

WILLISTON BASIN WATER TREATMENT TECHNOLOGY TEST BED



U.S. DEPARTMENT OF
ENERGY



WE SEEK TO PILOT-TEST TECHNOLOGIES CAPABLE OF TREATING HIGH-TDS WATER.

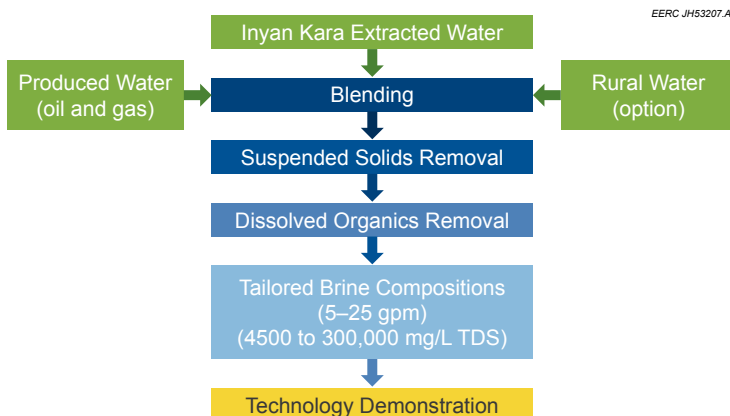
TREATMENT AND HANDLING of high-TDS (total dissolved solids) waters associated with energy production are challenging and not readily or economically accomplished using conventional water treatment techniques. Geologic injection is often required to effectively manage fluids associated with electrical power generation, oil and gas production, and active reservoir management for geologic CO₂ storage.

As part of a public-private collaboration, a facility is being constructed in western North Dakota to pilot-test high-TDS water treatment technologies that can:

- Produce alternate sources of water for industrial or domestic use.
- Produce salable products.
- Meaningfully reduce brine disposal volumes.

Pilot testing provides critical understanding of technology performance under field operating conditions. This understanding enables the advancement and commercial adoption of viable technologies capable of treating these challenging waters for beneficial use.

The Energy & Environmental Research Center (EERC) is seeking companies interested in pilot-testing water treatment technologies at the facility. This is a collaborative effort with Nuverra Environmental Solutions (Nuverra) and the U.S. Department of Energy (DOE) National Energy Technology Laboratory.



Conceptual extracted water treatment flow diagram.



The extracted water treatment test bed facility is located approximately 13 miles east of Watford City, North Dakota, immediately adjacent to North Dakota Highway 23 on the Johnsons Corner site, a Nuverra-operated commercial saltwater disposal (SWD) facility.

The test bed will feature the ability to blend extracted and produced waters in order to generate tailored brine compositions ranging from ~4500 to ~300,000 mg/L TDS.

EERC engineering staff will be on-site during all demonstration activities to assist with connections to the test bed facility and to monitor and gather process performance data. Technology developers are expected to provide their own operations staff. During steady-state operation, EERC engineering staff will conduct energy and material balances (power consumption, process flows, and influent and effluent quality analyses).

A report summarizing demonstration activities and detailing performance data and technology capabilities will be prepared and submitted to DOE. Nondisclosure and site access agreements between the EERC, Nuverra, and technology developers will be negotiated prior to demonstration.

Currently, no guarantee is offered that DOE or other funding will be available to assist interested treatment technology developers. However, the field site and facilities for water treatment demonstrations, including potential cost offsets for power, cooling water, and effluent disposal, may be made available at no or reduced cost to selected demonstrations.

BLENDING AND PRETREATED WATER CHARACTERISTICS

The table below shows the typical composition of a blended water that could be treated at the site.

Parameter	Value, mg/L
B	303
Li	46
Na	49,900
K	5010
Mg	680
Ca	13,800
Sr	1140
Ba	24
Fe	46
Mn	12
P	<15
Si	<20
Fluoride	<7
Sulfate	167
NO ₂ and NO ₃ (as nitrogen)	<4
Chloride	108,700
TSS ¹	-
TOC ²	-
TDS	180,000
Total Hardness as CaCO ₃	38,700

¹TSS (total suspended solids).

