

Bitter Brine Reclaim for Winter Maintenance

Mike Gresch

February 8, 2018

Road Salt Symposium
– Minneapolis, MN



Acknowledgements

- Paul Bretl, Mitch Colstad, Dan Seeley
- Emily Jones, Catherine Harris
- Connie Fortin
- Plumbers at Pertzborn & Hooper Construction



Madison Metropolitan
Sewerage District



FORTIN
CONSULTING, INC.
serving the environment

A large facility in downtown Madison

- 1000 Students live onsite with parking
- UW Health building, 10 floors
- Underground heated public parking for 200
- 12 business



Brooming snow



Existing problems

- Water softener salt
 - Sump pumps overloaded
 - Pipes corroded from softener salt
 - 3000 gallons of water per regeneration event
 - Dumping 750 lbs of salt per regen into the city sewer
 - Salt sales and service were the same company
- Safety hazard 144,000 volts of power in next room
- Dry salt
 - Wasting salt on exterior grounds
 - 200-300 lbs per event
 - Salt storage space issues

The idea



Road salt reduction training – Fall 2014

Water softener training – Spring 2014

Madison Metropolitan
Sewerage District

FORTIN
CONSULTING, INC.
serving the environment

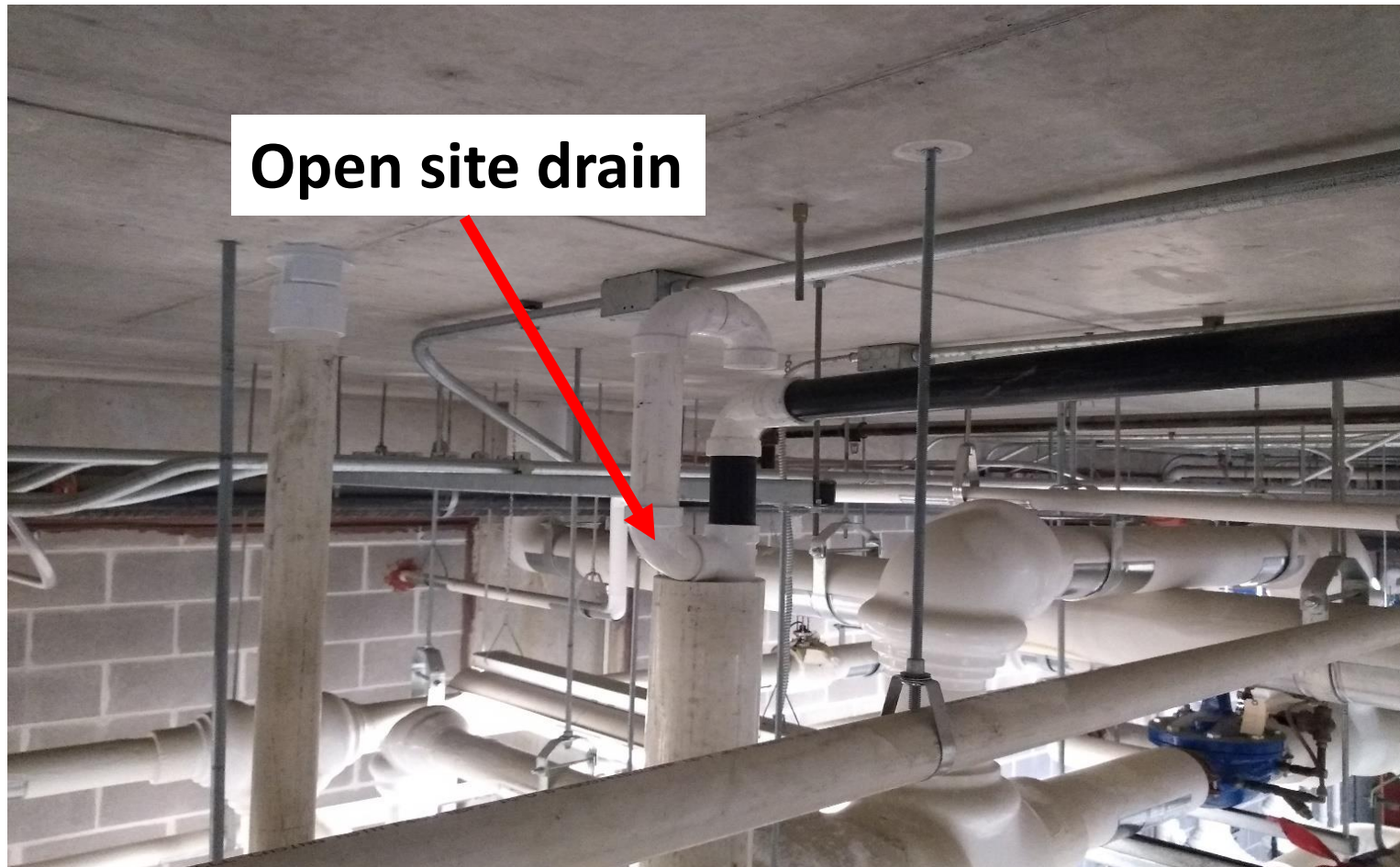
2 separate trainings, but why not put them together and use the softener salt twice.

