

# Texas Desal 2017

DEVELOPING A DROUGHT-PROOF WATER SUPPLY



Texas P3 at Work–EWM’s Full Recovery Desalination in El Paso



# Definition

## **con-cen-trate**

/ˈkənsənˌtrāt/

*noun*

*a substance made by removing water or other diluting agent; a concentrated form of something, especially food.*

## **brine**

/brīn/

*noun*

*water saturated or strongly impregnated with salt.*





# Traditional Disposal Options

- Surface discharge
- Wastewater treatment plant
- Evaporation
- Deep well injection
- Zero liquid discharge



# Inland Disposal

- Surface discharge ✓ Not available
- Wastewater treatment plant ✓ Uses hydraulic capacity of WWTP
- Evaporation ✓ High land cost
- Deep well injection ✓ Costly and may not be suitable
- Zero liquid discharge ✓ Highest cost option

Makes inland brackish expensive or infeasible



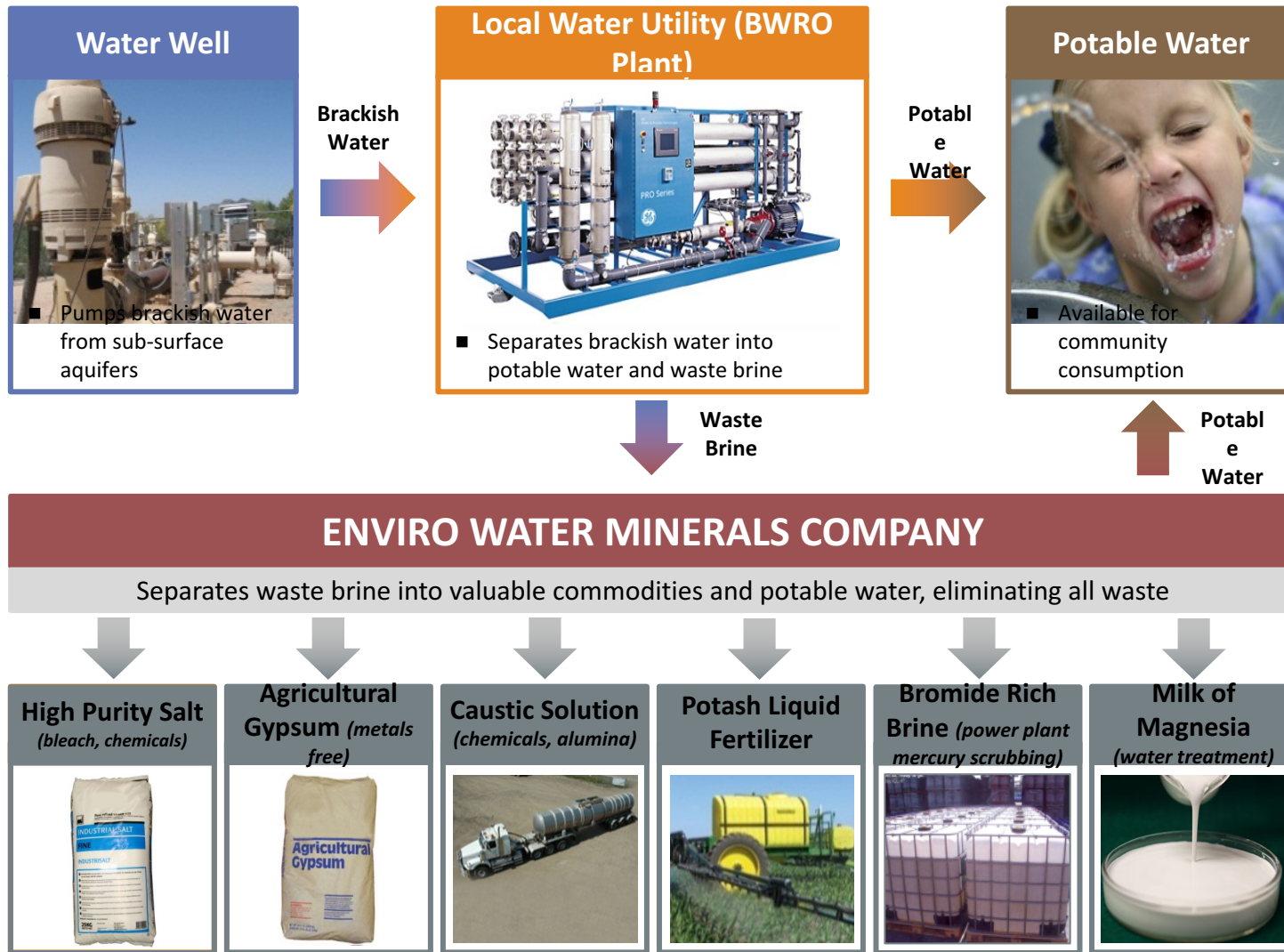


# WHAT IF.....

- ❑ IT'S NOT A WASTE
- ❑ IT HAS VALUABLE USES
- ❑ IT'S A WATER SUPPLY

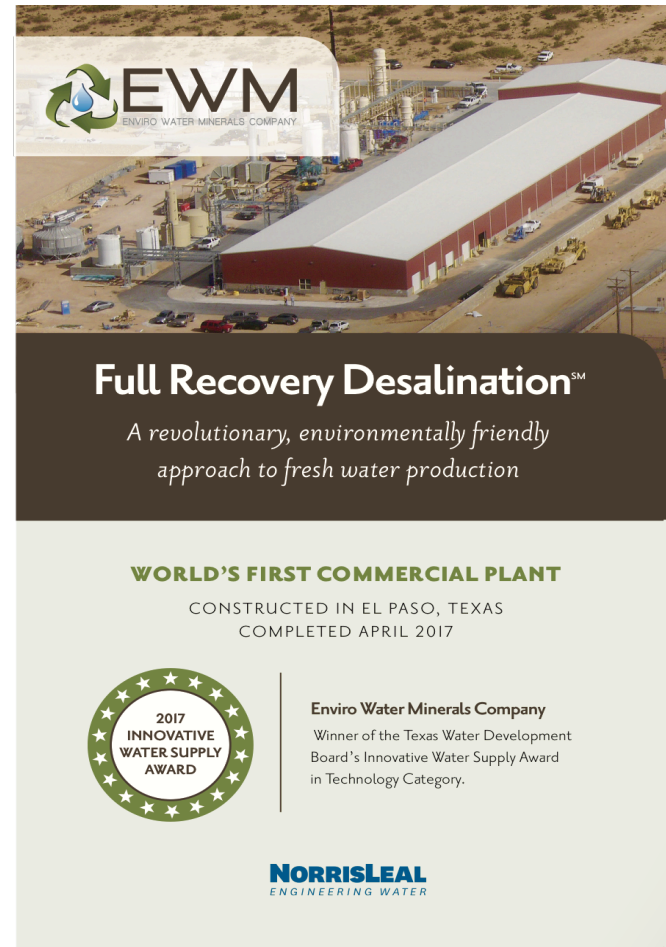


