

# Terry Ranch Project

## Water & Sewer Board Update

January 20, 2021





# Due Diligence Update



# Water Treatment Pilot

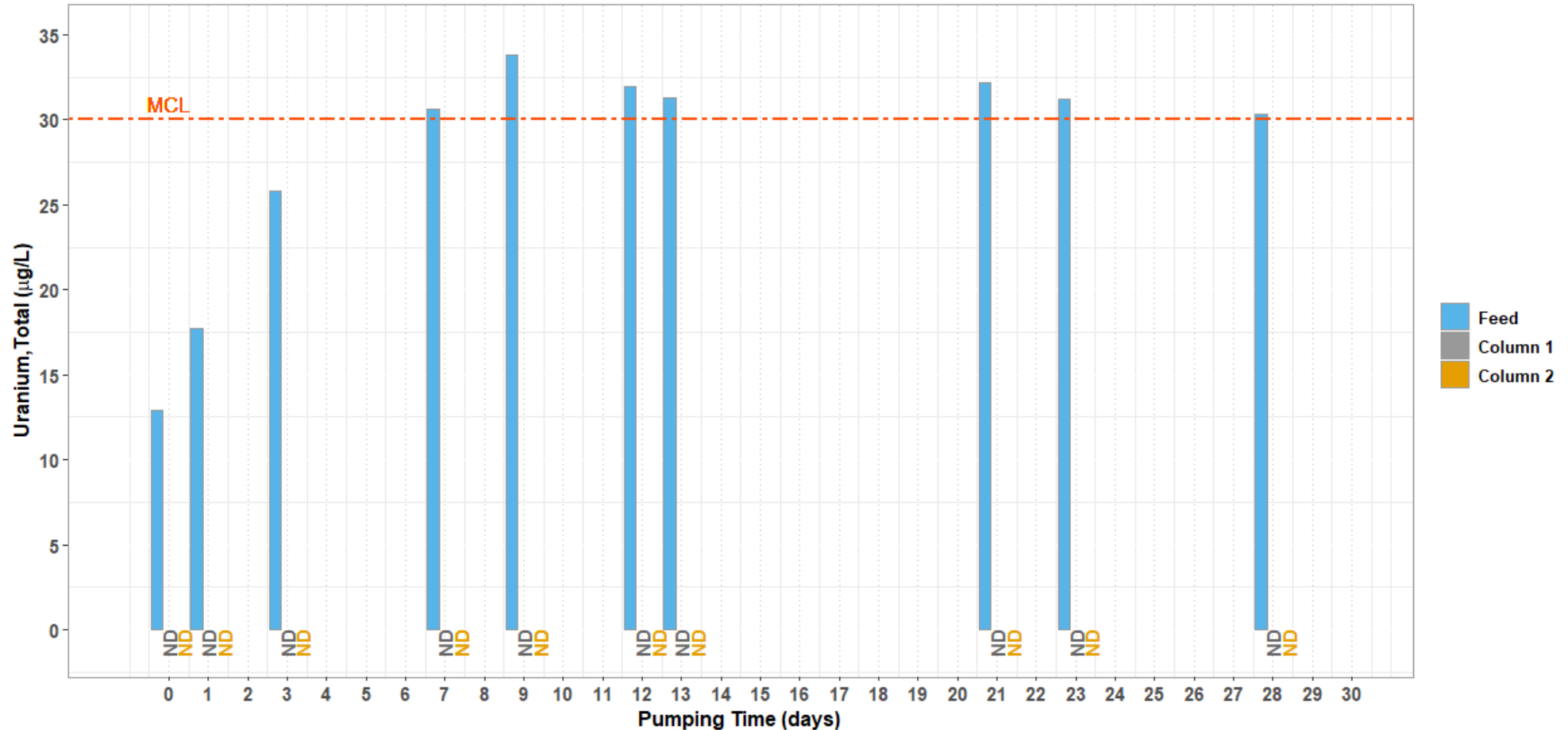
# Water Treatment Pilot Test Overview

- Pilot operated from Nov 10 to Dec 10 (30 days)
  - Source EB-2
- Water quality sampling and analysis
  - Sampled influent (feed) and effluent (discharge)
  - 1,178 individual analyses
- Pilot operated in same fashion as full-scale plant with two columns in series



