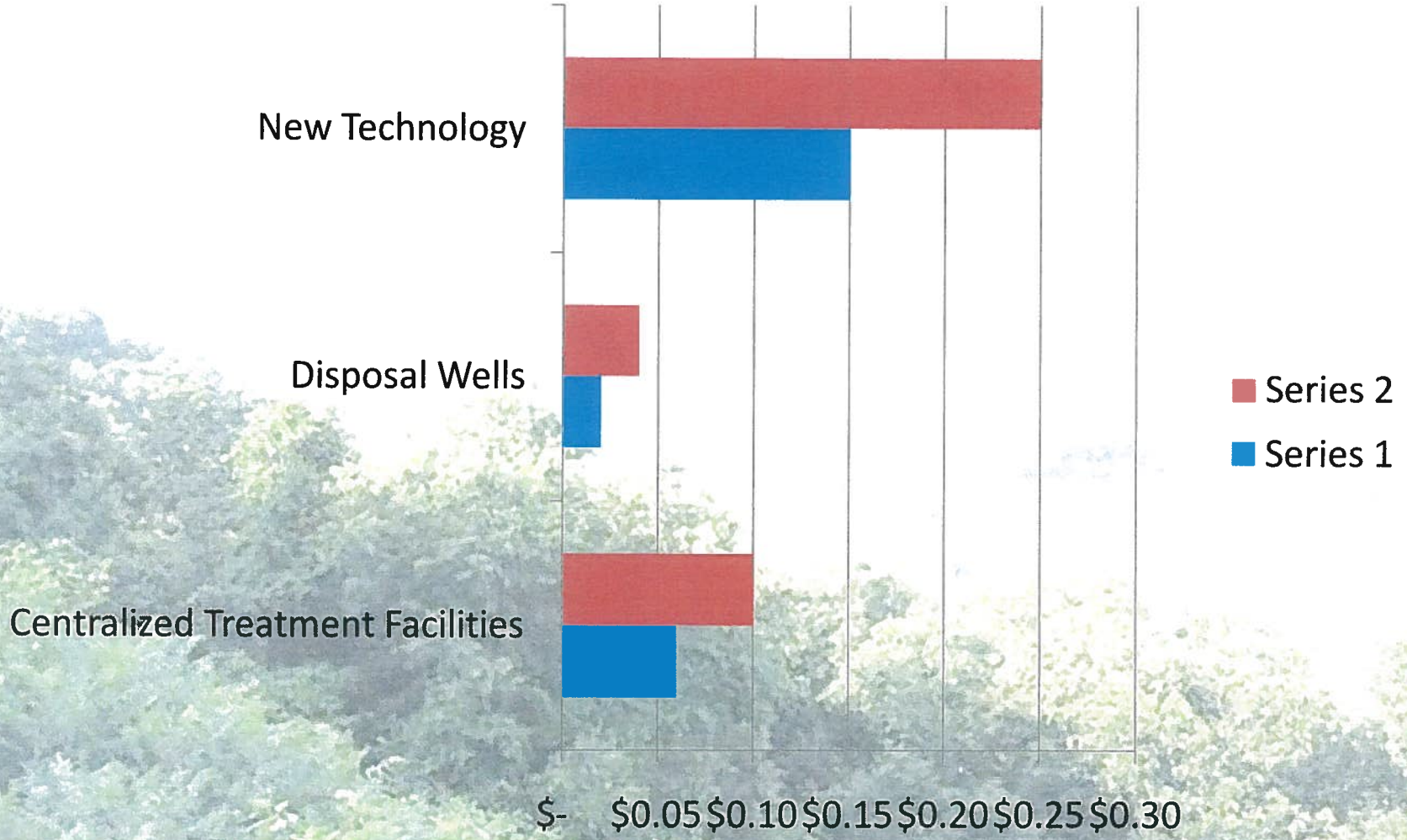
Treated Sludge



Evaporization/Crystallization

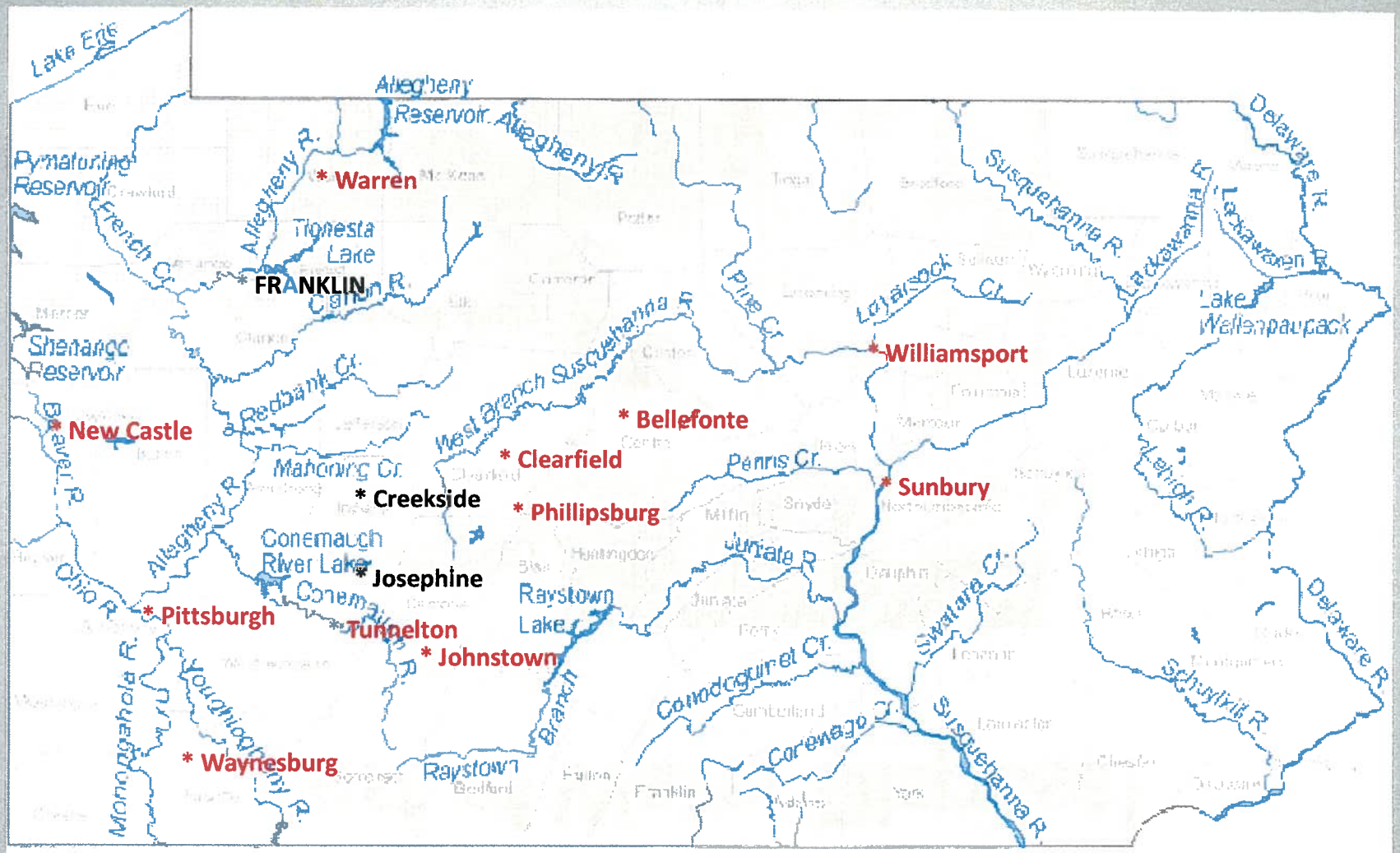
- The Only Evaporization/Crystallization Unit Operated in the State to Remove Salt From Brine Fluids Operated From 1989 to 1994.
- The Plant Processed 30,000 Gallons/day of Water
- The Plant Produced 15 Tons of Salable Salt.
  - 99% Sodium Chloride
  - 1% Other Salts
- The Water was Extensively Pre-Treated Prior to The Evaporation/Crystallization Process

