Reclaimed Water Aquifer Storage & Recovery (ASR) Rio Rancho, New Mexico

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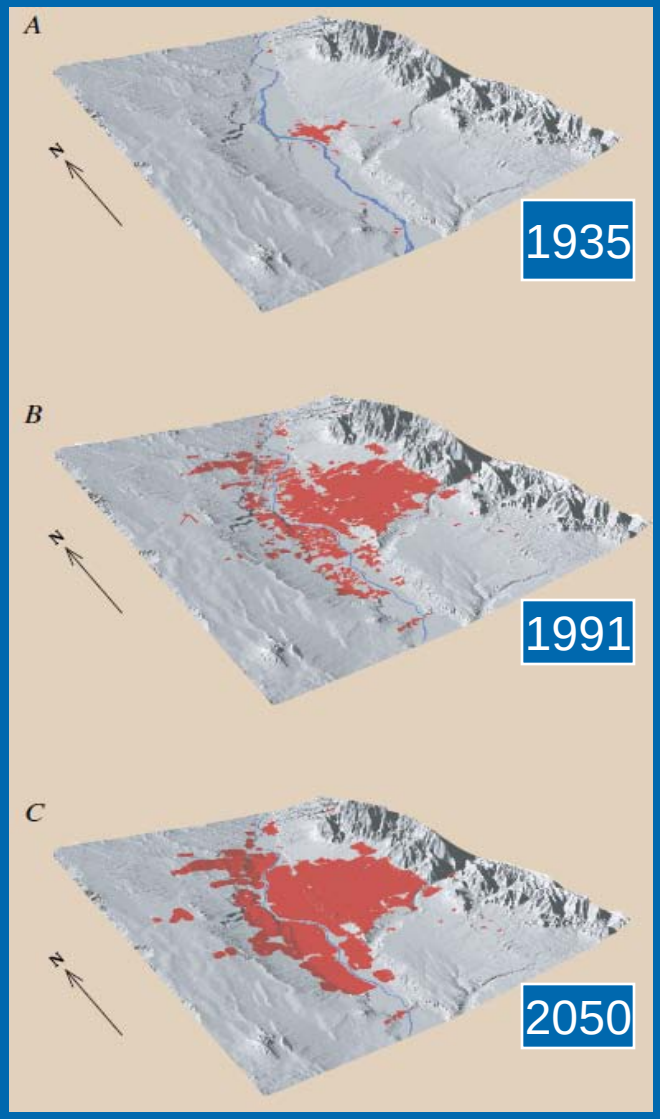
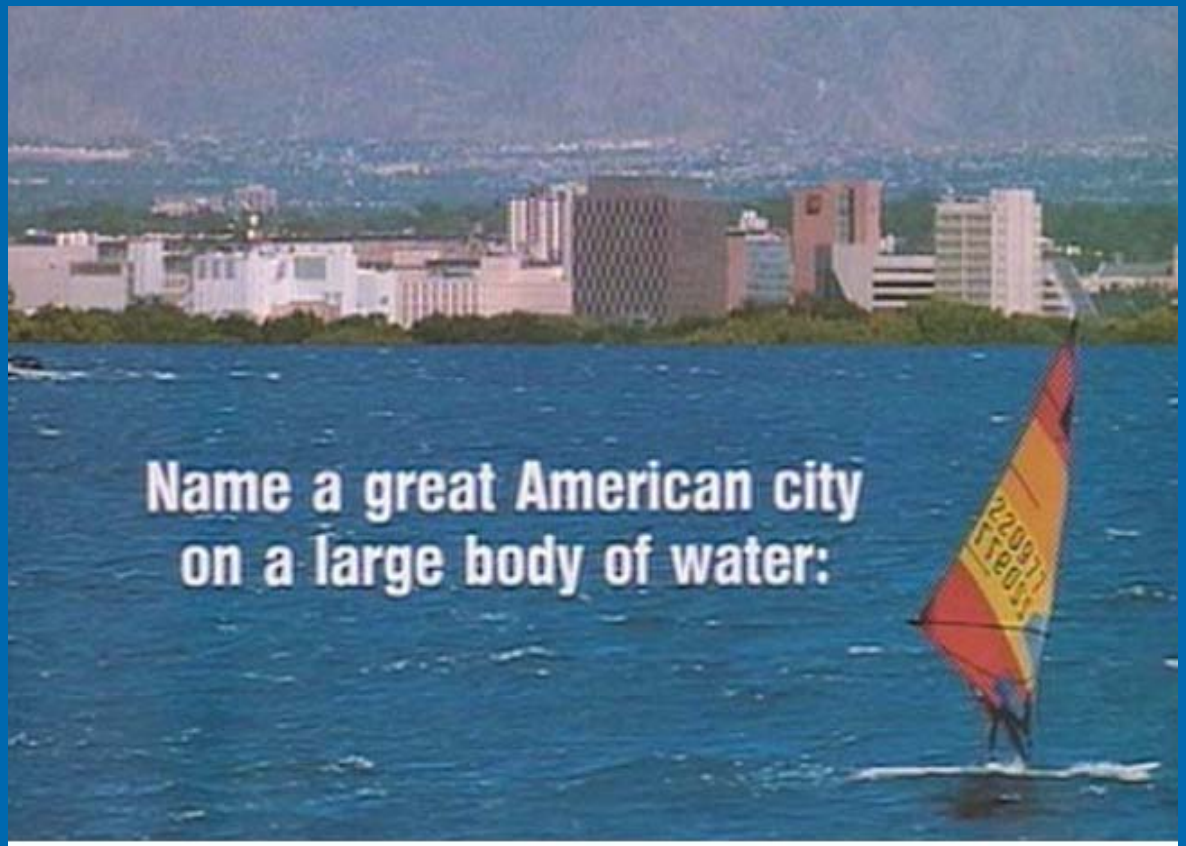
Presentation Outline

