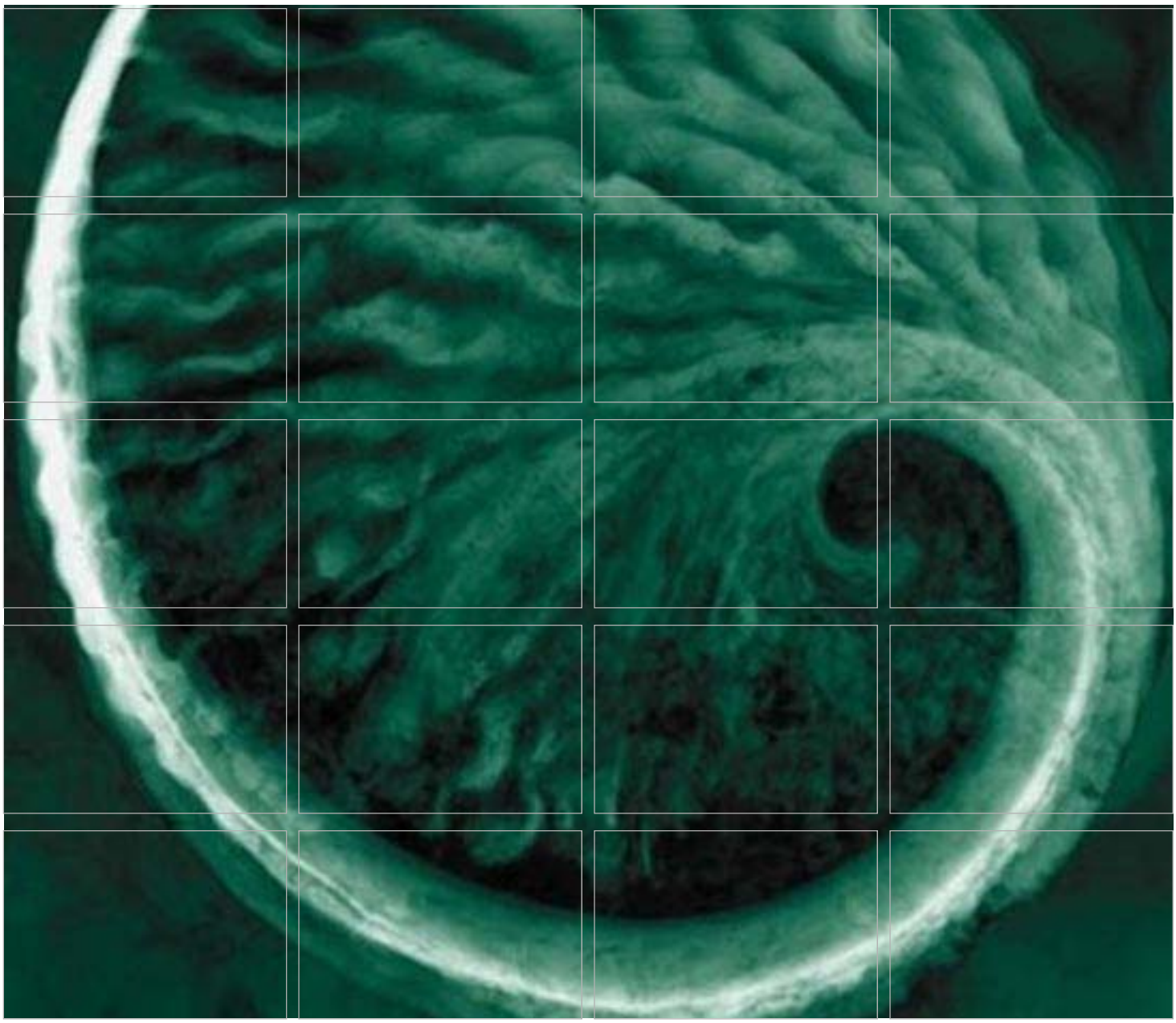

Annual Groundwater Monitoring and Corrective Action Report

CPS Energy
Calaveras Power Station – Sludge Recycle Holding Pond
San Antonio, Texas

January 2019

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Calaveras Power Station – Sludge Recycle Holding Pond