Original floor drain



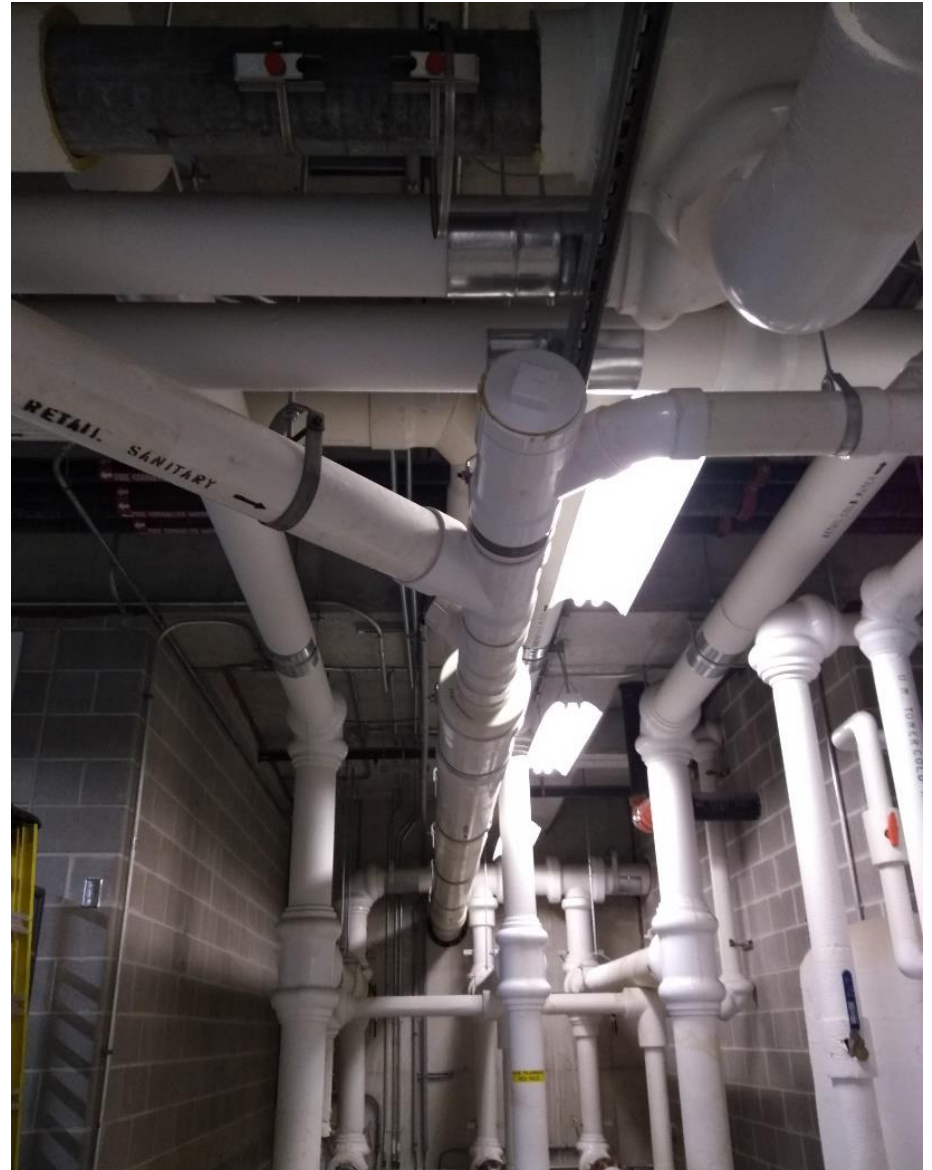
Elevate the drain

Brine regeneration water drains with gravity



Sanitary path

- Reduced sump load
- Plastic pipe
- Reduce safety hazard



Phase one solved several problems

- **Water softener salt**

-  – Sump pumps overloaded

-  – Pipes corroded from softener salt

- 3000 gallons of water per regeneration event

- Dumping 750 lbs of salt per regen into the city sewer

- Salt sales and service were the same company

-  • **Safety hazard 144,000 volts of power in next room**

- **Dry salt**

- Wasting salt on exterior grounds

- 200-300 lbs per event

- Salt storage space issues

Mechanics of a water softener

- Saltwater removes calcium carbonate (hardness) from the resin bed
- Brine with calcium, magnesium and iron is called “bitter brine”, normally waste product
- Sweet brine is excess salt water and can be re-used in the softener (softener reclaim)
- Very scientific patented method test salinity

