


A dynamic splash of water with numerous bubbles and droplets, rendered in shades of light blue and white, occupies the lower half of the slide. The splash is captured in motion, with water droplets trailing off to the right. The background is a clean, light blue gradient.

Nitrate Treatment **It's Never Easy**

CANV AWWA Spring Conference
Sacramento
March 27th 2019

What Am I In For?

- Nitrate treatment overview
 - Project overview
 - Technical approach
 - Case studies of participating utilities
 - Lessons learned
- 

Nitrate Treatment

Non-Treatment Options

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graph TD; A[Non-Treatment Options] --> B[Well Abandonment]; A --> C[Wellhead Protection and Land Use Management]; A --> D[Alternative Sources and Source Modification]; A --> E[Blending];
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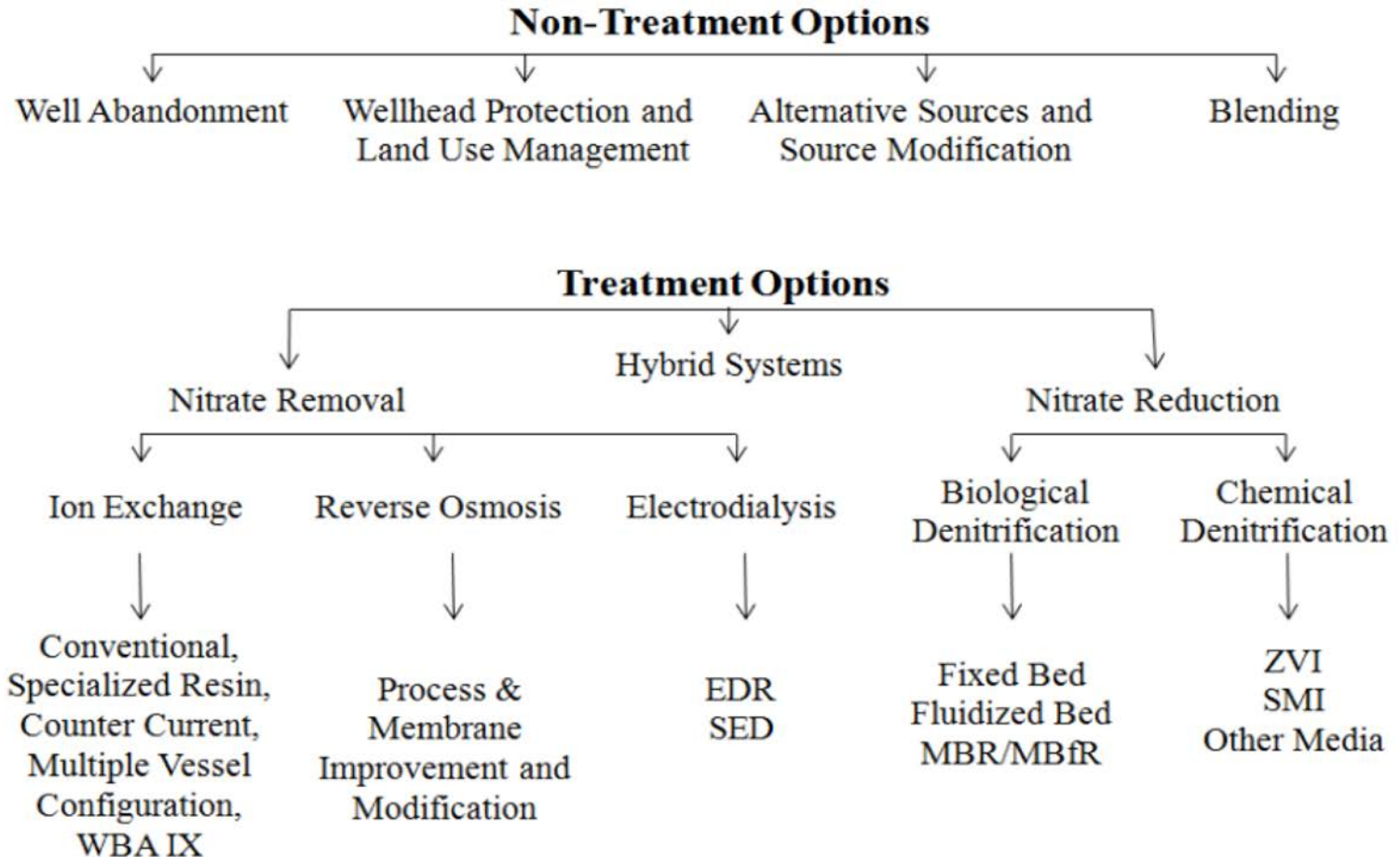
Well Abandonment