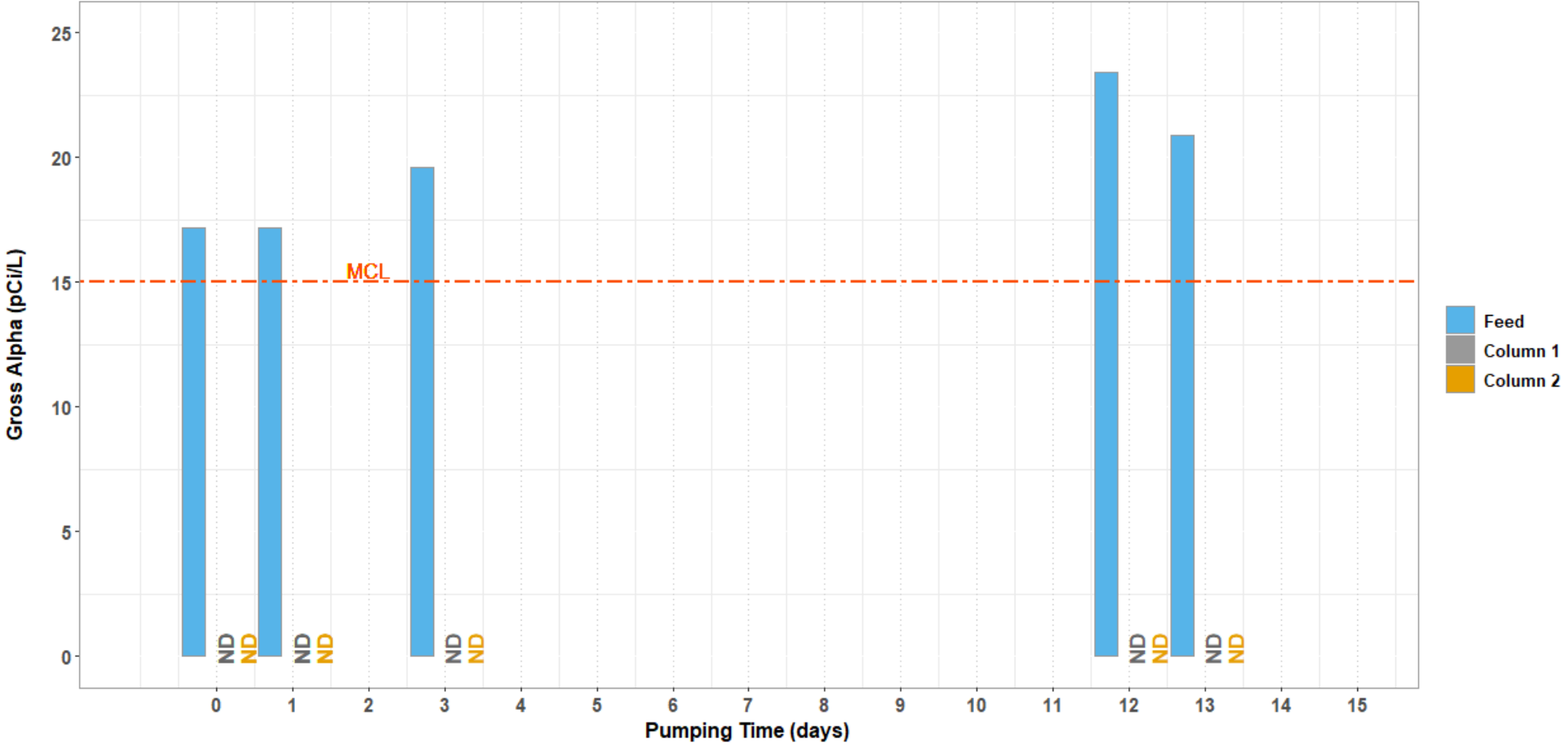
# Uranium Results

- All effluent samples were non-detect for uranium



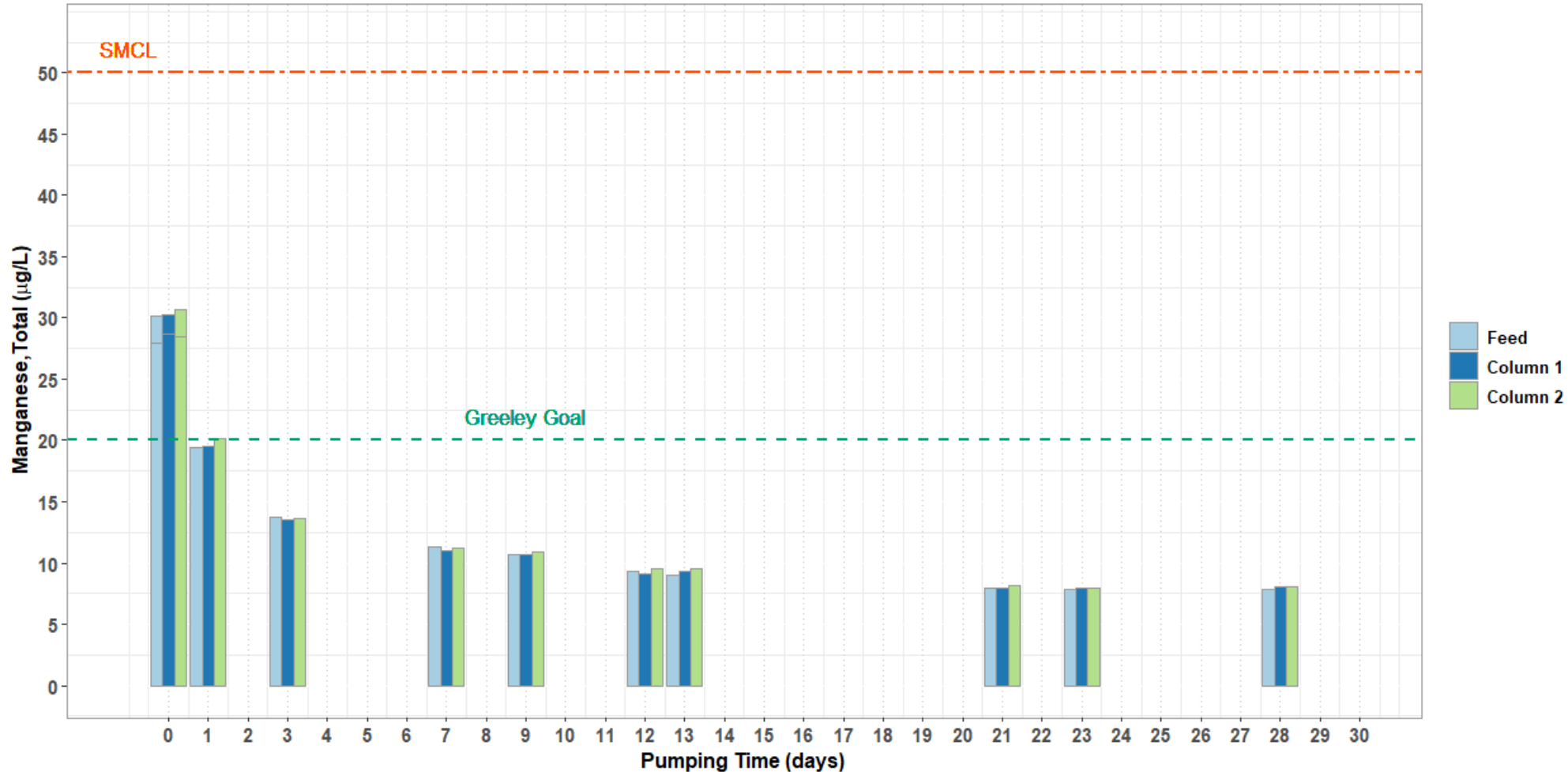
# Gross Alpha Results

- All effluent samples