- Water Resource Limitations
- Advanced Water Treatment Pilots
- Aquifer Recharge Demonstrations
- Next Steps

The "Lake Superior" Myth



Source: U.S. Geological Survey (USGS)

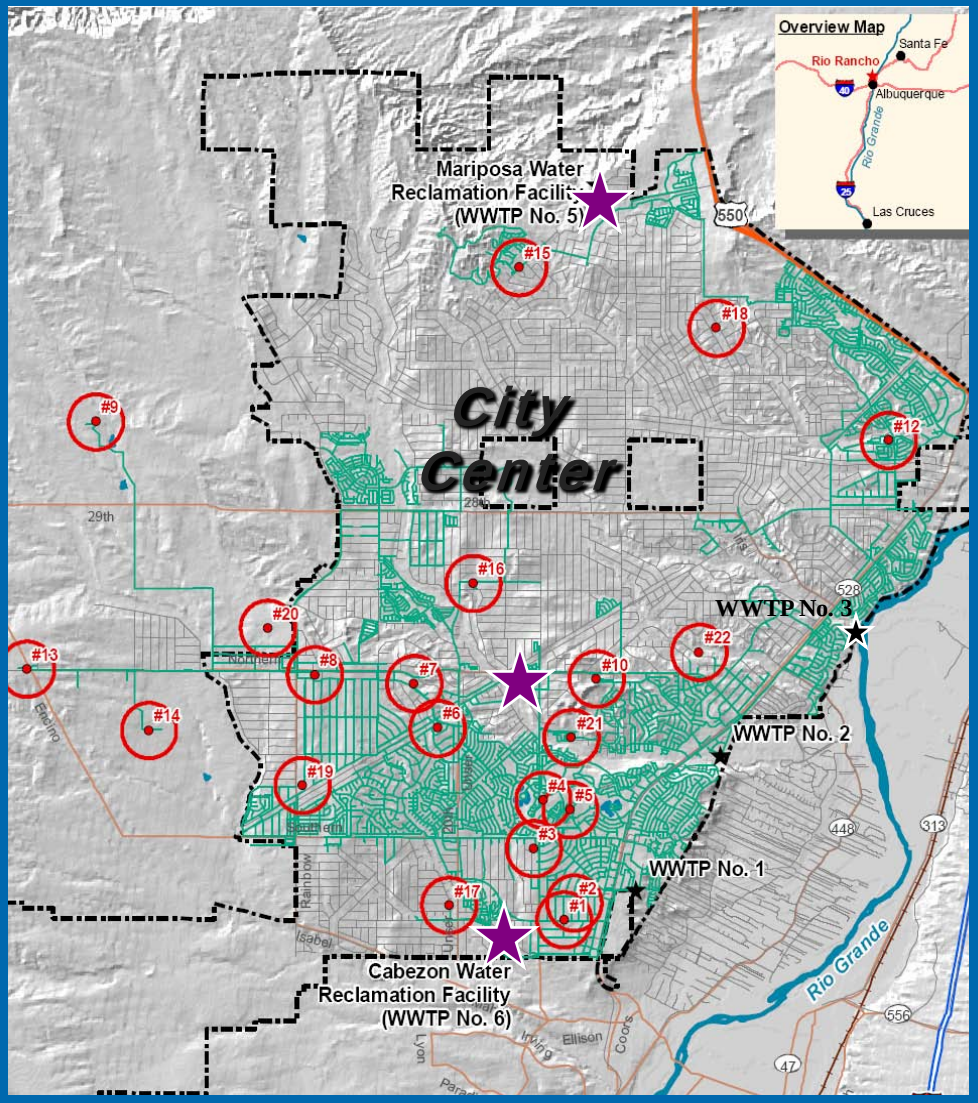


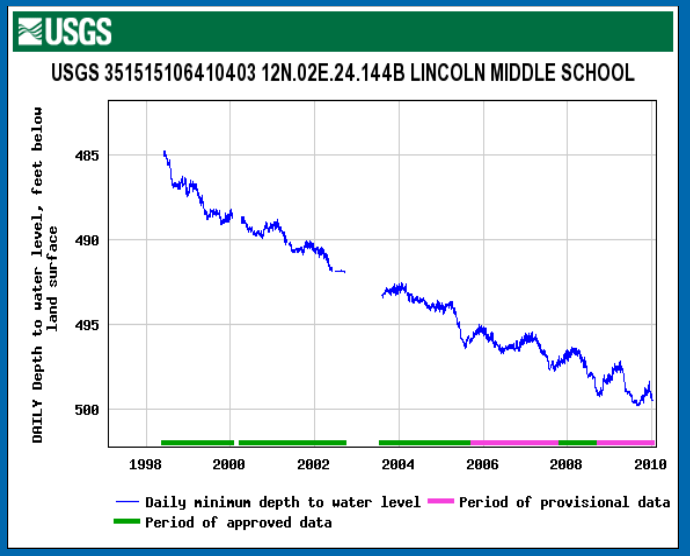
Albuquerque Living – October, 1984

City History

- 1960s - Bulk land subdivision of 91,000 acres by Rio Rancho Estates (AMREP)
- 1981- City founded, ~10,000 people
