Re-Build of Chlorate Unloading Tank at the Verso Quinnesec Mill & the Installation of an External Heater

PAPTAC Fall Meeting

Victoria, BC.

November 6-8, 2019

Brian La Brash

Presentation Outline

- Review of Tank and heating system prior to project
- Reason for the Project & Project Goals
- Tank Re-Build
- New Heating System
- Questions

Reasons for the Project

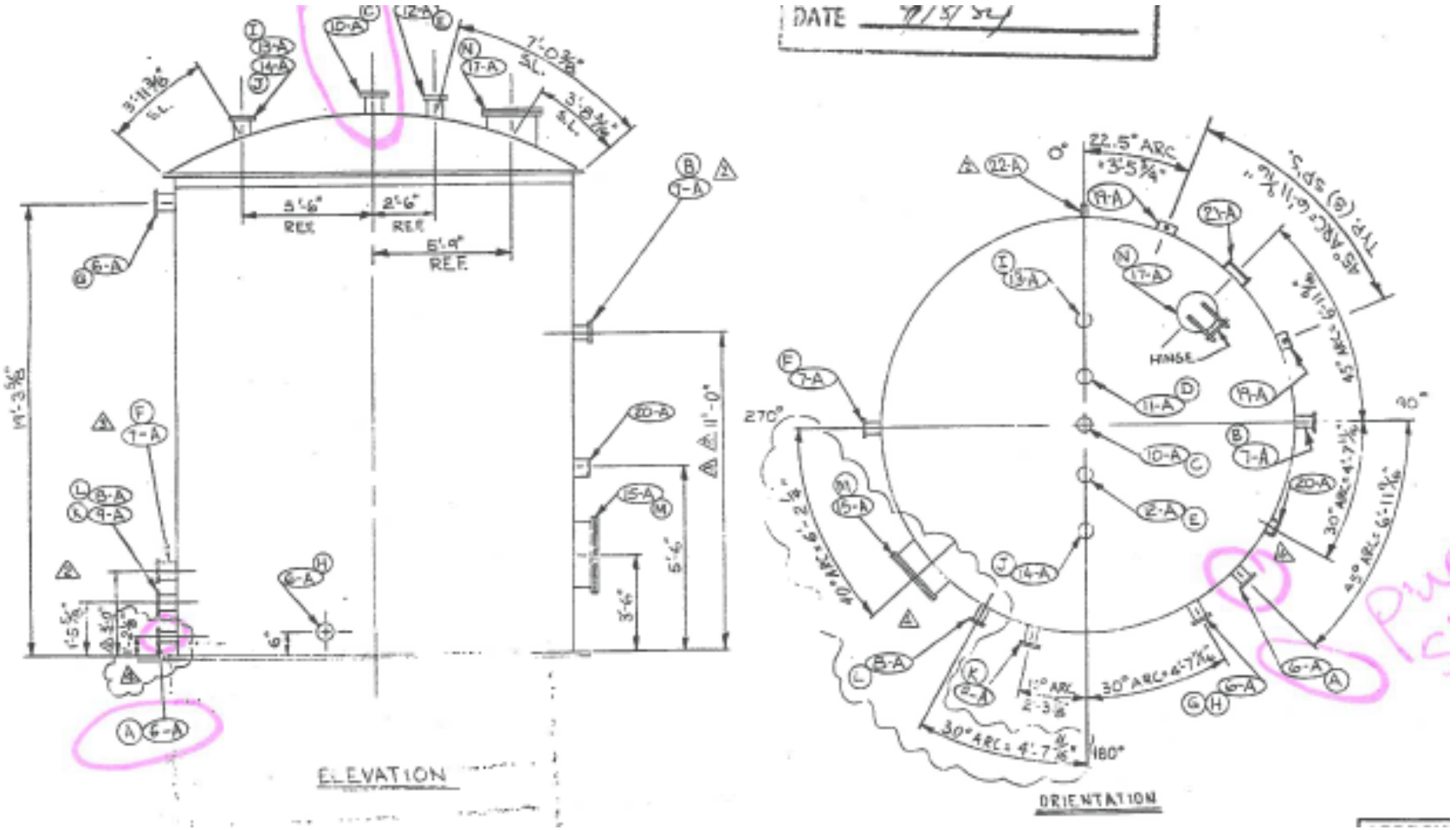
- The tank was significantly corroded from the inside & outside and had significant tile damage on the inside.
- The tank had many repairs to tile in the past and was an expensive “every outage” maintenance item. Steel had also been replaced on the tank in the past due to corrosion.
- Leaks in early 2018 resulted in the tank being taken out of service. Upon internal inspection structural integrity was questionable without significant rebuild.
- Internal direct steam heating contributed to tile damage and accelerated corrosion.

