United States Department of the Interior

BUREAU OF RECLAMATION
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IN REPLY REFER TO:

86-68190
2.2.4.21

MARCH 22, 2019

VIA ELECTRONIC MAIL ONLY

TRAVEL REPORT

To: Richard LaFond, Division Chief, Civil Engineering
Robert Einhellig, Division Chief, Engineering and Laboratory Services

From: Stephen Ogle, Civil Engineer
Chris Waechter, Civil Engineer
Sherri Pucherelli, Biologist
Kevin Kelly, Research Chemist

Subject: Meeting to Discuss Dreissenid Mussel Control using Carbon Dioxide

1. **Travel period**: March 18th-20th, 2019

2. **Places or offices visited**: USGS Facility in La Crosse, WI

3. **Purpose of trip**: To meet and discuss potential data sharing regarding the use of CO_2 as a primary chemical in control methods of dreissenid mussels and veligers. The goal was to obtain any information regarding the efficacy of carbon dioxide as an attachment control measure.

4. **Synopsis of trip**: The USGS team has been conducting extensive research on CO_2 effects on the mussels, including lethal dosing, along with Asian Carp movement deterrence via CO_2 barriers. Differences in the research conducted by BOR and USGS are found in the CO_2 applications. While the USGS has been researching CO_2 efficacy in open bodies of water, BOR is researching the use of CO_2 to reduce veliger settlement along pipe walls.

Kevin Kelly kicked off the meeting by presenting the work performed by BOR and in-depth descriptions of his proposed mussel control methods. The methods included injection of CO_2 via a Speece cone, a downflow bubble contactor, and electrical methods (electrical field and impressed current cathodic protection). Discussion followed in which the appropriate electrical control methods were identified for different systems. Electrical field generation was discouraged for hydropower facilities to avoid radiated electromagnetic interference between the control field generator and hydropower generators.

The USGS team presented their research on both mussel and carp control methods, and informed BOR of the current CO_2 pesticide registration packet review being performed by the EPA. They anticipate that it will soon be approved and can then be modified to include dissolved CO_2 as an

acceptable control method for mussels and crayfish. USGS hopes to hear back from the EPA shortly after the April 17th comment period closure.

The USGS confirmed that their use of pH sensors to monitor dissolved CO_2 concentrations has been a successful surrogate approach. This may indicate that Speece cone equipment setups can be simplified if the project progresses from bench-scale to pilot. It was determined that BOR will want to include a switch-over for two tanks at the pilot-level system if compressed CO_2 is used instead of liquid. The USGS team then conducted a tour of the facility, which included chemistry labs, molecular biology labs, a mobile mussel lab and more.

The USGS dissolved CO_2 experimental setup consisted of a series of tanks with varying concentrations to observe the required dosing and exposure period to cause mussel death. The tanks were staged in series with ~10% less dissolved CO_2 in each subsequent tank. Although the tanks were open to the air, USGS data suggests that CO_2 losses to the atmosphere are negligible. The USGS are using an automatic switchover on the CO_2 tanks to avoid pressure losses and unplanned interruptions to the experiment.

5. **Conclusions and Recommendations:** The USGS team believes the Speece cone injection method for the closed pipe system may be a better application than open-body CO_2 injection. Previous research done by the USGS team indicates that CO_2 is a reasonable veliger settlement deterrent, and it should be a plausible solution to the settlement issues in the cooling lines at a BOR hydropower facility. As a result, the USGS would like to remain in contact with BOR for information to be exchanged. Experimental results from the USGS team for specific dissolved CO_2 concentrations that deter mussel attachment are expected to be ready around August 1st, 2019. The primary contact for the meeting and future communication is Diane Waller (Research Fishery Biologist).

6. **Client feedback received:** None.

7. **Action correspondence initiated or required:** An Interagency Agreement (IAA) was discussed moving forward to ensure effective collaborative efforts.

cc: Chris Waechter, Civil Engineer
Sherri Pucherelli, Biologist
Kevin Kelly, Research Chemist

SIGNATURES AND SURNAMES FOR:

Travel to: USGS Facility in La Crosse, WI

Date or Dates of Travel: March 18th-20th, 2019

Name and Code of Travelers: Stephen Ogle (86-68190), Chris Waechter (86-68190), Sherri Pucherelli (86-68560), Kevin Kelly (86-68540)

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Traveler: CHRISTOPHER WAECHTER Digitally signed by CHRISTOPHER WAECHTER Date: 2019.04.08 08:48:19 -06'00' Date

Traveler: KEVIN KELLY Digitally signed by KEVIN KELLY Date: 2019.04.08 09:49:05 -06'00' Date

Traveler: SHERRI PUCHERELLI Digitally signed by SHERRI PUCHERELLI Date: 2019.04.08 10:15:11 -06'00' Date

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