Wellhead Protection and
Land Use Management

Alternative Sources and
Source Modification

Blending

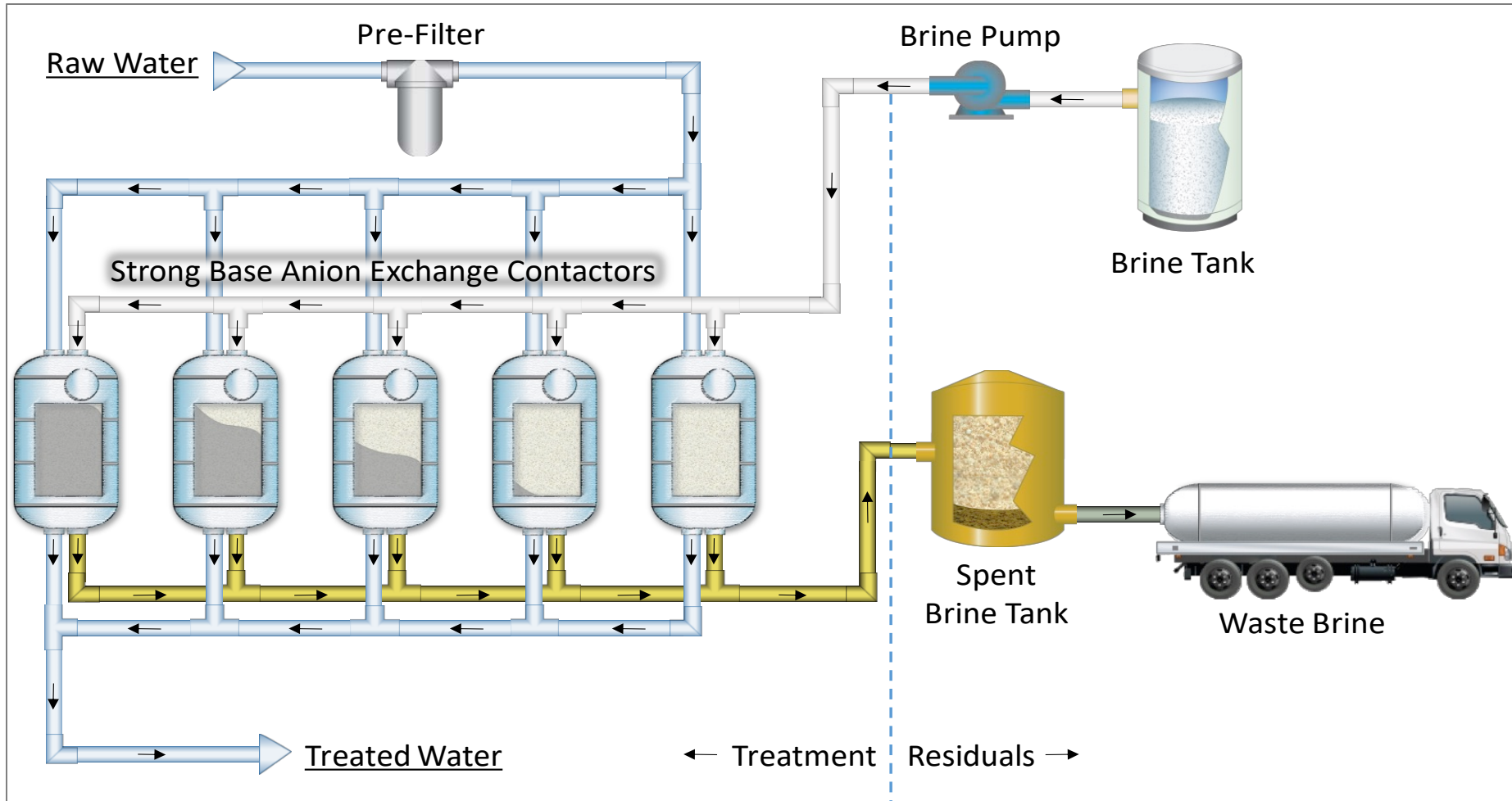
Nitrate Treatment

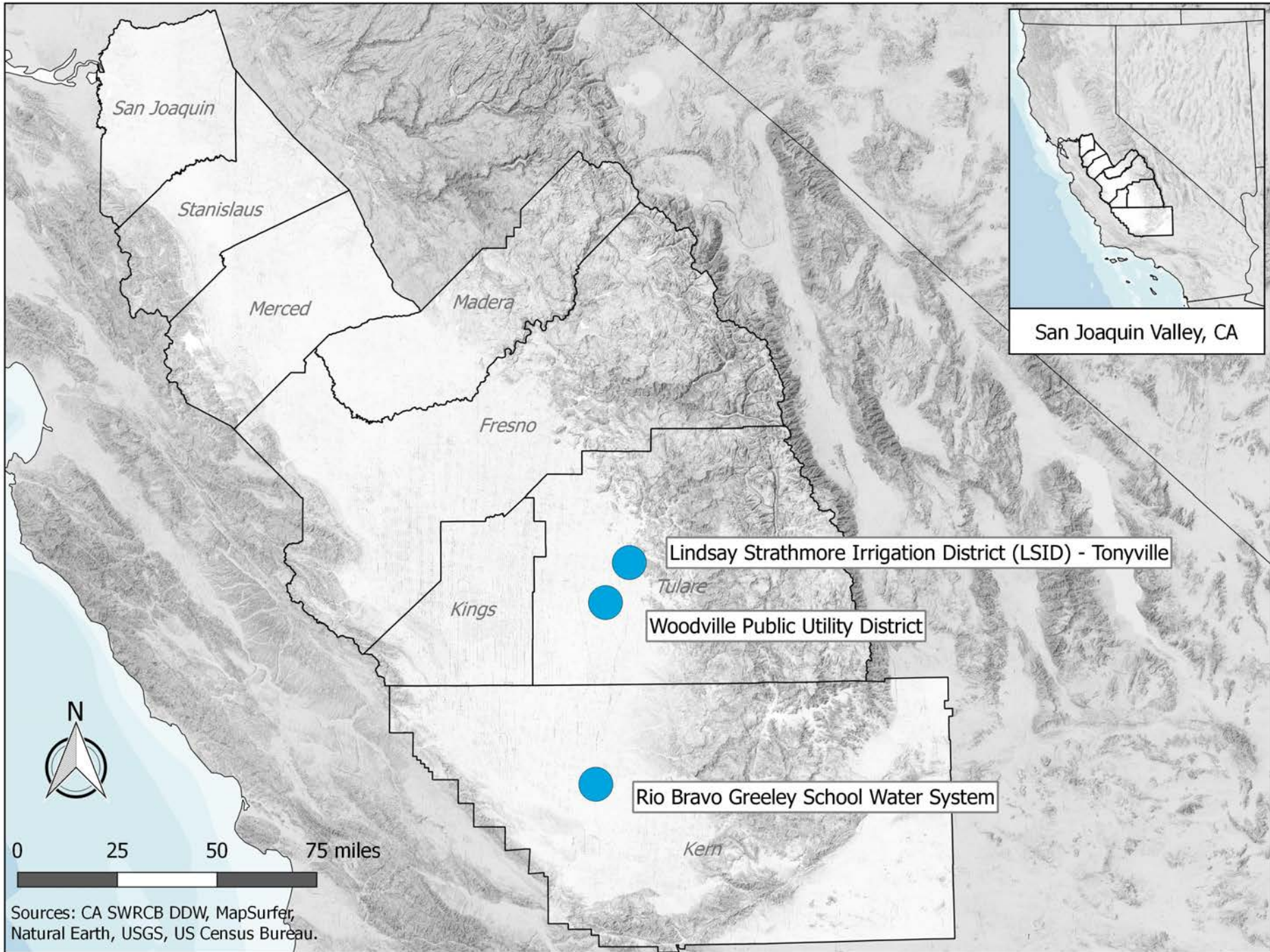


Proposition 50 Project - Objectives

- \$5M in grant funds to install and operate strong base anion exchange (SBA-IX) systems over a three-year period
- Minimize O&M costs by sharing:
 - Operations
 - Brine disposal
 - Salt delivery
- Reduce waste brine disposal costs:
 - Collection
 - Administration
 - Purchasing agreements with disposal providers

SBA-IX Overview





San Joaquin Valley, CA

Lindsay Strathmore Irrigation District (LSID) - Tonyville

Woodville Public Utility District

Rio Bravo Greeley School Water System

Sources: CA SWRCB DDW, MapSurfer, Natural Earth, USGS, US Census Bureau.

Project Approach

- Install at least three strong base anion exchange (SBA-IX) treatment systems in disadvantaged communities
 - Treatment systems provided by Ionex SG
 - Ionex SG would provide oversight of necessary site improvements in a design-build type approach
- Systems operated for three years to validate the consolidated management approach and inform future solutions

Project Approach - Take 2

- IonexSG filed for bankruptcy in late 2018
 - Resulted in need to specify equipment and engineer site improvements
- Specification package intended to develop 'boiler plate' language and be easily modified to benefit other utilities
- Site visits and operational data review identified both concerns and opportunity for operational cost savings
- A deeper dive into the water quality details of the participating utilities revealed...it's not just nitrate

