MONTGOMERY & ASSOCIATES
Water Resource Consultants

www.elmontgomery.com
1814 Franklin Street, Ste. 501
Oakland, CA 94612
510.903.0458

TECHNICAL MEMORANDUM

DATE: May 9, 2019 **PROJECT #**: 9000.03

TO: Ron Duncan, Soquel Creek Water District on behalf of the Santa Cruz Mid-County Groundwater Agency

CC: Ralph Bracamonte, Central Water District
Darcy Pruitt, Santa Cruz Mid-County Groundwater Agency
John Ricker, Santa Cruz County Environmental Health
Isidro Rivera, City of Santa Cruz Water Department

FROM: Cameron Tana and Nick Byler

PROJECT: Santa Cruz Mid-County Basin Groundwater Monitoring

SUBJECT: Update through Water Year 2018

Introduction

This technical memorandum (memo) is the semi-annual groundwater monitoring report for the Santa Cruz Mid-County Groundwater Basin (Basin) with updates through Water Year 2018 on the attached groundwater level and salt concentration plots for the City of Santa Cruz (City) and Soquel Creek Water District's (SqCWD) coastal monitoring wells where target and protective elevations have been defined. These wells, shown on **Figure 1**, include three City wells in the Purisima area (Moran Lake Medium, Soquel Point Medium, and Pleasure Point Medium), five SqCWD wells in the Purisima area (SC-1A, SC-3A, SC-5A, SC-9C and SC-8D) and five SqCWD well clusters in the Aromas area (SC-A1A and B, SC-A8A and B, SC-A2A and B, SC-A3A and B, and SC-A4A and B). These wells are the key wells for assessing risk of seawater intrusion, and the status of recovery in the Basin. Protective elevations[1] estimated to protect productive aquifer units from seawater

[1] *Target elevations for non-critically dry years for the City's wells and SC-1A are listed in the cooperative monitoring/adaptive groundwater management agreement between the City and SqCWD (2015). They are based on the generalized and conservative Ghyben-Herzberg relationship as seaward cross-sectional models have not been developed for the City wells. The target elevations for non-critically dry years represent the long-term recovery goals for that part of the basin. Protective elevations for the other SqCWD wells representing long-term recovery goals are based on seaward cross-sectional models. In the remainder of this report, protective elevations refer to both target elevations and*

intrusion and secondary drinking water standards (MCLs) for chloride and total dissolved solids (TDS) are shown on the plots.

Groundwater level data through September 2018 are evaluated, which includes manual groundwater level measurements taken at least quarterly as well as logger data. Chloride and TDS data are included through January 2019 in order to bracket conditions for Water Year 2018. At City wells and SC-1A, sampling for chloride and TDS is quarterly. For City wells and SC-1A, the last sampling event occurred in October 2018 for the City wells and January 2019 for SC-1A. Sampling at other SqCWD Purisima area monitoring wells occurs semi-annually. The last sampling event occurred in October 2018. Sampling at Aromas area wells occurs quarterly with the last sampling event occurring in December 2018.

Groundwater Level Logger Averages

Groundwater level loggers are installed in monitoring wells reported on in this memo. Loggers are set to record groundwater levels at least hourly. This memo includes calculations of annual averages at each well. Logger data are used for these calculations where available with manual measurements used to fill in logger data gaps. Using logger data to calculate averages better represents average conditions over the year than using averages of manual measurements during the year. Manual measurement data can be skewed by the timing of the measurement especially in coastal wells that show tidal variation.

The annual averages are compared with protective groundwater elevations. Protective elevations are calculated as the long-term groundwater levels for protecting the productive aquifers of the basin from seawater intrusion. Therefore, a full year average is appropriate for comparison to protective elevations in evaluating Basin recovery. **Table 1** shows the calculated averages for coastal wells. Only the results from the A or B screen with lower annual averages are shown for the Aromas wells.

As discussed in the biennial report for Water Years 2015-2016 (HydroMetrics WRI, 2017), 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.

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protective elevations. Target elevations and protective elevations have been proposed as groundwater level proxies for seawater intrusion minimum thresholds in the Groundwater Sustainability Plan.

SqCWD based its protective elevations on groundwater levels that protect against seawater intrusion in at least 70 percent of the runs. Although protective elevations have been proposed as groundwater level proxies for seawater intrusion minimum thresholds in the Groundwater Sustainability Plan (GSP), **Table 1** shows the percentage of the runs that protect against seawater intrusion based on available modeling for the observed yearly average for groundwater levels presented below to provide a more detailed picture of the current level of seawater intrusion risk.

Table 1. Groundwater Level Averages Calculated from Logger Data at Coastal Monitoring Wells

Well	Data Through	365 Day Avg (ft msl)	Protective Elevation (ft msl)	Percent Runs Protective
Moran Lake Medium	9/30/2018	6.0	5.0	>GH[2]
Soquel Point Medium	9/30/2018	5.4	6.0	<GH
Pleasure Point Medium	9/30/2018	8.6	6.1	>GH
SC-1A	9/30/2018	10.2	6.2 (4[3])	>99
SC-3A	9/30/2018	10.6	10	>70
SC-5A	9/30/2018	9.5	13	<50
SC-9C	9/30/2018	9.5	10	<70
SC-8D	10/10/2018[4]	13.3	10	>99
SC-A1B	9/30/2018	7.9	3	>99
SC-A8A	9/30/2018	4.9	6	<50
SC-A2A	9/30/2018	6.6	3	>99
SC-A3A	9/30/2018	2.8	3	<60
SC-A4A[5]	9/30/2018	1.4	3	<50

Coastal monitoring wells in the Purisima with yearly averages through September 30, 2018 above the protective elevations set by the City and SqCWD are Moran Lake, Pleasure Point, SC-1A, SC-3A, and SC-8D. The coastal monitoring wells in the Aromas with yearly averages through September 30, 2018 above the protective elevations set by

[2] *Protective elevations at City of Santa Cruz wells based on Ghyben-Herzberg (GH) relationship as opposed to 100 sets of cross-sectional model runs so percentage runs protective are not calculated. Instead, it is noted whether 365 day average is greater or less than Ghyben-Herzberg calculation.*

[3] *The protective elevation based on 70th percentile of cross-sectional models at SC-1A is 4 feet msl.*

[4] *Date of last logger recording February 2, 2017 so based on quarterly manual measurements*

[5] *SC-A4A is in the Pajaro Valley Subbasin, not the Santa Cruz Mid-County Basin.*

SqCWD are SC-A1 and SC-A2. However, annual averages through September 30, 2018 are below protective elevations at Soquel Point, SC-5A, SC-9C, SC-A8A, and SC-A3A within the Basin so we do not consider the Basin to be fully recovered and thus the Basin continues to be in overdraft.

Groundwater Level Trends

After multiple years of coastal groundwater level increases throughout the Basin that coincides with pumping reductions in the Basin as well as SqCWD's declaration of a groundwater emergency (green shading on hydrographs), groundwater levels generally declined in Water Year 2018 compared to Water Year 2017.

- At the City's coastal monitoring wells and SqCWD's SC-1A in the western Purisima area, average groundwater levels in Water Year 2018 were up to 0.4 feet lower than Water Year 2017.
- Further east, SqCWD's monitoring wells SC-3A and SC-5A show a decrease of approximately 2 feet in average groundwater levels for Water Year 2018 compared to Water Year 2017.
- In the central Purisima area, SqCWD's monitoring wells SC-9C and SC-8D show a decrease of 2-4 feet in average groundwater levels for Water Year 2018 compared to Water Year 2017. Groundwater levels dropped below protective elevations at SC-9C.
- In the Aromas area, SqCWD's monitoring wells SC-A1, SC-A2, and SC-A8 show a slight decrease of average groundwater levels for Water Year 2018 compared to Water Year 2017 with the largest decrease at SC-A2 of approximately 0.8 feet.
- In the Aromas area, SqCWD's monitoring wells SC-A3 and SC-A4 have stable groundwater levels over the last two years but both remain below protective elevations.

Groundwater Pumping

Overall, Basin groundwater levels had been recovering over multiple years through Water Year 2017 due to decreased groundwater production (**Figure 2**). In Water Year 2016, municipal pumping in the Basin was the lowest recorded since 1977. The decrease corresponds with increased public awareness about the importance of sustained water conservation through conservation and curtailment programs instituted by local water agencies and drought related actions by the state of California. Municipal pumping has increased since Water Year 2016 with municipal pumping in Water Year 2018 totaling an estimated 4,360acre-feet per year, an increase of 9% compared to Water Year 2017 and 11% compared to Water Year 2016.

Rainfall and Recharge

Figure 3 shows rainfall totals for the NOAA Cooperative station in Santa Cruz (station number 047916). Rainfall in Water Year 2018 at the Santa Cruz station was 19.6 inches, which is below the average annual rainfall of 29.4 inches. This is also considerably less than Water Year 2017 where rainfall was 51.1 inches. A relationship between rainfall at this station and deep recharge in the Basin area has been derived from the calibrated PRMS simulation of Water Years 1984-2009 (HydroMetrics WRI, 2011) based on a best fit of rainfall and simulated deep recharge (HydroMetrics WRI, 2013). Although estimated for a slightly different area than the Basin, the annual and biennial reports present these recharge estimates to evaluate changes to recharge over time.

Evaluations in the annual and biennial reports based on the historical record have concluded that the effect of annual changes in recharge are not observed in coastal groundwater levels. Therefore, we do not attribute the decline in coastal groundwater levels observed in Water Year 2018 to the lower rainfall and recharge that occurred in Water Year 2018.

Changes in long-term recharge are more likely to affect Basin conditions than year to year changes. Accordingly, **Figure 3** shows how the long-term average annual recharge for the period since Water Year 1984 has been updated based on annual rainfall at the Santa Cruz station for each year since Water Year 2009. For example, the value plotted for Water Year 2018 of approximately 10,500 acre-feet per year represents an updated estimate for average between Water Years 1984 and 2018. This updated estimate is slightly below the average of 10,800 acre-feet per year for Water Years 1984-2009 derived from the PRMS simulation.

Salt Concentration Trends

When groundwater quality data through Water Year 2018 are evaluated, trends of salt concentrations indicating seawater intrusion have not changed substantially from the descriptions in the biennial report for Water Years 2015-2016 with one exception.

- TDS and chloride concentrations in one of the City's monitoring wells (Soquel Point Medium) indicate seawater intrusion in the westernmost Purisima area (Purisima A Unit). However, concentrations in this monitoring well show a decreasing trend. Concentrations in the Moran Lake Medium monitoring well indicate seawater intrusion in the past, but now has a decreasing trend, which suggests seawater intrusion is no longer occurring in this area of the Purisima A Unit

- TDS and chloride concentrations do not indicate seawater intrusion at the City's Pleasure Point Medium monitoring well and SqCWD's monitoring wells SC-1A, SC-3A, and SC-5A in the Purisima A Unit in the western Purisima area. Concentrations at these wells are stable or decreasing.

- TDS and chloride concentrations do not indicate seawater intrusion at SqCWD's monitoring wells SC-9C and SC-8D in the central Purisima area (Purisima BC and DEF-units). Concentrations at these wells are stable or decreasing.

- TDS and chloride concentrations continue to indicate seawater intrusion in deep monitoring wells SC-A8A, SC-A2A, SC-A3A, and SC-A4A installed below the freshwater-saltwater interface in the Aromas area but concentrations are stable or decreasing.

- At Aromas area monitoring wells SC-A2B and SC-A3B installed above the saltwater interface, TDS and chloride concentrations now indicate seawater intrusion as the saltwater interface has since risen into portions of the Purisima F-unit and Aromas Red Sands screened by these wells. Concentrations at SC-A2B show an increasing trend over the last two years despite groundwater levels being above protective elevations. The December 2018 concentration of 470 mg/L exceeded the maximum chloride concentration for 2013-2017 at this well. As the maximum chloride concentration for 2013-2017 is currently proposed as the minimum threshold for intruded wells such as SC-A2B, it would be considered an undesirable result if any of the next three samples from the well also exceed the proposed minimum threshold. Concentrations at SC-A3B have been stable.

- At other Aromas area monitoring wells SC-A1A, SC-A1B, SC-A8B, and SC-A4B where TDS and chloride concentrations have not indicated seawater intrusion, concentrations are stable (Purisima DEF-unit, F-unit and Aromas Red Sands).

- Salt concentrations remain consistent relative to SkyTEM seawater intrusion results as described in a March 8, 2018 technical memorandum (HydroMetrics WRI, 2018).

Summary

In summary, groundwater levels declined in Water Year 2018 as a result of an increase in groundwater pumping after multiple years of groundwater level recovery. Groundwater levels are at protective elevations established by SqCWD and the City at a majority of coastal monitoring wells. However, groundwater levels dropped below protective elevations at one coastal monitoring well in Water Year 2018. Full groundwater level recovery will not be achieved until groundwater levels are at protective elevations at all coastal monitoring wells. To achieve long-term sustainability, groundwater levels will need to be maintained above protective elevations after recovery. Therefore, the basin continues to be in a state of overdraft.

Groundwater quality trends do not indicate new 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 with the exception of one well. At SC-A2B, an increasing trend has been observed over the last two years and the latest sample exceeded the proposed minimum threshold. If any of the following three samples exceed the proposed minimum threshold, that would be considered an undesired result based on the proposal for the GSP.

Attachment: City of Santa Cruz and Soquel Creek Water District coastal monitoring well hydrographs and chemographs.

References

HydroMetrics LLC, 2009, Groundwater levels to protect against seawater intrusion and store freshwater offshore, prepared for Soquel Creek Water District, January.

HydroMetrics WRI, 2011, Estimation of Deep Groundwater Recharge Using a Precipitation-Runoff Watershed Model, prepared for Soquel Creek Water District, Central Water District, and the City of Santa Cruz, August.

