

BlueTech Research and Emerging Technologies

Mike Mickley, PE, PhD

Mickley & Associates LLC
BlueTech Research

2020 MSSC Annual Salinity Summit
“One Water...It’s Here”

February 26 – 28, 2020
Las Vegas

Overview

1. BlueTech Research
2. Brief review of emerging high recovery technologies
3. Forthcoming Reclamation report entitled **Emerging Technologies for High Recovery Processing**
4. The importance of **INNOVATION in WATER: BlueTech Research Documentary Video Trailer**

BlueTech Research

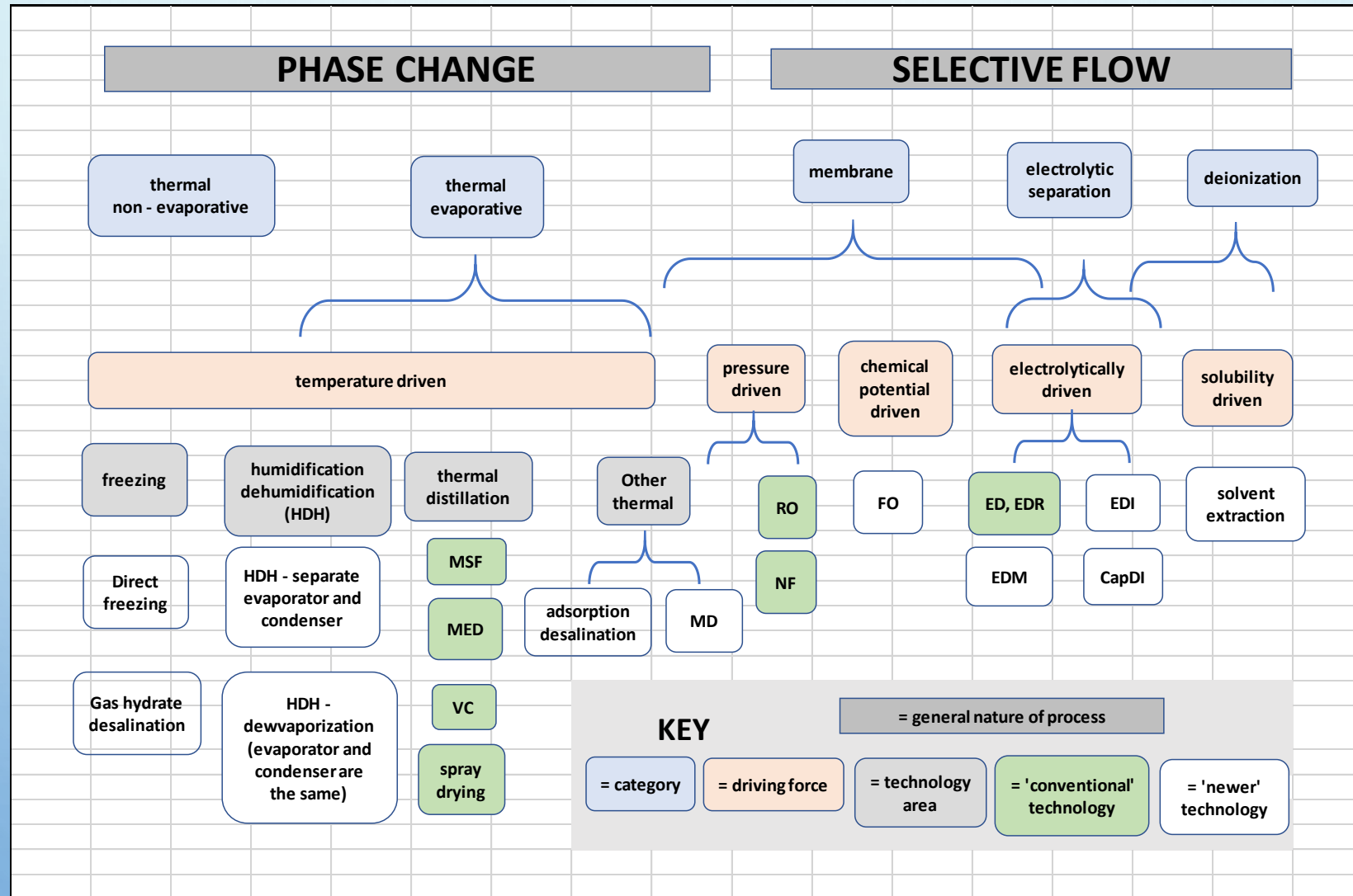
BlueTech Research

- **Water Technology Market Intelligence** company
 - Cork, Ireland and Vancouver, British Columbia