were non-detect for gross alpha



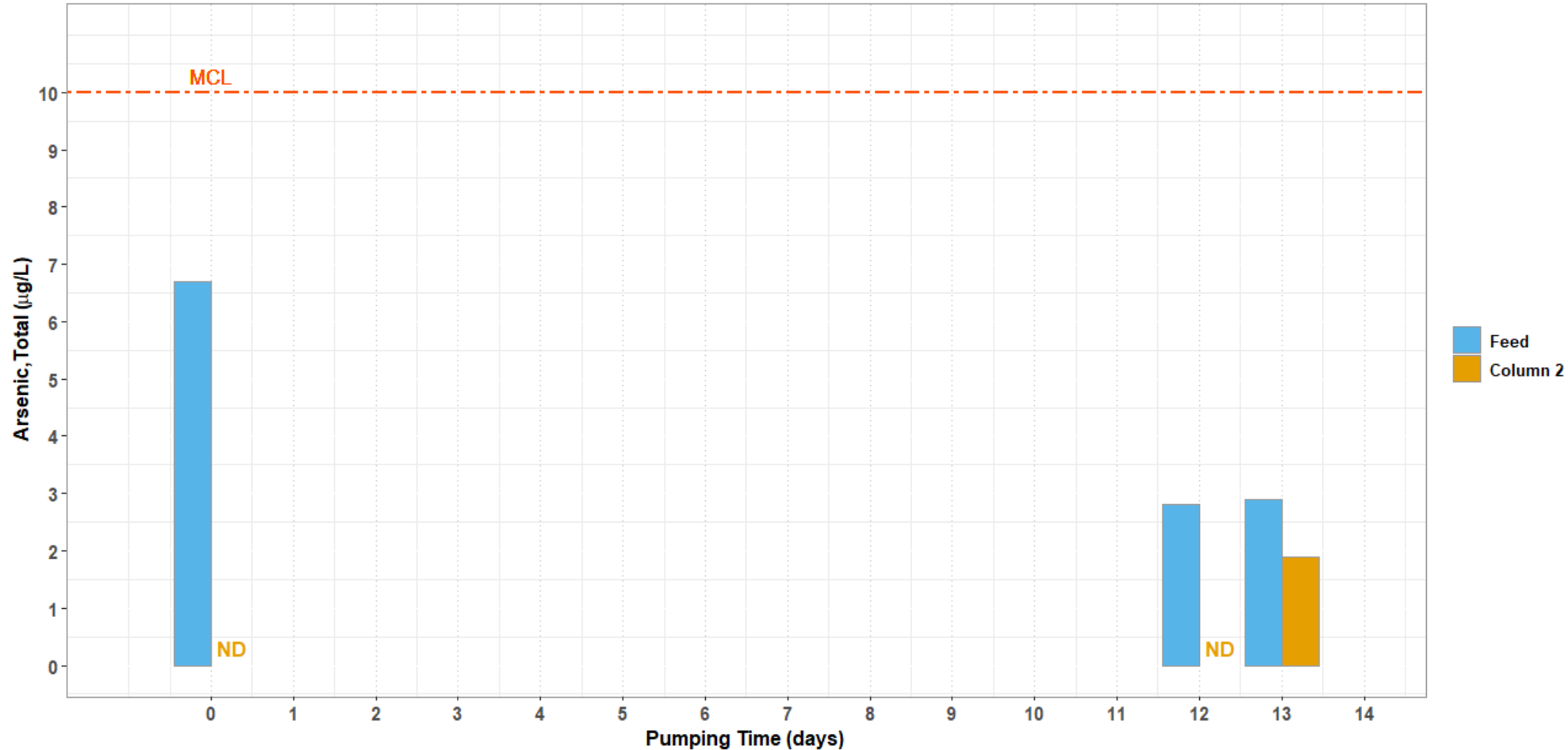
# Manganese Results

- Manganese is not removed by the ion exchange media
- Manganese at EB-2 is below Greeley's goal



