



## **SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY**

Thursday, March 16, 2017 - 7:00 p.m.  
Simpkins Family Swim Center  
979 17th Avenue, Santa Cruz, California

### **AGENDA**

- 1. Call to Order**
- 2. Roll Call**
- 3. Oral Communications for Items Not on the Agenda**
- 4. Administrative Items**
  - 4.1 Approve Meeting Schedule for 2017
  - 4.2 Approve Minutes from November 17, 2016 MGA Meeting
  - 4.3 Adopt Conflict of Interest Code
  - 4.4 Report on MGA Plan Development Working Group
  - 4.5 Approval of HydroMetrics Modeling Budget Reallocation
  - 4.6 Consideration of Funding Approval for Work to Locate Seawater Interface Offshore
  - 4.7 Preliminary Review of Fiscal Year 2017-2018 Budget
- 5. Information Items**
  - 5.1 MGA Recognized in Stanford University Report
  - 5.2 Treasurer's Report
  - 5.3 Quarterly Monitoring Data Update
- 6. Oral Reports**
  - 6.1 Outreach Reports
  - 6.2 Board Member Reports
  - 6.3 Staff Reports
- 7. Adjournment**

March 16, 2017

**MEMO TO THE MGA BOARD OF DIRECTORS**

Subject: Agenda Item 4.1

Title: Approve Meeting Schedule for 2017

Per the MGA bylaws, the board is directed to approve the meeting schedule at the first meeting of the year. Below are the remaining meeting dates to be approved for 2017. Meetings are to be held on the third Thursday of odd months at the Simpkins Family Swim Center unless otherwise indicated on the MGA website. Meetings are subject to be cancelled or rescheduled at the discretion of the Executive Team.

- Thursday, May 18<sup>th</sup>
- Thursday, July 20<sup>th</sup>
- Thursday, September 21<sup>st</sup>
- Thursday, November 17<sup>th</sup>

Possible Board Actions:

1. By MOTION, approve the board meeting dates listed above.

By   
\_\_\_\_\_  
Ron Duncan  
General Manager  
Soquel Creek Water District



**SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY  
Draft Meeting Minutes  
November 17, 2016**

**1. Call To Order**

Dr. Jaffe called the meeting to order at 7:01 p.m.

**2. Roll Call**

Board Members Present: B. Jaffe, R. Marani, C. Abramson, J. Benich, Z. Friend, J. Kennedy, J. Kerr, T. LaHue, R. Menard (for C. Mathews), J. Ricker (for John Leopold)

Staff Present: L. Strohm, R. Bracamonte, T. Carson, R. Duncan, J. Townsend, S. Ryan, M. Schumacher

Others Present: Robert Schultz (Trout Gulch Mutual Water), Amanda Peisch-Derby (California Department of Water Resources)

Absent: C. Mathews, D. Lane, J. Leopold, E. Cross, I. Rivera, H. Luckenbach

There were approximately 15 members of the public in attendance.

**Presentations**

“Item 5.3: Biennial Report Scope of Work”  
by Cameron Tana, HydroMetrics WRI

“Item 6.1: Model Simulations and Climate Change Scenario”  
by Cameron Tana, HydroMetrics WRI

“Item 6.2: Model Technical Advisory Committee Meeting Notes”  
by Cameron Tana, HydroMetrics WRI

“Item 6.3: Pure Water Soquel”  
by Melanie Mow Schumacher, Soquel Creek Water District

**3. Oral Communications Related to Items Not on the Agenda**

Marilyn Garrett, an Aptos resident and retired school teacher shared her concerns that wireless technology is causing adverse health effects. She stated that voluntary and continuous radiation damages community health and violates privacy rights. Ms. Garrett expressed her opposition to wireless meters and wireless technology upgrades. She shared several handouts (Exhibit A) and urged agency representatives present to remove the harm associated with wireless technologies.

**4. Approval of Minutes of the Previous Meeting**

**4.1 Accept Minutes from September 15, 2016 MGA Meeting**

The group suggested the edits listed below:

- On p.4 change to “anadromous salmonid streams.”
- On p. 5 change to “...was submitted to DWR and is anticipated to be accepted on September 21, 2016.”
- On p. 6 change to “Mr. Ricker replied that the group will be interacting with...”

The new California Department of Water Resources Regional Coordinator, Amanda Peisch-Derby acknowledged that she had a few corrections for the September minutes. The Chair asked her to submit her clarifications in writing to be added to the final record.

MOTION: Mr. LaHue; Second: Mr. Marani. To approve the minutes of September 15, 2016 with edits as written above. Motion passed unanimously. Abstentions: Don Lane
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**5. Administrative Items**

**5.1 Appointment of Alternate Private Well Owner Representative**

Mr. Ricker reviewed the process, and reported that the Executive Team recommends that the board appoint Robert Schultz from the Trout Gulch Water System as the alternate. He added that the four representatives should draw straws to determine who has four year and two year terms.

Becky Steinbruner urged the board to change the bylaws to allow private well owners to select their own representatives. She added that she welcomes the appointment of Mr. Schultz.

Mr. Ricker responded briefly by referencing the staff report on this item. He is open to discussing the matter further, but is not aware of a current formal mechanism for that sort of election. Mr. LaHue commented that the group is open to hearing other ideas, but for now advertising well and allowing everyone to apply is the best solution.

The PWO Representatives then drew straws with the following outcome:

- Mr. Kennedy & Mr. Abramson – four year terms; and
- Mr. Kerr & Mr. Schultz – two year terms.

MOTION: Mr. Kennedy; Second: Mr. LaHue. To appoint Robert Schultz as the Alternate Private Well Owner Representative. Motion passed unanimously. Abstentions: Don Lane

### **5.2 Proposal to Create a Temporary Board Working Group to Work With Staff to Develop a Detailed Plan for Preparing the Groundwater Sustainability Plan**

Ms. Menard shared the intention to create a working group to create a plan for the plan, identify the resources required, and figure out the membership and charter for the group. She invited board members to work with staff in the working group. The plan is to bring information to the board in January on the resource requirements, and in March on the budget and planning process. In the spring the working group will bring recommendations to the board on the membership and charter for the subcommittee. The working group will be temporary and not beholden to the Brown Act with representation from each agency as well as the Private Well Owner Representatives.

Volunteers: Mr. Kennedy, Mr. Benich, Mr. Ricker, Dr. Jaffe, Ms. Menard. Others may participate (e.g., Executive Team Members and a representative from the City of Santa Cruz.)

MOTION: Mr. LaHue; Second: Mr. Marani. To appoint a temporary board working group as defined in the bylaws to develop a detailed plan for preparing the GSP. Motion passed unanimously. Abstentions: Don Lane

### **5.3 Approve HydroMetrics WRI Scope of Work and Budget for Biennial Report**

Mr. Duncan reviewed the motions listed below. Mr. Tana from HydroMetrics WRI provided a presentation (see Appendix A for slides).

Why doesn't the report include recommendations?

- Mr. Tana replied that he is open to the possibility if it would be useful for discussion and the board's process. The suggestion was made to call those recommendations "Items for Consideration."

Has the work of HydroMetrics WRI been put out to bid? Are there any conflicts of interest with the former general manager from Soquel Creek Water District serving as a consultant for HydroMetrics WRI?

- Mr. LaHue responded that he is in favor of putting things out to bid, although in this case it would have slowed down the process. Mr.

Duncan added that every 3-5 years the HydroMetrics WRI contract goes out to bid through the Soquel Creek Water District. Mr. Tana responded that Laura Brown consults for HydroMetrics WRI on other contracts and not the MGA. Mr. Duncan replied that there would be nothing incorrect about her consulting on this project.

MOTION: Mr. LaHue; Second: Ms. Menard. To waive the MGA's standard purchasing policy requirements. Motion passed unanimously. Abstentions: Don Lane

MOTION: Mr. LaHue; Second: Ms. Menard. To approve the Scope of Work as presented by HydroMetrics WRI and authorize staff representatives to sign a purchase order in the amount not to exceed \$49,640. Motion passed unanimously. Abstentions: Don Lane

## 6. Information Items

### 6.1 HydroMetrics WRI Update on Climate Change Approach & Scenarios

Mr. Tana provided a presentation and noted that the model will be used to evaluate groundwater alternatives and strategies to help with sustainability planning. Assumptions about specific numbers and locations will be based on preliminary feasibility evaluations that are already available. The overall focus is on basin-wide sustainability. The first main question will be to look at saltwater intrusion and model what happens to the seawater interface with various management strategies.

The group discussed the baseline assumptions and the need to be able to compare the possibilities objectively across various metrics and scales. Ms. Menard mentioned that the Water Supply Advisory Committee looked at how to make options more comparable (e.g., average cost per acre foot of yield).

What is the limit on the number of simulations that can be run?

- Once the model is built it will belong to the MGA and anyone who is trained and qualified can use it for future analysis. The goal is to evaluate the main strategies under consideration and provide an early guide to evaluate future planning options.

Bruce Daniels spoke about the need to calibrate the model and identify sensitivities that will need to be adjusted which will happen naturally in the process of building the model. It will be worth exploring external sensitivities as well.

Marilyn Garrett commented that she attended the Soquel Creek Water District board meeting last Tuesday, and found "Pure Water" to be a

misleading term for treated water. She expressed her concerns regarding the potentially toxic nature of treated water that would be injected into the groundwater. Ms. Garrett urged the group to look at the main causes of groundwater depletion (e.g., industrial agriculture), and expressed her desire to see an ecological approach.

Is Aquifer Storage and Recharge possible in the Purisima formation?

- It is possible to store recharge in the Purisima and recover it later within limits. Aquifer Storage and Recharge (ASR) will be evaluated in the model. The City of Santa Cruz is looking into ASR as a potential strategy and will be testing injection wells in 2018.

Will the models include recharge from septic systems? How do natural percolation strategies fit into the process?

- Recharge from septic systems will be included in the model. If there is a viable percolation plan, there is no reason not to include it in future runs of the model. Soquel Creek Water District, Dr. Fisher and others are looking at natural percolation methods.

Mr. Tana continued to present on future climate scenarios and provided background on the temperature calculations included. Mr. Jaffe acknowledged the value of this effort, and the input of top notch scientists at the USGS as well as the Technical Advisory Committee. Mr. Daniels acknowledged that the model assumes the worst which will make it harder to get a solution, but if the estimates are wrong the solution should still work. The group discussed the possibility of including a factor of risk or uncertainty into the model.

## **6.2 Receive Notes from Technical Advisory Committee Meeting #2 for Santa Cruz Mid-County Groundwater Agency Groundwater Model**

Mr. Tana reviewed the advice received and subsequent adjustments to the notes from the Technical Advisory Committee Meeting in August. There were two main technical notes: 1) regarding concerns about the offshore extent of the model which can be extended if so desired; and 2) related to how rainfall is being distributed throughout the basin.

## **6.3 Update on Soquel Creek Water District's Pure Water Soquel Project**

Melanie Mow Schumacher presented on the Soquel Creek Water District's (SqCWD) Pure Water Soquel project and provided a handout (Exhibit B). The SqCWD Board of Directors is currently exploring desalination, river water transfers and water purification for groundwater replenishment as water supply options. For the Pure Water Soquel Project, the water that would be used for groundwater recharge would go through more steps

than typical conventional treatment (e.g., microfiltration, reverse osmosis, ultraviolet treatment, and advanced oxidation). Ms. Schumacher reviewed the historical context and referenced similar projects in California. She recommended that individuals visit similar facilities in the area to learn more about the purification process (e.g., Pure Water Monterey Pilot or Silicon Valley Water Purification Center). Mr. Friend left the meeting at 8:46 p.m. Ms. Schumacher concluded by noting that the District applied for a grant under Proposition 1 for pilot testing. She encouraged individuals to submit their comments and concerns as part of the CEQA process. A draft Environmental Impact Report is scheduled to be released in summer of 2017.

Ms. Steinbruner submitted a petition to the Chair (Exhibit C) requesting that residents of Santa Cruz County be allowed to vote by ballot on injecting treated water into the local groundwater supply. She acknowledged that submitting the petition as part of this meeting does not ensure that it will be included as part of the District's scoping process which is a separate mechanism.

#### **6.4 Receive Department of Water Resources Best Management Practices and Guidance Documents**

Mr. Duncan reported that the California Department of Water Resources (DWR) recently released their Best Management Practices (BMPs). Amanda Peisch-Derby asked to say a few words as the new Regional Coordinator for DWR. While the BMPs can be used to meet SGMA compliance and GSP regulatory requirements, they are optional and not prescriptive. The BMPs also address GSP regulations in Section 352.2 (Monitoring Protocols) and Section 352.4 (Data and Reporting Standards) that are required, but there is still flexibility for GSAs to develop their own BMPs. DWR is currently requesting comments by November 28<sup>th</sup> which can be submitted by email, mail, or through the website. She offered to provide additional information and added that the guidance documents are still in development and open for input.

#### **6.5 Treasurer's Report**

Ms. Strohm provided a brief update and reviewed the numbers in the Treasurer's Report for September and October. She added that transactions have been minimal and welcomed any questions.

### **7. Oral Reports**

#### **7.1 Outreach Reports**

Ms. Ryan shared the latest outreach efforts and website analytics. Approximately 44% of visitors are new users that tend to see three pages per session. The monthly e-blast is now going out to 750 users. The monthly drop-in hours have had low attendance, but the group is hoping

that will increase over time. Mr. Kerr acknowledged the value in providing the opportunity for members of the public to ask questions in an informal setting. The county will host an informal meeting of agricultural and commercial PWOs in late January focusing on how they can engage in the process. The Resources Conservation District and county are starting to offer well sounding and water use assessments to PWOs within the basin.

### **7.2 Status Update on Hiring of Senior Water Resource Planner**

Mr. Carson reported that the position reopened in August, and the hiring team conducted two rounds of interviews. The interview panel consisted of the Executive Team, Mr. Carson, and Susan Farrar (CFO and Administration Director at the Community Foundation of Santa Cruz County). The hiring team is in the midst of negotiations, and hopes to have the new hire on board by early 2017.

### **7.3 Board Member Reports**

Ms. Menard encouraged board members and PWO Representatives to attend the ethics training at Capitola City Hall on January 17<sup>th</sup>.

### **7.4 Staff Reports**

There were no staff reports provided.

## **8. Adjournment**

The meeting adjourned at 9:04 p.m. The next meeting will be held at 7:00 p.m. on Thursday, January 19<sup>th</sup> at the Simpkins Family Swim Center unless otherwise posted on the MGA website.

SUBMITTED BY:

APPROVED BY:

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Julia Townsend  
Program Associate  
Regional Water Management Foundation

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Cynthia Mathews  
Board Secretary  
City of Santa Cruz

**Fires and Explosions:** Fatalities and serious injuries have been caused by smart meter fires and explosions. Following fire incidents, hundreds of thousands of smart meters have been recalled in Saskatchewan, Pennsylvania, Arizona, Florida, Oregon, and elsewhere. In early 2015, electrical surges caused hundreds of smart meters to explode off of the walls in Stockton and Capitola, California.



# “SMART” METERS



## “Smart” Meter Radiation is a Serious Risk to Our Health.

**Cancer & RF Radiation.** The World Health Organization (WHO) states that radio frequency (RF) electromagnetic fields (EMF) from non-ionizing radiation-emitting devices (such as “smart” meters, cell phones, and wi-fi) are a **Class 2B possible cancer causing agent** in the same category as lead, DDT, and chloroform. Studies show DNA breaks and damage.

“Smart” meters pulse RF radiation up to 190,000 times/ day at levels hundreds of times stronger than that which have been found to cause serious health problems. **Children, pregnant women, seniors, those with immune deficiencies, medical conditions, pacemakers and implants are especially at risk.**

**Upon installation of smart meters and infrastructure,** some people report headaches, ringing ears, dizziness, breathing problems, insomnia, nausea, cognitive problems, memory loss, muscle spasms, rashes, heart problems, and even seizures. Some have had to abandon their homes. Electro-Hypersensitivity (EHS) increases with exposure.

**Time bomb.** Peer-reviewed science confirms many harmful effects of EMF emitting technologies like smart meters. At first, the dangers of smoking and asbestos were ignored. Many illnesses, like cancer, take years to develop. **Will you allow the utilities to put your family's health at risk?**

“**Adverse neurological effects** have been reported in people who sustain close proximity to wireless meters, especially under 10 feet,” say 54 experts in 20 countries, including Joel Moskowitz of UC Berkeley School of Public Health and David Carpenter, Director, University of Albany NY Institute for Health and the Environment.



## WHAT CAN WE DO?

- Inform elected officials that you oppose smart meters—hold them accountable.
- Organize a public meeting or panel discussion on the subject.

discuss on the subject.

- **Refuse together with your community. There is power in numbers.**
- **Take direct action to block deployments and have smart meters removed.**

### If you have an analog meter:

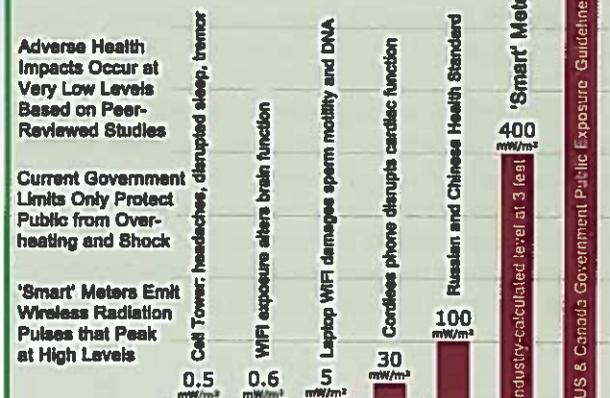
- **Send a certified letter** to utility refusing consent.
- **Secure analog meters** behind locked gates or lock box.
- **Do not allow installers on your property.** Call police if they trespass. Form a neighborhood watch.
- **Tell them “You are trespassing, Get off my property, I forbid installation of the digital meter.”**

- **Don't agree to illegal ‘opt out’ fees.** We never opted in!

### If you have a “smart” meter:

- **Revoke consent by certified letter** (samples on our website). Set a deadline for removal.
- Insist on written confirmation that replacement meters are **“electromechanical analogs with no electronics.”**
- When utilities refuse to remove unauthorized “smart” meters, people are buying analog meters online and having them installed. **It can be dangerous to swap an electric meter if you don't know what you are doing.**
- In the event of a disconnect, be prepared to speak out to the local council, the community, and the media. Report service cuts and other abuses to us.
- **Get it in writing!** Keep copies of all correspondence. Avoid circular conversations. Ask for a supervisor. **Insist on analog for no charge. Don't back down.**
- **Don't give up your power or your rights-** assume the utility company is being deceptive.

## “Smart” Meter Wireless Radiation Comparison



More detailed information at: [SmartGridAwareness.Org](http://SmartGridAwareness.Org)



**Costing You Money. Risking Your Health, Privacy and Safety.**

[info@stopsmartmeters.org](mailto:info@stopsmartmeters.org) • PO Box 682 Portola, CA 96122  
For area information, please contact your local organization, above.

**For more info,** copies of this brochure, FAQ, DVD's, EMF testers, local contacts, organizing support and advice, and to donate, **please visit our website.**



## What are “Smart” Meters?

- Any **electronic utility meter**—usually wireless
- Allows utilities, third parties, and governments access to detailed info about your home life
- Emits **RF radiation** and “dirty electricity” linked to environmental and health problems
- Can **catch fire**, explode, and damage appliances
- **Increases utility bills**

Communities worldwide are rejecting “smart” meters, ordering safety recalls, and replacing analogs. However, utilities continue to mislead the public and install without a mandate, using coercion, extortion, and propaganda to achieve their aims.

**VERIFY!** Thousands of published and peer-reviewed scientific papers show environmental and human health damage from microwave radiation. To learn more and reduce your risk, go to: [StopSmartMeters.org/warning](http://StopSmartMeters.org/warning). You and your community have the right to safety, health and privacy. **Did you know?** Neither smart meters nor “opt out” fees are required by law.



# Why are utilities replacing reliable analog electric, gas and water meters with "smart" meters?

- To cut costs by firing meter readers.
- To obtain federal grants (your tax dollars).
- To charge you more during "peak" hours.
- To enable remote shut-off.
- To extract data on your family's behavior.

## Smart Meters are NOT Green.

The manufacture and operation of millions of power-consuming "smart" meters and data centers increases carbon and electromog pollution. No power savings have been attributed to "smart" meters, which squander resources needed for efficiency and local renewable energy. RF radiation damages life.

## Types of "Smart" Meters:

**AMI (Advanced Metering Infrastructure)** uses a "mesh network" of wireless pulses between meters and utility antennas; can remotely shut off power.

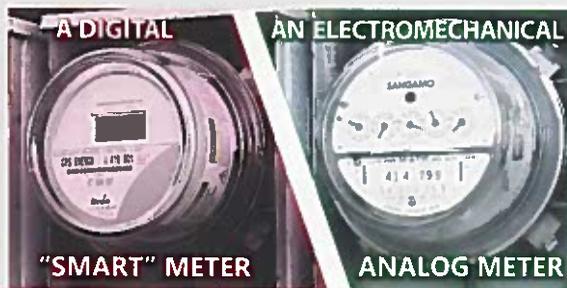
**AMR (Automated Meter Reading- aka OMR/ERT)** broadcast your info for utility drive-by reading. 'Bubble up' type transmit all the time, 'wake up' when signaled.

**PLC (Power Line Communication) aka TWACS** transmits your data over power lines. Though this is a wired system, 'dirty electricity' radiates inside homes.

**"Radio Off" Digital Meters** can still be surveillance devices, cause "dirty electricity" and health problems, overcharge and burn. Utilities may turn radio "on."

## Know the Difference

**Bottom Line: If it's plastic and electronic, refuse it.** Demand a "non-electronic electromechanical analog." Beware "Trojan Horse" meters that resemble analogs. An FCC number = wireless. Use an EMF Tester from StopSmartMeters.org/store to be sure.



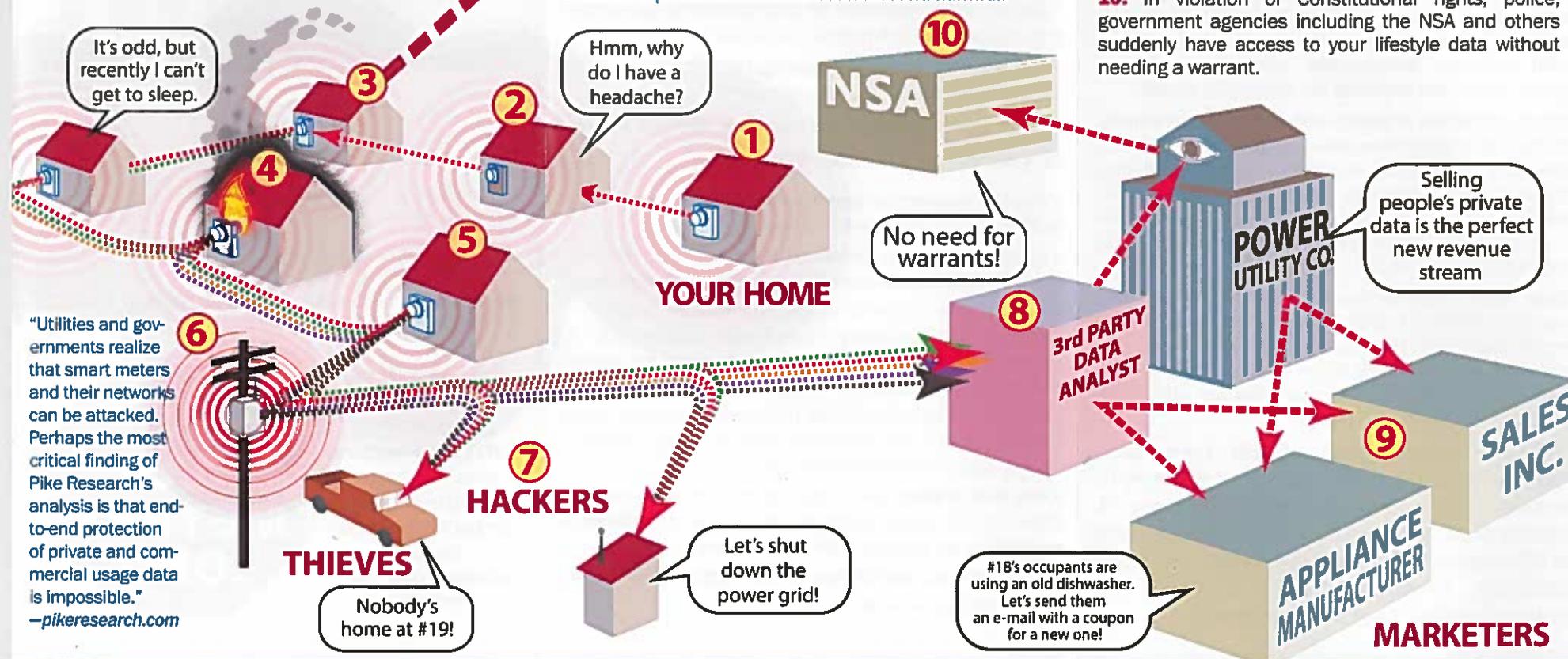
# The Path of Your Privacy: How an AMI "SMART" METER MESH NETWORK really works

Exhibit A - November 17, 2016 Board Meeting

1. In an AMI "mesh network," data is transmitted from one "smart" meter and sent by wireless microwave pulses on to the next house's meter, and the next . . .
2. Although a neighbor may choose to keep or replace their analog meter, they may still be exposed to microwave radiation from surrounding meters.
3. Anyone whose outside wall has a "smart" meter, or who lives adjacent to banks of meters suffers strong bursts of pulsed radiation, all day and night long, , up to 190,000 times/ day.
4. "Smart" Meters- made cheaply of plastic, carrying high voltage, and installed by temp workers, are prone to fire and explosion and have caused multiple injuries and fatalities.
5. Random homes get "collector meters," through which data from hundreds of homes is funneled. Radiation exposure is dramatically multiplied for these families who are never informed that their meter is the "collector."



A child sleeping on the other side of the wall from a meter or meters is subject to involuntary pulsed radiation at levels far above what peer-reviewed science has found harmful.



"A so-called 'Smart Grid' that is as vulnerable as what we've got is not smart at all, it's a really really stupid grid."

-James Woolsey, former CIA Director, 2011



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4th edition January 2016



**Danger: Radiation. Stop the property devaluating and cancer-causing Verizon 4G/5G surveillance microwave "microcell" and cell tower deployment next to our homes**

**Where: unlimited permanent placement and continuous radiation-emitting facilities by telecommunication corporations approx. every 1/4 mile on utility poles, rooftops, residential, commercial and agricultural land.**

**When mailing the postcard "Notice of Public Hearing" regarding a wireless communication facility, the County/City omits disclosure of documented health impacts due to cell tower proximity\*:**

Sleeping disorders	Increased cancer incidence	Cardiovascular problems
Depressive tendencies	Chronic fatigue/ headaches	Concentration difficulties/memory loss

\*"Five Studies showing Ill-Health Effects from Masts" (i.e. cell towers) Document produced by Dr. Grahame Blackwell (2005)

Facts from independent, non-industry sources: Science from 1932 to the present has demonstrated conclusively the harmful effects of "wireless" microwave radiation. Hundreds of oral and written health complaints followed the installation of PG&E's microwave "Smart" Meters, which emit biologically damaging pulsed modulated microwave radiation similar to 4G technologies. These testimonies prompted our County Health Officer to issue a report (as part of Item 41) "Health Risks Associated with Smart Meters" [and Other Wireless Technologies Such as Cell Towers] to the Santa Cruz County Board of Supervisors on 1/24/12 (available at [www.co.santa-cruz.ca.us](http://www.co.santa-cruz.ca.us)). These non-UL-certified surveillance "smart" meters were recently recalled in Saskatchewan and Portland after causing fires.... and now installed on these "microcell" utility poles.

**No resident and/or child has authorized 24/7 involuntary bodily microwave radiation trespass. We do NOT consent to these violations of our privacy, health, constitutional, or property rights.**

What you can do to register your opposition with our elected Supervisors:

1. Attend televised Tuesday Board of Supervisors meetings and speak for 3 minutes during 9:00 a.m. "oral communications", Oct.11<sup>th</sup> and 18<sup>th</sup>, Nov. 15<sup>th</sup> and 22<sup>nd</sup>, Dec. 6<sup>th</sup> and 13<sup>th</sup>, 2016. 701 Ocean Street (at Water). Board of Sup. phone: (831) 454-2200. Call in comments, or for info. about constituent meetings. More information: Ask Planner Frank Barron (831) 454-2530 for a list of existing and planned locations, dates of public and appeal hearings.
2. View the July 21, 2012 demonstration at S.C. Verizon store opposing their North Coast 4G rollout: <http://www.indybay.org/newsitems/2012/07/22/18718032.php>. Consider organizing an event/protest.

**Cell Phones, Cell Towers, WiFi, Wireless SmartMeters**  
emit microwave radio frequency radiation.

Independent research shows this radiation causes cellular stress and damage, DNA damage, blood-brain barrier disruption, increased cancer and tumor risk, decreased melatonin, insomnia, abnormal heart rhythms, strokes, altered brainwaves, cognitive difficulties – memory and concentration, headaches, links to Alzheimer’s and impacts to wildlife.

**Children are especially vulnerable.**

**Get the independent science, not the industry spin**

[takebackyourpower.net](http://takebackyourpower.net)

Dr. Karl Maret/ Dr. Magda Havas

[radiationresearch.org](http://radiationresearch.org)

Youtube: Resonance: Beings of Frequency

Dr. Erica Mallery-Blythe - Electromagnetic Radiation, Health and Children, 2014

[cellphonetaskforce.org](http://cellphonetaskforce.org)

[emfsafetynetwork.org](http://emfsafetynetwork.org)

[electromagnetichealth.org](http://electromagnetichealth.org)

[emrpolicy.org](http://emrpolicy.org) / [wirelesswatchblog.org](http://wirelesswatchblog.org)

[radiationeducation.com](http://radiationeducation.com) (for kids, by kids)

[EMFSummit.com](http://EMFSummit.com) / [bioinitiative.org](http://bioinitiative.org)

[emfacts.com](http://emfacts.com) / [lessemf.com](http://lessemf.com)

The Truth About Smart Meters – Brian Thiesen

<http://www.youtube.com/watch?v=v4HsxNG2-4M&feature=youtu.be>

[stopsmartmeters.org](http://stopsmartmeters.org)

<https://www.youtube.com/watch?v=solvrkfg-l> (Liz Barris re: LA firefighters against cell towers)

“To my knowledge, ‘microwave’ or ‘radiowave sickness’ was first reported in August 1932 with the symptoms of severe tiredness, fatigue, fitful sleep, headaches, intolerability and high susceptibility to infection.” “The paradox of course is how microwave radiation can be used as a weapon to cause impairment, illness and death and at the same time be used as a communications instrument.” Barry Trower, Royal Navy Microwave Weapons Researcher.

<http://www.magdahavas.com/wordpress/wp-content/uploads/2012/01/Amended-Declaration-of-Barry-Trower.pdf>

### STIMULATION TO EMIT PIPING NOISE

In a Swiss study, published in April 2011, two mobile phones were placed close to a beehive, and the piping made by bees was recorded. All experiments showed clearly that the worker bees were stimulated to emit piping sounds. Under natural conditions such piping is used to signal the preparation for swarming or as a reaction to disturbances in the hives. These observations are yet another proof that bees are susceptible to pulsed electromagnetic fields and that they exhibit sensitive behaviour alterations when exposed to them. Interestingly enough, the number of bee colonies is dwindling mainly in parts of the earth where mobile phones are widespread (such as North America, Europe, Australia, Southern Brazil, Taiwan and Japan). The connection between dying bees and mobile communications is indisputable!

### IF THE BEES DISAPPEAR, MAN WILL DISAPPEAR AS WELL

We have to thank the bees for the enormous development of earth's vegetation with its approximately 200,000 species of the most varied flowering plants. Around 80% of all fruits and berries depend on insects for their pollination. The diligent bees take on the bulk of this work. We owe the bigger part of our daily nutrition to them. It is questionable whether we could survive without this type of food. Our love, gratitude, and appreciation for the bees as well as our respective care for these precious beings therefore cannot be great enough!

### Can we afford an unnatural technology for mobile communications if our own basis of existence is destroyed as a result?

The World Foundation for Natural Science was founded in 1993 by The Most Rev. Dr. Peter W. Leach-Lewis and has, since its inception, vehemently taken a stand for...

- ... informing about the dangers of contaminating nature by means of technological radiation,
- ... stopping the unchecked proliferation of mobile communications and the drastic reduction thereof,
- ... the immediate development of a new technology for mobile communications and data transmission that is in accord with nature.

Please support us in reaching these goals!  
If you have any questions, please contact us any time.



#### The World Foundation for Natural Science

World Headquarters

P.O. Drawer 16900, Washington, DC 20041, U.S.A.  
Tel. +1(703)631-1408 Fax +1(703)631-1919

European Headquarters

P.O. Box 7995, CH-6000 Lucerne 7, Switzerland  
Tel. +41 (0)41 798 03 98 Fax +41 (0)41 798 03 99

[www.naturalscience.org](http://www.naturalscience.org)

# MOBILE COMMUNICATIONS

## THE CAUSE FOR THE GLOBAL DISAPPEARANCE OF THE BEES

STAY AWAY FROM MOBILE COMMUNICATIONS



"If the bee disappears  
from the surface of the earth,  
man has no more than four years to live:  
no more bees, no more pollination,  
no more plants, no more animals,  
no more humanity!"