Tank Status Before Repair/Re-build

History of Tank

Tank Description	Time Period	Comments
Tile lined carbon steel with a Neurofast liner between the steel and brick	1985 – XXX 2018	New Tank. Neurofast Liner failed over time. No specific date known.
Roof Section Repair	2004	External corrosion
Tile repair during major outages	2004 – XXX 2018	Normal repairs for damaged/missing tile
Tank removed from service based on external leaks and internal inspection results	July 2019 - Present	Significant corrosion. Significant structural work to replace wall and roof sections. Decision made to go with new tank of some type
New Tank Built inside old steel shell	July 2019	New tank is FRP

Chlorate Unloading Tank Layout



Damaged Tile and Missing Nozzles

Common to see this every time the tank was opened for a major outage

Penberthy Circulating Eductor - 1997

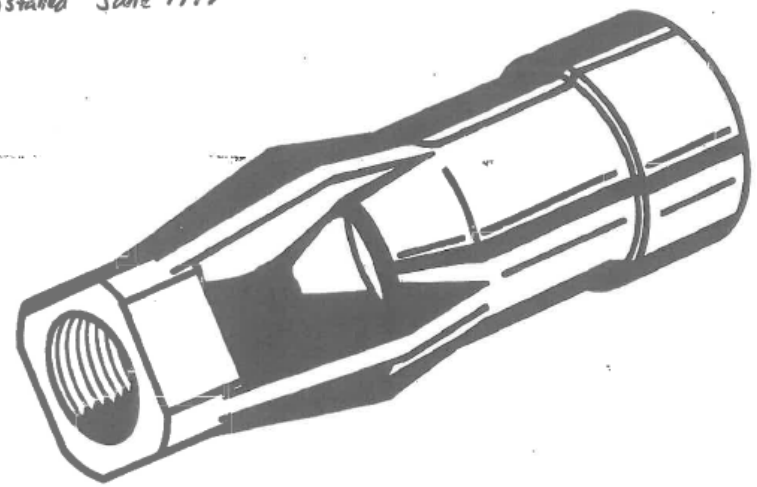
PENBERTHY®

Section 10
Instal. Instr. 19
Issued 8/9
Replaces 4/8

Mixer/ Heater

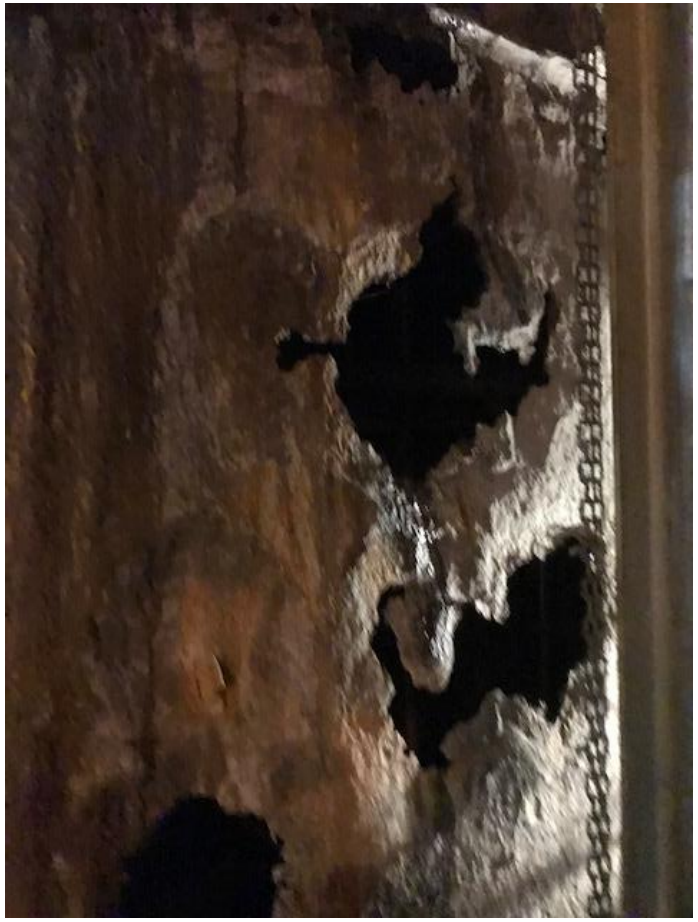
Model CTE

Equipment #
38-13021-20
Installed June 1997



Common damage to the Steam Eductors

An Area of the Tank Sidewall



After tile and group was removed it was quite obvious the tank was in extremely bad shape

Roof of Tank

This is why we don’t walk on tank roofs we don’t know the condition of!

Tank Options Explored

- 2205 Duplex SS
- Titanium
- Replace in-kind – Tile Lined Carbon Steel
- FRP

Thank you to all that responded to my questions on Materials of Construction. We also used an old group question on heating options.

Tank Replacement Options

Tank Material of Construction	Decision Criteria
2205 Duplex Stainless Steel	2X the cost of FRP
Titanium	Anticipated cost too high