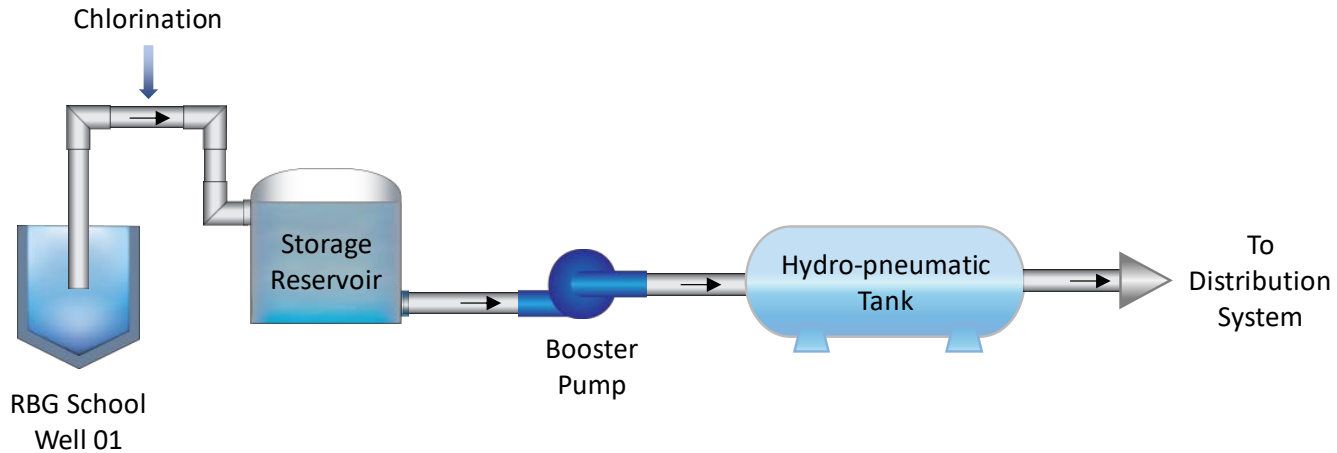
System Improvements

Rio Bravo Greeley School

- Population - 887, connections - 16
- Supplied by a single well
 - Well 01 - 300 gpm capacity
- Bottled water has been provided since August 2015 which corresponds with the time the nitrate MCL was exceeded
- Nitrate concentrations have remained between 11-13 mg/L as NO₃
- No other known water quality challenges until the first 1,2,3-TCP (TCP) compliance sample results were reported

