

**ASSESSMENT OF PRODUCED WATER FOR  
AGRICULTURAL IRRIGATION OF EDIBLE CROPS:  
IDENTIFYING CHEMICALS OF INTEREST  
PROGRESS REPORT  
MAY 9, 2019**



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# BACKGROUND

**GSI was retained by the Water Board to assist in 3 tasks:**

- 1. Selection of “Chemicals of Interest”, from a list of known chemical additives and naturally occurring chemicals in produced water, for further evaluation**
- 2. Literature review focusing on the “Chemicals of Interest” in the context of produced water reuse in agriculture irrigation and other potential sources of these chemicals in the agricultural water supply**
- 3. Sampling and chemical analysis of crops irrigated with produced water in the Central Valley**

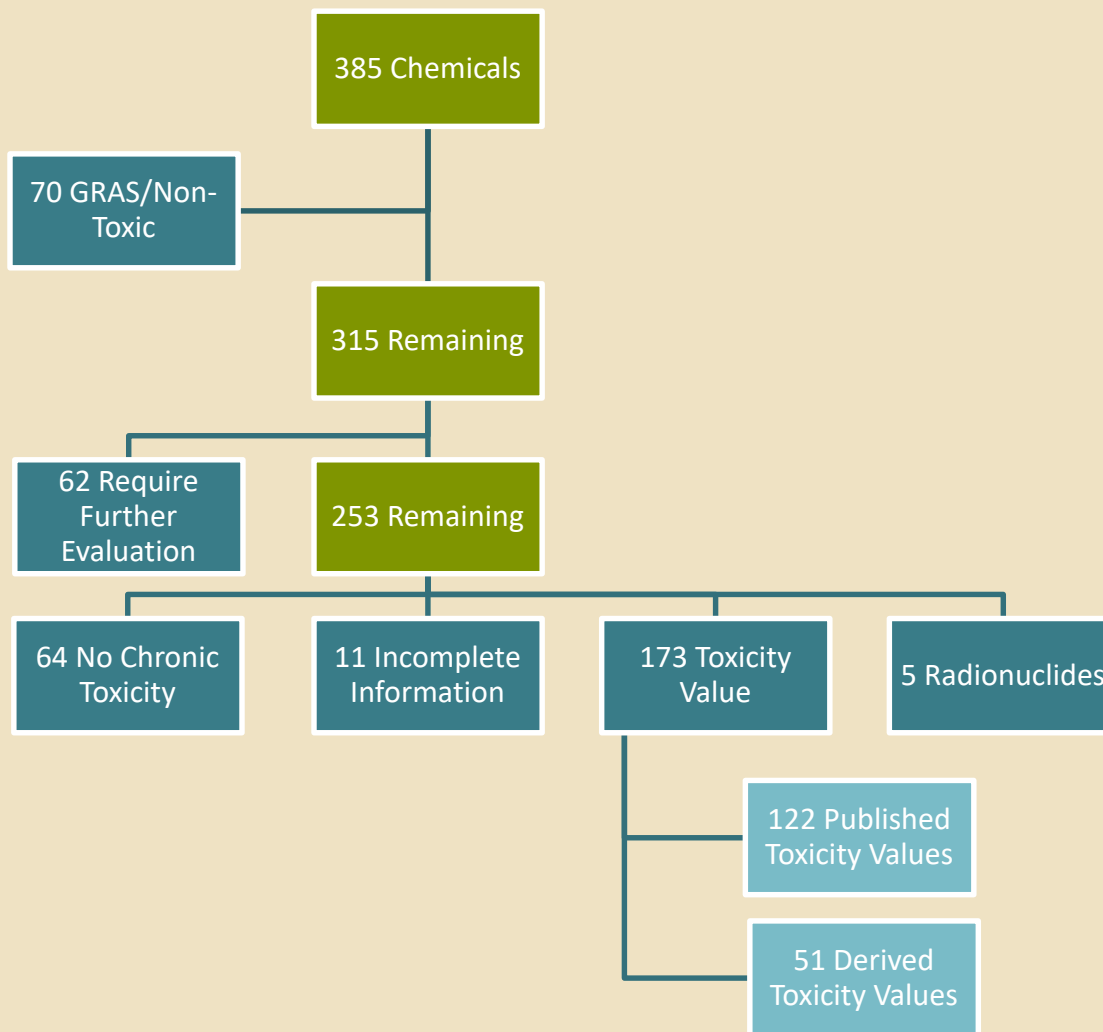
## TASK 1: PROGRESS UPDATE CHEMICALS OF INTEREST

385 CHEMICALS TO  
EVALUATE

90  
NATURALLY  
OCCURRING

312 UNIQUE  
CHEMICAL  
ADDITIVES

# TASK 1: PROGRESS UPDATE CHEMICALS OF INTEREST



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- **Draft report submitted to the Water Board and Food Safety Panel**
  - **Current report is posted online**
  - **Working on incorporating comments from FSP**
- **Scope of work originally asked for incorporating fate and transport, including plant uptake, into selection of chemical list**
  - **Through discussions with the Water Board and Scientific Advisor, fate and transport has not been incorporated into the current work**
  - **Looking for advice from FSP about how to proceed**
    - **Issues of incorporating fate and transport, especially for most toxic chemicals**
    - **Addressing breakdown products**
    - **Addressing those chemicals without toxicity data**

## TASK 2: PROGRESS UPDATE ON LITERATURE REVIEW

- **Focus of literature review (from MOU Scope of Work)**
  - **Review of produced water used in agriculture**
  - **Other sources of chemicals, including agricultural and natural sources**
  - **Ambient levels**
  - **Known levels in foodstuff**
  - **Chronic oral toxicity**
    - Those that require further evaluation (62 Chemicals)
    - Those with incomplete information (11 Chemicals)