Carbon Steel with Tile Lining	Life cycle costs too high based on past experience
Fiberglass Reinforced Plastic (FRP)	Significantly used for this application in the industry and lowest projected cost

Tank Rebuild

Bad sections were removed and new plate was welded in its place. Walls, roof, and floor.

Rebar was welded to the surfaces to provide a bonding surface for the FRP

0.30” of FRP Structural was layed-up and 0.20” of Corrosion Liner.

Existing nozzles got an FRP liner all the way to the outside flange face

Derakane 510N with a 210 oF temperature Limit was used

SPECIFICATIONS

Unless otherwise provided in this Quotation, fiberglass products will be fabricated in accordance with applicable ASTM standards and ECC Quality Assurance Procedures.

Quantity:	(1)
Design Code:	ASTM
Chemicals:	Sodium Chlorate
Temperature:	210 Degrees F.
Pressure:	Atmospheric
Resin Primer:	Derakane 8084
Resin Liner:	Derakane 510N
Resin Structural:	Derakane 510N
Resin Mortar:	Derakane 510N with Milled Fibers
Cure System:	MEKP
Liner:	.200" double C-Veil
Structural Thickness:	.300"
Glass Reinforcement:	Advantex E-CR Glass
Exterior:	Wax Coat
Color:	Natural
Anchors:	3/8" diameter rebar
Blast Media:	Black Jack Slag Abrasive

SCOPE OF WORK

ECC to supply all labor, materials, equipment and expertise to scaffold, demo existing brick out of the inside of the vessel, weld 3/8" diameter rebar on 24-30" centers, prime, putty and overlay the entire inside surfaces of the ClO3 Storage Tank with approximately .300" of structural laminate and .200" of liner. Each of the existing nozzles of the vessel will have FRP inserts and laminated into the existing steel inserts and laminated into the sidewall of the vessel.

All blast media and other debris generated from the project to be disposed of by Verso.