(Credited to Albert Einstein)

**The honeybee has existed on earth for about 40 million years. It is threatened to become extinct within only one decade!**

### THE BEES DISAPPEAR

For several years a massive disappearance of bees has been observed worldwide. In Germany, Austria and Switzerland for example about 30% of the bees died during the winter of 2009/2010. In some places in America losses of up to 80% have been recorded within the last few years. Science calls this phenomenon "Colony Collapse Disorder" (CCD). But none of the factors known to have had any influence here, such as the varroa mite, insecticides, fungicides or lack of food due to changes in the environment, can provide a satisfactory explanation as to the main cause for the unusually high decline of the honeybee population. No matter how much all these factors just mentioned do impact the natural life and functioning of the bees, **the actual reason for the disappearance of the bees is the worldwide proliferation of mobile communications.**

### WEAKENING OF THE IMMUNE SYSTEM

Scientists at the American Beltsville Agricultural Research Center found that the deceased bees had a greatly weakened immune defence. But what is the explanation? The immune system only operates in an optimal way when cell-to-cell communication works properly. The multiple biochemical activities within the cells are controlled

by means of electromagnetic impulses. This is how essential information can be exchanged between cells at the speed of light. The problem with mobile communications is that its unnatural frequencies are exactly within the range of these natural biological processes, although they are much more dominant. As a consequence they interrupt vital cell-to-cell communication exchange...they literally butt in (Dr. Wolf Bergmann), so the immune system is no longer able to perform its task in an optimal way. This leads to the bees' no longer being able to cope with viral infections, fungal infestations or other diseases and impacts to which they were exposed in the past, and to their ultimate demise.

By the way: cell-to-cell communication works just the same in all living beings, and that includes human cellular communication. This should tell us something ...



### DISRUPTION OF ORIENTATION

However, technological electromagnetic radiation not only influences the immune system, it also interferes with the natural terrestrial magnetic field. Bees can detect the direction and change of the earth's magnetic field, using this ability for their orientation. But when the natural terrestrial magnetic field is constantly superimposed with technological radiation they lose their sense of orientation and cannot find their way back to their hives.

Exhibit A - November 17, 2016 Board Meeting

Several scientists, first and foremost Dr. Ulrich Warnke, confirm the suspected direct link between technological radiation and the disappearance of the bees. In 2010, scientists at Panjab University in Chandigarh, India, found that a strong decrease in the number of bees occurs in a hive when influenced by mobile phone radiation. Bees are usually able to find their way without any difficulty within a radius of 5 kilometres from the hive. The Indian study found that the worker bees returned less and less frequently to the beehive after the installation of a mobile phone. If the worker bees do not return, the queen dies together with her entire offspring. Bee keepers also observed that there were no bee diseases until a mobile communications tower had been installed nearby, whereas, following the installation of the tower, increased mortality would occur.

### ADVERSE EFFECTS ON THE WAGGLE DANCE

Bees also use electromagnetic fields to communicate with each other. When a food source is located at a distance of more than 100 meters from the beehive, the bees use the so called waggle dance in order to indicate to each other the direction and distance to good food sources. Using tiny magnetite crystals in the abdomen, they are able to induce frequencies between 180 Hz and 250 Hz. Mobile phone data transmission works with a high-frequency carrier signal modulated with a pulsed low-frequency signal. This pulsed signal has a frequency of 217 Hz and lies exactly within the range of the waggle dance, which is yet another interference with their natural communication.

**Press release: June 1, 2016**

**For immediate distribution**

Contact: Nina Beety 831-655-9902  
Wireless Radiation Alert Network

## **MAJOR U.S. GOVERNMENT STUDY FINDS CELL PHONE RADIATION CAUSES CANCER**

Last Thursday, the U.S. National Toxicology Program released final peer-reviewed results of its \$25 million study on rats and cell phone radiation exposure. The findings: 1 in 12 male rats developed malignant brain tumors (glioma) or malignant heart tumors (schwannoma) or pre-cancerous lesions. None of the rats in the control group developed tumors of the brain or heart or pre-cancerous lesions. Birth weights for exposed animals were also lower than for control animals.

Microwave News, which announced the impending release of results, cited an unnamed source within NTP that senior scientists wanted to get this information out to the public as soon as possible.

Chris Portier, former associate director of the NTP, called this study a "game changer" and "a wake-up call to the scientific establishment." These results concur with human studies such as the 5-country Interphone study which found significant 40-95% increases in glioma after only 10 years for cell phone usage as little as ½ hour per day. The latency for brain tumors is normally 15-30 years. The WHO IARC listed this radiation as a Class 2B carcinogen in 2011.

The NTP study was designed to mimic human exposure and look at effects on all parts of the body. Consumer Affairs says, "Rats are commonly used in cancer studies because their reactions to various carcinogens are similar to humans." The study intentionally kept exposure levels low, below levels that would increase body temperature. As a result, the cancers were not caused by thermal effects. Current FCC exposure limits are only based on thermal effects. Wireless devices are tested for compliance with these thermal limits but are not safety tested.

Female rats developed tumors or pre-cancerous lesions at a lower level which was not considered statistically significant. American Cancer Society stated: "It's important to note that these sorts of gender differences often appear in carcinogenic studies."

The frequency tested was 900 MHz for 10 minutes on and 10 minutes off for a cumulative time of 9 hours per day. This frequency is close to that used by other wireless devices including PG&E wireless Smart Meters.

The American Cancer Society called the NTP report "good science," saying

NTP staff were clearly aware of the potential importance of this study and went the extra distance to ensure the best science is used. They used double the

number of animals required for this type of study; they convened not one but three panels to look at abnormal tissues from treated animals to ensure that what was identified as a brain and heart tumor was indeed a brain and heart tumor; they solicited review from multiple scientists from outside the NTP to critically review all aspects of the data analysis and study findings, to ensure the findings would stand up to the critical assessment expected once these unexpected findings were released.

On Friday, the Institute for Electrical and Electronics Engineers (IEEE) released a statement with comments from Ken Foster of the IEEE committee that reviews RF exposure limits:

With the NTP study results, Foster expects more governments to put out cautionary guidelines and radiation labeling for cellphones. He says he wouldn't be surprised if California adds RF radiation to its Proposition 65 list of carcinogenic chemicals, and if the IARC ups its classification rating from 2B: possibly carcinogenic to humans to 2A: probably carcinogenic to humans. "And they wouldn't be out of line in doing that," he says. "This is going to change the rhetoric in the field. People can point to much more hard evidence that [cellphone RF exposure] really is a problem."

Joel Moskowitz, Director, Center for Family and Community Health at the School of Public Health, UC Berkeley:

The results of the study reinforce the need for more stringent regulation of radiofrequency radiation and better disclosure of the health risks associated with wireless technologies -- two demands made by the International EMF Scientist Appeal -- a petition signed by 220 scientists who have published research on the effects of electromagnetic radiation.

Ron Melnick, retired from the National Toxicology Program, told Microwave News:

The NTP tested the hypothesis that cell phone radiation could not cause health effects and that hypothesis has now been disproved...After extensive reviews, the consensus is that there was a carcinogenic effect...This is a major public health concern because the cells which became cancerous in the rats were the same types of cells as those that have been reported to develop into tumors in cell phone epidemiological studies.

IEEE calls NTP studies "the gold standard for animal cancer assays". The National Toxicology Program is part of the National Institutes of Health, and tests substances for toxicity and effects on human health.

NTP report: <http://bit.ly/NTPcell1>

###

Monterey County Herald (<http://www.montereyherald.com>)

## **Nina Beety: Monterey cell tower onslaught fraught with risk**

*By Nina Beety, Guest commentary*

Friday, September 30, 2016

A cell tower tsunami is about to hit our community, affecting humans, wildlife and trees.

The Federal Communications Commission is pushing new cell towers (called “small cells”) into the public right-of-way in preparation for 5G — Chair Tom Wheeler proudly calls it “infrastructure intensive, requiring a massive deployment of small cells.” This is not for phone coverage. It is for future technology uses and faster streaming video.

These pole-mounted microwave transmitters will be located on sidewalks and in front yards, outside front doors and bedroom windows throughout our community. In places where utilities are undergrounded, new utility poles will be erected for these antennas.

The visual blight will be substantial, with multiple antennas installed on many utility poles. The radiation will be everywhere.

There will also be probable noise issues with buzzing from the electronics and cooling fans, most noticeable at night when people are sleeping.

California law says that telecom uses of the right-of-way cannot “incommode” the public, yet that’s exactly what these intrusive antennas do.

Microwave radiation emissions cause human and environmental damage. This radiation harms birds, butterflies, bees, trees and other species.

These antennas violate ADA; for those disabled by sensitivity to electromagnetic radiation, these towers will turn sidewalks and streets into “no go” zones. Eventually, there will be no safe place anywhere.

Thousands of U.S. cell towers are out of compliance with FCC limits, as high as 600 percent. Once antennas are installed, Crown Castle and other providers may broadcast at any level; violations have been sent to the FCC, but it has taken no action. Crown Castle’s antennas already exceed FCC thermal guidelines as far as 4 feet from their face. Crown Castle hasn’t provided a number, or what levels the antennas emit at 5 feet, 6 feet or 8 feet out, though. The space around these antennas is not a vacuum. Birds, bats, bees, butterflies and other insects inhabit these zones, and homes with second stories are directly adjacent.

FCC limits have not been updated since 1996, and those limits are only based on heating effects to a large man for a few minutes of exposure. There are no guidelines for non-thermal biological effects or

Exhibit A - November 17, 2016 Board Meeting

chronic exposure or exposure to children. Other countries have much stricter standards than the United States.

The National Toxicology Program of the National Institutes of Health announced in May that this radiation causes brain tumors, heart tumors and pre-cancerous lesions below FCC thermal limits. Substantial peer-reviewed research has shown harm from this radiation for decades and that cancer clusters occur around cell towers up to one-quarter-mile away. Radiation comparisons to baby monitors and other wireless devices, none of which have been safety tested, are little comfort.

Tuesday, the Monterey City Council will consider a wireless ordinance revision that allows these new cell towers. It will also hear an appeal by Crown Castle to allow the first cell tower in Monterey's right-of-way, which the Planning Commission previously rejected. If approved, this tower will create precedent for right-of-way use throughout Monterey, even if the new ordinance is not approved.

The Pacific Grove Planning Commission has approved three right-of-way antenna projects along Central Avenue. This approval creates a precedent in Pacific Grove unless it is appealed and overturned. The Planning Commission ignored its ordinance that prohibits actions that would be injurious to monarch butterflies. Microwave radiation affects butterflies on many levels, including to immune function, fertility, navigation, learning, DNA and causing blood-brain barrier breaches. P.G. and Monterey also routinely sign off on health and safety declarations in the paperwork.

Crown Castle, according to its 2014 SEC filing, does not have liability insurance for health effects. If residents sue over these cell towers, the cities will be left defenseless. The company also has substantial indebtedness, which can impair its ability to do proper maintenance.

The law firm which Monterey hired to consult with for these issues stated on its website: "Fast and reliable legal services for the telecom industry and cell site landlords." This was removed after I brought it to the attention of the City Council, but staff continue to consult with the firm to create this ordinance and support Crown Castle's appeal.

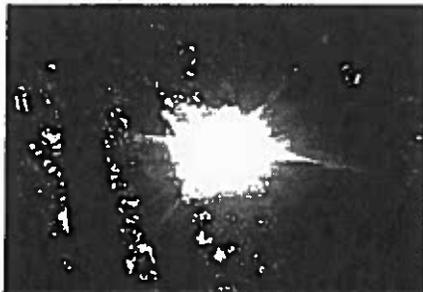
The character and health of our towns will be irreparably damaged by allowing cell towers in the public's right-of-way. Two years from now, it will be too late to say, "I wish we'd known. I wish we'd said no." Please oppose these towers and Monterey's new ordinance before it is too late.

*Nina Beety is a member of the California EMF Safety Coalition. She lives in Monterey.*

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URL: <http://www.montereyherald.com/opinion/20160930/nina-beety-monterey-cell-tower-onslaught-fraught-with-risk>

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**"Our lives begin to end  
the day we become  
silent about things that  
matter."**

**- Martin Luther King, Jr.**

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- **Quotes from Experts**
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## **New Study: Carrying a Cell Phone in a Backpack Leads to Blood Abnormalities**

17.01.2015 by emily Category [Electromagnetic Health Blog](#)

There is a growing body of scientific evidence of brain cancer risk from cell phone use. People have been long been advised to use a headset or speakerphone to keep the Radiofrequency (RF) radiation away from the head. Distance lowers the risk, due to the fact that the signals decrease over distance according to the inverse square law. This can also lessen electrosensitivity symptoms, such as headaches, concentration problems and fatigue. But, it turns out, according to a new pilot study, these protective measures may not be adequate to prevent biological consequences. Further precautionary steps when using cellular and wireless devices may be in order.

**New research, reported in the journal of the Weston A. Price Foundation, Wise Traditions, January 16, 2015, shows the act of carrying a cell phone (smart phone) in a receptive mode in a backpack is sufficient to create disturbing changes in a person's blood, without the cell phone**

being used.

Dark-field microscope analysis showed substantial changes in blood after short-term cell phone radiation exposure, both in a carrying condition (in a back pack) and in an active use condition (i.e. browsing the web, making calls on the speaker and placing calls with the phone against the head at least twice for approximately 5 minutes each). Each of the two exposure conditions were 45-minutes in duration.

The purpose of the study was to determine if the Weston A. Price Foundation-recommended diet had protective effects against the biological effects of cell phone radiation. No protective effects of diet were found, but important insights were gained about the impacts of cell phone exposure on human peripheral blood.

In both a carrying condition, and an active use condition, substantial degenerative changes in the blood were observed. Changes observed with live blood analysis, using a dark field microscope and digital video camera to capture the images, included dramatic red blood cell aggregation and stickiness, as well as red blood cell morphological (shape) changes, including the formation of echinocytes (spiky cells).

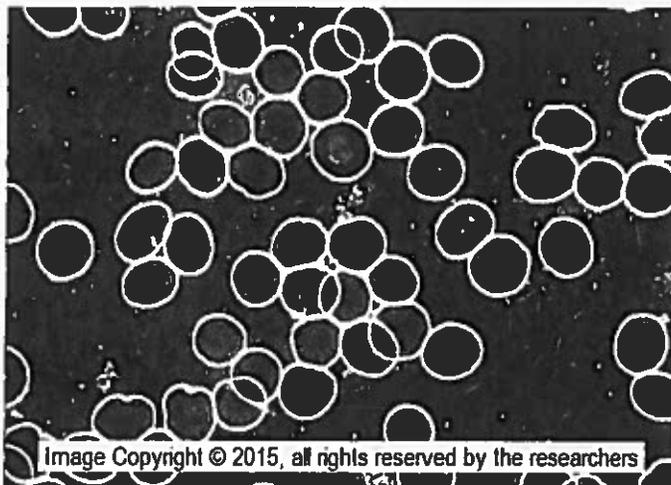
According to the authors, "Such blood morphologies—the RBC clumping and misshapen cells—are frequently observed in ill persons and those eating less-than-optimal diets."

**"Does Short-term Exposure to Cell Phone Radiation Affect the Blood?", *Wise Traditions, the journal of the Weston A. Price Foundation***

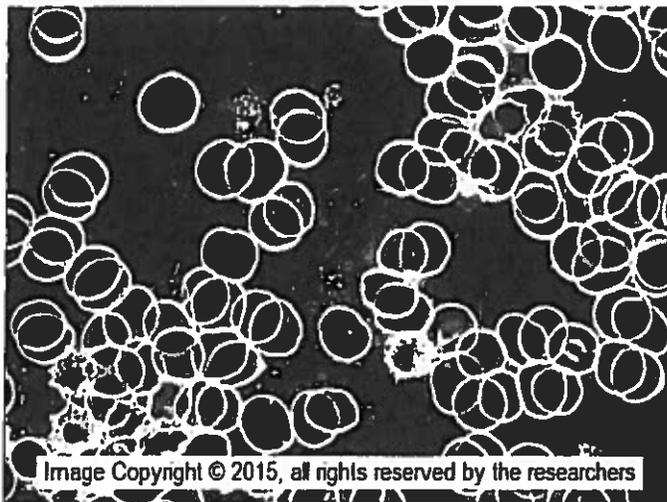
**Example of Changes Found:**

**Figure 5:** Baseline Condition of male, age 55, showing normal, healthy blood.

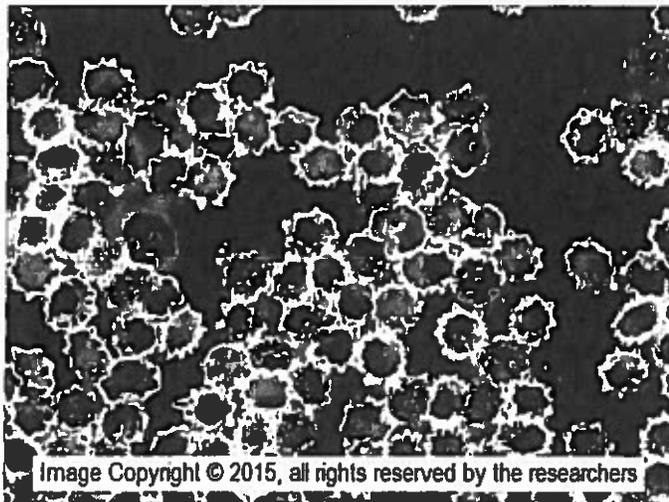
*(Image Copyright © 2015, all rights reserved by the researchers; permission granted for use here)*



**Figure 6:** Carrying condition of same male showing aggregated cells and a few misshapen RBCs  
*(Image Copyright © 2015, all rights reserved by the researchers; permission granted for use here)*



**Figure 7:** Active use condition of same male subject showing all RBCs are misshapen.  
*(Image Copyright © 2015, all rights reserved by the researchers; permission granted for use here)*

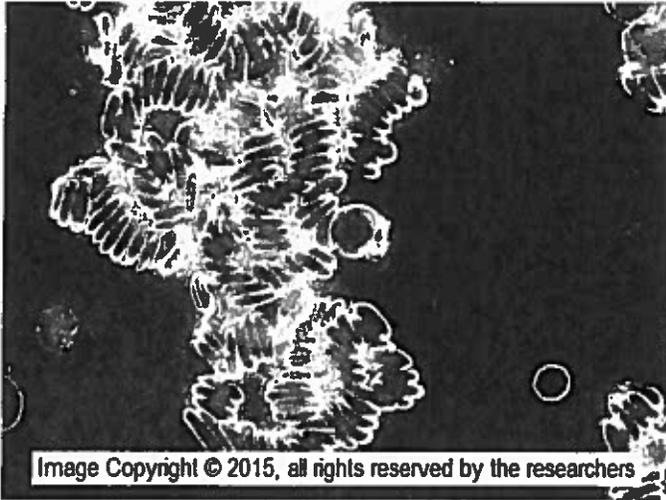


Note, the authors indicate it is probable the blood changes observed would affect blood circulation, as red blood cell aggregation is well-known to diminish microcirculation. Blood cell aggregation increases blood viscosity, and this impairs blood flow. Since blood viscosity and blood flow are important factors in heart attacks and strokes, the results of this study suggest circulation risks from cell phone exposures may be important information for anyone with a circulatory disorder, or history of either of these conditions, to know. Moreover, it is worthwhile to consider these findings in light of the fact that cardiovascular disease is the number one cause of death in the US.

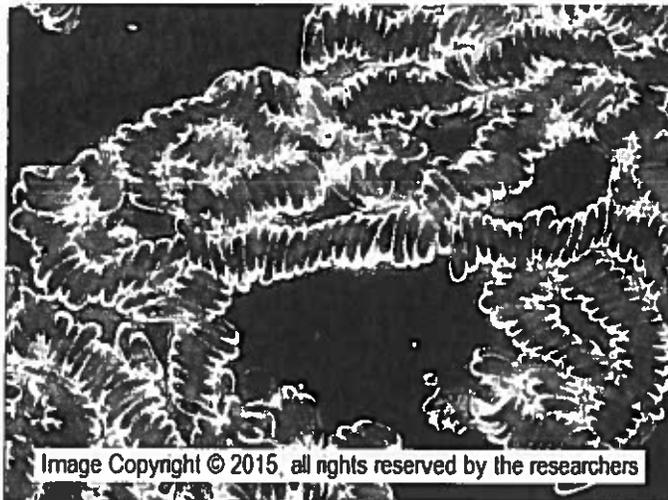
Also, importantly, the changes observed in the 'active use' condition were not only observed in blood drawn from the upper body (a finger), but in blood drawn from a toe. Effects far from the local area of exposure demonstrates microwave radiation emitted during cell phone use may impact the body systemically, literally from 'head to toe'. Exploration of other remote effects is indicated.

**Figure 8:** Active use condition of female subject. Age 55, fingertip blood showing RBCs in rouleaux.

*(Copyright Image © 2015, all rights reserved by the researchers, permission granted for use here)*



**Figure 9:** Active use condition of same female subject, toe blood showing RBCs in rouleaux.  
*(Copyright Image © 2015, all rights reserved by the researchers; permission granted for use here)*



While the authors acknowledge this is a small pilot study (10 persons, with almost all demonstrating a healthy live blood profile to start) they say the changes in the blood from cell phone exposure are 'substantial in magnitude'. Observed blood changes occurred over two 45-minute intervals, a fraction of the time many people, possibly billions, today either use a cell phone or have it physically near to them while turned on. The "onset, reversibility, recovery time, and chronicity of these blood changes need further investigation".

**Based on this study documenting visual effects on peripheral blood following short-term human exposure to cell phone radiation, ElectromagneticHealth.org offers the following insights and precautionary recommendations:**

1. The precautionary practice of using headsets or speakerphones with cell phones is valuable advice.

However, these practices may not offer full or adequate protection from cell phone radiation if the cell phone is still located close to the body.

2. Cell phones turned on, even when not against the ear and in a backpack, result in rapid degenerative changes in the blood. Thus, cell phones should be turned OFF when not in use to avoid unnecessary exposures.



3. Another reason to keep the cell phone turned OFF is out of respect for the biology of others nearby, since nearby exposure without actual cell phone use was shown to have biological consequences.

4. The study showed younger subjects showed less aggregated red blood cells (RBCs) than older subjects for the 'carrying condition', as well as less aggregated red blood cells (RBCs) and less blood cell shape changes than older subjects in the 'active use' condition. Thus, younger people, especially, should understand initial effects from cell phone radiation may impact older people faster.

5. Note we do not know what blood would look like after many hours of cell phone exposure over may days, weeks, months and years, and whether, under these circumstances, if younger people would continue to exhibit the possible resilience noted here. In any event, in both young people and older people, in this study, in brief exposures of 45-minutes, degenerative changes were observed.

6. While this study evaluated blood effects of short-term cell phone use, and of nearby cell phone exposures, it is very likely similar findings would occur with exposure to other wireless devices emitting the same radiofrequency radiation. Until further research is conducted, it would be prudent to keep all wireless equipment turned OFF when not in use, including WiFi routers, wireless computers, laptops and tablets, computer peripheral equipment, like wireless printers and scanners, and all other wireless devices and equipment.

7. The decision to hard-wire communications devices, so there is no ambient radiofrequency radiation whatsoever, is the safest choice. This would include using land-line phones, hard-wiring home security systems, not using wireless sensors in the home, or wireless baby/elder, monitors, and hard-wiring all internet connections at home and in schools and offices. The choice to use WiFi and wireless devices in schools should be given very thoughtful and careful reconsideration until such time as research on blood effects in these types of exposure conditions can be competed.

8. Understand scientists do not yet know just how far away from one's body one would need to place a smart phone to not observe the negative effects on live blood when using a phone on either a speakerphone or headset. We know effects were seen when phones were as close as in a backpack. Until this is determined, it would be prudent to keep the phone as far away from the body as possible, using headset extension cords, and certainly not keeping a phone in one's pocket or backpack if one

seeks to minimize degenerative changes in red blood cells.

9. People with circulation disorders, or at risk for, or with a history of, heart attacks and strokes, should be careful to not expose themselves to cell phone radiation. This would include people with any circulatory disorders affecting the eyes.

10. People need to know their exposures to RF radiation, and I urge families, and perhaps community centers, to get an electrosmog meter so you can begin to take control over your circumstances, starting with awareness of exposures. Go to [www.EMFSafetyStore.com](http://www.EMFSafetyStore.com) for resources.

Further research in this direction is strongly advised. ElectromagneticHealth.org would like to see research demonstrating effects of longer exposures; to gauge how far away from a cell phone one needs to be in order to not see degenerative effects on the blood; to understand the disparities seen between observed blood changes in a cell phone carrying position and active use position, where important insights about the degenerative process may be learned; to see effects on people who are already ill; to see effects from nearby wireless devices; to study larger samples; to look at potential protective effects of other diets; to look at potential effects of shielding devices using subtle energy technologies; to assess the connection between observed blood effects and health conditions; and to find a way to assess potential blood and health effects of the coming 'internet of things', where home-based appliances and equipment will communicate wirelessly continuously.

Chronic illnesses have increased dramatically since the early 1990s, as cell phones became widespread. No pre-market health testing on cell phones was required, nor was there post-market health surveillance. **ElectromagneticHealth.org believes it is essential citizens demand pre-market health testing on exposure scenarios involving the coming 'internet of things'. Live blood analysis would be one way to assess the effect of these and other RF technologies on biology.**

If you wish to support further scientific exploration by the authors of this study, please contact us so we can convey your interest. [Emily@electromagnetichealth.org](mailto:Emily@electromagnetichealth.org)

**"Does Short-term Exposure to Cell Phone Radiation Affect the Blood?", *Wise Traditions*, the journal of the Weston A. Price Foundation**

Electromagnetic  
Health.org

## Electromagnetic Health News!

Please support our work by making  
a tax-deductible donation.  
We are 100% donation-based  
and need your support  
to educate, communicate and analyze  
critical developments in this field.

[ElectromagneticHealth.org](http://ElectromagneticHealth.org) is dedicated to being an educational resource for the public, health care providers and the media on the health hazards of electromagnetic radiation. While most of the content here is free, proceeds at this site from the sale of educational content and remediation supplies will support further activism, new educational content and scientific research on the connection between radiofrequency radiation and individual illnesses and conditions. Please be in touch if you can support this important work in other ways!

### **Health and Environmental Consulting**

Environmental consulting, including EMF remediation strategies, is available by appointment with our Founder, Camilla Rees, MBA, for \$175.00 per hour, and on a sliding scale basis for those of limited means. Camilla is a leading health educator who has studied widely in health and medicine and speaks widely on mitigation of electromagnetic fields. She is co-author, with Magda Havas, PhD, of "Public Health SOS: The Shadow Side of the Wireless Revolution" and was co-author of the landmark white paper, "Cellphones and Brain Tumors: 15 Reasons for Concern". Camilla has been an Integrative Care Counselor, Cancer Guide, Educator in Mental Imagery and facilitator of Hellinger Family and Organizational Constellations. She is an Executive Coach to change agents. Recently, Camilla held a Briefing on Wireless Hazards in the U.S. Congress.

Camilla is available for EMF consultations to individuals, schools, governments, physicians, other health providers, and CEOs and Human Resources personnel, either in person or by phone. Please complete email request for appointment below and someone will be in touch with you to schedule.

### **We encourage you to:**

1. Sign the **Petition to Congress**,
2. **Donate** to the worthy non-profits in this area,
3. Buy the very inexpensive E-book "***Public Health SOS: The Shadow Side of the Wireless Revolution***"
4. **Share** this site with every patient, health care practitioner, parent, school teacher, elderly person, government official and journalist you know!

## **Phone**

If you are a member of the media and doing a story and need support, please contact us at:  
(641) 715-3900 Ext: 61768#

## **Email**

All others, send in your suggestions, questions and inspirations to:

# PUREWater Soquel

Replenishing Mid-County Groundwater

# PROJECT OVERVIEW

November 2016

## Our Water Supply Challenges

The groundwater basin that Soquel Creek Water District (District) relies on for 100% of its water supply is not sustainable and seawater intrusion is present in the Pleasure Point, Aptos, Seascapes, and La Selva Beach areas. The basin also provides water for over a thousand private well users, small mutual water systems, and municipal pumpers.

The main challenges we face include:

- Critically overdrafted groundwater basin
- Seawater intrusion and contamination
- Meeting the State mandate of basin sustainability by 2040
- Addressing stricter water quality standards
- Future climate change impacts such as seawater rise and reduced recharge

In order to address these challenges and ensure a reliable water supply for current and future generations, the District needs a new water supply.

## WHAT'S INSIDE?

What is Pure Water Soquel?	2
Why Purified Water?	2
What are the Project Benefits?	2
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Technical Studies	3
Project Timeline and Proposed Milestones	3
How to Learn More and Participate	4
Considering Options: River Water Transfers and Desalination	4

## Our Community Water Plan and Pure Water Soquel Project



**The District has developed an action oriented, multi-faceted Community Water Plan.** This long-range plan is based on community input and serves as the District's

roadmap to meet our goal of long-term sustainability by 2040. The Community Water Plan's key components include: water conservation, groundwater management, and securing supplemental supplies.



**Furthering Water Conservation and Zero Impact Development:** Our customers are helping to protect our limited groundwater supply by making conservation a way of life,

when rain is plentiful and in times of drought. We offer many tools and programs to help customers use water efficiently at home and at work. We're proud of the work our customers have done to conserve water and we're committed to supporting these efforts.



**Pro-Active Groundwater Management:** Our network of monitoring wells helps us understand how much water is in the underground aquifers we pump from and where seawater intrusion is

occurring. We closely measure how much water we pump, monitor water quality, and are shifting well pumping away

from the coast. We're also working together with other local agencies and private well owners who pump water from the same groundwater basin to find regional solutions to protect our shared water supply.



### Securing Supplemental Water Supplies:

Conservation and groundwater management are helpful, but not sufficient to protect the groundwater basin from being contaminated by seawater intrusion. A new source of supply is still needed. Through phone and on-line surveys, the three qualities that are most important to our customers for a new water supply project are timeliness, water quality, and reliability.



The District has been evaluating three different supply options with **Pure Water Soquel, a groundwater replenishment project using purified water, as its preferred project.** The District continues to carry forward two other options, river water transfers with the City of Santa Cruz and desalination from Moss Landing, since the solution may involve a combination of supplemental water supply options.

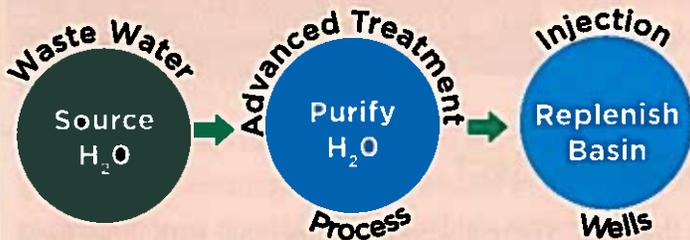
# PUREWater Soquel

Replenishing Mid-County Groundwater

## What is Pure Water Soquel?



**Pure Water Soquel** has been selected by the District Board as its preferred project for a new source of water. It involves taking municipal wastewater from the Santa Cruz County Sanitation District or the City of Santa Cruz and uses advanced water purification methods to produce 1,500 acre-feet per year (488 million gallons per year) of high-quality water. The purified water would then be injected into the ground to replenish the groundwater basin and provide a seawater barrier. The project is currently undergoing environmental review (see project timeline on page 3).



Cost estimates of the proposed Pure Water Soquel Project are preliminary since numerous component alternatives are being evaluated. Total preliminary project cost estimates range from \$50–70 million. The District is actively seeking state grant funding to help offset these costs.



Orange County Water District's Groundwater Replenishment System has produced over 200 billion gallons of purified water and has been in operation for 40 years. (photo credit: Orange County Water District)

Many communities with long-term water shortages have either implemented or are currently evaluating purified water projects. Orange County Water District has been purifying recycled water to use as groundwater replenishment for over 40 years. Utilities in San Diego, Los Angeles, the San Francisco Bay Area, Monterey, and Silicon Valley are all seriously considering purified water as a part of their water supply portfolios.

## What are the Project Benefits? .....

### PROVIDES A BARRIER AGAINST SEAWATER

**INTRUSION** — Helps prevent seawater intrusion from moving farther inland and contaminating drinking water wells. Southern Santa Cruz County, Monterey County, and many other coastal communities around the world are challenged with seawater intrusion.

### RELIABLE AND DROUGHT-PROOF WATER

**SUPPLY** — Provides a diversified water portfolio that is available year-round and is drought-proof to supplement our currently overdrafted groundwater supply.

**HIGH-QUALITY WATER** — Using proven technology with multiple treatment processes, provides purified water that meets all state and federal water quality criteria and is cleaner than most bottled water.

### BENEFICIAL REUSE OF EXISTING SOURCE —

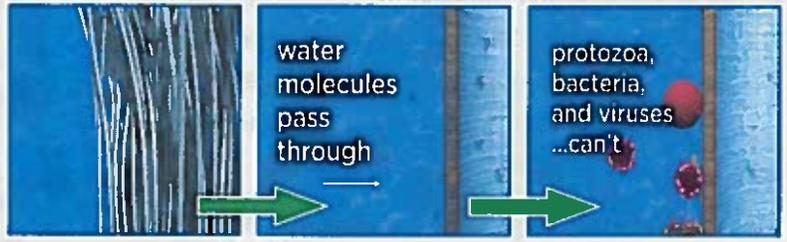
Eliminates one-quarter of the 8 million gallons a day (average) of treated wastewater that goes out into the Pacific Ocean. This water can be diverted from being wasted, discharged to the ocean, and instead be put to beneficial uses. Once recycled and purified the water could be stored underground for environmental protection and to meet future community needs.

**TIMELINESS** — Purifying recycled water has been successfully implemented in other California communities. Water rights, that are typical of surface water projects, and marine issues, that are typical of desalination projects, will not apply to the District's purified water project, thus potentially reducing the time to acquire permits.

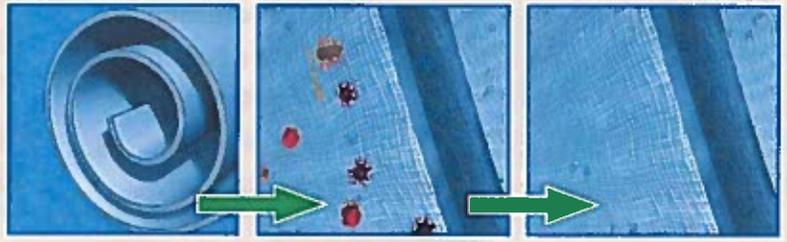
# Understanding the Water Purification Process

Currently, most advanced water purification processes involve a multi-stage process of micro-filtration, reverse osmosis, and ultraviolet light with advanced oxidation.