²TOC (total organic carbon).

TEST BED FEATURES

The site will include a heated building with a concrete floor that is integrated with the on-site formation water extraction and disposal infrastructure. The building will accommodate a standard semi tractor-trailer (53 ft long).

UTILITIES

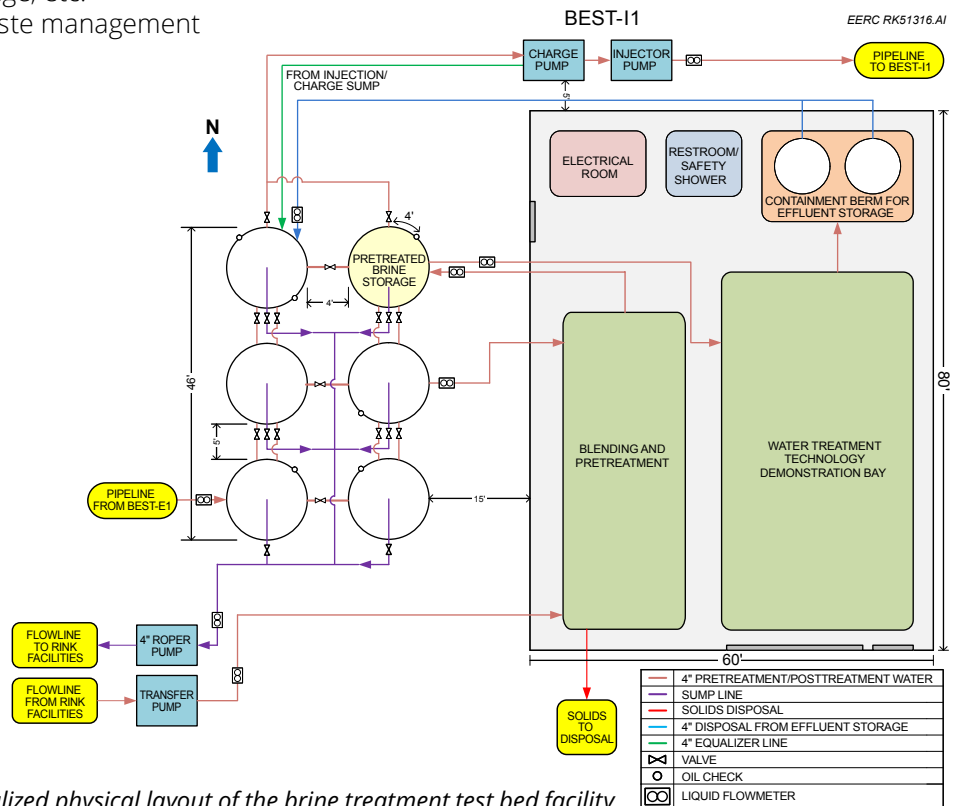
- Up to 300 kW of electric power
- Propane (5000-gal tank)
- Noncontact cooling water (30 gpm)

DEMONSTRATION TEST TRIALS

- Pilot treatment rates ranging from 1 to 25 gpm
- 30–60+-day extended-duration tests (desired minimum of two maintenance cycles)
- Monitoring of energy, flow, chemical usage, etc.
- Waste management

EXTRACTED WATER PRETREATMENT

- Blending of formation waters (Bakken and Inyan Kara Formations) to target a TDS level of 180,000 mg/L or tailored blends to suit capabilities and/or limitations of specific technologies
- Suspended solids removal
- Dissolved organics removal
- Ability to provide Bakken produced and/or flowback water for suitable demonstrations



Conceptualized physical layout of the brine treatment test bed facility.

If you are interested in demonstrating a brine treatment technology at this site or for more information, please contact:

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