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Heating System Upgrade

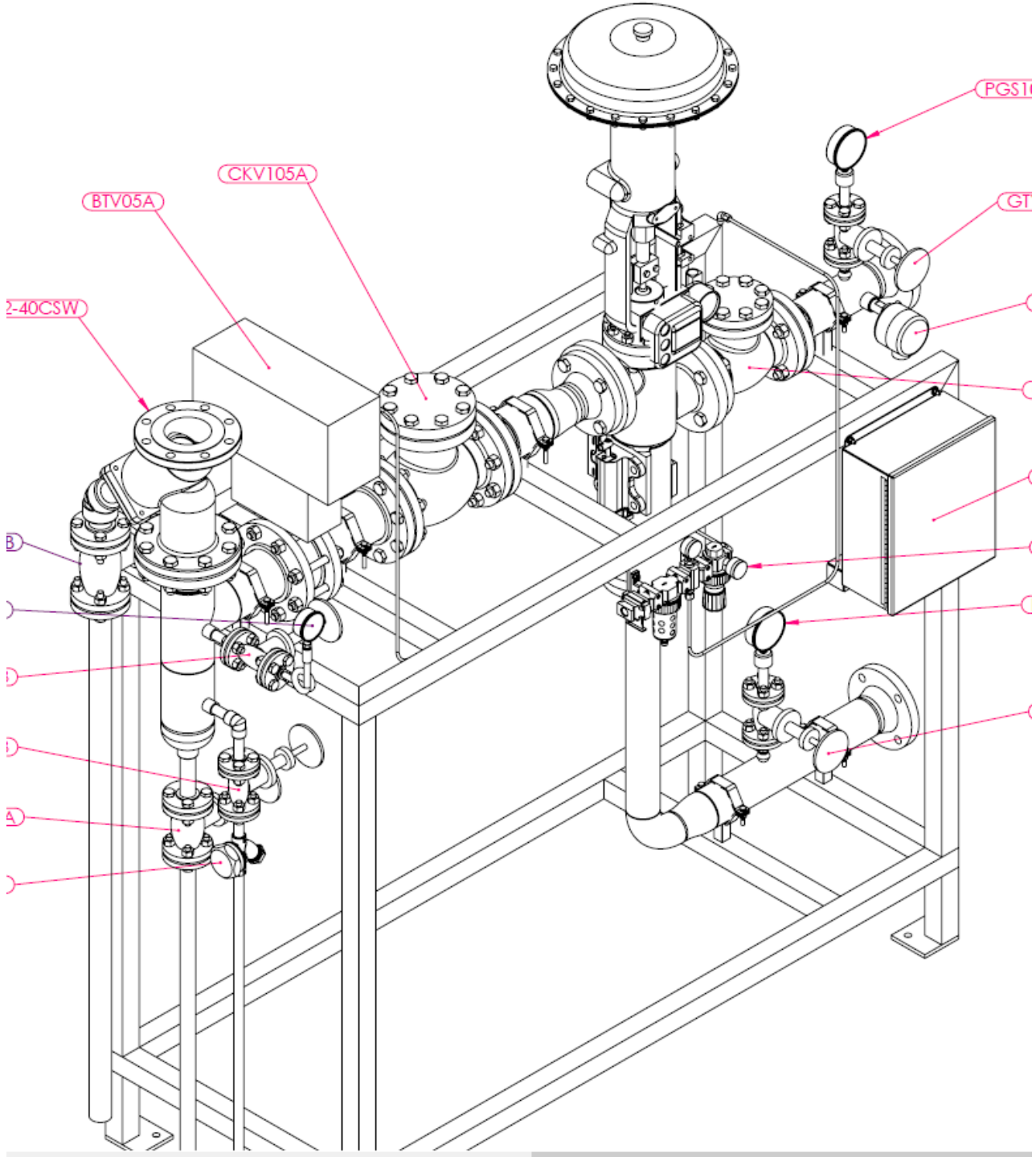
Heating System History of Tank

System	Time Period	Reason(s) for Removal
Steam Coil – inside of tank	1985 - ?	Coil failed
Direct 65# steam injection on Recirculation Line with Steam Control Valve	? - 1997	Piping at injection point failed every 3 months
Steam Circulating Eductors - inside of tank	1997 – July 2019	High Maintenance and the tank rebuild design would be at-risk of overheating
HydroHeater® on Recirculation Line	July 2019 - Present	

Steam Heating Options Explored

Existing Steam Eductor System	Based on past history and the potential for overheating it was ruled out.
External Heat Exchanger	History of leakage and pluggage in the industry. It was ruled out
PIK™ Heater	Quinnesec history is a short life – ruled out
Hydro Thermal K Series Heater	Proven at the Verso Androscoggin Mill – Selected