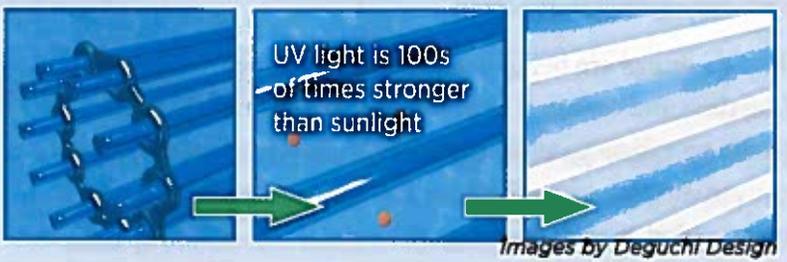
**STEP 1:** To purify recycled water, the first step is to pretreat the water through micro-filtration. Water is pumped through tubes filled with tiny membranes. Each membrane, made up of hollow fibers, is perforated with holes 1/300th the width of a human hair. Through this process, solids and bacteria are caught in the fibers and removed from the water.



**STEP 2:** The water is treated through reverse osmosis, a process that again forces the water through membranes, removing salt, micro-organisms and chemicals.



**STEP 3:** At this point the water is purified, but will go through one more step to ensure safety. The treated water is exposed to ultraviolet light with advanced oxidation causing any remaining organic chemicals to break down into simple elements such as oxygen, nitrogen and carbon.



Images by Deguchi Design

## Technical Studies

Technical studies have been conducted or are currently underway to help inform the environmental review. These include:

- Feasibility Study — draft completed March 2016
- Geochemical Characterization — currently being conducted
- Water Quality/Constituents of Emerging Concern (CEC) Testing — currently being conducted with a technical advisory panel
- Groundwater Modeling and Particle Tracking — currently being conducted

## Pure Water Soquel Timeline and Proposed Milestones

2014	2014-2016	2016-2018	2018-2022
Soquel Creek Water District Board selects Purified Water for Groundwater Replenishment as its preferred water supply option and directs staff to further evaluate.	District receives State Water Resources Control Board grant and prepares a Feasibility Study.	District conducts environmental review to prepare Environmental Impact Report (EIR).  District seeks additional grant funding.	District to conduct permitting, design, and construction

## How to Learn More and Participate .....

The District welcomes input and wants to ensure that information on the Pure Water Soquel project is available and accessible for its customers and community members. Community informational meetings will be held throughout the environmental review period for the community to learn about the technical studies being conducted, the project study process, upcoming milestones, and to provide input.

The District is preparing an environmental impact report (EIR) on its Pure Water Soquel Project.

The first step in the EIR process is called scoping, which will help the District define the environmental issues to be evaluated in the EIR. Release of a Notice of Preparation/Initial Study (NOP/IS) is expected to occur in late November and will initiate the start of the scoping period and public comments on the environmental topics, potential effects, mitigation measures, and range of alternatives to be analyzed in the project EIR will be welcome during that period.

Two meetings are being held at different times (daytime and evening) to accommodate as much public participation as possible. Attend whichever is most convenient for you, or both, as the same information will be provided at each meeting.

### Scoping Meetings

**Date:** Wednesday, December 7, 2016

**Times:** 2pm and 6pm

**Location:** Twin Lakes Church, Building 700,  
2701 Cabrillo College Dr, Aptos, CA 95003

Meeting facilities are accessible to persons with disabilities. Requests for special accommodations or translation services should be directed to Melanie Mow Schumacher no later than five days before the meeting by calling 831-475-8501x153 or emailing [melanies@soquelcreekwater.org](mailto:melanies@soquelcreekwater.org)

To access information on the District's website, visit [www.soquelcreekwater.org/purewatersoquel](http://www.soquelcreekwater.org/purewatersoquel).



## CONSIDERING OPTIONS: Diversifying with river water transfers and/or desalination

Like the Pure Water Soquel Project, river water transfers and desalination are other options to diversify the District's water supply portfolio.



**River Water Transfers:** The District has embarked on a pilot project of purchasing excess treated river water from the City of Santa Cruz and is addressing water quality issues with blending river water with groundwater. The District recognizes river water is not a guaranteed, reliable source of supply. Limits due to future drought conditions, habitat protection, and the City's own water

supply needs may impact the availability and timeliness of this source for the District.



**Desalination:** The District has signed a non-binding, non-financial agreement to potentially purchase desalinated water from the proposed Deep Water Desal Project in Moss Landing. The project is undergoing environmental review. The District recognizes this project is a back-up option for Cal-Am in Monterey and is being co-located with data centers which may impact the availability and timeliness of this source for the District.



5180 Soquel Drive  
Soquel, CA 95073  
[www.soquelcreekwater.org](http://www.soquelcreekwater.org)

For more information contact:

Melanie Mow Schumacher, PE | Associate Manager-Special Projects  
Phone: 831-475-8501x 153 | Email: [melanies@soquelcreekwater.org](mailto:melanies@soquelcreekwater.org)

# PETITION TO THE SANTA CRUZ MIDCOUNTY GROUNDWATER AGENCY:

We, the undersigned residents of Santa Cruz County, demand that you allow us to vote by ballot to approve or disapprove current plans in process to inject treated sewage water into the local groundwater supply.

*Presented to  
Board 11/17/16  
by Becky Steinbruner*

NAME (print, please)

e-mail or mailing address

BECKY STEINBRUNER

*Becky St*

*KI6TKB@yahoo.com*

JOHN BERGSTROM

*jbergstrom.ia@gmail.com*

J. CORBECK

*Michai@Keytex.com*

Judy Kuehlborn

*30 carol way - Aptos, CA*

Avis MYERS

*100 CAROL WAY, APTOS*

Emily Tunquist

*933 Panselle Lane #3 Capitola*

Holly A. Hoff

*732 Seachiff Dr. Aptos*

Thomas Stumbaugh

*111 Vista Mar Ct., Aptos*

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NAME (print, please)

e-mail or mailing address

Elizabeth A. Karzas

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GARY KNOWLES

106 Fife Ln. Aptos

Kathy Knowles

106 Fife Ln. Aptos

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NAME (print, please)

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Janice Tempy Wolf jatewa@yahoo.com

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Joanne Ferchland - Parella joannefp@gmail.com

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seaeckel@sbcglobal.net

Tina Bamford

Tina.Bamford@qmail.com

PETITION TO  
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GROUNDWATER AGENCY:

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NAME (print, please)

e-mail or mailing address

<u>Richard Bruce</u>	<u>4625 N Rober Galon Soquel</u>
<u>Cathlin Afchison</u>	<u>703 Escalona Capitola</u>
<u>Marc Kiefer</u>	<u>marckiefer@comcast.net</u>
<u>John Suter</u>	<u>jack@gmail.com</u>
<u>Andrea <del>Ca</del></u>	<u>anabatow@yahoo.com</u>
<u>Dennis Rod</u>	<u>800 Vin Hill Rd, Santa Cruz, CA 95065</u>
<u>Carol Disbois</u>	<u>534 Smilgelfield Aptos 95063</u>

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NAME (print, please) e-mail or mailing address

Marilyn Garrett 351 Redwood Hts. Rd, Aptos

Joy Roszyk 2002 Seascapo Aptos, CA

Joy Roszyk " "

Lora Allanson lora@allanonsinsurance.com

ACACIA STONE atjstone17@gmail.com

Brian Laufer b.rie.laufer@gmail.com

Christina Melgares 6104 Jason Ct Aptos

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NAME (print, please)

e-mail or mailing address

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NAME (print, please)      e-mail or mailing address

Jessalyn Steinman      jessalynsteinman@gmail.com,

Jonathan Crockett      ROCKETTJ@GMAIL.COM

Lowell Webb      webbsfarmsupplier@yahoo.com

Kristen Batchelor      Kidbee137@gmail.com

LINDA C HERZOG BURTI

Danielle Burnett-Foster      daniellereneeburnett@yahoo.com

Susie Polnaszek      polnaszek@gmail.com

March 16, 2017

## **MEMO TO THE MGA BOARD OF DIRECTORS**

Subject: Agenda Item 4.3

Title: Adopt Conflict of Interest Code

### Attachments

1. Proposed Conflict of Interest Policy of the Santa Cruz Mid-County Groundwater Agency

The Political Reform Act of 1974 (Government Code sections 81000, et seq.) requires state and local government agencies to adopt and promulgate a conflict of interest code. This is also specified in Section 8.5 of the Joint Exercise of Powers Agreement creating the Santa Cruz Mid-County Groundwater Agency (MGA).

The MGA Executive Team reviewed various examples of local conflict of interest codes, including those of the Soquel Creek Water District, Central Water District, Resource Conservation District of Santa Cruz County, and the Santa Cruz County Regional Transportation Commission, which is also a local agency consisting of multiple agency members. Using the existing conflict of interest codes of other similar agencies, staff developed a draft conflict of interest code for the MGA that was as simple as possible and met the legal requirements. The proposed code was reviewed by MGA Legal Counsel and was further modified based on her direction. Legal Counsel advised that the list of designated positions did not need to include consultants at this time. Staff has also consulted with the County Elections Department regarding proper procedures for disclosure.

The proposed conflict of interest code (attached) identifies the Board of Directors (including Alternates) and the four agency members of the Executive Team as designated positions in disclosure category 1. Those persons will be required to file a Statement of Economic Interests (Form 700) with the Clerk of the Elections Department of the County of Santa Cruz, which will make the statements available for public inspection and reproduction pursuant to Government Code section 81008. The forms should be filed by April 3, 2017, and should be filed as an "Assuming Office" statement, effective March 17, 2016, the date of agency creation, or whatever later date an individual assumed a designated position. Persons who already file a statement electronically can add the MGA to their current statements. Others should file a hard copy with a wet signature.

After approval of the conflict of interest code by the MGA Board, the code must be transmitted for approval by the County Board of Supervisors, which is the

reviewing agency for approval of conflict of interest codes for local government agencies within Santa Cruz County.

Possible Board Actions:

1. By MOTION, adopt the proposed Conflict of Interest Code of the Santa Cruz Mid-County Groundwater Agency.
2. By MOTION, direct the MGA Secretary to transmit the adopted Conflict of Interest Code to the Santa Cruz County Board of Supervisors for approval.

Or,

3. By MOTION, adopt the proposed Conflict of Interest Code of the Santa Cruz Mid-County Groundwater Agency, with modifications.

Or,

4. By MOTION, provide direction to staff for further modification of the proposed Conflict of Interest Code of the Santa Cruz Mid-County Groundwater Agency.

By   
John A. Ricker  
Water Resources Division Director  
County of Santa Cruz

**CONFLICT OF INTEREST CODE  
OF THE  
SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY**

The Political Reform Act of 1974 (Government Code sections 81000, et seq.) requires state and local government agencies to adopt and promulgate conflict of interest codes. The Fair Political Practices Commission has adopted a regulation, section 18730 of Title 2 of the California Code of Regulations, which contains the terms of a standard conflict of interest code that can be incorporated by reference in an agency's code. After public notice and hearing, the Fair Political Practices Commission may amend the standard code to conform to amendments of the Political Reform Act. Therefore, the terms of section 18730 of Title 2 of the California Code of Regulations and any amendments to it duly adopted by the Fair Political Practices Commission together with the attached Appendices designating positions and establishing disclosure categories are hereby incorporated by reference and together constitute the Conflict of Interest Code of the SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY (hereafter "Agency").

Individuals holding designated positions shall file their statement of economic interests with the Clerk of the Elections Department of the County of Santa Cruz, which will make the statements available for public inspection and reproduction pursuant to Government Code section 81008.

Attachments:

- Appendix A: Designated Positions
- Appendix B: Disclosure Categories

Approved by Order of the Board of Directors

Ayes:

Noes

Abstain:

Absent:

Adopted:

\_\_\_\_\_  
Bruce Jaffe  
Board President

Attested:

\_\_\_\_\_  
Cynthia Mathews  
Board Secretary

**APPENDIX A: DESIGNATED POSITIONS**

<u>Designated Positions</u>	<u>Assigned Disclosure Category</u>
Board of Directors (including alternates)	1
Executive Team:	1
City of Santa Cruz Water Director	
Soquel Creek Water District General Manager	
Central Water District General Manager	
County of Santa Cruz Water Resources Division Director	

## **APPENDIX B: DISCLOSURE CATEGORIES**

### Category 1

A designated position in this category must report all income (including gifts, loans, and travel payments), investments, business positions, and interests in real property located in or originating from sources doing business within the boundaries of the agency.

March 16, 2017

## **MEMO TO THE MGA BOARD OF DIRECTORS**

Subject: Agenda Item 4.4

Title: Report on MGA Plan Development Working Group

### Attachments

1. MGA Plan Development Working Group Charge (approved by the MGA Board at its 11/17/2016 Meeting)
2. MGA Plan Development Working Group February 3, 2017 Meeting Notes
3. Updated Copy of GSP Outline and Checklist
4. MGA Plan Development Working Group February 24, 2017 Meeting Notes
5. List of Supplemental Source Options
6. Preliminary Version of GSP related budget items for Fiscal Year 2018

At the November 2016 MGA Board Meeting, the board accepted a staff recommendation to establish a working group made up of representatives of each member agency as well as the private well owner representatives. Working group members include Bruce Jaffe, John Benich, Jon Kennedy, Rosemary Menard and John Ricker, with additional staff representatives. In addition, MGA Board Vice Chair Rob Marani participated in the working group's February 24<sup>th</sup> meeting.

The working group was charged to develop recommendations on the approach for developing the Groundwater Sustainability Plan (GSP) for consideration to the full board. Attachment 1 is the MGA Board's charge to the working group and includes a range of topics the board wanted the working group to address.

The working group has met four times since December 2016 and is pleased to provide the MGA Board with a report on their activities. The group asks the MGA Board to provide feedback on its work to date and planned work for the remainder of its existence. In addition, the working group will provide another update at the MGA Board's planned May 18, 2017 meeting.

At the working group's January 28, 2017 meeting it decided to use its two scheduled meetings in February to do two things:

1. Use a brainstorming exercise to identify and discuss the key issues that will need to be addressed in preparing the GSP; and
2. Review an updated version of the list of GSP requirements based on the state's July 2016 Emergency Regulations.

Attachment 2 summarizes the results of the working group's February 3<sup>rd</sup> brainstorming session. The goal of the session was not to evaluate or prioritize

issues, but simply to identify and discuss them. The following are the key topic areas covered by the brainstorming (in no particular order):

1. What are our Guiding Principles?
2. Sustainable Yield Concept
3. Data Inputs, Modeling Assumptions and Modeling Results
4. Define problem
5. Historical Impacts – Lively discussion regarding how the overdraft occurred and the usefulness of examining the history of pumping groundwater in the basin.
6. Process Design
7. What are the solutions?
8. What does it take to get to agreement?
9. Structure of fees
10. Interface with County Planning
11. Public Involvement

The meeting notes in Attachment 2 provide additional details about what was discussed in each topic area. (Note: The order of the topics above is different from the Meeting Notes document. The items were reordered in this memo so they would be in a more process or subject-matter order for MGA Board Members not involved in the working group.)

At the working group's February 24<sup>th</sup> meeting, it reviewed and discussed the state's GSP Outline and Checklist. The GSP Outline and Checklist that was developed is included as Attachment 3. During the working group's discussion of this material, a number of the topic areas were identified as the main areas where the proposed GSP Development Committee would focus their work.

Key topic areas identified in the GSP Outline and Checklist are highlighted in yellow on Attachment 3 and include the following:

1. Land Use Elements and Relationships to Applicable General Plans
2. Additional GSP Content, particularly items related to, for example, control of sea water intrusion, conjunctive use of surface water and groundwater
3. Current and historical Groundwater conditions
4. Water Budget Information
5. Surface Water Supply for Groundwater Active or Passive Groundwater Recharge
6. Dividing the Basin into Separate Management Areas
7. Sustainability Goal
8. Undesirable Results of Each Sustainability Indicator
9. Minimum Thresholds
10. Measurable Objectives

## 11. Projects and Management Actions, including Financing

The items not highlighted in yellow on Attachment 3 are those items that are descriptive or technical in nature and that are not likely to be controversial or to substantially influence the selection of projects or strategies for restoring the basin. Work on these items would be allocated to MGA staff and would not be included in the charge or work plan that would be developed for the proposed GSP Development Committee.

Meeting notes from the working group's February 24<sup>th</sup> meeting are included as Attachment 4.

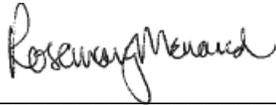
Attachment 5 is a table that was developed by staff and provided to working group members at their January 13<sup>th</sup> meeting. The table provides the working group members with an overview of the full range of supplemental supply projects that have been under review over the last several years or are under active study now by one or more of the MGA partner agencies. A brief discussion of the status of each option is also presented in the table. Information about the range of options that could ultimately play some role in restoring the Mid-County Basin is relevant to for both items discussed during the working group's brainstorming session – see item #9 on the list of topics, and items # 5 and 11 on the GSP Outline and Checklist.

Finally at the working group's February 24<sup>th</sup> meeting, the group discussed a preliminary version of the Fiscal Year 2018 MGA budget items related to the work on GSP during the next fiscal year. The main point of discussion on the preliminary FY18 GSP Budget was that the budget needs to include more resources for public outreach and engagement. Specific suggestions included: adding resources for using a social media presence by, for example, engaging paid interns; and making sure we have the resources necessary to use a variety of formats such as infographics, videos, and accessible written materials.

Additional meetings are planned for March, April and May. At the board's May 18<sup>th</sup> meeting the working group would expect to bring a charge and recommendation about the membership and appointment process for the proposed MGA GSP Development Committee.

Possible Board Actions:

1. By MOTION, accept the Working Group's report and provide any relevant feedback to the Working Group on its work.
2. By MOTION, take no action.

By 

Rosemary Menard  
Director  
Santa Cruz Water Department

### **MGA Working Group Charge from the MGA Board**

- a. **Charge:** Review the state's recently adopted emergency regulations for the Groundwater Sustainability Plans and develop recommendations to the Board on the following:
  - i. A recommended scope of work and strategy, including a community engagement and involvement strategy and schedule for developing the GSP;
  - ii. A recommended resource strategy and budget for preparing the plan, including a recommended FY 2018 budget proposal for the planned work on the GSP in FY 2018;
  - iii. A recommended charge and membership for the proposed GSP Development Committee;
  - iv. Review and consider the content of on any technical work products that could influence the proposed structure of the GSP planning process, or the charge or recommended membership of the proposed GSP Development Committee.
- b. **Work Plan:**
  - i. Scope of work and strategy:
    1. Identifying the portions of the plan development work that would be completed by staff and those that would be the focus of the work of the proposed GSP Development Committee;
    2. Schedule – Provide a preliminary report to the Board at its January 19, 2017 meeting and any final recommendations to the Board for its March 16, 2017 meeting
  - ii. A recommended resource strategy and budget for preparing the plan, including a recommended FY 2018 budget proposal for the planned work on the GSP in FY 2018.
    1. Conduct a needs assessment and identify the resources necessary to support development of the plan, for example additional services to support technical, policy, facilitation, or outreach work needed during the planning process; and create and recommend to the Board a proposed approach to provide the resources, for example through contracts, or shared services;
    2. Create and recommend to the MGA Board any RFP's for additional consulting resources and evaluate and

- recommend to the Board any contracts for resources needed to support plan development.
3. Develop the GSP scope of work, schedule and budget for work expected to be done during FY 2017-2018 GSP development work.
  4. Schedule for this element: Complete preliminary budget by March 16, 2017, and final budget by May 18, 2017
- iii. A recommended charge and membership for the proposed GSP Development Committee
1. Prepare for the Board's consideration a draft charge for the GSP Development Committee as well as a recommendation for the GSP Development Committee's membership;
  2. Develop and recommend to the Board any additional Working Groups or other efforts focused on "getting ready" topics, for example, water use data or community outreach and engagement efforts.
  3. Schedule for this element – complete by July 2017

**Meeting Notes**

**MGA Board Working Group on Planning for the GSP**

**Friday, February 3, 2017**

**9:00 to 11:00 am**

**Community Foundation Santa Cruz County**

**Agenda: open discussion to consider the scope of GSP development**

**Present:**

Jon Kennedy – Private Well Owner Representative

John Benich - CWD

Bruce Jaffe – SqCWD

Ralph Bracamonte – CWD

Ron Duncan – SqCWD

Rosemary Menard – SCWD

John Ricker – SC County

Tim Carson – RWMF

Darcy Pruitt – RWMF/MGA

**1. Data Inputs, Modeling Assumptions and Modeling Results**

- Data
  - Assumptions
  - Judgments regarding time scale and impacts
    - Make data available
    - Focus on solutions
- Model
  - Check Assumptions that support the model
  - Calibration
  - Validation
  - If it works/how it works
    - Public needs to understand
    - Open up the black box to explain data inputs, model processing (high level explanation) and model outputs and how they are used
- Extent of Return Flow
  - What are return flows and why they matter
  - How it changes the impacts
    - If it changes the impacts
    - How it might vary with geography and location

## **2. Historical Impacts – Lively discussion regarding how the overdraft occurred and the usefulness of examining the history of pumping groundwater in the basin.**

- Consensus for nuanced approach to address overdraft history
  - Basin pumping history provides background
  - History does not resolve the overdraft
  - Focus should be forward looking
    - Solutions oriented
    - May be an issue once we are down the road, paying for mitigation

## **3. What are Our Guiding Principles?**

- Important to lay these out to guide other discussions
- Impacts to groundwater v. Water budget approach
  - Enforcement of water budget targets & efficiency requirements
    - Education
    - Not Quotas
    - Charges as a mechanism

## **4. Sustainable Yield Concept**

- What does history get us?
- How do we (or do we) deal with historical fight?
  - No pumping records for many users
- Want solutions
  - Don't waste time on unanswerable questions

## **5. Process Design**

- Start with principles, context
- Agree on the facts
- Clarify goals
- Conceptual process to make community involvement productive
  - What do I need to contribute to the solutions?
- Iterative Process
  - Understand issues
  - Avoid contention that doesn't move the process forward

## **6. What does it take to get to agreement?**

- Talk about data
  - Agree on the facts
  - Help people understand complex issues
  - Don't talk about blame, blame doesn't solve problems
  - Work to create context and avoid abstraction – bring controversial issues forward when it is possible to describe what it would mean to

people if those issues were addressed through Action Plan A or Action Plan B or etc.

- Water Rights Discussion
  - SGMA does not give us authority to modify water rights
  - Most adjudications do not cutback on pumping allocations but bring in supplemental supplies
  - Conservation in the Basin has made a good start
    - Look for more solutions

## **7. Structure of fees**

- How to decide?
  - Who should pay?
  - How to assess value?
- Charges
  - How to allocate costs?
  - How to reimburse purveyors for the work they are already doing to reach sustainability?

## **8. Interface with County Planning**

- Mechanism to protect basin with changing future
  - Population
  - Temperature
  - Rising sea level

## **9. What are the solutions?**

- Lay out the alternatives clearly
- How to select the solutions?
- Who does it?
- Private projects?

## **10. Define problem**

- Define sustainable for our basin
- Problem defined in the SGMA
  - Groundwater overdraft
  - Reduction in groundwater storage
  - Seawater intrusion
  - Degrade water quality
  - Land subsidence
  - Surface water depletion
- Identify objectives to address each problem

## **11. Public Involvement**

- Process of engaging the community
- Board and staff role, not GSP specific

- GSP Committee
  - What resources are needed?
    - Possible list of areas where resources are needed Hydrogeology and modeling (Hydrometrics)
    - Structure/amount of user fees (public policy type advice related to things like Prop 218)
    - Facilitation for the GSP Development Committee? What other experts?
    - Meeting facility rental, budgets for things like food for committee members (based on timing of meetings, for example)
    - Educational materials to support education and communication during the GSP development process. For example funds to support development of info-graphics, videos, mailers, etc. ?

Action Items:

Darcy to update GSP excel spreadsheet for 2/24 meeting.

The working group suggests the board discuss the role of the MGA Board at it's 3/17 board meeting

Items to discuss and resolve in an open forum include:

### **Role of MGA**

- Funding Projects
- Solving problems
- Decisions re aquifer
  - MGA Oversight

### **Board Work Plan**

- Do we want to make policies before we have a plan?
  - No, we want to understand data first

### **MGA coordination between agencies**

- Not dictate to agencies
- Small MGA agency
- All powers
- But the intention is for a small footprint
  - Some discussion about whether the MGA's role might increase or decrease over time
  - Generally, MGA is not intended to do projects.
  - Clarify MGA role in overseeing water quality (vis. Injection)

	A	B	C	D	E
1	<b>Table 1. Preparation Checklist for GSP Submittal</b>				
2					
3	GSP Regulation Section	Water Code Section	Requirement	Description	Existing Information - starting point
4					
5	<b>Article 3. Technical and Reporting Standards</b>				
6	352.2	10733.2	Monitoring Protocols	Monitoring Protocols adopted by the GSA for data collection and management Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin	SAGMC/BIG quarterly monitoring  2007 Groundwater Management Plan Section 5, Element 1
7					
8	<b>Article 5. Plan Contents, Subarticle 1. Administrative Information</b>				
9	354.4		General Information	Executive Summary	Darcy to write, GSA to review
10				List of References and Technical Studies	TBD
11	354.6		Agency Information	GSA Mailing Address	Darcy to write, GSA to review
12				Organization and Management Structure	Darcy to write, GSA to review
13				Contact Information of Plan Manager	Darcy to write, GSA to review
14				Legal Authority of GSA - Estimate of Implementation Costs	GSA Board w/ GSA Staff support
15	354.8a	10727.2(g)	Maps	Area covered by GSA	Basin Boundary Map
16				Adjudicated areas, other agencies within the basin, and areas covered by an Alternative	Overlay on Basin boundary
17				Jurisdictional boundaries of federal or State land	Overlay on Basin boundary
18				Existing Land Use Designations	City & County GP & HE
19				Density of wells per square mile	Basin Boundary Map
20	354.8b		Description of Plan Area	Summary of jurisdictional areas and other features	SqCWD & SCWD UWMP Ch3.
21	354.8c, d, e	10727.2(g)	Water resource monitoring and management programs	Description of water resources monitoring and management programs	Soquel-Aptos Groundwater Management Plan (SqCWD& CWD GWMP) Section 5, Element 1
22				Description of how the monitoring networks of those plans will be incorporated into the GSP	
23				Description of how those plans may limit operational flexibility in the basin	
24				Description of conjunctive use programs	
25	354.8f	10727.2(g)	Land Use Elements or Topic Categories of Applicable General Plans	Summary of general plans and other land use plans	City & County General Plan & Housing Element data; SqCWD & SCWD UWMP Ch 3
26				Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects	SqCWD & SCWD UWMP Ch4
27				Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans	SqCWD & SCWD UWMP Ch5
28				Summary of the process for permitting new or replacement wells in the basin	County Planning and SCCC 7.70
29				Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management	Darcy to coordinate with City and County Planning Staff and GSA
30	354.8g	10727.4	Additional GSP Contents	Description of Actions related to:	
31				Control of saline intrusion	
32				Wellhead protection	
33				Migration of contaminated groundwater	SqCWD & CWD GWMP Sec 3.7
34				Well abandonment and well destruction program	SCCC 7.70.100 summary
35				Replenishment of groundwater extractions	
36				Conjunctive use and underground storage	
37				Well construction policies	SCCC 7.70
38				Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects	SqCWD & CWD GWMP Sec 3
39				Efficient water management practices	SqCWD & CWD GWMP Sec 3.8.2
40				Relationships with state and federal regulatory agencies	SqCWD & CWD GWMP Sec 2.4
41				Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity	
42				Impacts on groundwater dependent ecosystems	
43	354.10		Notice and Communication	Description of beneficial uses and users	SCWD UWMP Ch 4
44				List of public meetings	SqCWD & CWD GWMP Sec 2.2 as model for this section
45				GSP comments and responses	
46				Decision-making process	
47				Public engagement	
48				Encouraging active involvement	
49				Informing the public on GSP implementation progress	
50	<b>Article 5. Plan Contents, Subarticle 2. Basin Setting</b>				
51	354.14		Hydrogeologic Conceptual Model	Description of the Hydrogeologic Conceptual Model	Describe HydroMetrics Model
52				Two Scaled Cross-Sections	SqCWD UWMP fig 5-2
53				Map(s) of Physical Characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies	UWMPs and GWMPs
54	354.14.c.4	10727.2.(a).5	Map of Recharge Areas	Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas	County GIS & ENV Health data
55		10727.2.(d).4	Recharge Areas	Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin	UCSC Recharge Suitability Data
56	354.16	10727.2.(a).1, 10727.2.(a).2	Current and historical groundwater conditions	Groundwater elevation data	SqCWD & CWD GWMP Sec 3.4
57				Estimate of groundwater storage	
58				Seawater intrusion conditions	SqCWD & CWD GWMP Sec 3.6
59				Groundwater quality issues	GWARR 2011 Sec 5.4
60				Land subsidence conditions	SqCWD & CWD GWMP Sec 3.5, 5.1
61				Identification of interconnected surface water systems	
62				Identification of groundwater-dependent ecosystems	
63	354.18	10727.2(a)3	Water Budget Information	Description of inflows, outflows, and change in storage	
64				Quantification of overdraft	
65				Estimate of sustainable yield	
66				Quantification of current, historical, and projected water budgets	
67		10727.2(d)5	Surface Water Supply	Description of surface water supply used or available for use for groundwater recharge or in-lieu use	
68	354.2		Management Areas	Reason for creation of each Management Area	
69				Minimum Thresholds and Measurable Objectives for each Management Area	
70				Level of monitoring and analysis	
71				Description of Management Areas	
72				Explanation of how management of Management Areas won't cause undesirable results outside the Management Area	

	A	B	C	D	E
3	GSP Regulation Section	Water Code Section	Requirement	Description	Existing Information - starting point
73	<b>Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria</b>				
74	354.24		<b>Sustainability Goal</b>	<b>Description of the Sustainability Goal including:</b>	
75				Information from the basin setting used to establish the Sustainability Goal	
76				Discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield	
77				Explanation of how the Sustainable Goal is likely to be achieved within 20 years of plan implementation and is likely to be maintained through the planning and implementation horizon	
78	354.26		<b>Undesirable Results</b>	<b>Description of Undesirable Results for any of the sustainability indicators</b>	
79				Cause of Groundwater Conditions that would lead to Undesirable Results	
80				Criteria used to define Undesirable Results for each sustainability indicator based on minimum thresholds	
81				Potential effects of Undesirable Results on beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from Undesirable Results	
82	354.28	10727.2(d)1, 10727.2(d)2	<b>Minimum Thresholds</b>	<b>Description of each minimum threshold and how they were established for each sustainability indicator</b>	
83				Relationship for each sustainability indicator	
84				Description of how minimum thresholds have been selected to avoid causing Undesirable Results	
85				Description of how selection of the Minimum Threshold may affect beneficial uses and users of groundwater	
86				Standards related to sustainability indicators	
87				How each minimum threshold will be quantitatively measured for each sustainability indicator	
88	354.30	10727.2.(b).1,	<b>Measurable Objectives</b>	<b>Description of establishment of the measurable objectives and how the measurable objectives were established for each relevant sustainability indicator</b>	
89		10727.2.(b).2,		Description of how a reasonable margin of safety was established for each measurable objective	
90		10727.2.(d).1,		Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones for each relevant sustainability indicator	
91		10727.2.(d).2		Measurable Objective for Sustainability Indicator 1-x	
92				Interim Milestone at 5 years	
93				Interim Milestone at 10 years	
94				Interim Milestone at 15 years	
95				Milestone at 20 years	
96	354.34	10727.2.(d).1,	<b>Monitoring Network</b>	<b>Description of Monitoring Network</b>	
97		10727.2.(d).2,		Description of Monitoring network objectives	
98		10727.2.(e),		Description of how the monitoring network is designed to: demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions - Description of how the monitoring network provides adequate coverage of sustainability indicators	
99		10727.2(f)		Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends	
100				Scientific rationale (or reason) for site selection	
101				Consistency with data and reporting standards	
102				Corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone	
103				Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used	
104	352.2		<b>Monitoring Protocols</b>	<b>Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies</b>	
105	354.36		<b>Representative Monitoring</b>	<b>Description of representative sites if designated</b>	
106				Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators	
107				Adequate evidence demonstrating site reflects general conditions in the area	
108	354.38		<b>Assessment and Improvement of Monitoring Network</b>	<b>Review and evaluation of the monitoring network</b>	
109				Identification and description of data gaps	
110				Description of steps to fill data gaps	
111				Description of monitoring frequency and density of sites	
112	<b>Article 5. Plan Contents, Subarticle 5. Projects and Management Actions</b>				
113	354.44		<b>Projects and management actions</b>	<b>Description of projects and management actions that will help achieve sustainability goal</b>	
114				Measurable objective that is expected to benefit from each project and management actions	
115				Circumstances for implementation	
116				Public noticing	
117				Permitting and regulatory process	
118				Time-table for initiation and completion, and the accrual of expected benefits	
119				Expected benefits and how they will be evaluated	
120				How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.	
121				Legal authority required	
122				Estimated costs and plans to meet those costs	
123				Management of groundwater extractions and recharge	
124	354.44.b.2	10727.2(d)3		<b>Overdraft mitigation projects and management actions</b>	

**Meeting Minutes**  
**MGA Board Working Group on Planning for the**  
**GSP Friday, February 24, 2017**  
**9:00 to 11:00 am**  
**Community Foundation Santa Cruz County**

**Agenda: Continuation of GSP development discussion**

**Present:**

John Benich - CWD  
Bruce Jaffe – SqCWD  
Jon Kennedy – Private Well Owner Representative  
Rob Marani – CWD  
Ron Duncan – SqCWD  
Rosemary Menard – SCWD  
John Ricker – SC County  
Darcy Pruitt – RWMF/MGA

1. California required topics for GSP
  - a. Present and briefly discuss outline/checklist re state required elements of GSP (see Attachment A = Attachment 3 of the MGA Board Item).
2. Discuss required elements that are likely topics for GSP committee oversight and input
  - i. Additional GSP Content
  - ii. Current and Historical Groundwater Conditions
  - iii. Water Budget
  - iv. Sustainability Goals
  - v. Undesirable Results
- b. Discuss Approach to GSP Preparation
  - i. Begin with narrative approach that is user friendly for newcomers to the process
  - ii. Recommend narrative/graphic approach similar to SqCWD Community Water Plan
- c. Discuss process for finding the right GSP Committee members
  - i. Discuss process similar to selection of Private Well Owners as outlined in the MGA Bylaws
  - ii. What to give the GSP Committee to make their involvement useful and to limit frustration