- 2010 - 75,000 people, highest growth rate in State
- 2030 - Annual growth rate projected to slow from current rate of 3.2 to 1.6%

Water Resource Management

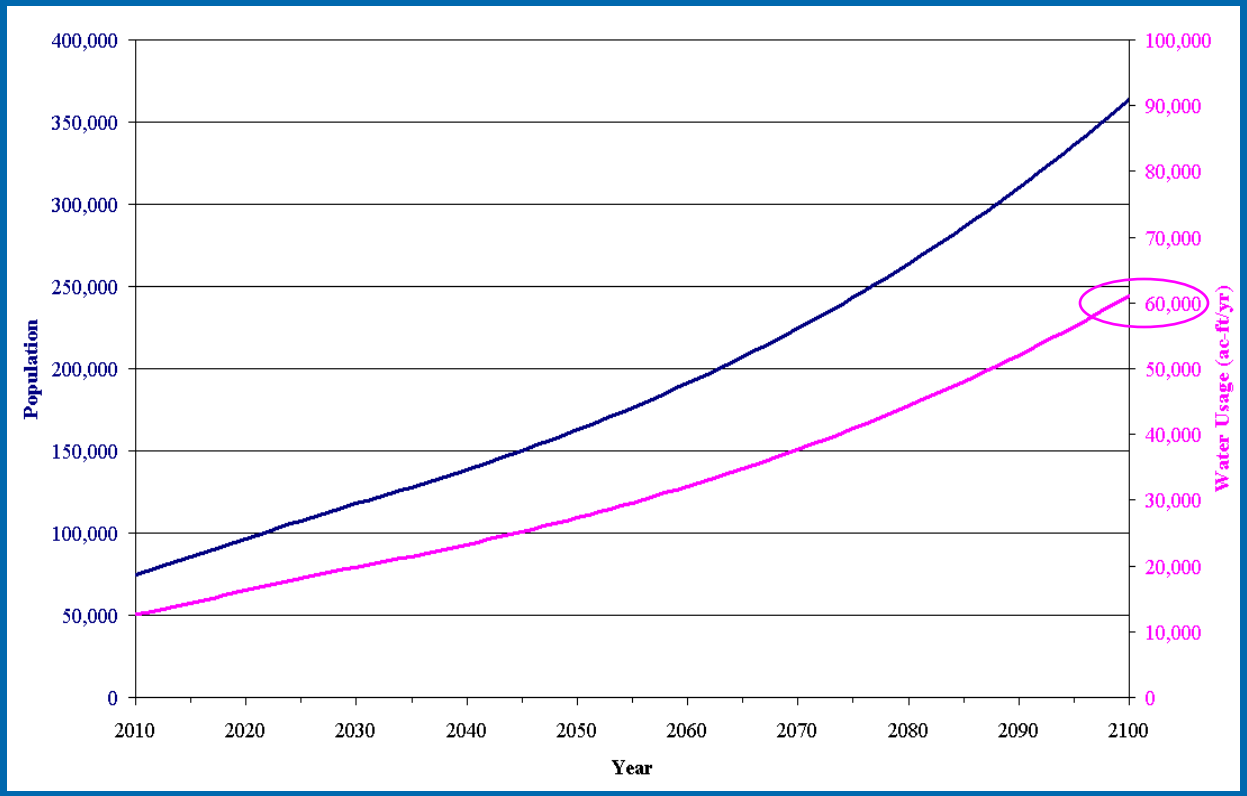




= Recharge Demonstration & Treatment Pilot Sites

Rio Rancho Population and Water Use Projections

- Population growth competes with existing water users for supplies.
- Combination of agricultural and inter-basin water right transfers, and new source development required.

