STW Water Process & Technologies

A Subsidiary of STW Resources Holding

"A Water Solutions Company"

OTCQB: STWS

STW Water Process & Technologies

"Capabilities for Municipal & Industrial Applications"

STW WATER CAPABILITIES: STW assesses the customer's water processing needs and oversees all project phases including; Analysis, Regulatory, Technology, Implementation and Operation. STW's business model provides consultation services, full process design & engineering, fabrication, installation & commissioning, training, on-going operation & full maintenance, troubleshooting, repairs and other services.

STW BUSINESS MODEL: STW Water will design, build, own and operate water systems for some customers simply offering our reclamation and water management services. NO capital expense to our Customers for our systems. STW will process water for a fee per 1,000 gallons.

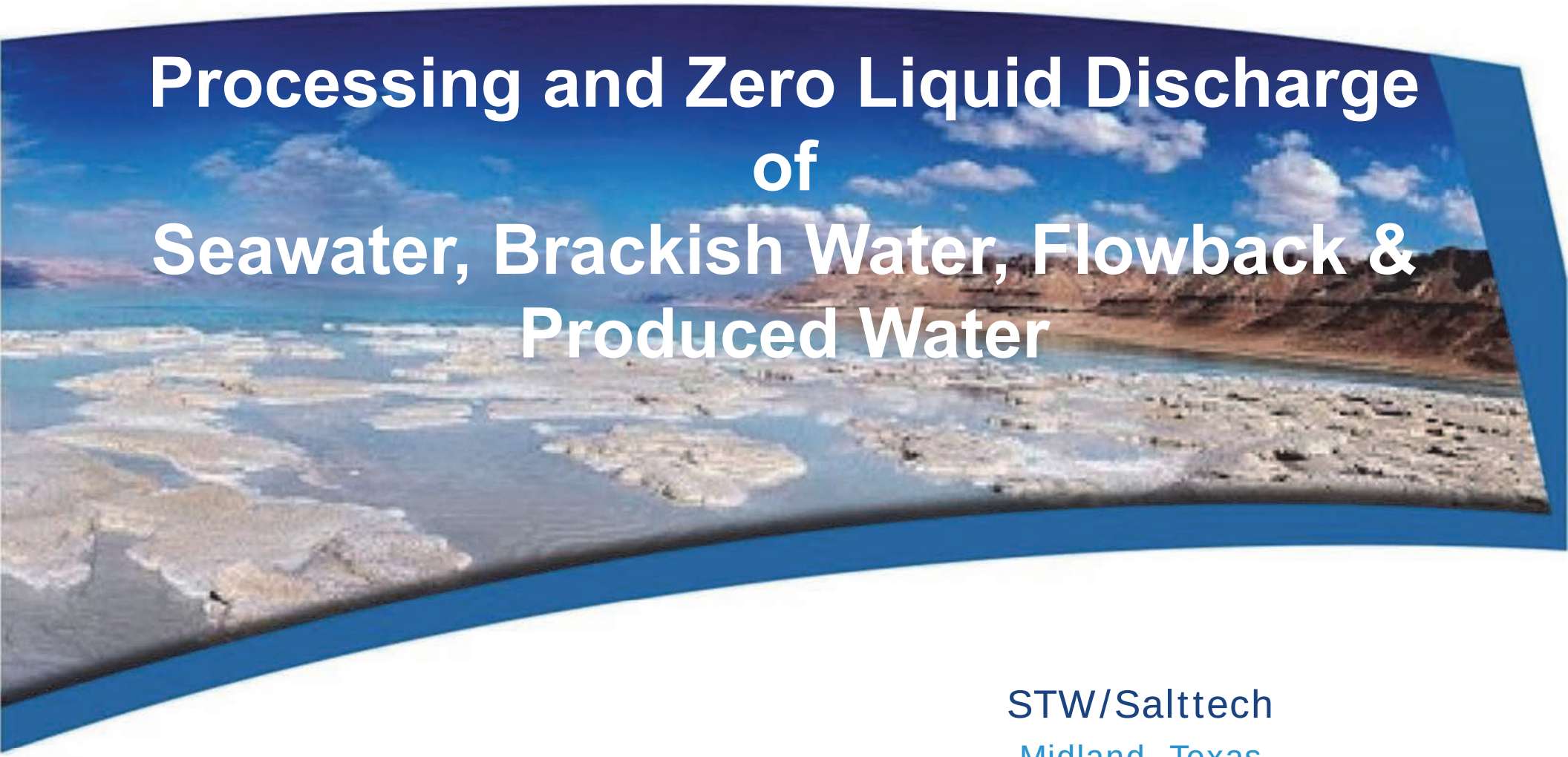
STW provides industry leading patented technologies with Texas based Manufacturing Partners:

- **DESALINATION:** Brackish water, High brackish water or Seawater or Geothermal Water: STW's DyVaR system combined with a Hybrid high brackish high recovery or Seawater Reverse Osmosis System or the water from geothermal operations will have no environmentally sensitive concentrated brine reject discharged into the local waterways.
- **ZERO LIQUID DISCHARGE:** STW DyVar technology is a Zero Liquid Discharge system capable for 95%+ of the fresh water recovery in the process.
- **TOILET TO TAP TECHNOLOGY:** STW's Toilet to Tap technology with its advanced pre-treatment process combined with Hybrid high brackish high recovery or Seawater Reverse Osmosis System is capable to purify contaminated water with variety of complex water quality thereby preventing fouling attacks on membranes & allowing reliable operation with significantly reduced operating expenses and decreased power consumption.
- **NEW EMERGING TECHNOLOGY:** STW with its manufacturing partner is developing patent process design capable to remove all contaminants in water but chlorides (hardness, sulfates, TSS, hydrocarbons) along with a patent process design for leachate removal. These patented processes will be highly beneficial to oil & gas market for water reclamation and reuse.

SALTTECH
RESPONSIBLE BRINE PROCESSING

STW
Resources

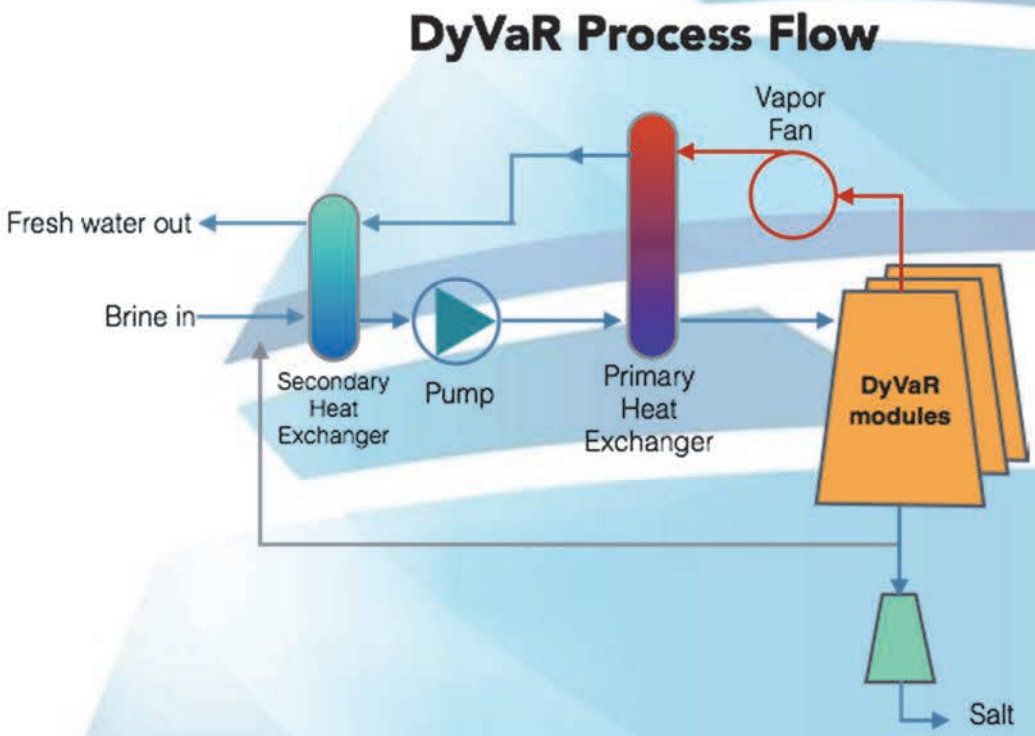
Processing and Zero Liquid Discharge of Seawater, Brackish Water, Flowback & Produced Water



