Request for information (RFI) No. 57 - 2018

Solutions for fast clogging groundwater wells

Mekorot – The Israel National Water Company LTD. (here and after "**Mekorot**") supplies 1.5 billion cubic meters of water per year, which accounts for approximately 80% of Israel's drinking water and 70% of the total annual water consumption in Israel. Mekorot's activities constitute a unique mosaic of activities under one roof, which are unparalleled worldwide. This mosaic includes the following core areas: Water supply and Resource Management, Water Quality and Security, Desalination, Hydrology and Drilling, Effluent reclamation, Wastewater treatment, Rain Enhancement, Storm Water Catchment, R&D and Developing Water Technologies and Sustainable Development.

Mekorot's intentions in this Request for information (RFI) is to expand Mekorot's knowledge in existing solutions for fast clogging groundwater wells as described below.

1. **The Technological Need**:

1.1 The Technological Need in Mekorot Water Co. LTD (here and after "**Mekorot**")- Israel:

- There are 1,200 active groundwater wells in Mekorot. About 10% of them are fast clogging wells.
- Each year Mekorot drills an additional 20 new wells.
- Each year Mekorot restores 15 clogged wells.
- A typical fast clogging well in the Arava desert will clog and require restoration every 3-8 years.
- During the clogging process the well capacity decreases. This is sometimes very problematic as these wells are the only water source in the area.

- The restoration process is problematic as well. It is very costly. It also involves the usage of hazardous chemicals.
- To summarize - there is a need to prevent/minimize/delay the clogging process.

1.2 **The Technological Need in the world**:

Fast clogging wells exists in many other places in the world- in Australia ,USA, the Middle east, and Africa. We believe that the wide-world market for solutions for fast clogging wells is large enough to justify R&D focused on this issue. We still have not conducted an in-depth survey to explore the size, segmentation and trends of this specific market.

2. **Previous Research**:

- Before a solution could be developed and tested it was important to characterize the clogging process.
- The majority of well fouling, leading to clogging, occurs due to biofilm formation. Several studies have implicated the important role of sulfate- and iron-reducing bacteria, as well as sulfur- and iron- oxidizing bacteria in biofouling in aquatic environments. Despite this, there was still a lack of information regarding the characterization of the bacterial populations which form the biofilm in water wells in general and in wells of the Arava (Israel) in particular. Thus, the bacterial population in clogged water wells was characterized.
- Samples were collected during clogged water well rehabilitation of several wells in the Arava valley of southern Israel. The samples were analyzed for their chemical content, bacterial diversity and main microbial communities using metagenomics according to the 16S rRNA gene, and bacterial biofilm potential using culturing methods, static and flowing assays.
- The most abundant phyla were Proteobacteria, Actinobacteria, Chloroflexi and Firmicutes. In general, similar bacterial diversities were found in most of the water drilling sites. More particularly, diverse potential contributors to the well clogging were found, ranging through sulfur, nitrogen, and iron related bacteria. Most of these

were associated with biofilm formation and known as contributors to water well clogging. Bacteria associated with nitrogen cycle and biofilm formation were widely abundant in the clogged material of the studied area.

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3. **<u>The Next Step of The R&D</u>**:
   - Based on the previous characterization of the clogging process, Mekorot is interested in identifying, applying and testing relevant solutions.
   - Solutions could include:
     - Anti-biofouling paints or coatings to be applied on the wells strainers to prevent them from clogging.
     - Biocides or other chemicals to be dosed to the wells. Such solutions should include applicative techniques to inject the chemicals to the required depth within the well (see attached typical well cross section). In this case please specify regarding the injection by packers and the neutralization process of the injection waste stream.
   - The next step of the required R&D could include several phases such as:
     - <u>Lab</u> testing of the solution for <u>preliminary</u> testing of the ability to prevent/minimize/delay the clogging process.
     - <u>Field</u> testing of the solution for <u>advanced</u> testing of the ability to prevent/minimize/delay the clogging process.