Cost of Water Disposal

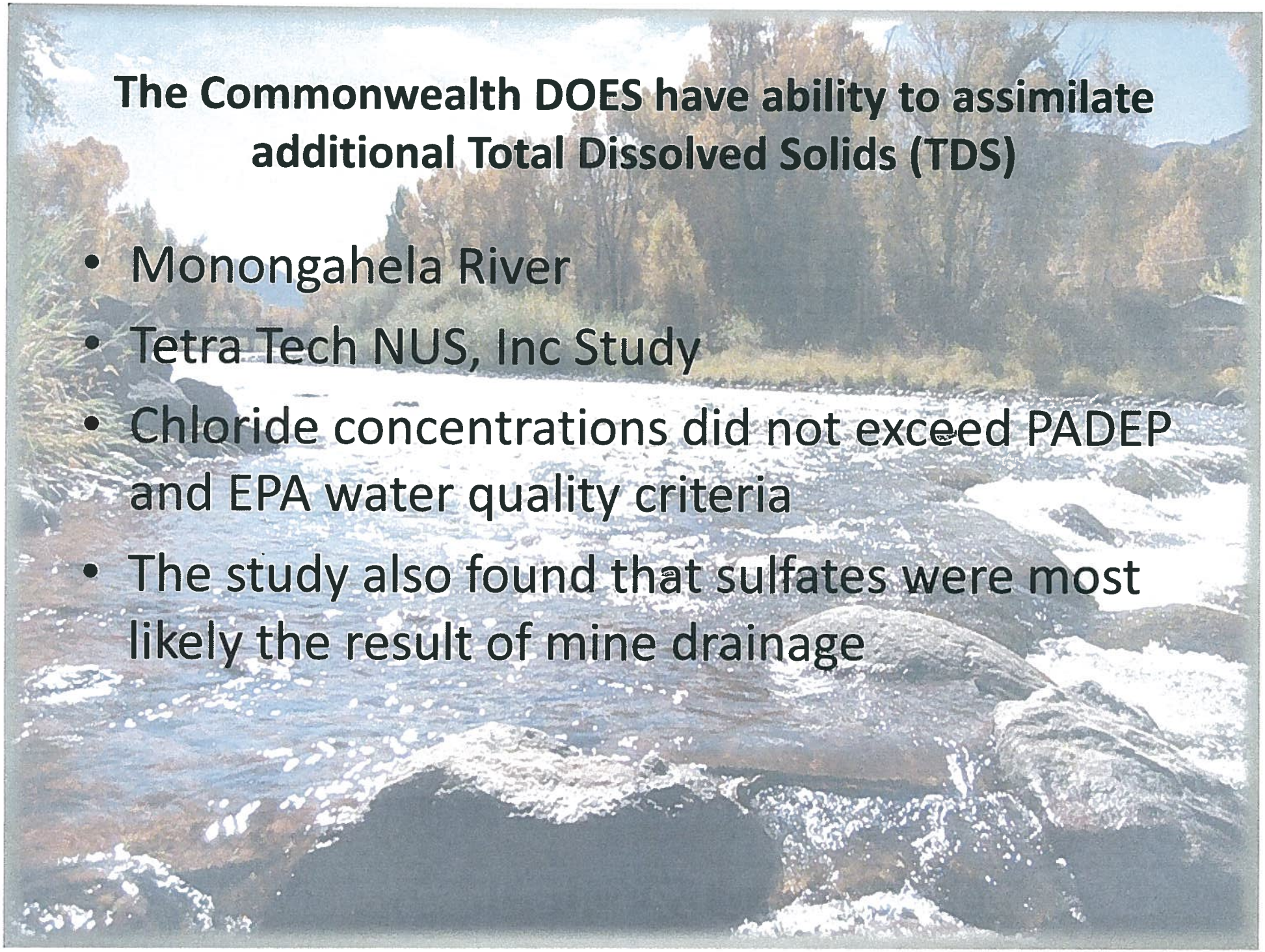


