Produced Water Research Needs and Smart Decision Making for Reuse

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GROUNDWATER PROTECTION COUNCIL



PRODUCED WATER REPORT

Regulations, Current Practices & Research Needs

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Why is More Research Needed?

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Why is More Research Needed?

- Analytical Challenges and Limitations
- Identify and Address Health and Environmental Risks
- Quantity and Quality
- Variability over Time
- Logistical Considerations
- Permitting and Regulatory Structures

When and Where Should Research be Focused?

- Volume exceeds disposal capacity
- Volume of water needed exceeds availability
- Higher quality produced water (less treatment needed)
- Projected local demand exceeds reliable supply
- Other local drivers

How Should Research be Conducted?

- Applied and Strategic
- Collaborative
- On actual produced water (not synthetic)



Basic Research Needs

Lab Analytical Method Development and Capacity Characterization Raw and Treated using various Technologies

Study actual Produced Water (not synthetic)

Science Based Regulatory and Monitoring Standards

Fit for Purpose Risk Assessment for various Reuse

"Fit-for-Purpose" Research Considerations





Land Application



- Constituents present at what level
- Agronomic rates
- Absorption, infiltration, permeability in various soil types and ground cover
- BMPs at surface or shallow depths to prevent runoff
- Irrigation strategies
- Model development for long term soil health
- Expand toxicity test in terrestrial environments
- Worker exposure considerations
- Ecosystem adaptation to water quality change
- Impacts to ground water and surface water

Water Resources

- Model fate and transport of constituents
- Bioaccumulation
- Quantity vs Quality impacts
 - Aquatic life at various flowrates
 - Point of stress
 - Ratio of fresh water to produced water and impacts based on different stream types
- Impacts of ASR/MAR
 - Impacts to wells
 - Plume movement
 - Underground chemical interactions



Water Resources

- Assimilative capacity of receiving water
 - Impacts to designated beneficial uses
 - Impacts to downstream water bodies (terminal lakes, etc)
- Crossing jurisdictional boundaries
 - Discharge permit implications
 - Injection into large aquifer under lying multiple states
 - Ownership and liability
 - Water transfer rules
 - Multi-agency involvement



Water Resources

- Watershed implications
 - Impacts to TMDLs
 - Wasteload Allocations



- Impacts to permit limits of downstream discharge
- Ionic balance or other chemical changes
- Biomonitoring species impacts
- Water quality improvement
- Impacts to other wells
- Impact to groundwater classified as USDW or surface water classified as PPWS or EPPWS

Industrial Uses

- Implications of changes in water characteristics
- Impact on process operation or products
- Impacts to solids management and wastestream disposal
- Pretreatment needs
- Secondary market development (lithium, iodine, etc)
- Worker safety





Livestock and Wildlife

- What are appropriate treatment technologies?
- What are appropriate levels of constituents?
- Bioaccumulation
 - What species are more/less susceptible?
 - Which contaminants?
 - Short term and long term impacts (acute, chronic, sub-leathel, etc)
 - Impacts to food chain
- Ecosystem impacts to discharge stopping

Legal and Regulatory Questions

- What permits or authorizations are required?
- What agencies have regulatory authority?
- Who owns or controls rights to produced water?
- How is produced water defined?
- Who has liability for spills, disposal, etc?
- When or where does liability or ownership transfer?
- How do other environmental regulations impact reuse?
 Government



Logistical Considerations

- When is there a need for the produced water?
 - seasonal vs year round
 - Water stress
- What is the available infrastructure? What is the necessary infrastructure?
- What operational decisions need to be made to consider produced water reuse?

Economic Considerations

- Treatment
 - What are treatment options?
 - What do they cost?
 - What are disposal costs?



- Transportation and Infrastructure
 - What are the methods available?
 - Trucking vs Piping (hard infrastructure or temporary)
- Contract management
- Energy costs for various treatment, transportation and disposal 17

Economic Considerations

- What markets might be developed?
- How can solids be managed?
- Water rights
 - How has them?
 - Who has to pay for them?
 - If/when are permits required?
- When is it economically feasibility to reuse?



Public Perception Questions

- Who will conduct outreach?
- How, when, where and to whom should risk communication occur?
- What mitigation measures will be in place? How, when, where and under what conditions will mitigation occur?
- How can transparency be ensured?

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Benefits

• What circumstances lead to a "win-winwin"? (industry-citizens-environment)



How do I decide if I should move my project forward?

Phase I: Preliminary Assessment of Proposed Program



Does the preliminary assessment suggest a feasible program?

No

Phase II: Identify Stressors of Interest (constituents of concern) for Risk Assessment



Phase III: Risk Assessment- Treated Produced Water

<u> Phase III: Risk Assessment –</u>

Treated Produced Water

Exposure Assessment

Hazard Identification & Dose Response Assessment

Risk Characterization

Phase IV: Risk Management & Decision Making



Ongoing assessment and incorporation of new knowledge

Feedback

Produced Water Report



GWPC

- Taskforce established September 2019
- Project Groups
- IF Policy Regulatory THE REPORT. – Water Quality T-Water Quality Water Quality T-Water Quality Mary Quality WITH THE
 - Focus Areas
 - Ownership, liability, NPDES delegation
 - ASR/MAR
 - Treatment technologies
 - Land application
 - Expanded in oilfield use

Region 6 States

- NPDES Delegation
- New Mexico
 Regional Woriginap
 New Mexico Consortium

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