4. **<u>The Required Information</u>**:
   - Company description- basic facts and figures about the company- location, number of employees and other important details.
   - Product description-
     - Technological features.
     - If the solution is a chemical to be added to the water-
       - MSDS.
       - Toxicity for plants.
       - approvals for environmental disposal.
     - Advantages over competing products.

- Key factor- Proven (by a third party) durability and lifespan.
- Required operation and maintenance.
- Please specify regarding approvals for usage in drinking water applications.
- Costs.
- Previous relevant installations description including specific references.

5. Administrative information

a. The information shall be provided by all the interested parties on a voluntary basis, with the understanding that the present request is for the purposes of information collection only.

b. It is clarified and stressed that the present application is not considered a Request For Proposals and is not a part of a tender procedures, but rather it is carried out for receiving information only, following which the company shall consider its further actions.

c. All the expenses associated with the submission of the response to the present request shall be at the expense of the participants only. In no case shall the participants be entitled to any kind of payment for the participation in the RFI, and/or refund and/or compensation and/or indemnity for expenses and/or damages that may be caused to them in connection to the response and/or the preparation of the response and its submission.

d. Mekorot reserves the right to make changes and/or corrections in the present request, including the date of submission, and will be entitled to cancel it.

e. Without detracting from the specifications of the present document, Mekorot reserves the right to contact the responders to the present application, whether all of them or part of them, as well as any other entity with clarification questions or with applications, to receive any information and/or any data.

f. The present application does not constitute an obligation and/or a basis for contracting of any type with any of the responders, and response to the present application does not create any obligation and/or advantage of any

kind for the responders. Mekorot may consider its actions and act upon its exclusive discretion.

6. The method of submitting a response to the present request

a. Responses to the required information specified above and any other information that the responders wish to transfer to Mekorot to the present application shall be submitted in a closed envelope into the tender box located at the offices of Mekorot at 9 Lincoln St., Tel Aviv, – the tender unit (7th floor). The response envelope shall read "**Request for information (RFI) for a Solutions for fast clogging groundwater wells**" to Mekorot on Sundays through Thursdays between 8:00 and 15:00 at **no later than august 6, 2018 at 12:00 noon** (Israel local time).

b. Mekorot reserves the right to contact any responder of the present application for additional clarifications with regards to the information provided by them as part of the present procedure, as well as the right to meet any of them in order to receive explanations and clarifications concerning their answers.

If the information provided to Mekorot contains commercial secrets, this must be clearly specified at any relevant place in the document of the response.

The response shall be submitted both printed out in three copies and on magnetic media.

7. Details and clarifications

For questions, details or clarifications that may be required for answering the present request, one can contact Mr. Avi Assayag at assayaga@Mekorot.co.il. Please verify that the email has been received at the telephone 03-6230735/707/781.

8. Making use of the received information

a. The requested information is required as part of the activities of Mekorot for examining the possibilities of contracting and signing deals on the system specified above, and the present application does not create any obligation whatsoever on the part of Mekorot or on the part of anyone on its behalf towards any of the responders.

b. Mekorot reserves the right to make use of the information obtained for its own purposes and at its own discretion, but in any case, Mekorot obliges that information that will be transferred to it shall only be used by it to examine its activities which are the subject of the present application and that information defined as a commercial secret shall not be exposed beyond the persons occupied with the present procedure inside the company.

c. The list of responders that will be obtained following the present application does not, due to the very fact of response, constitute a closed list of bidders for carrying out a competitive procedure of any kind if held, and the responders shall have no special status in such a procedure due to the very fact of their participation in the present procedure.

9. Property of Mekorot in the present procedure document

To remove any doubt, it is hereby clarified that any document from Mekorot that will be transferred, in the extent transferred, to the responders to the present application is the property of Mekorot and may not be used for purposes other than the response to the present application.