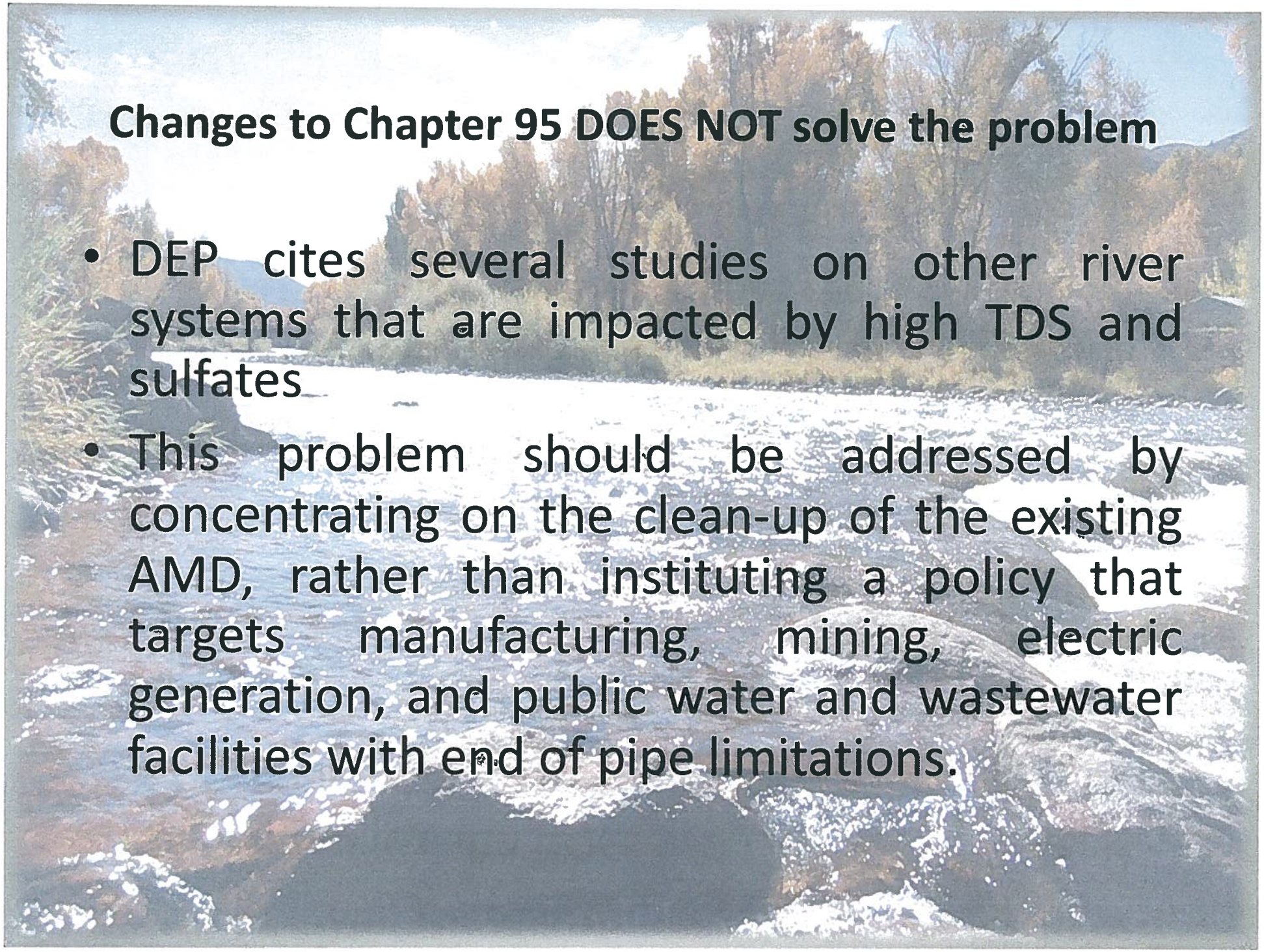
HRT/PA Brine Facilities

Other Facilities