———, 2012, Revised Protective Groundwater Elevations and Outflows for Aromas Area and Updated Water Balance for Soquel-Aptos Groundwater Basin, letter to Laura Brown, Soquel Creek Water District, March 30.

———, 2013, Rainfall-Recharge Relationship Based on PRMS Model Results, Technical Memorandum to Taj Dufour, Soquel Creek Water District, from C. Tana and G. King, April 12.

———, 2017, Santa Cruz Mid-County Basin Groundwater Management Biennial Review and Report, Water Years 2015-2016, prepared for Santa Cruz Mid-County Groundwater Agency, July.

———, 2018, Management Implications of SkyTEM Seawater Intrusion Results, Technical Memorandum to Ron Duncan for Santa Cruz Mid-County Groundwater Agency, from C. Tana, March 8.

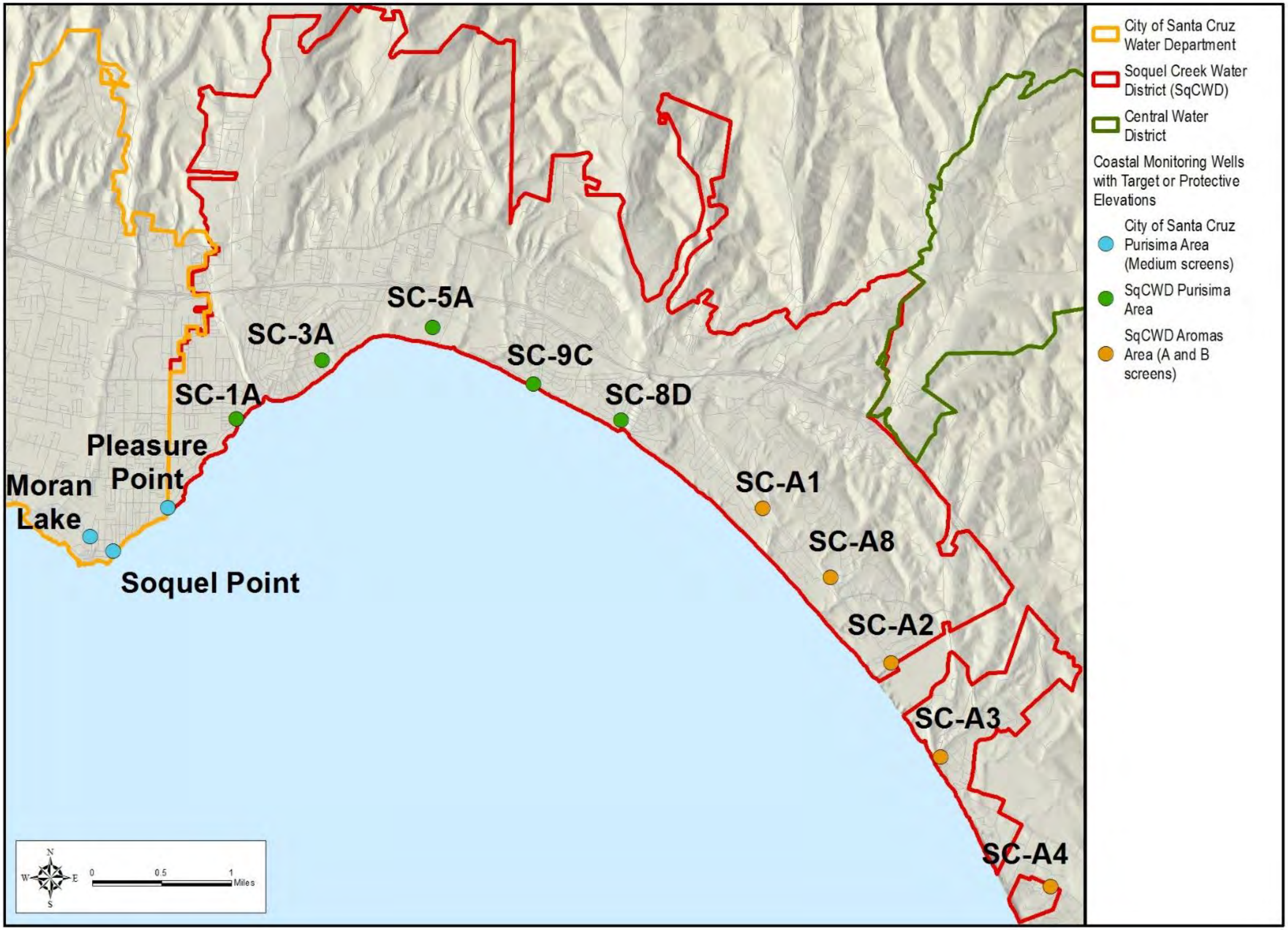

Figure 1. Locations of Coastal Monitoring Wells Where Target or Protective Groundwater Elevations Have Been Estimated

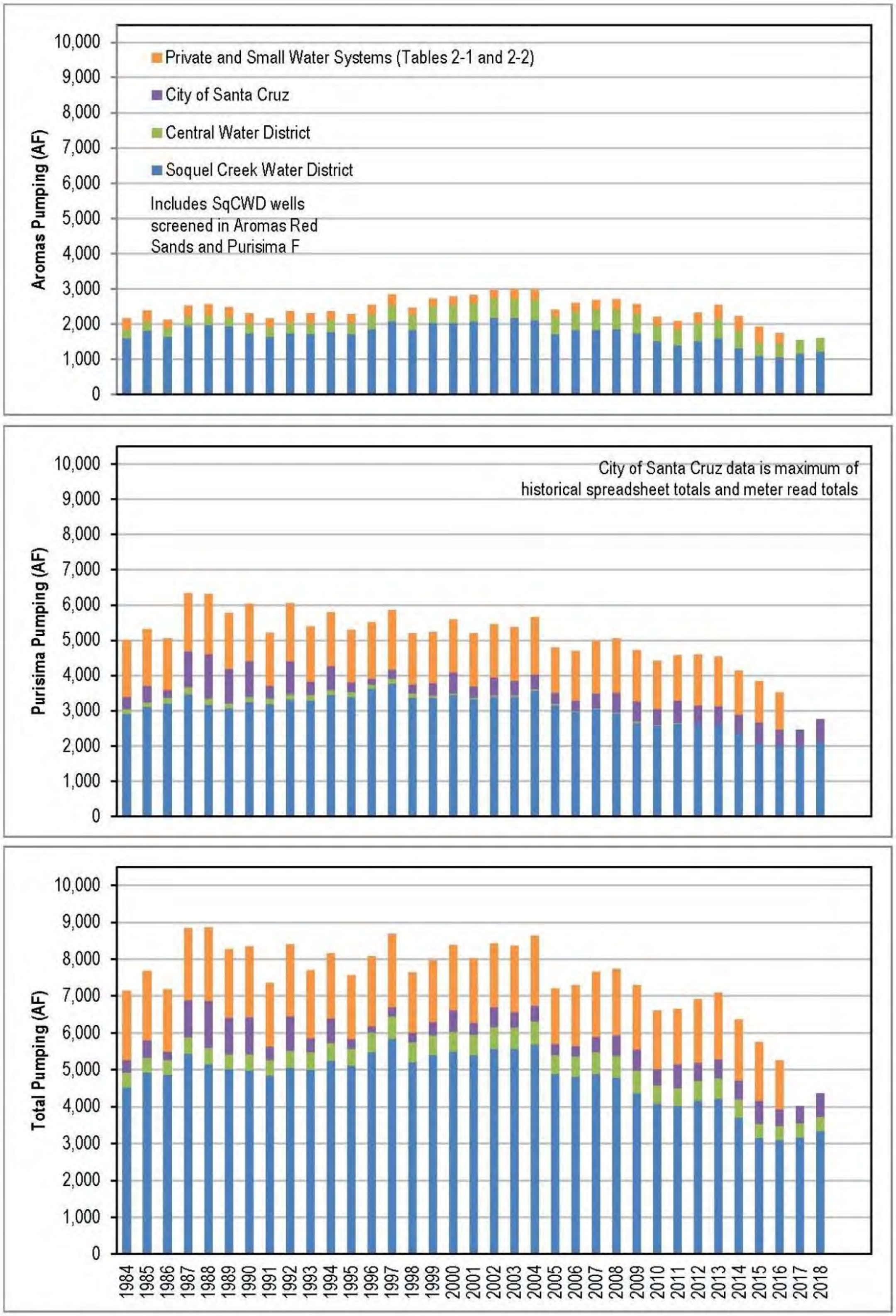

Figure 2. Santa Cruz Mid-County Basin Pumping by Water Year in Acre-Feet

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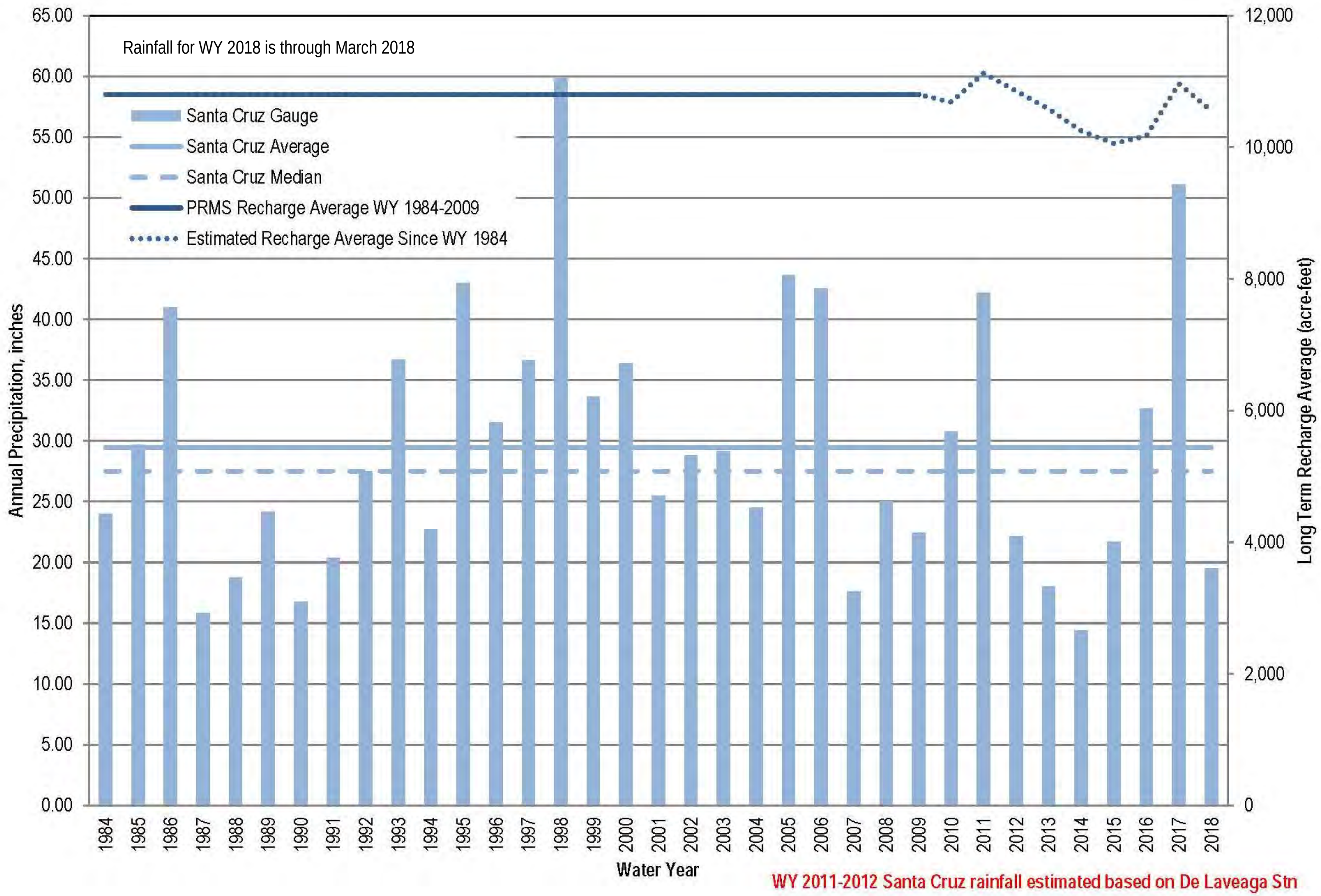
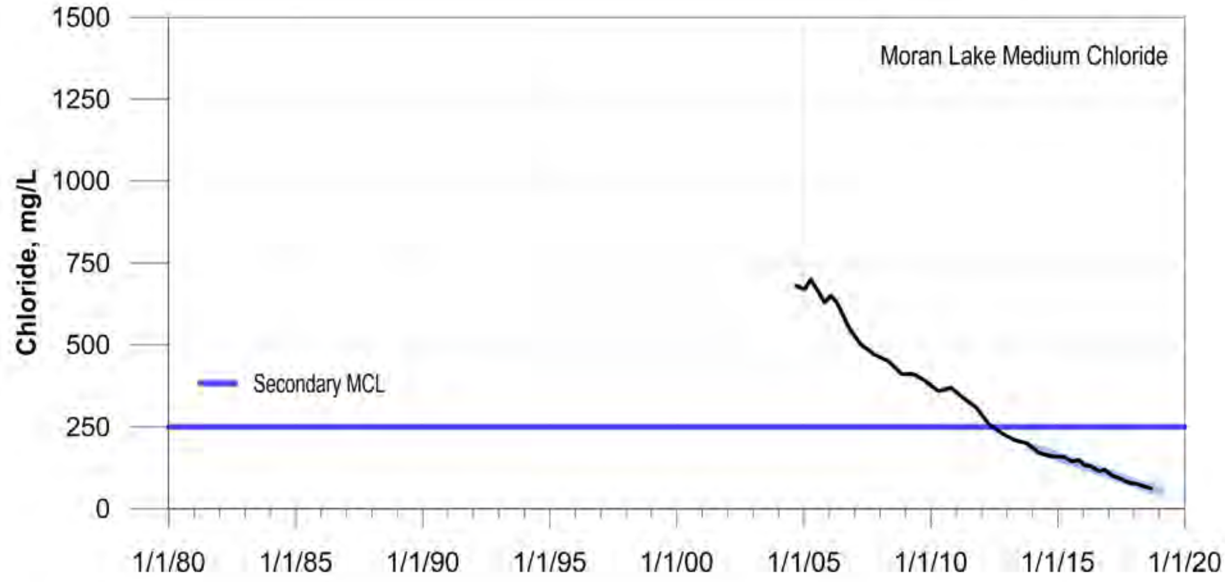
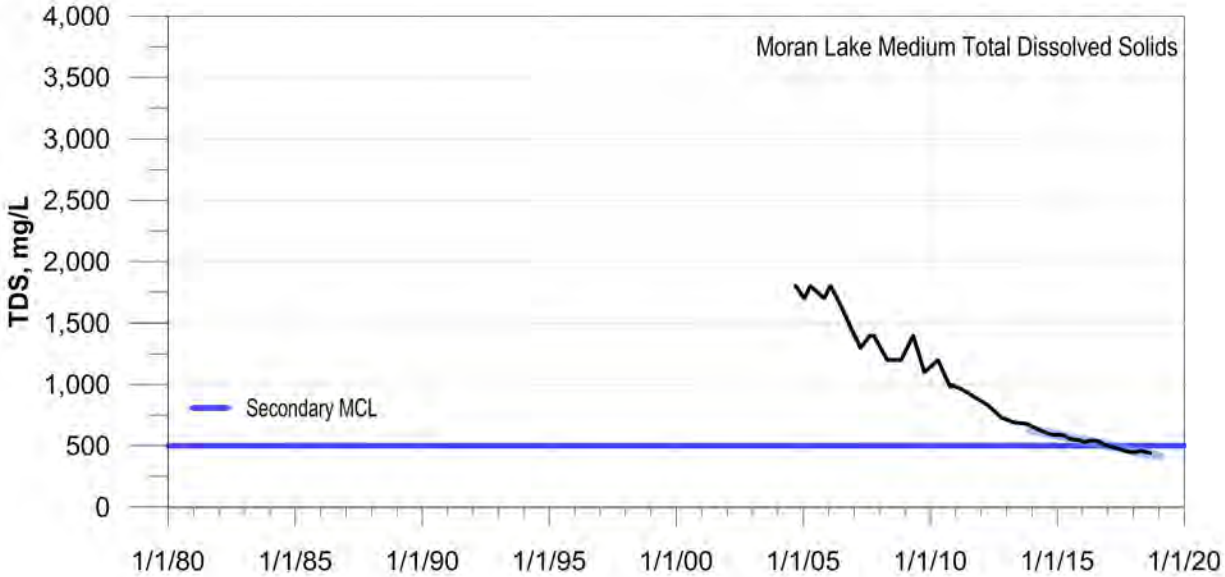