Water softener regeneration steps

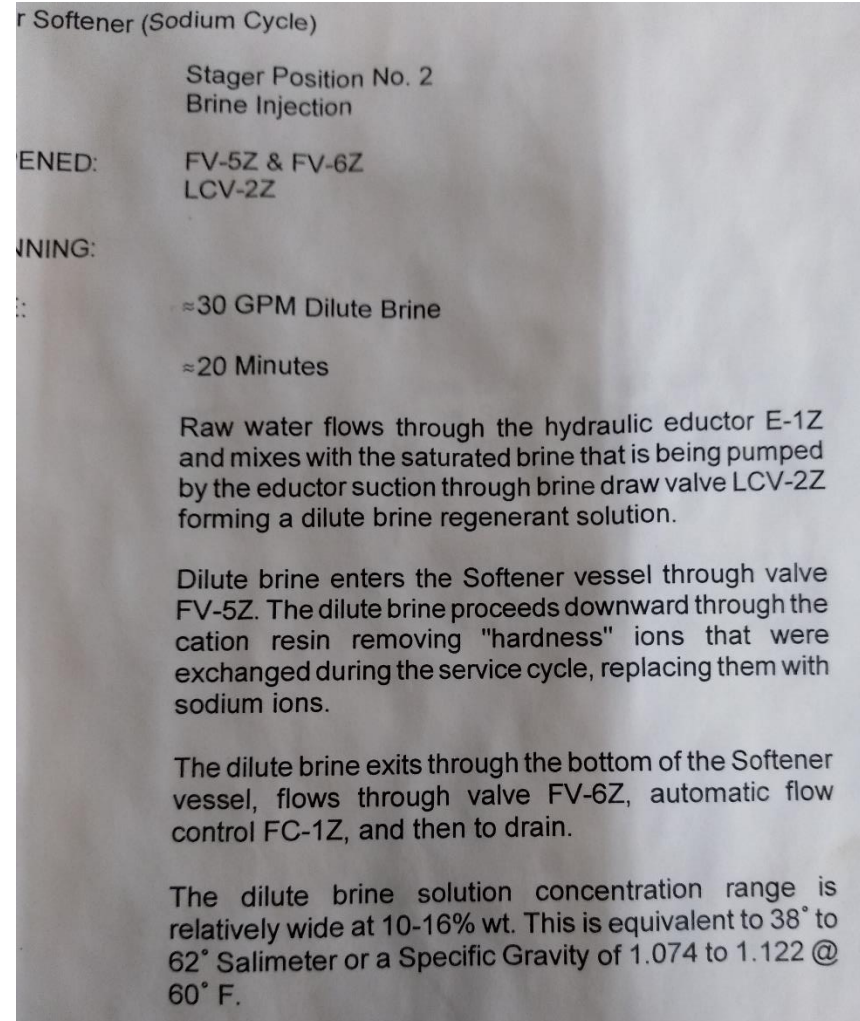
1. Back wash
2. Brine displacement
Brine capture
from 45-37 min
3. Slow rinse
4. Fast rinse