STW/Salttech
Midland, Texas

Salttech DyVaR Desalination Solution

This system is currently operating in West Texas processing brackish water for a municipality



ENVIRONMENTAL BENEFITS: If the STW/Salttech DyVaR Technology is placed inline with a Seawater Desalination System or used with a Geothermal Operation, there will be NO potentially environmentally sensitive brine concentrate discharged into the local waterways since the system is Zero Liquid Discharge and 93-97% of the fresh water is recovered in the process. The waste stream is salt crystals and minerals.

STW/Salttech Technology: Dynamic Vapor Recompression (DyVaR) DESALINATION TECHNOLOGY

- DyVaR applicable for all kinds of highly concentrated fluids
  - Removes Total Dissolved Solids (TDS)
  - Removes Hardness
  - Removes TSS
  - Removes Volatiles
  - Disinfection technology
- DyVaR is a ***modular system***
- DyVaR uses ***no chemicals***,
- DyVaR uses ***no membranes***
- *DyVaR requires* ***no pretreatment***
- DyVaR requires little operator attention
- DyVaR has very high energy efficiency
- DyVaR is ***insensitive to scaling or fouling***
- DyVaR is designed for continuous operation

- **ENVIRONMENTAL IMPACT: If placed inline with a Seawater RO System or used with a geothermal operation, there will be no potentially environmentally sensitive brine concentrate discharged into the local waterways since the system is Zero Liquid Discharge and 93-97%+ of the fresh water is recovered in the process. The waste stream is salt crystals and minerals.**

Crystallization

Utilizing the DyVaR system, it is possible to concentrate any saline liquid to a crystallization level. It is also possible to create a 10# Brine liquid.

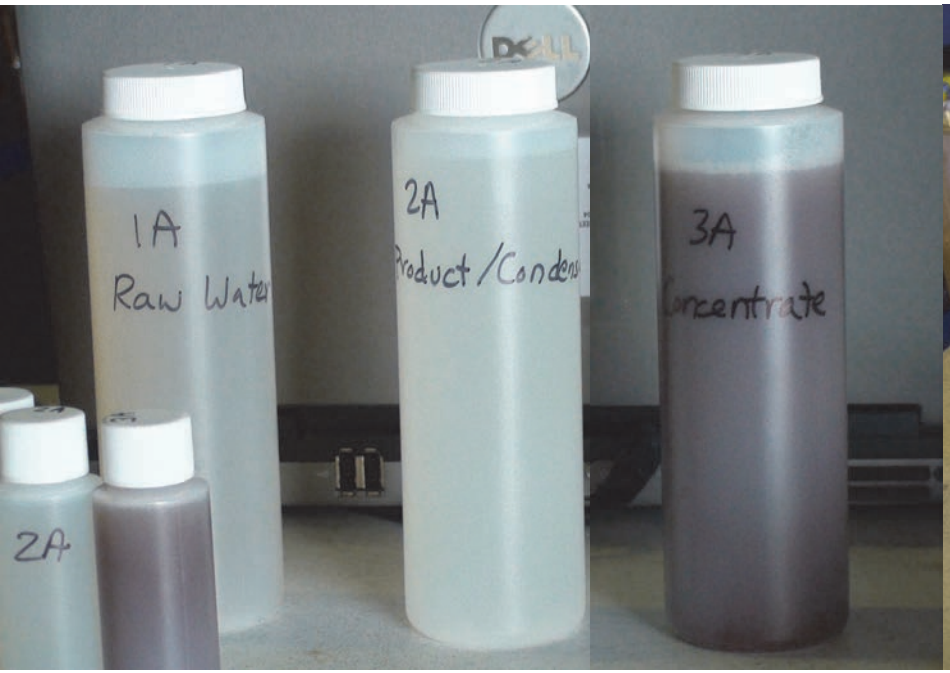
Ultra Low Scaling - In comparison to other evaporation technologies, any scaling effects in the DyVaR system will be mitigated since boiling place in the individual DyVaR modules and not in the heat exchanger. The re-circulation rate combined with the velocity of the re-circulating liquid is so high that any formed crystal will be removed by the force of the liquid itself.

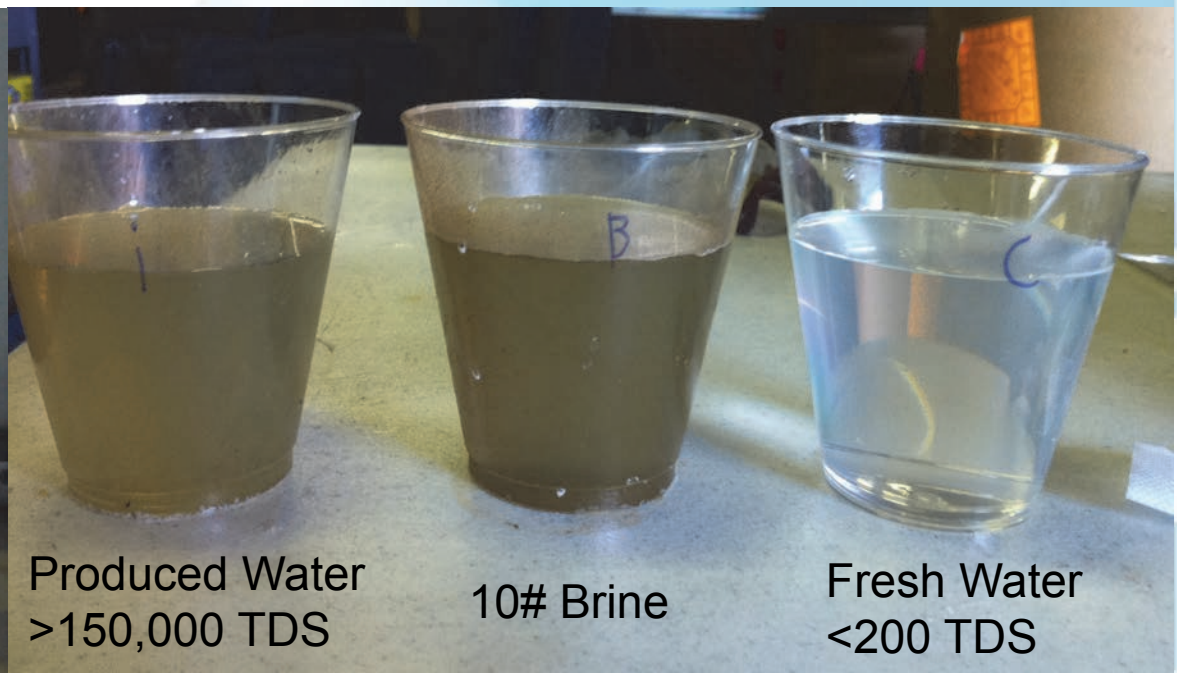
No Chemicals or Filters Used - Footprint for a 3,000 bbl/day system is approximately 30' x 40'

Footprint for a 5,000 bbl/day system is approximately 50' x 80'

Zero Liquid Discharge (ZLD) - The two effluent streams are approximately 96+% fresh water and 10# Brine or salt crystals. If 10# brine is needed for drilling operations, the crystallized salt can be transported and mixed at the location for a lower cost than transporting liquid brine.