1. Outline of materials that GSP Committee would be expected to produce as a starting point for:
    - a. Mission Statement
    - b. Principles
    - c. Basin Management Goals
    - d. Objectives
  - iii. Materials would be based on the existing plans that have already been prepared for the basin by the individual MGA member agencies
    1. Jon Kennedy provided draft outline of suggested materials for GSP Committee (see Attachment A)
  - d. Board Input re GSP Committee:
    - i. GSP Charge/Scoping Statement
    - ii. Problem Statement
    - iii. Structure of Committee
  - e. GSP Charge needs to be defined in terms of what is achievable and what the State requires.
    - i. Discuss basin overdraft as an example
      1. SGMA requires groundwater levels must not drop below 1/1/2015 levels
      2. SCMCGB goal also needs to address protective groundwater levels needed to prevent sea water intrusion
        - a. The need to prevent salt water intrusion exceeds the State's legally mandated requirement
    - ii. Land Use & GSP requirements
      1. Coordinate with appropriate land use agency planners
        - a. County
        - b. Capitola
        - c. AMBAG
          - i. Population Projections
            1. Confer re usefulness of AMBAG population projections, especially as compared to actual population trends.
          - ii. Desire to create a strong connection between land use planning and water supply availability within the GSP and General Plan Update (GPU) processes
3. Budget Discussion (see Attachment C = Attachment 6 of the MGA Board Item)
  - a. Reviewed 2016-2017 budget and expenditures
    - i. Discuss modeling 2017-2018 budget projections actual contract and other expenses for groundwater model
    - ii. Discussed monies that were not expended from 2016-2017 budget
  - b. Reviewed 2017-2018 budget proposal based on projected GSP expenditures
    - i. Not as much needed on model construction
    - ii. More on
      1. Public outreach

2. Technical assistance
3. Basin monitoring support
4. Report to MGA Board on GSA Working Group status/progress
  - a. GSP content outline overview (see Attachment A)
    - i. Discuss areas where community involvement is needed
  - b. GSP Committee Charge and Oversight (see Attachment B)
    - i. identify likely candidates once Scope/charge identified
  - c. GSP Budget (see Attachment C)
5. Action Items
  - a. Darcy Pruitt to complete draft GSP Working Group meeting minutes and circulate (complete)
  - b. John Ricker to coordinate with land use planning agencies on meeting(s) to discuss land use components of GSP, GPU and other plans that may impact groundwater supply and sustainability planning.
  - c. Rosemary and MGA Board/GSP Working Group members to coordinate GSP Working Group report to entire MGA Board for March 16, 2017 MGA Board meeting
  - d. Leave 3/3/GSP Working Group on calendar in case subset of group needs to meet to coordinate report to MGA Board
  - e. Darcy Pruitt, Sierra Ryan and Eileen Cross to discuss public outreach strategy and coordinate with GSP Working Group to make sure useful GSP outreach materials are available and accessible to public (initial meeting - 3/6/2017 12-2pm, location TBD)

## Attachment B

### Principles

- Understand the basin system
- Base discussions as much as possible on data
  - Identify where there may be competing data or differing interpretations
- Strive to understand and clarify different points of view on the committee
- Get agreement on the problem; re-define the problem as needed
- Use the impact on the basin as a context (particularly on costs)
- Iterate and adjust

### Mission

- Bring our basin into a sustainable state
- Involve the major stakeholder groups in developing agreement about a plan to achieve sustainability within 20 years, sooner if possible
- Educate the user community on re-charge, use, and projected changes over time
- Build support for a robust plan to maintain sufficient, high quality water supply to maintain the environment, the population and the quality of life for all parts of the ecology of our basin

### Basin Management Goals (from *Groundwater Management Plan 2007*)

1. Ensure water supply reliability for current and future beneficial uses
2. Maintain water quality to meet current and future uses
3. Prevent adverse environmental impacts

### Objectives

- 1.1 Pump within sustainable yield
- 1.2 Develop alternative water supplies to achieve long-term balance between recharge and withdrawals
- 1.3 Manage groundwater storage for future use and drought reserve
- 2.1 Manage water quality to meet current standards
- 2.2 Maintain groundwater levels to prevent seawater intrusion
- 2.3 Prevent contaminant pathways
- 3.1 Maintain or enhance the quality of groundwater recharge
- 3.2 Avoid adverse impacts or alteration in stream flows
- 3.3 Protect the structure of the basin: avoid withdrawals that alter hydraulic characteristics or cause subsidence or sea water intrusion

## Working Draft

## Water Supply Augmentation Options for the Santa Cruz Mid-County Groundwater Basin

Source	Project/Program	Opportunity	Constraint(s)	Status
Water Conservation	Soquel Creek Water District Program	Reduce demand through increasing the efficiency of water use by existing and future water users	The success of existing SqCWD demand management programs may limit the potential for achieving future savings.	Soquel Creek Water District's (SqCWD) 2015 Urban Water Management Plan shows an actual 2015 system wide gallons per capita per day (gpcd) of 69, with a residential gpcd of 50. The projected system wide gpcd in 2035 is estimated to be 67, with a residential gpcd of 49. New water demand is offset through the Water Demand Offset program which uses development fees for conservation projects which save approximately two times the development's expected demand.
	City of Santa Cruz Program	Reduce demand through increasing the efficiency of water use by existing and future water users	No significant constraints.	The City's 2015 Urban Water Management Plan documents the current system wide gallons per capita per day (gpcd) of 70, with a residential gpcd of 43. For 2035 the projected system wide gpcd is estimated to be 80, with a residential gpcd of 46. <sup>1</sup>
	Central Water District Program	Reduce demand through increasing the efficiency of water use by existing and future water users		To be added
	Santa Cruz County Small Water System Program	Reduce demand through increasing the efficiency of water use by existing and future water users		The County requires source metering and reporting of monthly usage on all public water systems with 5 or more connections. Systems with 15 or more connections will be required to meter individual connections by January 2018.
	Santa Cruz Mid-County Groundwater Basin Private Well Owner's Program	Reduce demand through increasing the efficiency of water use by existing and future water users	The County does not provide rebates, relying on State rebate programs to offer incentives.	The County's water conservation program includes the following elements: <ul style="list-style-type: none"> <li>• Enforcement of an ordinance on all residential users prohibiting wasteful uses of water.</li> <li>• Requirement for replacement of inefficient toilet and showerheads at time of property sale.</li> <li>• Implementing building code requirements for efficient fixtures for all new construction and remodels.</li> <li>• Requiring water conservation forms as part of any new well permits for wells expected to use over 2 AFY.</li> <li>• Implementing a currently grant-funded program to do water conservation assessments for of private well owner's properties.</li> <li>• Participation in the Water Conservation Coalition of Santa Cruz County to provide outreach and education to residents.</li> </ul>

<sup>1</sup> Note – the data used to calculate gpcd for the 2015 update to the City's Urban Water Management Plan was heavily influenced by water restrictions associated with the drought. Future estimated gpcd are higher because water restrictions aren't assumed to be in place and therefore wouldn't influence the projected figures.

Source	Project/Program	Opportunity	Constraint(s)	Status
Surface Water	In Lieu Recharge (passive recharge)	<p>Near term – now to 5 years: Provide surface water from the City’s North Coast sources to off-set part of the Soquel Creek Water District’s wet season demand and rebuild groundwater resources by eliminating or reducing pumping during some part of the year.</p>	<ul style="list-style-type: none"> <li>• Volume of the City’s available water from its north coast sources is limited due to fish flows although it is not constrained by water right Place of Use restrictions.</li> <li>• Water quality issues involving the mixing of treated drinking water from surface water and groundwater sources</li> <li>• Potential volume of wet season demand that could be off-set by providing treated surface water is a limiting factor and may not provide for restoration of the basin within a desired time frame.</li> </ul>	<ul style="list-style-type: none"> <li>• Soquel and the City of Santa Cruz have an existing agreement to explore a small scale in lieu exchange with an estimated volume of about 300 acre feet/year. The term of the agreement is for 5 years with a current ending date of 12/31/2020.</li> <li>• Water Quality analyses and planning for initiation of water transfer is underway but will likely not be completed in time to allow the pilot project to go forward during the winter of 2016-2017. Likely earliest initiation in winter of 2017-2018.</li> </ul>
		<p>Long term – 5 years into the future Provide surface water from the City’s North Coast sources to off-set part of the Soquel Creek Water District’s wet season demand and rebuild groundwater resources by eliminating or reducing pumping during some part of the year.</p>	<ul style="list-style-type: none"> <li>• Potential volume of wet season demand that could be off-set by providing treated surface water is a limiting factor and may not provide for restoration of the basin within a desired time frame.</li> <li>• Water rights – the Place of Use for the City of Santa Cruz surface water rights from the San Lorenzo River do not include the Soquel Creek Water District or the parts of the Santa Cruz Mid-County Groundwater Basin that are outside the City’s current water service area.</li> <li>• Current infrastructure allows about 1 to 1.5 mgd capacity – could be enlarged if determined to be cost-effective. Estimated annual capacity of existing infrastructure could be in the neighborhood of 800 acre feet/year.</li> </ul>	<ul style="list-style-type: none"> <li>• Work is underway by Santa Cruz to resolve fish flow issues in a manner that will allow Place of Use water rights constraints for the San Lorenzo River to be resolved. Estimated time for resolution – 1 to 2 years.</li> </ul>
	Aquifer Storage and Recovery (active recharge)	<p>Create an underground reservoir of stored treated surface water using available winter flows (above those required for ongoing operations and fish flows). Stored water would provide drought supply for Santa Cruz and could be designed with additional capacity to contribute to the restoration of the Santa Cruz Mid-County Groundwater Basin and provide drought storage for Santa Cruz. (Note: An ASR project using surface water from the San Lorenzo River source to store water in the Santa Margarita Groundwater Basin is also being evaluated.)</p>	<ul style="list-style-type: none"> <li>• The feasibility of storing and retrieving stored water from the Santa Cruz Mid-County Groundwater Basin may be a constraint.</li> <li>• The adequacy of existing infrastructure to deliver available water to potential injection wells as well as the sizing and location of wells to extract water needed to meet Santa Cruz’s drought needs are being evaluated.</li> <li>• Availability of appropriate and available real property parcels or rights of way for the development of necessary wells and delivery infrastructure may be a constraint.</li> </ul>	<ul style="list-style-type: none"> <li>• The City of Santa Cruz is working to assess the feasibility of injecting treated drinking water from its surface water sources into regional groundwater aquifers. Phase I of the work will be completed this year, and Phase II, which includes pilot testing injection in each aquifer, will begin in 2018 and be completed in 2 to 3 years.</li> <li>• Information generated by these evaluations will be used to determine the degree to which ASR is a feasible part of the City’s strategy to improve the reliability of its water supply.</li> </ul>
		<p><b>General Constraint for surface water options:</b></p> <ul style="list-style-type: none"> <li>• City’s need to build drought supply through a combination of passive and/or active recharge could result in significant future withdrawals from the basin that may interfere with the timeframe or even ultimate success of reaching basin recovery goals.</li> <li>• Long term reliability of surface water as a supply may be an issue if climate change results in some shift in the amount of pattern of precipitation and/or if multi-year drought conditions occur.</li> </ul>		

Source	Project/Program	Opportunity	Constraint(s)	Status
Storm Water	Distributed Storm Water Managed Aquifer Recharge (DSWMAR)	Where feasible, install small to medium scale (up to 1000 acre feet/year/site) facilities to capture storm water and recharge more shallow zones of aquifers through surface spreading and/or constructed dry wells. <sup>2</sup>	<ul style="list-style-type: none"> <li>The scale of recharge DSWMAR may be a constraint to achieving timely recharge of the Mid-County Basin.</li> <li>Topographic, ground cover and local vegetation, and surface and sub-surface geology/hydrogeology can provide significant constraints for siting DSWMAR.</li> <li>DSWMAR introduces water to the upper levels of aquifers and most drinking water production draws from deeper levels. Depending on the configuration of aquifers, DSWMAR may never reach the aquifers drinking water is being drawn from.</li> </ul>	<ul style="list-style-type: none"> <li>UCSC Professor Andrew Fisher has initiated work on this approach working with land owners in the Pajaro Valley Water Management Agency on several surface spreading projects and has good data about the effectiveness of this approach given the right surface and subsurface hydrogeologic conditions.</li> <li>Santa Cruz County has installed dry wells to capture and recharge storm water in Live Oak and Aptos.</li> </ul>
Recycled Wastewater	Non-Potable Reuse (NPR)	Off-set peak season irrigation demand by replacing use of treated drinking water with treated wastewater	<ul style="list-style-type: none"> <li>Existing infrastructure does not allow for the distribution of NPR, so new infrastructure would be required to develop this alternative.</li> <li>Peak season irrigation demand is time limited (typically no more than 4 to 6 months) and there are relatively few concentrated centers of irrigation demand that would allow for the cost of distribution infrastructure to be spread across a large enough rate base to make NPR a cost-effective alternative for the user.</li> <li>Active water conservation programs in both the Soquel Creek and Santa Cruz water service areas are targeting irrigation demand and working to reduce this demand through incentive programs, making an effort to produce a new product to replace existing potable demand likely to be even less effective over time.</li> <li>The Santa Cruz Wastewater Treatment Facility currently does not treat the majority of the wastewater it receives to the treatment standard required for non-potable reuse. Expansion of the plants facilities to treat additional water to a tertiary level is under consideration, and at least a partial expansion is planned.</li> </ul>	<ul style="list-style-type: none"> <li>As part of the implementation of the Water Supply Advisory Committee's recommendations, the City of Santa Cruz is completing an evaluation of a whole range of opportunities for greater future utilization of recycled water in its water service area. An evaluation of opportunities for NPR use has been completed and its results will be available for consideration by the MGA.</li> <li>Soquel Creek Water District has completed two feasibility studies evaluating NPR; including a market study evaluation of potential irrigation demands as well as a satellite reclamation facility to offset groundwater pumping of Seascape Golf Course.</li> <li>The potential for the incidental use of tertiary treated wastewater being sent from the Santa Cruz Wastewater Treatment Facility to Soquel Creek has been identified and is being evaluated.</li> </ul>

<sup>2</sup> see further information at <http://www.cityofsantacruz.com/home/showdocument?id=46143>

Water Supply Augmentation Options for the Santa Cruz Mid-County Groundwater Basin

Source	Project/Program	Opportunity	Constraint(s)	Status
Recycled Wastewater	Indirect Potable Reuse – Groundwater Augmentation (the <b>Pure Water Soquel</b> project is an example of this approach)	Provide full advanced treatment (FAT) of wastewater and inject the treated water into the aquifer to ultimately mix with native groundwater and contribute to the restoration of the groundwater basin, provide a barrier to seawater intrusion, and provide a sustainable source of supply.	<ul style="list-style-type: none"> <li>In general there are few technological constraints of this approach. The treatment techniques and processes used to produce drinking water from waste water supplies have a track record of performance and are widely in use in California and elsewhere.</li> <li>To the degree that there are constraints, they are more likely to be of a policy or political nature than of a technical nature. Policy issues may include potential perception that there are public health issues associated with using waste water as a source.</li> </ul>	<ul style="list-style-type: none"> <li>As part of the implementation of the Water Supply Advisory Committee’s recommendations, the City of Santa Cruz is completing an evaluation of a whole range of opportunities for greater future utilization of recycled water in its water service area. An evaluation of opportunities for IPR use is still underway and will be available for consideration by the MGA.</li> <li>The Soquel Creek Water District is pursuing an IPR project and has initiated the EIR process and has been coordinating with the City of Santa Cruz (City Manager, Public Works, and Water Departments) regarding the secondary or tertiary treated wastewater that would be used as the source water for this project as well as the County Sanitation District regarding raw wastewater.</li> </ul>
	Indirect Potable Reuse – Surface Water Augmentation	Provide complete advanced treatment (CAT) of wastewater and pump treated water back to Loch Lomond Reservoir to mix with existing surface water providing the water necessary to allow long term water service from surface water sources to the Soquel Creek Water District, thus substantially reducing or eliminating groundwater pumping in the Santa Cruz Mid-County Groundwater Basin.	<ul style="list-style-type: none"> <li>The comments from the option immediately above are relevant here as well.</li> <li>In surface water augmentation, a constraint can be achieving necessary reservoir residence time as the dynamics of mixing and water movement in a reservoir are substantially different from those in aquifers.</li> <li>If a reservoir is full due to natural run off, it is not feasible to add additional water to the system, which may limit the benefit from this approach. Policy issues may include potential perception that there are public health issues associated with using waste water as a source.</li> </ul>	<ul style="list-style-type: none"> <li>The City of Santa Cruz’s recycled water study is evaluating the option of sending advanced treated wastewater to Loch Lomond.</li> </ul>
Recycled Water	Direct Potable Reuse	Provide complete advanced treatment (CAT) of wastewater and pump treated water back to the Graham Hill Water Treatment Plant to mix with existing surface water providing the water necessary to allow long term water service from surface water sources to the Soquel Creek Water District, thus substantially reducing or eliminating groundwater pumping in the Santa Cruz Mid-County Groundwater Basin.	<ul style="list-style-type: none"> <li>While under development, the regulatory framework for direct potable reuse in California is not yet in place and some estimates are that it will be as long as 10 years before it is.</li> <li>The policy and political issues associated with the various approaches to indirect potable reuse are certainly relevant here.</li> </ul>	<ul style="list-style-type: none"> <li>The City of Santa Cruz’s recycled water study is evaluating this option using assumptions about what the regulatory framework for treatment and operation would involve.</li> <li>Soquel Creek Water District’s recycled water feasibility study has evaluated this option using assumptions about what the regulatory framework would involve as well.</li> </ul>

Source	Project/Program	Opportunity	Constraint(s)	Status
Sea Water	Deep Water Desal <sup>3</sup>	<p>Contract for the purchase of desalinated water from a privately developed and financed desalination facility at a site in Moss Landing. Desalinated water would replace water pumped from groundwater, which would allow the basin to recover.</p> <p>The proposed Deep Water Desal Plant would have a reduced energy requirement (compared to a regular desal plant) due to warming the sea water by using it to cool a proposed (cooling energy intensive) data center before it is desalinated. In addition, the Moss Landing site offers the opportunity to bring sea water into the facility from a deeper intake in the off-shore Monterey Canyon, which may reduce or eliminate any possible impacts of a facility intake.</p>	<ul style="list-style-type: none"> <li>• A major constraint of this option is uncertainty about whether such a facility will actually be developed.</li> <li>• Water would need to be piped from Moss Landing to at least the Soquel-Aptos area, likely with those costs borne directly by Mid-County groundwater users.</li> <li>• Likely structure of any contract would be long term “take or pay,” for the contracted amount. May or may not be flexibility to restructure contract in future to provide more or less water should needs change.</li> </ul>	<ul style="list-style-type: none"> <li>• The Soquel Creek Water District has signed a non-binding letter of interest with Deep Water Desal and has provided some funding to have evaluation of a potential pipeline between Moss Landing and Soquel included in any EIR prepared by Deep Water Desal for its proposed project.</li> </ul>
	Local Desal	<p>Construct a local desalination plant that would supply an alternate source of water, which would allow the basin to recover.</p>	<ul style="list-style-type: none"> <li>• In general there are few technological constraints of desalination. The treatment techniques and processes used to produce drinking water from sea water have a track record of performance and are in use in California and elsewhere in the US and the world.</li> <li>• Concerns raised during the consideration of an earlier local desal project jointly sponsored by the City of Santa Cruz and the Soquel Creek Water district included both the energy intensive nature of such a facility as well as the potential for impacts to marine life due to the project intake.</li> </ul> <p><b>General Constraint for desalination options:</b></p> <ul style="list-style-type: none"> <li>• As a result of the November 2012 passage of (City of Santa Cruz Charter Amendment) Measure P, requires that no legislative action to authorize, permit construction, operate and/or acquire a desal plant or incur any indebtedness for that purpose shall be valid unless authorized by an affirmative vote of qualified electors in the City of Santa Cruz.</li> </ul>	<ul style="list-style-type: none"> <li>• The City of Santa Cruz and the Soquel Creek Water District explored development of a desal plant, completing many studies, including developing and issuing a draft environmental impact report and receiving public comment on this report. In the fall of 2013, the Santa Cruz City Council directed staff to discontinue working on this effort while it explored other alternatives. The joint desal was not “taken off the table,” but rather to be considered along with other options. Ultimately the Water Supply Advisory Committee recommendations, which included local desal as one of the back-up options for meeting Santa Cruz’ water supply needs, were developed and accepted by the City Council.</li> <li>• Soquel Creek Water District looked into pursuing the scwd2 desalination project on its own as well as a local-only facility developed within the mid-county region. Based on political nature and constraints for the City’s Charter amendment, a local only project was not selected by SqCWD to further pursue at this time.</li> </ul>

<sup>3</sup> See also <http://www.deepwaterdesal.com/>

Table 1. Proposed MGA Annual Budget for FY 2017/18

Item	Note/Consultant	2016 - 2017 Budget Amount	Expended as of 12/31/16	Estimated to complete	Rollover to 2017- 2018	2016 - 2017 Budget Notes	2017 - 2018 Estimated Budget	2017 - 2018 Budget Notes
<b>Hydrology Work</b>								
Quarterly groundwater monitoring updates	HydroMetrics WRI	\$ 4,000.00					\$ 8,000.00	
Biennial groundwater monitoring report	HydroMetrics WRI	\$ 50,000.00					\$	Only need once every two year. Note need this year.
Technical support for SGMA	HydroMetrics WRI	\$ 75,000.00					\$ 25,000.00	
Groundwater model	HydroMetrics WRI  (incl: 70K of USGS work and 70K from County grant)	\$ 356,000.00	\$ 295,000.00				\$ 110,000.00	Not sure if the number of 110K is correct - Ron checking with HM
County stream gages	TBD	\$ 50,000.00					\$ 50,000.00	
	<i>Subtotal</i>	<b>\$ 535,000.00</b>						
<b>GSP Development</b>								
Technical support	\$10,000/month	\$ 120,000.00					\$ 120,000.00	
Public policy consulting and facilitation support	\$12,000/month	\$ 144,000.00					\$ 144,000.00	
Graphical support	TBD	\$					\$ 50,000.00	
	<i>Subtotal</i>	<b>\$ 264,000.00</b>						
<b>Outreach</b>								
Translation services		\$ 5,000.00	\$				\$ 5,000.00	
Newspaper ads		\$ 4,000.00	\$				\$ 4,000.00	Upcoming meetings
Groundwater awareness week		\$ 2,000.00					\$ 2,000.00	
Public meetings (food and space rental)		\$ 1,000.00					\$ 1,000.00	
Miscellaneous (brochure development, website, web videos, etc.)		\$ 21,000.00					\$ 21,000.00	
Additional \$46,000 from County grant fund – not included in this budget		\$ 46,000.00					\$ 20,000.00	
	<i>Subtotal</i>	<b>\$ 79,000.00</b>						

March 16, 2017

## MEMO TO THE MGA BOARD OF DIRECTORS

Subject: Agenda Item 4.5

Title: Approval of HydroMetrics Modeling Budget Reallocation

Attachment:

1. Letter titled “*Additional Budget Request for Groundwater Model,*” from HydroMetrics WRI to Ron Duncan dated February 28, 2017

### **Additional Funding Request**

As shown in Attachment 1 HydroMetrics WRI is requesting additional funding (\$107,070 in total), for continued development of the model for Fiscal Year 2016-2017. The two reasons they are requesting the additional funding are:

1. To date, the work has taken more effort than anticipated due to the complexity of the integrated watershed-groundwater model being used. Thus they are requesting an additional \$56,950 to complete the scoped work.
2. They are also proposing scope beyond what was approved in September 2016 to implement simulation of seawater intrusion in the model during this fiscal year. In September the tentative plan was to complete implementation next fiscal year, but the U.S. Geological Survey (USGS) model developer is only available to provide support under the existing joint funding agreement through June. Thus they are requesting an additional \$50,120 to accelerate and perform this task. (The \$50,120 does not include \$1,840 for Barry Hecht to be a Technical Advisory Committee (TAC) member for the groundwater modeling effort. HydroMetrics WRI recommends that the MGA contract directly Barry Hecht for this work.)

### **MGA Budgeted Amounts and Remaining Funds**

At the March 17, 2016 MGA meeting the board approved \$356,000 for groundwater modeling work (Item 5.1). That amount included \$70,000 for work by USGS and another \$70,000 related to a county grant.

On September 15, 2016 the MGA Board approved a Scope of Work from HydroMetrics with a budget not-to-exceed \$239,085 for modeling work in FY 2016-2017 (Item 5.1). Although the \$70,000 county grant work was included in the budget it was not included in the Scope of Work for \$239,085. The grant work includes use of the model to assess impacts of non-municipal pumping in the basin. John Ricker of the County of Santa Cruz has indicated that this assessment can take place in summer 2017. The budget for the assessment will need to be added again next fiscal year if HydroMetrics WRI’s request is granted.

HydroMetrics has continued to work on the model in the hope and expectation that the budget request will be approved. Staff appreciates their diligence because the model is a driving force in much of the evaluation needed for the required

Groundwater Sustainability Plan and progress is behind schedule. Waiting several months for MGA Board approval would set them further behind. Staff recommends board approval of the request for \$107,070. Please note that MGA Executive Team members are authorized (per MGA policies) to authorize budgeted work up to an amount of \$40,000 to proceed without board approval.

There are sufficient funds in several categories of the FY 2016-2017 budget to fund this additional request. If approved, the amount would come from remaining funds in the groundwater hydrology budget and the \$120,000 budgeted for technical support for Groundwater Sustainability Planning.

**Possible Board Action:**

1. By MOTION, approve the HydroMetrics WRI budget request for \$107,070 for groundwater modeling.
2. Take no action.

By   
\_\_\_\_\_  
Ron Duncan  
General Manager  
Soquel Creek Water District



1814 Franklin St, Suite 501  
Oakland, CA 94612

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Mr. Ron Duncan  
General Manager, Soquel Creek Water District  
On behalf of Santa Cruz Mid-County Groundwater Agency Executive Staff  
PO Box 1550  
Capitola, CA 95010-1550

February 28, 2017

Subject: Additional Budget Request for Groundwater Model

Dear Mr. Duncan:

This letter provides an update on the Santa Cruz Mid-County Basin groundwater model that HydroMetrics WRI is developing for the Santa Cruz Mid-County Groundwater Agency (MGA), and includes a request for additional budget for continued development of the model this fiscal year (2016-2017). The budget for this fiscal year's purchase order #1003 was based on a scope dated September 2, 2016 and approved by the MGA Board at its September 2016 meeting. We have expended the purchase order budget, but have not completed the approved scope. To date, the work took more effort than anticipated due to the complexity of the integrated watershed-groundwater model being used. Therefore, we are requesting additional budget to complete the scope. The MGA has additional funds budgeted for the model in FY 2016-2017 and the tasks planned for these additional funds can be performed next fiscal year (2017-2018).

We are also proposing scope beyond what was approved in September in order to implement simulation of seawater intrusion in the model during this fiscal year. In September, the tentative plan was to complete this implementation next fiscal year, but the U.S. Geological Survey (USGS) model software developer has informed us that he is only available to provide support under the existing joint funding agreement through June. In order for us to perform this implementation with his support available, unused funds budgeted for other groundwater hydrology tasks will likely need to be reallocated to model work.

## GROUNDWATER MODEL UPDATE

The model uses USGS' model code GSFLOW (Markstrom et al., 2008) that is a fully integrated watershed-groundwater model. The new regulations for Groundwater Sustainability Plans set surface water-groundwater models as a technical standard, and DWR staff has provided positive feedback on MGA's choice to use GSFLOW. GSFLOW combines the Precipitation-Runoff Modeling System (PRMS) model for surface watersheds with a MODFLOW-based groundwater model. To date, we have integrated the PRMS watershed model and the MODFLOW subsurface groundwater model into a working version of GSFLOW, but continue to work on model calibration to observed groundwater level and streamflow data.

Since September 2016, we have held a third Technical Advisory Committee meeting by webcast. Development of the climate change scenario and concepts for model simulations were presented at this meeting and at the following November 2016 MGA Board meeting.

After improving calibration of the model (Task 4.4), we will complete a draft technical memorandum (Task 4.7) for discussion with the Technical Advisory Committee on March 7. Concurrent with documentation and review of Task 4, we will proceed with model simulations (Tasks 5.2 and 5.3) and provide a draft technical memorandum on the results in early April.

## CALIBRATION CHALLENGES

Several calibration challenges have been encountered following incorporation of the groundwater and surface water components into an integrated GSFLOW model of the basin. Due to relatively long GSFLOW model run times, calibration has proceeded separately on both the PRMS and MODFLOW-components of the model. Calibrating each model separately has increased the effort needed to complete calibration. Within the groundwater model, observed groundwater elevations in several key areas of the basin were observed to be relatively insensitive to initial calibration efforts. A review and update of the basin conceptual model, particularly with respect to faults and boundary conditions, has helped calibration progress. Our updated conceptual model, and assessment of fault locations, was completed with input from Mike Cloud. This new conceptual model has significantly changed our understanding of groundwater flow in the Santa Cruz Mid-County Basin. This new conceptual model of groundwater flow, however, did require considerable effort that was not foreseen in the original scope. We will document this new conceptual model in the draft technical memorandum (Task 4.7) for the Technical Advisory Committee.

A comprehensive review of observation and monitoring locations used as calibration targets has also been performed as part of the calibration process to remove redundant or unreliable groundwater elevation data, particularly at private well locations where there is little well construction information. These data were impeding the development of a coherent distribution of simulated groundwater elevations. Calibration is currently proceeding with a refined group of calibration targets that are more in agreement with the basin conceptual model.

Calibration also continues on the PRMS model. The current PRMS model simulates some stream gauges adequately, but it appears as though improving the model fit to certain stream gauges will come at the expense of other simulated gauges. We are currently assessing the best collection of gauges to simulate. We have also evaluated the conceptual model for watershed flows in PRMS to best facilitate calibration of the stream-aquifer interaction in the integrated GSFLOW model.

#### **AVAILABLE MODEL BUDGET FOR FY 2016-2017**

The MGA budgeted \$356,000 for the groundwater model in FY 2016-2017. We have expended \$239,086 on purchase order 1003 through December 2016. There have also been two approved scope items separate from purchase order 1003 that use the MGA's budget for the groundwater model: the joint funding agreement between Soquel Creek Water District and the US Geological Survey (USGS) to provide review and support for the modeling effort and a purchase order for Barry Hecht of Balance Hydrologic to provide review as part of the Technical Advisory Committee. The table below summarizes the budgets scoped for issued purchase orders and the joint funding agreement as well as updated expenditures. \$56,950 remains unallocated from the MGA budget for the groundwater model and we request that amount to complete the scope approved by the MGA Board in September 2016.

*Summary of MGA Groundwater Model Budget FY2016-2017*

<b>Model Scope</b>	<b>MGA Budget</b>	<b>Scoped Budget</b>	<b>Scoped vs. MGA</b>	<b>Expended</b>	<b>Expended vs Scoped</b>
HydroMetrics PO 1003	\$216,000	\$239,085	(\$23,085)	\$239,086	(\$1)
USGS	\$70,000	\$50,485	\$19,515	\$10,687	\$43,075
County Prop 1 Grant	\$70,000	\$0	\$70,000	\$0	\$0
Balance TAC Review	\$0	\$9,480	(\$9,480)	\$1,150	\$8,330
<b>Total</b>	<b>\$356,000</b>	<b>\$299,050</b>	<b>\$56,950</b>	<b>\$250,923</b>	<b>\$51,404</b>

The unallocated amount of \$56,950 that we are requesting to complete our approved scope was included in the MGA budget because Santa Cruz County has grant funding from California Proposition 1 of \$70,000. Although the grant funding is meant to contribute to model development and analysis included in our current scope, it is also meant to fund use of the model to assess impacts of non-municipal pumping in the basin. John Ricker of the County has indicated that this assessment can take place summer of 2017 so budget for the assessment will need to be added again next fiscal year if our current request is granted.

As shown on the following table, \$56,950 will cover cost estimates for scoped tasks that depend on completion of model calibration. Since additional effort on calibration is continuing, we plan to bill this extra calibration effort, but we are not requesting budget beyond \$56,950 to complete all of the tasks scoped in September.

*Summary of Cost Estimates for Tasks Scoped in September to be Completed*

<b>Task</b>	<b>Original Cost Estimate</b>	<b>Task Budget Remaining</b>
4.4 Calibrate GSFLOW	\$34,660	\$0
4.7 Draft Technical Memo and Review of GSFLOW	\$18,620	\$18,620
5.2 Evaluate Groundwater Management Alternatives and Scenarios	\$16,140	\$7,722
5.3 Run Alternatives with Climate Change Scenarios Based on Historical Record	\$12,760	\$12,760
5.5 Draft Technical Memo and Review of Model Simulations	\$14,570	\$14,570
<b>Total</b>	<b>\$96,750</b>	<b>\$56,950</b>

### **ADDITIONAL SCOPE AND BUDGET**

The September scope also listed a number of additional tasks that will need future allocation of budget in addition to the assessment for the County grant: these include simulating the seawater intrusion, additional climate change scenarios, evaluating predictive uncertainty, and producing the final model report. We plan to submit a cost estimate for these tasks include in the budget for next fiscal year 2017-2018 with the exception of the task simulating the seawater interface.

We recommend moving up the implementation of the seawater interface in the model to this fiscal year. The USGS has added the seawater interface package (SWI2) to the GSFLOW software code under the joint funding agreement with Soquel Creek Water District with funding from the MGA. The USGS developer has informed us that his

support under the agreement will extend only through this fiscal year, so implementing the SWI2 package in the MGA model this fiscal year will maximize access to his support. Also, this USGS support is already included in this fiscal year's budget. Our 2015 work plan described this implementation task (4.6) as follows:

A priority use of the model is to predict future movement of the seawater interface even in areas such as the Purisima Formation, where the interface has not yet been observed. We will implement the sharp-interface package (SWI2) for MODFLOW. HydroMetrics WRI will approximate the interface location in the Aromas over time and use the approximate initial condition in the model. Approximated changes over time will be used to check against model results. HydroMetrics WRI will map an assumed interface in the Purisima that will facilitate simulations evaluating minimum travel time of the interface to production wells in the Purisima. This assumed interface will be implemented in the SWI2 package.

