

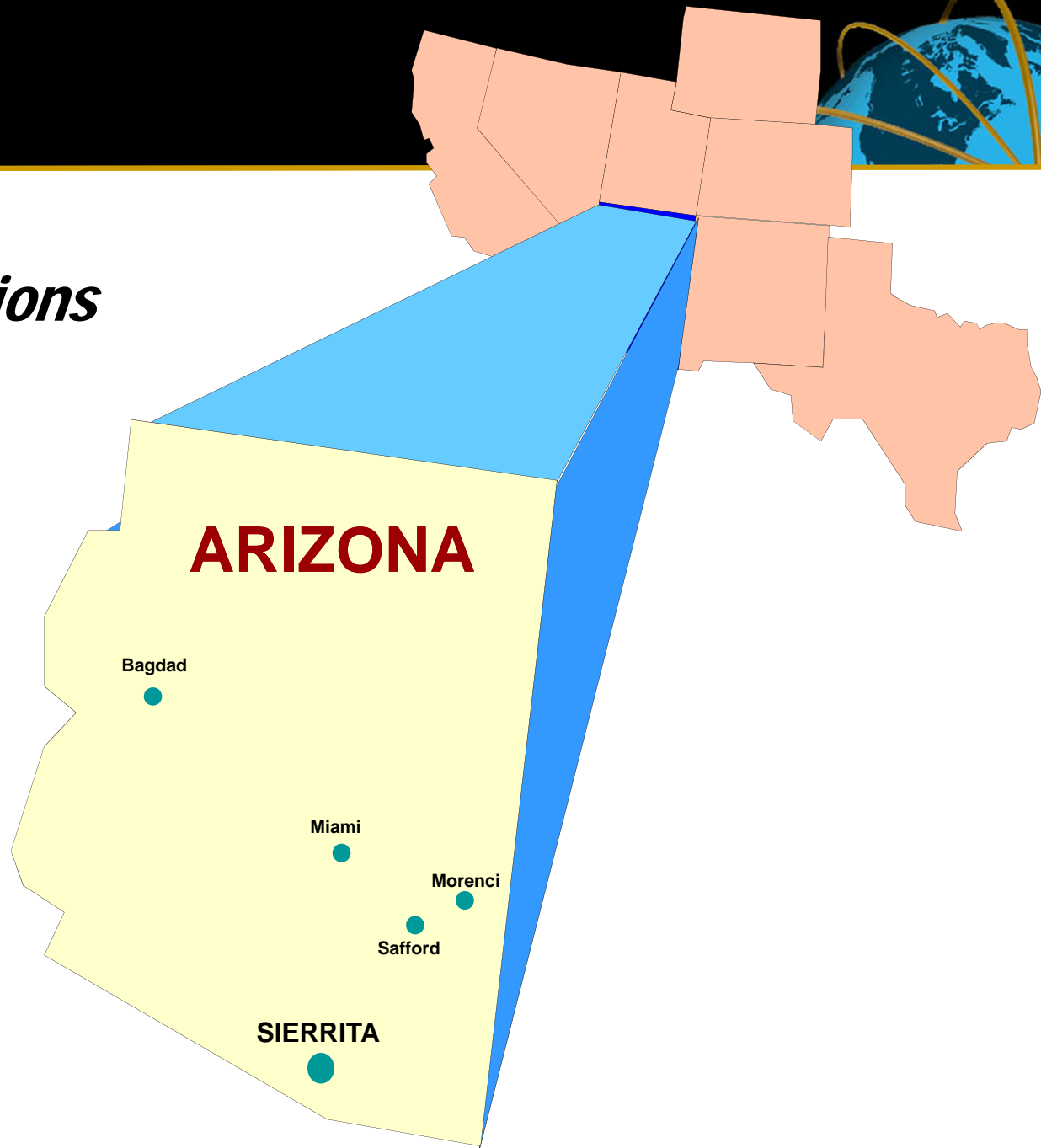
Connecting the World

Water Reuse for Managing Impacted Water At Sierrita

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May 3, 2011



Sierrita Operations

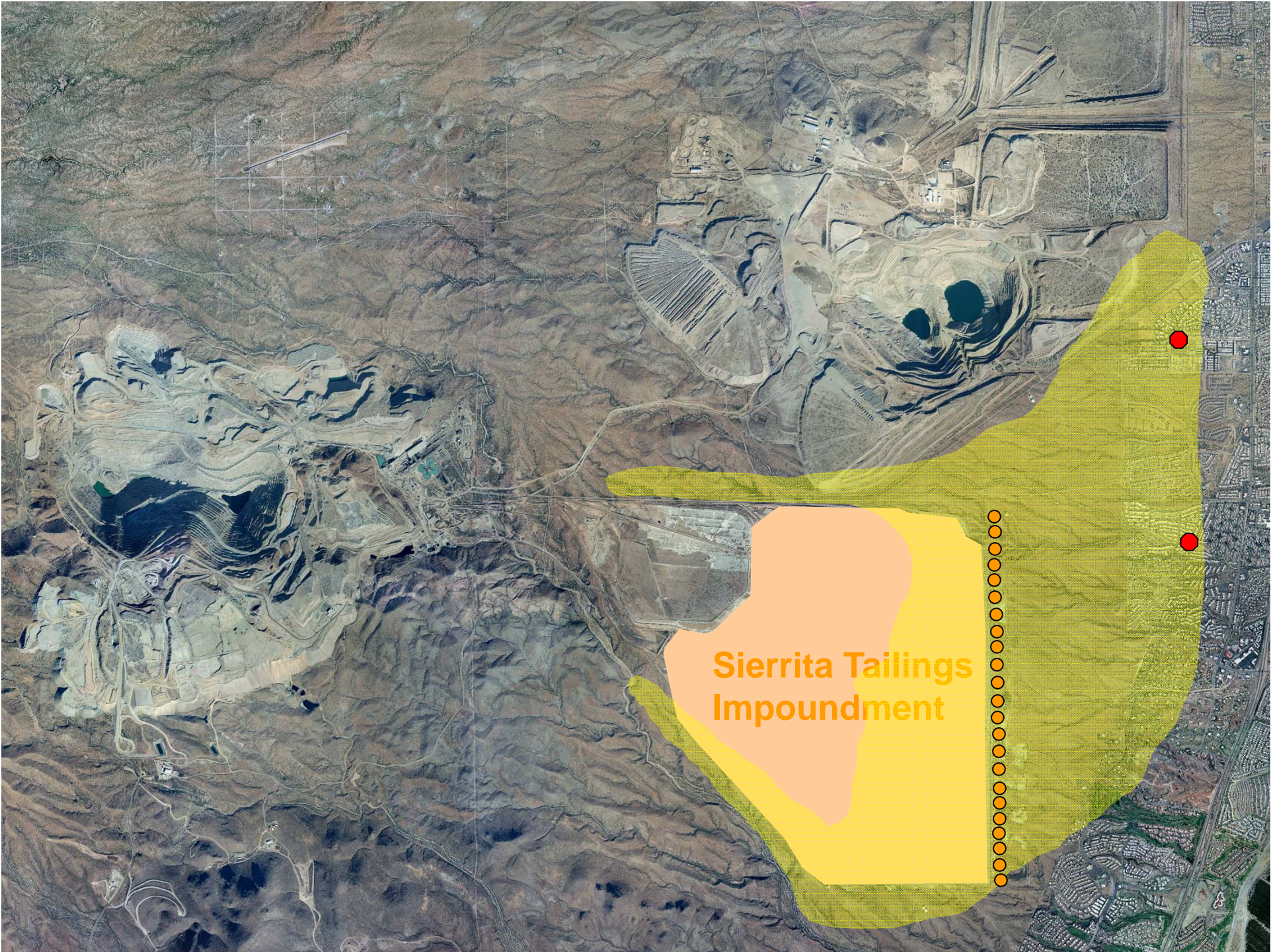


Groundwater Sulfate Plume



Background

- 1970 – Sierrita Tailings Impoundment begins operation
- 1973 – Pima County identifies elevated sulfate in wells east of tailings
- 1978-81 – Sierrita installs first series of interceptor wells
- 1995 – Elevated sulfate identified in potable water supply wells
- 2003 – Sulfate in two supply wells exceed 500 mg/L
- 2003 – Provided Community Water Company with an interim alternate water supply
- 2006 – Signed a Mitigation Order on Consent with ADEQ to address sulfate in drinking water
- 2007 – Paid for the design and construction of two new water supply wells and associated water treatment – \$13 million



**Sierrita Tailings
Impoundment**

Mitigation Order Requirements

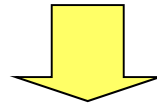