Oil & Gas Produced and Flowback Water - Will process up to 300,000 TDS water and reduce TDS and salt content to <200 TDS

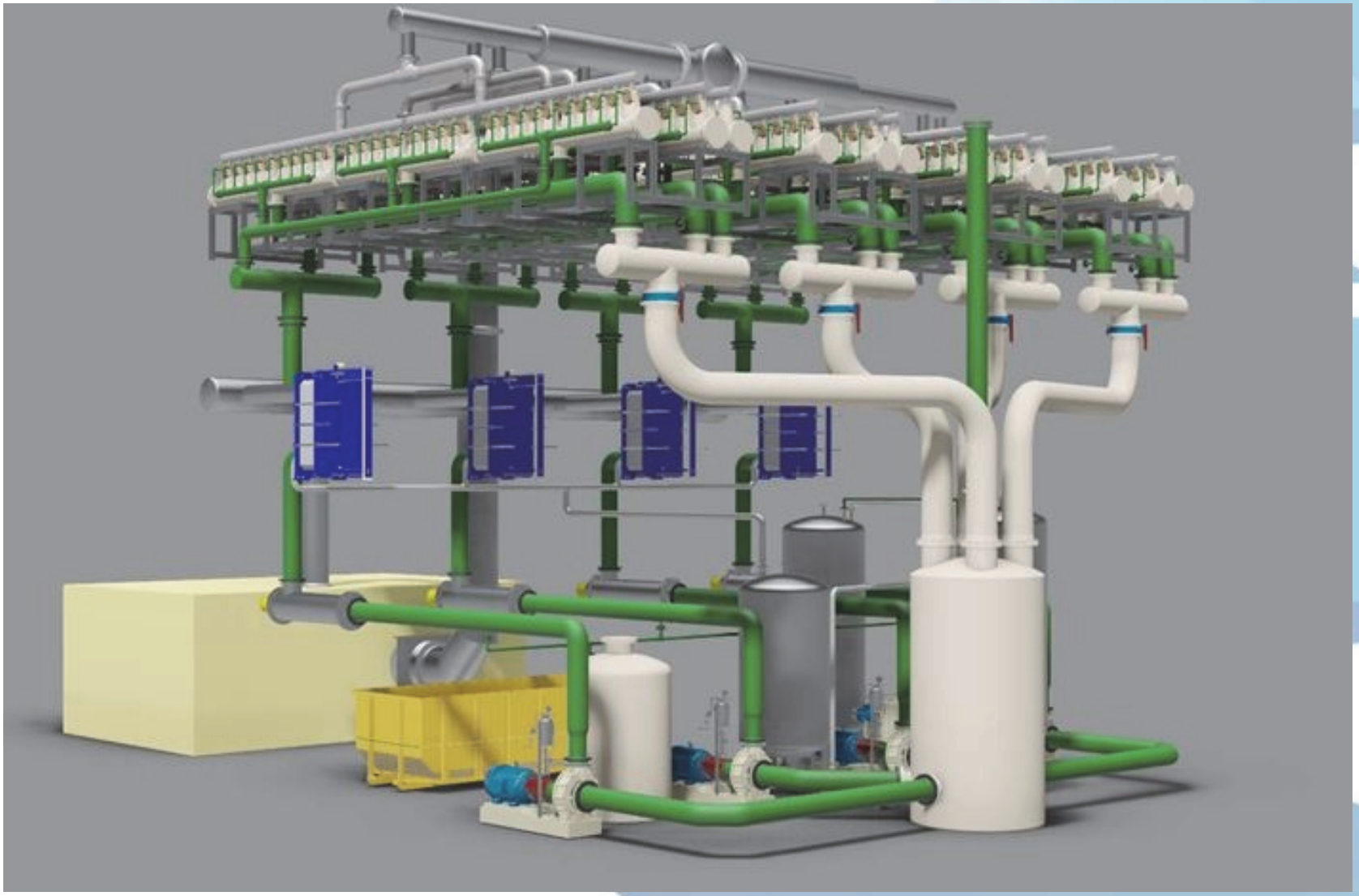




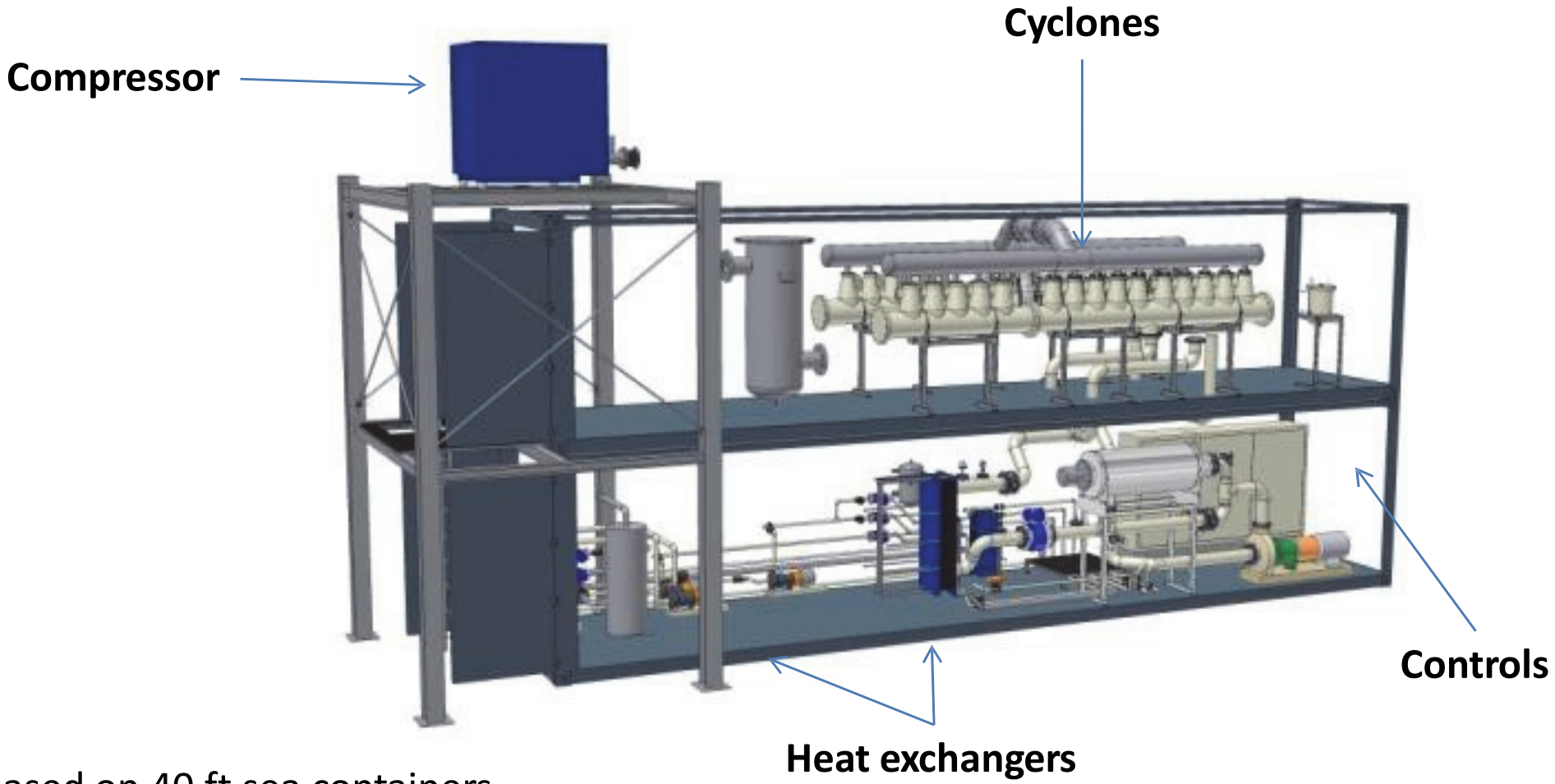
STW Water Process & Technologies

"DyVaR 2700 3-D Drawing"