Although not explicit in the work plan, our implementation will include simulating the seawater interface for the groundwater management alternatives. Our level of effort on Task 4.6 has been increased slightly from what was estimated in the work plan based on our more recent experience with the SWI2 package. We also have added a subtask to document this work in a separate memo as shown in the following table.

*Cost Estimate for Simulating Seawater Intrusion*

<b>Staff</b>	<b>Williams</b>	<b>Tana</b>	<b>King</b>	<b>Culkin</b>	<b>Staff</b>	<b>Total</b>
<i>Rate</i>	\$195	\$175	\$165	\$155	\$115	
4.6 Implementation	16	60	16	120	24	\$37,620
5.5.1 Memo and Review	4	12	4	40	24	\$12,500
<b>Total</b>	<b>20</b>	<b>72</b>	<b>20</b>	<b>160</b>	<b>48</b>	<b>\$50,120</b>

Our experience testing the SWI2 package for earlier cross sectional models for MGA in 2015 revealed several technical challenges with obtaining useful results from this model process. We will utilize support from USGS staff to the extent possible during the remaining fiscal year, but there is a lack of published or otherwise available work where SWI2 was implemented in a GSFLOW model, or basinwide model of this scale in general. Therefore, challenges may arise that prevent us from completing this task within the fiscal year. If this occurs, we will discuss how to proceed with MGA staff.

Funding this work will require budget allocation this fiscal year. This may be facilitated by a transfer from other budget items for technical work. The MGA issued purchase orders for technical support for Sustainable Groundwater Management Plan total only

\$27,500 of the \$70,000 budgeted for the year, with \$42,500 remaining. The MGA has issued a purchase order of \$15,000 for technical support for Groundwater Sustainability Plan planning, but budgeted a total of \$120,000 for the year. Also, we recommend that the MGA separately allocate an additional \$1,840 to fund TAC member Barry Hecht's review of seawater intrusion simulation memo resulting in a total additional budget allocation of \$51,960 for the model.

A summary of the full budget status and task requests is attached. The total request for HydroMetrics WRI scope is \$107,070.

### SCHEDULE

The schedule for presentation of deliverables for tasks above are as follows:

March 7	TAC Meeting for Technical Memo on GSFLOW Integration and Calibration
Late April	TAC Call for Technical Memo on Model Simulations
June	TAC Call for Technical Memo on Seawater Intrusion Simulations
July	Presentation to MGA Board

### REQUEST APPROVAL PROCESS

We understand that you plan to present this request to the MGA Board at its March meeting. Based on this plan, we have continued to work on the September scope with the understanding that payment is contingent on MGA Board approval.

Please let me know if you have any questions.

Sincerely,



Cameron Tana, Vice President  
HydroMetrics Water Resources Inc.

Cc: Ralph Bracamonte, Central Water District  
Rosemary Menard, City of Santa Cruz  
Darcy Pruitt, MGA Senior Planner  
John Ricker, County of Santa Cruz

## Budget Detail for Mid County Basin Groundwater Model Fiscal Year 2016-2017

Tasks	FY 16-17 Approved PO 1003 (Sep scope)	FY 16-17 Expended thru Dec 2016 PO 1003	Additional HydroMetrics WRI Budget Request	USGS 15WSCA600094 410 FY15-16 to FY 16-17	TAC Member (Balance Hydrologic)
	(\$)	(\$)	(\$)		
<b>Task 1 Scoping Effort</b>				\$ -	\$ -
<i>BIG Work Plan Cost Estimate</i>		\$ 278		\$ -	\$ -
1.1 Scoping Meetings (assume 2)					
1.2 Draft Memorandum on Potential Model Uses				\$ -	\$ -
1.3 Develop Work Plan and Revise Cost and Schedule					
1.4 Additional TAC Member Compensation	\$ 8,920	\$ -			\$ 9,480
<b>Task 1 Subtotal</b>	\$ 8,920	\$ 278	\$ -	\$ -	\$ 9,480
<b>Task 2 Develop Model of Surface System</b>				\$ -	\$ -
<i>BIG Work Plan Cost Estimate</i>				\$ -	\$ -
2.1 Define Model Grid for Groundwater Model				\$ -	\$ -
2.2 Refine Model Grid for PRMS and Define Stream/Subwatershed Network				\$ -	\$ -
2.3 Compile Land Surface Data from Sub-Watershed Based PRMS				\$ -	\$ -
2.4 Climate Data for PRMS	\$ 12,090			\$ -	\$ -
2.5 Land Use Analysis for Water Use and Return Flow	\$ 14,440			\$ -	\$ -
2.5.1 Implement PRMS Water Use Module to Simulate Return Flow					
2.6 Draft Technical Memo and Review of PRMS Inputs	\$ 10,730			\$ 4,391	
2.7 Construct Grid-Based PRMS for GSFLOW	\$ 9,460			\$ -	\$ -
2.8 Calibrate PRMS	\$ 10,640			\$ -	\$ -
<b>Task 2 Subtotal</b>	\$ 57,360	\$ 99,068	\$ -	\$ 4,391	\$ -
<b>Task 3 Develop Model of Sub-surface System</b>				\$ -	\$ -
<i>BIG Work Plan Cost Estimate</i>				\$ -	\$ -
3.1 Develop Sub-surface Hydrogeologic Structure				\$ -	\$ -
3.2 Define Boundary Conditions	\$ 6,750			\$ -	\$ -
3.3 Develop Pumping Time Series	\$ 6,660			\$ -	\$ -
3.4 Draft Technical Memos and Review of MODFLOW Inputs	\$ 8,250			\$ -	\$ -
3.5 Compile Groundwater Level Calibration Data				\$ -	\$ -
3.6 Create Recharge Package Based on HRU Based PRMS	\$ 6,990			\$ -	\$ -
3.7 Roughly Calibrate Subsurface MODFLOW	\$ 14,060			\$ -	\$ -
<b>Task 3 Subtotal</b>	\$ 42,710	\$ 71,780	\$ -	\$ -	\$ -
<b>Task 4 Develop Integrated Model of Surface and Sub-surface Systems</b>				\$ -	\$ -
<i>BIG Work Plan Cost Estimate</i>				\$ -	\$ -
4.1 Implement SFR and UZF Package	\$ 9,345			\$ -	\$ -
4.2 Create GSFLOW	\$ 9,445			\$ -	\$ -
4.3 Draft Technical Memo and Review of GSFLOW Integration				\$ 2,722	
4.4 Calibrate GSFLOW	\$ 34,660			\$ -	\$ -
4.5 Implement SWI2 Code in GSFLOW (coordinate with USGS)	\$ 2,755			\$ 29,371	\$ -
4.6 Incorporate Density Dependence for Seawater Intrusion			\$ 37,620	\$ -	\$ -
4.7 Draft Technical Memo and Review of GSFLOW	\$ 18,620		\$ 18,620	\$ 6,000	
4.7.1 Review of GSFLOW with SWI2	\$ -		\$ -		
<b>Task 4 Subtotal</b>	\$ 74,825	\$ 47,898	\$ 56,240	\$ 38,093	\$ -
<b>Task 5 Model Simulations</b>				\$ -	\$ -
<i>BIG Work Plan Cost Estimate</i>				\$ -	\$ -
5.1 Develop Climate Change Scenario Based on Historical Record	\$ 11,800			\$ -	
5.1.1 Develop Additional Climate Change Scenario Such as GCM Downscaling				\$ -	
5.2 Evaluate Groundwater Management Alternatives and Scenarios	\$ 16,140		\$ 11,000	\$ -	\$ -
5.2.1 Evaluate Seawater Interface for Alternatives	\$ -		\$ -		
5.3 Run Alternatives with Climate Change Scenario Based on Historical Record	\$ 12,760		\$ 12,760	\$ -	\$ -
5.3.1 Run Selected Alternatives with Additional Climate Change Scenarios				\$ -	
5.4 Evaluate Predictive Uncertainty for Preferred Alternative				\$ -	\$ -
5.5 Draft Technical Memo and Review of Model Simulations	\$ 14,570		\$ 14,570	\$ 6,000	
5.5.1 Draft Technical Memo and Review of SWI2 Implementation and Simulations			\$ 12,500		\$ 1,840
<b>Task 5 Subtotal</b>	\$ 55,270	\$ 20,063	\$ 50,830	\$ 6,000	\$ 1,840
<b>Task 6 Final Model Report</b>				\$ -	\$ -
<i>BIG Work Plan Cost Estimate</i>				\$ -	\$ -
6.1 Final Draft Report				\$ 2,000	
6.2 Final Report				\$ -	\$ -
<b>Task 6 Subtotal</b>	\$ -			\$ 2,000	
<b>TOTAL</b>	\$ 239,085	\$ 239,086	\$ 107,070	\$ 50,484	\$ 11,320

March 16, 2017

## **MEMO TO THE MGA BOARD OF DIRECTORS**

Subject: Agenda Item 4.6

Title: Consideration of Funding Approval for Work to Locate Seawater Interface Offshore

### Attachment

1. Slide Presentation to be Provided at the March 7, 2017 Soquel Creek Water District Board Meeting

Jacob Vind works for the Ministry of Foreign Affairs of Denmark as the Head of the Water Technology Alliance in California. The Danish government has collaborated with the private sector and universities to create the Water Technology Alliance. One of their goals is to share their work towards groundwater sustainability. Danish water utilities have been very innovative in their efforts to prevent seawater intrusion and achieve groundwater sustainability. Mr. Vind spoke at a workshop on February 3rd for local water professionals. He is also scheduled to give a presentation at the March 7th Soquel Creek Water District Board meeting. Attachment 1 is the presentation he is planning to share at the March 7th meeting.

Mr. Vind has indicated they may have the technology to locate the seawater interface in the offshore aquifers. This would be of benefit to the MGA to have this interface defined. Mr. Vind indicated they are performing work in the Monterey Bay Region in May and that there would be costs savings if the MGA is interested in having them survey our area for the offshore seawater interface during that same time period. He indicated they will have their Danish geophysicist in town from March 24th to 31st and they will be available to meet and discuss this further.

At the time this memo is being written, we do not know much more than is being presented. The initial estimated cost range is \$50,000 to \$100,000. However, by the MGA Board Meeting on March 16th we will have a better idea if seeking their expertise is prudent and can make a recommendation to the MGA Board. The meeting in late March would also provide more information.

### Possible Board Actions:

1. By MOTION, designate a couple of MGA board members to join staff in meeting with the Danish representatives during March 24th to March 31st.
2. By MOTION, approve a funding amount of not to exceed \$100,000 to be reallocated from unused funding from the existing 2016/17 fiscal year budget to be available for locating the seawater interface, if approved as suggested in Motion 3.

3. By MOTION, authorize the MGA Board Chair, if upon obtaining additional information and it appears prudent, to approve a funding amount not-to-exceed the specified amount in Motion 2 above to locate the seawater interface offshore.
4. Take no action.

By   
\_\_\_\_\_  
Ron Duncan  
General Manager  
Soquel Creek Water District

Figure 1 – Seawater Intrusion in the District’s Service Area

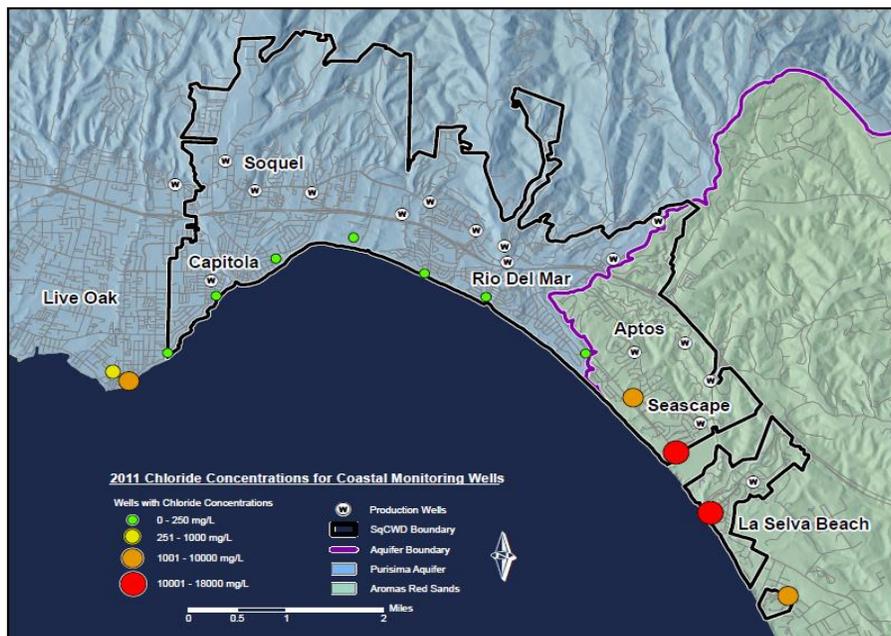


Figure 2 – Seawater Intrusion in the Watsonville Area

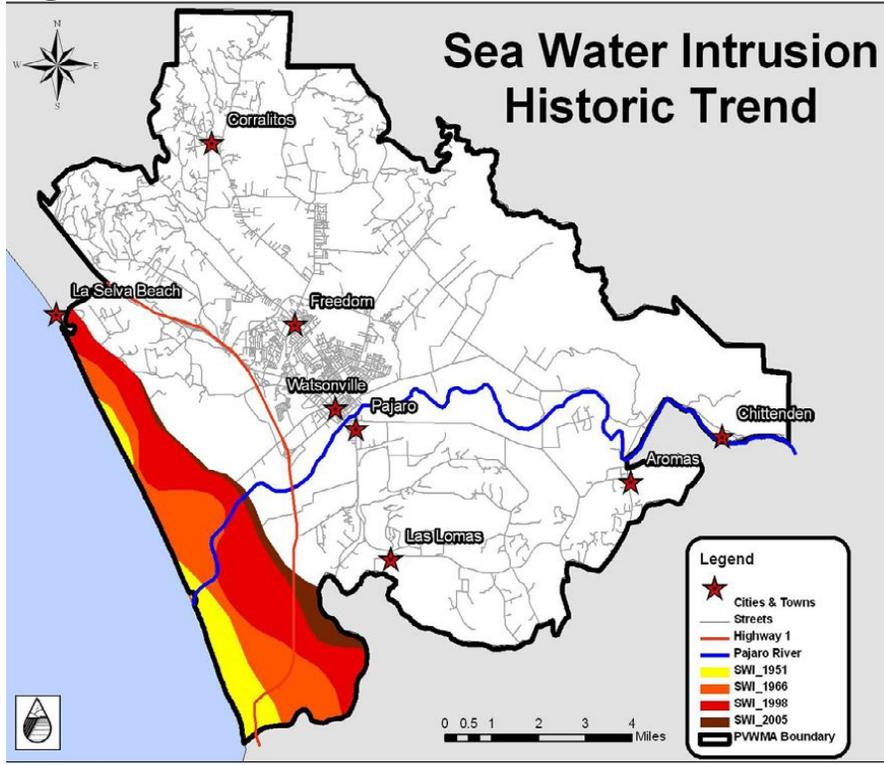
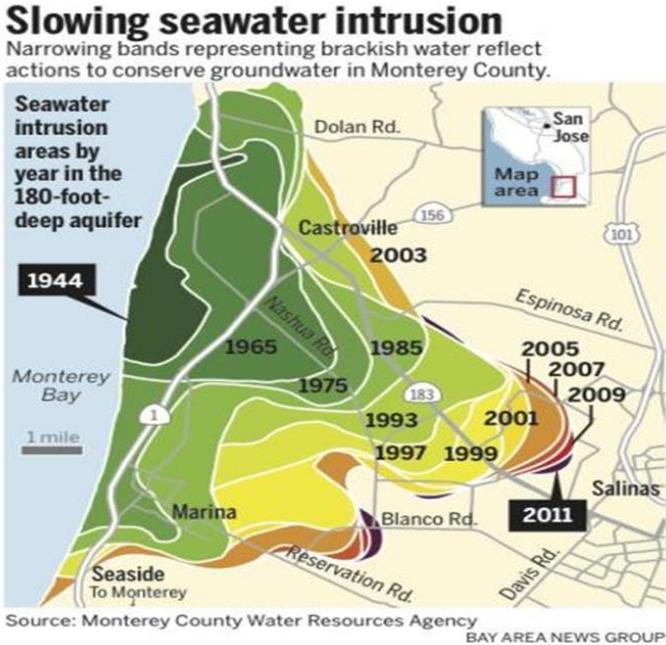


Figure 3 – Seawater Intrusion in the Monterey Area



**Figure 4 – Designation of the Santa Cruz Mid-County Basin and Adjacent Basins as Critically Overdrafted by CA Department of Water Resources**



March 16, 2017

## **MEMO TO THE MGA BOARD OF DIRECTORS**

Subject: Agenda Item 4.7

Title: Preliminary Review of Fiscal Year 2017-2018 Budget

### **Proposed MGA Planning Budget for FY 2017/18**

The Fiscal Year 2017/2018 (FY 17/18) Santa Cruz Mid-County Groundwater Agency (MGA) budget was prepared with the same major categories as the prior fiscal year (FY 16/17). As shown below, the grand total estimated FY 17/18 budget is \$1,035,006. With the aid of \$91,500 in grants, the total budget that partner agencies must contribute is reduced to **\$943,506**. The current cost-sharing agreement percentages among the partner agencies and resulting contributions based on the estimated budget are:

- Soquel Creek Water District 70% = \$660,456
- Central Water District 10% = \$94,350
- City of Santa Cruz 10% = \$94,350
- County of Santa Cruz 10% = \$94,350

For FY 17/18, the following activities and associated budgets in Table 1 have been identified for the MGA. The narrative below provides more detail about each item in the Table.

#### **Agency Administration**

The Regional Water Management Foundation (RWMF), a subsidiary of the Community Foundation of Santa Cruz County (CFSCC), will continue to provide core staff support to the MGA in a similar capacity, roles, and function as FY 16/17. Supporting staff will include a full time Senior Planner (1.0 FTE), Program Associate (approximately 0.35 FTE), and the Program Director (approximately 0.15 FTE). Staff from the partner agencies will continue to guide and support much of the work needed to sustain the MGA and produce the work plan. The FY 17/18 budget includes expenses for miscellaneous direct expenses such as professional conference fees, meeting related expenses (e.g., travel to Sacramento) and other miscellaneous expenses (e.g., printing costs).

The Soquel Creek Water District (SqCWD) Finance Manager will continue as the Treasurer for the MGA and will be responsible for the accounting and billing functions for the agency. We estimate it will take about 6 hours per week of her time, equating to 0.15 FTE.

#### **Legal Support**

Legal counsel from the county's legal department will continue to provide legal services on an as-needed basis. If legal counsel specific to groundwater is necessary, or if there is a conflict of interest, then Russ McGlothlin of Brownstein Hyatt Farber Schreck is proposed to provide services.

## **Hydrology Work**

HydroMetrics WRI is envisioned to provide the hydrology work needed as described below.

### Quarterly Monitoring Updates

HydroMetrics WRI proposes to continue providing quarterly updates on groundwater levels and salt concentrations at coastal monitoring wells. These updates on groundwater conditions will inform MGA staff and board members about seawater intrusion risk and basin overdraft. In FY 16/17, HydroMetrics provided updates to staff via web meetings at a cost of \$4,000. In FY 17/18, HydroMetrics proposes that these updates continue at a cost of \$4,000 as well as an additional \$4,000 to: prepare each update for inclusion in the MGA Board agenda packet with a short written summary; and include time for HydroMetrics groundwater hydrologists to respond to staff and board member questions. The proposed total for FY 17/18 is \$8,000.

### Biennial Groundwater Monitoring Report

These reports are done every two years. A report was funded in FY 16/17, thus there is no budget allocation for this in FY 17/18.

### Technical Support for SGMA

This budget item is for HydroMetrics and/or a groundwater consultant awarded development of the Groundwater Sustainability Plan (GSP) to provide technical support for Sustainable Groundwater Management Act (SGMA) issues separate from the development of the GSP. Non-GSP SGMA related issues for the next fiscal year that may arise are not yet well defined. However, examples scoped for FY 16/17 that may continue into FY 17/18 include support for the process defining the basin priorities for the newly modified groundwater basins and reviewing and providing feedback on California Department of Water Resources' (DWR) plans to provide water budget estimates for the Central Coast. Another item previously discussed relates to previewing DWR's draft guidance document on sustainability criteria and providing comments to DWR on that document.

### Groundwater Model

The proposed budget for FY 17/18 is to complete the scope in the groundwater model work plan. The work plan tasks for FY 17/18 relate to simulations of downscaled global climate models, evaluating predictive uncertainty, and providing the final model report. The proposed budget amount is greater than budgeted in the work plan because HydroMetrics has gained a better understanding of the time required to work with the integrated watershed-groundwater model being used. However, while this budget is meant to cover the full scope, some of the planned scope may be reduced or delayed based on MGA priorities. The county's Prop 1 grant award is meant to fund simulations that assess impacts of non-municipal pumping in the basin and effects of potential management scenarios.

The HydroMetrics model budget (\$174,520) includes:

- \$154,000 HydroMetrics simulating downscaled global climate models, predictive uncertainty and final report
- \$5,520 Balance Hydrologic Technical Advisory Committee model review
- \$15,000 Rollover of USGS budget from FY 16/17 for support and review

In addition, model related work in FY 17/18 includes the \$70,000 county grant including assessment of impacts of non-municipal pumping in the basin and effects of potential management scenarios. This will be conducted by HydroMetrics but is not funded by the MGA.

#### County Stream Gauges

These funds will be used to establish additional stream gauges to measure spring/summer flow in critical reaches to better document stream/groundwater interactions, establish streamflow targets, and monitor long term attainment of streamflow goals.

#### **GSP Development**

Development of the Groundwater Sustainability Plan (GSP) will need technical, policy, facilitation, and graphical support.

#### Public Policy Consulting and Facilitation Support

This task carries over from FY 16/17 and includes funding for a professional/consultant(s) to provide public policy and facilitation support related to GSP development activities.

#### Graphical support

This will include the development of graphics to inform the board, staff, and general public of the GSP development process. It is anticipated that this work will be performed by a consultant/professional specializing in the visual display of information to support decision making and to convey complex information in a manner that is more accessible and understandable to non-technical people.

#### **Outreach**

Outreach is a required and key part of the GSP development. This funding will support activities such as: language translation services; advertisement of meetings (newspapers and signage); participation/promotion of groundwater awareness week; public meetings (including food and venue rental fees). Miscellaneous outreach related tasks refer to items such as: brochure development, website updates, web videos, and graphics for informational materials. Additional outreach efforts that are funded by the county grant award (not included in MGA cost share), will include a brochure to private well owners, conservation audits for private well owners, and well soundings.

**Contingency**

In FY 16/17, a 10% contingency amount was budgeted in recognition that the work the MGA was undertaking was new and there was the potential for unanticipated expenses. Due to an improved understanding of the GSP development process and associated expenses, staff recommends a 5% contingency to cover unforeseen needs in FY 17/18.

**FY 16/17 Rollover Amount to FY 17/18**

Based upon the FY 16/17 budget allocations and the estimated actual costs in FY 16/17 (which is based upon the costs incurred to date and the estimated costs remaining in FY 16/17), the estimated funding balance by budget category is presented in Table 1 as “Rollover to 2017–2018” in the amount of \$391,770. The FY 16/17 rollover total does not include in the cost of potential work related to the seawater interface offshore data collection effort (\$50,000-\$100,000), which if performed would reduce the rollover amount.

**POSSIBLE ACTION**

1. By MOTION, approve the proposed MGA Planning Budget and reconfirm the intent for the agency allocations presented in this memo for Fiscal Year 2017/2018.
2. Take no action.

By  \_\_\_\_\_

Ron Duncan  
General Manager  
Soquel Creek Water District

By  \_\_\_\_\_

Tim Carson  
Program Director  
Regional Water Management Foundation

Prepared on behalf of the MGA Executive Team:  
John Ricker, Ralph Bracamonte, Rosemary Menard, Ron Duncan

Table 1. Proposed Draft SCMGA Annual Budget for FY 2017/18

Item	Note/Consultant	2016 - 2017 Budget	2016 - 2017 Budget Modifications	2016 - 2017 Estimated Actual	Rollover to 2017 - 2018	2017 - 2018 Budget	2017 - 2018 Budget Notes
<b>Agency Administration</b>							
Senior Planner	RWMF	\$ 148,500		\$ 81,500	\$ 67,000	\$ 148,500	
Administrative Program Associate	RWMF	\$ 30,000		\$ 18,500	\$ 11,500	\$ 30,000	
Program Director	RWMF	\$ 29,000		\$ 37,000	\$ (8,000)	\$ 33,000	
Expenses (conference attendance, print copies, misc. direct expenses)	RWMF	\$ -		\$ 2,300	\$ (2,300)	\$ 2,000	
0.15 FTE – Treasurer	Leslie Strohm (SqCWD)	\$ 36,000		\$ 9,160	\$ 26,840	\$ 28,000	
Accounting and other software		\$ 1,500		\$ 600	\$ 900	\$ 1,500	
Annual Outside Audit		\$ 12,000		\$ 6,000	\$ 6,000	\$ 6,000	
Office supplies at SqCWD (phone, computer, print copies, etc.		\$ 10,000		\$ 2,600	\$ 7,400	\$ 5,200	
	<i>Subtotal</i>	<b>\$ 267,000</b>		<b>\$ 157,660</b>	<b>\$ 109,340</b>	<b>\$ 254,200</b>	
Table 1 - Continued							
<b>Legal Support</b>							
Legal assistance with drafting bylaws and general support	SC County Legal Counsel - \$250/hr x 80 hrs	\$ 20,000		\$ 5,000	\$ 15,000	\$ 10,000	
Legal assistance and services for GSA/GSP guidance and possible conflict resolution	Brownstein Hyatt Farber Schreck	\$ 10,000		\$ -	\$ 10,000	\$ 10,000	
	<i>Subtotal</i>	<b>\$ 30,000</b>		<b>\$ 5,000</b>	<b>\$ 25,000</b>	<b>\$ 20,000</b>	

Table 1. Proposed Draft SCMGA Annual Budget for FY 2017/18

Item	Note/Consultant	2016 - 2017 Budget	2016 - 2017 Budget Modifications	2016 - 2017 Estimated Actual	Rollover to 2017 - 2018	2017 - 2018 Budget	2017 - 2018 Budget Notes
<b>Hydrology Work</b>							
Quarterly groundwater monitoring updates	HydroMetrics WRI	\$ 4,000		\$ 4,000	\$ -	\$ 8,000	
Biennial groundwater monitoring report	HydroMetrics WRI	\$ 50,000		\$ 50,000	\$ -	\$ -	
Technical support for SGMA	HydroMetrics WRI	\$ 75,000	\$ (47,500)	\$ 27,500	\$ -	\$ 25,000	Pending Board approval 3/16/17 - Transfer \$47,500 to offset costs of Groundwater model increase (\$107k)
Groundwater model	HydroMetrics WRI (excluding 70K from County grant)	\$ 286,000		\$ 286,000	\$ -	\$ 174,520	\$154,000 HydroMetrics WRI \$5,520 Balance Hydrologic TAC model review \$15,000 Rollover of USGS budget from FY16-17
Groundwater model	HydroMetrics WRI	\$ -	\$ 107,070	\$ 107,070	\$ -	\$ -	Budget increase pending Board approval 3/16/17
Groundwater model - County grant not included in MGA cost share	County grant	\$ 70,000		\$ -	\$ -	\$ 70,000	County grant is excluded from cost share
County stream gages	TBD	\$ 50,000		\$ 25,000	\$ 25,000	\$ 50,000	
Seawater Interface Offshore data collection	TBD	\$ -	\$ 100,000	\$ 100,000	\$ -	\$ -	Budget increase pending Board approval 3/16/17. Cost range estimate is \$50k - 100k
	<i>Subtotal</i>	<b>\$ 535,000</b>	<b>\$ 159,570</b>	<b>\$ 599,570</b>	<b>\$ 25,000</b>	<b>\$ 327,520</b>	
<b>GSP Development</b>							
Technical support	\$10,000/month	\$ 120,000	\$ (59,570)	\$ 23,000	\$ 37,430	\$ 120,000	Pending Board approval 3/16/17 - Transferred 59,570 to offset costs of Groundwater model increase (\$107k)
Public policy consulting and facilitation support	\$12,000/month	\$ 144,000		\$ -	\$ 144,000	\$ 144,000	
Graphical support	TBD	\$ -		\$ -	\$ -	\$ 50,000	
	<i>Subtotal</i>	<b>\$ 264,000</b>	<b>\$ (59,570)</b>	<b>\$ 23,000</b>	<b>\$ 181,430</b>	<b>\$ 314,000</b>	

Table 1. Proposed Draft SCMGA Annual Budget for FY 2017/18

Item	Note/Consultant	2016 - 2017 Budget	2016 - 2017 Budget Modifications	2016 - 2017 Estimated Actual	Rollover to 2017 - 2018	2017 - 2018 Budget	2017 - 2018 Budget Notes
<b>Outreach</b>							
Translation services		\$ 5,000		\$ -	\$ 5,000	\$ 5,000	
Meeting advertising		\$ 4,000		\$ -	\$ 4,000	\$ 9,000	
Groundwater awareness week		\$ 2,000		\$ -	\$ 2,000	\$ 2,000	
Public meetings (food and space rental)		\$ 1,000		\$ 300	\$ 700	\$ 3,600	
Miscellaneous (brochure development, website, web videos, graphics for documents, etc.)		\$ 21,000		\$ 3,200	\$ 17,800	\$ 28,900	
Additional \$46,000 from County grant fund – not included in MGA cost share		\$ 46,000		\$ 24,500	\$ 21,500	\$ 21,500	Excluded from cost share. Brochure to private well owners; conservation audits to private well owners; well soundings
	<i>Subtotal</i>	<b>\$ 79,000</b>	<b>\$ -</b>	<b>\$ 28,000</b>	<b>\$ 51,000</b>	<b>\$ 70,000</b>	
	<i>Pre Subtotal</i>	<b>\$ 1,175,000</b>	<b>\$ 100,000</b>	<b>\$ 813,230</b>	<b>\$ 391,770</b>	<b>\$ 985,720</b>	
	<i>10% Contingency</i>	\$ 117,500				\$ 49,286	5% Contingency (reduction from FY 16/17)
<b>Grand Total (with grants)</b>		<b>\$ 1,292,500</b>				<b>\$ 1,035,006</b>	
	Less County grant funded modeling	\$ (70,000)				\$ (70,000)	Less County grant funded modeling
	Less County grant funded outreach	\$ (70,000)				\$ (21,500)	Less County grant funded outreach
<b>Grand Total (without grants)</b>		<b>\$ 1,152,500</b>				<b>\$ 943,506</b>	

March 16, 2017

## MEMO TO THE MGA BOARD OF DIRECTORS

Subject: Agenda Item 5.1

Title: MGA Recognized in Stanford University Report

This past summer the Santa Cruz Mid-County Groundwater Agency (MGA) participated as a case study for a Stanford University report called "*To Consolidate or Coordinate: Status of the Formation of Groundwater Sustainability Agencies (GSA) in California.*" The report notes that the MGA is the only basin thus far to coordinate multiple agencies to govern a GSA. The MGA has been viewed as a model agency for leading the way for GSA development and demonstrating collaboration.

Key findings of the report include:

- As of October 31, 2016, a total of 106 entities had submitted notices to serve as GSAs. The vast majority came from single agencies rather than collaborations among multiple agencies, and over a third had voluntary groundwater management plans in place prior to the Sustainable Groundwater Management Act (SGMA).
- Local agencies had submitted GSA notices to cover all or part of 51 high- and medium-priority basins, ranging from one to 14 prospective GSAs per basin.
- Of these 51 basins, 13 are completely covered by a single GSA, 10 were covered by multiple GSAs that were overlapping or not yet exclusive, and 28 had incomplete coverage.
- Only one basin (Santa Cruz Mid-County Groundwater) is being governed by a newly created governance structure involving multiple agencies.
- Seven inter-related factors played a role in decisions about the scale of GSAs, and whether to pursue consolidated or coordinated approaches to management at the basin scale: basin size; degree of heterogeneity in basin conditions; concerns about autonomy and representation; needs for financing GSA activities; existing capacity to serve as a GSA; prior collaborative experience; and the presence of trusted basin-wide leadership.

To read the full report go to:

<http://waterinthewest.stanford.edu/publications/consolidate-or-coordinate-formation-groundwater-sustainability-agencies>

Possible Board Action:

1. Informational only, no action necessary.

By   
\_\_\_\_\_  
Ron Duncan  
General Manager  
Soquel Creek Water District

March 16, 2017

**MEMO TO THE MGA BOARD OF DIRECTORS**

Subject: Agenda Item 5.2

Title: Treasurer's Report

Attachments

1. Treasurer's Report for the Period Ending February 28, 2017

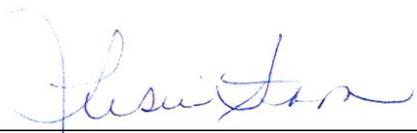
Attached is the Treasurer's Report for January and February 2017. The report contains three sections:

- Statement of Changes in Revenues, Expenses and Net Position
  - This interim financial statement provides information on the revenue that has been invoiced to the member agencies and the expenses that have been recorded as of February 28, 2017.
- Statement of Net Position
  - This interim financial statement details the cash balance at Wells Fargo Bank, the depository institution for the Santa Cruz Mid-County Groundwater Agency (MGA), the membership revenue still owed through accounts receivable, and the resulting net income as reported on the Statement of Changes in Revenues, Expenses and Net Position from the preceding page.
- Warrants
  - The list of warrants reflects all payments made by the MGA, either by check or electronic means, for the period covered by the Treasurer's Report.

The Treasurer's Report will be provided on a monthly basis according to statutory requirement and to promote transparency of the agency's financial transactions.

