Aquifer Recharge & Recovery

Treasure Valley CAMP – 11/10/10

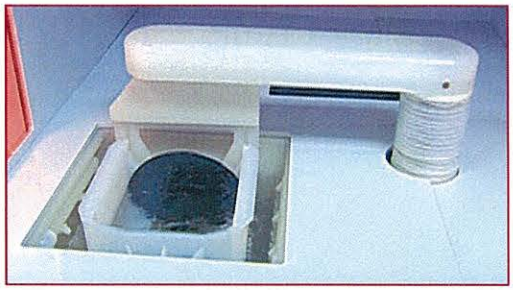
©2010 Micron Technologies, Inc. All rights reserved. Products are warranted only to meet Micron's production data sheet specifications. Information, products, and/or specifications are subject to change without notice. All information is provided on an "AS IS" basis without warranties of any kind. Dates are estimates only. Drawings are not to scale. Micron and the Micron logo are trademarks of Micron Technology, Inc. All other trademarks are the property of their respective owners.

Micron Water Usage

A stable supply of high-quality water is a critical raw material in the semiconductor manufacturing process

Micron Water Use - Industrial

- Cleaning & rinsing silicon wafers
  - Cleans & rinses occur numerous times while building circuitry on wafers i.e., process is water intensive
  - Fab requires ultrapure water to minimize risk of contamination
- Facilities systems (fire suppression, boilers, scrubbers, cooling)



Micron Water Sources

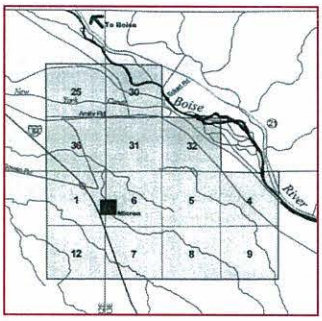
Groundwater
- 3 onsite wells
- Industrial

River Water
- Irrigation
- Recharge
- Industrial

Municipal Water
- Potable
- Industrial

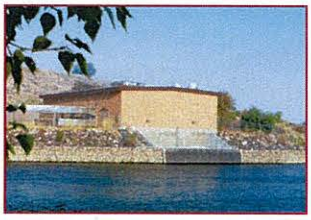
- Reclaim/Reuse
- 45-70% UPW

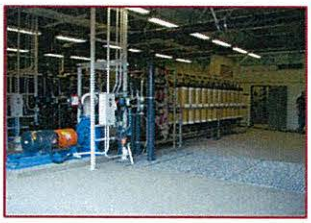
Area Groundwater History



- IDWR established Southeast Boise Groundwater Management Area in 1994 to stop decline in groundwater levels
  - No new water rights granted without adequate mitigation
- Reinforced Micron's interest in stabilizing the area's groundwater supply
- Micron developed a conceptual plan for an aquifer recharge & recovery (ARR) project in 1995

Micron's ARR Conceptual Plan



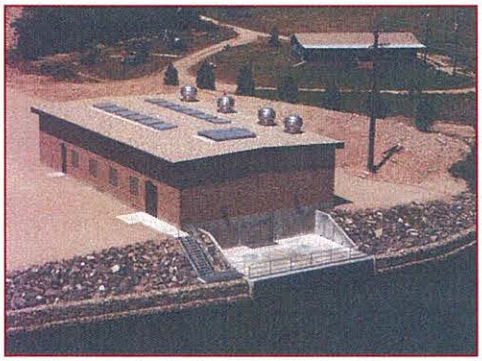


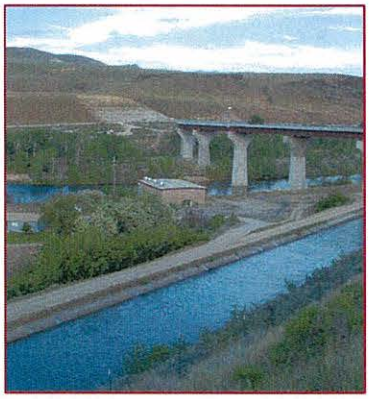
- Acquire Boise River surface water rights
  - Irrigation, aquifer recharge, and industrial use
- Build a pump station at the Boise River and pipeline to site
- Treat surface water to drinking water standards
- Build & operate an injection well
- Technical studies
  - Computer model of aquifer
  - Geochemical compatibility of river water and local groundwater