A Subsidiary of STW Resources Holding

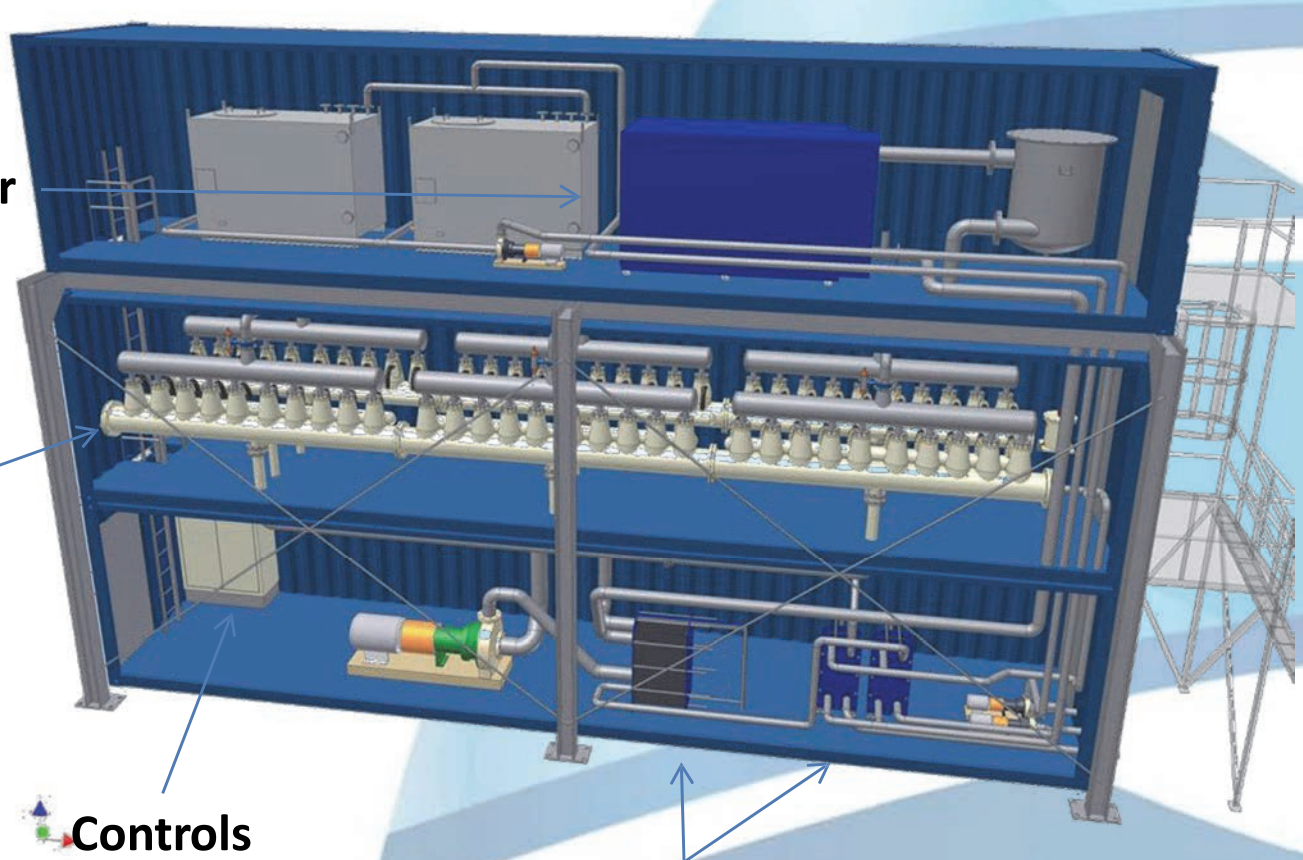


Demo system- Containerized Model



Based on 40 ft sea containers

Containerized Modular Design

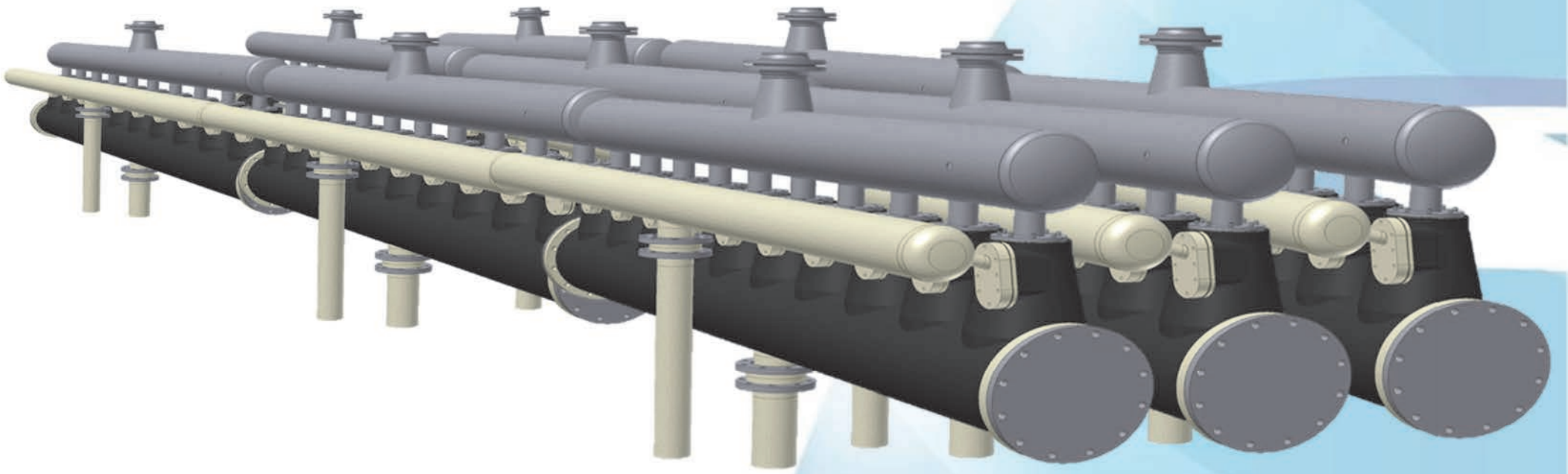


Based on 40 ft sea containers

STW Water Process & Technologies

"DyVaR Systems"