Annual Groundwater Monitoring and Corrective Action Report

January 2019

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1. INTRODUCTION

CPS Energy owns and operates the Calaveras Power Station which consists of two power plants (J.T Deely and J.K. Spruce) that are subject to regulation under Title 40, Code of Federal Regulations, Part 257 (40 CFR §257) (a.k.a. the CCR Rule). The Power Station is located in unincorporated Bexar County, Texas, approximately 13 miles southeast of San Antonio. Currently, CPS Energy operates four CCR units at the Power Station: Sludge Recycle Holding (SRH) Pond, Bottom Ash Ponds, Evaporation Pond, and the Fly Ash Landfill. This *Annual Groundwater Monitoring and Corrective Action Report* (Report) addresses the SRH Pond. The other units listed above are discussed in separate reports.

This Report was produced by Environmental Resource Management (ERM), on behalf of CPS Energy, and summarizes the groundwater monitoring activities for the SRH Pond and provides a statistical summary of the findings for samples collected during the 2018 semi-annual monitoring events. Consistent with the requirements of the CCR Rule, this Report will be posted to the facility's operating record and notification will be made to the State of Texas. Additionally, this Report will be placed on the CPS Energy publically accessible internet site. Unless otherwise mentioned, the analyses in this Report follow the *Groundwater Sampling and Analysis Program* (SAP) (ERM, 2017) posted on the internet site. The table below cross references the reporting requirements under the CCR Rule with the contents of this Report.

Regulatory Requirement Cross-Reference

Regulatory Citation	Requirement (paraphrased)	Where Addressed in this Report
§257.90(e)	Status of the groundwater monitoring and corrective action program	Section 2
§257.90(e)	Summarize key actions completed	Section 2
§257.90(e)	Describe any problems encountered and actions to resolve problems	Section 2
§257.90(e)	Key activities for upcoming year	Section 4
§257.90(e)(1)	Map or aerial image of CCR unit and monitoring wells	Figure 1
§257.90(e)(2)	Identification of new monitoring wells installed or decommissioned during the preceding year	Section 2
§257.90(e)(3)	Summary of groundwater data, monitoring wells and dates sampled, and whether sample was required under detection or assessment monitoring	Sections 2 and 3, Tables 1 through 3, and Figure 2
§257.90(e)(4)	Narrative discussion of any transition between monitoring programs	Section 4

The SRH Pond is located east of the Power Station generating units and is adjacent to and immediately west of the Bottom Ash Ponds. The SRH Pond consists of two ponds separated by a dividing wall (oriented north and south) containing flue gas desulphurization scrubber sludge. The SRH Pond was constructed in 1992. The CCR unit location is shown on Figure 1.

2. PROGRAM STATUS

From December 2016 to October 2017, groundwater samples were collected as part of background sampling. After October 2017, groundwater samples were collected as part of detection monitoring. The samples were collected from the groundwater monitoring well network certified for use in determining compliance with the CCR Rule.

The groundwater monitoring well network consists of two upgradient monitor wells (JKS-49 and JKS-51) and three downgradient monitor wells (JKS-52, JKS-53, and JKS-54). All monitoring wells are screened within the uppermost groundwater bearing unit (GWBU) in the vicinity of the SRH Ponds. The uppermost GWBU varies in thickness from approximately 9.5 to 21.5 feet thick and is comprised of clayey/silty sand to moderately-sorted sand. The uppermost GWBU is located below semi-confining units (i.e., clay, sandy clay, or silty clay), and above a sandstone bedrock unit.

The monitoring well locations are shown in Figure 1. No problems were encountered in the data collection or in well performance, and no action was required to resolve any issues. No new monitoring wells were installed or decommissioned after the certification of the well network.

2.1. GROUNDWATER FLOW RATE AND DIRECTION

Depth to groundwater surface measurements were made at each monitoring well prior to sampling. Groundwater elevations were calculated by subtracting the depth to groundwater measurement from the surveyed reference elevation for each well.

Groundwater elevations collected during the monitoring events are summarized in Table 1. Groundwater elevations and the potentiometric surface for the most recent monitoring event (October 2018) are shown on Figure 2. Groundwater in the vicinity of the SRH Ponds appears to flow radially towards the adjacent channel (south and southwest). The horizontal gradient is approximately 0.007 feet/foot.

