

**18/19 FEBRUARY 2021 BOARD MEETING
CONTESTED AGENDA ITEM**

AGENDA ITEM: 9

SUBJECT:

Food Safety Project White Paper on the Reuse of Produced Water for Irrigation of Food Crops Grown in Kern County (White Paper)

BOARD ACTION:

None; Informational item only.

BACKGROUND:

Oil field produced water (produced water) is a by-product of crude oil production. In the southern Central Valley, low salinity produced water has been used to irrigate approximately 94,000 acres of crops for over 30-years. Produced water discharges are regulated through individual waste discharge requirements adopted by the Central Valley Water Board or "Board."

In response to growing public concern, and because food safety falls out of the area of the Board's expertise, Board staff convened the Food Safety Expert Panel (Panel) to help evaluate this practice. The Panel includes experts in public health, local wildlife, toxicology, risk assessment, food, and agriculture. The Panel provided input on technical aspects of the Food Safety Project, which examined the potential risks of reusing produced water for the irrigation of food crops. The Board also contracted Dr. William T. Stringfellow, Research Engineer with the Berkeley National Laboratory, as a scientific advisor (Science Advisor). Throughout the Food Safety Project, Board staff hosted internal working meetings attended by Panel members and the Board's Science Advisor, and public meetings to provide the public with updates on the Food Safety Project's progress.

As a part of the Food Safety Project, the Board entered into a memorandum of understanding (MOU) with dischargers of produced water (dischargers) to fund studies which evaluated the practice of using produced water for irrigation. Under the MOU, Board staff managed technical aspects of study designs and implementation with input from the Panel; the dischargers funded the work. A third-party consultant, GSI Environmental, Inc., (GSI), was selected to complete three studies (Tasks 1-3). Tasks 1-3, and their results are briefly summarized below:

- Task 1 –GSI identified chemicals that could potentially be found in produced water and completed a preliminary hazard evaluation to identify chemicals of interest (Chemicals of Interest) requiring further evaluation. The preliminary hazard evaluation focused on the oral toxicity and persistence in the environment of each chemical. Based on the preliminary hazard evaluation, GSI identified 143 Chemicals of Interest.
- Task 2 –GSI evaluated the Chemicals of Interest through a literature review examining the safety of the chemicals in the context of potential harm through ingestion, overall persistence in agricultural systems, and potential for plant uptake. GSI found most of the organic Chemicals of Interest were expected to biodegrade or be tied up in the soils and were not expected to accumulate in crops to levels that would be harmful for human consumption. GSI concluded that there was some potential for inorganic constituents to accumulate in soils and be taken up by plants. However, the results of Task 3, discussed below, did not indicate that produced water irrigated crops were accumulating inorganic constituents in levels that would be harmful to human health.
- Task 3 – Under this task, crops were sampled to compare whether those irrigated with produced water (treated samples) were accumulating oil field chemical constituents at rates higher than those irrigated with traditional sources of water (control samples). From 2017 through 2019 Board staff oversaw the sampling of almonds, pistachios, grapes, oranges, lemons, mandarins, apples, tomatoes, cherries, carrots, potatoes, and garlic. Where analytical methods were available, the edible portions of the crops were analyzed for constituents considered to be potentially present in produced water. GSI concluded that when chemicals were detected, the concentrations were generally similar between treated and control sample sets. The mean or median concentration sample comparisons were statistically higher for crops irrigated with produced water for a small portion of the data set (i.e., barium and zinc in almonds, and strontium in garlic, grapes, and lemons). Also, a small portion of the data set were higher for crops irrigated using conventional water. GSI concluded that the differences were not large enough to suggest that crops irrigated with produced water were different than those grown

with conventional sources or commonly found in the U.S. marketplace. Therefore, it does not appear that consuming crops grown with oil field produced water present and elevated risk to public health.

Based on the study results and input during public meetings, the Panel developed recommendations on the current practices and potential future studies to close data gaps. In general, the recommendations include: discontinue food sampling, continue current monitoring programs, continue disclosure and evaluation of oil production additives, encourage dischargers to submit additive mass data and missing hazard information, evaluate new projects proposing to reuse produced water for irrigation based on findings of the Food Safety Project, encourage the Board to study the fate and transport of Chemicals of Interest, examine the long-term impacts of produced water on soils, and encourage the Board to examine emerging monitoring approaches.

The Science Advisor and Board staff have prepared the Food Safety Project White Paper on behalf of the Panel. The White Paper summarizes the Food Safety Project, work and findings of Tasks 1-3, Panel recommendations on the reuse of produced water, and identified data gaps.

RECOMMENDATION:

None

REVIEWS:

Management Review:	wdh
Legal Review:	JMJ 28 January 2021

BOARD MEETING LOCATION:

Central Valley Regional Water Quality Control Board
11020 Sun Center Dr. #200
Rancho Cordova, CA 95670

Internet Zoom Meeting