Figure 3. Rainfall at Santa Cruz Co-op Station and Estimated Long-Term Recharge


Moran Lake Medium Chloride
Chloride, mg/L
1500
1250
1000
750
500
250
0
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
1/1/20


Moran Lake Medium Total Dissolved Solids
TDS, mg/L
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
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
1/1/20


Moran Lake Medium Groundwater Elevation
Groundwater Elevation, ft MSL
40
30
20
10
0
-10
Manual
Data Logger
Protective Elevation
Five Year Trend
1/1/80
1/1/85
1/1/90
1/1/95
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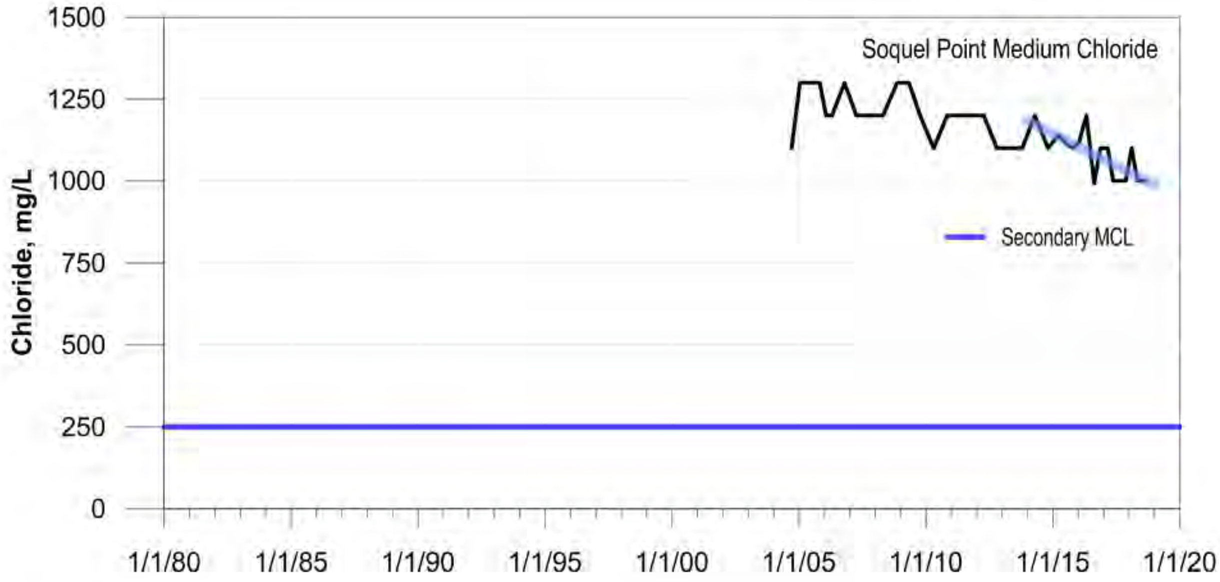
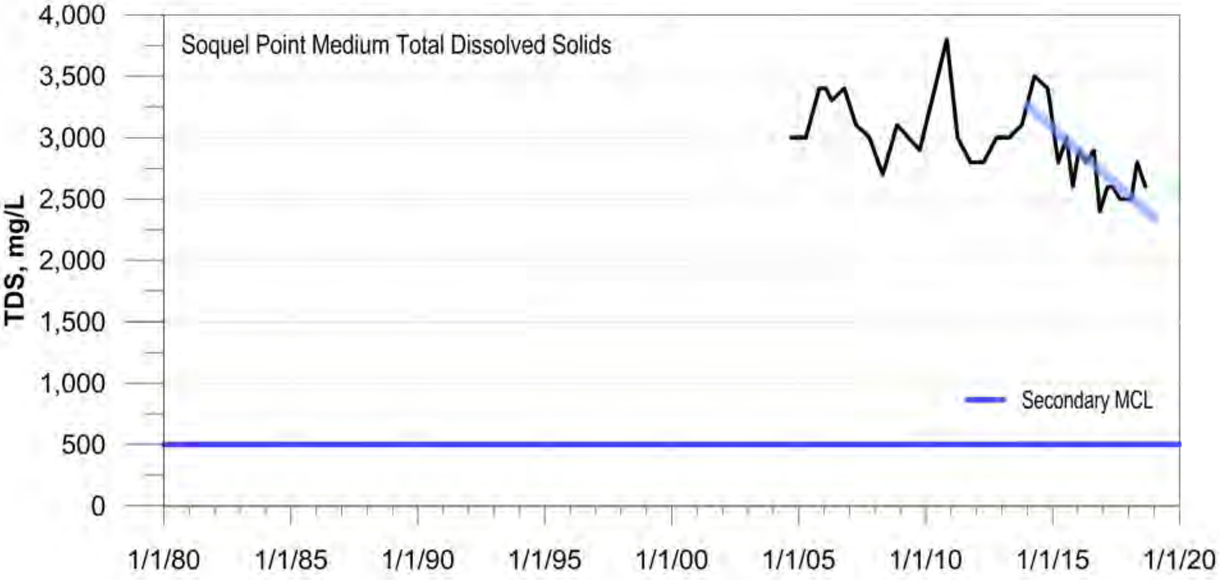
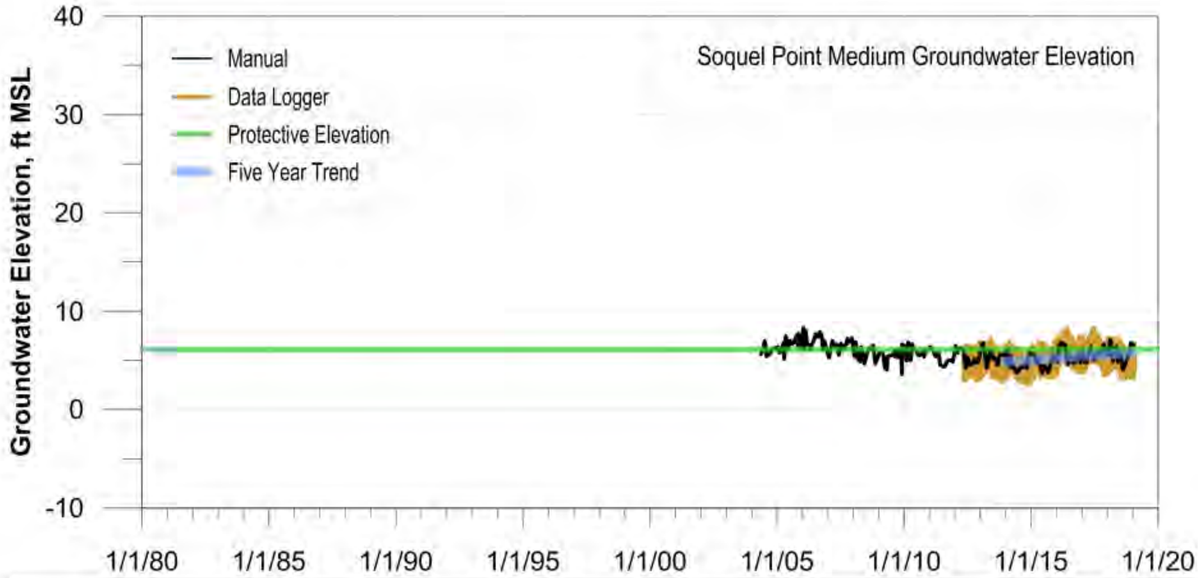
1/1/10
1/1/15
1/1/20



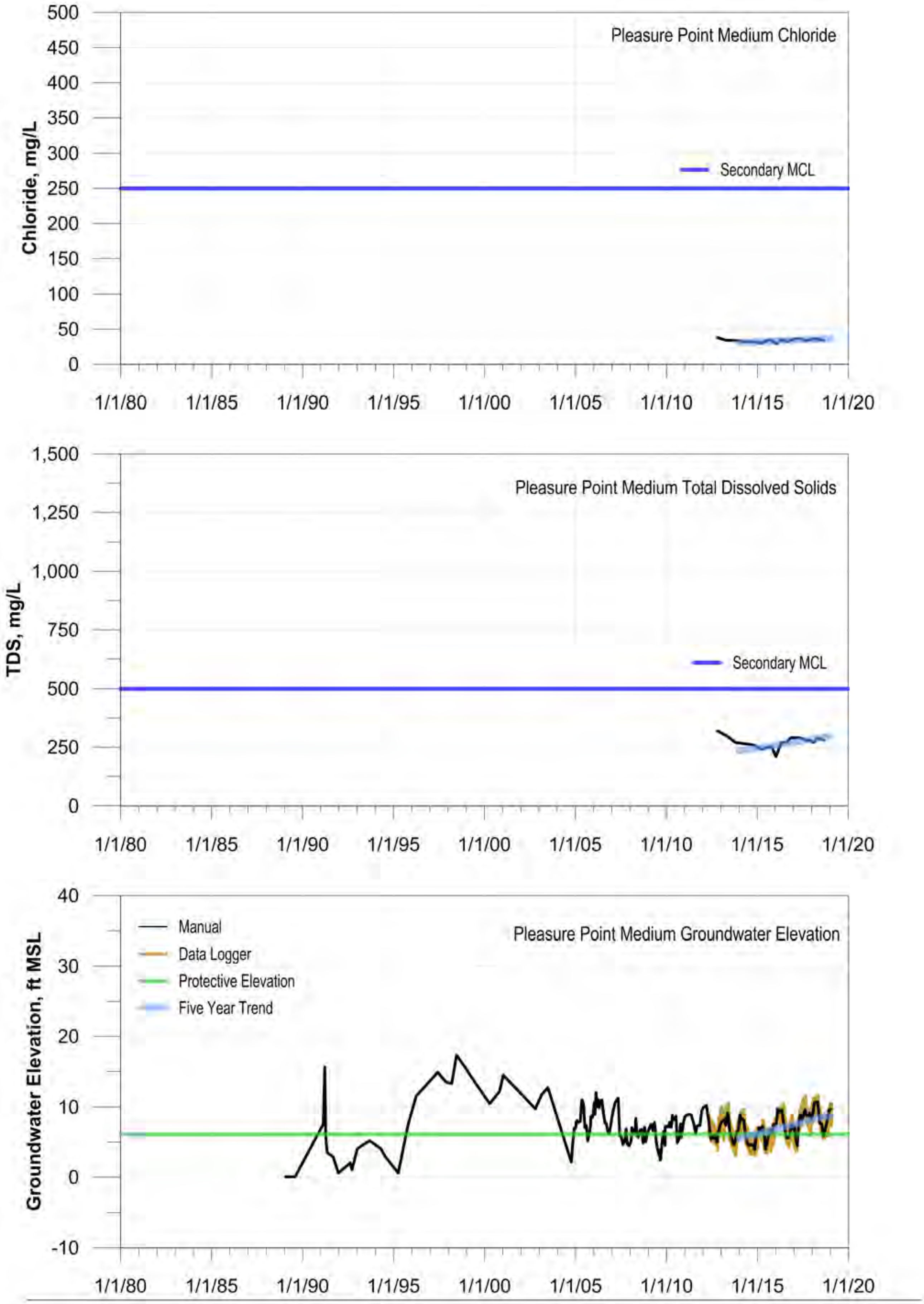
Soquel Point Medium Chloride
Secondary MCL
Chloride, mg/L
1500
1250
1000
750
500
250
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20