System Improvements Rio Bravo

Current System Configuration



System Improvements Rio Bravo



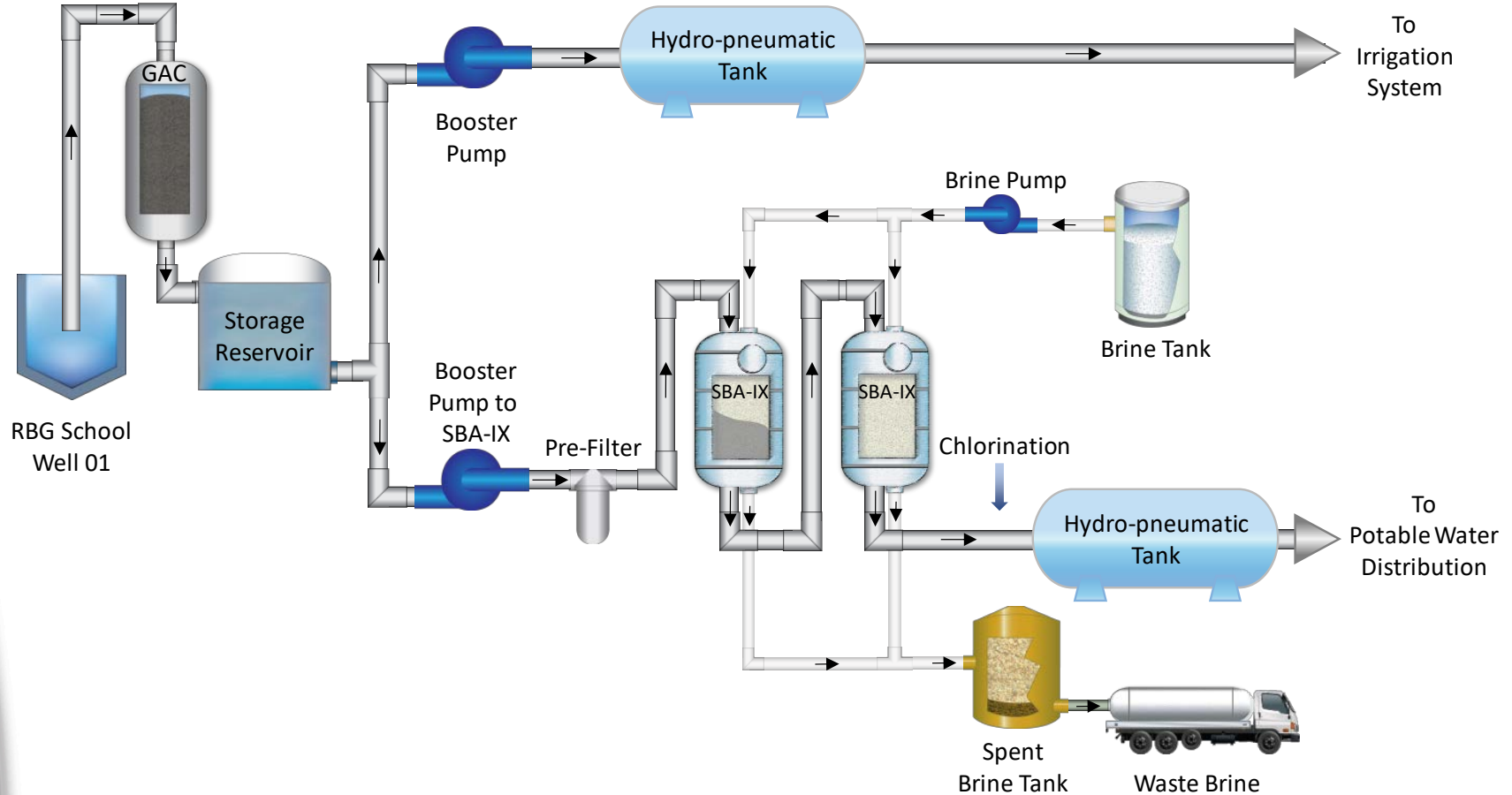
System Improvements

Rio Bravo

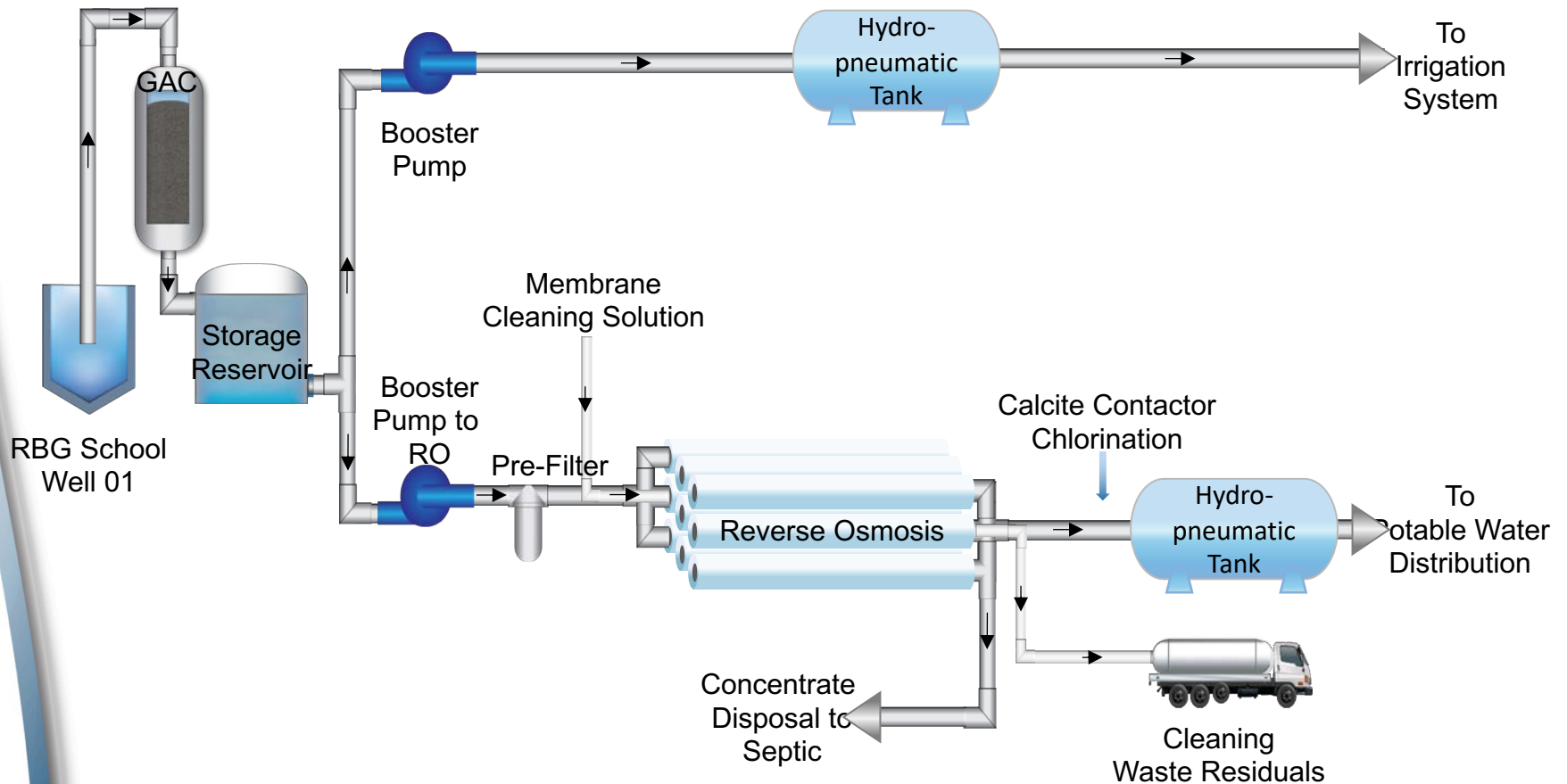
- Vast majority of water production is for non-potable purposes
 - Treating only potable supply greatly reduces O&M
 - Cross connection control investigation showed significant pipeline improvements necessary
- Challenging design questions result of the potential of nitrate 'sloughing' from GAC
 - Full- vs. partial flow treatment
 - Order of GAC in process

System Improvements Rio Bravo with SBA-IX

Proposed System Configuration



System Improvements Rio Bravo Reverse Osmosis



System Improvements Rio Bravo

- Unique challenges
 - Project funding did not include:
 - GAC treatment or media replacement
 - Pipeline improvements
 - Well pump replacement
 - Second hydropneumatic tank
 - Corrosion analysis showed SBA-IX could have detrimental impacts
 - RO discharge to septic
 - Permitting
 - Discharge volume
 - Shifting to RO appears to be the right solution- but limits ability to test consolidated management approach