Possible Board Actions:

1. Informational, no motion necessary.

By   
\_\_\_\_\_  
Leslie Strohm  
Treasurer  
Santa Cruz Mid-County Groundwater Agency

# Treasurer's Report

Santa Cruz Mid-County Groundwater Agency  
For the period ended February 28, 2017



Prepared by  
**Leslie Strohm**

Prepared on  
**February 28, 2017**

# Statement of Revenues, Expenses and Changes in Net Position

January - February, 2017

	<b>Total</b>
<b>INCOME</b>	
<b>Total Income</b>	
<b>GROSS PROFIT</b>	<b>0.00</b>
<b>EXPENSES</b>	
5100 Groundwater Management Services	3,528.75
5120 Grndwtr Mgmt - Groundwater Model	42,547.50
5300 Administrative Personnel Services	26,266.75
5317 Office Services - Bank Charges	2.80
5340 Computer Services	118.99
5510 GSP Consulting Services	603.75
5520 Legal Services	501.50
<b>Total Expenses</b>	<b>73,570.04</b>
<b>NET OPERATING INCOME</b>	<b>-73,570.04</b>
<b>NET INCOME</b>	<b>\$ -73,570.04</b>

# Statement of Net Position

As of February 28, 2017

	<b>Total</b>
<b>ASSETS</b>	
<b>Current Assets</b>	
<b>Bank Accounts</b>	
1100 Wells Fargo Business Checking	779,208.24
<b>Total Bank Accounts</b>	<b>779,208.24</b>
<b>Accounts Receivable</b>	
1200 Accounts Receivable - Membership Revenue	55,250.00
<b>Total Accounts Receivable</b>	<b>55,250.00</b>
<b>Total Current Assets</b>	<b>834,458.24</b>
<b>TOTAL ASSETS</b>	<b>\$834,458.24</b>
<b>LIABILITIES AND EQUITY</b>	
<b>Liabilities</b>	
<b>Total Liabilities</b>	
<b>Equity</b>	
Retained Earnings	
Net Income	834,458.24
<b>Total Equity</b>	<b>834,458.24</b>
<b>TOTAL LIABILITIES AND EQUITY</b>	<b>\$834,458.24</b>

# Warrants

January - February, 2017

Date	Transaction Type	Num	Name	Memo/Description	Clr	Amount
<b>Check</b>						
01/11/2017	Check		SVCCHRG	Service Charge	R	-2.80
						2.80
<b>Bill Payment (Check)</b>						
02/24/2017	Bill Payment (Check)	10016	Regional Water Management Foundation			-54,502.79
						-54,502.79
02/24/2017	Bill Payment (Check)	10017	Soquel Creek Water District (2)	0000260		-70.99
						-70.99
02/24/2017	Bill Payment (Check)	10018	Hydrometrics Water Resources, Inc.			-4,083.75
						-4,083.75
01/09/2017	Bill Payment (Check)	10010	Hydrometrics Water Resources, Inc.		R	-52,727.00
						-52,727.00
01/09/2017	Bill Payment (Check)	10011	Brownstein Hyatt Farber Schreck, LLP	017669.0001	R	-501.50
						-501.50
01/03/2017	Bill Payment (Check)	10012	Balance Hydrologics, Inc.			-1,150.00
						-1,150.00
01/03/2017	Bill Payment (Check)	10013	Soquel Creek Water District (2)	0000260		-48.00
						-48.00

Date	Transaction Type	Num	Name	Memo/Description	Clr	Amount
01/03/2017	Bill Payment (Check)	10014	Hydrometrics Water Resources, Inc.			-41,397.50
						-41,397.50
01/03/2017	Bill Payment (Check)	10015	Hydrometrics Water Resources, Inc.			-48.75
						-48.75

March 16, 2017

## **MEMO TO THE MGA BOARD OF DIRECTORS**

Subject: Agenda Item 5.3

Title: Quarterly Monitoring Data Update

### **Attachments**

1. Technical Memorandum from HydroMetrics WRI titled “Quarterly Update of Coastal Monitoring Data through Water Year 2016”

### **Purpose**

This memo presents an excerpt from the biennial report of groundwater conditions in the Santa Cruz Mid-County Basin for Water Years 2015 and 2016 and is used to provide MGA staff and board members with a quarterly update of coastal monitoring well data through Water Year 2016.

The memo includes a discussion of the following:

1. Coastal groundwater level averages for Water Years 2015 & 2016 compared to protective elevations
2. Groundwater level trends with hydrographs of groundwater data through 2016
3. Groundwater quality trends with Chemographs of chloride and total dissolved solids (TDS) concentrations of data through 2016

### **Discussion**

Groundwater levels are at protective elevations established by Soquel Creek Water District (SqCWD) and the City of Santa Cruz (City) at 8 of 13 coastal monitoring wells. SqCWD set protective elevations at its monitoring wells based on cross-sectional models of density dependent flow to simulate the long term seawater interface resulting from the groundwater level set at each monitoring well. The City set protective elevations at its monitoring wells based on the more conservative and commonly used Ghyben-Herzberg relationship. For example, and as stated by HydroMetrics WRI, the Ghyben-Herzberg results for SqCWD’s well SC-1A of 6.2 feet mean sea level (MSL) is higher than the 4 feet MSL that is protective at 70% of the runs for the well. As part of the cooperative groundwater management agreement between SqCWD and the City, 6.2 feet MSL is used as the agreed upon protective level.

Although some recovery of the basin has occurred over the last two years as evidenced by rising water levels, full basin recovery has not been achieved since five wells still have average groundwater levels below the protective elevations. As mentioned by HydroMetrics, to achieve full basin recovery additional reduction of

the historical basin deficit with continued low pumping or supplemental groundwater recharge will be required.

Recent groundwater quality data for coastal monitoring wells does not indicate new or increased seawater intrusion as the chloride and TDS trends are stable or have been decreasing over the last two years.

HydroMetrics WRI staff will be present at the board meeting and can answer any questions related to this memo.

Possible Board Action:

1. Informational only, no action necessary.

By   
\_\_\_\_\_  
Isidro Rivera  
Associate Civil Engineer  
City of Santa Cruz

## TECHNICAL MEMORANDUM

To: Isidro Rivera, City of Santa Cruz Water Department, on behalf of the Santa Cruz Mid-County Groundwater Management Agency (MGA)

From: Cameron Tana

Date: March 3, 2017

Subject: Quarterly Update of Coastal Monitoring Data through Water Year 2016

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### 1. EXCERPT FROM BIENNIAL REPORT

We are currently compiling the biennial report of groundwater conditions for Water Years 2015 and 2016 in the Santa Cruz Mid-County Basin (basin) scheduled to be presented to the MGA Board at its May 2017 meeting. To provide MGA staff and Board with a quarterly update of basin conditions before the biennial report is complete, this memorandum presents an excerpt from the biennial report related to coastal monitoring data through Water Year 2016. Quarterly updates on basin conditions have been based on coastal monitoring data because seawater intrusion risk is the primary sustainability criterion for the basin.

The excerpt from the biennial report includes the following for coastal monitoring data:

1. Groundwater level averages for Water Years 2015 and 2016 compared to protective elevations to prevent seawater intrusion;
2. Hydrographs of groundwater level data compared to protective elevations as well as 5 year trend lines;
3. Chemographs of chloride and total dissolved solids (TDS) concentrations compared to drinking water secondary maximum contaminant limits (MCLs) for those salt constituents as well as 5 year trend lines.

### 2. COASTAL GROUNDWATER LEVEL AVERAGES COMPARED TO PROTECTIVE ELEVATIONS

Soquel Creek Water District (SqCWD) and City of Santa Cruz (City) established protective elevations to prevent long term seawater intrusion at their coastal monitoring wells screened in aquifer units with nearby production wells in the Purisima and Aromas

areas (Figure 1). We consider average groundwater levels below protective elevations that have been observed in the coastal monitoring wells to represent a condition of basin overdraft. This finding led to California Department of Water Resources designation of the former Soquel Valley Basin as a basin in critical overdraft and since the Mid-County Basin includes all of the former Soquel Valley Basin, the Mid-County Basin should be considered as a basin in critical overdraft as well. In addition, basin recovery will not be achieved until average groundwater levels reach protective elevations at all coastal monitoring wells.

The MGA will likely re-consider the protective elevations established by SqCWD and the City when it develops measurable objectives for seawater intrusion in the Groundwater Sustainability Plan (GSP). Therefore, the coastal groundwater level averages below are presented in context of how SqCWD and the City established the protective elevations.

SqCWD set protective elevations at its monitoring wells (names beginning with “SC”) based on cross-sectional models of density dependent flow to simulate the long term seawater interface resulting from the groundwater level set at each monitoring well (HydroMetrics LLC, 2009, and HydroMetrics WRI, 2012) . Due to lack of offshore data for calibration, an uncertainty analysis was performed using runs of each cross-sectional model with 100 different sets of hydrologic parameters within documented ranges. SqCWD based its protective elevations on groundwater levels that protect against seawater intrusion in at least 70 percent of the runs. However, the model results also allow us to quantify the percentage of the runs that protect against seawater intrusion for the observed average groundwater levels presented below.

The City set its protective elevations at its monitoring wells (Moran Lake, Soquel Point, and Pleasure Point) based on the commonly used Ghyben-Herzberg relationship. This relationship does not account for local aquifer characteristics and do not provide probabilities for protection against seawater intrusion, but based on the most likely pathway for seawater intrusion in the area, the Ghyben-Herzberg results are more conservative than results from the cross-sectional modeling (HydroMetrics WRI, 2016). For example, the Ghyben-Herzberg results for SqCWD’s well SC-1A of 6.2 feet mean sea level (msl) is higher than the 4 feet msl that is protective at 70 percent of the runs for the well. As part of the cooperative groundwater management agreement between SqCWD and the City, 6.2 feet msl is used as the agreed upon protective level (City and SqCWD, 2015).

Table 1 shows the average groundwater levels calculated for Water Years 2015 and 2016 based on logger data recorded at 15 minute intervals. The average groundwater levels are compared to protective elevations and, where available, the percentage of cross-

sectional model runs that protect against seawater intrusion at the average level. At SqCWD's Aromas coastal monitoring wells SC-A1, SC-A2, SC-A3, SC-A4, and SC-A8, average levels measured at both the A and B screens installed at the depth of the seawater interface are compared to the protective elevation. The lower average between the two screens is presented.

*Table 1. Average Groundwater Levels Water Years 2015-2016 Compared to Protective Elevations*

<b>Monitoring Well</b>	<b>Protective Elevation (ft msl)</b>	<b>Avg. Groundwater Level Water Year 2015 (ft msl)</b>	<b>Percentage of Runs Protective</b>	<b>Avg. Groundwater Level Water Year 2016 (ft msl)</b>	<b>Percentage of Runs Protective</b>
Moran Lake Medium	5	5.2	N/A	5.6	N/A
Soquel Point Medium	6	4.8	N/A	5.8	N/A
Pleasure Point Medium	6.1	5.5	N/A	7.1	N/A
SC-1A	6.2	9.1	>99%	9.2	>99%
SC-3A	10	10.2	>=70%	13.0	>99%
SC-5A	13	4.8	<50%	11.5	<50%
SC-9C	10	0.3	<50%	9.9	>=60%
SC-8D	10	9.2	<50%	10.7	>=70%
SC-A1B	3	7.6	>99%	7.7	>99%
SC-A8A	6	5.5	>=50%	5.5	>=50%
SC-A2A	3	6.0	>99%	6.3	>99%
SC-A3A	3	2.9	>=50%	3.1	>=80%
SC-A4A <sup>1</sup>	3	1.4	<50%	1.5	<50%

<sup>1</sup> SC-A4 is located in the Pajaro Valley Subbasin south of the Santa Cruz Mid-County Basin

As a result of long-term recovery and an acceleration of recovery over the last two years (see below), average groundwater levels in Water Year 2016 met the established protective elevations at the most monitoring wells since the wells were installed. Average groundwater levels in Water Year 2016 met established protective elevations at 8 of 13 of the wells. Since five wells have average groundwater levels below established protective elevations, full basin recovery has not been achieved and the basin is still considered in long-term overdraft. For SqCWD wells where estimates of percentage of runs that are protective at the average groundwater level, 6 of 10 wells are protective for the 70% of

runs used to establish protective elevations, but only 4 of 10 wells are protective at greater than 90% of runs.

### 3. GROUNDWATER LEVEL TRENDS

The attached hydrographs for the monitoring wells show long-term recovery of groundwater levels at most wells over 5-10 years. The trends over Water Years 2015 and 2016 differ by basin area as follows:

- In the Western Purisima at the City's monitoring wells and SqCWD's SC-1A, there has been a slight increasing trend in groundwater levels over the last two water years.
- Further east in the Purisima at SqCWD's monitoring wells SC-3A, SC-5A, SC-9C, and SC-8D, there has been an acceleration in recovery over the last two water years.
- At SqCWD's monitoring wells in the Aromas areas, SC-A1, SC-A8, SC-A2, SC-A3, and SC-A4, groundwater levels have been mostly stable over the last two water years.

The overall groundwater level recovery over the last two years likely relates to a decrease in municipal pumping, which will be presented in the biennial report. Although substantial recovery was achieved over the last two years, the rate of recovery would likely decrease even if historical low amounts of municipal pumping are maintained. Rising groundwater levels will increase groundwater flowing offshore, which is necessary to reduce the risk of seawater intrusion but also increase the amount of water needed to raise groundwater levels. These relationships will be simulated by the groundwater model currently under development for more accurate projection of recovery under different groundwater management alternatives and climatic conditions.

Although overall groundwater levels can be related to municipal pumping, SqCWD wells near SC-A3 and SC-A4 on both sides of the boundary between the Santa Cruz Mid-County Basin and the Pajaro Valley Subbasin have been offline since 2013. Therefore, municipal pumping has had little effect on groundwater levels in this area over the last two years.

### 4. GROUNDWATER QUALITY TRENDS

Historically, seawater intrusion has been observed at some coastal monitoring wells when the wells were installed. Since installation of these wells, the saltwater interface appears to have receded in the City's Western Purisima area, while intruding further in

some wells of SqCWD's Aromas area. Seawater intrusion in aquifer units with nearby production has not been observed in the coastal monitoring well locations in SqCWD's Purisima area and the westernmost location in the Aromas area. Over the last two years, the trends for chloride and TDS concentrations have not notably changed and do not indicate an increase in seawater intrusion. The salt concentration conditions can be summarized for groups as wells as follows:

- In the City's Moran Lake well in the Western Purisima area, concentrations continue to decrease from levels above the MCL at well installation to at or below the MCL currently. However, concentrations at the Soquel Point well continue to be stable at elevated levels above the MCLs.
- At Purisima area wells (Pleasure Point, SC-1A, SC-3A, SC-5A, SC-9C, and SC-8C) where chloride concentrations have been below 100 mg/L for nearly all of the dataset, chloride concentrations continue to be below 100 mg/L and TDS concentrations are stable or decreasing.
- At Aromas area wells (SC-A1A, SC-A1B, SC-A8B, and SC-A4B) where the saltwater interface has not been indicated, concentrations are stable or decreasing.
- At the deepest Aromas area wells (SC-A8A, SC-A2A, SC-A3A, and SC-A4A) installed below the saltwater interface, concentrations remain elevated but stable.
- At the Aromas area wells installed above the saltwater interface but the interface has risen into (SC-A2B and SC-A3B), concentrations continue to indicate intrusion but do not appear to be continuing to increase. A series of changes in sampling equipment and settings at SC-A3B make it difficult to evaluate the trend at that well beyond the last two years.

The stable or decreasing trends at the coastal monitoring wells indicate no new seawater intrusion or further inland movement of the seawater interface where it has been historically observed.

## 5. SUMMARY

In summary, substantial progress towards groundwater level recovery was achieved during Water Years 2015 and 2016. Groundwater levels are at protective elevations established by SqCWD and the City at a majority of coastal monitoring wells. However, full groundwater level recovery will not be achieved until groundwater levels are at protective elevations at all coastal monitoring wells. Therefore, the basin continues to be in a state of overdraft.

Additional reduction of the historical basin deficit will be necessary to achieve full recovery. Additional reduction of the historical basin deficit will require continued low

pumping and/or supplemental groundwater recharge. The MGA may also redefine the recovery goal when it reassesses protective elevations to prevent seawater intrusion. A groundwater model is being developed that will more accurately project recovery under different groundwater management alternatives and climatic conditions.

Seawater intrusion continues to occur in parts of the basin. However, groundwater quality trends do not indicate new or an increase in seawater intrusion. Coastal well locations where seawater intrusion has not been observed continue to show no indication of seawater intrusion. Seawater intrusion where it has been observed is either stable or decreasing.

## 6. REFERENCES

City of Santa Cruz and Soquel Creek Water District, 2015, *Cooperative Monitoring/Adaptive Groundwater Management Agreement*, April 23.

HydroMetrics LLC, 2009, *Groundwater Levels to Protect against Seawater Intrusion and Store Freshwater Offshore*, January.

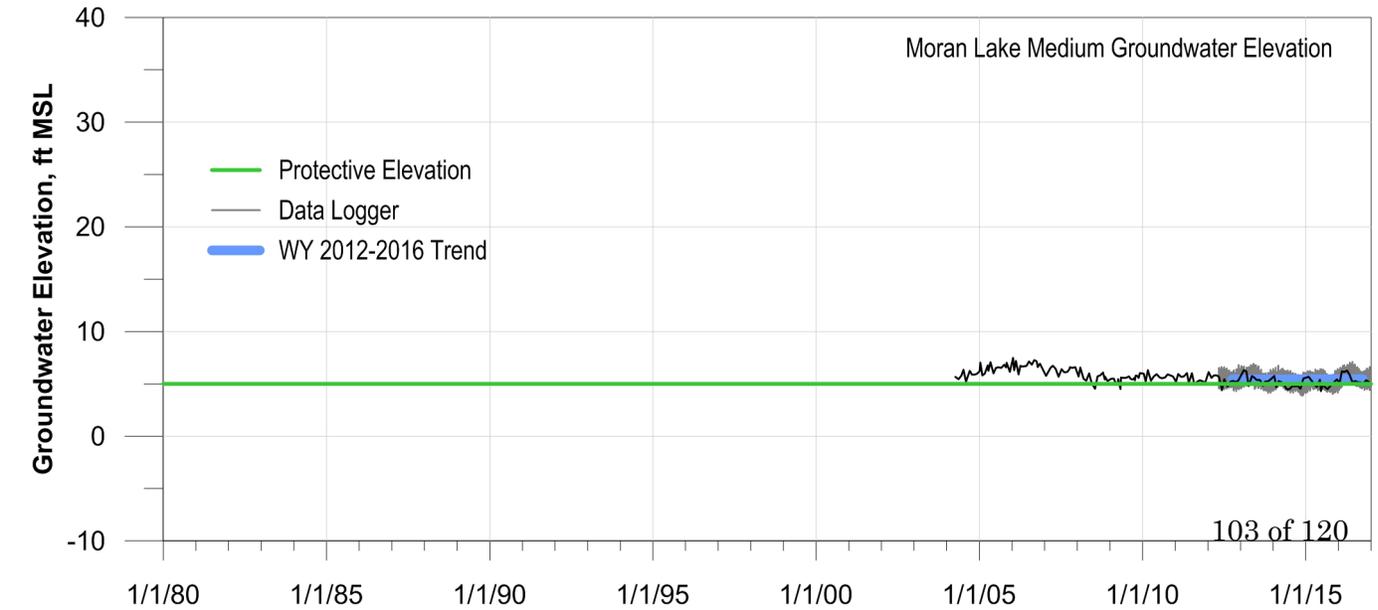
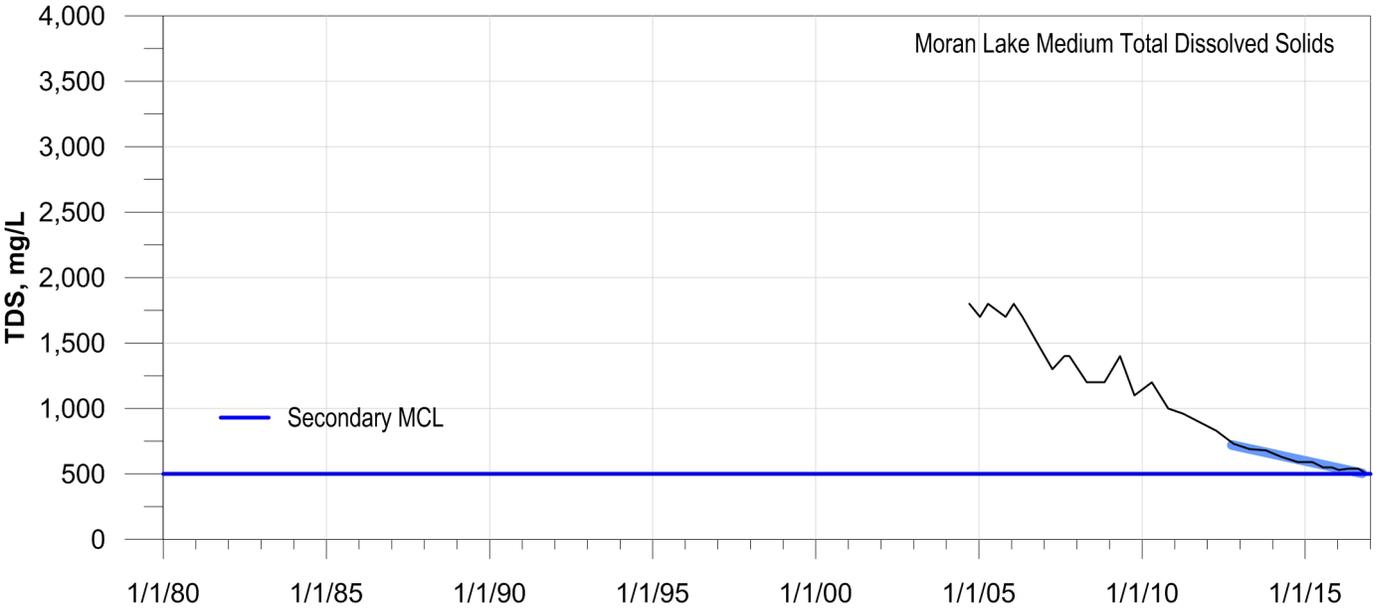
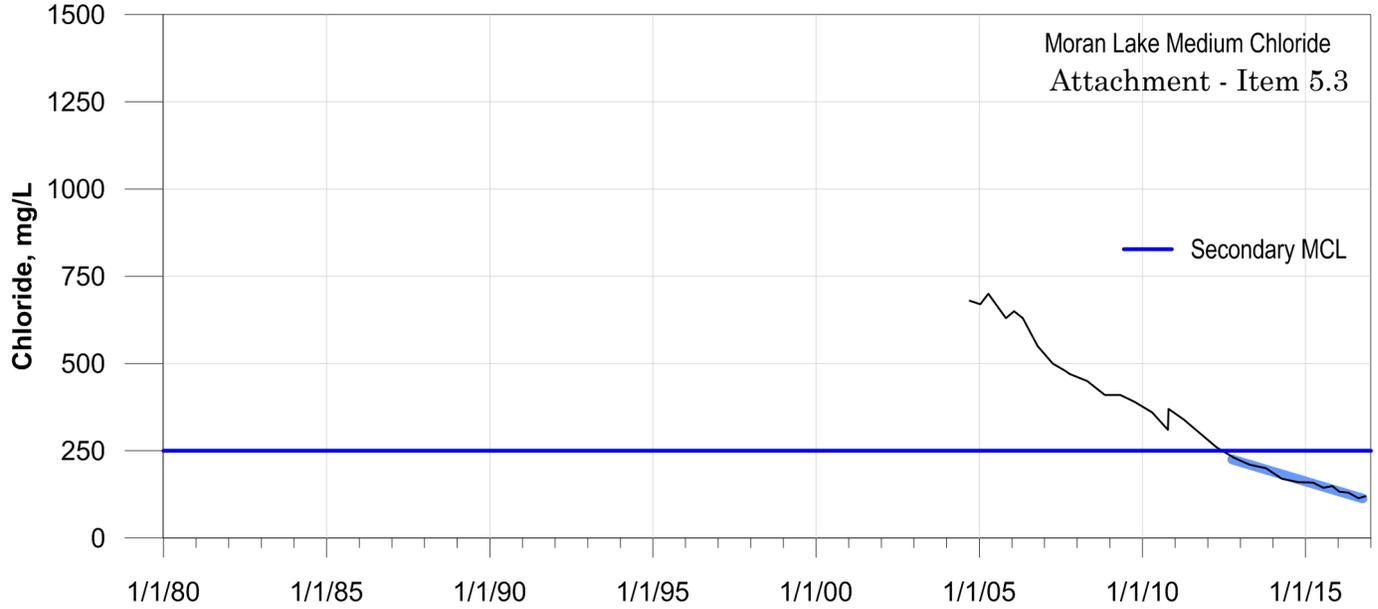
HydroMetrics WRI, 2012, *Revised Protective Groundwater Elevations and Outflows for Aromas Area and Updated Water Balance for Soquel-Aptos Groundwater Basin*, April 3.

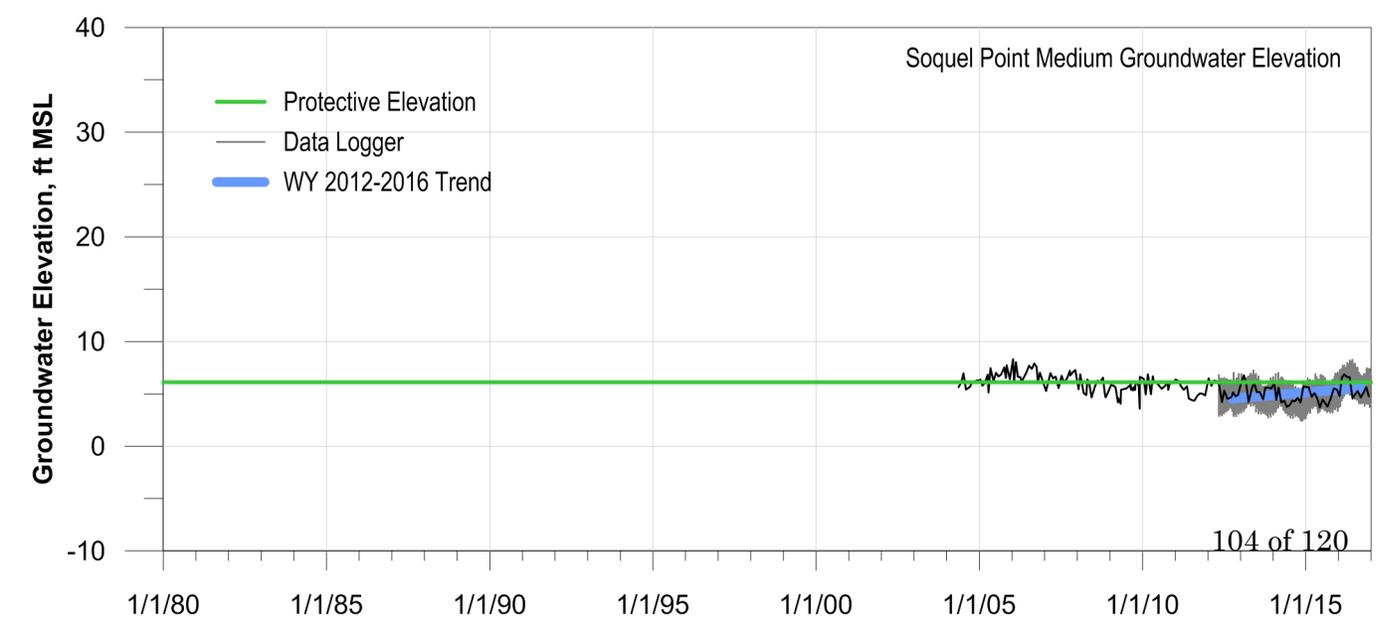
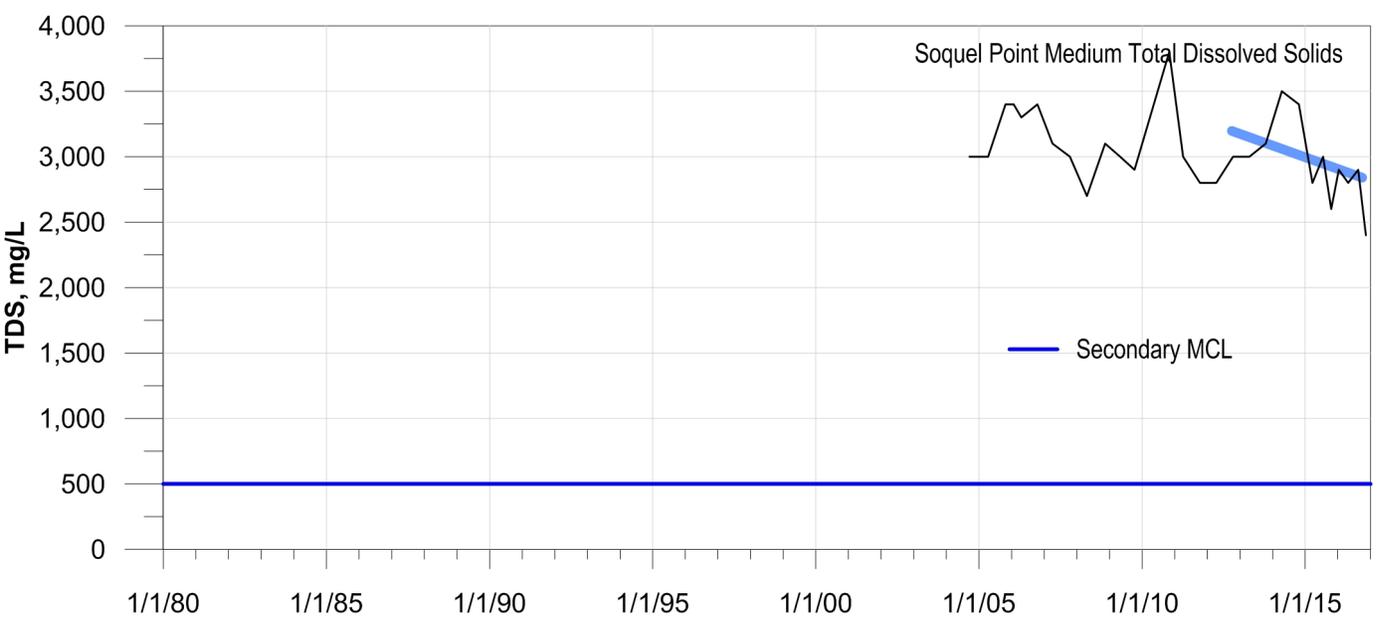
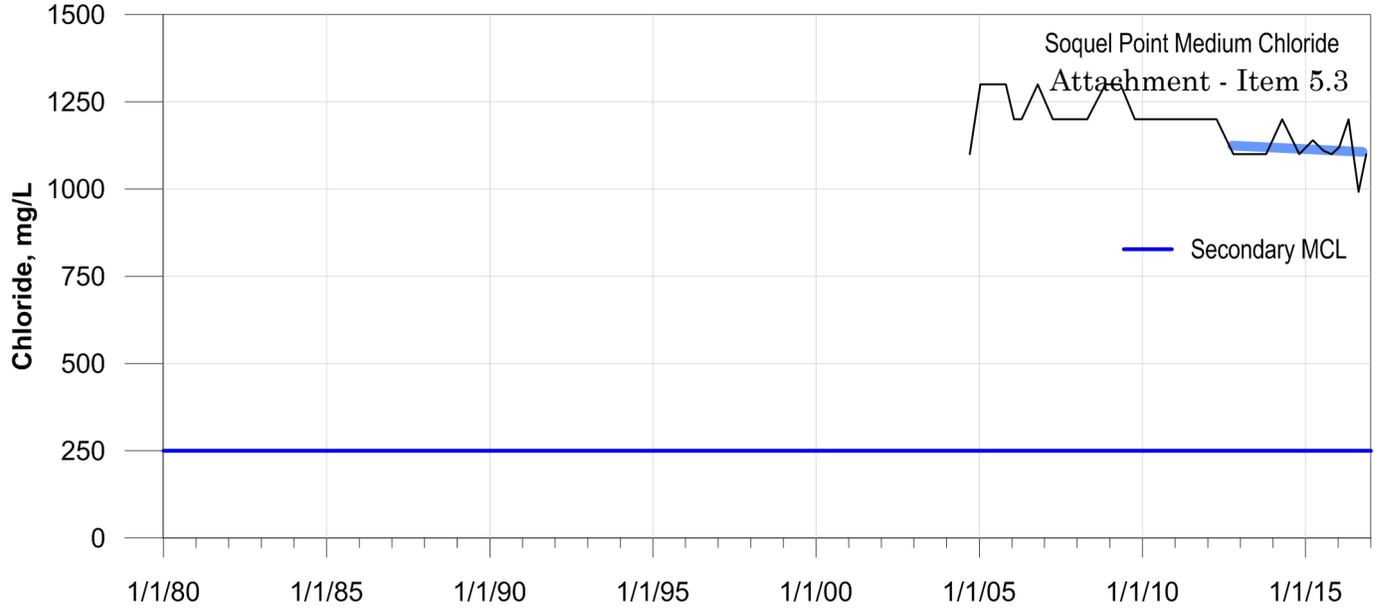
HydroMetrics WRI, 2016, *Cross-Sectional Model Modifications for Evaluation of Protective Groundwater Elevations to Prevent Seawater Intrusion*, January 11.