- **Provides investors, water companies, researchers and regulators** with the latest clarity and critical analysis on water technologies and their market areas.
- **BlueTech Research:**
 - **Covers all water-related technologies**
 - **Attends conferences and meetings worldwide**
 - **Gathers and reports intelligence on demand.**
 - **Technology Assessment Group (TAG) members (advisors) cover specific topics and participate in information gathering, reports, webinars, consulting projects with BlueTech Research clients**
- **My area of focus = desalination, brine management, ZLD**

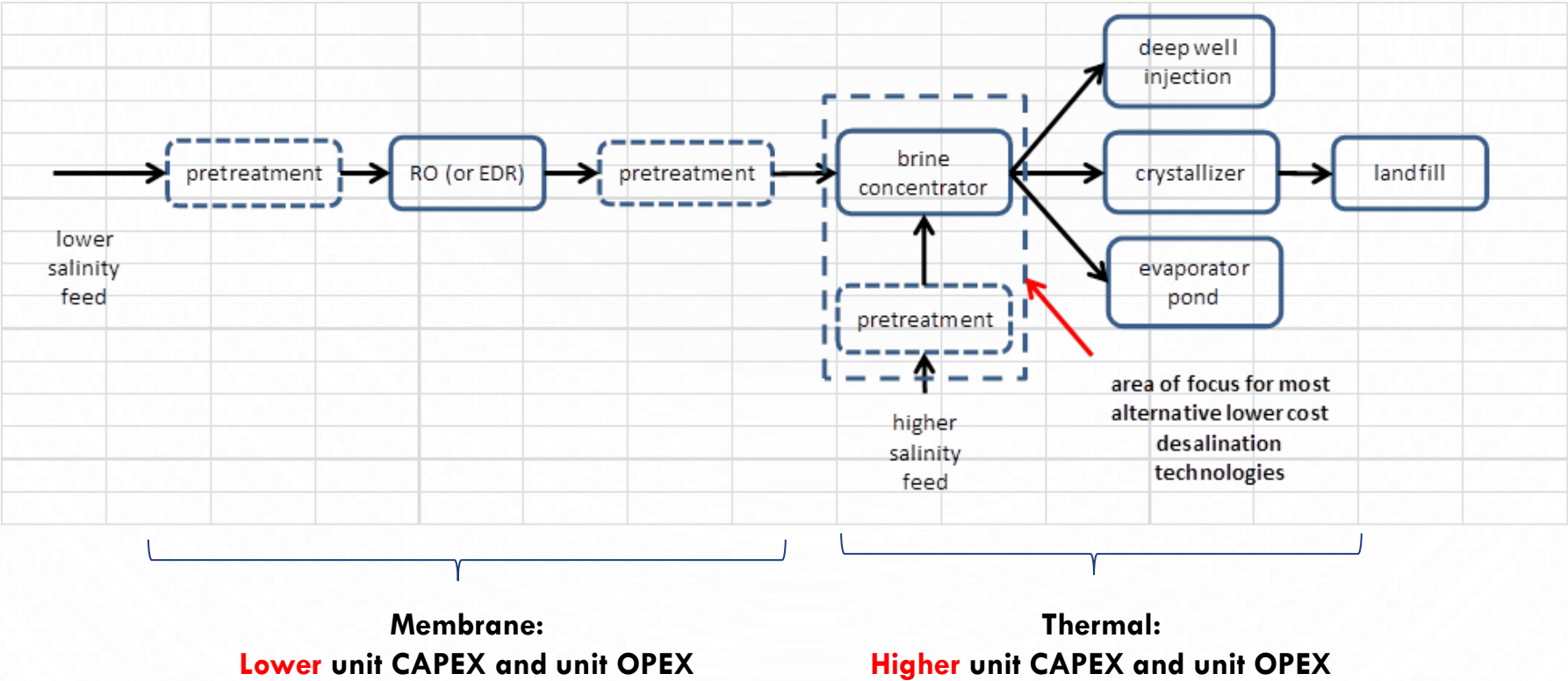
The focus is
on innovation
- emerging
technologies