A Subsidiary of STW Resources Holding



30 cyclones in row = **1 string**

90 cyclones in 3 rows of 30 = **1 section**

1 string of 3 modules (or 30 cyclones) can be fed from 1 header

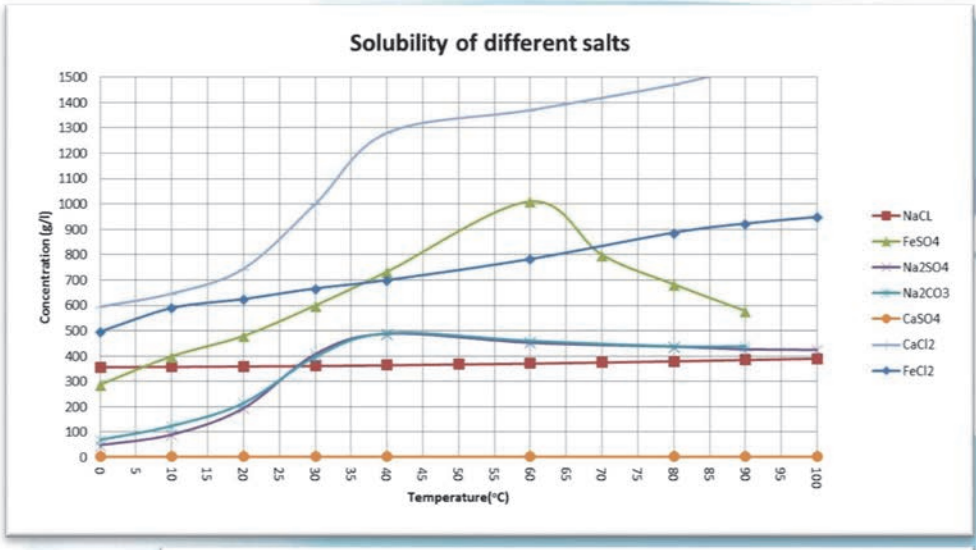
3 strings of 3 modules (or 90 cyclones) can be fed by 1 pump

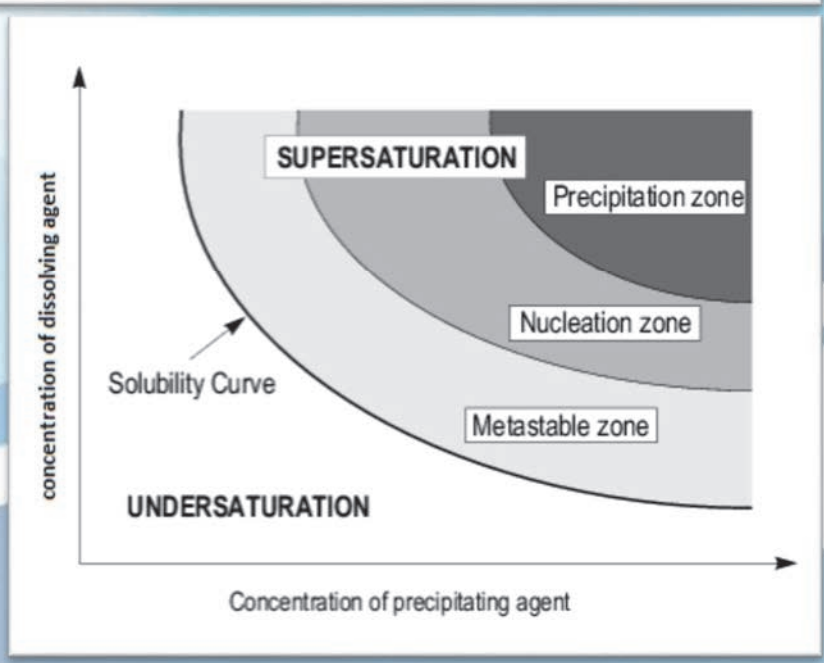
STW Water Process & Technologies

"DyVaR Systems Crystallization"

A Subsidiary of STW Resources Holding

- Positive and negative ions can combine into different molecules
- A molecule will form and crystallize when a super saturation of the positive and negative ions that make it up are present
- Salt molecules have different points of super saturation depending on for example: composition, temperature, pressure etc.