Soquel Point Medium Total Dissolved Solids
Secondary MCL
TDS, mg/L
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20



Manual
Data Logger
Protective Elevation
Five Year Trend
Soquel Point Medium Groundwater Elevation
Groundwater Elevation, ft MSL
40
30
20
10
0
-10
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20


Pleasure Point Medium Chloride
Chloride, mg/L
Secondary MCL
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
Pleasure Point Medium Total Dissolved Solids
TDS, mg/L
Secondary MCL
1,500
1,250
1,000
750
500
250
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
Pleasure Point Medium Groundwater Elevation
Groundwater Elevation, ft MSL
Manual
Data Logger
Protective Elevation
Five Year Trend
40
30
20
10
0
-10
1/1/80
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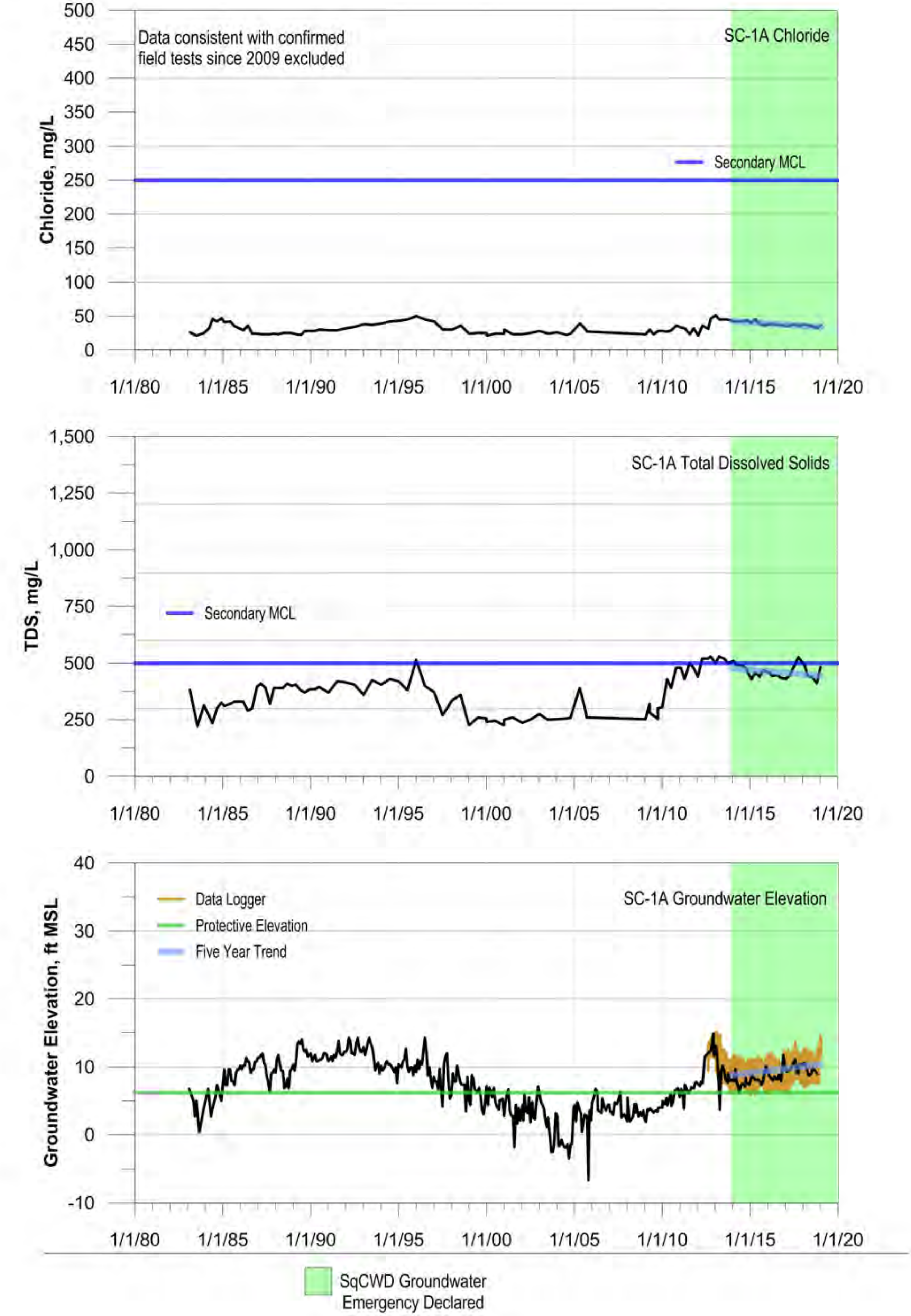
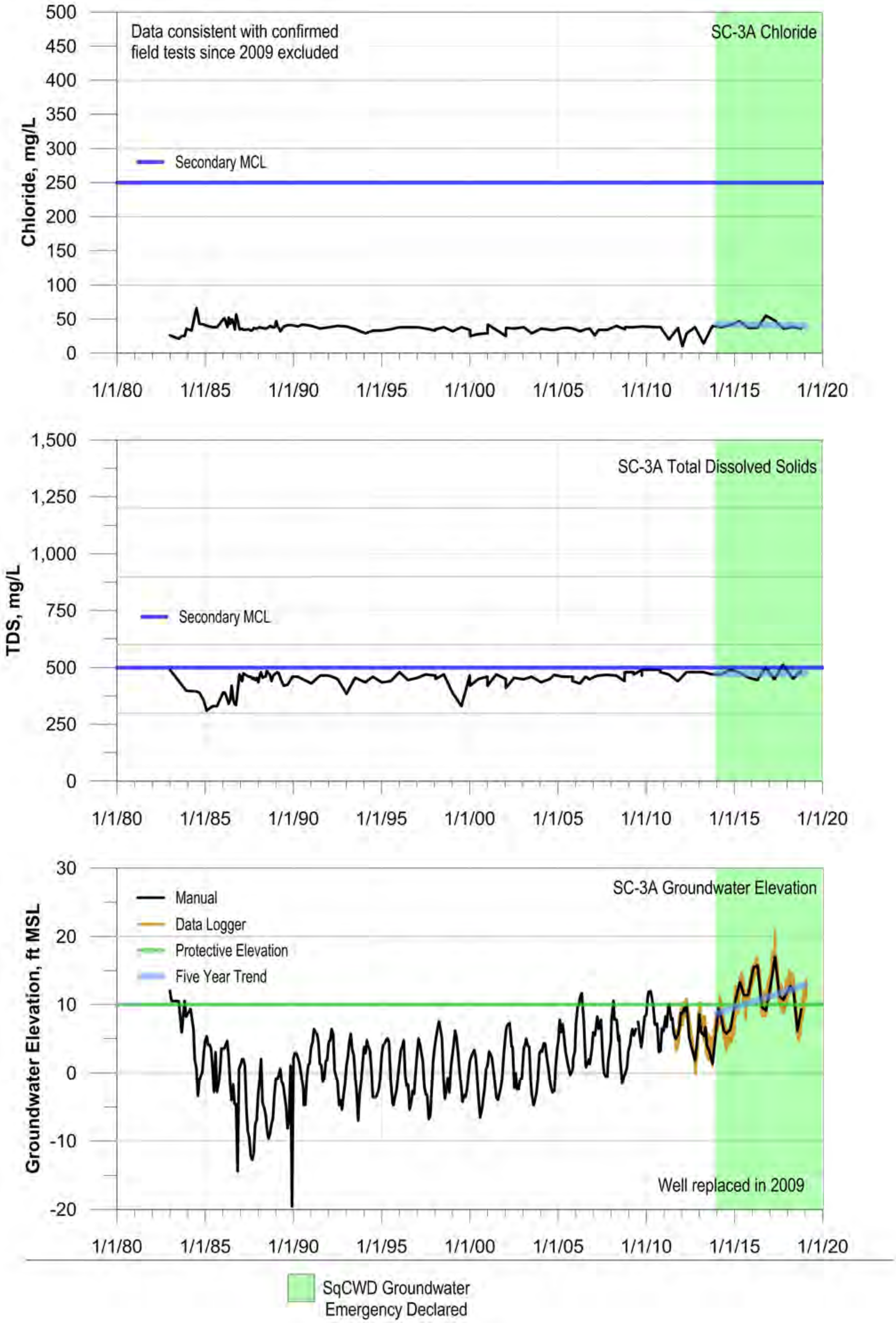
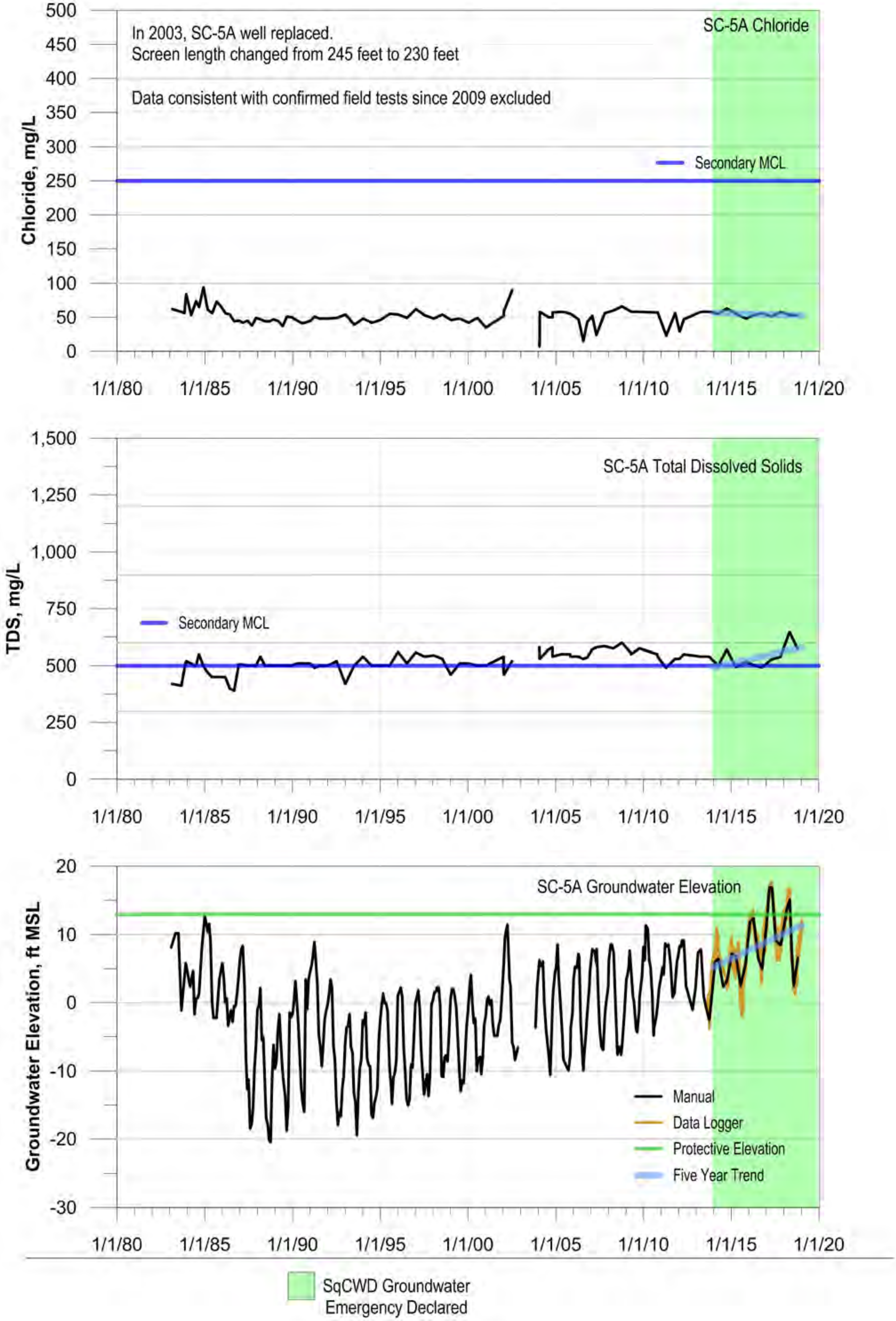
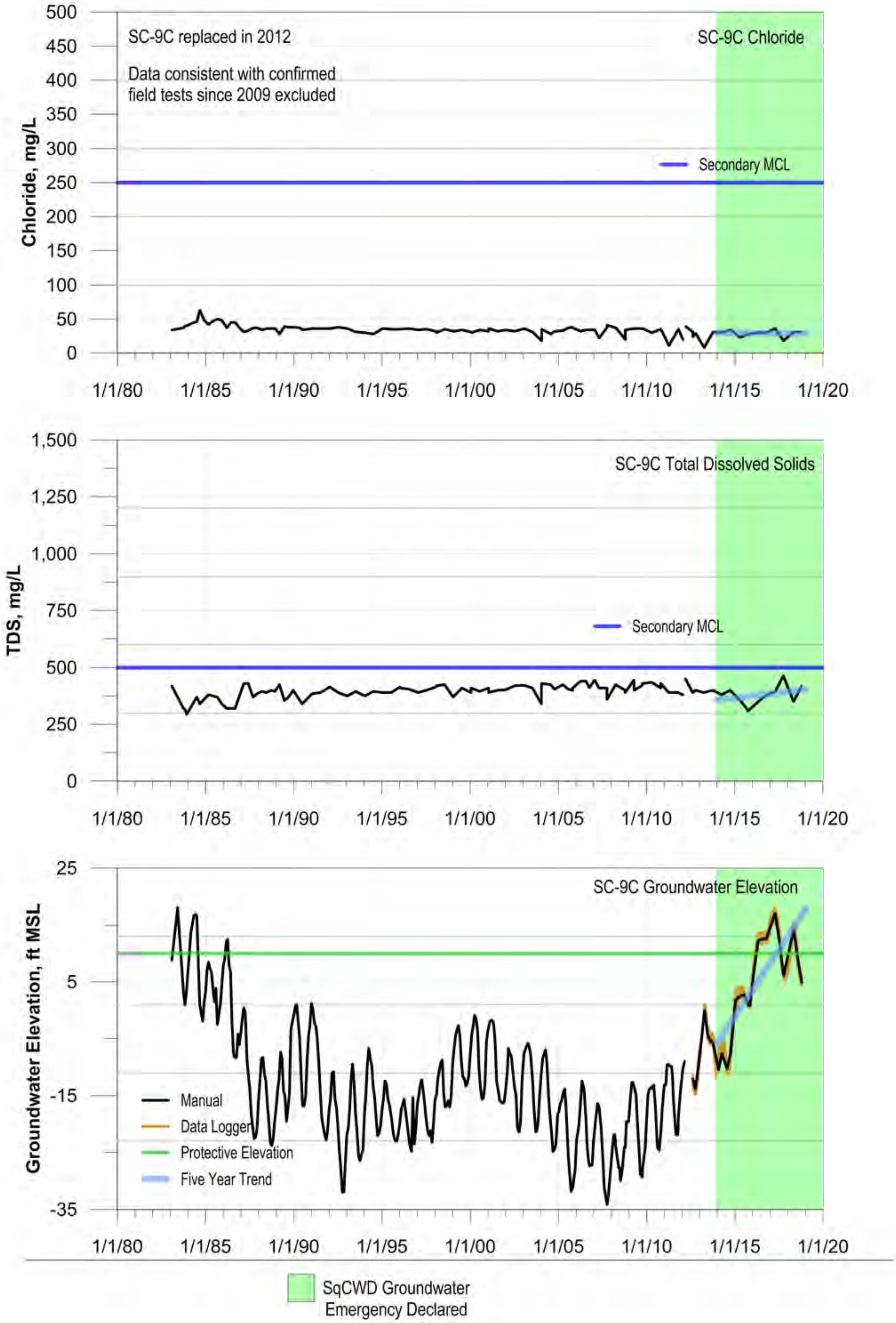
1/1/10
1/1/15
1/1/20