# Arsenic Results

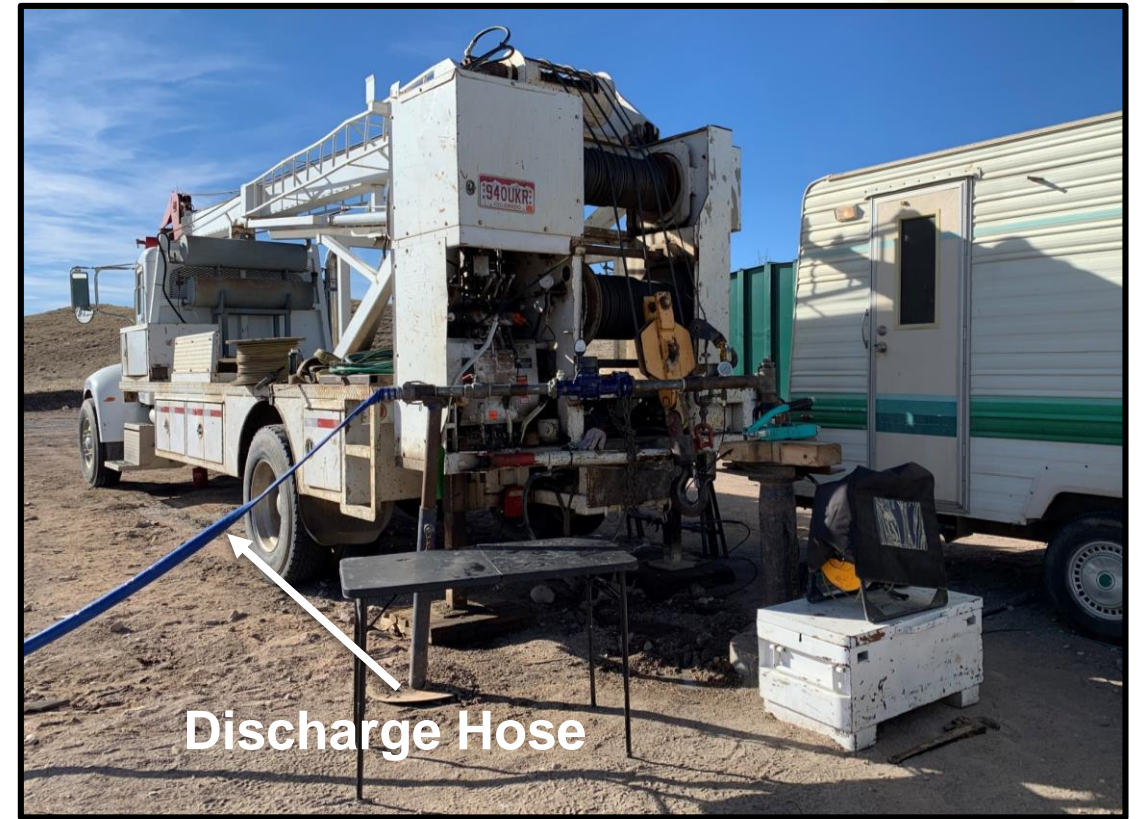
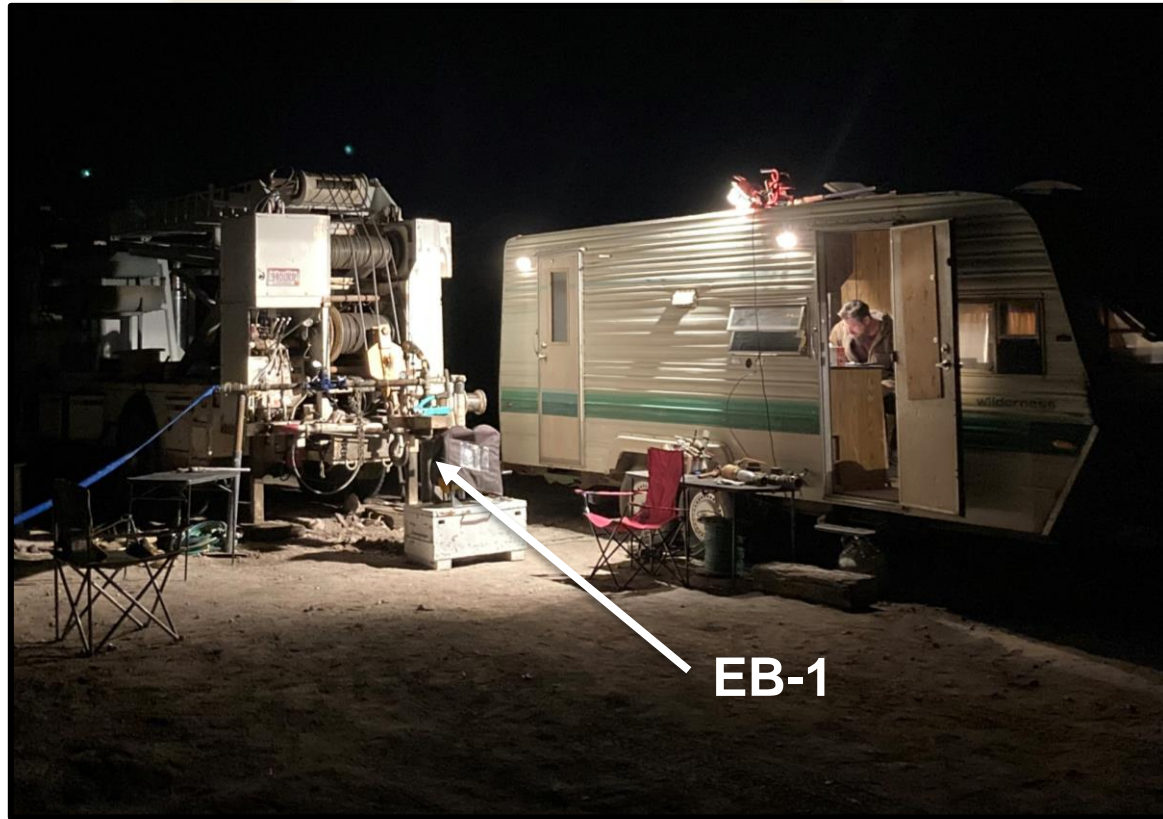
- Effluent samples were non-detect for arsenic except for one sample
- Arsenic can be treated w/ variations in media