- Ensure drinking water supplies do not exceed 250 mg/L sulfate at point of use
- Schedule and tasks
 - Submit Work Plan to ADEQ (Aug 2006)
 - Form Community Advisory Group (Jul 2006)
 - Establish local information repositories (Jun 2006)
 - Evaluate Interceptor Well performance (Apr 2007)
 - Characterize aquifer and plume (Oct 2008)
 - Submit a feasibility study (Dec 2008)
 - Submit a Mitigation Plan to ADEQ (May 2009)

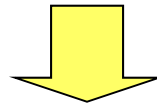
Mitigation Action Identification and Screening



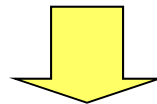
Develop Mitigation Action Objective
(ensure existing drinking water supplies have a sulfate concentration < 250 mg/L)



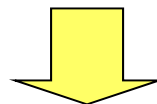
Develop Mitigation Response Actions (e.g., source control, groundwater control, water management, treatment)



Identify and Screen Control Technologies Applicable to Each Action



Identify and Evaluate Representative Process Options for each Technology



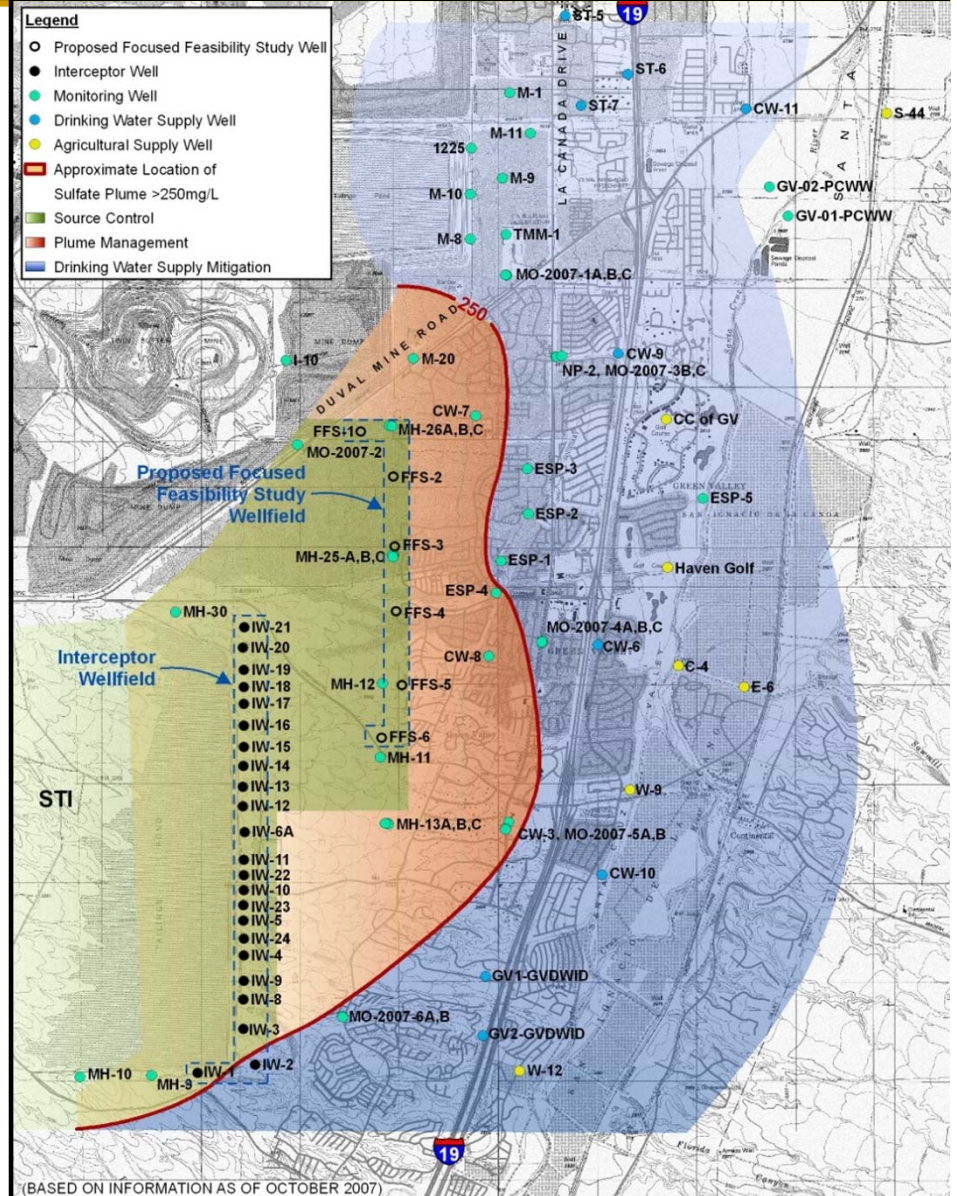
Assemble Technologies into Mitigation Alternatives

