CONSORTIUM NEWS NOTES – September 2021

Consortium News Note Highlights

- Consortium END OF YEAR Meeting - December 1-2 (MARK ON YOUR CALENDARS)
- Welcome Randy Shaw - new Operations Manager to the Consortium
- Consortium Website Upgrades Coming in mid-October
- Coordination/collaboration efforts with NMED
- Coordination/collaboration efforts with EPA
- Research and Pilot Project Testing Update
- Task Committee Progress in 3rd Quarter 2021
- Recent Consortium Presentations and Technical Outreach
- Public Education and Outreach Workshops Coming in Fall 2021

Consortium END-OF-YEAR Meeting Scheduled for Dec 1-2, 2021

The annual **End-of-Year Meeting** of the NM Produced Water Research Consortium has been scheduled for **Wednesday and Thursday December 1st and 2nd** at New Mexico State University in Las Cruces, New Mexico. We are planning for this meeting to be an in-person meeting of all Consortium members. The meeting will follow all current NM Department of Health guidelines for indoor meetings including any requirements for wearing masks or providing vaccination information if or as required at the time of the meeting. We are looking into the ability to provide live coverage as a remote participation event if required or of benefit to members.

The preliminary format includes:

- One day will be for a series of tours of NMSU facilities associated with produced water research and the Bureau of Reclamation's Brackish Groundwater National Desalination Research Facility in Alamogordo, NM. The NMSU tours will include treatment research laboratories and current projects, ecological testing laboratories, agricultural greenhouse testing facilities, and analytical laboratory testing capabilities. The BGNDRF tour will highlight their bench and pilot-scale testing capabilities for produced water treatment and reuse research.
- One day will include presentations of 2021 consortium progress, Including;
    - Treatment and pilot-testing project results and presentations,
    - Task Committee accomplishment and results,
    - Analysis and modeling efforts such as the produced water data portal and socio-economic modeling accomplishments and results,
    - Risk and toxicology evaluations and results, and
    - NMED interim guidelines for research and pilot-projects for 2022

All Consortium members will receive an Outlook Invitation via email to the 2021 Annual Meeting by mid-September. We will also be advertising the Annual Meeting on the Consortium website by early October, and you will be able to register for the Annual Meeting from the web site. PLEASE MARK THIS ON YOUR CALENDARS!

New Consortium Operations Manager - Randy Shaw

Randy Shaw, former manager of the Bureau of Reclamation's Brackish Groundwater National Desalination Research Facility for the past decade, has retired and has agreed to become the NMPWRC's Operations Manager. In that role, Randy will be responsible for the operational aspects of the Consortium including; upgrade of the Consortium's website to make it more user friendly, provide easier access to Consortium reports and documents, and provide management and tracking of all Consortium research reports and documents. This is similar to his previous role with BGNDRF and should help us provide better public outreach.

Because of his experience in coordinating research, development, and testing of desalination technologies while at BGNDRF, Randy will also be involved in helping to coordinate some of the bench and pilot-scale technology testing by the Consortium. Randy grew up in Hobbs and has an Agricultural Engineering degree from NMSU and has managed water system design, and operations in the Southwest where he worked for the BIA for over two decades. This experience will be invaluable to the Consortium as we support fit-for-purpose reuse of treated produced water. Randy lives in Tularosa, NM and therefore will be able to provide significant support to projects at NMSU, BGNDRF, and SE NM.

We are extremely excited that Randy has agreed to work part-time helping the Consortium, we can certainly use his experience and expertise.

Upcoming Consortium Website Improvements

The Consortium website is undergoing significant upgrades in the next month. We will be modifying the website from an initial information format, to a more interactive and educational website for easier public access to all Consortium activities and upcoming events, meetings, efforts, and documents. Another focus of the website upgrades is to better support public education and outreach efforts, providing public and Consortium access to webinars, podcasts, training, reference materials and documents, technology evaluation reports, etc.

Randy Shaw is leading this effort and we expect to see the upgrades completed by the end of September and full capability of the website by mid-October. At the same time we will be moving to a new web design format being implemented across all NMSU colleges. We do not envision the web site to be down much during this transition, but will continue to keep you updated when the new site goes live.

Please let us know if you or members of your organizations would be interested in participating as a reviewer of the new website and provide us with user input to make this very functional for Consortium members and the public.