# ASR Pilot Test Results

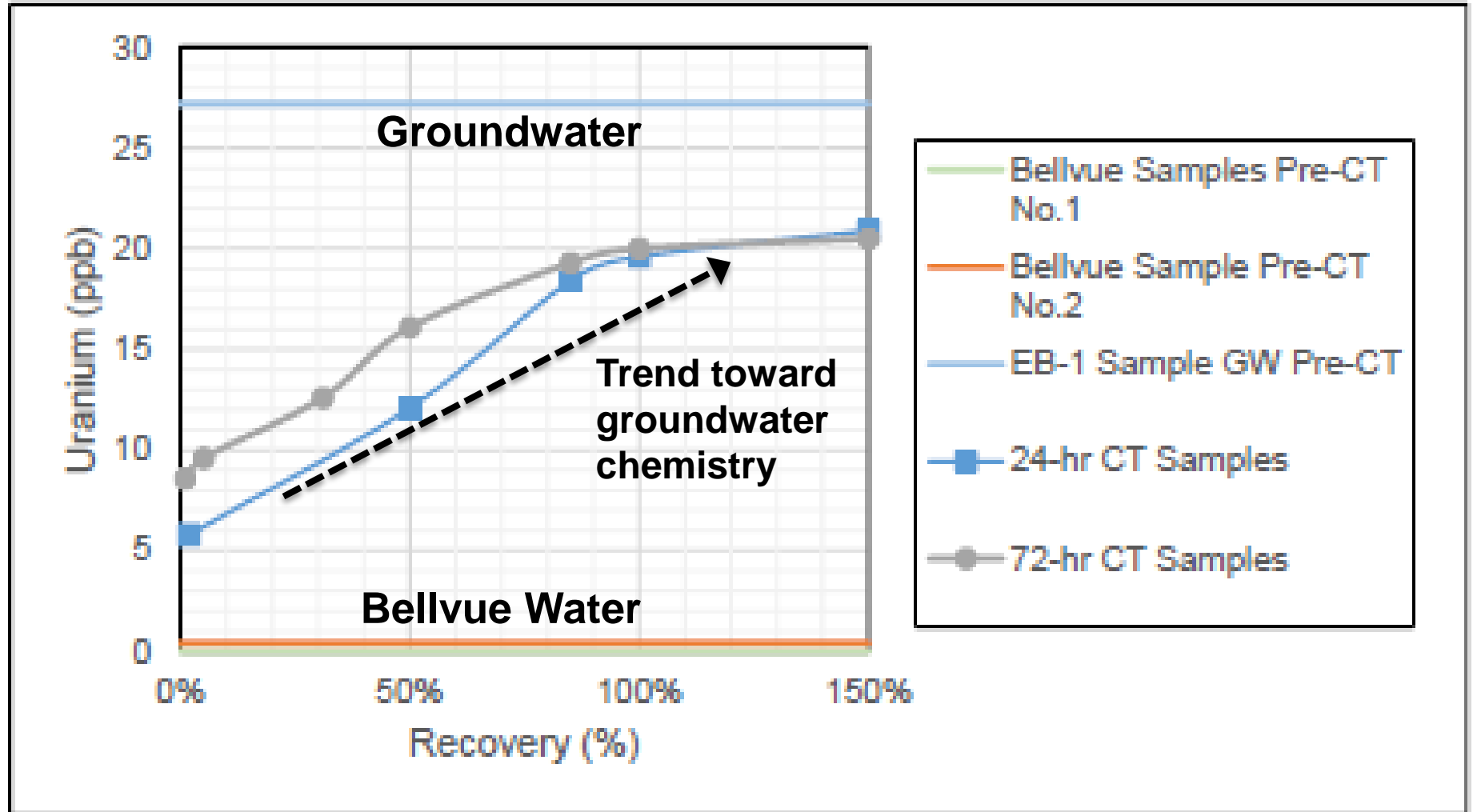
# Pilot Injection Test



**First Cycle:** 24 hrs injection, 24 hrs storage, 150% recovery  
**Second Cycle:** 3 days injection, 3 days storage, 150% recovery

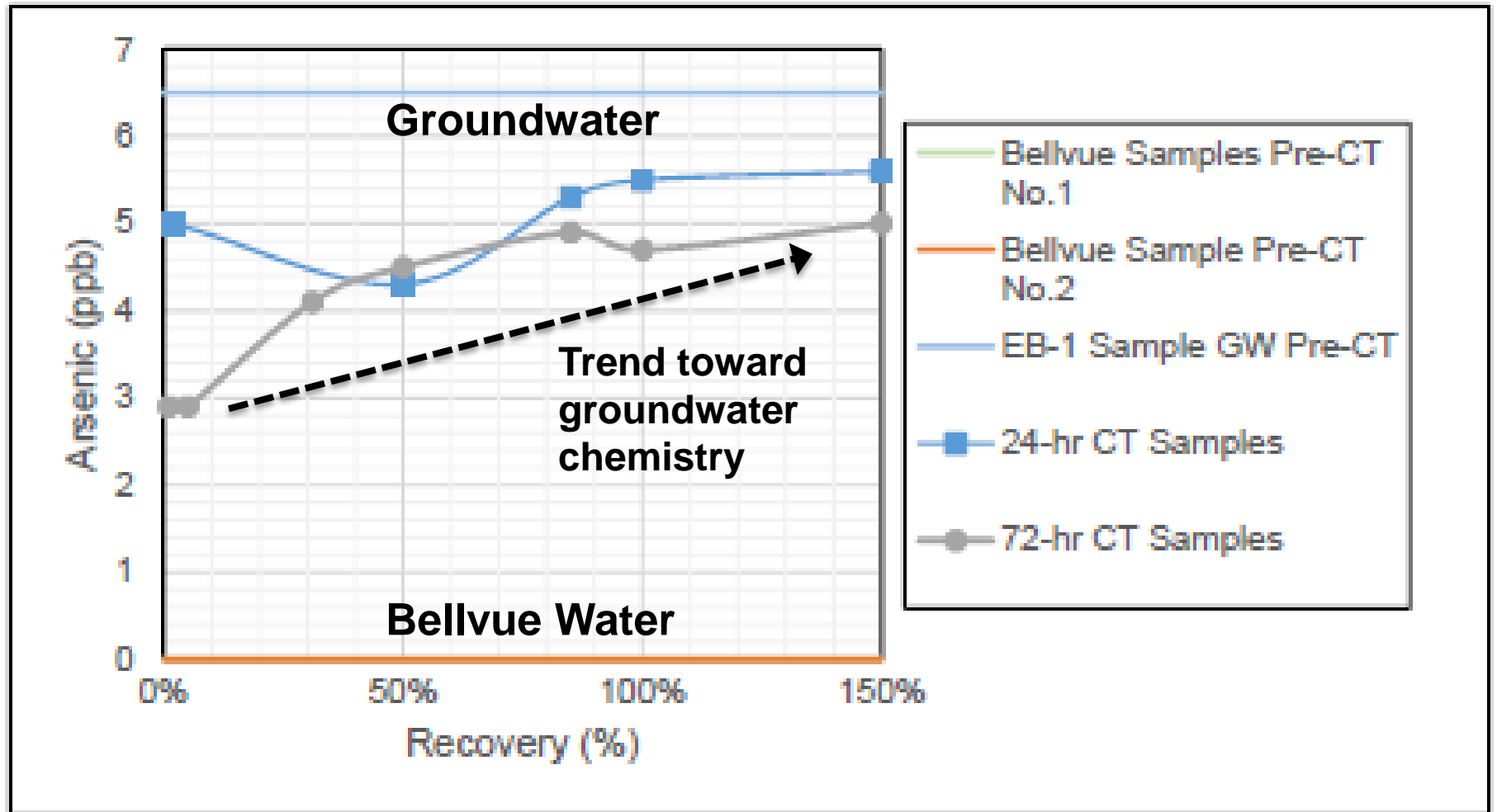
# Recovered Water Quality – Uranium

- Recovered water approaches groundwater U concentration with  $>$ % recovery
- No evidence of leaching uranium from the aquifer