Areas of Application of Mitigation Approaches

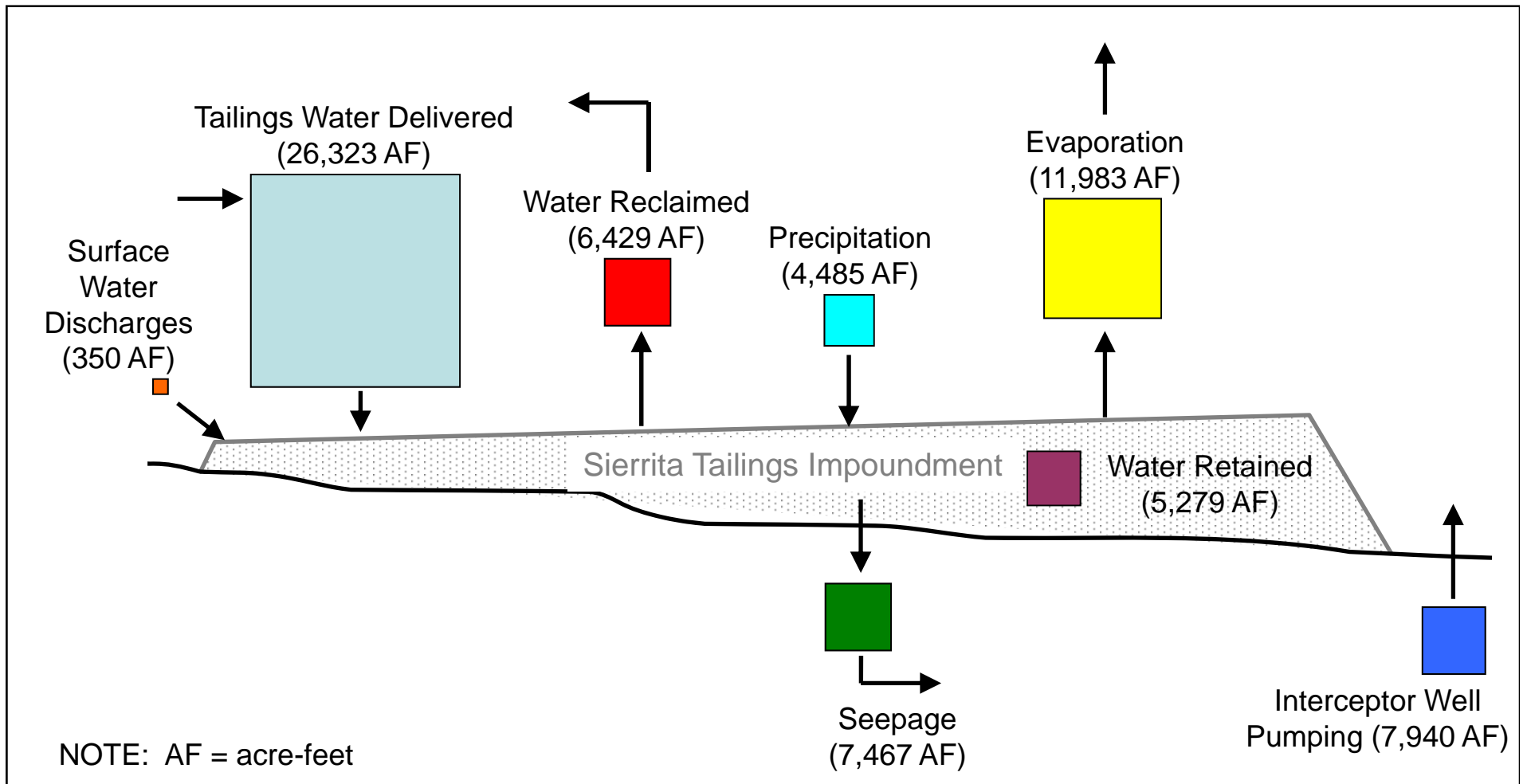


Legend

- Proposed Focused Feasibility Study Well
- Interceptor Well
- Monitoring Well
- Drinking Water Supply Well
- Agricultural Supply Well
- Approximate Location of Sulfate Plume >250mg/L
- Source Control
- Plume Management
- Drinking Water Supply Mitigation