Coordination/collaboration with NMED

Deborah Dixon, Consortium Fellow, is meeting weekly with NMED to assure good coordination on Task Committee progress. Specific interactions and coordination NMED representatives include;

- Review and comments by NMED on the NPDES+ Task Committee recommendations on produced water and treated produced water constituent sampling and analysis. Of the sampling and analysis procedures proposed, NMED reviewed and requested that an addition three constituents be added to the recommended analysis list of about 100 constituents.
- NMED has been provided preliminary results of bench-scale and pilot-scale treatment testing. These have been provided to help NMED establish interim guidelines for research and pilot projects on fit-for-purpose reuse in 2022. Those guidelines will to be presented at the Dec 1 and 2 End of Year meeting.
- NMED has reviewed preliminary planning efforts by the Public Education and Outreach Task Committee. Preliminary approaches developed by the task committee through discussions with regional stakeholders have been accepted, and NMED is considering additional education and outreach options and the associated schedule for technical outreach and public engagement.
- Consortium management has worked closely with NMED to get guidance on the Consortium web site upgrades to make sure that our information is more easily accessible by the public and has more information of public interest while also meeting NMED goals and objectives on public availability to Consortium documents.
- Finally, the Consortium management team meets monthly with NMED management to assure coordination of all Consortium planning efforts and technical activities.

Coordination/collaboration with US EPA

Consortium management continues to work closely with the Ground Water Protection Council to lead the US EPA's Water Reuse Action Plan (WRAP) for Produced Water. We have continued to provide quarterly milestones for the EPA and will undertake efforts with them and GWPC in December to establish a National Coordination Council for Produced Water in support of the WRAP. The intent is to establish opportunities for regional and national level funding to be shared by state consortia to support produced water research and development to address both regional and local science and technology gaps. This effort has been approved by EPA.

Consortium management and NMSU have been working closely since March with the US EPA to support the EPA's produced water risk and toxicology testing and evaluation efforts through the EPA Office of Research and Development. NMSU has collected and provided produced water samples to the US EPA from about ten different locations in the San Juan and Permian Basins that vary from 10,000 ppm to 120,000 ppm TDS. The EPA will conduct human cell line risk analysis to untreated produced water. The results will likely be available by late October or early November 2021, and will be presented by the EPA to Consortium membership when available, likely as part of the Year End Review in December 2021.

The Consortium will also be providing treated produced water samples from our pilot testing this summer and fall to the EPA to conduct similar cell line risk analyses to treated produced water. This should help assess the risk and toxicity of the produced water treatment processes. Those results will also be presented to the Consortium membership by EPA when available.

Research and Pilot Project Testing Update

The Consortium started bench and pilot project testing in April. To date, two projects have been completed and several large pilots are currently in the mobilization and startup phase. The updated efforts of these projects are noted below. Testing results will be presented at the End-of Year meeting in December if available. All data will be made available to the public following Consortium review and approval.

Company	Project	Projected Date	Status
Kanalis Resources	RO treatment of 10,000 ppm TDS San Juan Basin produced water for ag applications	April through October 2021. Treat 20 bbls of water at BGNDRF and conduct greenhouse studies w/NCRS on range grass growth at NMSU	Treatment completed in April, water at 200-500 ppm TDS, greenhouse studies will be completed by October.
zNano Membranes	Polymeric-based ceramic membrane for pretreatment of produced water to "clean brine" standard	June - August 2021 At BGNDRF, 100 bbls per week	Completed testing in early August. Test report underway.
Crystal Clearwater Resources	Low-temperature distillation of produced water	Pilot-testing in October-November in Permian Basin	System to be moved to NM from Canada in early October 2021
Katz Water Technologies	Thermal treatment of produced water	Pilot-testing in October - November in Permian Basin	System to be moved to NM from WY in early October
Hydrozonix	Ozone pre-treatment of produced water to "clean brine" standard	Pilot-testing in October-November in Permian Basin	Negotiating site
Hilcorp	Membrane distillation of produced water	Pilot-testing in October-November in San Juan Basin	System under construction
Marah Water Services	Electro-coagulation/cavitation treatment of produced water	Pilot-testing in October - November in Permian Basin	Negotiating site
Bechtel	Thermal desalination of produced water	Bench testing in November - December in Houston	At Bechtel test facility in Houston
Eureka	Thermal desalination and mineral recovery of produced water	November - December	At Eureka test facility in PA

Consortium Task Committee Progress in 3rd Quarter of 2021

For 2021, the Consortium initiated several Task Committees to facilitate technical progress in several areas, and were coordinated to help address specific science and technical issues and gaps of produced water treatment and reuse. The Task Committees consist of volunteers from the Consortium TSC who meet bi-weekly to provide technical input on the identified task issues

and concerns. A summary of recent efforts and recommendations from these Task Committees since the June update are highlighted below:

- NM Produced Water Data Portal Task Committee - focused on development of a user-friendly produced water data portal with the Ground Water Protection Council that meets emerging public and user needs and data accessibility requirements of the NM Water Data Act. The portal was designed to integrate OCD, NMTECH, and NMSU produced water quantity and quality data into a single GIS -based data base as recommended by the TSC in January 2020. An initial alpha version of the data portal was completed in June 2021. Since then the committee has;
    - added a "frequently asked questions" section,
    - has undergone two user review sessions, and is having a short user tutorial added, and
    - the public version will be available by the end of September and will be able to be used by the public from a new link on the Consortium web page.