Read the manual

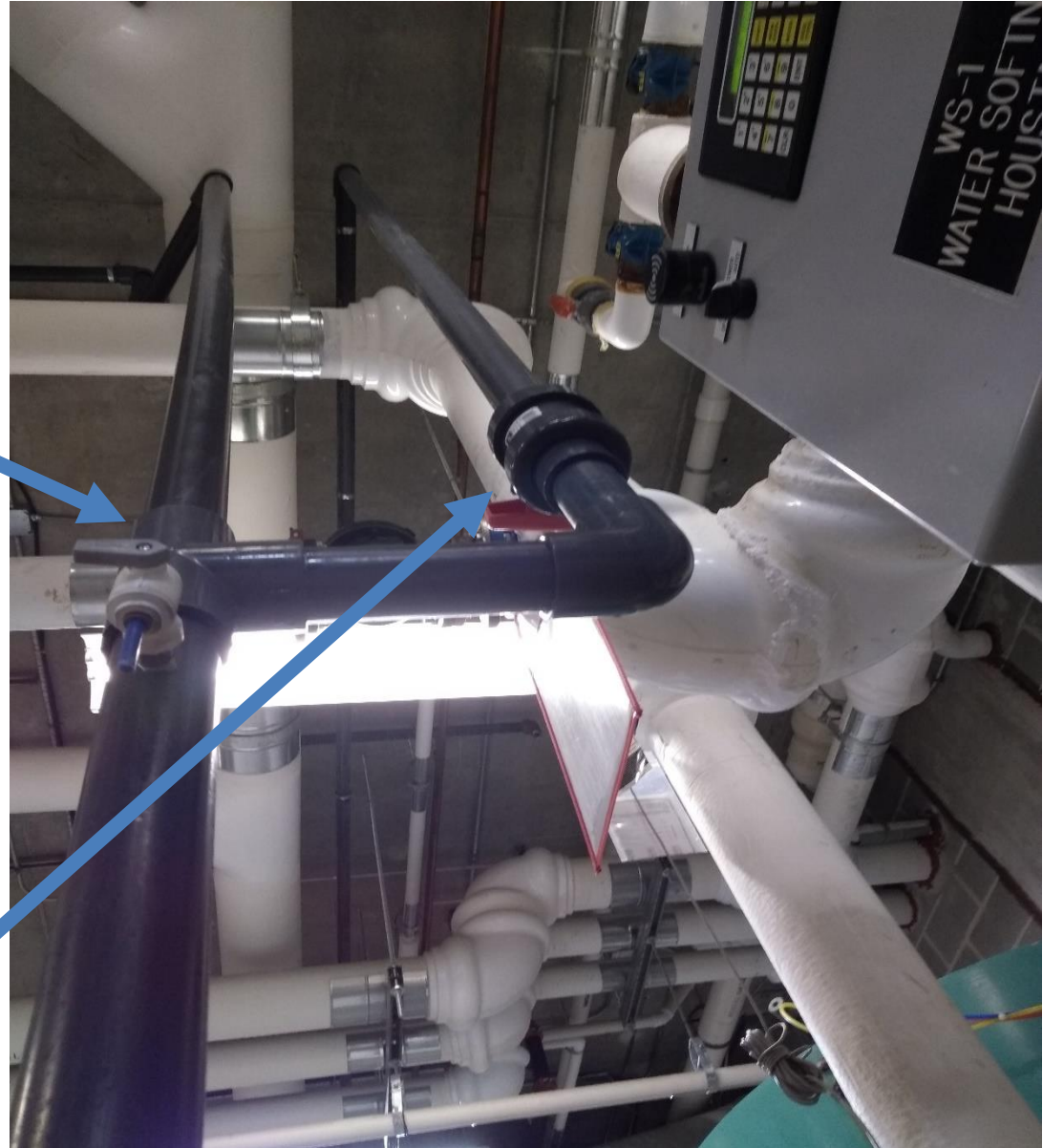
- Water softener basics
- Hardness is measured in grains per gallon
- 7000 grains of hardness equals 1 pound
- Madison water 25 grains per gallon

It pays to know the terms when talking to plumbers and technicians



Phase 2 – capture brine

- Add “T” to divert brine during brine displacement cycle (20 minutes)
- Shutoff needed to capture dilute brine (8 minutes)



Diversion tube

Open the shutoff valve to divert brine to IBC (Intermediate base container)

IBC tanks have external pump



Brine reduction with air

Box fan to evaporate the water and increase the salinity to 23.3% to use as road salt brine



Increase the salinity



Move brine with a pump

Single pump can serve many purposes

Lesson learned: do not install a sump pump in tank, the salt water will corrode the metal and could affect the seals



Pump to Bobcat

Use pump to transfer brine to the Bobcat tank



Spreading brine

- Buy good tank for the vehicle (125 gallon tank from Fleet Farm \$225)
- Retrofit bobcat with boom (8-10 holes) to spread brine
- Make boom removable, breakable, cheap and easy (save \$900 and make a boom for \$30)
- Broom all snow before brining
- Brine before a liquid precipitation event

Boom construction

Bottom view



Top view



Snow policy

- Start brooming snow once footprints visible
- Remove snow until event concludes
- Finish work with 30-50 gallons of brine
- If liquid precipitation is expected, put down brine to prevent slip and fall hazards

Snow



Broomed and brined



Anti-icing



Bitter brine summary

- **Save LOTS of road salt**
 - When needed, spread road salt by hand
- **Brining is simpler than dry salt spreading** (single pump vs. Saltdogg spreader)
 - The solution to finely & uniformly spreading salt
- **Turn softener regen waste into a resource**
 - Softener salt is cleaner than road salt
 - Increase softener efficiency (save salt)

Mike Gresch

mikegresch@hotmail.com

(608) 628-7607