System Improvements

LSID-Tonyville

- Contaminants: Nitrate, perchlorate, and arsenic
- Primary Improvements
 - SBA-IX for nitrate, arsenic, and perchlorate removal
- Additional Site Improvements
 - Limited site work

System Improvements

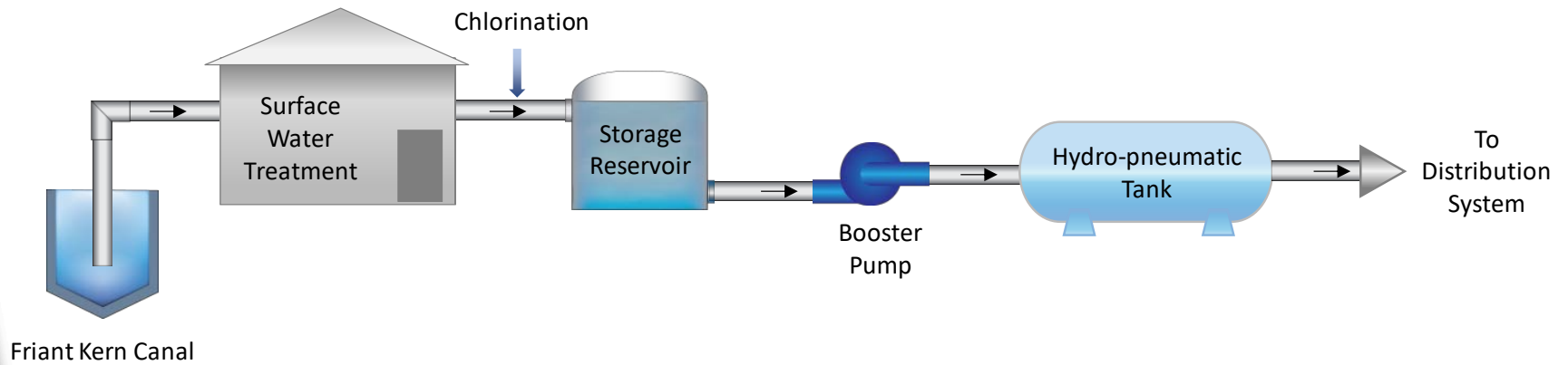
LSID – Tonyville



System Improvements

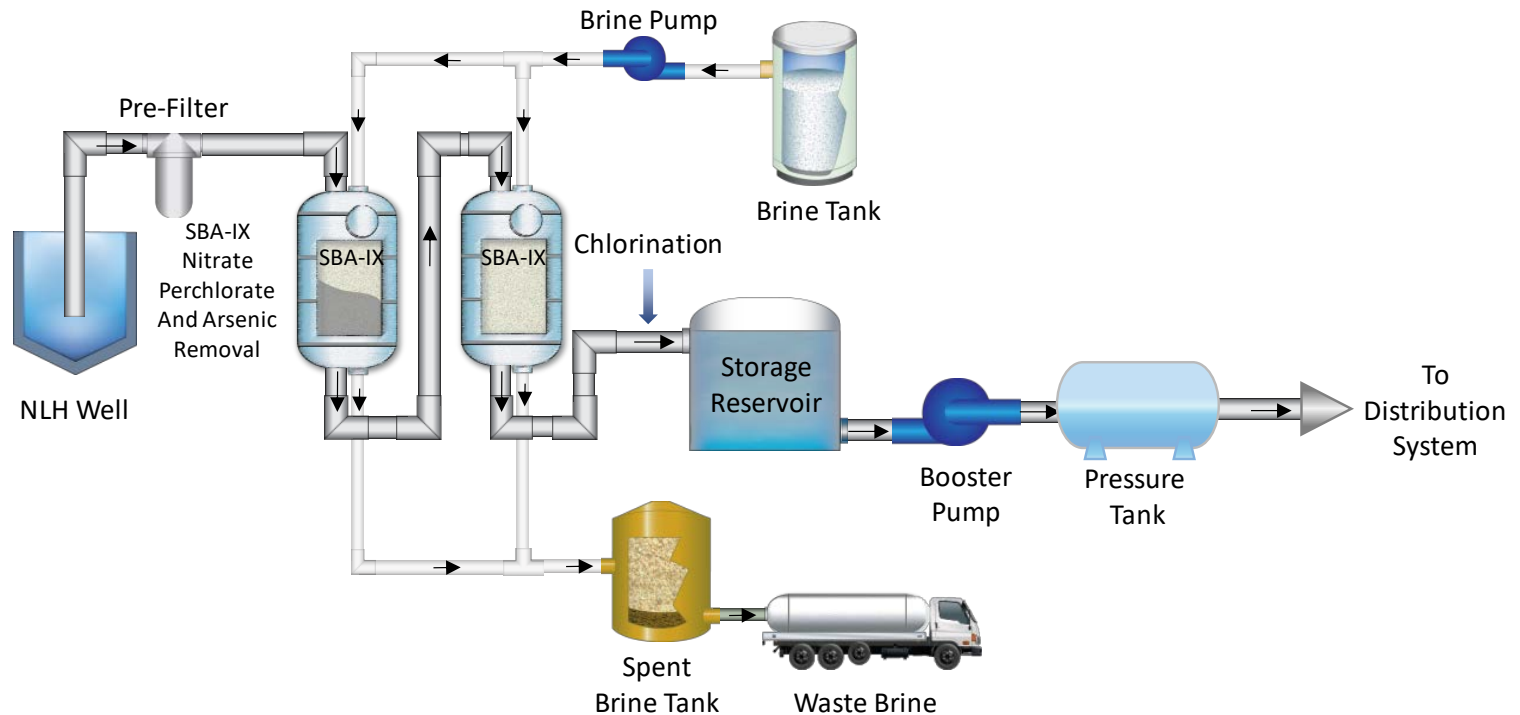
LSID – Tonyville

Current System Configuration



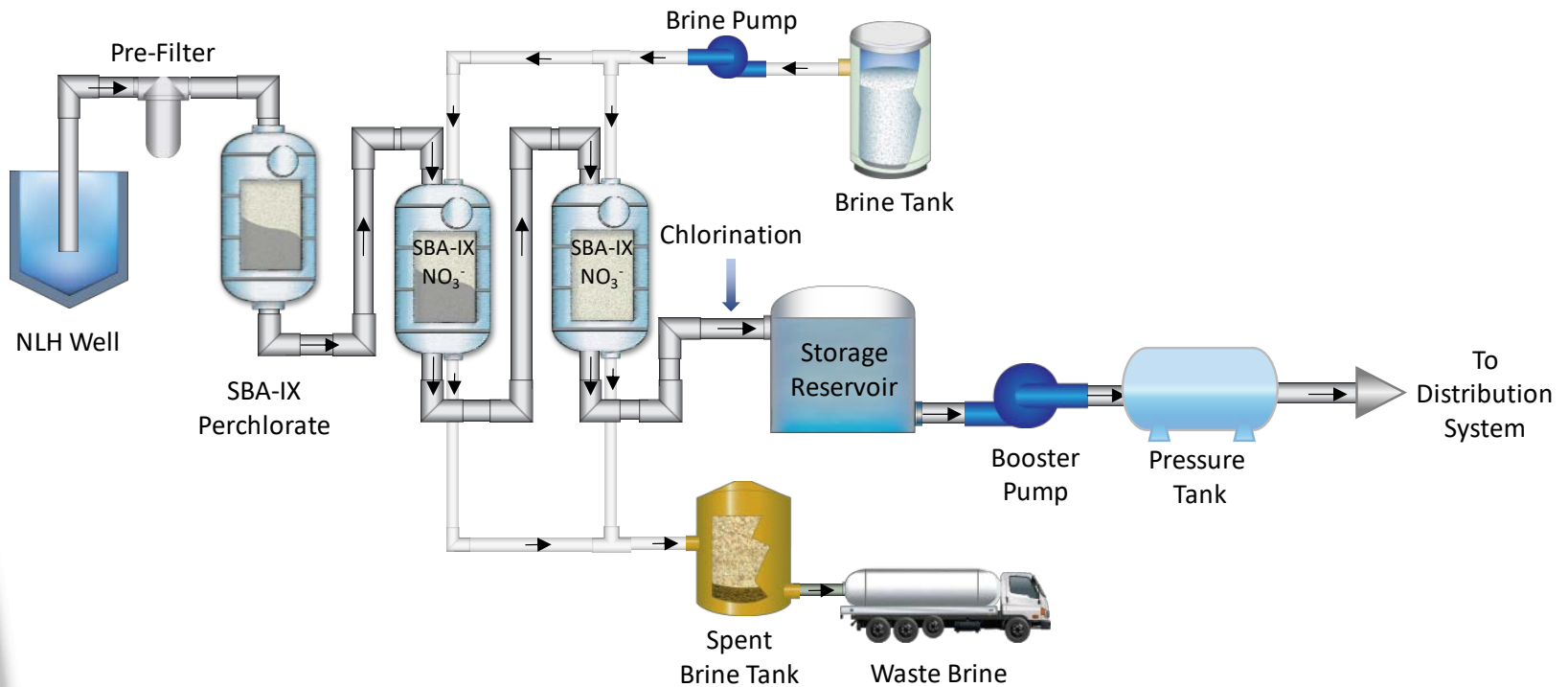
System Improvements LSID – Tonyville

Proposed System Configuration Option 2



System Improvements LSID – Tonyville

Proposed System Configuration Option 1



System Improvements

LSID-Tonyville

- Unique challenges
 - Existing surface water is of relatively high quality but groundwater treatment is still required
 - Largely due to periodic dry up of the Friant Kern Canal
 - Cost to treat is significantly more than that of surface water
 - Perchlorate and potentially arsenic in brine can limit disposal and comingling possibilities