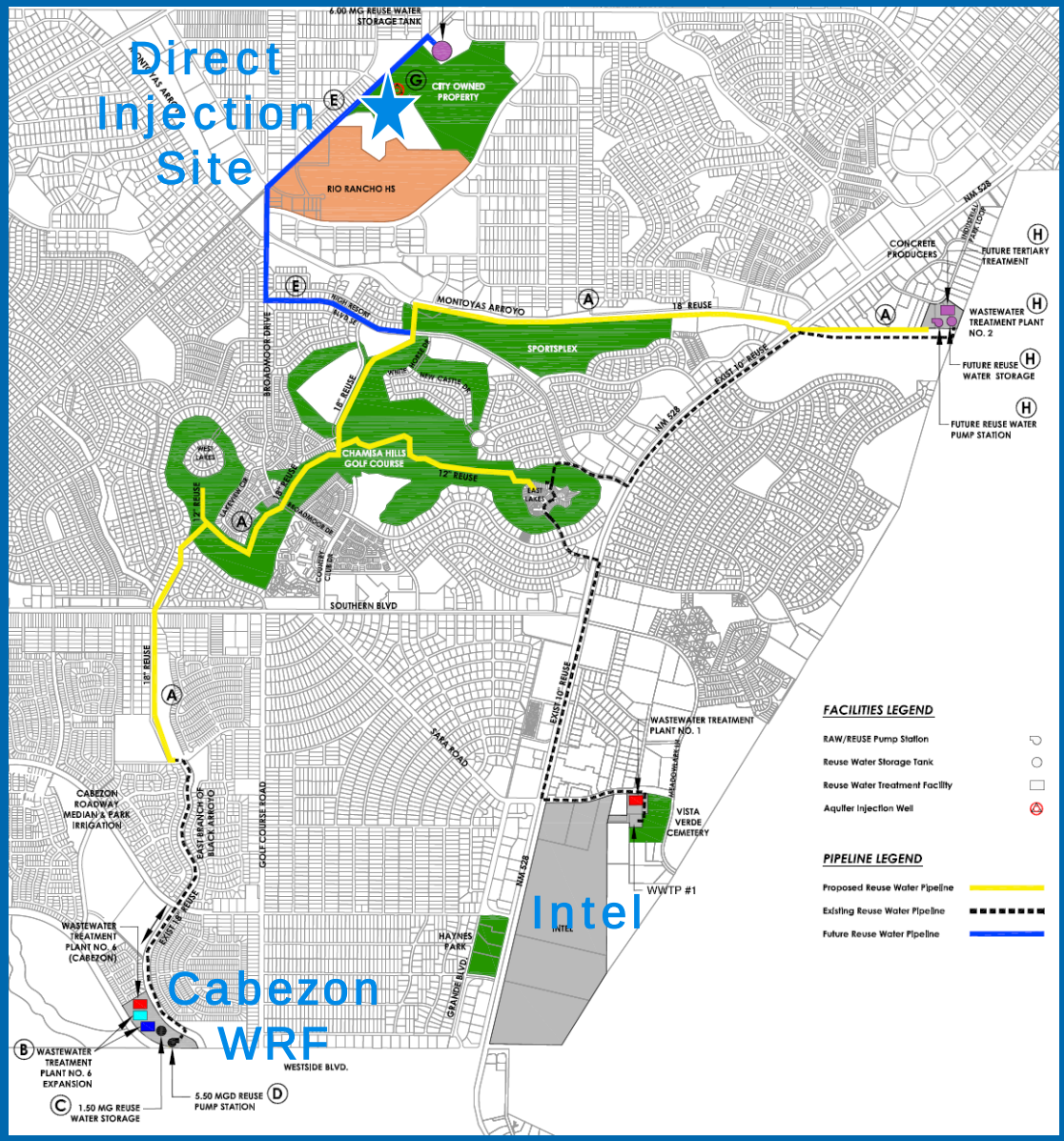


Why the Interest in Water Reuse and Aquifer Storage & Recovery?