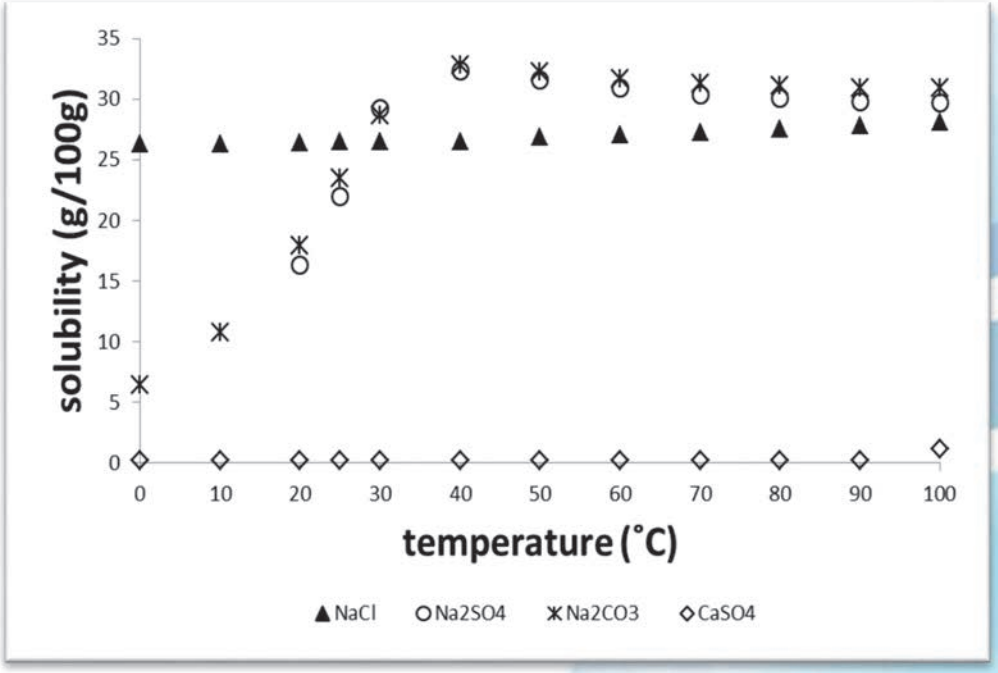




STW Water Process & Technologies

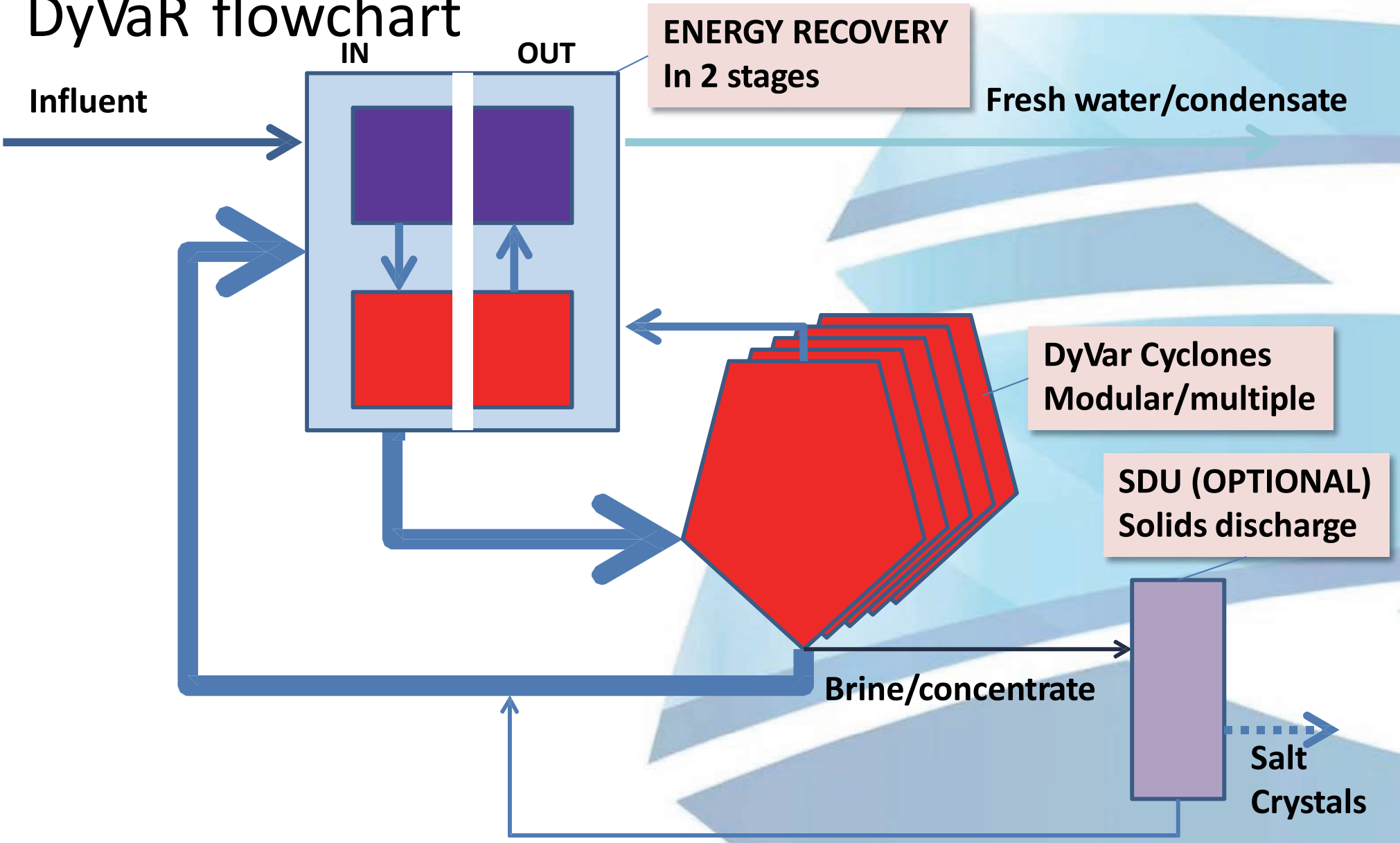
"DyVaR Systems Crystallization"

A Subsidiary of STW Resources Holding



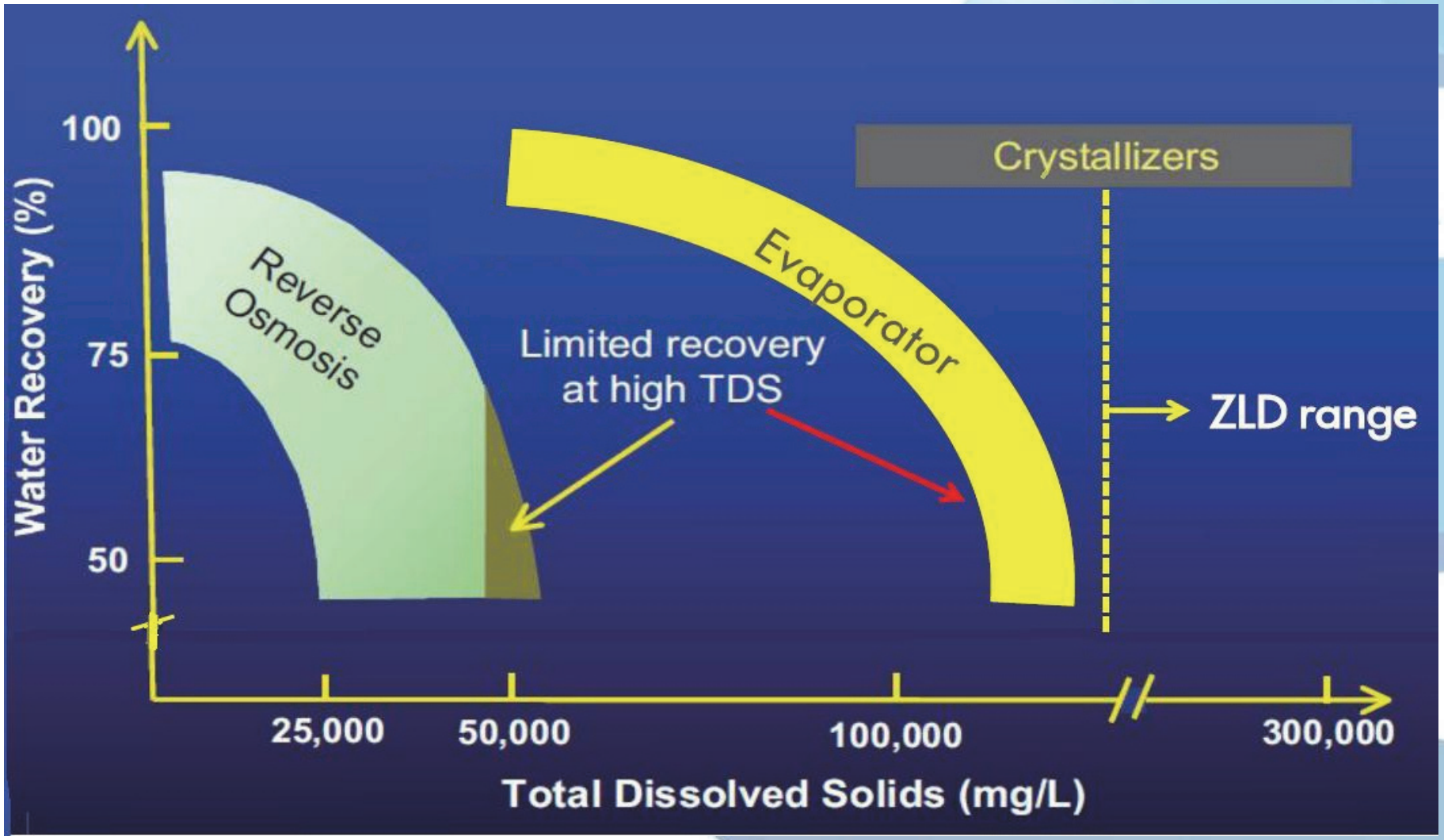
- In order to maintain the desired 10 ppg density of the fluid with the provided legacy specs*, the sodium chloride needs to be concentrated to its saturation point.
- To create a consistent brine, a concentration point is chosen just above the crystallization point of sodium chloride. This ensures that sodium chloride is optimally dissolved when it exits the unit. And any exces caused by fluctuations in the composition of the influent will precipitate.
- While concentrating the solution up to the saturation point of sodium chloride, a precipitation of Calcium sulphate and carbonate will occur because they become oversaturated at far lower concentrations.
- Solids can be removed from the brine stream through physical separation.