  - **Fate and transport**
  - **Plant uptake**
  - **Identification of knowledge gaps**

## TASK 2: PROGRESS UPDATE ON LITERATURE REVIEW

- **Currently working with Water Board to finalize methods of literature review, specifically inclusion/exclusion criteria**
- **Factors being currently considered**
  - **Date**
    - 2000 to present for literature focused on produced water
    - No set restrictions for other literature, given the potential for limited availability
    - Goal to focus on most up-to-date data
  - **Method of oil and gas extraction**
    - On-shore conventional oil and gas
  - **Location**
    - Produced water in North America
  - **Language**
    - English
  - **Types of Publications (in hierarchical order)**
    - Peer Reviewed Literature
    - Government Publications
    - Scientific Letters
    - Industry Reports

# TASK 3: PROGRESS UPDATE ON CROP SAMPLING

- Samples to date

Produce	2016	2017	2018	2019
Almonds		X	X	
Apples			X	
Carrots	X		X	
Citrus	X	X	X	X
Garlic		X	X	
Grapes		X	X	
Pistachios		X	X	
Potatoes	X		X	
Tomatoes			X	
Cherries				O



## TASK 3: PROGRESS UPDATE ON CROP SAMPLING

- **Currently working on drafting the 2018/2019 sampling report**
- **Results appear to suggest no significant difference between crops irrigated with produced and conventionally sourced waters**
  
- **Some issues with the lab providing report in timely manner has delayed reporting results**
- **GSI QC of data found issues that are now resolved**
  - **Naphthalene contamination reported as false quantification**
  - **False positive for 2-Chloroethyl Vinyl Ether**
- **Holding times exceeded for some grape (2018) and some lemon and mandarin (2019) samples**
  - **Equipment issues that were unable to be resolved prior to holding time exceedance**
    - **For grapes, equipment malfunctioned mid-process. Review suggested no major problems with the results**
    - **For some mandarin and lemon samples, equipment malfunctioned post-sample preparation before analysis. Review suggested no major difference between samples inside and outside of holding times**



**Thank you**

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