- City Council Resolution 01-004 - Eliminate wastewater effluent discharges to Rio Grande
  - Ongoing compliance issue related to stringent arsenic standard (3.6 ppb, adopted by Sandia Pueblo)
- Water resource sustainability goals
  - Reduce rate of ground- and surface-water depletions while increasing withdrawals
  - Conjunctive management of all potentially available water sources to meet projected municipal demand

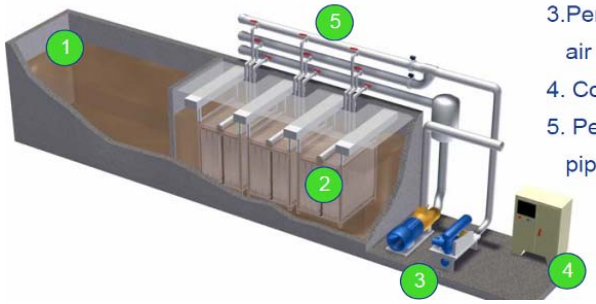
Water Reuse System Components

- Design Stage
  - Increase capacity at Cabezon WRF
  - Advance treatment for injection facility
  - Improve distribution to points of use
  - Above- and below-ground storage
- Challenges
  - Public perception
  - Financing
  - Permit compliance (OSE, NMED, NPDES)



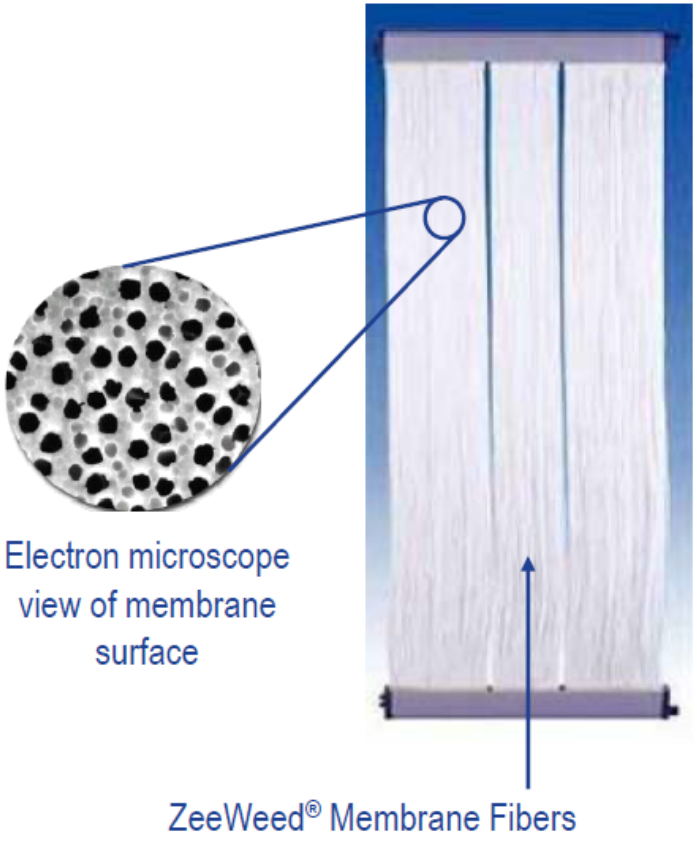
Advanced Treatment Studies
Cabezon Water Reclamation Facility

Membrane Bioreactors (MBRs)



1.Biological reactor
2.Membranes
3.Permeate pump & air blower
4. Control panel
5. Permeate & air piping

- Membrane fibers have billions of microscopic pores on the surface
- The pores form a barrier to impurities, while allowing pure water molecules to pass
- Water is drawn through the pores using a gentle suction