# Recovered Water Quality – Arsenic

- Recovered water approaches groundwater As concentration with >50% recovery
- No evidence of leaching arsenic from the aquifer
- Arsenic can be treated with variations in media



# Distribution System Water Quality Analysis

# Distribution System Water Quality Analyses

- Study conducted to evaluate impacts of the Terry Ranch groundwater added to the existing water supply systems.
- Analyses conducted
  - Review of City's lead and copper sampling data (2014 onward)
  - Evaluate 10 parameters for evaluation of corrosion, metal release and water aggressiveness
  - Assess the stability of distribution system corrosion scales: Existing system evaluated against the new Terry Ranch groundwater source
  - Review indices of corrosion and water aggressiveness
    - (e.g., Langelier Saturation Index, Calcium Carbonate Precipitation Potential, Chloride-to-Sulfate mass ratio, and others)
  - Evaluate the need for treatment adjustments for corrosion control
- Scenarios evaluated:



**Scenario 1**

*Individual  
sources*



**Scenario 2**

*Bellvue +  
Terry Ranch*



**Scenario 3**

*Bellvue + Boyd +  
Terry Ranch*

# Distribution System Water Quality Analyses

## Study Results: Overall observations

- The Terry Ranch water alone is not conducive to lead corrosion or lead release, but tends to be slightly corrosive towards copper piping. Existing distribution system corrosion scales are not expected to change when Terry Ranch water is introduced, thus pH adjustment of Terry Ranch water is not recommended.
- Blending with water from existing plants (Bellvue and Boyd WTPs), decreases copper piping corrosiveness. A blend of all three water sources would not be considered corrosive towards metal, including lead or copper.
- Adjustments at Boyd WTP would help reduce the corrosiveness of this water supply.
  - The Boyd WTP pH is lower when compared to other sources
  - Increasing the target pH would reduce the water corrosiveness and aggressiveness. Accomplished through minor additions of caustic soda
  - Allows the 3 water sources (Terry Ranch, Bellvue, and Boyd) to have a similar pH and limit fluctuations in the distribution system



# Cost Estimates



# Cost Introduction

- ✓ Costs presented at December 16 Board Meeting were preliminary
- ✓ Costs have since been further refined
  - ✓ Refined milestones
  - ✓ Iterated water supply modeling
  - ✓ Added construction escalation – 5% annually
  - ✓ Converted costs to 2020 dollars – 3% discount rate

# Construction Phasing

<b><i>Assumed Completion</i></b>	<b>Target Event</b>	<b>Infrastructure</b>
2023	Construct 1st Pipeline Segment	Transmission pipeline south of Hwy 14 & all land acquisition
2035	Construct All Backbone Infrastructure	Transmission pipeline north of Hwy 14 and pipeline appurtenances; on-ranch pipelines, roads, and power
2040	Treat and Deliver 8 cfs to Greeley	Treatment plant and fully equipped wellheads
2065	Treat and Deliver 16 cfs to Greeley	Expanded treatment plant and additional wells
2100+ (Buildout)	Inject; Deliver 45 cfs to Greeley	Pumping station, injection system, additional wells, expanded treatment

# Construction Cost Estimates

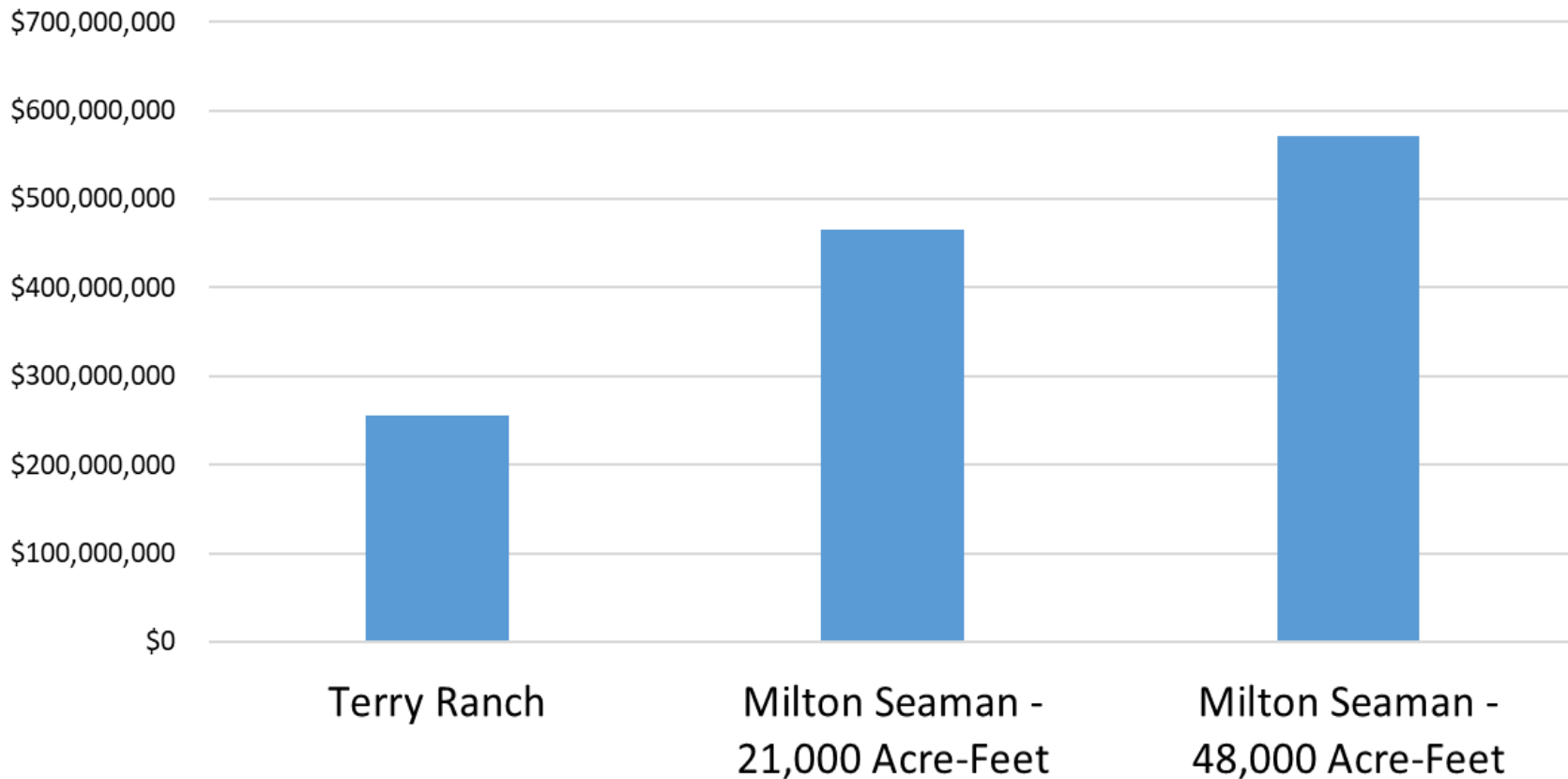
<b>Target Event</b>	<b>Cumulative Construction Cost Estimate</b> (if constructed today)	<b>Cumulative Greeley's Portion of Cost*</b> (if constructed today)	<b>Cumulative Greeley's Escalated Cost in 2020 dollars</b> (phased construction)
1st Pipeline Segment (6 miles) & Acquisition	\$34,000,000	\$7,000,000	\$7,000,000
All Backbone Infrastructure	\$210,000,000	\$85,000,000	\$101,000,000
Treat and Deliver Water to Greeley, 8 Wells	\$288,000,000	\$163,000,000	\$209,000,000
16 Wells Online, Meets 2065 Needs	\$318,000,000	\$193,000,000	\$256,000,000
45 Wells & Injection, Meets Buildout Needs	\$470,000,000	\$345,000,000	\$589,000,000