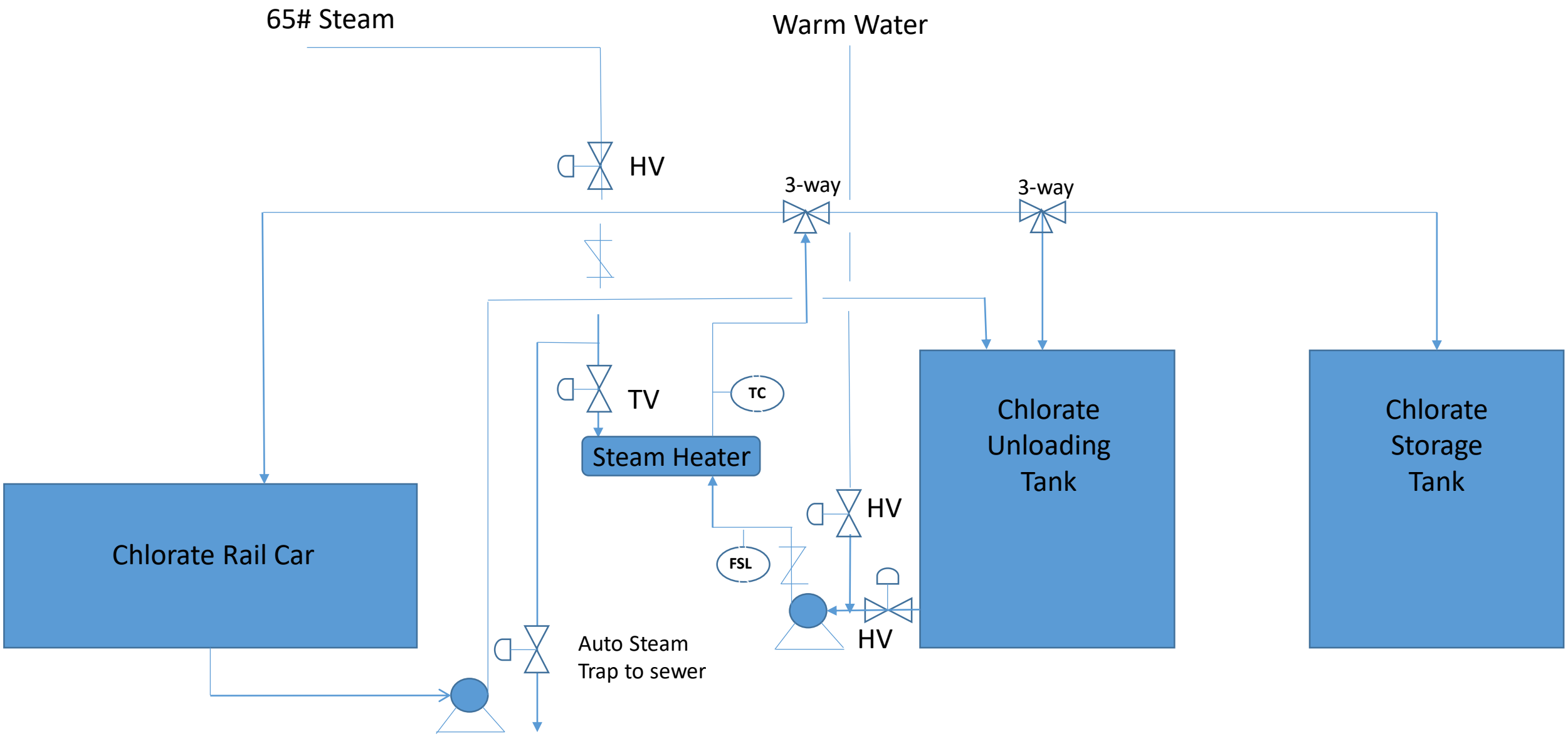
http://www.hydro-thermal.com/products


CKV105A
BTV05A
2-40CSW
GT

Installed Heater

Installed Heater and Transfer/Recirc Pump

Chlorate Unloading & Storage System



Hydroheater® Info

- Model K612
- Operates similarly to a steam control valve
- Interlocked to prevent exceeding FRP temperature maximum
- Comes with a flow switch to prevent adding steam with no flow of fluid to be heated
- Recommended to have an automated flushing sequence
- Has been running since early July with no issues
- 2205 Alloy on wetted parts

Additional System Improvements

- Added an automated fill & flush sequence by actuating the water fill valve and Circulation Pump suction valve / Tank Isolation valve. These valves replaced manual valves.

Control Changes

- Temperature set-point is now run off the recirculation temperature element with the tank temperature acting as an indication and interlock.
- Created an autofill function for the unloading water level

Questions?

Thank You