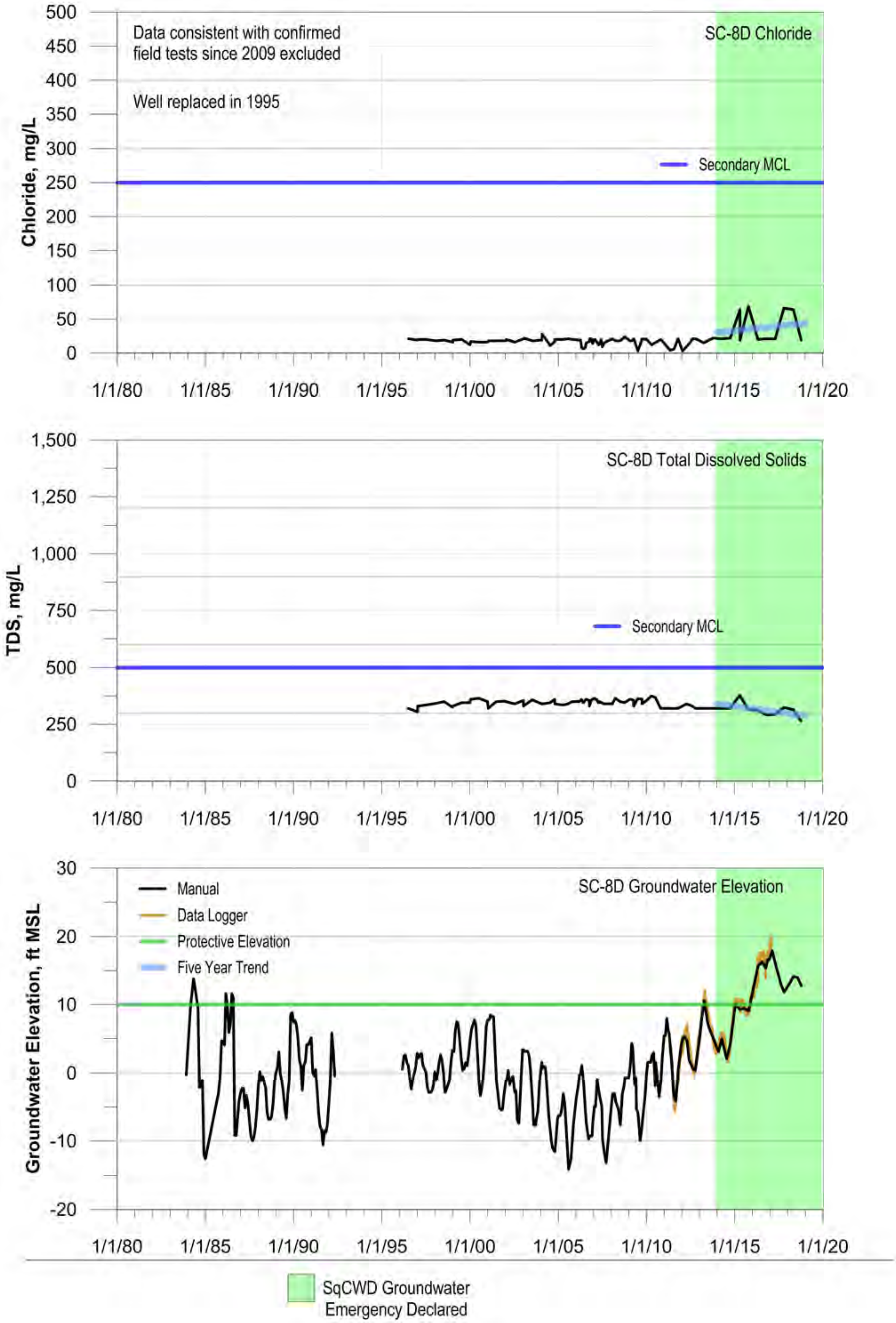

Data consistent with confirmed field tests since 2009 excluded
SC-1A Chloride
Secondary MCL
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-1A Total Dissolved Solids
Secondary MCL
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
SC-1A Groundwater Elevation
Data Logger
Protective Elevation
Five Year Trend
Groundwater Elevation, ft MSL
40
30
20
10
0
-10
SqCWD Groundwater Emergency Declared


Data consistent with confirmed
field tests since 2009 excluded
SC-3A Chloride
Chloride, mg/L
Secondary MCL
SC-3A Total Dissolved Solids
TDS, mg/L
Secondary MCL
SC-3A Groundwater Elevation
Groundwater Elevation, ft MSL
Manual
Data Logger
Protective Elevation
Five Year Trend
Well replaced in 2009
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SqCWD Groundwater
Emergency Declared

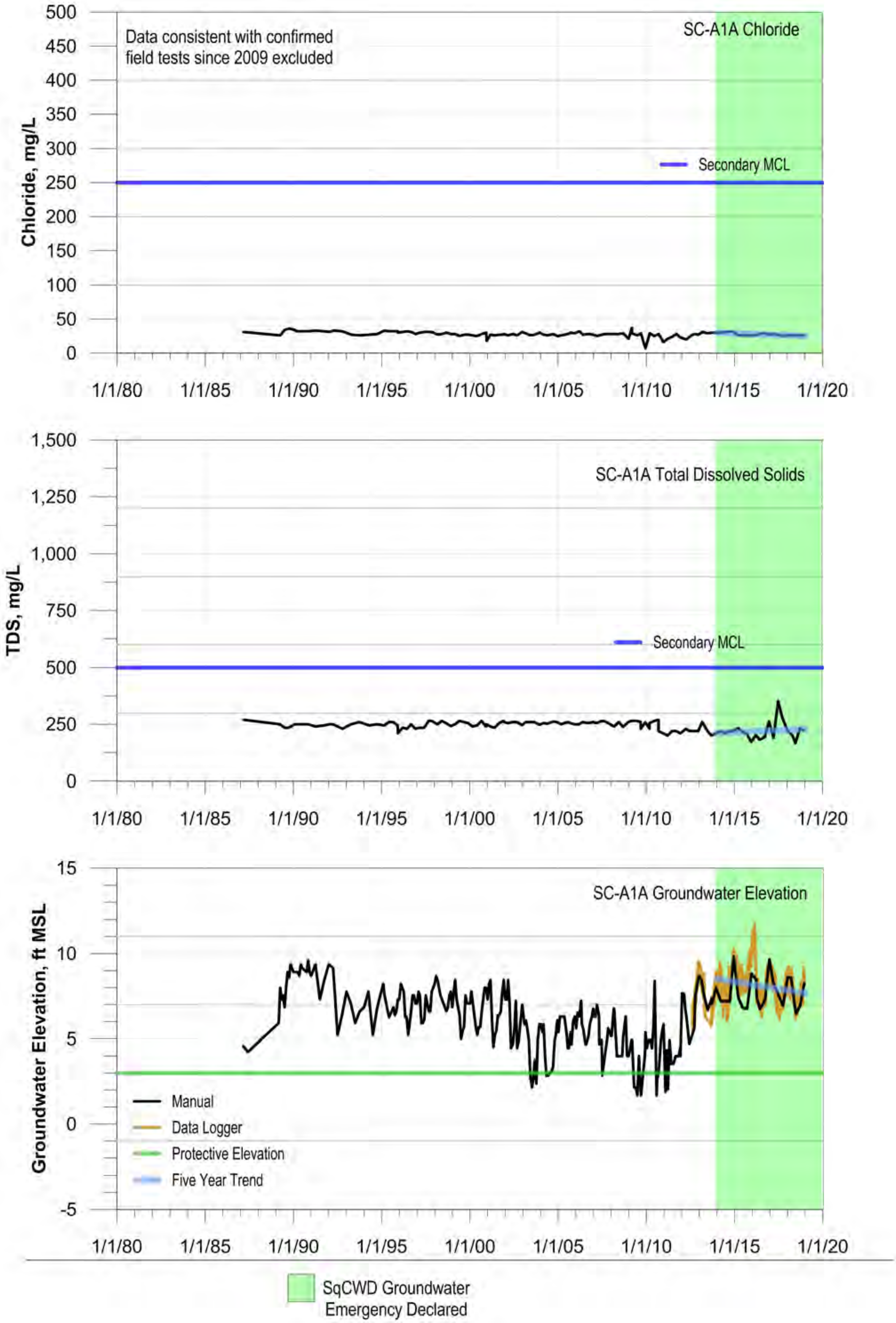


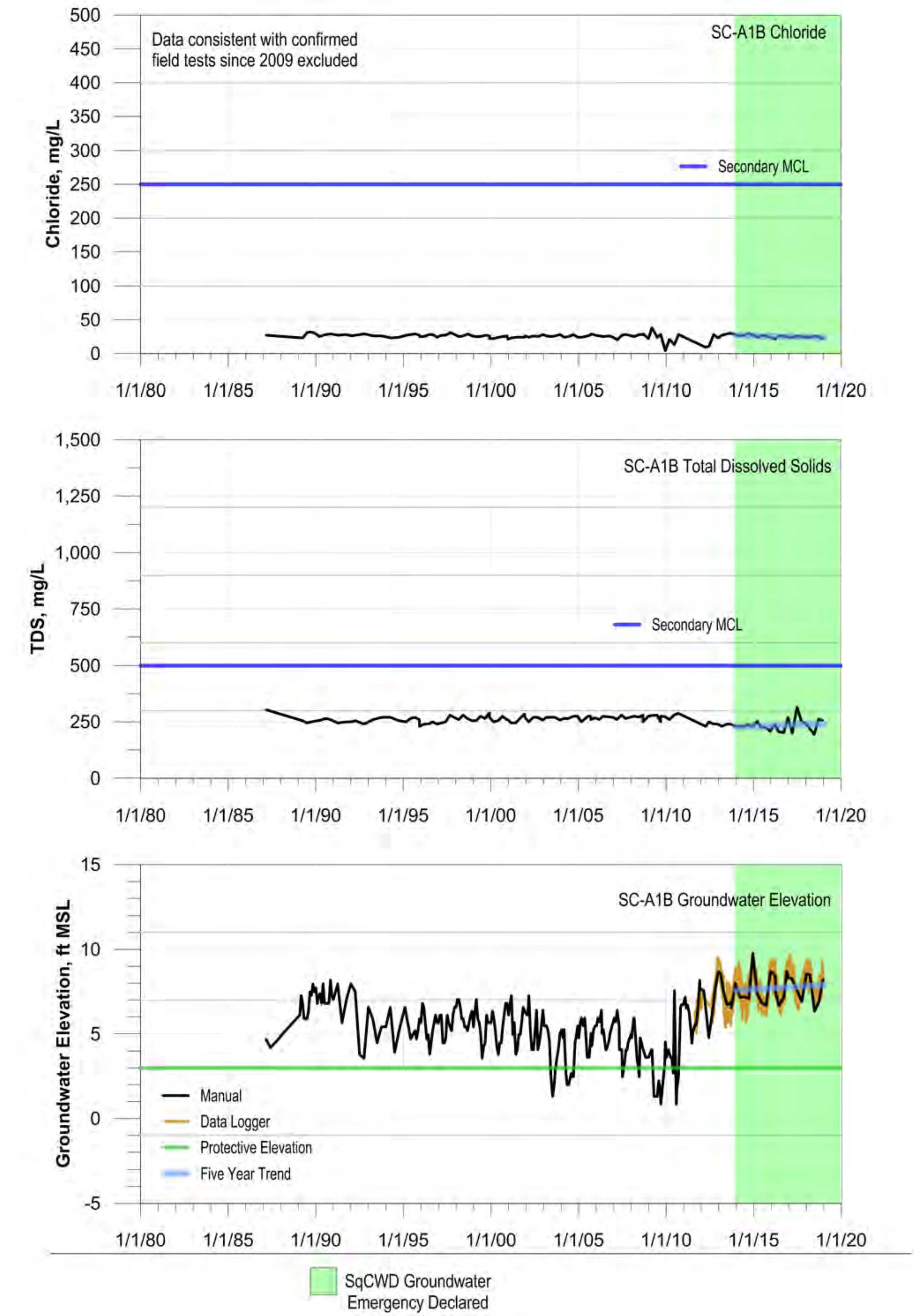
SC-5A Chloride
In 2003, SC-5A well replaced.
Screen length changed from 245 feet to 230 feet
Data consistent with confirmed field tests since 2009 excluded
Secondary MCL
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-5A Total Dissolved Solids
Secondary MCL
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
SC-5A Groundwater Elevation
Groundwater Elevation, ft MSL
20
10
0
-10
-20
-30
Manual
Data Logger
Protective Elevation
Five Year Trend
SqCWD Groundwater Emergency Declared