Attachment: Chemographs and Hydrographs for Coastal Monitoring Wells

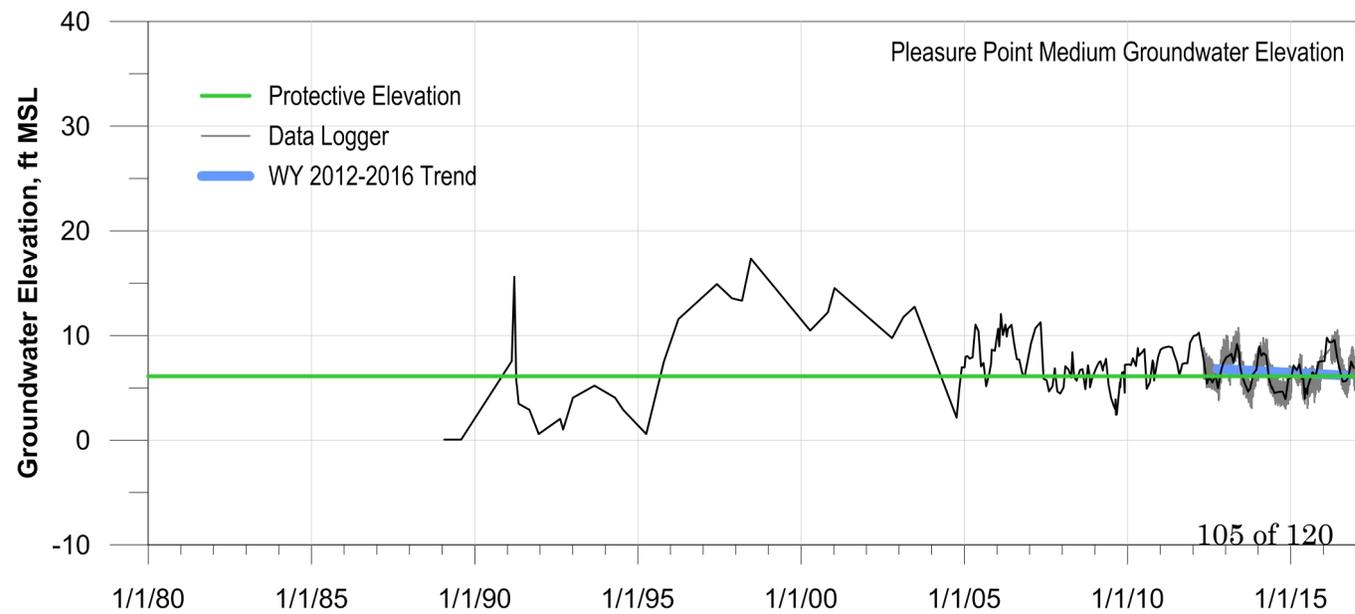
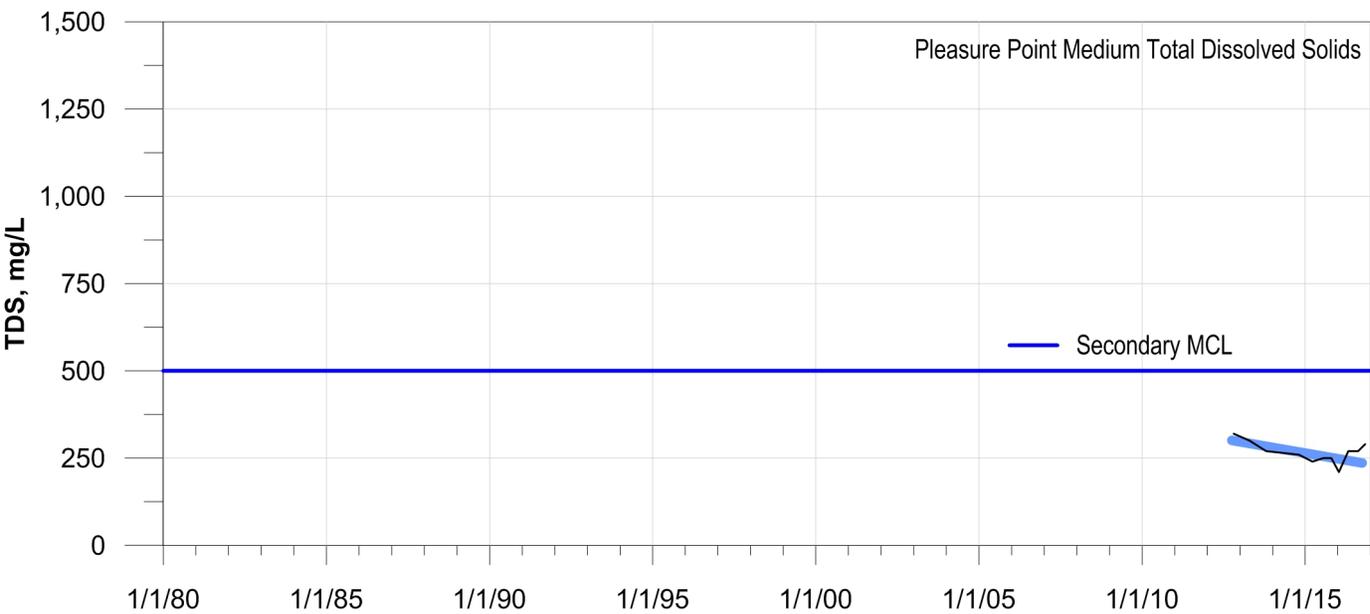
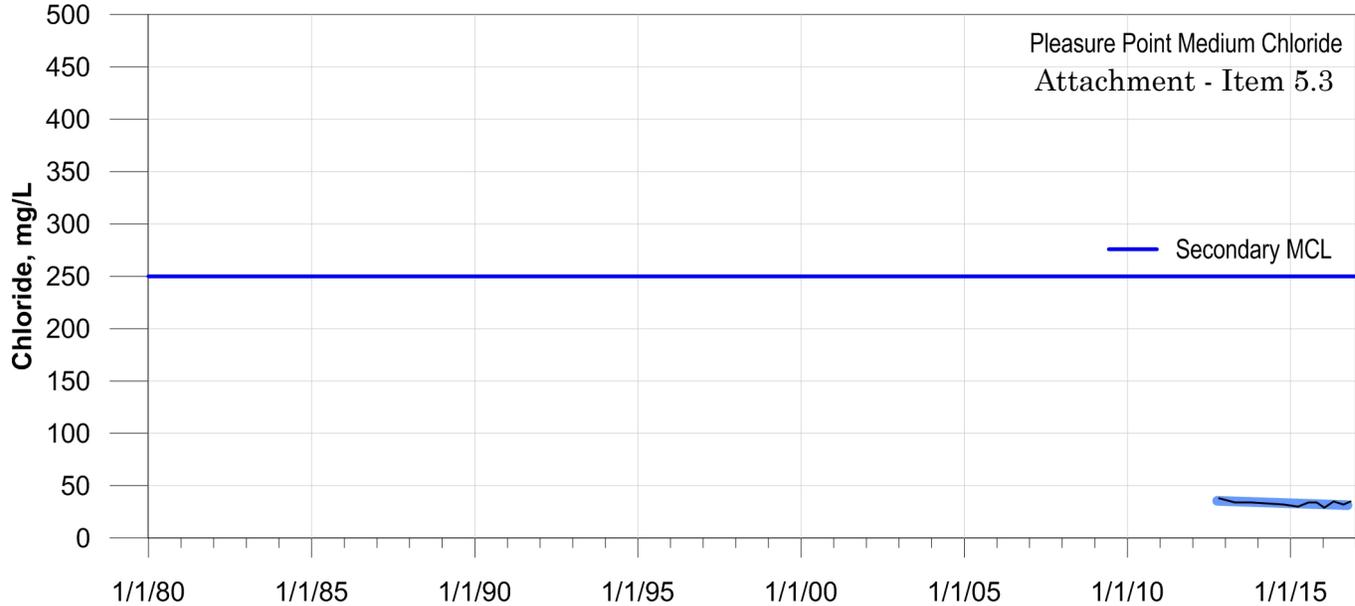


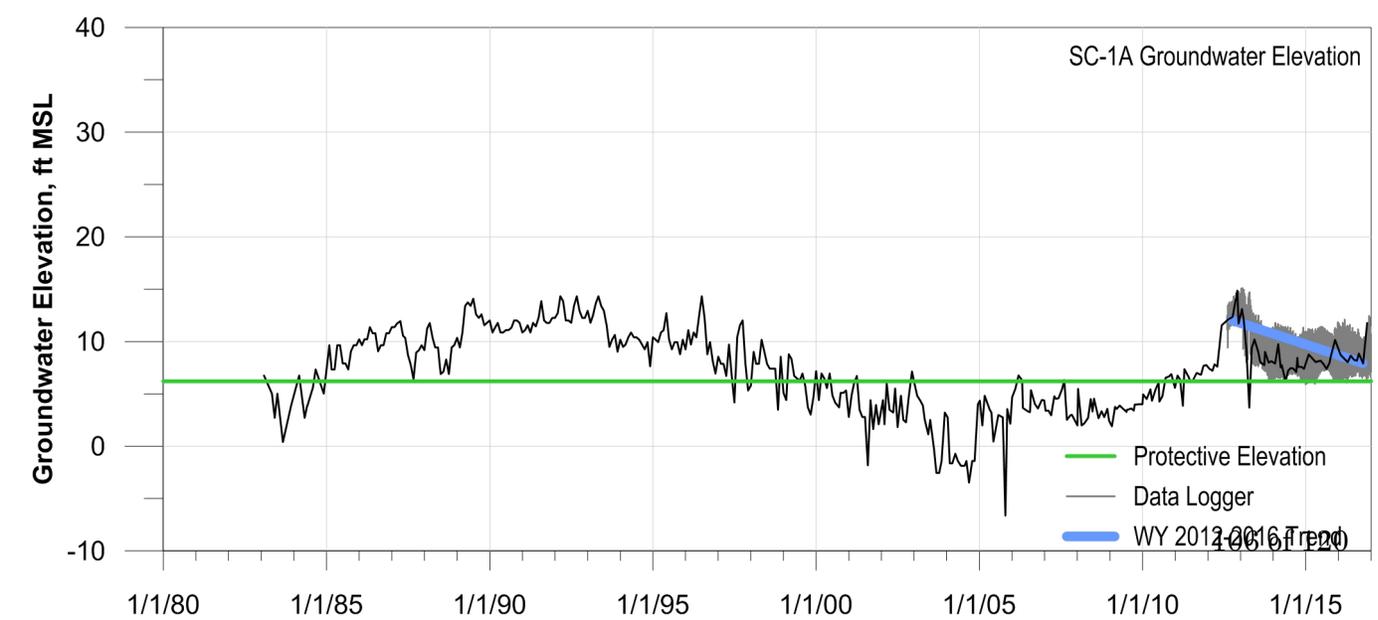
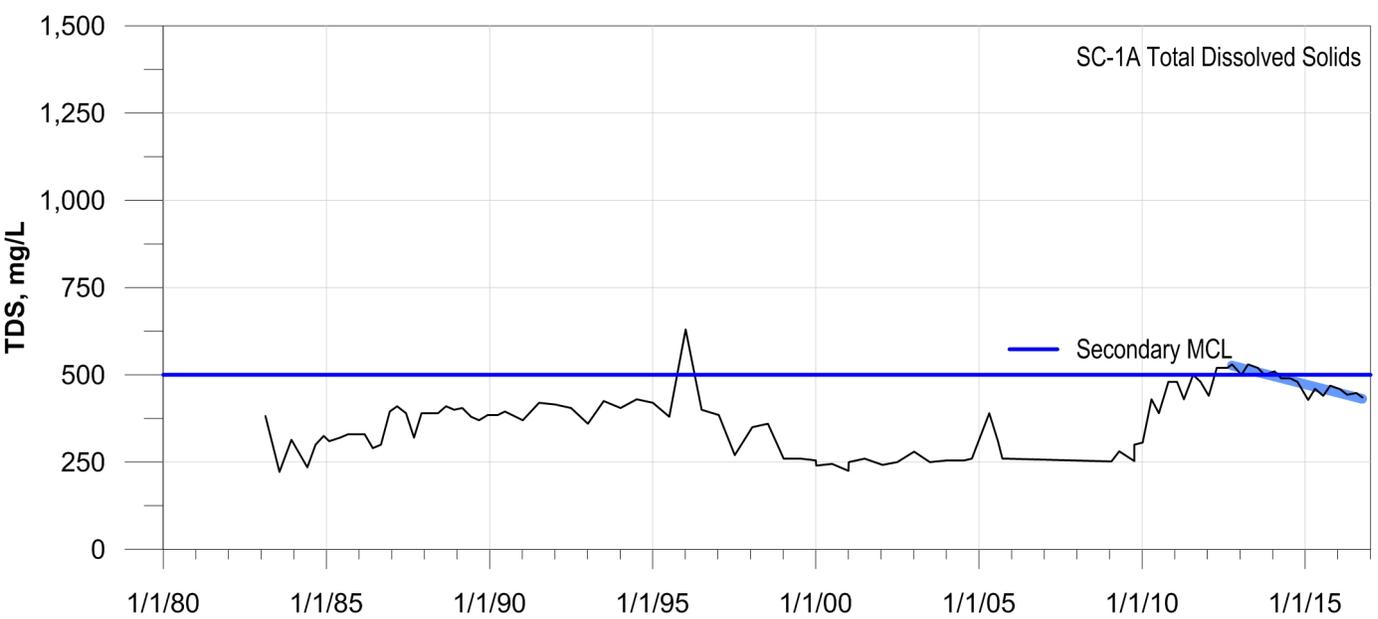
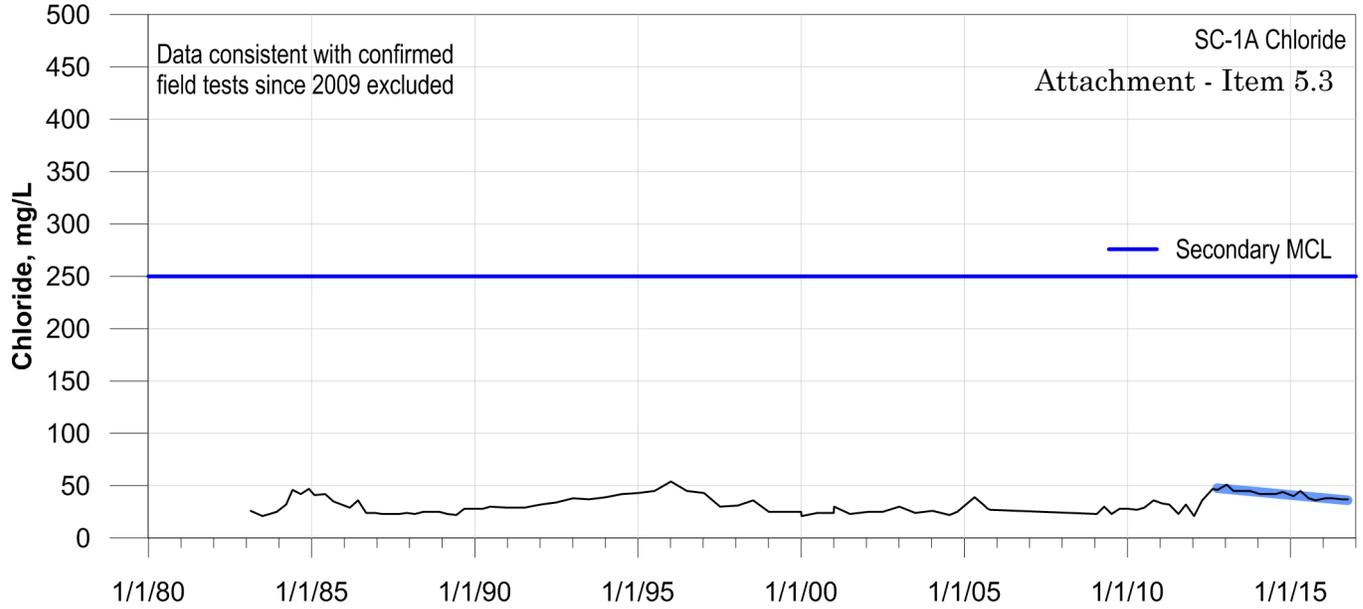
Figure 1. Locations of Coastal Monitoring Wells where Protective Groundwater Elevations Have Been Estimated





Pleasure Point Medium Chloride  
Attachment - Item 5.3

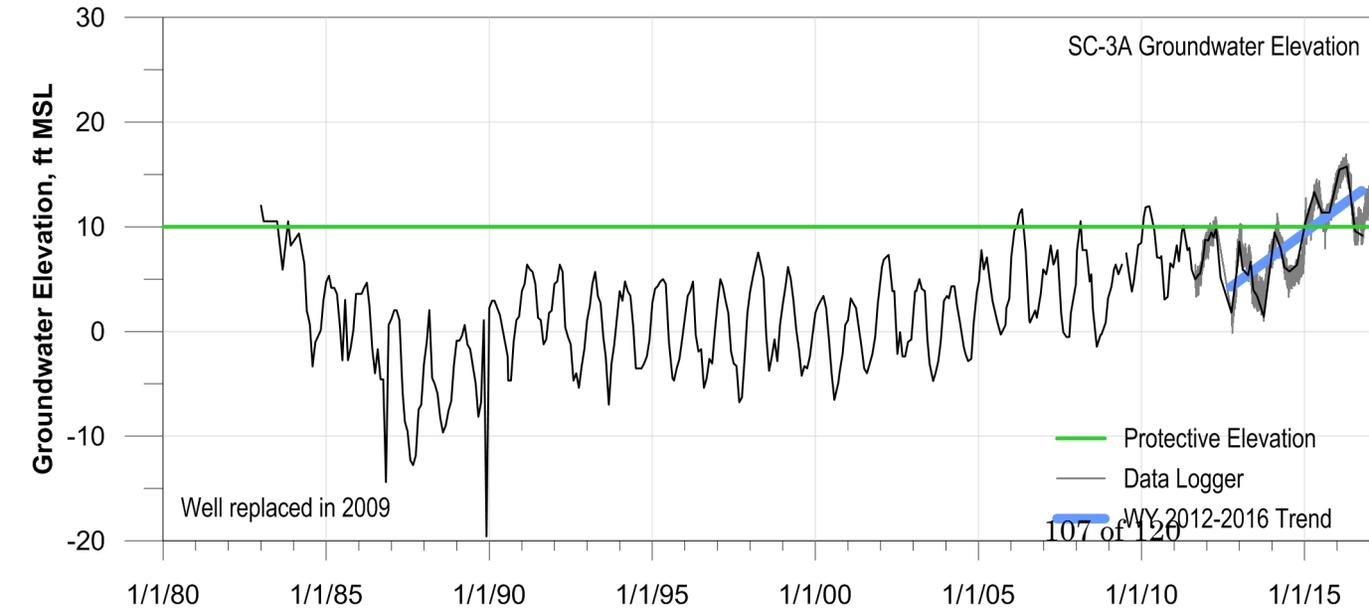
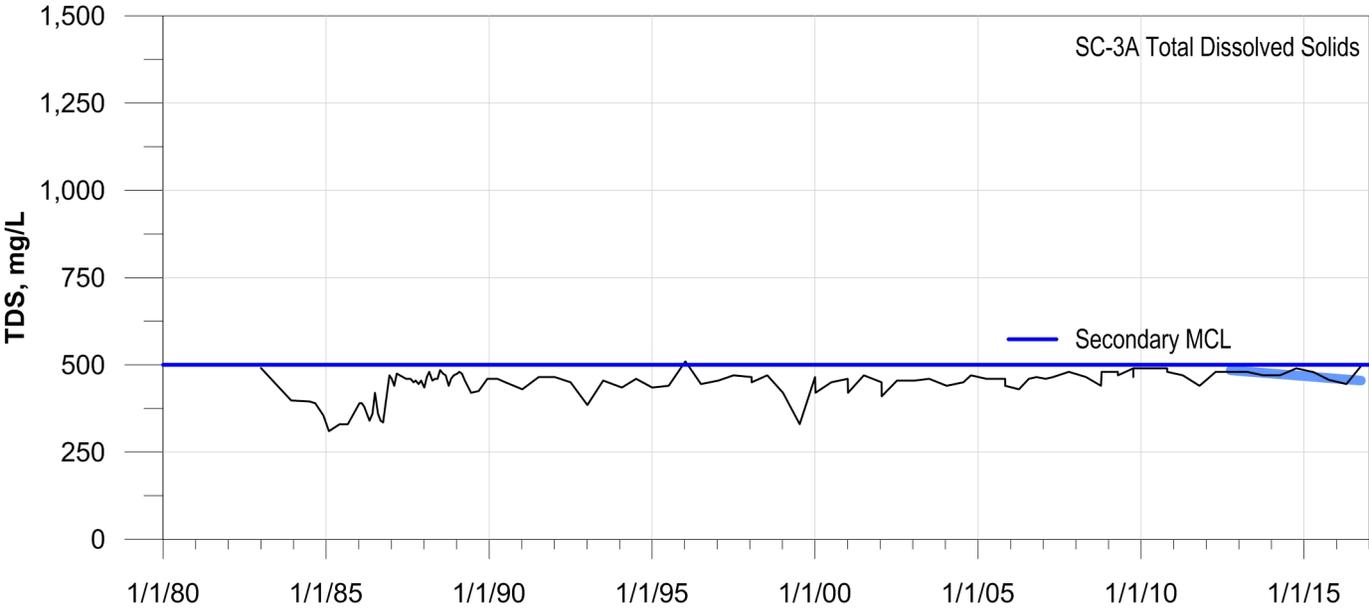
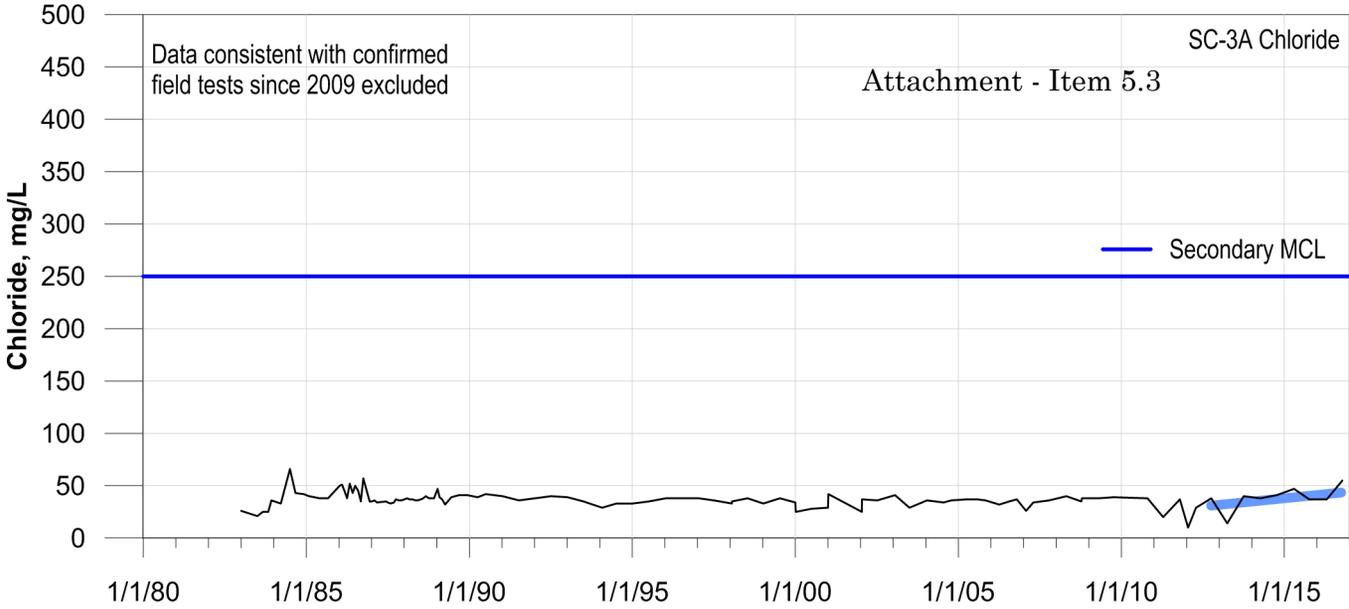




Data consistent with confirmed field tests since 2009 excluded

### Attachment - Item 5.3

SC-3A Chloride

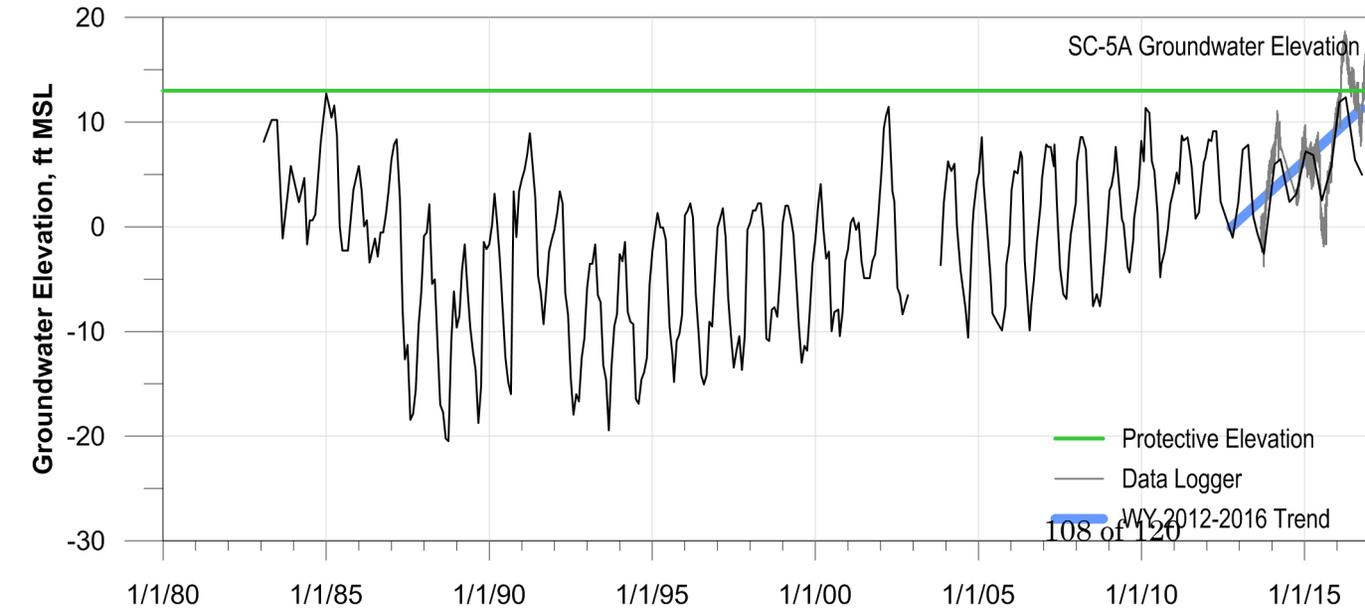
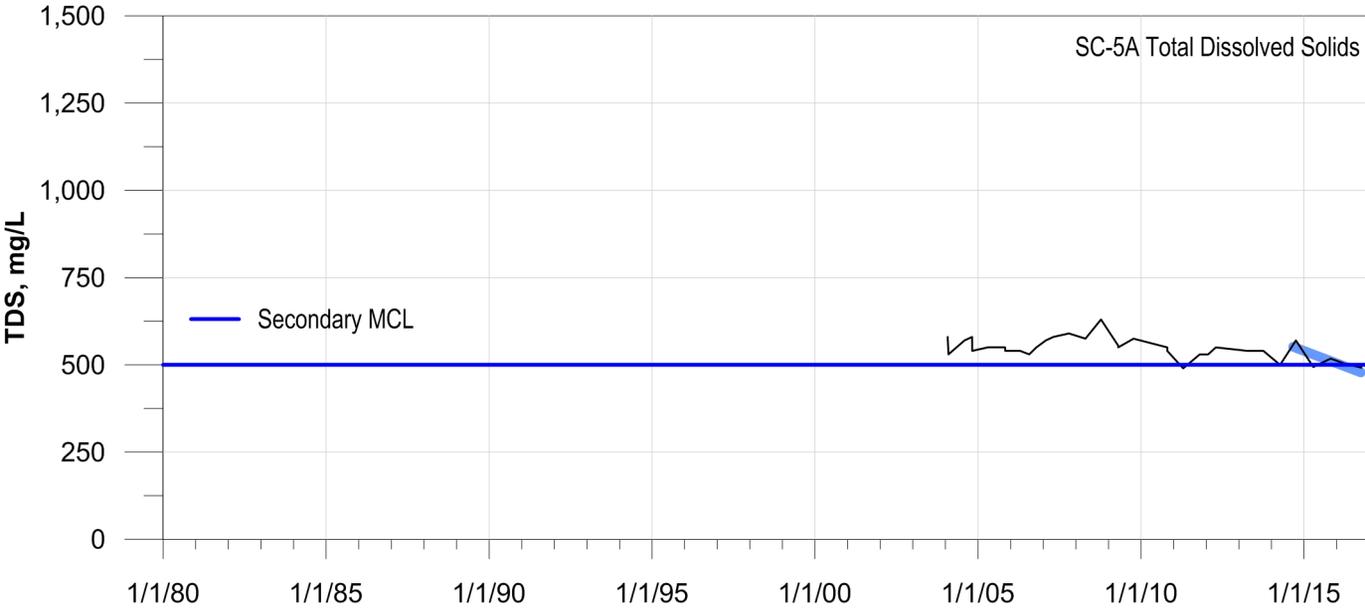
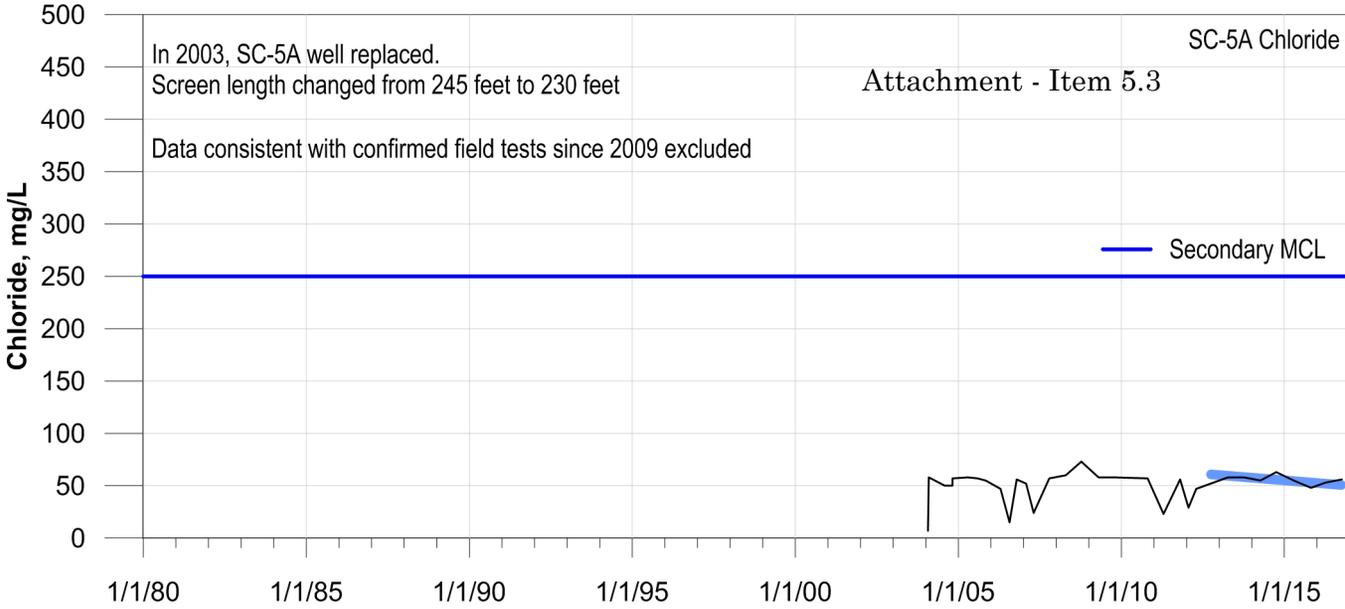