Water Balance



SCHEMATIC DIAGRAM OF 2006 WATER BALANCE FOR SIERRITA TAILINGS IMPOUNDMENT

Mitigation Alternatives



Mitigation Action Objective – Ensure drinking water supplies do not exceed 250 mg/L sulfate at point of use

- Alternative 1
 - Monitored natural attenuation
- Alternative 2
 - Plume stabilization
 - Large scale water treatment plant at end of mine life
- Alternative 3
 - Plume stabilization and reduction
 - Large scale water treatment plant at end of mine life
- Alternative 4
 - New tailings impoundment and plume stabilization
- Alternative 5
 - New tailings impoundment, plume stabilization and reduction

Alternative 5

New Tailings Impoundment , Plume Stabilization and Reduction



■ **Source Control**

- Base case actions
 - Lined ponds (Duval Canal and Amargosa Ponds)
 - Optimize reclaim pond pumping
 - Soil cap and stormwater controls at final reclamation of STI
- Pumping at the IW and FFS wells for source control
- Develop new tailings impoundment to replace the Sierrita Tailings Impoundment

■ **Plume Management**

- Pumping at FFS, PS and MC wells to prevent plume migration and to reduce the plume extent
- Groundwater monitoring

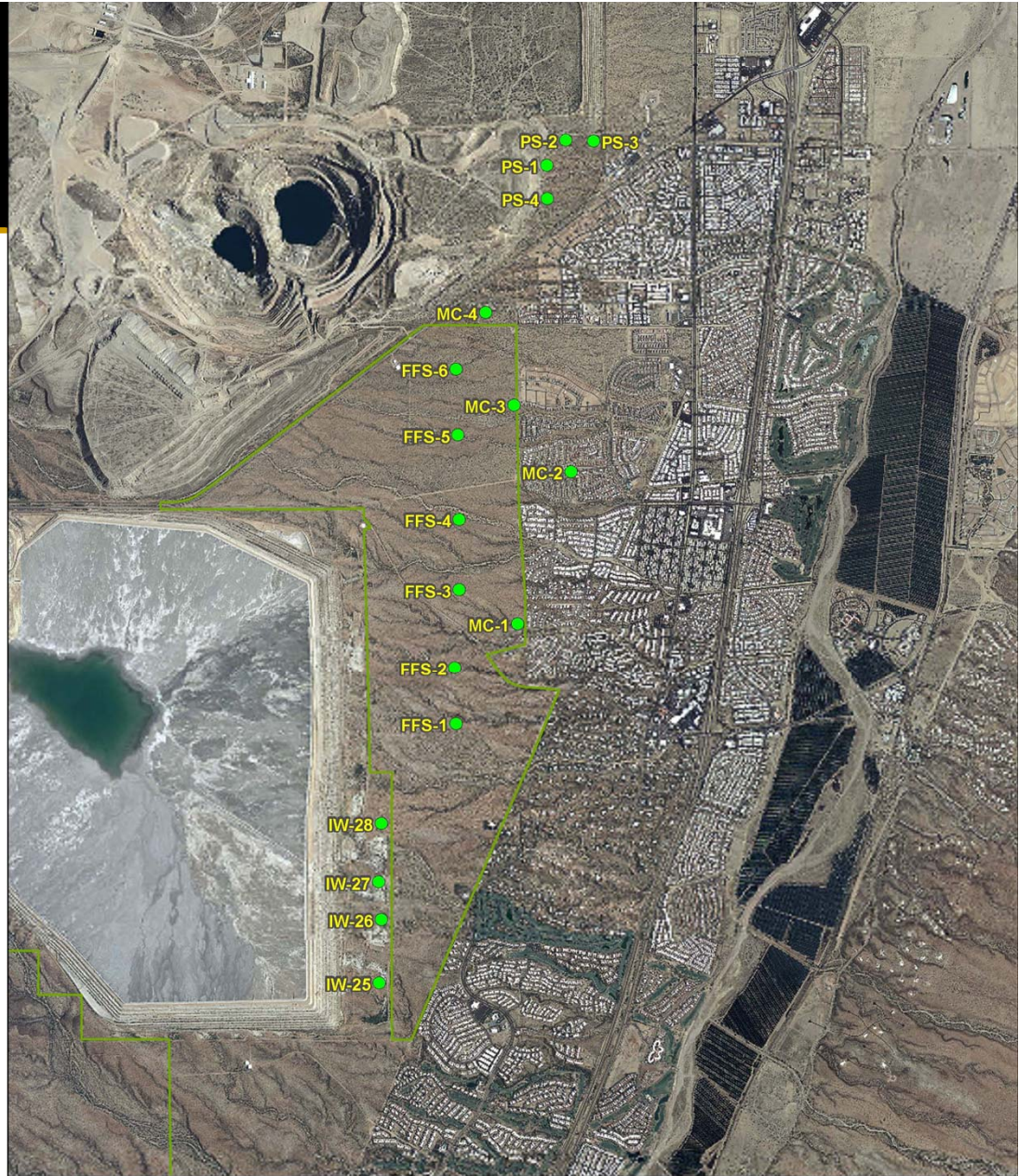
■ **Water Use**

- Extracted groundwater used in operations during mine life
- Post-mining extracted groundwater would be minimal and can be evaporated in pit or possibly treated for other uses.