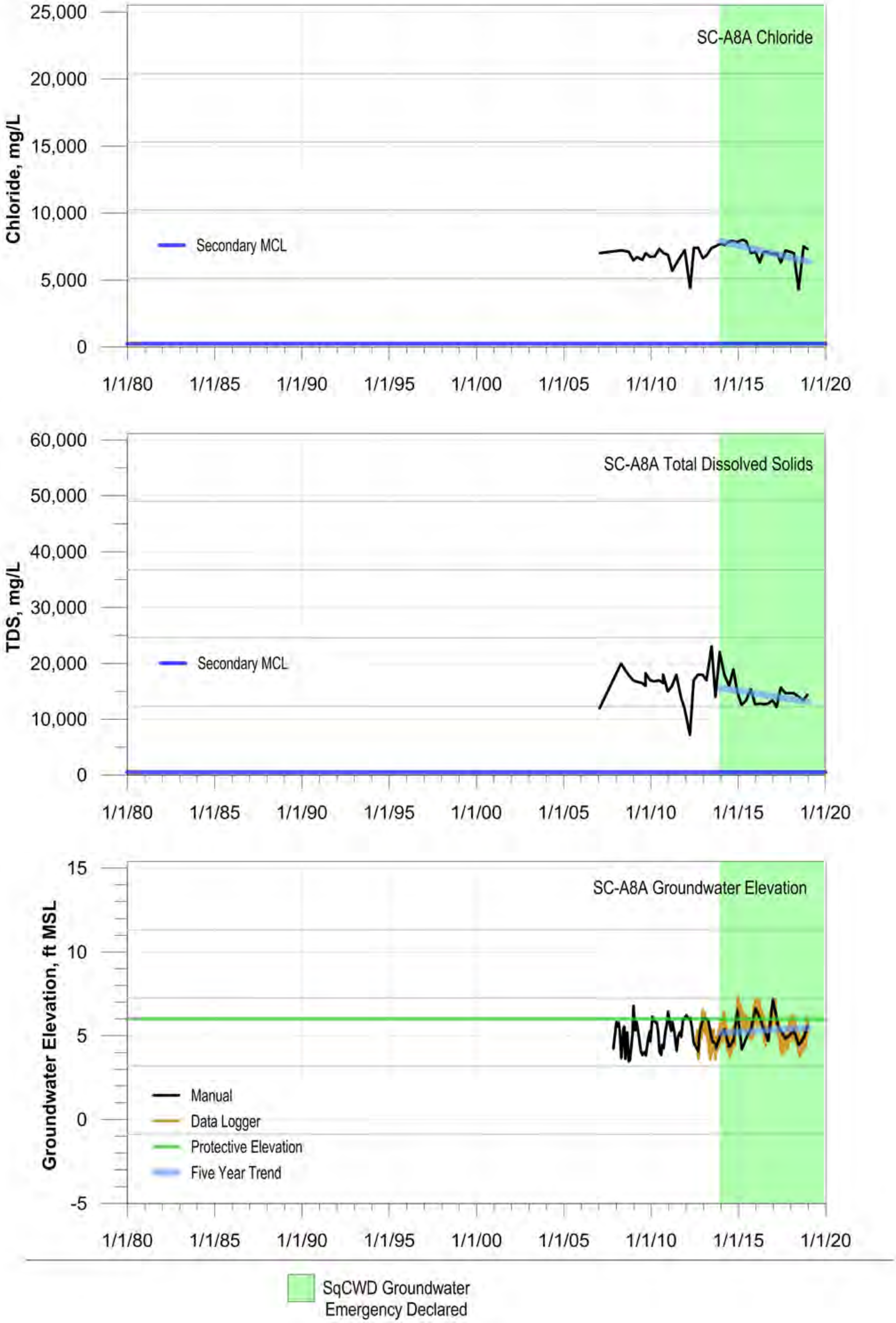

SC-9C replaced in 2012
Data consistent with confirmed field tests since 2009 excluded
SC-9C Chloride
Secondary MCL
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-9C Total Dissolved Solids
Secondary MCL
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
SC-9C Groundwater Elevation
Groundwater Elevation, ft MSL
25
5
-15
-35
Manual
Data Logger
Protective Elevation
Five Year Trend
SqCWD Groundwater Emergency Declared

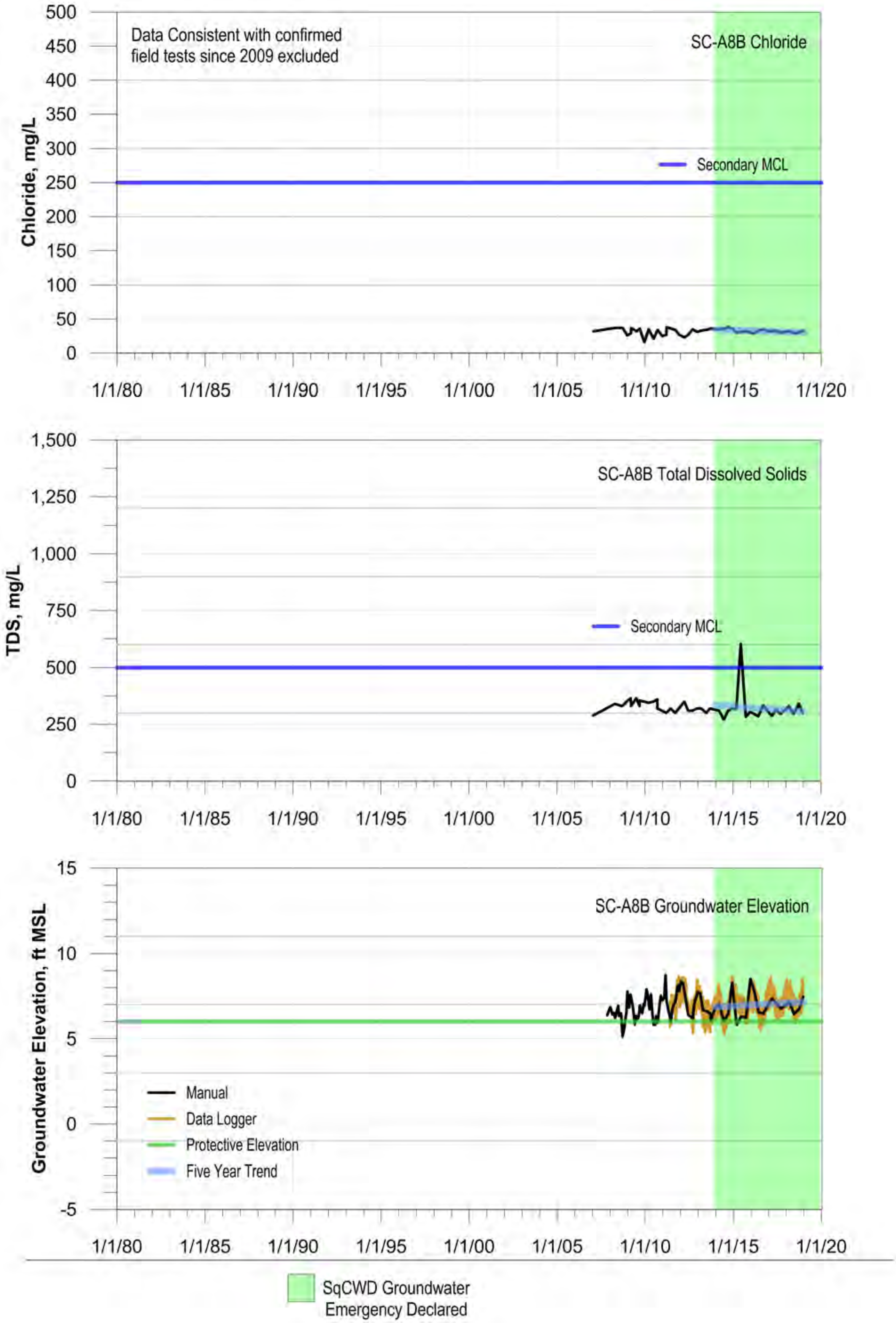


Data consistent with confirmed field tests since 2009 excluded
Well replaced in 1995
SC-8D Chloride
Secondary MCL
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-8D Total Dissolved Solids
Secondary MCL
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-8D Groundwater Elevation
Manual
Data Logger
Protective Elevation
Five Year Trend
Groundwater Elevation, ft MSL
30
20
10
0
-10
-20
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SqCWD Groundwater Emergency Declared

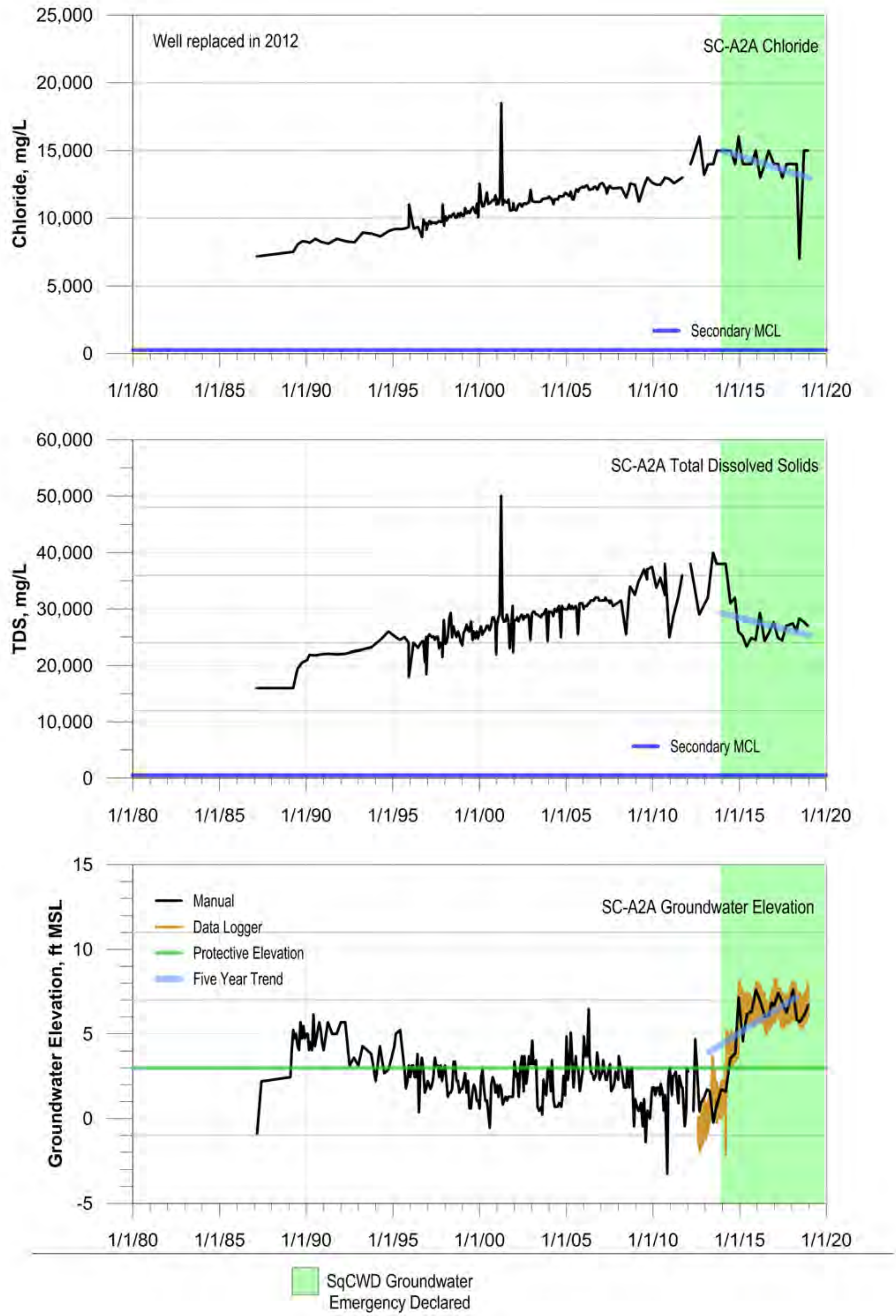

Data consistent with confirmed field tests since 2009 excluded
SC-A1A Chloride
Secondary MCL
Chloride, mg/L
0
50
100
150
200
250
300
350
400
450
500
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-A1A Total Dissolved Solids
Secondary MCL
TDS, mg/L
0
250
500
750
1,000
1,250
1,500
SC-A1A Groundwater Elevation
Groundwater Elevation, ft MSL
-5
0
5
10
15
Manual
Data Logger
Protective Elevation
Five Year Trend
SqCWD Groundwater Emergency Declared

