



For Department Use Only:

Agency Interest Number \_\_\_\_\_  
PRD Assigned \_\_\_\_\_

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**1. Name and mailing address of person or group performing research (Responsible Person):**

(a). Person #1

Name: Ruikun Xin

Work Phone: 832-331-2929

Cell/Home Phone: 832-331-2929

Fax: N/A

Email: [rxin@solmem.com](mailto:rxin@solmem.com)

(b). Person #2

Name: Andrew Ibarra

Work Phone: 719-918-9450

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(c). Person #3

Name: Roxy Evans

Work Phone: 832-691-9126

Cell/Home Phone: 832-691-9126

Fax: N/A

Email: [revans@solmem.com](mailto:revans@solmem.com)

**2. Name and position of person completing form:**

(a). Person #1

Name: Ruikun Xin

Position: R&D Engineer at SolMem LLC

Work Phone: 832-331-2929

Cell/Home Phone: 832-331-2929

Fax: N/A

Email: [rxin@solmem.com](mailto:rxin@solmem.com)

(c). Person #2

Name: Roxy Evans

Position: Business Director at SolMem LLC

Work Phone: 832-691-9126

Cell/Home Phone: 832-691-9126

Fax: N/A

Email: [revans@solmem.com](mailto:revans@solmem.com)



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**3. Research Focus (PWRRC Research Category):**

We will conduct field testing of SolMem’s water treatment system using three sources of wastewater at the Brackish Groundwater National Desalination Research Facility (BGNDRF) with 1). Brackish water from any of the 4 wells at BGNDRF, 2). Water from BGNDRF’s evaporation pond, 3). Produced water from the industry members of the NMPWRC. It is worth noting that the produced water will be tested at the end of this project, and it (i.e., treated and untreated produced water as well as the brine and permeate) will not be pumped to the brackish water wells and the evaporation ponds at BGNDRF (i.e., no cross contaminations of the feed waters).

The expected usage of the feed water is 300~600 L/day (i.e., batch mode). The size and specifications of the system are summarized in Table 1 below.

**Electrical Power Requirements**

- Total power requirements: 10 – 15 kW
- Voltage: Single Phase (220 V) & Three phase (380 V)
- Frequency: 60 Hz

**Weight (skid and parabolic trough)**

- 2.5 metric tons

**Dimensions**

- Skid dimensions: 6m (L)x2.4m (W)x2.5m(H)  
(20 ft shipping container)
- Parabolic trough dimensions: 1.5m(L)x1.4m(W)  
x2.5m(H)

**Remote control**

- The pilot plant is equipped with remote controlled-operation

Table 1. Summary of parameters (e.g., power, dimension, etc.) of SolMem’s pilot system.

**4. Is the proposed use of the treated produced water to be used inside or outside of the oil and gas industry?**

In this project, there will be no use of the treated produced water inside or outside of the oil and gas industry. Based on the experimental design and the performance of SolMem’s system, the treated produced water will be disposed of following the NWPWRC and BGNDRF’s regulations. For the purposes of this test, there will be no discharge of the produced water. The distillate will be collected in a holding tank for sampling before being blended back with the concentrated brine for reinjection into the SWD.

**5. Does the location for testing the technology take place inside or outside of the oil and gas field?**

It will take place outside of the oil and gas field. The testing will be conducted within the Brackish Groundwater National Desalination Research Facility (BGNDRF) campus.

**6. Physical location of the research site including size and boundaries of site (include, street address, township, range, section, county, distance from closest town or landmark, directions to facility. Provide as an attachment.**

The testing will be conducted within the BGNDRF’s campus. The address is 500 Lavelle Rd, Alamogordo, NM



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88310.

7. Topographic and aerial map(s) showing:

- land status and adjacent land status
- 100-year flood plain,
- dwellings and occupied establishments,
- watercourses including irrigation ditches, wetlands, lakes, karst and soils
- water wells (types) or springs
- site security
- site plan showing locations of relevant structures

Shown below is the aerial photo acquired from BGNDRF (i.e., the testing site host). SolMem's system will be located within the BGNDRF facility, at testing pad #9.



8. List any regulatory, governmental and non-governmental agencies, including municipalities or counties that have authority on the testing location. Provide as an attachment.

(a). The Brackish Groundwater National Desalination Research Facility, 500 Lavelle Rd, Alamogordo, NM 88310.