Electron microscope view of membrane surface

ZeeWeed® Membrane Fibers

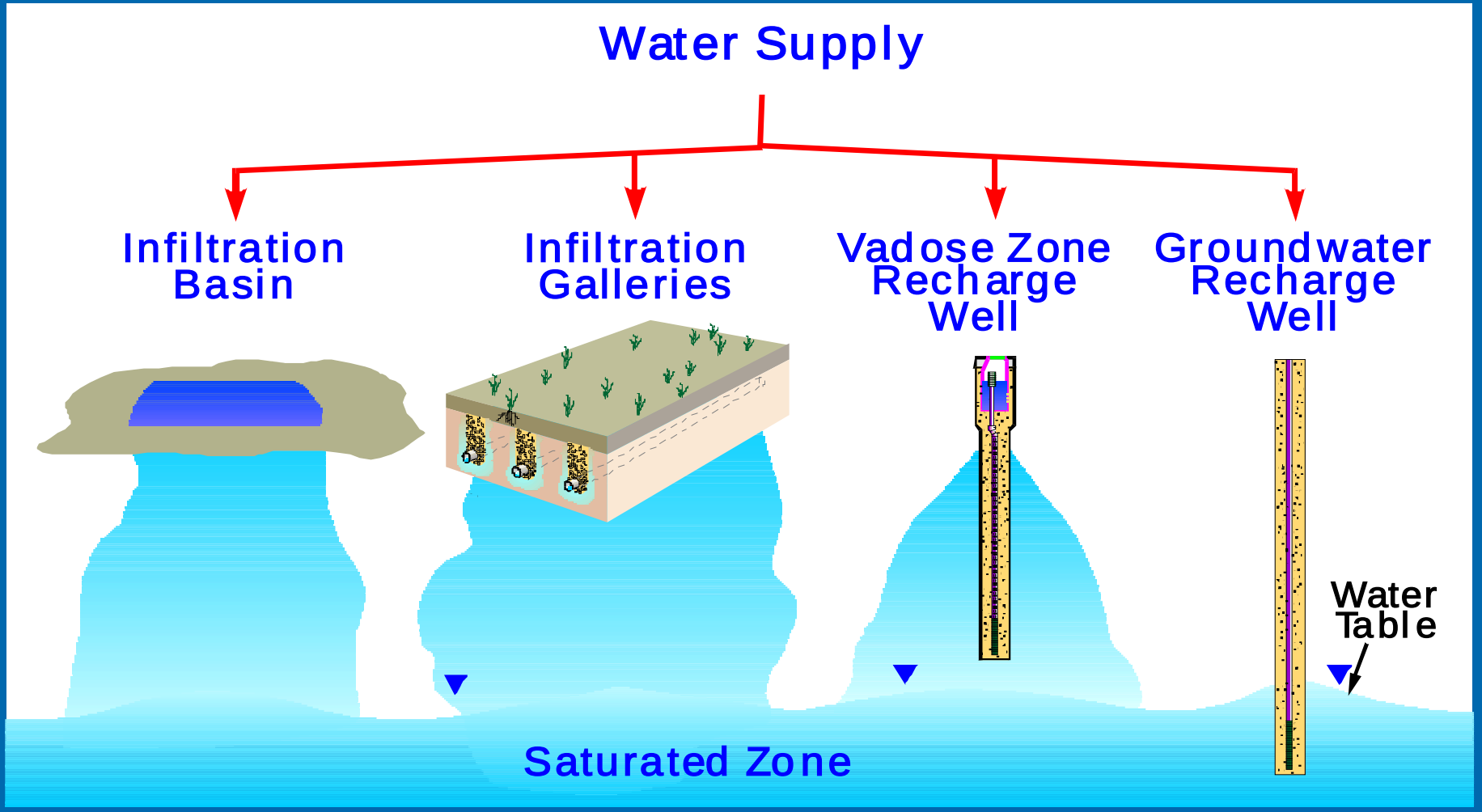
Advanced Oxidation Process (AOP)

Biologically Activated Carbon Assessment

MBR-AOP-BAC Treatment Process

- Conducting routine system checks and water quality sampling over 5-month period.
- Preliminary findings
  - MBR - excellent pathogen and solids removal, NMED Class 1A quality
  - AOP - Destruction of trace organics (EDCs / Pharmaceuticals / Personal Care Products) with bromate control.
  - BAC - Reduction of dissolved organic carbon, 1 to 3 mg/L attainable over long term, biologically stable water.
  - Treatment to NMED Most Stringent Enforceable Standards

Aquifer Recharge Methods

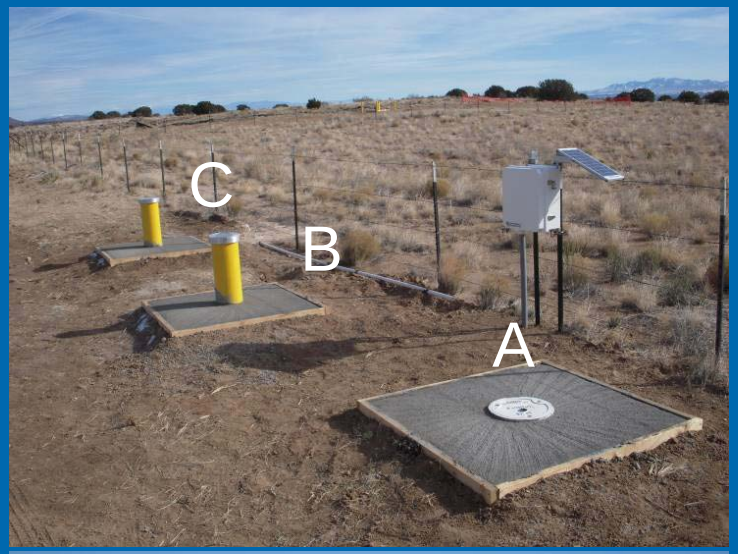


Mariposa WRF - Surface Infiltration Gallery Construction

- A single 10-inch distribution manifold feeds system
- Polyethylene chambers installed within 37 rows
- 2-acre footprint