\*Deducts Wingfoot's \$125 million contribution.

\*\*2020 net present value considering 5% construction escalation and 3% discount rate. Timeline assumed.

# Milton Seaman Comparison

**Cost to Meet 2065 Water Needs**

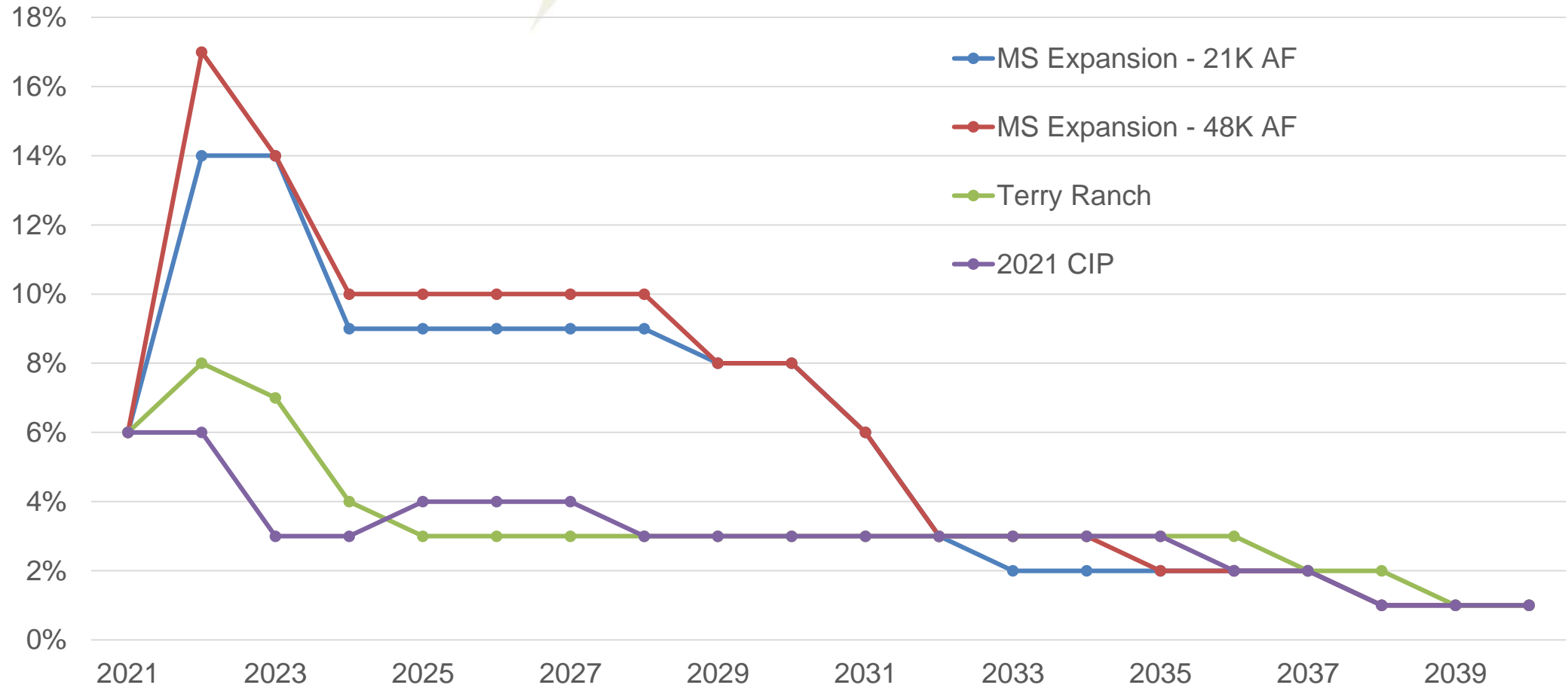


- ✓ Other considerations:
  - ✓ Terry Ranch costs spread over many decades
  - ✓ Terry Ranch requires less water acquisition than Milton Seaman and other alternatives

\*Costs presented as 2020 net present values using 5% construction escalation and 3% discount rate. Timeline assumed.