2.2. SAMPLING SUMMARY

A summary of the total number of samples collected from each monitoring well is provided in Table 2. Groundwater analytical results from the monitoring events are summarized in Table 3. Laboratory data packages are provided in Appendix A.

The SRH Pond monitoring wells were sampled by CPS Energy using low flow sampling techniques during the monitoring events. No data gaps were identified during the 2018 semi-annual groundwater monitoring events.

2.3. DATA QUALITY

ERM reviewed field and laboratory documentation to assess the validity, reliability and usability of the analytical results. Samples were sent to Xenco Laboratories, located in San Antonio, Texas for analysis. Data quality information reviewed for these results included field sampling forms, chain-of-custody documentation, holding times, lab methods, cooler temperatures, laboratory method blanks, laboratory control sample recoveries, field duplicate samples, matrix spikes / matrix spike duplicates, quantitation limits, and equipment blanks. A

summary of the data qualifiers are included in Table 3. The data quality review found the results to be valid, reliable, and useable for decision making purposes with the listed qualifiers. No analytical results were rejected.

3. STATISTICAL ANALYSIS AND RESULTS

Consistent with the CCR Rule and the SAP, a prediction limit approach [40 CFR §257.93(f)] was used to identify potential impacts to groundwater. Tables and figures generated as part of the statistical analysis are provided in Appendix B. The steps outlined in the decision framework in the SAP include:

- Interwell versus intrawell comparisons;
- Establishment of upgradient dataset;
- Calculation of prediction limits; and
- Conclusions.

The remaining sections of this Report are focused on evaluation of the October 2018 sampling results. Note the April 2018 sampling results were evaluated as discussed in the *April 2018 Groundwater Sampling Event – Calaveras Power Station CCR Units* (ERM, 2017) provided in Appendix C.

3.1. INTERWELL VERSUS INTRAWELL COMPARISONS

When multiple upgradient wells were available within the same unit, concentrations were compared among these wells to determine if they could be pooled to create a single, interwell, upgradient dataset. For each analyte, Boxplots (Appendix B, Figure 1) and Kruskal-Wallis test results (Appendix B, Table 1) are provided for upgradient wells. The statistical test shows that:

- Two Appendix III analytes [chloride and total dissolved solids (TDS)] will follow interwell analysis, with no significant differences present in upgradient data; and
- The remaining five Appendix III analytes [boron, calcium, fluoride, pH, and sulfate] will follow intrawell analysis, with significant differences present in upgradient data

Interwell analytes will use a pooled upgradient dataset for subsequent report sections. Conversely, intrawell analytes will have each individual upgradient dataset used for subsequent report sections.

3.2. ESTABLISHMENT OF UPGRADIENT DATASET

When evaluating the concentrations of analytes in groundwater, USEPA Unified Guidance (2009) recommends performing a careful quality check of the data to identify any anomalies. In addition to the data validation that was performed, descriptive statistics, outlier testing, and temporal stationarity checks were completed to finalize the upgradient dataset.

3.2.1. Descriptive Statistics

Descriptive statistics were calculated for the upgradient wells and analytes at the SRH Ponds (Appendix B, Table 2). The descriptive statistics highlight a number of relevant characteristics about the upgradient datasets including:

- There are a total of 12 well-analyte combinations for the upgradient dataset;
- 12 well-analyte combinations have detection rates greater than or equal to 50 percent;
- 11 well-analyte combinations have 100 percent detects;
- Ten well-analyte combinations follow a normal distribution (using Shapiro-Wilks Normality Test); and
- Two well-analyte combinations have no discernible distribution.

3.2.2. Outlier Determination

Both statistical and visual outlier tests were performed on the upgradient datasets. Data points identified as both a statistical and visual outlier (Appendix B, Table 3 and Appendix B, Figure 2) were reviewed before they were excluded from the dataset. A total of two potential outliers were initially flagged from the upgradient datasets. However, these values were consistent with seasonal fluctuations and concentrations detected in other upgradient wells or in historical groundwater sampling results. No analytical or sampling issues were identified during data review; therefore, the two values were considered valid and were retained for upper prediction limit (UPL) calculations.