High Recovery Technologies

Desalination Technology Categories (my Area of Focus)



Conventional High Recovery (ZLD) Processing Scheme



The comparison of high recovery technologies is relative to this conventional processing scheme

High Recovery Processing

- **HISTORY:**

- Slow growing and mostly industrial market
- In the U.S. - medium and large MLD/ZLD systems dominated by Aquatech, Suez, and Veolia

- **HYPOTHESIS:**

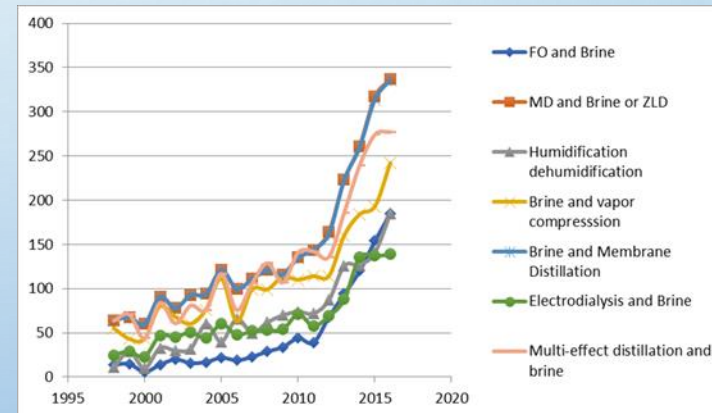
- 8-10 years ago – perceptions of significant market growth due to:
 - new unconventional O&G applications
 - increased brine disposal regulation and increased consideration of water reuse

- **EVIDENCE:**

- Increase in new companies (focus on reducing costs)
- Increase in literature and patents
- Heavy focus on O&G applications

- **STATUS**

- **Not much impact yet**
- Less expensive solutions exist
- Considerable challenges for new technologies/new companies
- 2008 downturn in the economy



High Recovery RO-related Technologies

- (arguably) the area of greatest potential to reduce costs
- Likely to be accepted sooner than other technologies
- Likely to be introduced into the municipal sector first

→ The future of high recovery (MLD and ZLD) is membranes

Technologies include:

- **SMART SYSTEMS** (smart control)
 - **CCRO** (Desalitech)
 - **Flow reversal/block rotation – AEDGE**
 - **MAX H2O - IDE**
 - **Xtreme RO - SALTWORKS**
- **Cascade systems (osmotically assisted RO)**
- **High pressure systems**

Tie-in With Reclamation Project

Reclamation Report:

Emerging Technologies for High Recovery Processing

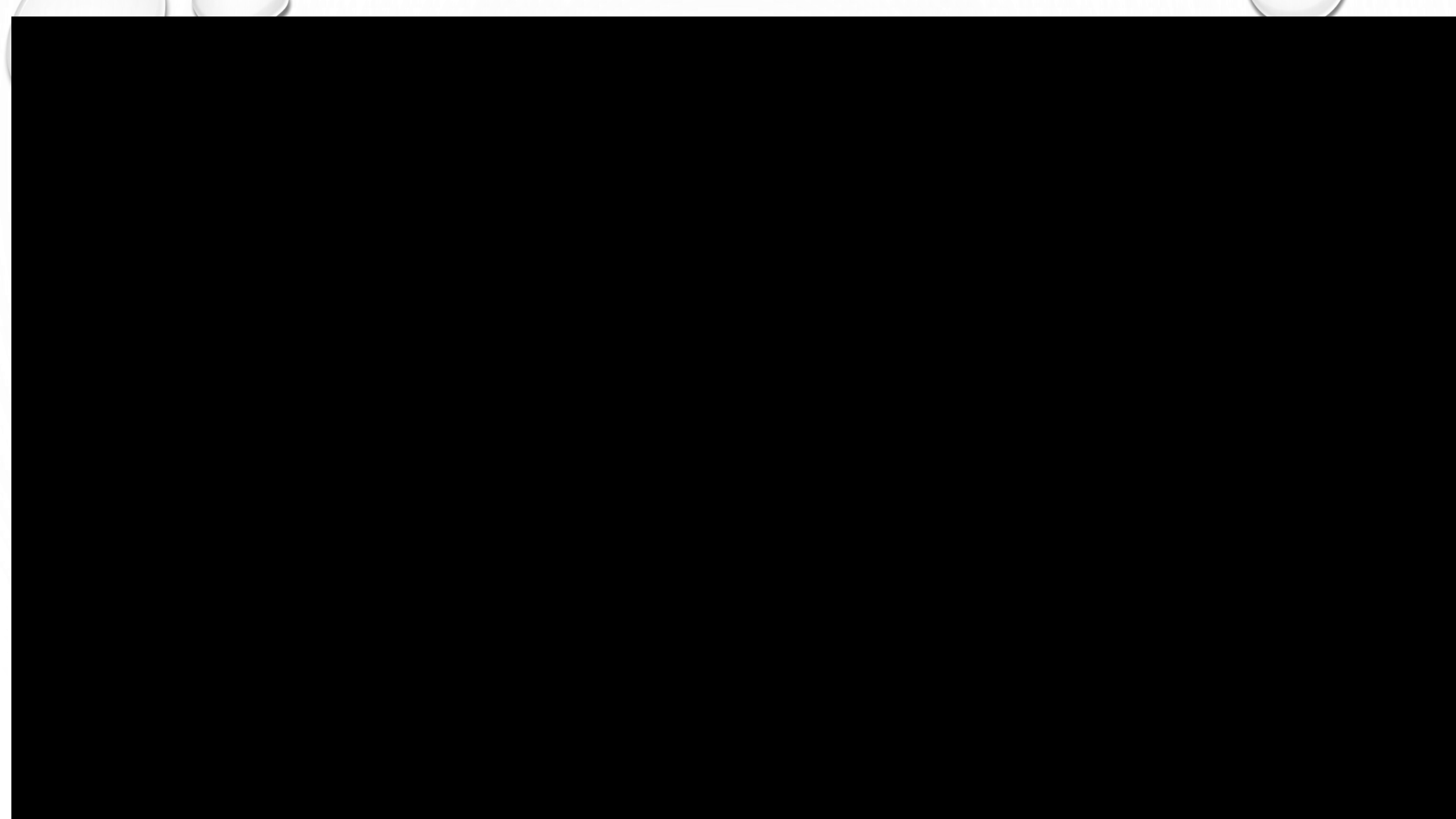
- In final revision
- **Mickley & Associates' report which includes information from BlueTech Research work**
- **Project undertaken to support the Reclamation CONCENTRATE MANAGEMENT TOOLBOX project**

BlueTech Research Documentary

BRAVE BLUE WORLD

BRAVE BLUE WORLD

- BlueTech Research's CEO, Paul O'Callaghan, wanted to **pose water issues in a documentary in terms of the positive INNOVATIVE efforts addressing water issues.**
- As Executive Producer, in two years he enlisted **several partners**
 - ** BlueTech Research
 - ** Dupont
 - ** L'Oreal
 - ** Aqualia
 - ** Water Environment Federation
 - ** Suez
 - ** Xylem
 - ** Water Alliance
- The **documentary opened December 16, 2019** at the Paramount Theater in Hollywood.
- Information can be found at <https://www.braveblue.world/>



Summary

- **Innovation is necessary.**
- **There are groups and individuals pushing the edges to address water challenges.**
- **The MSSC community plays an important part in carrying this message and in being part of these efforts.**

CONTACT INFORMATION

President

Mickley & Associates LLC

Lafayette, CO

303 499 3133

mike@mickleyassoc.com

Technical Assessment Group

O2 Environmental / BlueTech Research

Cork, Ireland and Vancouver BC

www.o2env.com