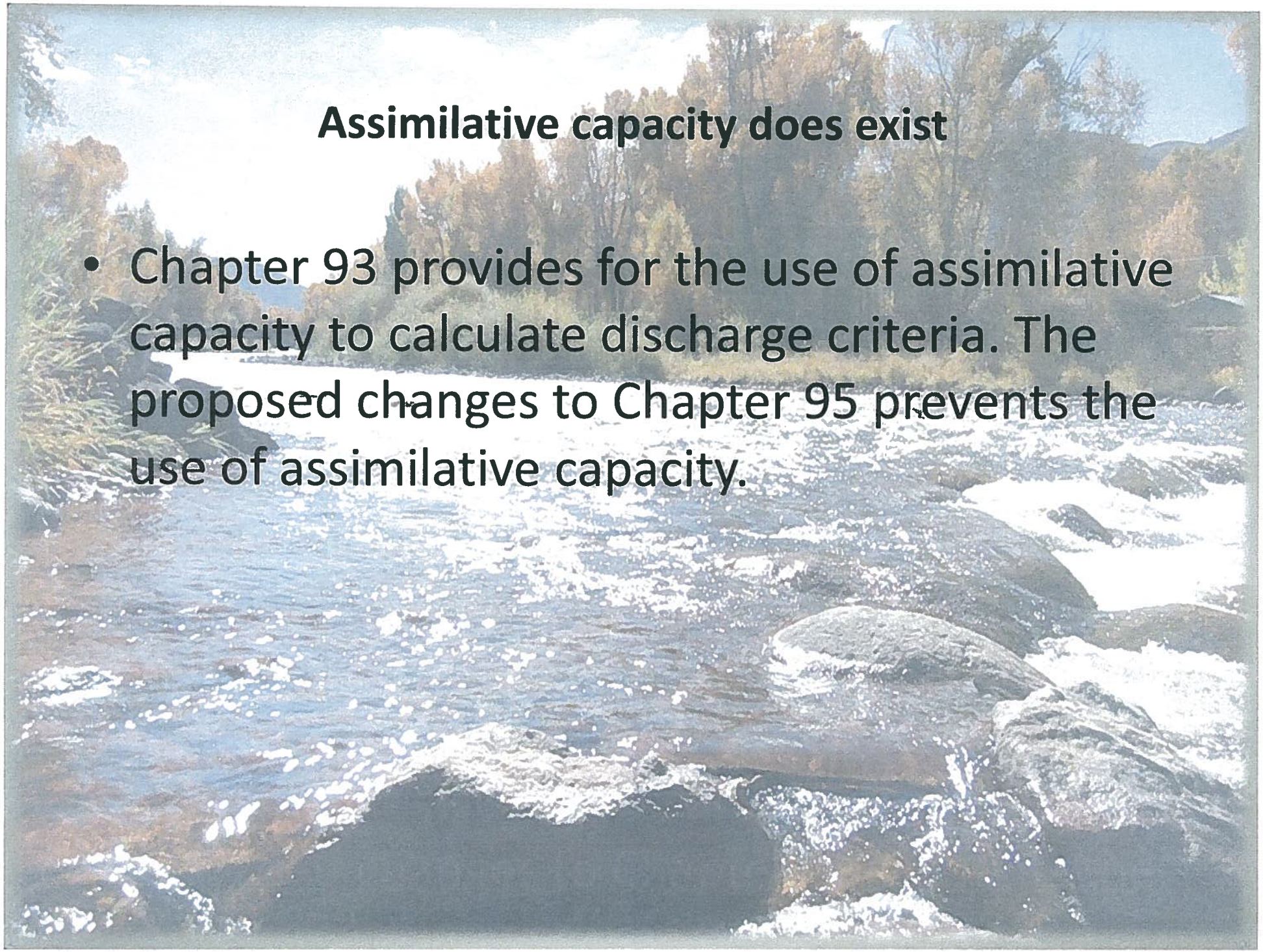
Source: Hart Resource Technologies, Inc.

