

Crop Testing Analysis



**CAWELO WATER DISTRICT
BAKERSFIELD, CA
OCTOBER 28, 2016**



Expert Engagement

Analytical Data:

- Amec Foster Wheeler Environmental & Infrastructure, Inc.
- Advanced Environmental Concepts, Inc.
- Weck Laboratories, Inc.
- Anresco Laboratories

Evaluation:

- Dr. Heriberto Robles, Enviro-Tox Services, Inc.



Credentials

Heriberto Robles, M.S., Ph.D., D.A.B.T.:

- 35 years experience in environmental toxicology and human health and environmental risk assessment
- Certified by the American Board of Toxicology
- One of 3,125 in the world

Expertise:

- Human and Occupational Toxicology
- Environmental Toxicology
- Human and Ecological Risk Assessment
- Environmental Chemical Fate and Transport

Cawelo Water District

Mission to provide clean, safe irrigation water:

- Serving Kern County for more than 50 years
- Provides irrigation water to 34,000 acres of orchards, vineyards and other crops
- Working collaboratively with regulators to evaluate water quality
- Monitored by the Central Valley Regional Water Quality Control Board (Regional Board):
 - Long history of compliance with the Regional Board
 - Monthly testing and reporting for nearly 70 constituents
 - Expanded quarterly testing and reporting for more than 160 constituents

Decisions Based on Sound Science



Thoughtful Dialogue Guided by Facts:

Study #1

- Initial water quality testing for approximately 70 constituents & analysis of almonds, grapes and pistachios (presented April 2016)

Study #2

- Testing of oranges, mandarins and lemons

Study #3

- Testing of carrots and potatoes

Study #4

- On June 17, 2016, the oil company submitted to the Regional Board a list of constituents used in the oil extraction process
- The expanded water quality testing of more than 160 constituents, based off the oil company list, is now conducted and reported quarterly to the Regional Board

Snapshot of Current Scientific Facts



Initial Results Show Recycled Produced Water Supply Safe for Irrigation:

- Water quality testing for nearly 70 constituents presented to the Food Safety Panel in April 2016
- Meets water quality goals for agricultural use
- Organic compounds either at or below levels considered safe for drinking water (a higher standard than what is required for agricultural use)
- U.S. EPA Regional Screening Levels for tap water
- Cal/EPA Environmental Screening Levels



Snapshot of Current Scientific Facts

Almonds, Grapes & Pistachios:

- Analysis supports initial water quality findings; water safe for agriculture irrigation
- Testing showed crops irrigated with produced water have a similar chemical composition as foods grown with any other water supply



New Citrus Crop Analysis

Mandarins, Oranges & Lemons:

- Analysis supports initial water quality findings; water safe for agriculture irrigation
- Utilized U.S. EPA testing protocols
- Nine constituents identified from water quality study
 - Tested for: acetone, benzene, toluene, ethylbenzene, xylenes, acenaphthene, fluorene, naphthalene and phenanthrene



New Citrus Crop Analysis

Mandarins, Oranges & Lemons:

- Nine constituents either not found or found at similar concentrations in both Test and Control samples
- Results indicate organic constituents are not being absorbed nor accumulated in edible fruit
- Test and Control samples collected from eighteen different sampling locations on Feb. 16 and 17, 2016
- Re-test date March 23, 2016, fruit and dust samples
- Ongoing testing recommended

New Root Crop Analysis Summary



Carrots & Potatoes:

- Analysis supports initial water quality findings; water safe for agriculture irrigation
- Acetone detected in Test and Control samples at extremely low levels, indicating it is a naturally occurring substance
- Preliminary results show organic constituents are not being absorbed nor accumulated in the roots of plants
- Nine constituents identified from water quality study
 - Tested for: acetone, benzene, toluene, ethylbenzene, xylenes, acenaphthene, fluorene, naphthalene and phenanthrene
- Final report expected to be released in November 2016

Expanded Water Quality Testing



Quarterly Testing for 160+ Constituents:

- On June 17, 2016, the oil company submitted to the Regional Board a list of constituents used in the oil extraction process
- In August 2016, Cawelo submitted expanded water quality data, as required by the Regional Board to test for more than 160 constituents
- Systematically moving through review process of expanded testing data
- To date, vast majority have been non-detectable or below drinking water quality standards – an even higher standard than required
- Expanded testing

Expanded Water Quality Testing



Quarterly Testing for 160+ Constituents:

Detected Compounds	June and September 2016 Maximum Detected Concentration (ug/L)	Does Maximum Detected Concentration Exceed Drinking Water Screening Levels or MCLs?
Volatile Organic Compounds		
1,2,4-Trimethylbenzene	2.4	No
1,2-Dichloropropane	0.19	No
Chloroform	0.21	No
Ethylbenzene	0.65	No
Methanol	860	No
n-Propylbenzene	0.23	No
Toluene	0.42	No
Xylenes	2.3	No
Semi-Volatile Organic Compounds		
Acenaphthene	0.53	No
Fluorene	0.37	No
Naphthalene	0.11	No
Phenanthrene	0.22	No
Petroleum Hydrocarbons		
Kerosene	620	No

Note:
MCLs=Maximum Contaminant Levels
Ug/L=Micrograms per liter

Next Steps

Collaboration with Regional Board:

- All data available on website
- Ongoing voluntary crop sampling continues