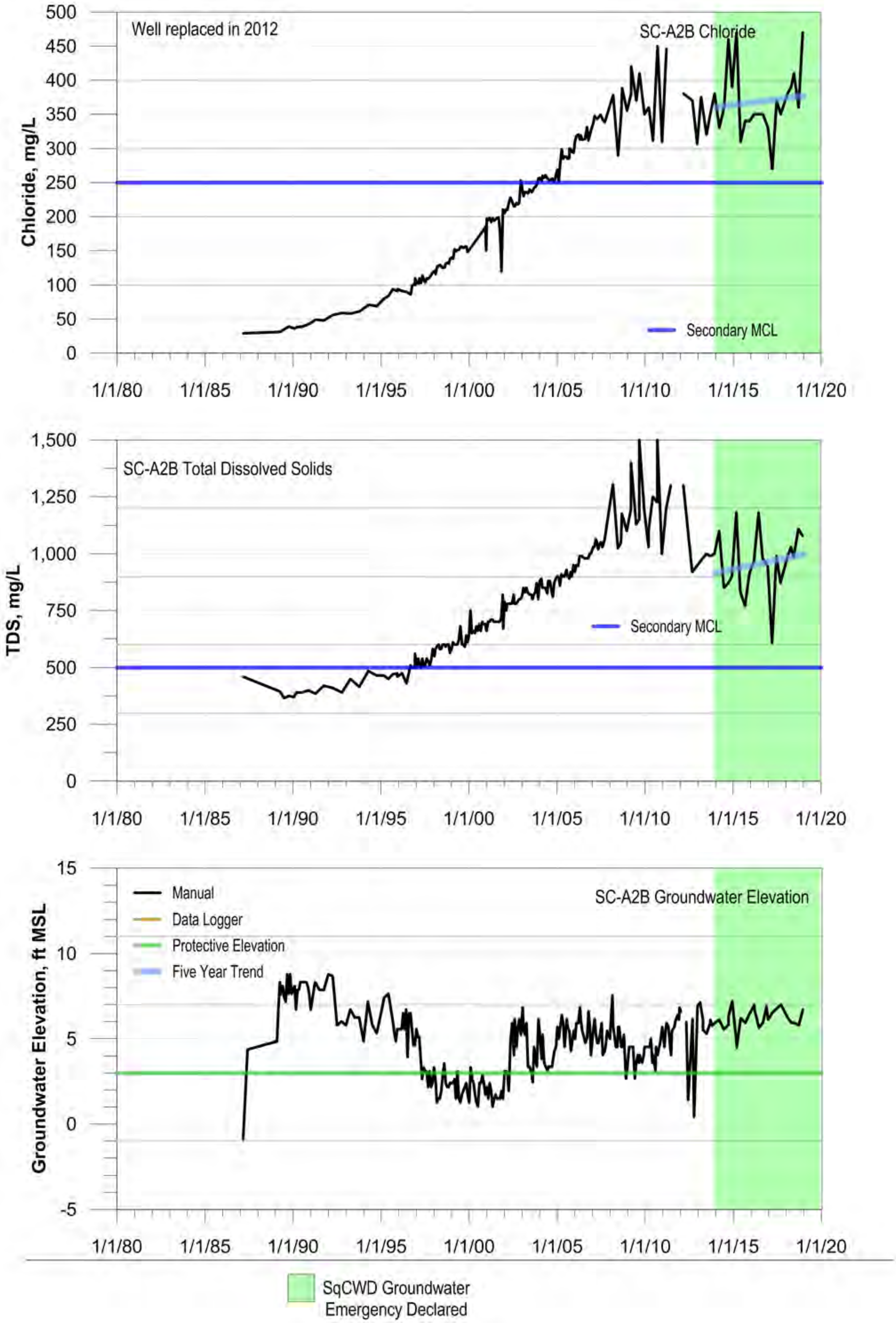

SC-A1B Chloride
Data consistent with confirmed field tests since 2009 excluded
Secondary MCL
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-A1B Total Dissolved Solids
Secondary MCL
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
SC-A1B Groundwater Elevation
Groundwater Elevation, ft MSL
15
10
5
0
-5
Manual
Data Logger
Protective Elevation
Five Year Trend
SqCWD Groundwater Emergency Declared

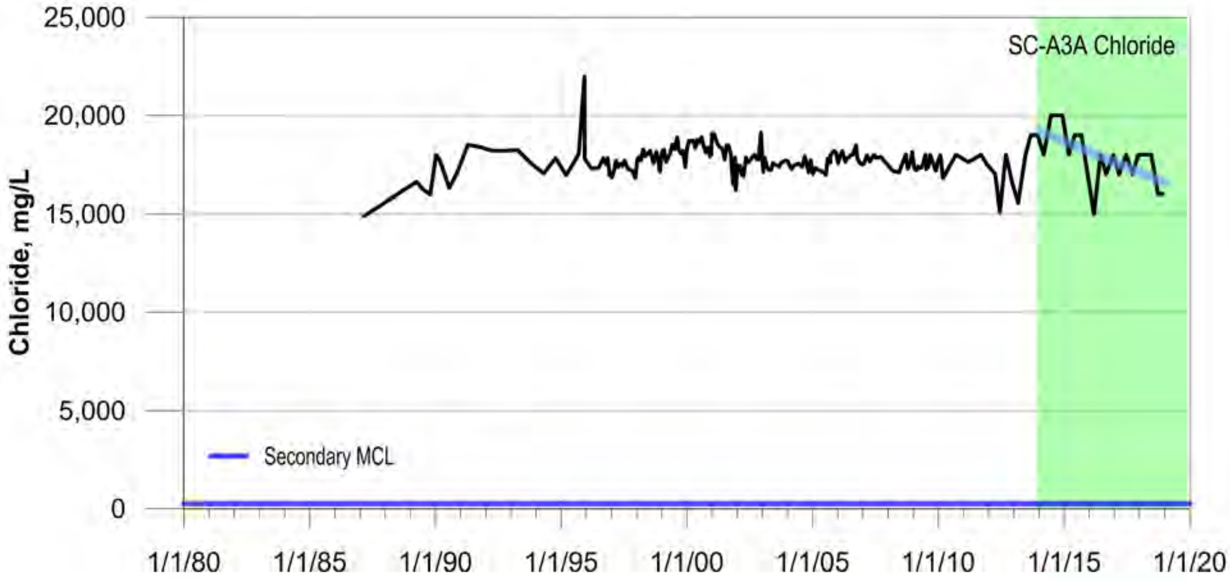

25,000
20,000
15,000
10,000
5,000
0
Chloride, mg/L
SC-A8A Chloride
Secondary MCL
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
60,000
50,000
40,000
30,000
20,000
10,000
0
TDS, mg/L
SC-A8A Total Dissolved Solids
Secondary MCL
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
15
10
5
0
-5
Groundwater Elevation, ft MSL
SC-A8A Groundwater Elevation
Manual
Data Logger
Protective Elevation
Five Year Trend
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SqCWD Groundwater
Emergency Declared

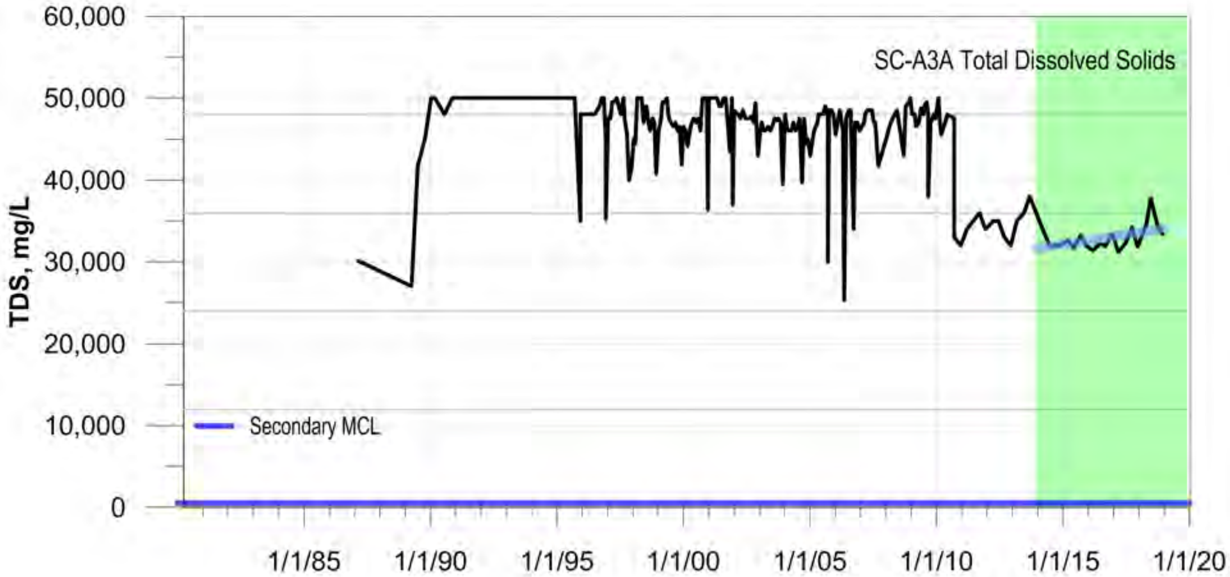


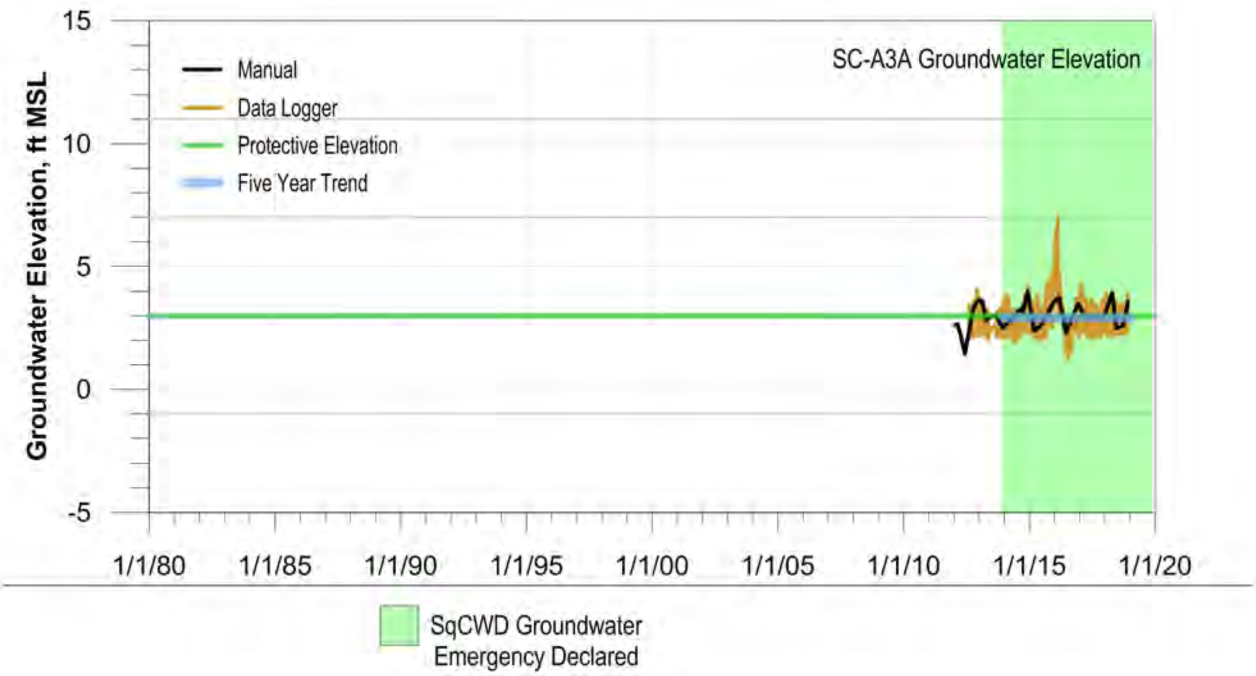
Data Consistent with confirmed field tests since 2009 excluded
SC-A8B Chloride
Secondary MCL
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-A8B Total Dissolved Solids
Secondary MCL
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
SC-A8B Groundwater Elevation
Groundwater Elevation, ft MSL
15
10
5
0
-5
Manual
Data Logger
Protective Elevation
Five Year Trend
SqCWD Groundwater Emergency Declared