System Improvements Woodville

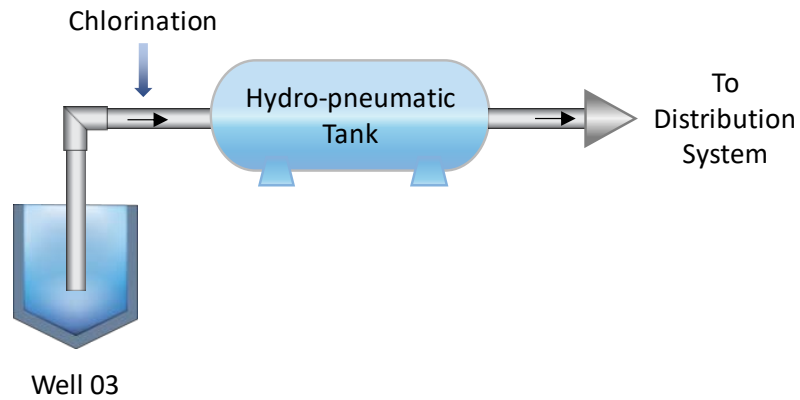
- Contaminants: Nitrate > MCL and 1,2,3-TCP > MCL in recent years, currently low-level
- Primary Improvements
 - SBA-IX for nitrate removal
- Additional Site Improvements
 - Electrical upgrades
 - Storage

System Improvements Woodville



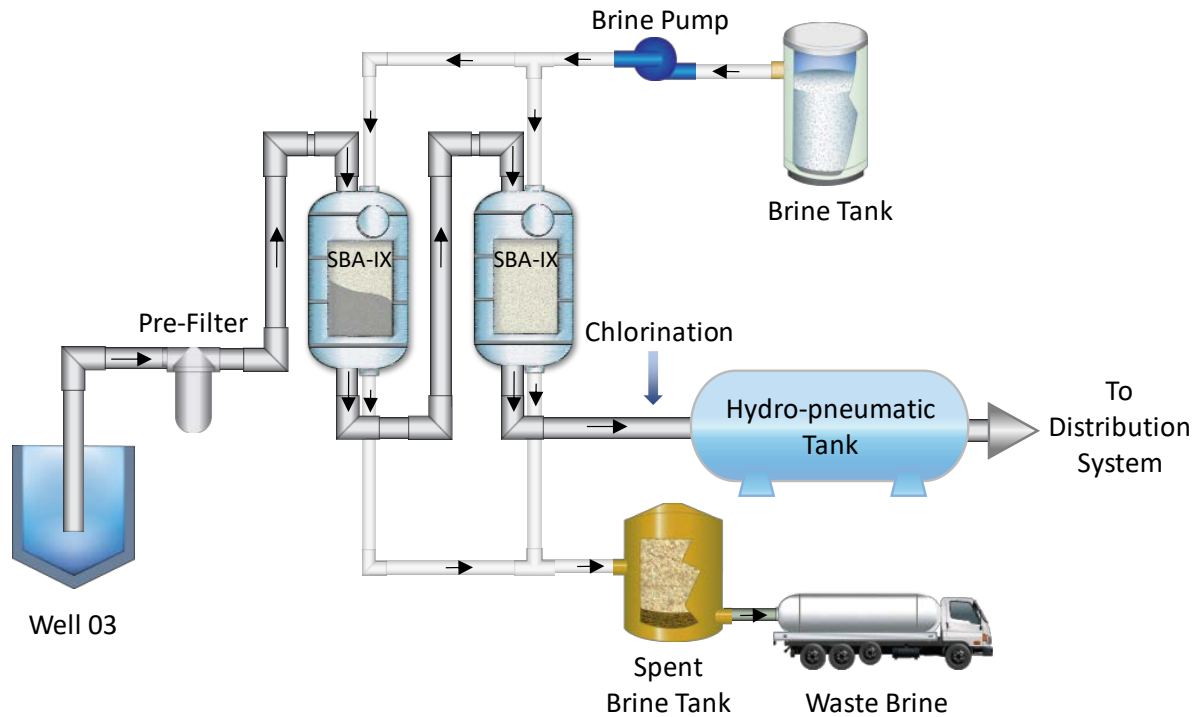
System Improvements Woodville

Current System Configuration



System Improvements Woodville

Proposed System Configuration



System Improvements Woodville

- Unique challenges
 - Site visit revealed Well 3 functions as a peaking well and cycles on/off several times per hour when needed
 - Primary well (Well 1) is currently below nitrate MCL but concentrations appear to be trending upwards
 - Storage could limit the need for SBA-IX treatment but a solution is needed in the event the primary well fails
 - Provisions required for future TCP treatment installation

Reminders and Lessons Learned

- Smaller ≠ simpler
- The needs of each individual system are unique and therefore so is the right solution
- If details are not carefully considered the proposed solution may create long term water quality or operational challenges
- A balance is needed between treatment system sophistication and operational requirements
- Even with grant funding and short-term operational support. Long-term operations are not affordable
- There is a real need for continued improvement and innovation with nitrate treatment approaches

Acknowledgements

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 - Woodville
- DDW
- DWR

Thanks!

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