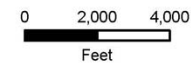
Alternative 5 Pumping Facilities

- Extraction well
- Arizona State Land Boundary

- IW - Interceptor well
- FFS – Focused Feasibility Study well
- PS – Plume Stabilization well
- MC – Mass capture well



Legend
● Extraction Well
□ Arizona State Land Boundary

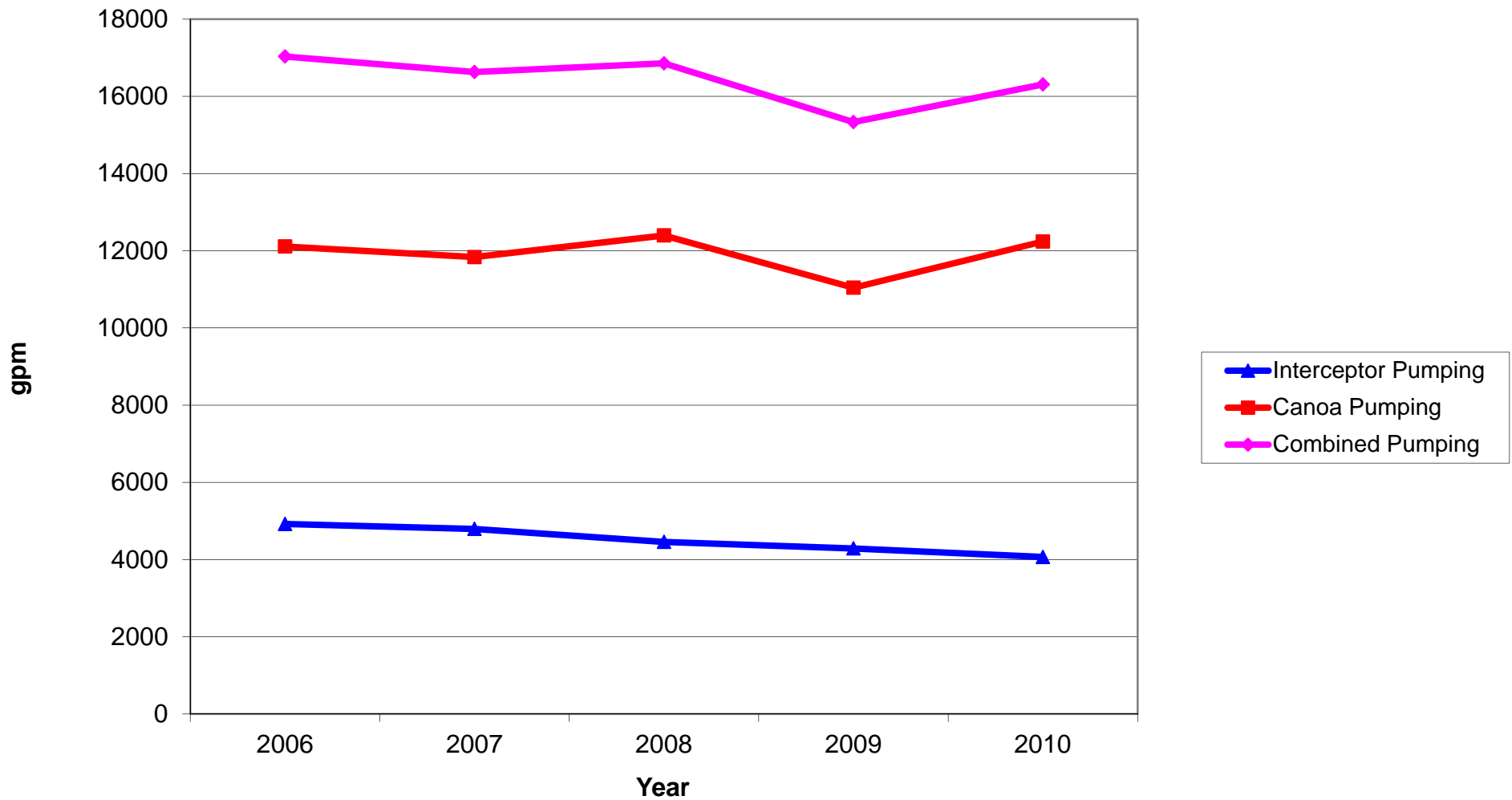


CLEAR CREEK ASSOCIATES