# Rate Comparison

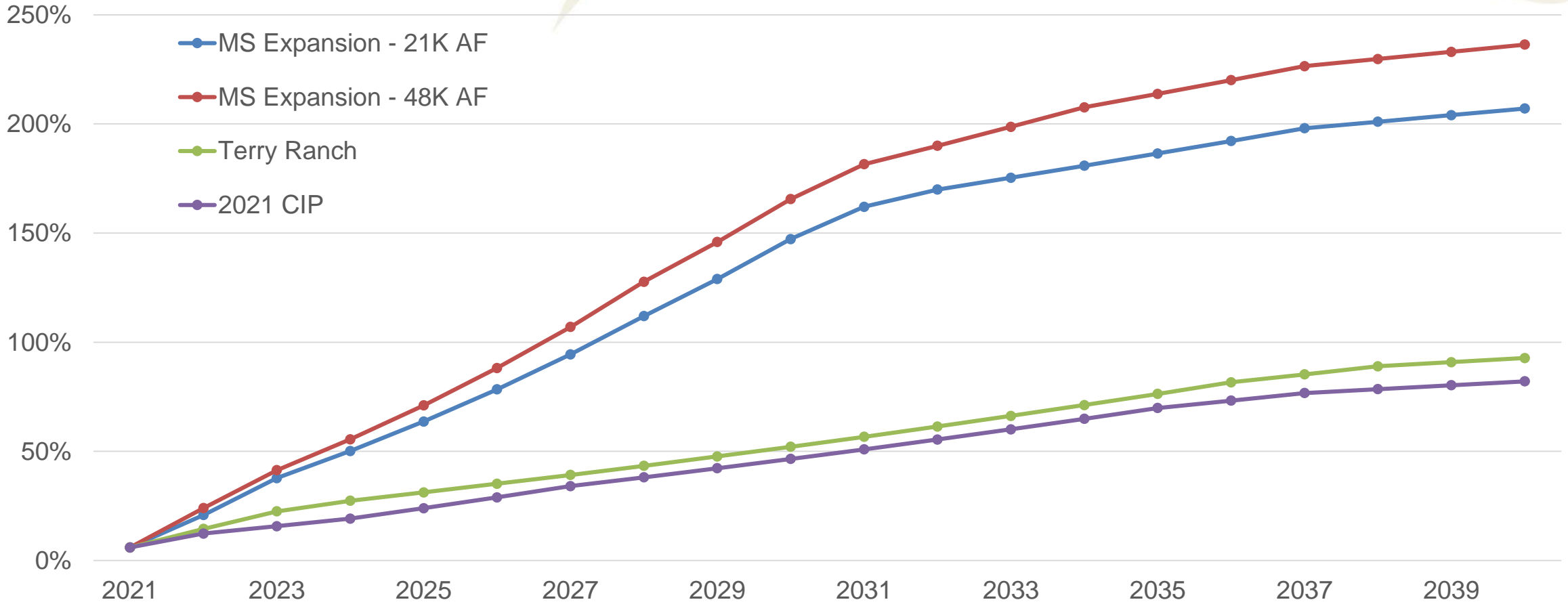
## Annual Rate Impacts



Rates calculated with future, escalated project costs.

# Rate Comparison

## Cumulative Rate Impacts



# Operational Costs

<b>Cost per 1,000 gallons</b>	<b>Terry Ranch Withdrawal</b>	<b>Boyd Treatment Plant*</b>	<b>Bellvue Treatment Plant*</b>
Treatment Plant Only	\$0.81	\$0.84	\$0.27
<b>Total Cost to Deliver Water</b>	<b>\$1.63</b>	<b>\$1.48</b>	<b>\$0.79</b>

\*2016-2019 Boyd & Bellvue Averages

Terry Ranch will be operated as a drought supply.



# Outreach & Next Steps





# Community Outreach

- ✓ Community Open Houses - December 2 and **February 10**
- ✓ City Council Meetings - October 13, January 12, March 2, March 16
- ✓ City Boards & Commissions – presenting to 11 in January & February
- ✓ Service Organizations - Chamber of Commerce, Rotary, Kiwanis
- ✓ Community Groups - Realtor Association, L3, others
- ✓ Website - [greeleygov.com/terryranch](http://greeleygov.com/terryranch) – updating FAQs
- ✓ Social Media

Suggestions for additional outreach are welcomed

# Community Feedback & Questions

- ✓ What if uranium treatment fails?
  - ✓ Terry Ranch treatment will be designed to be fully redundant, just like existing treatment plants
  - ✓ Two ion exchange column in series
  - ✓ Standby ion exchange columns
- ✓ What happens to the uranium after it is removed from water?
  - ✓ Third-party vendors will handle all treatment media – collect from site, haul, and dispose.

# Community Feedback & Questions

- ✓ Could water quality change over time?
  - ✓ Unlikely and certainly less than surface water
- ✓ Were there other water providers interested in the project?
  - ✓ Yes, but Greeley is uniquely situated to use Terry Ranch water given its location and existing infrastructure.
- ✓ Will Greeley lose water rights associated with Milton Seaman?
  - ✓ No. Rights will be moved. Rights are very junior.

# Community Feedback & Questions

- ✓ How will Wingfoot make money and what will Greeley residents pay?
  - ✓ Wingfoot will sell credits to developers. Wingfoot does not receive any ongoing compensation from water sold to Greeley customers.
  - ✓ Greeley foregoes future cash-in-lieu fees from developers, but in return, receives water and storage upfront. Cash-in-lieu revenue is used to develop water supply projects like Terry Ranch.
  - ✓ Wingfoot will also receive a portion of revenue for sales of Terry Ranch water to non-Greeley customers, for example, water sold to oil & gas operators.
- ✓ What will Wingfoot charge for credits?
  - ✓ Wingfoot will likely sell credits at a price less than Greeley's cash-in-lieu rate. Greeley effectively sets the credit price ceiling. Credits will reduce development costs.

# Proposed Next Steps

Event	Date
Finalize Diligence and Peer Reviews*	January - February
W&S Board Consideration of Closing	February 17, 2021
First City Council Reading	March 2, 2021
Second City Council Reading	March 16, 2021
Closing Deadline	March 22, 2021

\*Diligence findings are being progressively reviewed by staff and 3<sup>rd</sup> party peer reviewers



[greeleygov.com/terryranch](http://greeleygov.com/terryranch)