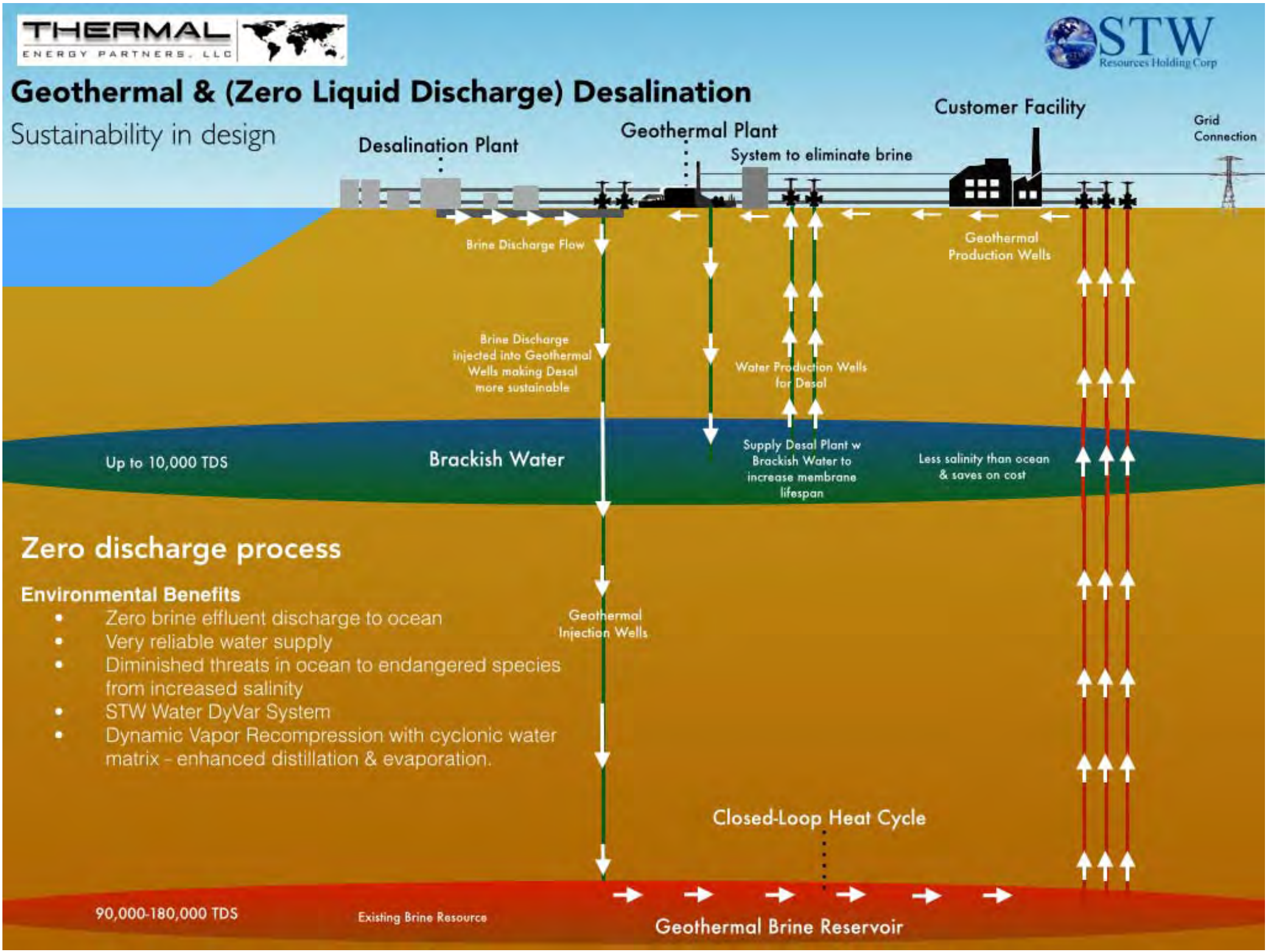
DyVaR flowchart



DyVaR

*basics for this diagram are based on information of Royal Dutch Shell/Shell Oil




THERMAL ENERGY PARTNERS, LLC
STW Resources Holding Corp
Geothermal & (Zero Liquid Discharge) Desalination
Sustainability in design
Desalination Plant
Geothermal Plant
System to eliminate brine
Customer Facility
Grid Connection
Brine Discharge Flow
Geothermal Production Wells
Brine Discharge injected into Geothermal Wells making Desal more sustainable
Water Production Wells for Desal
Up to 10,000 TDS
Brackish Water
Supply Desal Plant w Brackish Water to increase membrane lifespan
Less salinity than ocean & saves on cost
Zero discharge process
Environmental Benefits
Zero brine effluent discharge to ocean
Very reliable water supply
Diminished threats in ocean to endangered species from increased salinity
STW Water DyVar System
Dynamic Vapor Recompression with cyclonic water matrix - enhanced distillation & evaporation.
Geothermal Injection Wells
Closed-Loop Heat Cycle
90,000-180,000 TDS
Existing Brine Resource
Geothermal Brine Reservoir

DyVaR PICTURES

Salttech's DyVaR Picture from an ongoing project - Loving County, Mentone Texas

PBELAB

10014 SCR 1213
Midland, Tx 79706
432-661-4184 Phone

SUMMARY REPORT

STW Resources		Project:	SaltTech
3424 South County Road 1192		Project Number:	BJ SWD 1
Midland TEXAS, 79706		Project Manager:	Alan Murphy
SAMPLED:	08/31/14 to 09/01/14	**REPORTED:**	10/14/14 15:49
RECEIVED:	09-02-201		

LAB #		4I02011-03	4I02011-04	-	-	-	-
MATRIX	Minimum	Water	Water	-	-	-	-
SAMPLE ID	Reporting Limit	BJ SWD 1 Influent	BJ 1 SWD Freshwater	-	-	-	-

General Chemistry Parameters by EPA / Standard Methods (Water)

Total Alkalinity	2.00	mg/L	1060	498	-	-	-	-
Chloride	0.500	mg/L	47100	2.84	-	-	-	-
Specific Conductance (EC)	5.00	umhos/cm	83500	854	-	-	-	-
Total Hardness	5.00	mg/L	27100	<5.00	-	-	-	-
pH		pH Units	7.07	9.05	-	-	-	-
Temperature		pH Units	21.70	21.80	-	-	-	-
Total Dissolved Solids	20.0	mg/L	73700	56.0	-	-	-	-
Sulfate	1.00	mg/L	520	28.6	-	-	-	-

Total Metals by EPA / Standard Methods (Water)

Barium	0.00100	mg/L	8.80 [2]	<0.200 [2]	-	-	-	-
Calcium	0.0810	mg/L	6500 [2]	0.234 [2]	-	-	-	-
Iron	0.0170	mg/L	57.6 [2]	0.268 [2]	-	-	-	-
Magnesium	0.0360	mg/L	2640 [2]	<0.200 [2]	-	-	-	-
Manganese	0.00100	mg/L	<5.00 [2]	<0.200 [2]	-	-	-	-
Sodium	0.0100	mg/L	56100 [2]	2.63 [2]	-	-	-	-
Silica	0.0100	mg/L	18.3 [2]	0.480 [2]	-	-	-	-

Special Notes

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2 = Certification in process for this analyte.