(b). New Mexico Produced Water Research Consortium, 1025 Stewart St. Engineering Complex 1, Las Cruces, NM 88003

9. Provide a description of your signage plan for the testing site. Provide as an attachment.

The testing site is within BGNDRF facility. Managed by Bureau of Reclamation, BGNDRF has been hosting the testing of produced water treatment systems at bench scale and pilot scale. It is worth noting that NMPWRC has constructed a few produced water storage and disposal tanks at BGNDRF, and we have got their permission to use them for this project. We also got the confirmation from Dr. Mike Hightower that those tanks already have their own secondary containments, and they have already been evaluated by NMED. In case that those tanks are not available for this project, we will bring our own produced water storage and disposal tanks, and set up the required secondary containments (e.g., berms and liner that has a capacity of 1.5 times of the volume of the tanks) for them.



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**10. Provide a description of your site security plan, including training and site restriction methods.**

The testing site (i.e., BGNDRF) has its own security guard, who will ensure the safety of SolMem's system. SolMem will also send at least one senior research and development engineer and at least one operator to BGNDRF, who will be well-trained to conduct testing, operate the system, and follow the EHS regulations.

**11. List of adjacent landowners and confirmation that adjacent landowners have been notified of the proposed pilot project. Provide as an attachment.**

N/A.

**12. List the source(s) of the produced water including basin of origin. Describe how the produced water will be transported to and from the site including origin and disposal locations and onsite storage safety precautionary methods. Provide as an attachment.**

The produced water will be acquired from NMPWRC. The transportation and disposal of produced water be done by following the regulations from NMED, NMPWRC, and BGNDRF.

It is worth noting that NMPWRC has constructed a few produced water storage and disposal tanks at BGNDRF, and we have got their permission to use them for this project. We also got the confirmation from Dr. Mike Hightower that those tanks already have their own secondary containments, and they have already been evaluated by NMED. In case that those tanks are not available for this project, we will bring our own produced water storage and disposal tanks, and set up the required secondary containments (e.g., berms and liner that has a capacity of 1.5 times of the volume of the tanks) for them.

**13. Provide the disposal and decommissioning plan for the expected byproducts, waste products and other potentially contaminated materials. Plan should include disposition of equipment, soils, plants and piping requiring disposal and the expected disposal locations for each. Provide as an attachment.**

- Equipment: N/A – Our pilot study equipment is contained in a 20-ft shipping container. After we complete the testing at BGNDRF facility, it will be shipped back to SolMem's lab or other testing sites.
- Material: Secondary containment will be reused; other expendables of the treatment system will be disposed based on the requirements from BGNDRF and NMPWRC
- Water: All water will be disposed based on the requirements from NMED, BGNDRF and NMPWRC. To be specific, the treated and untreated/used brackish water (i.e., no PFAS) and evaporation pond water will be disposed to the evaporation ponds at BGNDRF. For the treated and untreated produced water as well as the brine and permeate, it is worth noting that NMPWRC has constructed a few produced water storage and disposal tanks at BGNDRF, and we have got their permission to use them for this project to dispose the aforementioned types of water. We also got the confirmation from Dr. Mike Hightower that those tanks already have their own secondary containments, and they have already been evaluated by NMED. In case that those tanks are not available for this project, we will bring our own produced water storage and disposal tanks, and set up the required secondary containments (e.g., berms and liner that has a capacity of 1.5 times of the volume of the tanks) for them.
- Soil: We do not expect to generate any contaminated soil. In case there is any, the contaminated soil will be disposed based on the requirements from BGNDRF and NMPWRC.

**14. Describe the expected contaminants in the untreated produced water and the treated produced water (e.g. contaminants being studied, known contaminants, known additives). Include estimated concentrations if known, and copies of laboratory analyses of untreated and treated produced water. Provide as an attachment.**

The untreated produced water will have the following expected water characteristics: a TDS of 30,000 ~ 120,000 PPM, a pH near 7, a residue oil concentration less than 2 PPM, and a close to zero TSS concentration. The detailed chemical composition and concentration is unknown.