- NPDES+ Task Committee - focused on looking at the most appropriate and cost-effective pre and post-treatment sampling and analysis approaches to establish treatment efficacy for produced water fit-for-purpose reuse. After looking at different sampling approaches, costs, and potential constituents of concern, the committee made several recommendations to NMED in August that included:
    - Monitoring of approximately 100 major constituents in NM produced water that will drive health and safety impacts,
    - While specifically focusing monitoring on treated produced water, monitoring of both treated and raw produced water to be conducted to enable mass balances of constituents, and to enable the observation of potential unknowns,
    - defining treatment process control metering to assure processes and treated water is consistent,
    - use of special analysis capabilities at NMSU to identify and quantify unknowns.

- Risk and Toxicology Task Committee - is focused on identifying the most recent guidelines and approaches for ecological and human risk and toxicology testing. In April the group connected with the US EPA risk and toxicology program on produced water and worked closely with the US EPA in May through September to:
    - Establish conceptual environmental risk and impact models for treated produced water fit-for-purpose reuse,
    - Worked with EPA to identify the most up to date whole effluent toxicity (WET) testing approaches for produced water,
    - Collected and provided the EPA with produced water samples from NM so they could conduct human cell line risk analyses,
    - Established guidelines to use EPA scoping-level analysis of fate and transport modeling of the use of treated produced water and the impact on human and ecological health and safety.

- Developed fact sheets and handouts for the public on these analysis approaches and the potential impact of treated produced water use on public and ecological health.

- Socio-economic, environmental, and ecological Task Committee - is looking at approaches to appropriately calculate cost/benefit of fit-for-purpose reuse of produced water based on socio-economic and fate and transport issues. As noted in the June update, the group is using a system-dynamics modeling approach to allow wide user analysis of different types of fit-for-purpose use of treated produced water and the associated range of social, economic, and ecological benefits or impacts. Since July the committee has:
  - integrated a user interface and an EPA risk and toxicology screening tool for treated produced water fate and transport and added a technology screening tool from NMSU,
  - implemented a NM-based economic impact model developed by the UNM Economics Department,
  - prepared the final Socio-economic modeling tool for demonstration to DOE Fossil Energy in late September,

  After addressing the DOE comments, the model will be linked to the Consortium web page for public use and access.

- Public Education and Outreach Task Committee - was developed to plan public discussions about Consortium efforts and status, and show public stakeholders the results and tools being developed by the Consortium related to treatment and reuse of produced water. Based on discussions with elected officials in the major oil producing counties and their recommendations, the task committee has chosen to;
  - Conduct outreach efforts in a technical workshop format using local colleges as the venue,
  - Plan 2-hour sessions to allow participants to attend small breakout sessions of 30 minutes each on use of the produced water data portal, information on results of pre-treatment and treatment testing, efforts on produced water risk and toxicology data information and efforts with EPA human risk analysis, and use of the socio-economic models being developed,
  - Utilize fact sheets and handouts at the sessions to support public awareness,
  - Actively plan for of the education outreach efforts to start in October and November, following state guidelines and decisions about Covid.

Consortium Presentations and Technical Outreach since June

- Presentation to the Energy Council in Santa Fe - June 18
- Presentation to the Interim Radioactive and Hazardous Materials Committee meeting in Carlsbad - July 14
- Presentation to the EPA's National Energy Advisory Team - July 19

- Presentation to the NM Society of Professional Engineers in Albuquerque - August 19
- Presentation at the Produced Water Society Conferencein Houston - September 8
- Presentation to the Tx Desal Association Conference in Austin - September 15
- Presentation at the Bureau of Reclamation WIN Conference - September 21
- Presentation at NMOGA in Santa Fe - October 4
- Presentation at the US Water Trust in Albuquerque - October 12

Upcoming Consortium Public Education and Outreach Meetings in Fall 2021

- Public Education and outreach meetings - Carlsbad, Hobbs, and Farmington - October/November,
- Las Cruces and Santa Fe - likely November or December with a slightly different format of outreach based on lessons learned from the first three workshops.