Permian Basin Environmental Lab, L.P.

Brent Barron
Technical Director

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Midland, Tx 79706
432-661-4184 Phone

SUMMARY REPORT

STW Resources		Project:	Salttech DyVaR Pilot Test
3424 South County Road 1192		Project Number:	SWD-Ft Stockton
Midland TEXAS, 79706		Project Manager:	Stan Weiner
SAMPLED:	09/03/14	**REPORTED:**	10/14/14 15:56
RECEIVED:	09-04-201		

LAB #		4I04002-01	4I04002-02	4I04002-03	-	-	-
MATRIX	Minimum	Water	Water	Water	-	-	-
SAMPLE ID	Reporting Limit	SWD #2 Influent	SWD #2 Condensate	SWD #2 10lb Brine	-	-	-

General Chemistry Parameters by EPA / Standard Methods (Water)

Total Alkalinity	2.00	mg/L	1050	470	940	-	-	-
Chloride	0.500	mg/L	66900	3.38	203000	-	-	-
Specific Conductance (EC)	5.00	umhos/cm	153000	819	296000	-	-	-
Total Hardness	5.00	mg/L	5400	<5.00	48100	-	-	-
pH		pH Units	7.48	8.44	7.17	-	-	-
Temperature		pH Units	22.00	22.10	22.10	-	-	-
Total Dissolved Solids	20.0	mg/L	85500	50.0	329000	-	-	-
Sulfate	1.00	mg/L	164	22.1	95.3	-	-	-

Total Metals by EPA / Standard Methods (Water)

Barium	0.00100	mg/L	26.7 [2]	<0.200 [2]	237 [2]	-	-	-
Calcium	0.0810	mg/L	1640 [2]	1.53 [2]	14000 [2]	-	-	-
Iron	0.0170	mg/L	14.5 [2]	0.798 [2]	331 [2]	-	-	-
Magnesium	0.0360	mg/L	318 [2]	0.262 [2]	3200 [2]	-	-	-
Manganese	0.00100	mg/L	6.37 [2]	<0.200 [2]	<5.00 [2]	-	-	-
Sodium	0.0100	mg/L	53500 [2]	3.04 [2]	277000 [2]	-	-	-
Silica	0.0100	mg/L	5.20 [2]	0.509 [2]	89.0 [2]	-	-	-

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Midland, Tx 79706
432-661-4184 Phone

SUMMARY REPORT

STW Resources		Project:	SaltTech
3424 South County Road 1192		Project Number:	RO Reject
Midland TEXAS, 79706		Project Manager:	Alan Murphy
SAMPLED:	08/31/14	**REPORTED:**	10/14/14 15:45
RECEIVED:	09-02-201		

LAB #		4I02011-01	4I02011-02	-	-	-	-
MATRIX	Minimum	Water	Water	-	-	-	-
SAMPLE ID	Reporting Limit	Downtown RO Reject	Downtown RO Freshwater	-	-	-	-

General Chemistry Parameters by EPA / Standard Methods (Water)

Total Alkalinity	2.00	mg/L	<5.00	11.0	-	-	-	-
Chloride	0.500	mg/L	2540	4.73	-	-	-	-
Specific Conductance (EC)	5.00	umhos/cm	13900	515	-	-	-	-
Total Hardness	5.00	mg/L	3950	<5.00	-	-	-	-
pH		pH Units	2.17	4.43	-	-	-	-
Temperature		pH Units	21.40	21.50	-	-	-	-
Total Dissolved Solids	20.0	mg/L	16300	56.0	-	-	-	-
Sulfate	1.00	mg/L	4560	7.64	-	-	-	-

Total Metals by EPA / Standard Methods (Water)

Barium	0.00100	mg/L	<0.200 [2]	<0.200 [2]	-	-	-	-
Calcium	0.0810	mg/L	1050 [2]	0.972 [2]	-	-	-	-
Iron	0.0170	mg/L	6.61 [2]	0.272 [2]	-	-	-	-
Magnesium	0.0360	mg/L	322 [2]	0.308 [2]	-	-	-	-
Manganese	0.00100	mg/L	<0.200 [2]	<0.200 [2]	-	-	-	-
Sodium	0.0100	mg/L	2480 [2]	2.12 [2]	-	-	-	-
Silica	0.0100	mg/L	21.1 [2]	<0.200 [2]	-	-	-	-

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Permian Basin Environmental Lab, L.P.

Brent Barron

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10014 SCR 1213
Midland, Tx 79706
432-661-4184 Phone

SUMMARY REPORT

STW Resources		Project:	Salttech DyVaR Pilot Test
3424 South County Road 1192		Project Number:	Billy Jackson SWD
Midland TEXAS, 79706		Project Manager:	Stan Weiner
SAMPLED:	09/23/14	**REPORTED:**	10/13/14 12:48
RECEIVED:	09-24-201		

LAB #		4I24009-04	4I24009-05	-	-	-	-
MATRIX	Minimum	Water	Water	-	-	-	-
SAMPLE ID	Reporting Limit	SWD Influent	SWD Effluent	-	-	-	-
Total Metals by EPA / Standard Methods (Water)							
Manganese	0.00100 mg/L	0.121 [1]	0.0180 [1]	-	-	-	-
Sodium	0.0100 mg/L	29700 [1]	0.950 [1]	-	-	-	-
General Chemistry Parameters by EPA / Standard Methods (Sludge)							
pH	0.10 pH Units	6.41	9.54	-	-	-	-
General Chemistry Parameters by EPA / Standard Methods (Water)							
Total Alkalinity	2.00 mg/L	740	710	-	-	-	-
Carbonate Alkalinity	0.100 mg/L	<0.100	<0.100	-	-	-	-
Bicarbonate Alkalinity	2.00 mg/L	740	710	-	-	-	-
Chloride	0.500 mg/L	48300	1.42	-	-	-	-
Specific Conductance (EC)	5.00 umhos/cm	48900	766	-	-	-	-
Total Hardness	5.00 mg/L	400	<5.00	-	-	-	-
Total Dissolved Solids	20.0 mg/L	77200	30.0	-	-	-	-
Sulfate	1.00 mg/L	245	43.4	-	-	-	-
Total Metals by EPA / Standard Methods (Water)							
Barium	0.00100 mg/L	11.7 [1]	0.0190 [1]	-	-	-	-
Calcium	0.0810 mg/L	1450 [1]	0.282 [1]	-	-	-	-
Iron	0.0170 mg/L	3.42 [1]	1.81 [1]	-	-	-	-
Magnesium	0.0360 mg/L	400 [1]	0.0720 [1]	-	-	-	-
Silica	0.0100 mg/L	32.4 [1]	2.56 [1]	-	-	-	-

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Technical Director

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STW Water Process & Technologies

Water Management, Water Conservation, and Water Reclamation

STW currently operates in West Texas, Oklahoma, & New Mexico with expansion plans in South Texas and other areas of the North Americas, Mexico, Central America, and the Caribbean.

Senior Management

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