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**15. Describe all components of the produced water processing, treatment, storage, secondary containment, and produced water system (e.g., pre-treatment units, above ground storage tanks, etc.). Include sizes, site layout map, closed loop processing plans, and specifications. Provide as an attachment.**

The shipping and disposal of the produced water will be handled by NMPWRC. The entire SolMem's system will be located inside of a secondary containment. The size and specifications of the system are shown in Table 1 in "3. Research Focus".

As shown in the executive summary, our system is comprised of a treatment skid located inside of a 20-ft shipping container and a SolarMEMD reactor mounted on top of a parabolic trough collector.

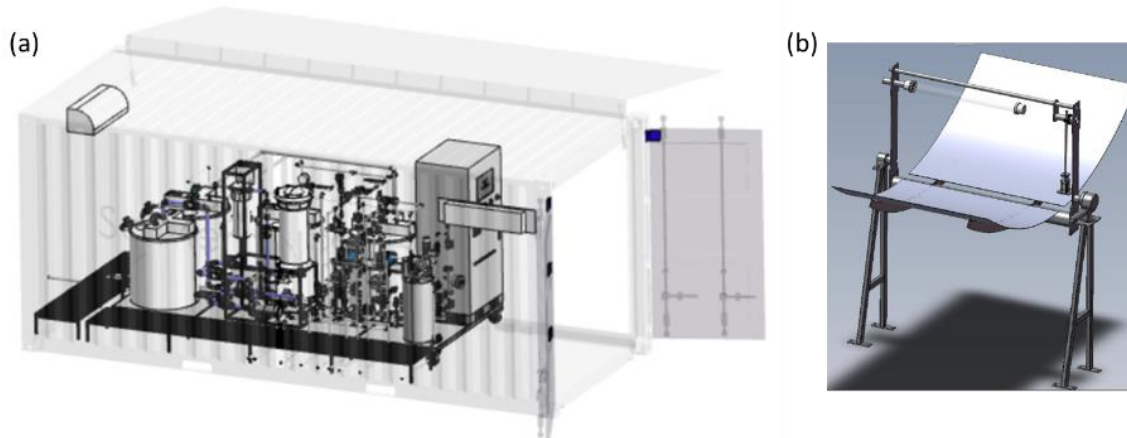


Figure 1. 3D schematics of (a). skid, and (b). parabolic trough collector.

A simplified process diagram illustrating the treatment process is shown in Fig 2. Before the treatment process, the feed water will be transported from the produced water tank at BGNDRF to the feed tank (i.e., batch mode) every day. During the treatment process, the feed water will be pumped from the feed tank to the SolarMEMD reactor. Inside the SolarMEMD reactor, the feed water is heated by the concentrated sunlight from the parabolic trough collector. The hot feed water then gets treated via evaporation and condensation process inside the SolarMEMD reactor. As a result, the feed water becomes brine and distillate after passing through the SolarMEMD reactor. The brine and distillate will be pumped back to the treatment skid and stored in the thermal storage brine tank and permeate tank respectively.

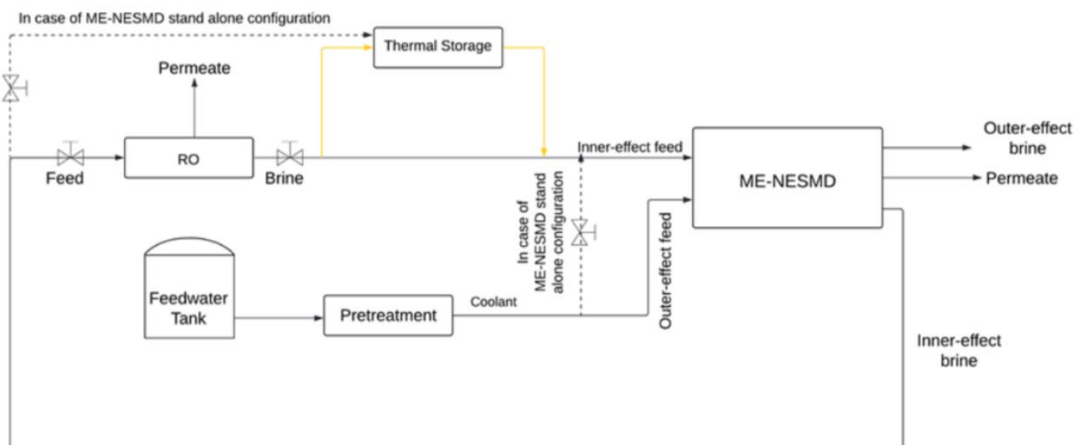


Figure 2. Simplified process diagram of ME-NESMD (i.e., SolarMEMD) process. Note that only stand-alone mode will be used, so the RO unit will not be installed, and it will be by-passed.