File ID 055039-056
Date 4/13/11

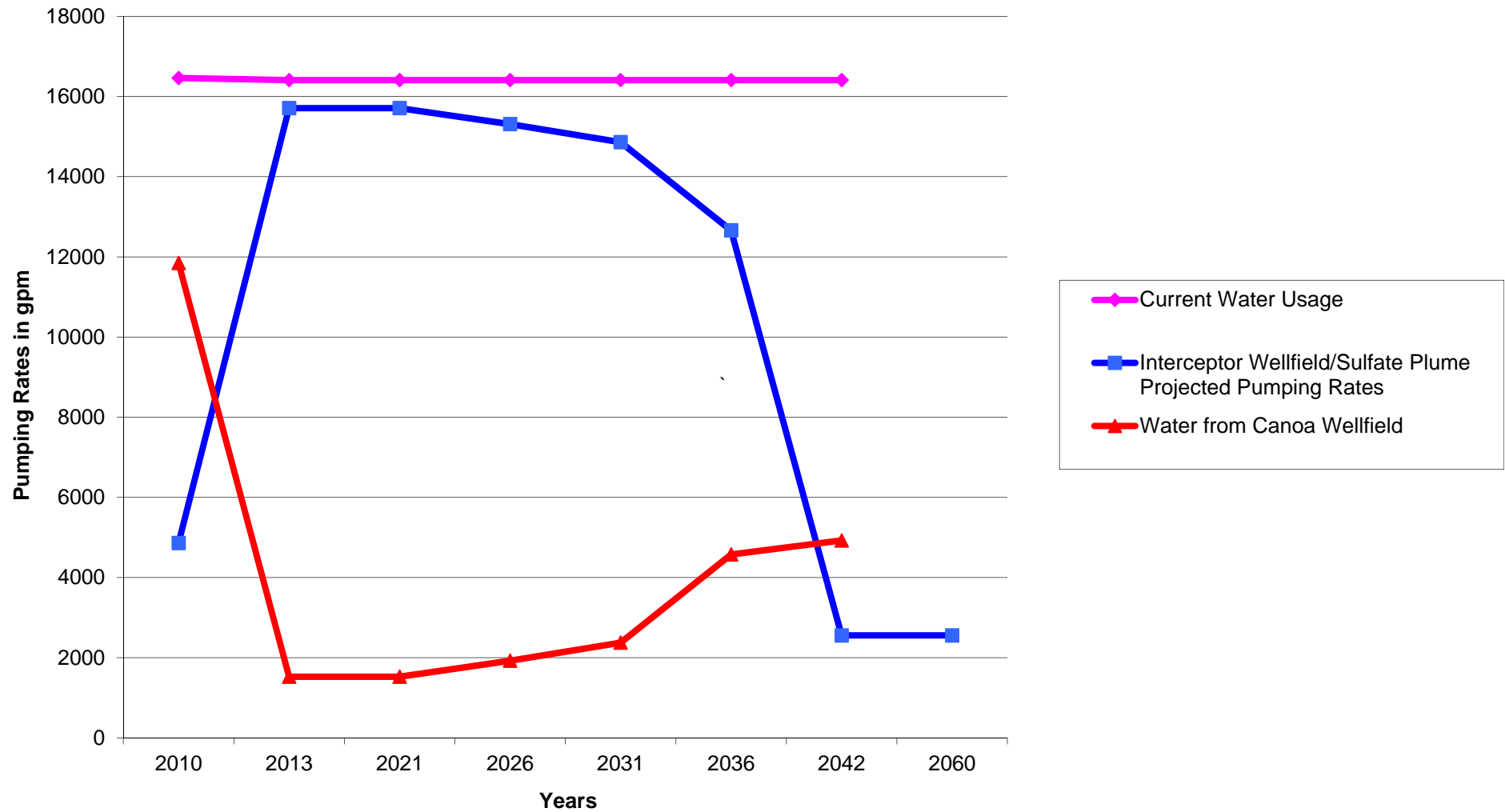


FIGURE 1
MITIGATION ORDER
EXTRACTION WELL
LOCATIONS

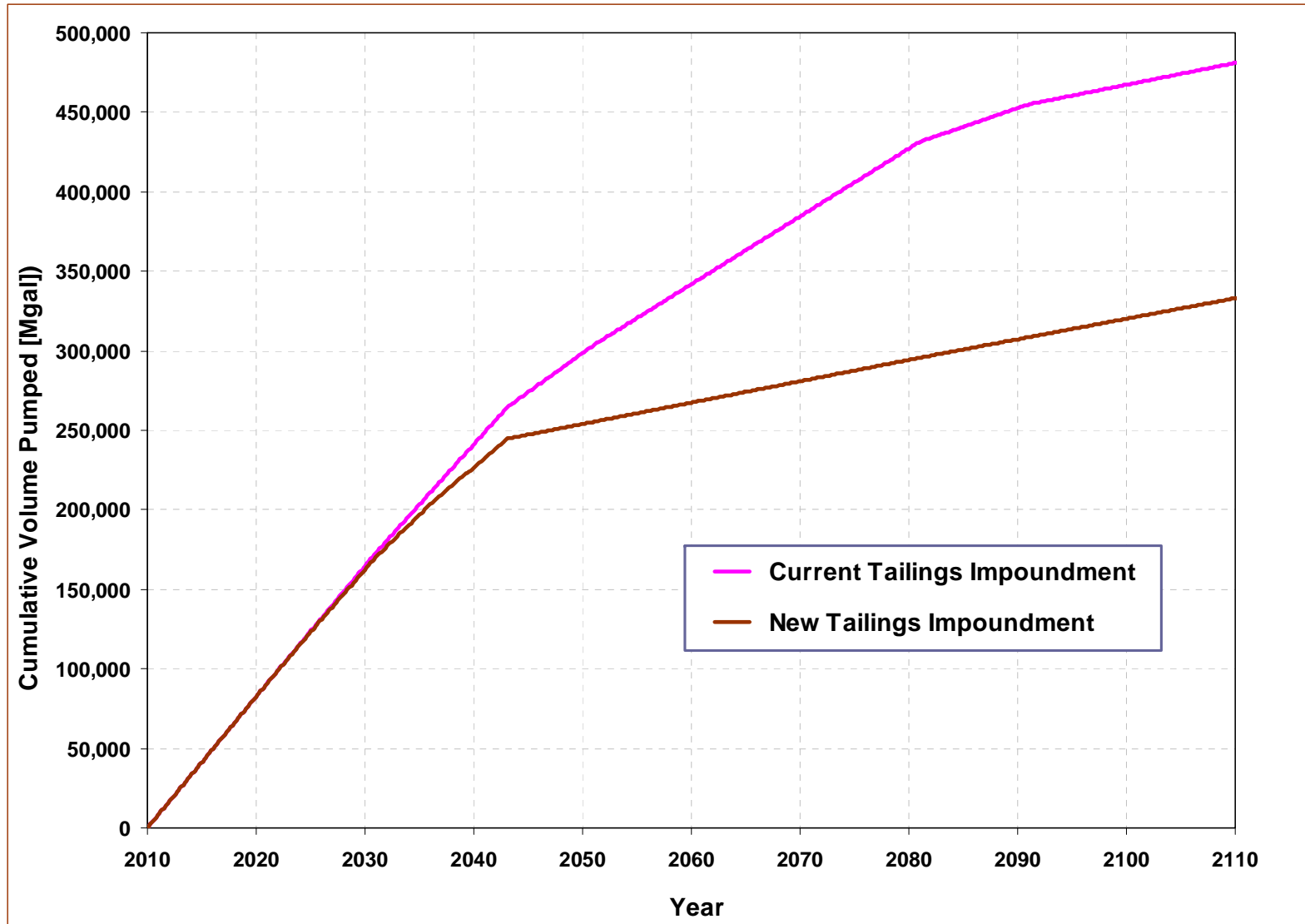
Sierrita's Current Well Pumping Rates



Pumping Rate Comparison






Long-Term Mitigation Pumping

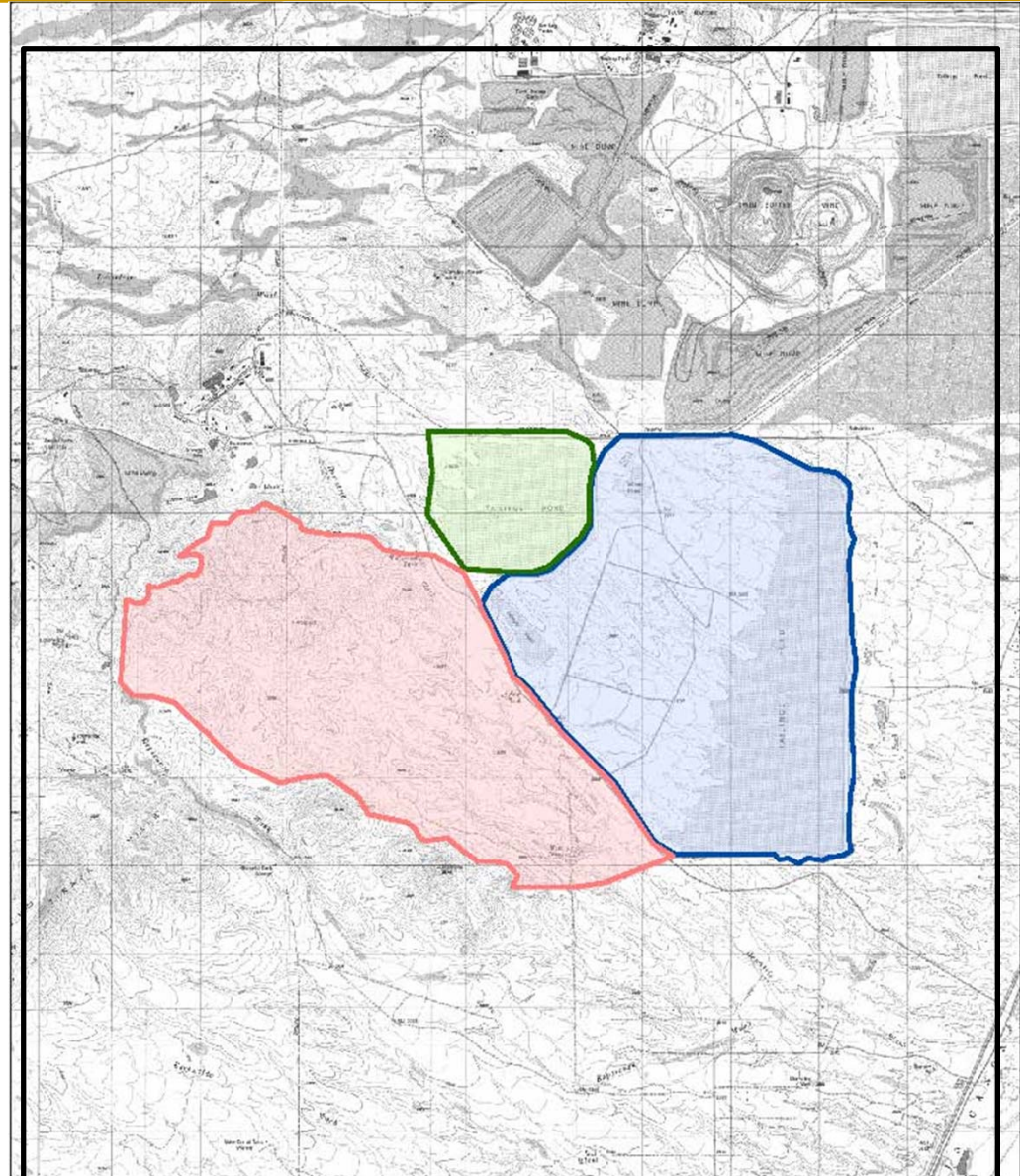


Proposed Location of New Tailings Impoundment