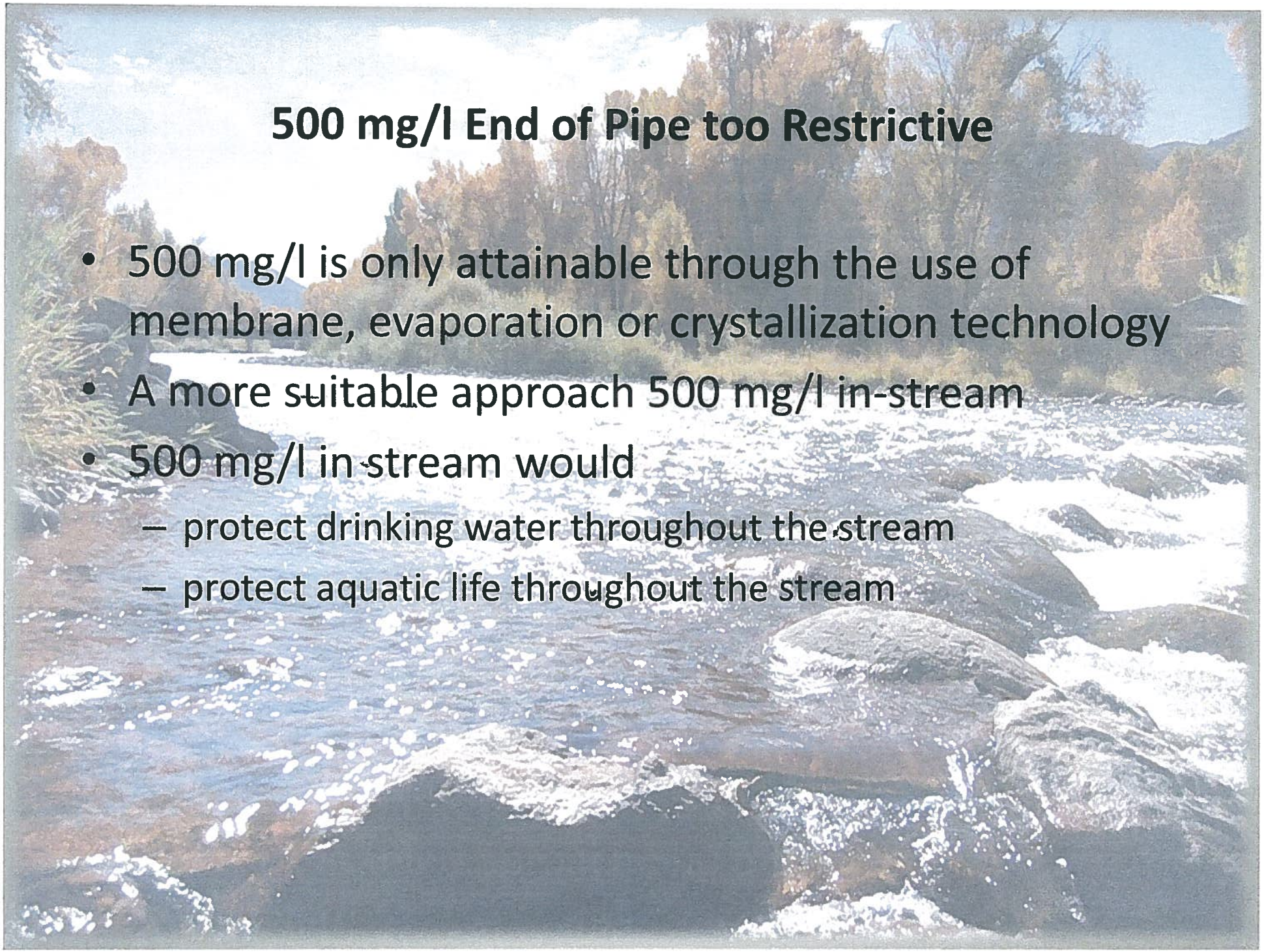

The Commonwealth DOES have ability to assimilate additional Total Dissolved Solids (TDS)
• Monongahela River
• Tetra Tech NUS, Inc Study
• Chloride concentrations did not exceed PADEP and EPA water quality criteria
• The study also found that sulfates were most likely the result of mine drainage



Changes to Chapter 95 DOES NOT solve the problem

- DEP cites several studies on other river systems that are impacted by high TDS and sulfates
- This problem should be addressed by concentrating on the clean-up of the existing AMD, rather than instituting a policy that targets manufacturing, mining, electric generation, and public water and wastewater facilities with end of pipe limitations.


Assimilative capacity does exist
• Chapter 93 provides for the use of assimilative capacity to calculate discharge criteria. The proposed changes to Chapter 95 prevents the use of assimilative capacity.



500 mg/l End of Pipe too Restrictive

- 500 mg/l is only attainable through the use of membrane, evaporation or crystallization technology
- A more suitable approach 500 mg/l in-stream
- 500 mg/l in-stream would
  - protect drinking water throughout the stream
  - protect aquatic life throughout the stream

500 mg/l End of Pipe too Restrictive (Continued)