# El Paso Full Recovery Desalination



# El Paso Project Timeline

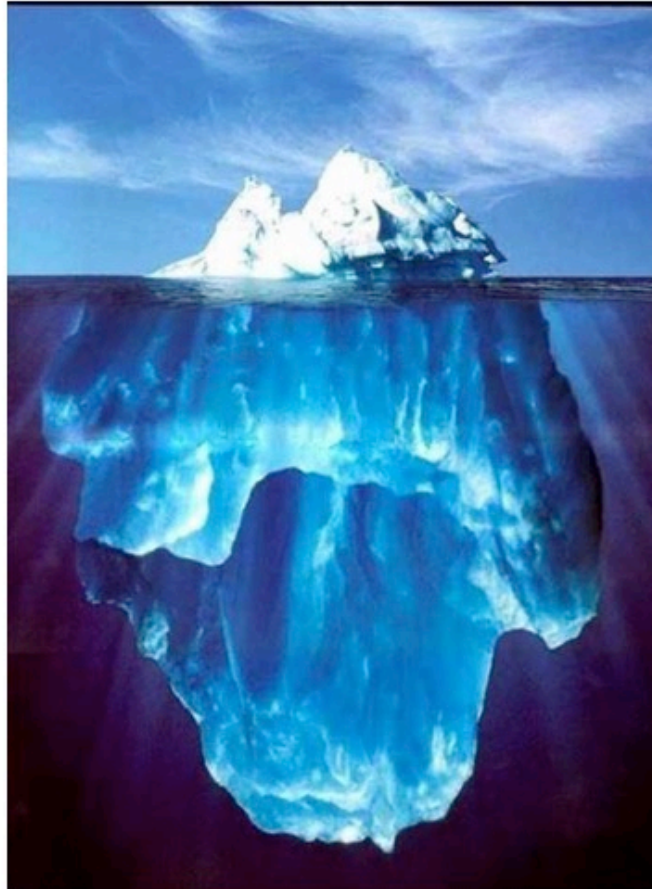
- Piloting completed in early 2014
- TCEQ Pilot approval late 2014
- Develop P&IDs 2015
- Design water process/TCEQ approval mid 2015
- Develop quote book for investors late 2015
- Financial close Dec 2015
- Break ground Feb 2016
  - over 300 PO's and Contracts
  - 70-100 employees
  - 14 months construction
- Ribbon cutting April 2017
- Currently commissioning





# Unlikely Candidate

- NorrisLeal – small business
  - Piloting for potable water process
  - TCEQ Approvals
  - Water system design
- High bids received
- Negotiated with NL on T&M to construct
- Negotiated with NL to operate



# Major Project Components

- Brackish RO
- Seawater RO
- Nano Filtration
- EDR
- EDBM
- Water Softeners



# Major Project Components

- 6.5 MW Combustion Turbine
- Acid/Caustic Evaporation
- Tank farm/loading stations
- Magnesium/Gypsum Settling







## EWM Full Recovery Desalination Plant, El Paso, Texas

**NORRISLEAL**  
ENGINEERING WATER



# Lessons Learned

- The good:
  - Ability to change
  - Teamwork
  - Mechanically complete in 14 months
  - Savings of approximately \$25 M
  - Local labor force
- Not so good
  - 7 day work week including most holidays
  - Exceeded budget
  - Underestimated time allotted for commissioning
  - Final design needed before project estimate



# Full Recovery Desalination Costs

Alternative Comparison 10 mgd (millions of dollars) Central Arizona Salinity Study, January 2010							40 MGD Full Recovery Desalination
10 MGD	Pipeline to Yuma	Evaporatio n Pond	Brine Concentra tor	Soften/ RO/ VSEP	Wetlands Surface Discharge	Injection Well	
Capital	\$266.11	\$651.69	\$272.71	\$286.56	\$150.22	\$114.46	Magnesium Hydroxide
O&M	\$0.62	\$3.50	\$29.75	\$6.90	\$1.75	\$11.31	Hydrochloric Acid
Annualized	\$14.92	\$40.26	\$44.40	\$22.30	\$10.37	\$17.46	Caustic Soda
per 1000 gallons	\$4.09	\$11.03	\$12.16	\$6.11	\$2.84	\$4.78	Gypsum
Water Recovered**							Potable Water
* (af)	0	0	10,528	9,238	0	0	44,361
Cost of water recovered			\$12.94	\$7.41			\$3.00-\$4.00/1000