ARR Project Water Rights

- Natural flow Boise River rights through annexation into Nampa & Meridian Irrigation District
- Bureau of Reclamation storage rights in Anderson Ranch Reservoir
  - 3,000 acre-feet (shared with Simplot)
  - Obtained by trading ~6,000 acre-feet of Lucky Peak storage water
- Boise River permit for flood control releases
  - When available (typically 5 weeks per year)

ARR Boise River Pump Station



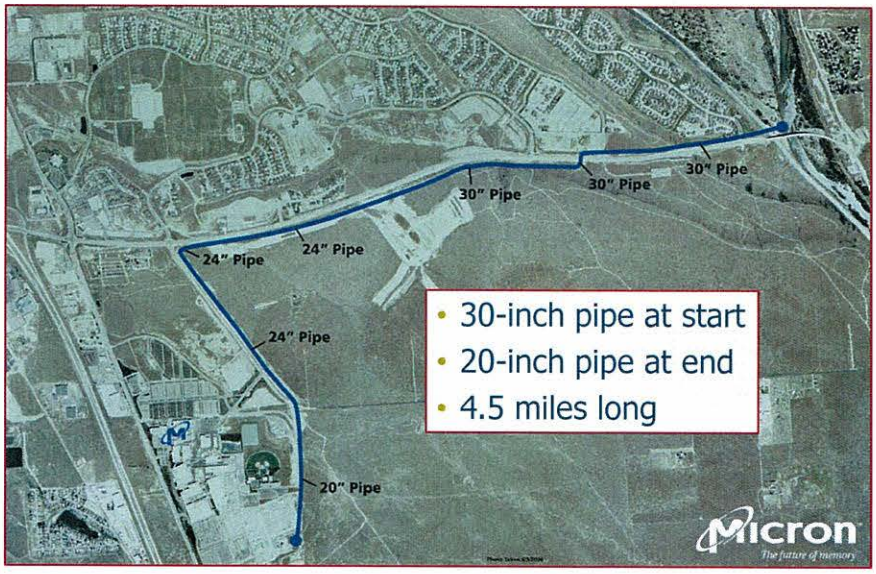


Constructed in 1998

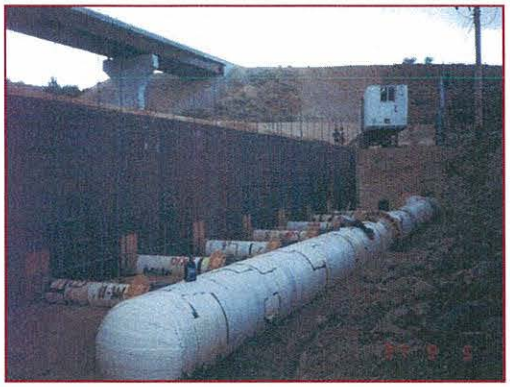
ARR Boise River Pump Station

- Design capacity is ~ 26,000 gpm
- Co-Owned
  - Micron, Simplot & Surprise Valley (50%)
  - United Water (50%)
- Equipment includes a moving screen two 200-hp, and two 400-hp pumps
- 170 psi is needed to lift water to MTI's river water treatment plant