In 2003, SC-5A well replaced.  
Screen length changed from 245 feet to 230 feet

Attachment - Item 5.3

SC-5A Chloride

Data consistent with confirmed field tests since 2009 excluded

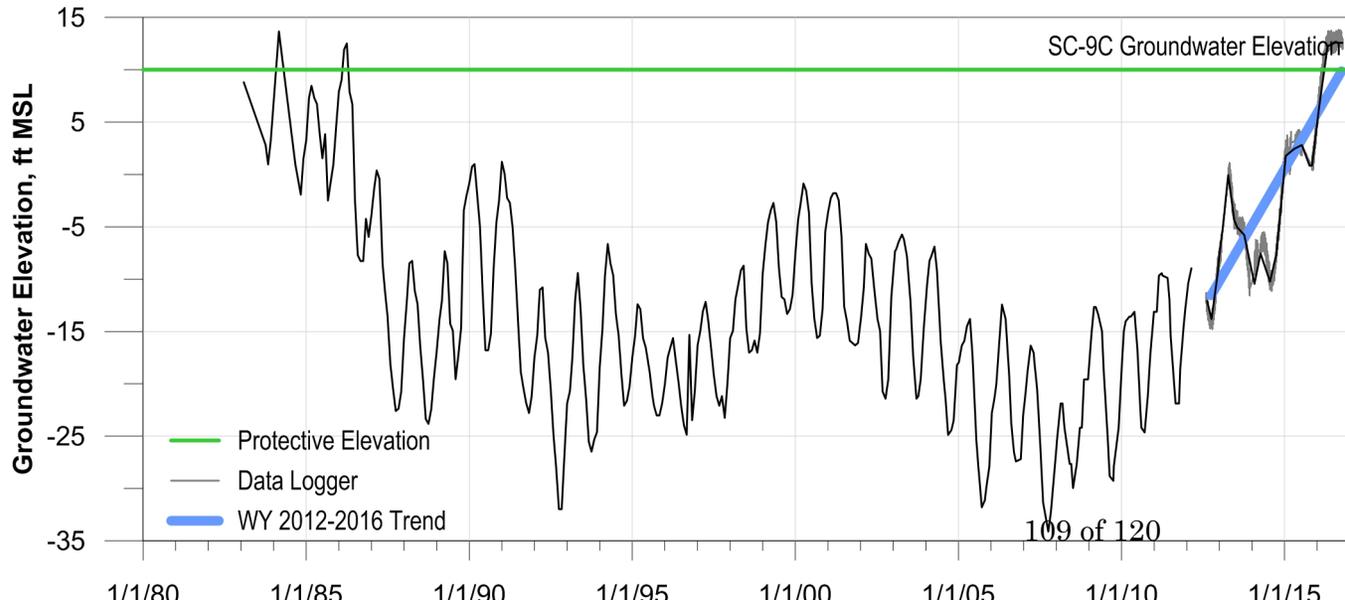
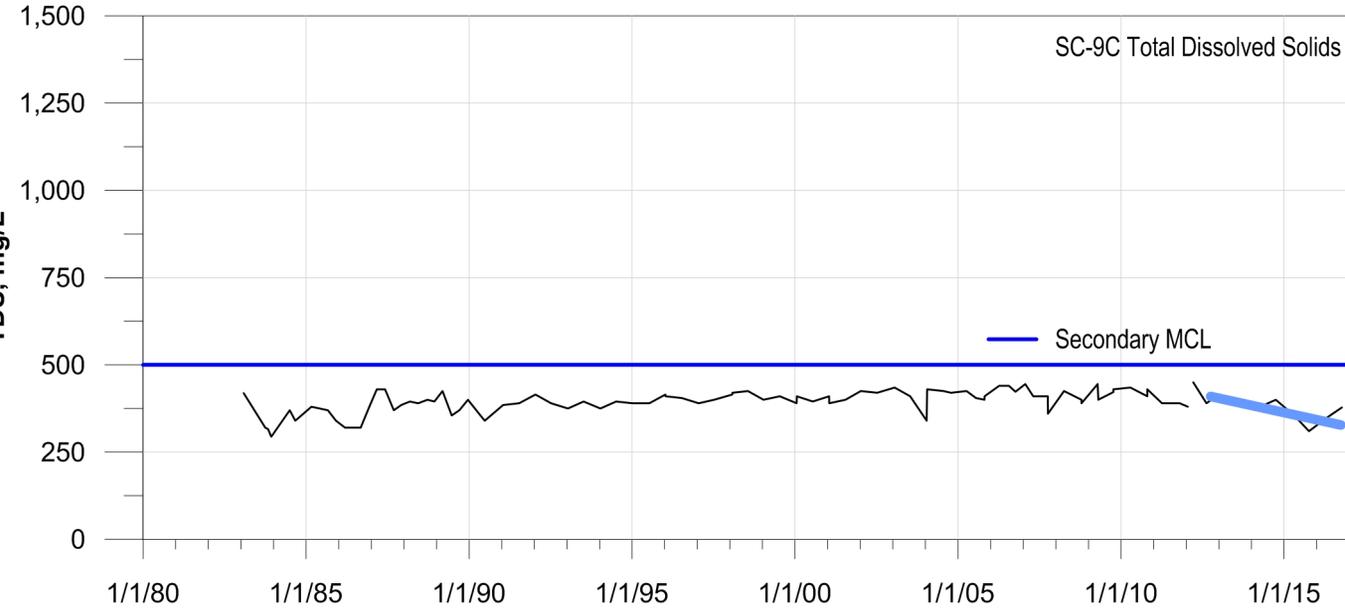
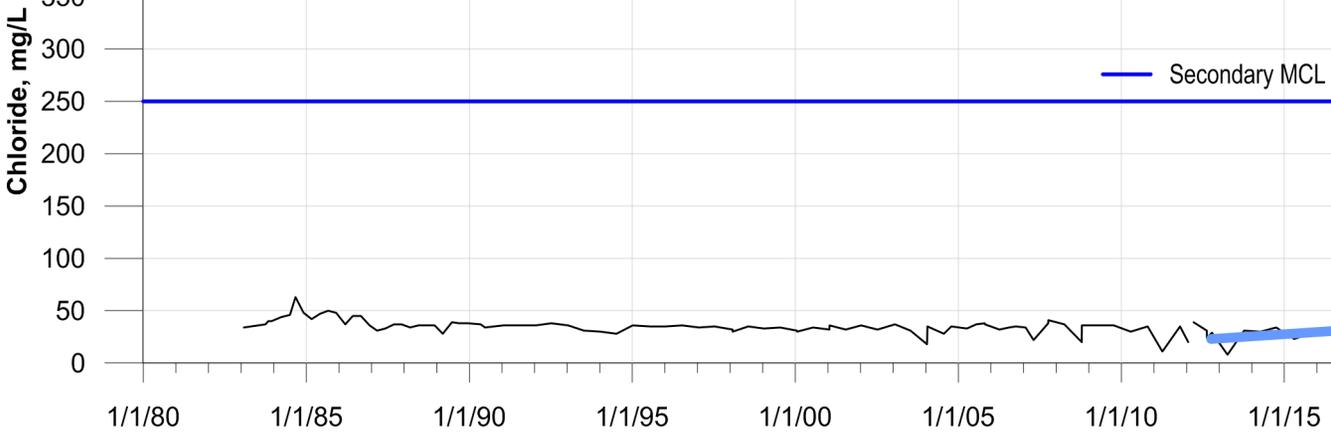


SC-9C replaced in 2012

SC-9C Chloride

Attachment - Item 5.3

Data consistent with confirmed field tests since 2009 excluded



Data consistent with confirmed field tests since 2009 excluded

SC-8D Chloride

Attachment - Item 5.3

Well replaced in 1995

Chloride, mg/L

Secondary MCL

1/1/80 1/1/85 1/1/90 1/1/95 1/1/00 1/1/05 1/1/10 1/1/15

TDS, mg/L

SC-8D Total Dissolved Solids

Secondary MCL

1/1/80 1/1/85 1/1/90 1/1/95 1/1/00 1/1/05 1/1/10 1/1/15

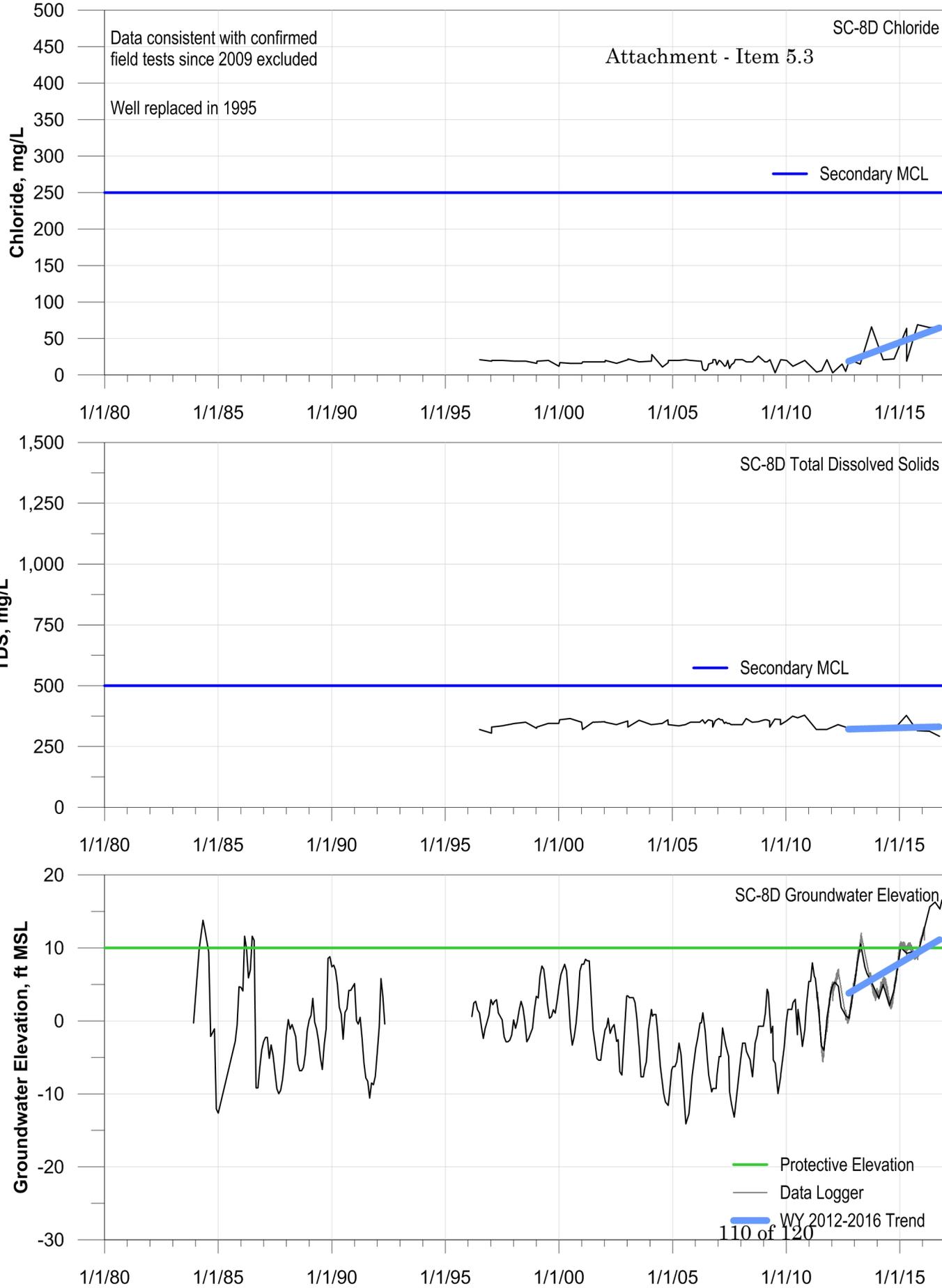
Groundwater Elevation, ft MSL

SC-8D Groundwater Elevation

Protective Elevation

Data Logger

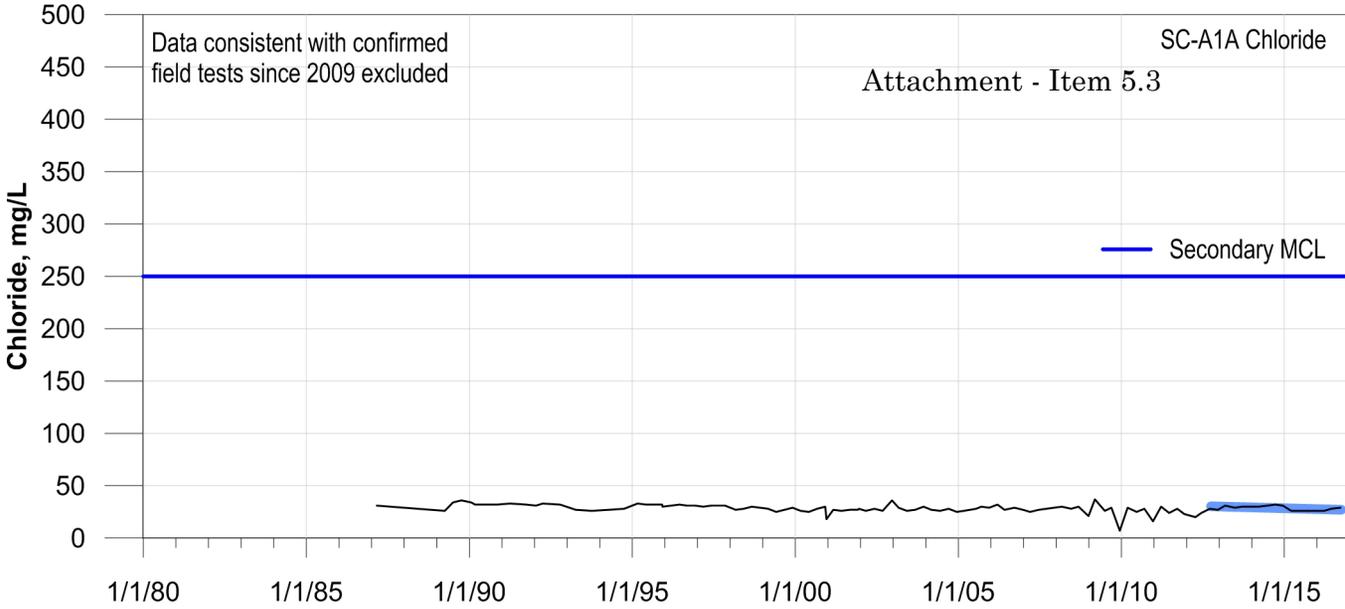
WY 2012-2016 Trend



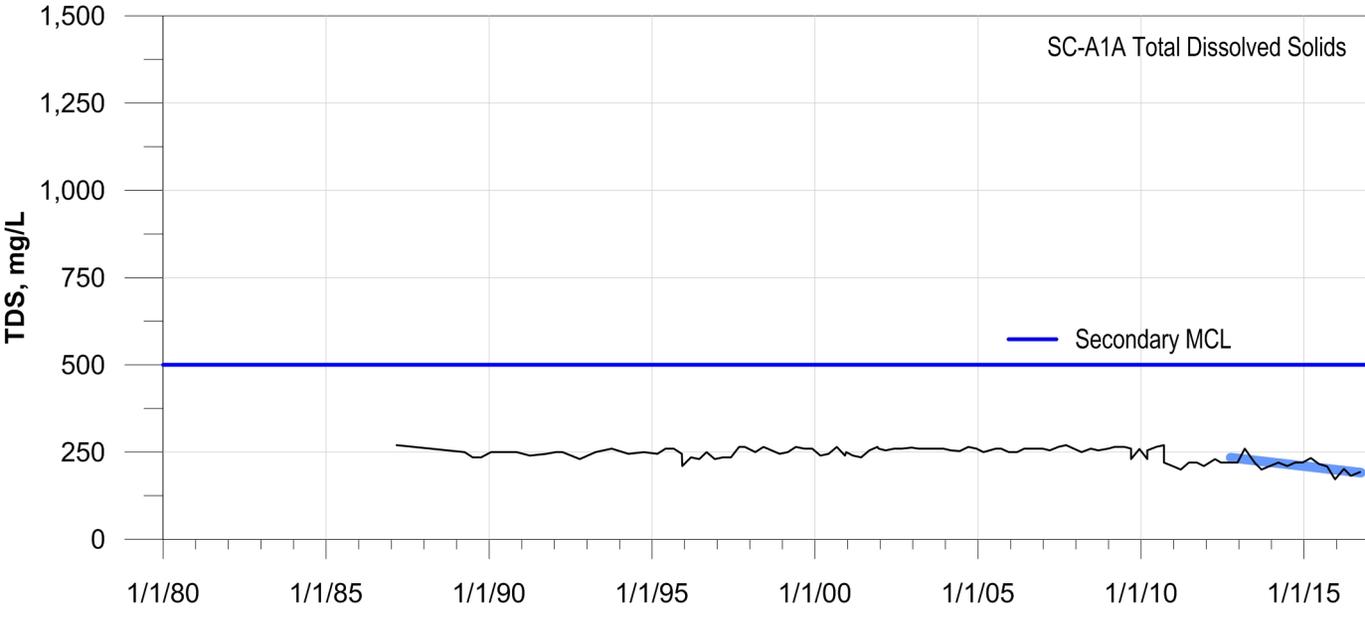
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### Attachment - Item 5.3

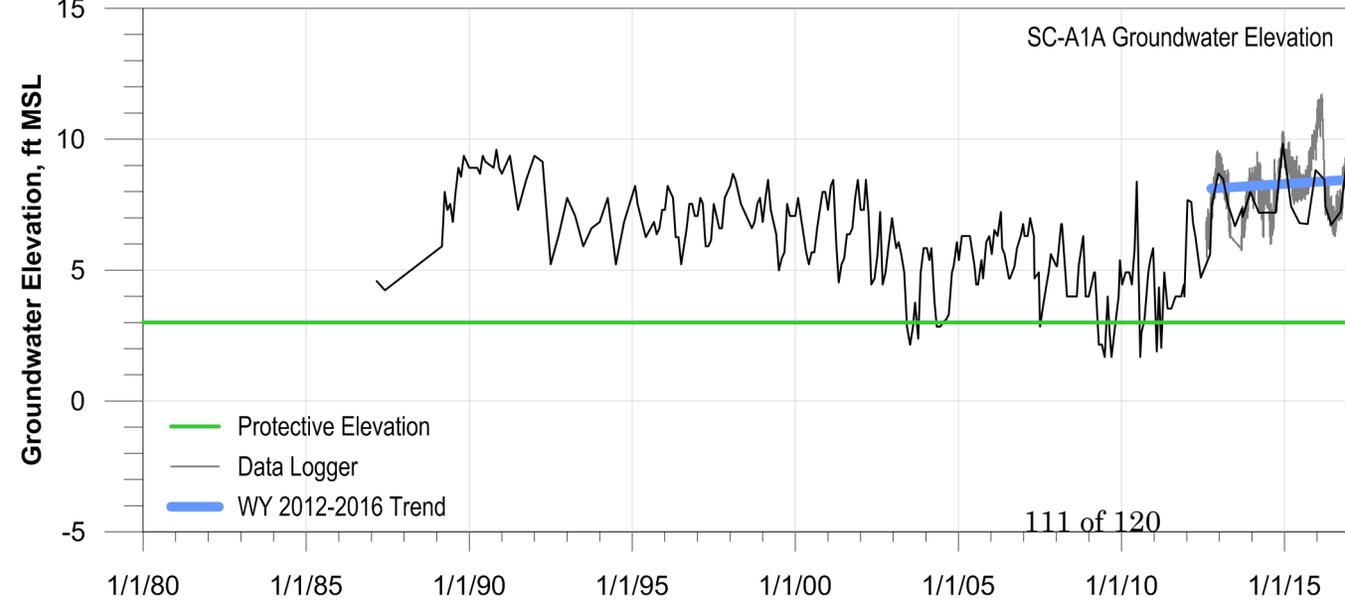
SC-A1A Chloride



SC-A1A Total Dissolved Solids



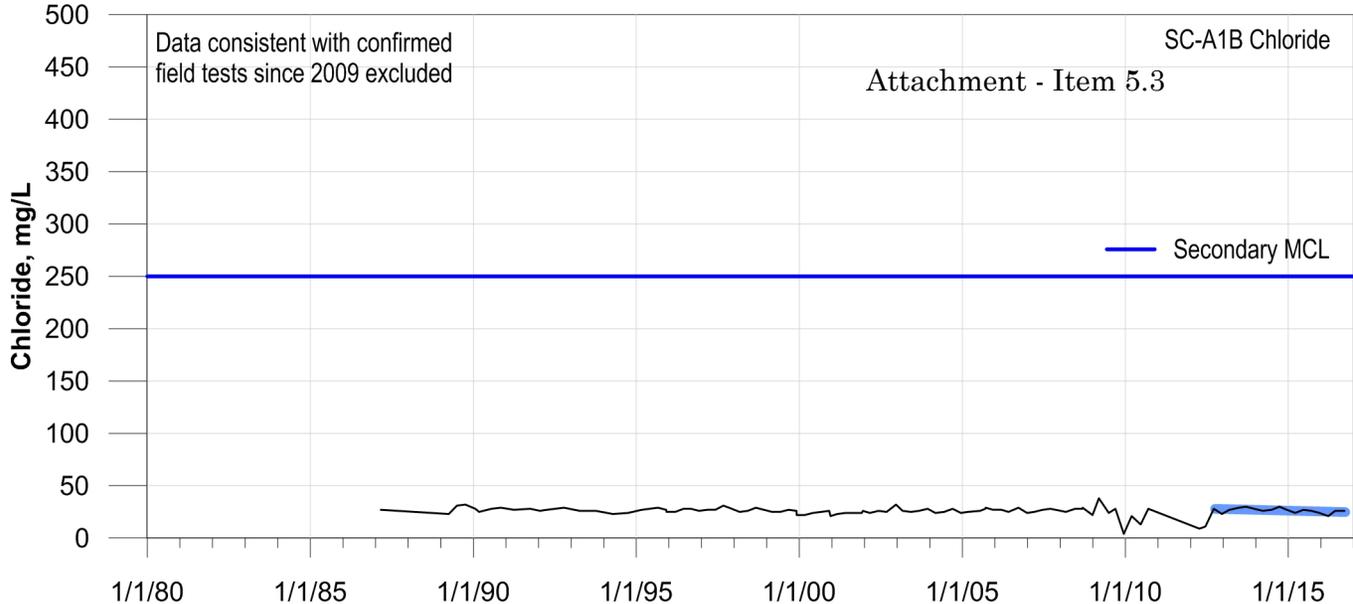
SC-A1A Groundwater Elevation



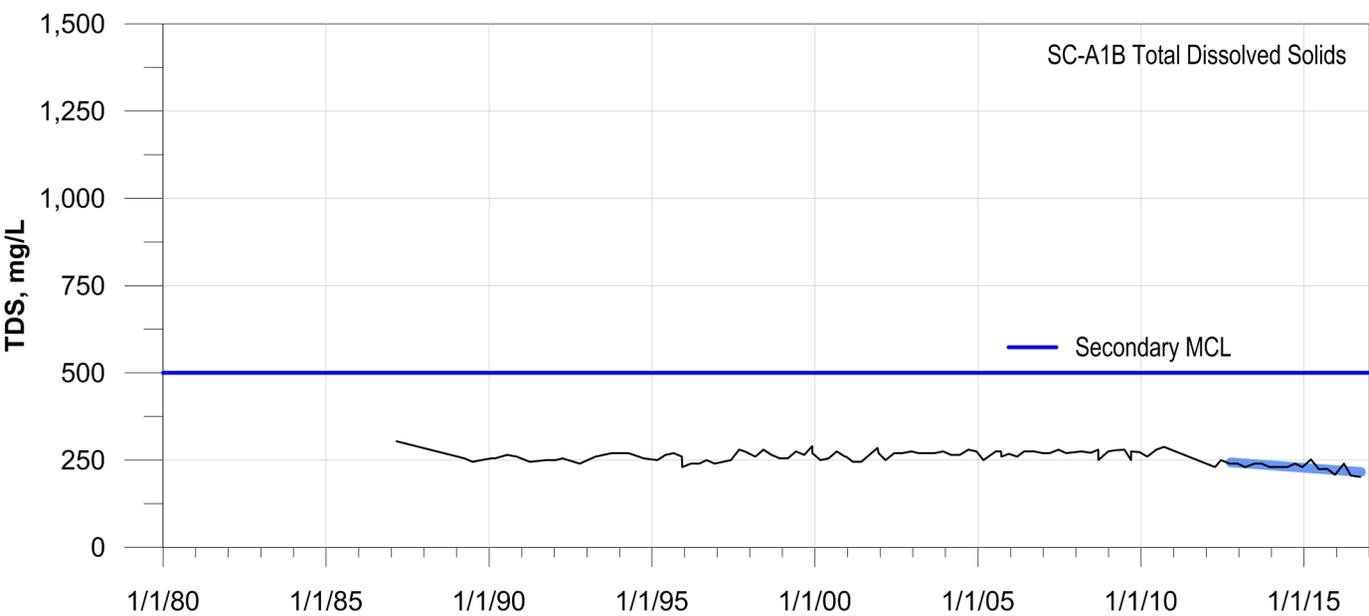
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### Attachment - Item 5.3

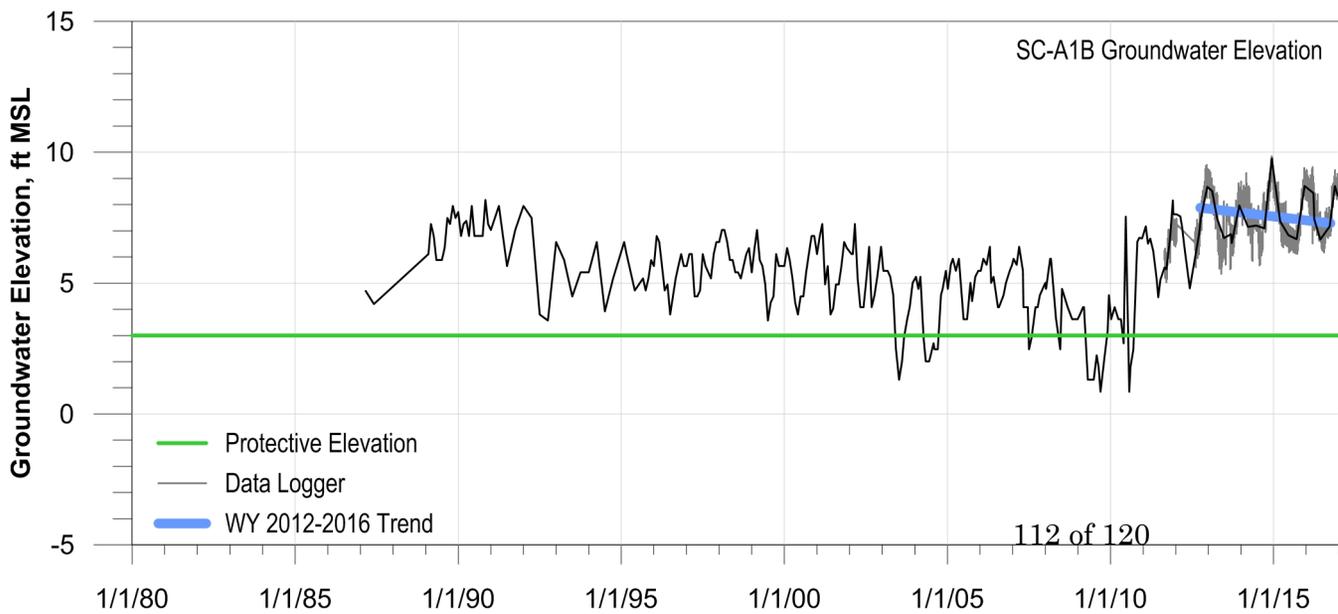
SC-A1B Chloride

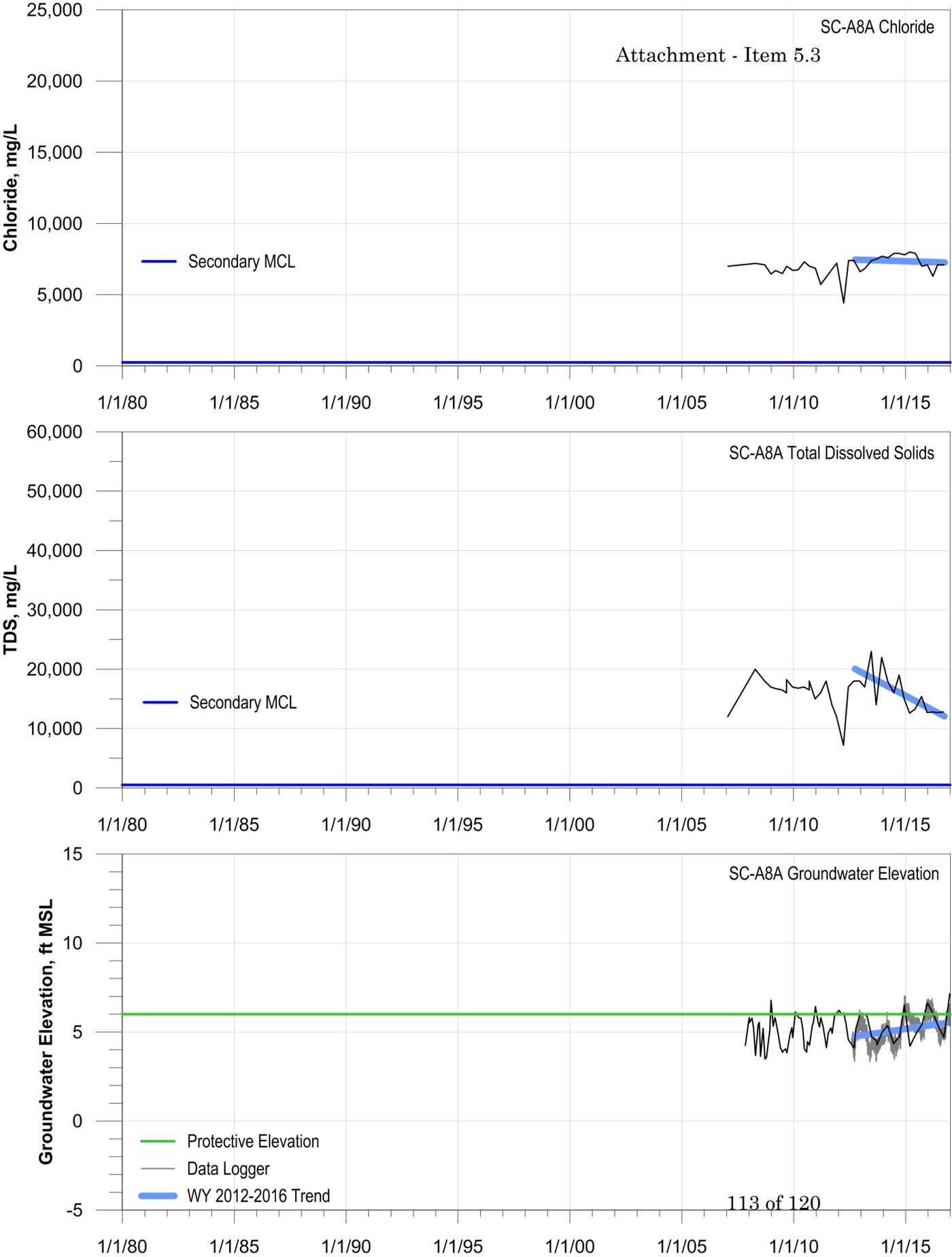


SC-A1B Total Dissolved Solids



SC-A1B Groundwater Elevation

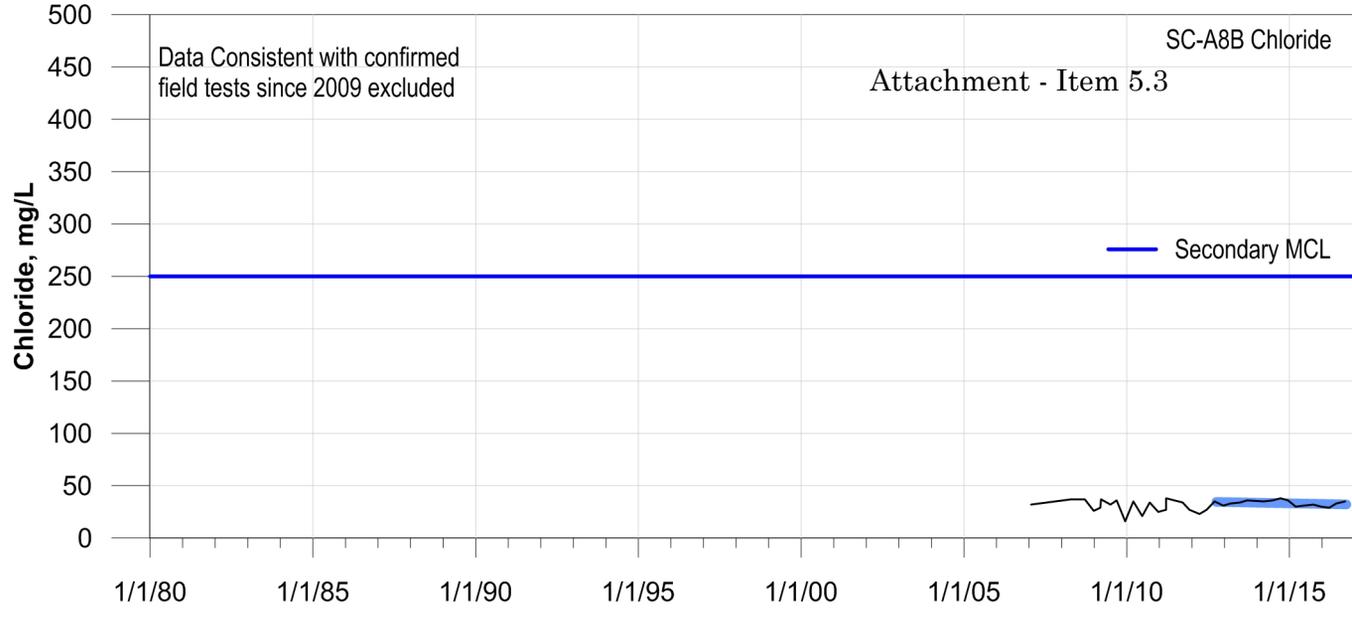




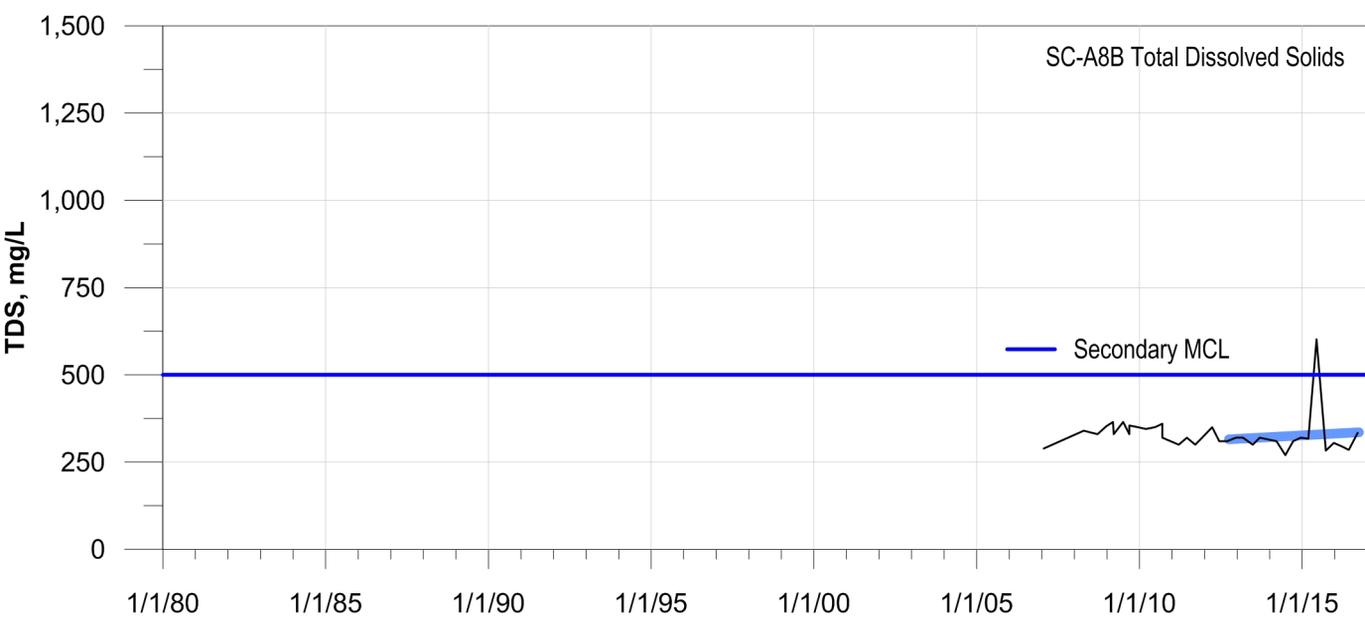
Data Consistent with confirmed field tests since 2009 excluded

### Attachment - Item 5.3

SC-A8B Chloride



SC-A8B Total Dissolved Solids



SC-A8B Groundwater Elevation