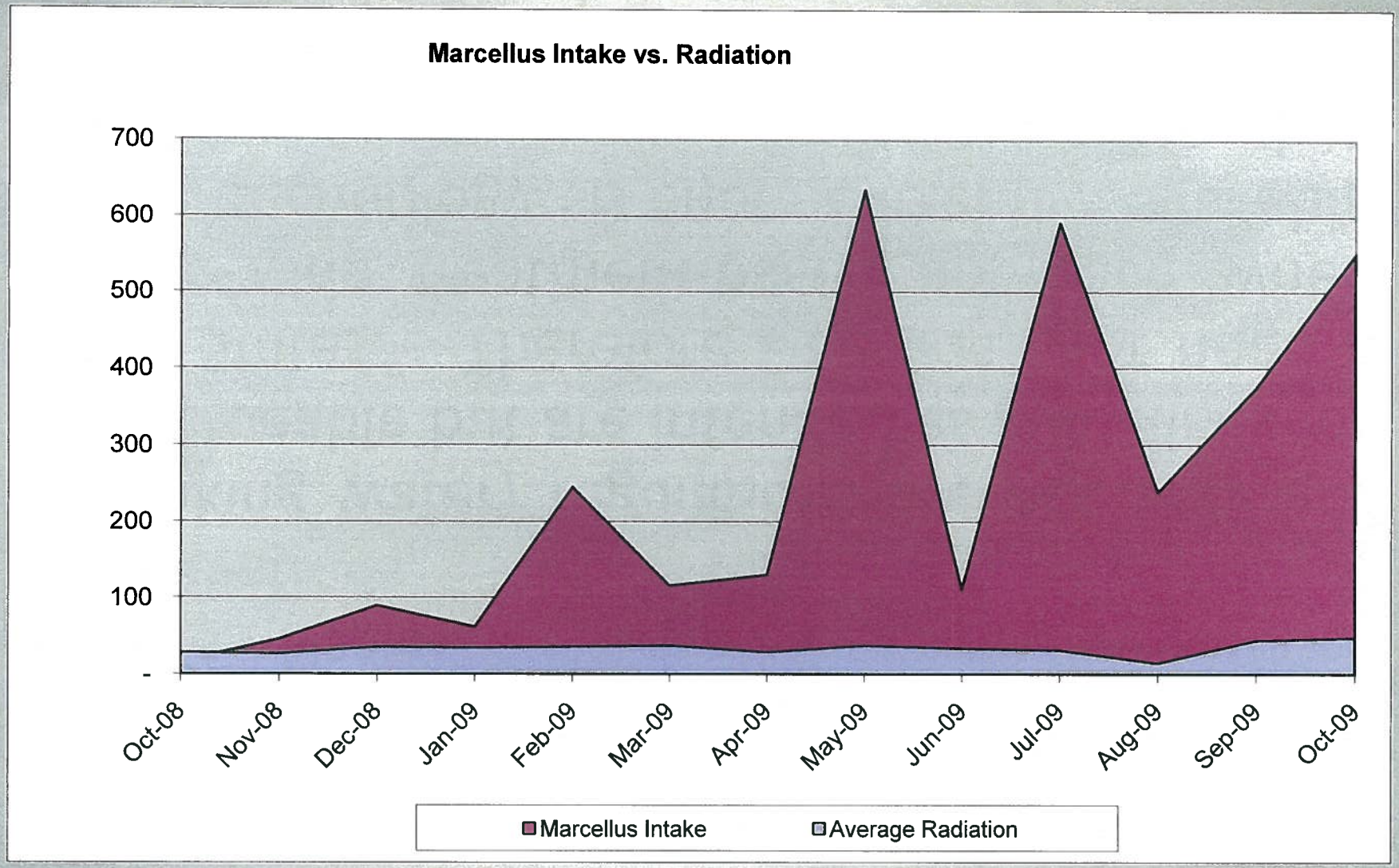
- DEP is currently reviewing Chapter 93 regulations
  - Creekside facility capacity would be decreased by 44%
  - Josephine facility capacity would be reduced by 78%
  - Franklin facility capacity would be reduced 30%
- Reduction of 245,000 gallons of fluid processed per day


Best available technology
• High energy demand for crystallization processes
• Increased emissions
• Economic Impact
• Time Frame for implementation of Chapter 95 is too short

Regulation Change is premature

- EPA's National Secondary Drinking Water Regulations, Part 143.1 "the (secondary drinking water) regulations are not federally enforceable but are intended as guidelines for the States." Therefore DEP does not need a state-wide treatment-based approach when the technology is not currently available and/or proven and the water quality data presented by DEP is limited to certain watersheds, not all State waters.

NORM


Marcellus Intake vs. Radiation
700
600
500
400
300
200
100
-
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Marcellus Intake
Average Radiation

Questions?