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**16. Describe your disposal plan for all produced water, treated produced water, permeate or brine concentrate into a SWD. Provide as an attachment.**

For the purposes of this test, there will be no discharge of the produced water. The distillate will be collected in a holding tank for sampling before being blended back with the concentrated brine for reinjection into the SWD.

For the treated and untreated produced water as well as the brine and permeate, it is worth noting that NMPWRC has constructed a few produced water storage and disposal tanks at BGNDRF, and we have got their permission to use them for this project to dispose the aforementioned types of water. We also got the confirmation from Dr. Mike Hightower that those tanks already have their own secondary containments, and they have already been evaluated by NMED. In case that those tanks are not available for this project, we will bring our own produced water storage and disposal tanks, and set up the required secondary containments (e.g., berms and liner that has a capacity of 1.5 times of the volume of the tanks) for them.



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**17. Describe your final closure plan after completion of the pilot project. Provide as an attachment.**

The decommission of the system will follow the regulations of BGNDRF and NMPWRC. The summary of deposal and decommission plan is as follows:

- Equipment: N/A – After the test is done, we will ship the equipment back to Houston or deploy it for more tests at other sites.
- Material: Secondary containment will be reused; other expendables of the treatment system will be disposed based on the requirements from BGNDRF and NMPWRC
- Water: All water will be disposed based on the requirements from BGNDRF and NMPWRC.
- Soil: We do not expect to generate any contaminated soil. In case there is any, the contaminated soil will be disposed based on the requirements from BGNDRF and NMPWRC.

**18. Estimated depth to ground water (ft):** \_\_\_\_\_ **Source of information** \_\_\_\_\_  
**Direction of groundwater flow:** \_\_\_\_\_ **Source of information** \_\_\_\_\_

N/A. This project will not involve the use of groundwater.

**19. Current Total Dissolved Solids Concentration in Groundwater** \_\_\_\_\_

N/A. This project will not involve the use of groundwater.

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Printed name:** \_\_\_\_\_ **Title:** \_\_\_\_\_

**Certification by Responsible Person**

I, \_\_\_\_\_, hereby certify that the information and data submitted in this application are true and accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, upon my oath or affirmation, before a notary of the State of \_\_\_\_\_

\_\_\_\_\_

Please return this form to:  
NMED Ground Water Quality Bureau  
P.O. Box 5469  
Santa Fe, New Mexico 87502-5469

Telephone: 505-827-2900  
Fax: 505-827-2965



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- Equipment: N/A – After the test is done, we will ship the equipment back to Houston or deploy it for more tests at other sites.
- Material: Secondary containment will be reused; other expendables of the treatment system will be disposed based on the requirements from BGNDRF and NMPWRC
- Water: All water will be disposed based on the requirements from BGNDRF and NMPWRC.
- Soil: We do not expect to generate any contaminated soil. In case there is any, the contaminated soil will be disposed based on the requirements from BGNDRF and NMPWRC.

18. Estimated depth to ground water (ft): \_\_\_\_\_ Source of information \_\_\_\_\_  
Direction of groundwater flow: \_\_\_\_\_ Source of information \_\_\_\_\_

N/A. This project will not involve the use of groundwater.

19. Current Total Dissolved Solids Concentration in Groundwater \_\_\_\_\_

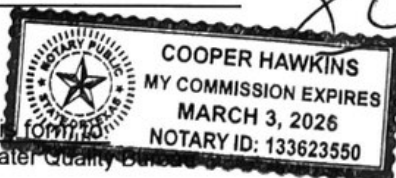
N/A. This project will not involve the use of groundwater.

Signature: JU Zhong Evans Date: 9/14/2023  
Printed name: JU Zhong Evans Title: Business Director

**Certification by Responsible Person**

I, JU Zhong Evans, hereby certify that the information and data submitted in this application are true and accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 14th day of September, 2023 upon my oath or affirmation, before a notary of the State of Texas



Please return this form to:  
NMED Ground Water Quality Bureau  
P.O. Box 5469  
Santa Fe, New Mexico 87502-5469

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