3.2.3. Check for Temporal Stability

A trend test was performed for all values in the upgradient wells that had at least eight detected data points and at least 50 percent detection rate. Time series figures of upgradient wells are provided in Appendix B, Figure 3. Additionally, the Mann Kendall trend test results are provided in Appendix B, Table 4. The following summarize the results of the trend analysis:

- There are a total of 12 well-analyte combinations in the upgradient dataset; and
- 12 well-analyte combinations meet the data requirements of the trend test of which:
    - No well-analyte combinations had a significant increasing trend;
    - Two well-analyte combinations had a significant decreasing trend; and
    - Ten well-analyte combinations had no significant trend (i.e., concentrations were stable over time).

3.3. CALCULATION OF PREDICTION LIMITS

A multi-part assessment of the monitoring wells was performed to determine what type of UPL to calculate as a compliance point. A decision framework was applied for each upgradient well based on inter/intrawell analysis, data availability, and presence of temporal trends.

A total of two well-analyte combinations were found to have either increasing or decreasing trends. For these well-analyte combinations, a bootstrapped UPL calculated around a Theil Sen trend was used to derive a more accurate UPL. The remaining ten well-analyte combinations were found to have no significant trend. Sanitas was used to calculate static UPLs using an annual site-wide false positive rate of 0.1 with a 1-of-2 re-testing approach.

A final UPL was selected for each analyte and compared to the October 2018 sampling results in the downgradient wells. A final lower prediction limit (LPL) was also selected for pH. For the two analytes following interwell analysis, the upgradient dataset was pooled prior to UPL calculations, resulting in a single UPL value per analyte. For the five analytes following

intrawell analysis, a UPL value was calculated for each of the upgradient wells. For these wells and analytes, the maximum UPL was selected as the representative UPL for each analyte. A similar approach was used to determine the LPL for pH, however, the minimum LPL was selected in the case of intrawell analysis. All final UPL and LPL values are shown in the table below Full upgradient well calculations are provided in Appendix B, Table 5.

Final UPL and LPL Values

Analysis Type	Analyte	LPL	UPL	Unit
Intrawell	Boron	--	2.71	mg/L
Intrawell	Calcium	--	231	mg/L
Interwell	Chloride	--	476	mg/L
Intrawell	Fluoride	--	0.816	mg/L
Intrawell	pH	5.48	7.19	SU
Intrawell	Sulfate	--	382	mg/L
Interwell	TDS	--	1,830	mg/L

3.4. CONCLUSIONS

The downgradient samples collected during the October 2018 monitoring event were used for compliance comparisons. All downgradient wells were below the UPLs and above the LPLs. Full downgradient results are provided in Appendix B, Table 6.

4. RECOMMENDATIONS

Currently, there are no plans to transition from detection monitoring to assessment monitoring.

5. REFERENCES

ERM, 2017. *Groundwater Sampling and Analysis Program.*

USEPA, 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities.* Unified Guidance. USEPA/530/R/09/007. Office of Resource Conservation and Recovery. Washington, D.C.

Tables

TABLE 1
Groundwater Elevations Summary
CPS Energy - Calaveras Power Station
SRH Pond

		JKS-49 Upgradient		JKS-51 Upgradient		JKS-52 Downgradient		JKS-53 Downgradient		JKS-54 Downgradient	
		TOC Elevation	498.63	TOC Elevation	496.92	TOC Elevation	493.15	TOC Elevation	494.74	TOC Elevation	496.4
Sampling Event	Sampling Event Dates	Depth to Water (feet btoc)	Water Level (msl)	Depth to Water (feet btoc)	Water Level (msl)	Depth to Water (feet btoc)	Water Level (msl)	Depth to Water (feet btoc)	Water Level (msl)	Depth to Water (feet btoc)	Water Level (msl)
1	12/6/16 to 12/8/16	8.81	489.82	10.76	486.16	7.53	485.62	7.70	487.04	10.19	486.21
2	2/21/17 to 2/23/17	8.56	490.07	10.80	486.12	7.43	485.72	8.52	486.22	10.48	485.92
3	3/28/17 to 3/30/17	8.90	489.73	10.59	486.33	7.33	485.82	8.95	485.79	10.64	485.76
4	5/2/17 to 5/4/17	8.85	489.78	10.56	486.36	7.35	485.80	8.74	486.00	10.64	485.76
5	6/20/17 to 6/21/17	8.75	489.88	10.56	486.36	7.46	485.69	8.47	486.27	10.71	485.69
6	7/25/17 to 7/26/17	8.46	490.17	10.68	486.24	7.50	485.65	8.85	485.89	10.85	485.55
7	8/29/17 to 8/30/17	7.21	491.42	10.48	486.44	7.40	485.75	8.55	486.19	9.50	486.90
8	10/10/17 to 10/11/17	11.17	487.46	10.98	485.94	7.53	485.62	9.21	485.53	11.17	485.23
9	4/4/18 to 4/5/18	9.00	489.63	10.93	485.99	8.48	484.67	8.90	485.84	10.76	485.64
10	10/30/18 to 10/31/18	6.88	491.75	10.45	486.47	8.33	484.82	8.40	486.34	10.55	485.85