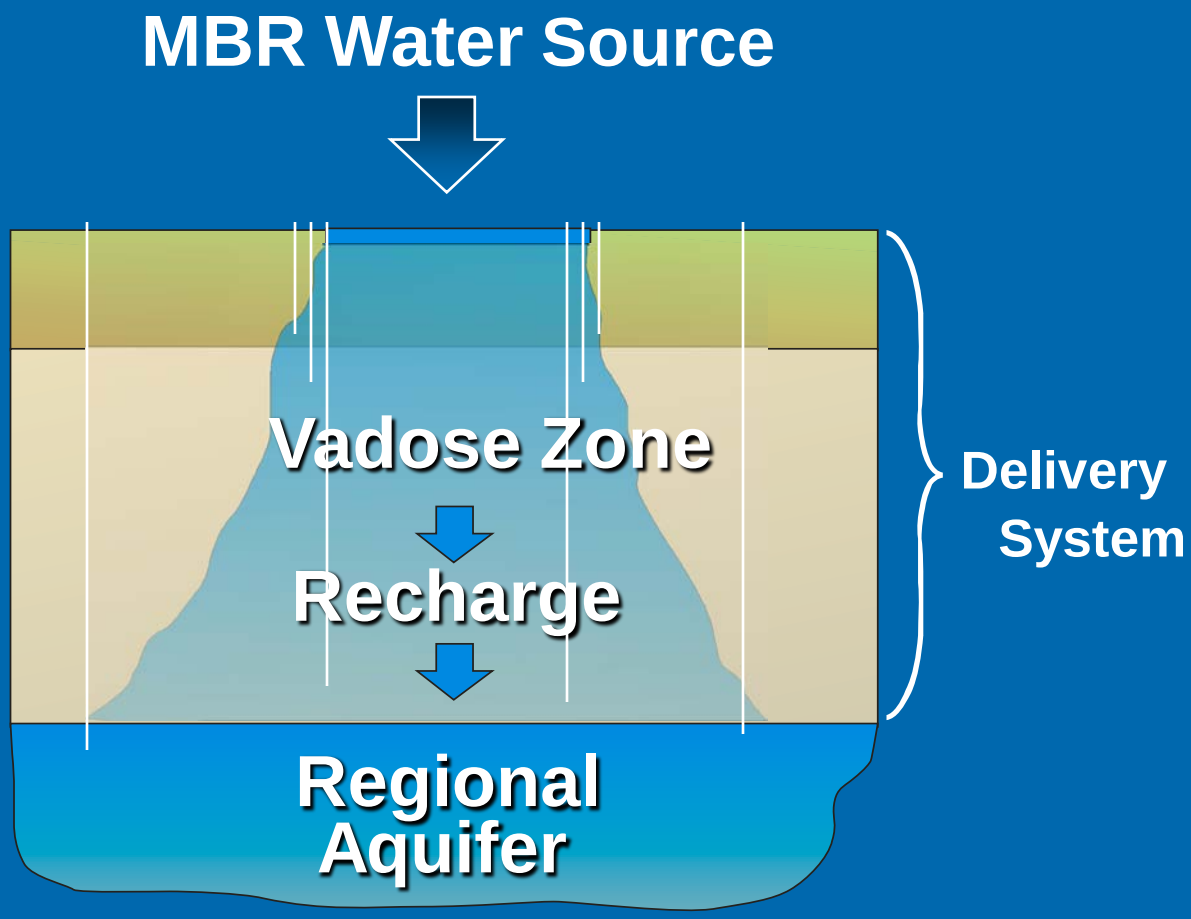
Recharge Monitoring Network

- ***Heat dissipation sensors (A)*** - soil-water retention characteristics and vertical water movement (0-50 ft).
- ***Suction lysimeters, tensiometers, temperature sensors (B)*** - water flux rate estimates (100 to 150 ft).
- ***Neutron Logging Access (C)*** - monitor movement of recharge wetting front *(0 to 460 ft)*.
- ***Monitor wells*** - collection of groundwater level and quality data (460 to 480 ft.