# Reality

Preliminary Design

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Final Design

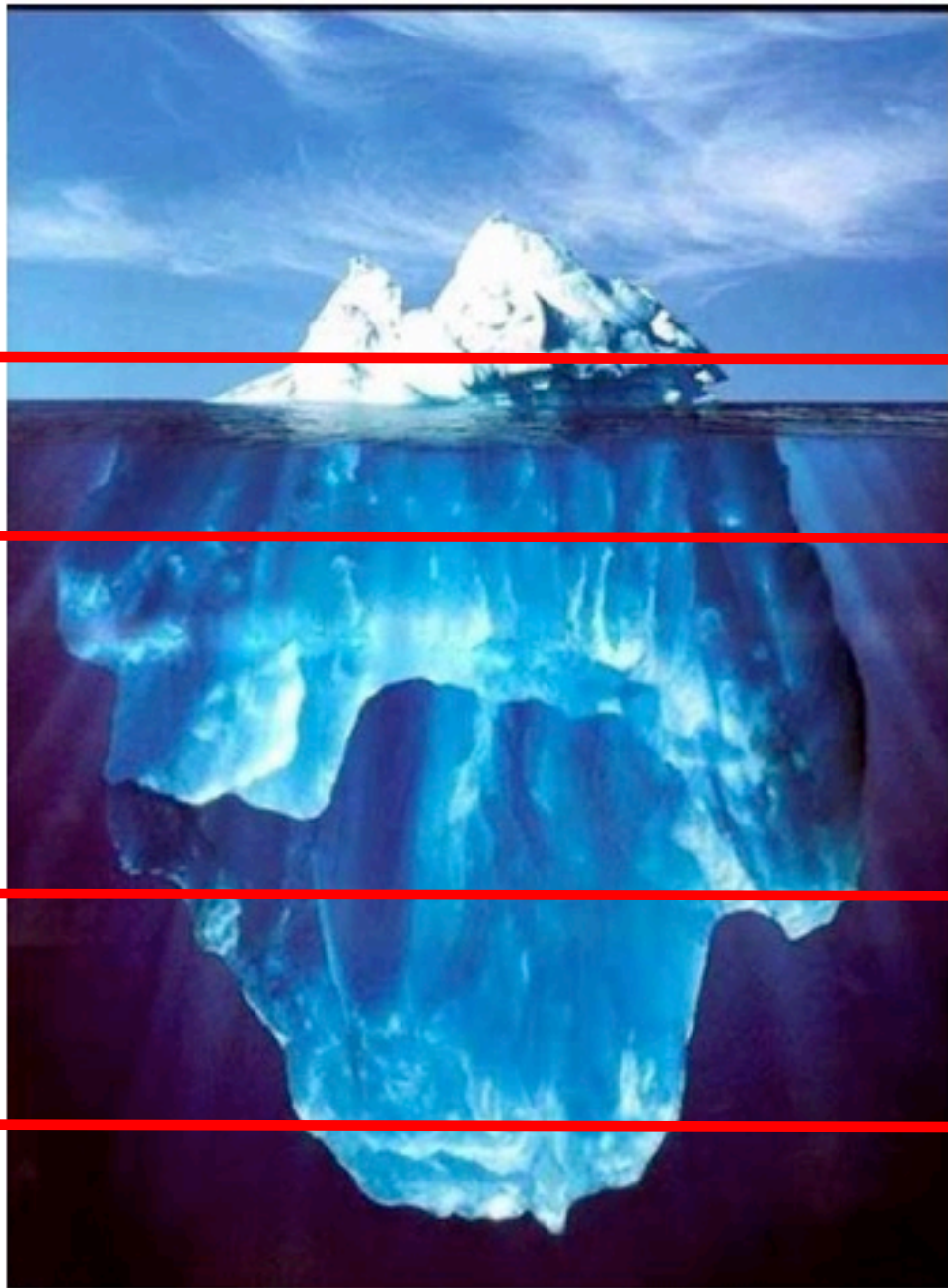
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Construction

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Commissioning

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