ARR Pipeline



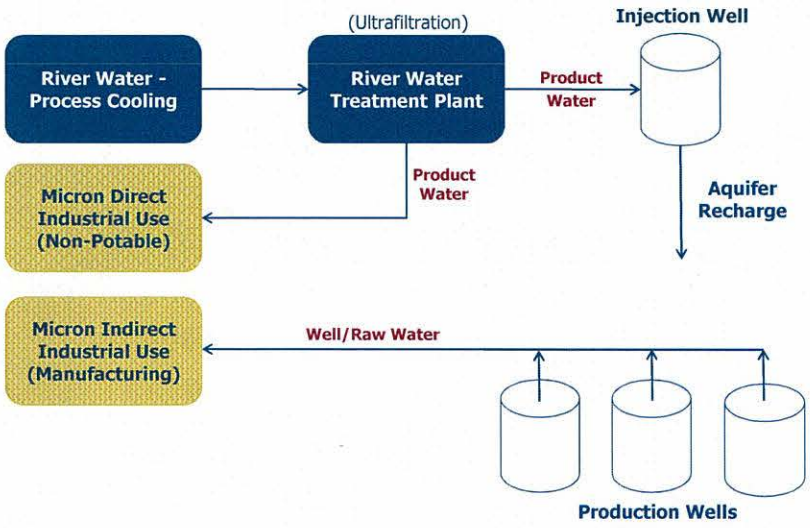
ARR Pipeline



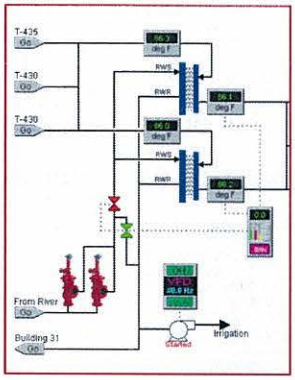
Pump manifold

Two 30-inch pipelines

Micron ARR Overview

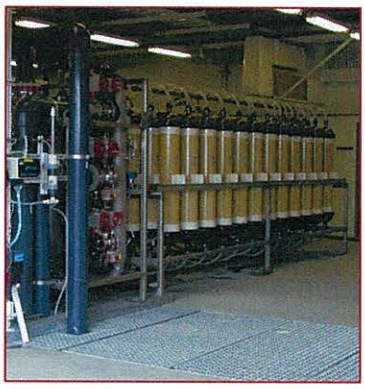


River Water Cooling of Process Water



- Collaborative effort with Idaho Power
- Pump cold (45-60 °F) river water to site
- Use in heat exchanger to cool warm (87 °F) process water
- Significant reduction in energy consumption achieved

River Water Treatment



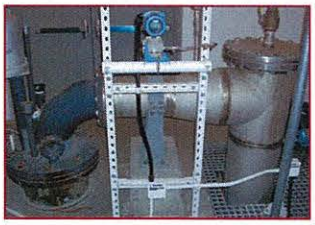
- Water is treated via ultrafiltration to remove particles and micro-organisms prior to recharge and industrial use
- Treatment performance
  - Drinking water standards
  - Porous membrane that rejects molecules > 0.01 µ (coliform, giardia, cryptosporidium, some viruses)
  - Eliminates the need for chlorine disinfection
  - Turbidity < 0.1 NTU

River Water Treatment

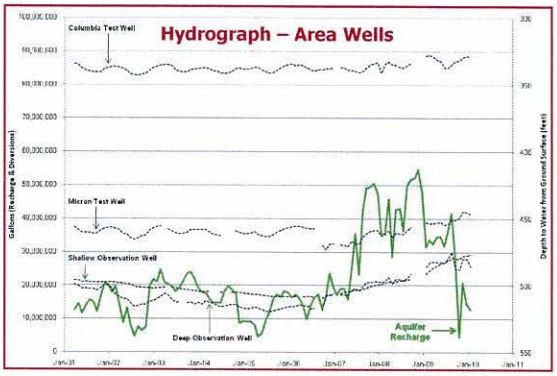
- Two 1-Mgd ultrafiltration membrane skids
  - Hollow fibers are bundled into membrane elements
  - One cross-flow system with inside-out flow (2 stages)
  - One dead-end flow system with outside-in flow
- Routine backwashes to force particles out of membrane
- Periodically perform a clean-in-place to remove fouling

Underground Injection Well

- Well is drilled to ~1,200 feet BGS
- Unique down-hole control valve
- Underground Injection Control Permit issued by IDWR
  - Injection capacity ~ 6,000 gpm
  - Sample quarterly for total coliform and total dissolved solids, report results to IDWR annually
  - Continuously monitor turbidity and temperature



- Additional monitoring
  - Measure and report groundwater levels at 7 wells to IDWR monthly
  - Quarterly water quality sampling of 6 Micron wells (BMP)

Goals Achieved with ARR

- Local aquifer water levels have stabilized
- Augmented the local groundwater supply
- Maintained existing groundwater quality