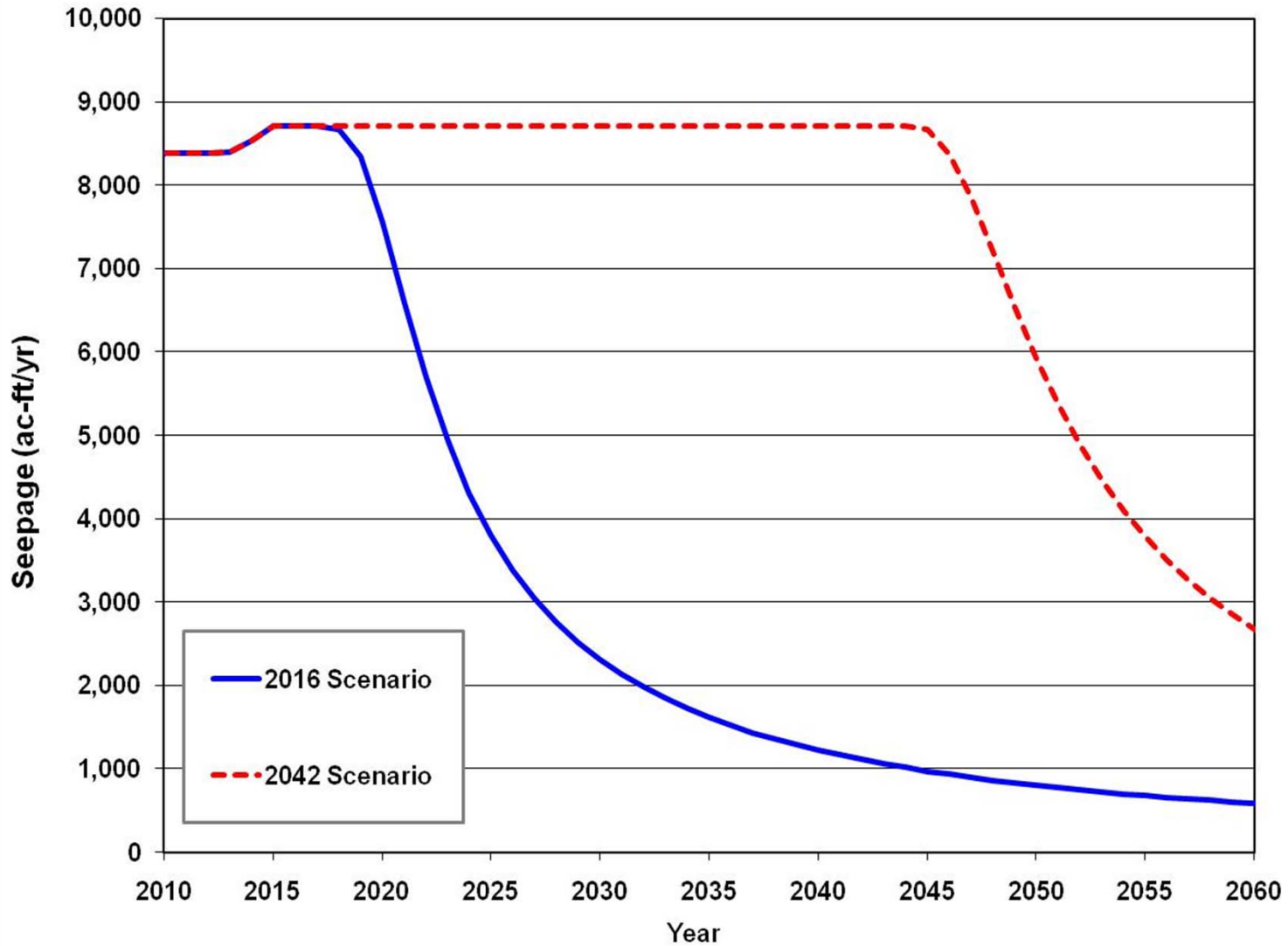


Legend

-  Sierrita Tailings Impoundment
-  Esperanza Tailings Impoundment
-  Proposed New Tailings Impoundment



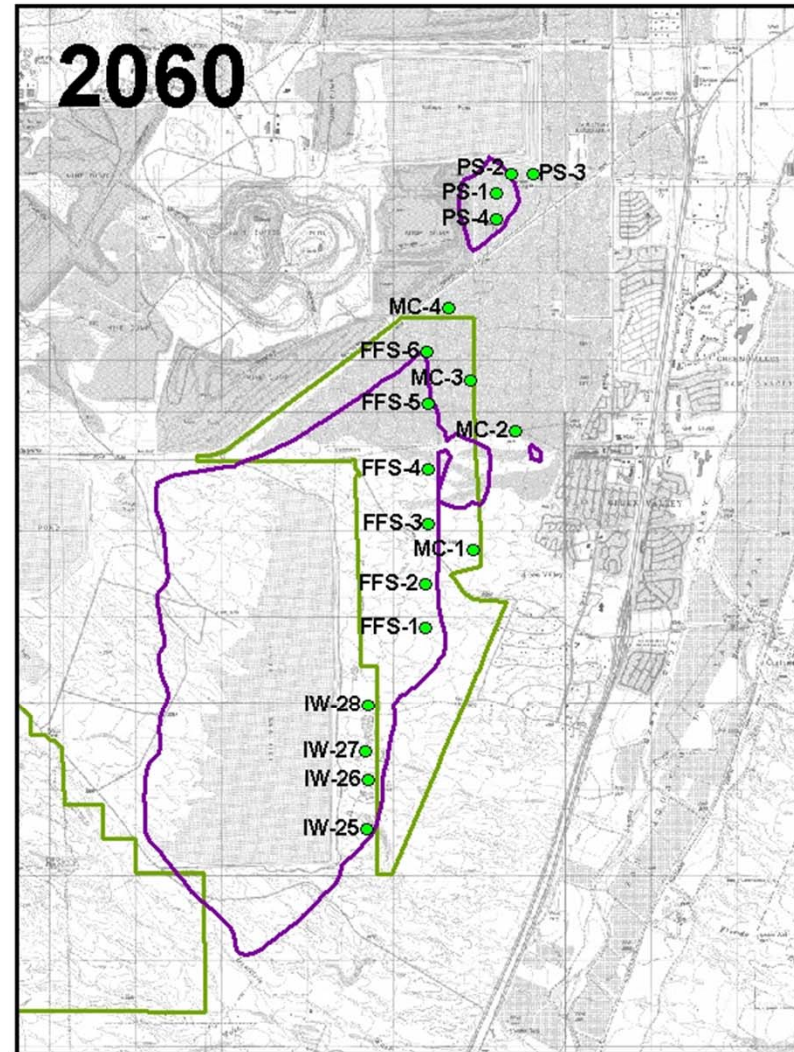
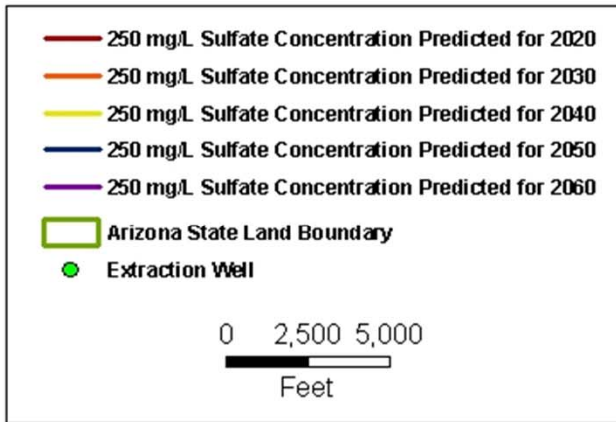
Modeled Seepage Rates for Sierrita Tailings Impoundment





Sulfate Concentrations Over Time

Alternative 5 Simulated 250 mg/L Sulfate Contour Over Time



Closing



- Use of technology to develop water balance
- Sustainability
 - Sulfate laden water replaces fresh water for mine
 - Reduces post mine life groundwater pumping and management
 - New modern tailings impoundment
 - Community benefit
- Sierrita Operations Website
 - <http://www.fcx.com/sierrita/home.htm>