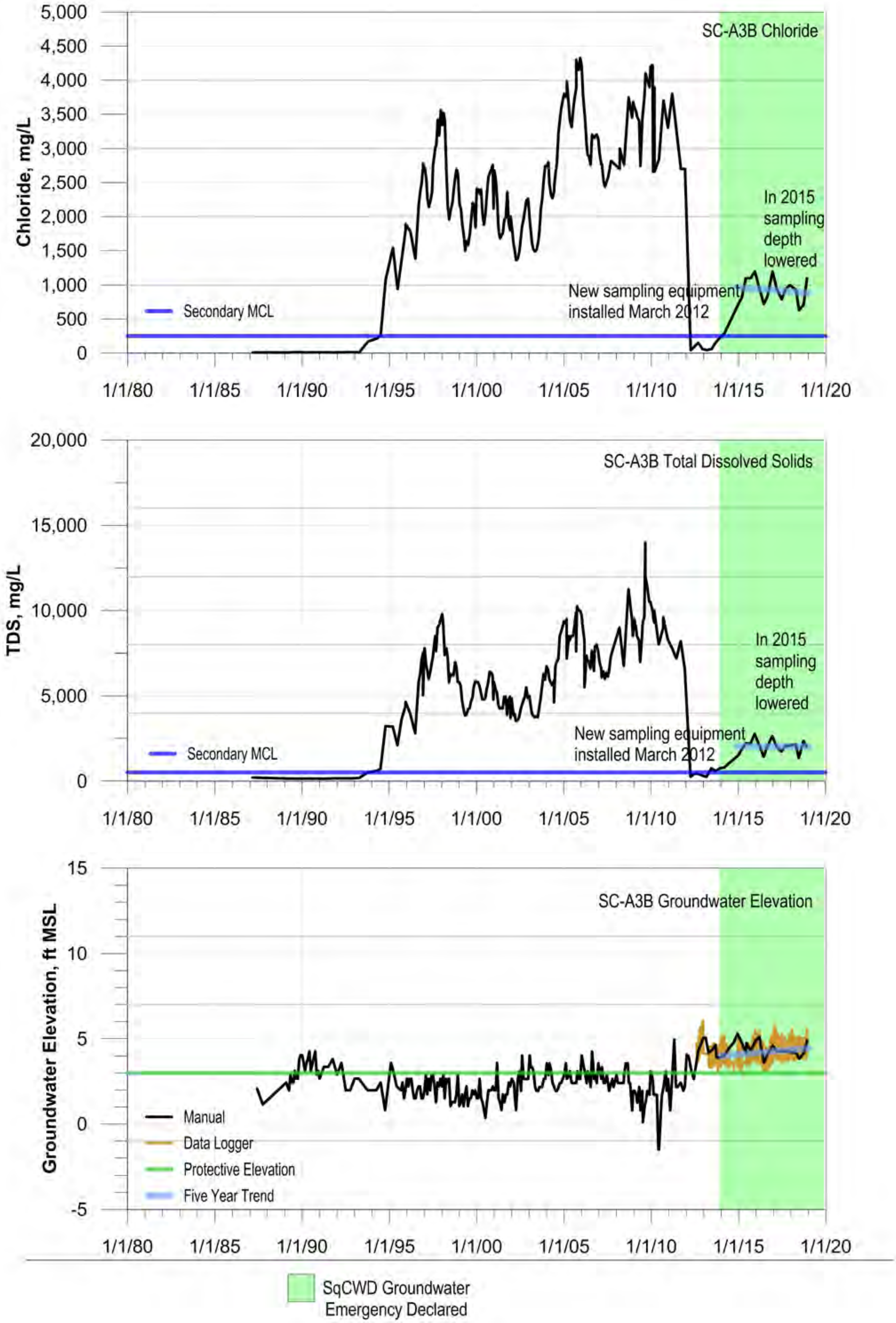

Well replaced in 2012
SC-A2A Chloride
Chloride, mg/L
25,000
20,000
15,000
10,000
5,000
0
Secondary MCL
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-A2A Total Dissolved Solids
TDS, mg/L
60,000
50,000
40,000
30,000
20,000
10,000
0
Secondary MCL
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
Manual
Data Logger
Protective Elevation
Five Year Trend
SC-A2A Groundwater Elevation
Groundwater Elevation, ft MSL
15
10
5
0
-5
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SqCWD Groundwater Emergency Declared

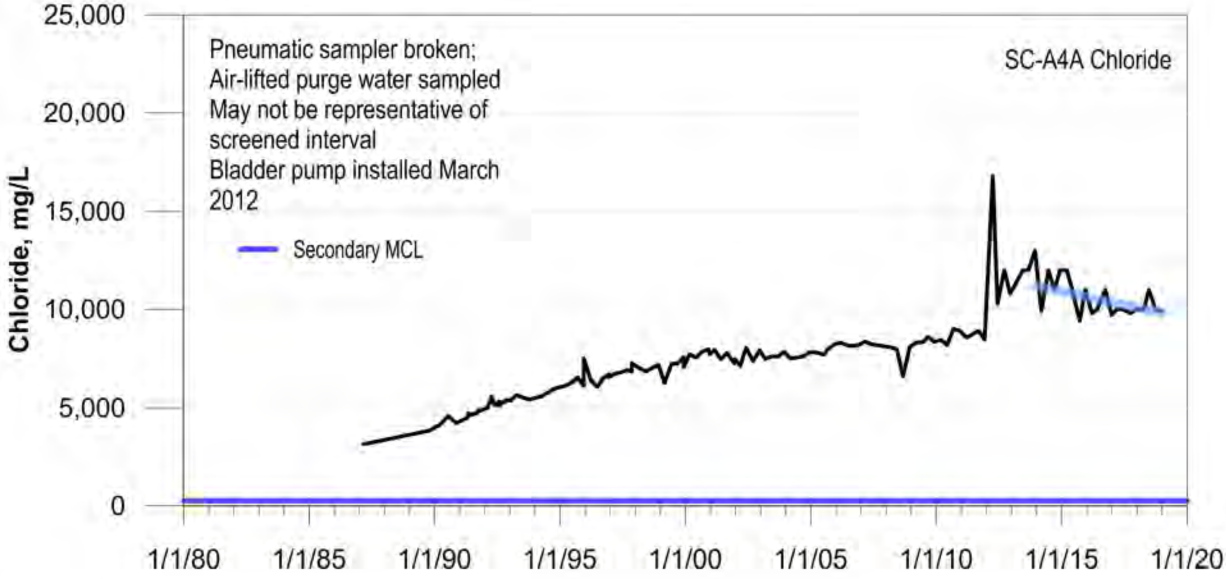

Well replaced in 2012
SC-A2B Chloride
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
Secondary MCL
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-A2B Total Dissolved Solids
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
Secondary MCL
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
Manual
Data Logger
Protective Elevation
Five Year Trend
SC-A2B Groundwater Elevation
Groundwater Elevation, ft MSL
15
10
5
0
-5
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SqCWD Groundwater
Emergency Declared

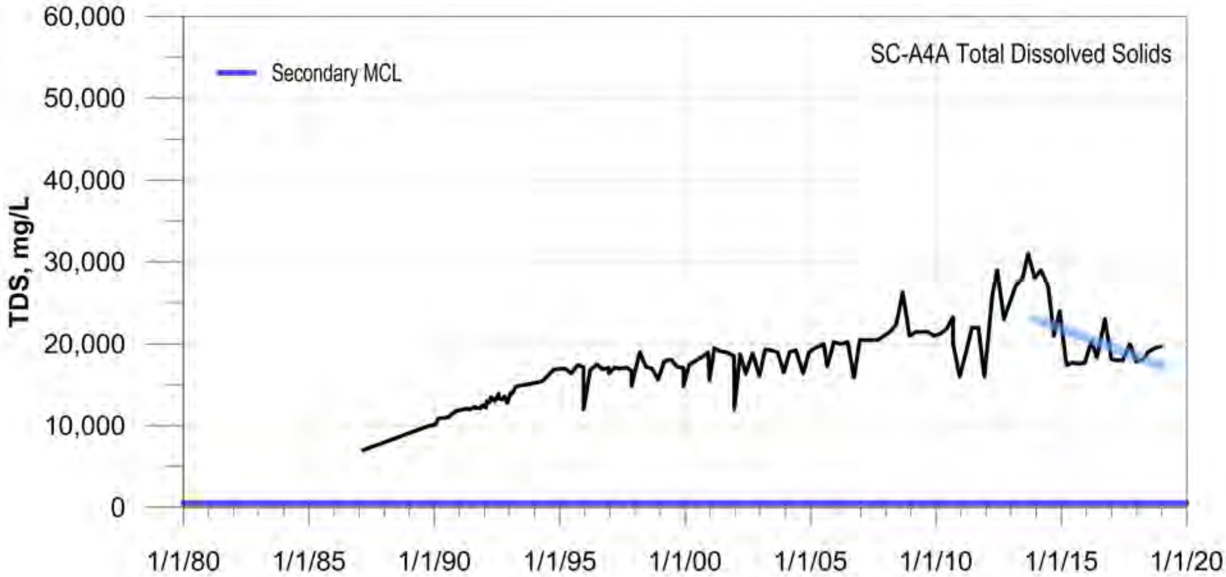

SC-A3A Chloride
Chloride, mg/L
25,000
20,000
15,000
10,000
5,000
0
Secondary MCL
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20

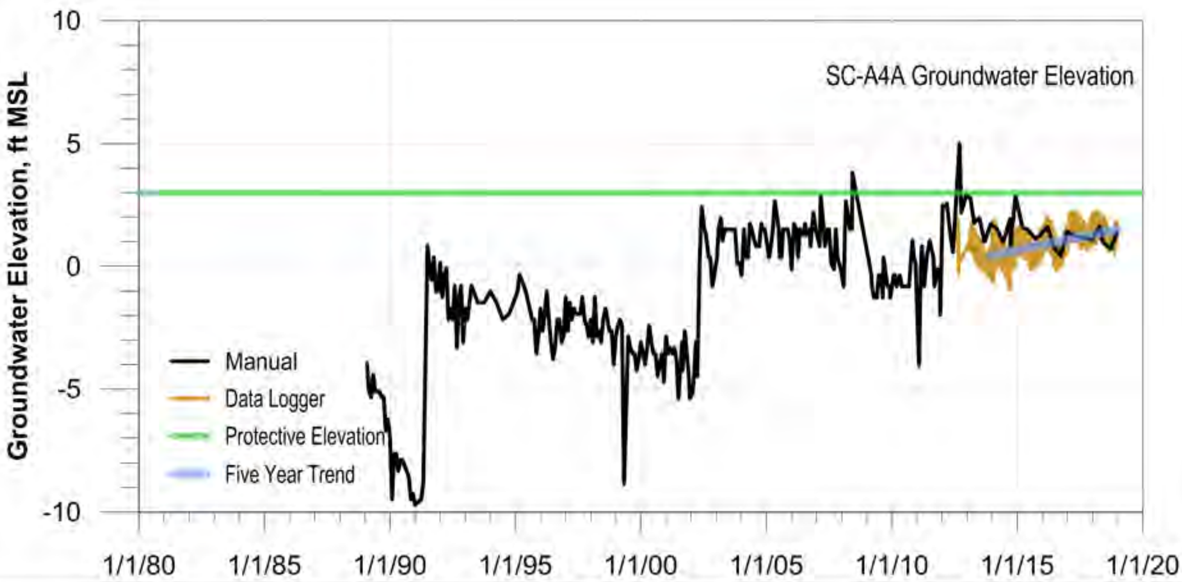

SC-A3A Total Dissolved Solids
TDS, mg/L
60,000
50,000
40,000
30,000
20,000
10,000
0
Secondary MCL
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20


SC-A3A Groundwater Elevation
Groundwater Elevation, ft MSL
15
10
5
0
-5
Manual
Data Logger
Protective Elevation
Five Year Trend
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SqCWD Groundwater Emergency Declared

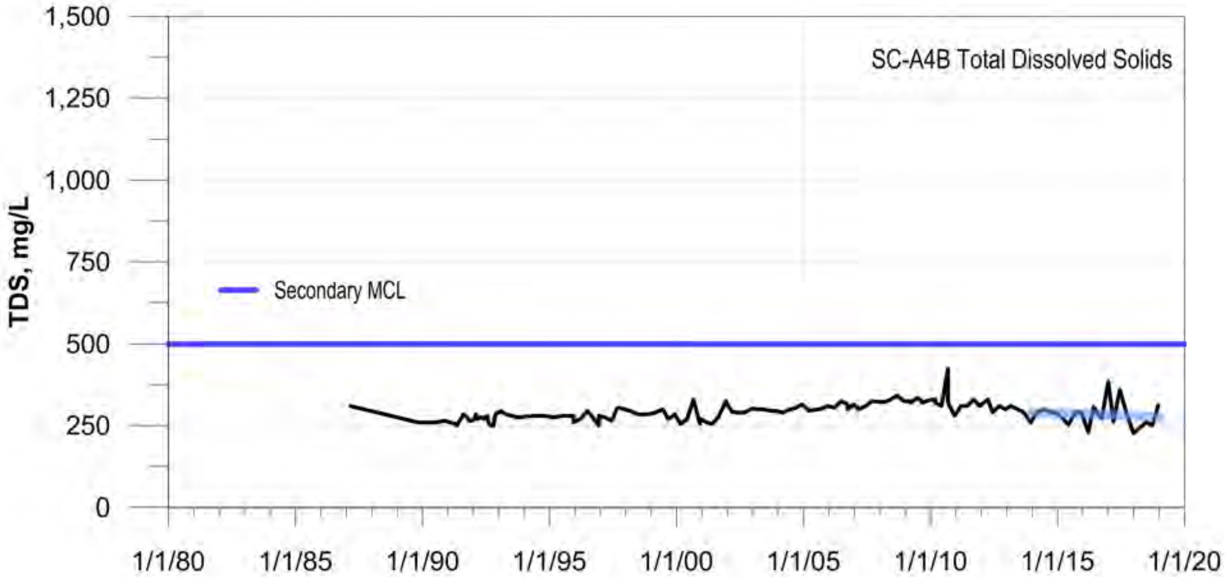

SC-A3B Chloride
Chloride, mg/L
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Secondary MCL
New sampling equipment installed March 2012
In 2015 sampling depth lowered
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-A3B Total Dissolved Solids
TDS, mg/L
20,000
15,000
10,000
5,000
0
Secondary MCL
New sampling equipment installed March 2012
In 2015 sampling depth lowered
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SC-A3B Groundwater Elevation
Groundwater Elevation, ft MSL
15
10
5
0
-5
Manual
Data Logger
Protective Elevation
Five Year Trend
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20
SqCWD Groundwater Emergency Declared


Pneumatic sampler broken;
Air-lifted purge water sampled
May not be representative of
screened interval
Bladder pump installed March
2012
Secondary MCL
SC-A4A Chloride
Chloride, mg/L
25,000
20,000
15,000
10,000
5,000
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20


Secondary MCL
SC-A4A Total Dissolved Solids
TDS, mg/L
60,000
50,000
40,000
30,000
20,000
10,000
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20


SC-A4A Groundwater Elevation
Groundwater Elevation, ft MSL
10
5
0
-5
-10
Manual
Data Logger
Protective Elevation
Five Year Trend
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20


SC-A4B Chloride
Secondary MCL
Chloride, mg/L
500
450
400
350
300
250
200
150
100
50
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20


SC-A4B Total Dissolved Solids
Secondary MCL
TDS, mg/L
1,500
1,250
1,000
750
500
250
0
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20


SC-A4B Groundwater Elevation
Groundwater Elevation, ft MSL
10
5
0
-5
-10
Manual
Data Logger
Protective Elevation
Five Year Trend
1/1/80
1/1/85
1/1/90
1/1/95
1/1/00
1/1/05
1/1/10
1/1/15
1/1/20