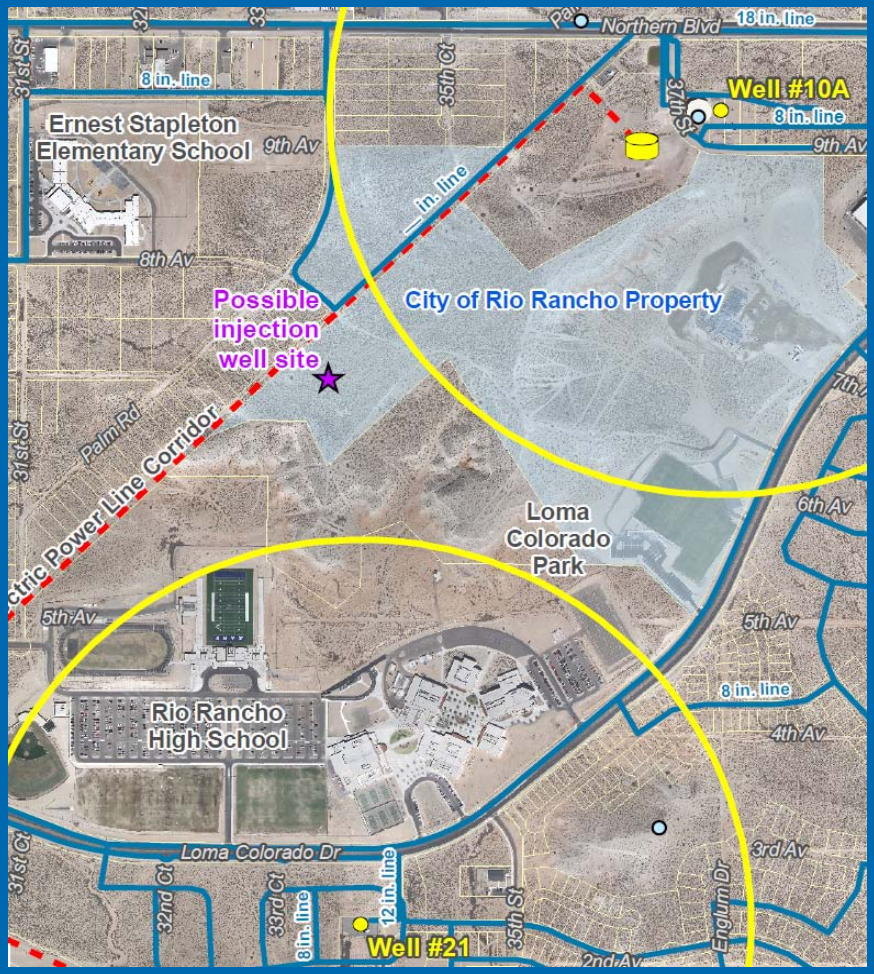


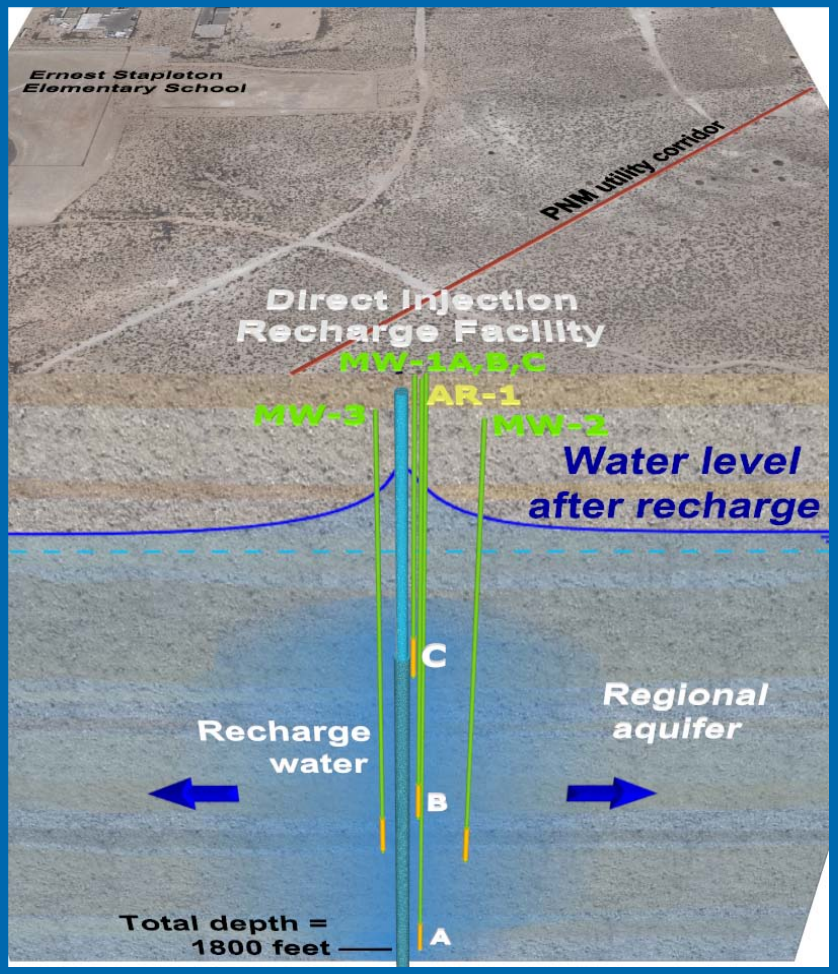
Recharge Monitoring Network

- Offset Jemez River depletions where water rights difficult to obtain.
- Soil-aquifer treatment benefits



Direct Injection Aquifer Recharge Demonstration





Nearby wells monitored to ensure water quality is maintained

Next Steps

- Start-up Mariposa WRF
  Unknown, currently insufficient wastewater influent source
- Complete Cabezon WRF treatment pilot (April 2010)
- Initial testing of direct injection facility (Fall 2010)
- Discharge permitting for direct injection with purified, reclaimed water source (2011)

Thank You!