NOTES:
btoc = below top of casing
msl = mean sea level

TABLE 2
Groundwater Sampling Summary
CPS Energy - Calaveras Power Station
SRH Pond

CCR Unit	Well ID	Well Function	Number of Samples Collected in 2016 - 2018	2016 - 2018 Sample Dates										Monitoring Program
				12/6/16 to 12/8/16	2/21/17 to 2/23/17	3/28/17 to 3/30/17	5/2/17 to 5/4/17	6/20/17 to 6/21/17	7/25/17 to 7/26/17	8/29/17 to 8/30/17	10/10/17 to 10/11/17	4/4/18 to 4/5/18	10/30/18 to 10/31/18	
SRH Pond	JKS-49	Upgradient Monitoring	10	X	X	X	X	X	X	X	X	X	X	Detection
	JKS-51	Upgradient Monitoring	10	X	X	X	X	X	X	X	X	X	X	Detection
	JKS-52	Downgradient Monitoring	10	X	X	X	X	X	X	X	X	X	X	Detection
	JKS-53	Downgradient Monitoring	10	X	X	X	X	X	X	X	X	X	X	Detection
	JKS-54	Downgradient Monitoring	10	X	X	X	X	X	X	X	X	X	X	Detection

NOTES:
X = Indicates that a sample was collected.

TABLE 3
Groundwater Analytical Results Summary
CPS Energy - Calaveras Power Station
SRH Pond

		JKS-49 Upgradient									
	Sample Date	**12/7/16**	**2/22/17**	**3/28/17**	**5/3/17**	**6/20/17**	**7/25/17**	**8/29/17**	**10/10/17**	**4/4/18**	**10/30/18**
	Task	**Event 1 Dec 2016**	**Event 2 Feb 2017**	**Event 3 Mar 2017**	**Event 4 May 2017**	**Event 5 Jun 2017**	**Event 6 Jul 2017**	**Event 7 Aug 2017**	**Event 8 Oct 2017**	**Event 9 Apr 2018**	**Event 10 Oct 2018**
Constituents	**Unit**										
Appendix III - Detection Monitoring											
Boron	mg/L	3.24	3.28	3.28	3.03	3.04 J	2.76	2.85	2.87	2.71	2.70
Calcium	mg/L	130	146	176	113	127	120	145	147	135	117 D
Chloride	mg/L	295	383	372	326	414	448	459	424	446 D	408
Fluoride	mg/L	0.715	0.643 JH	0.669 JH	0.809	0.627 JH	0.617 JH	0.525	0.712	0.697	0.719
Sulfate	mg/L	211	232	234	194	218	227	265	219	237	237
pH - Field Collected	Std	7.19	7.12	7.12	7.02	7.06	6.16	7.05	6.89	7.12	7.12
Total dissolved solids	mg/L	1250	1240	1190	1100	1450	1440	1490	1730	1310	1210
Appendix IV - Assessment Monitoring											
Antimony	mg/L	< 0.0100	< 0.00200	< 0.00200	0.00173	< 0.0100	< 0.00200	< 0.00200	< 0.00200	NR	NR
Arsenic	mg/L	< 0.0100	0.000676	< 0.00200	< 0.0100	< 0.0100	0.000544	0.000538	0.000478	NR	NR
Barium	mg/L	0.0607	0.0575	0.0503	0.0554	0.0783	0.0721	0.0788	0.0735	NR	NR
Beryllium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.0100	< 0.00200	< 0.00200	< 0.00200	NR	NR
Cadmium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.0100	< 0.00200	< 0.00200	< 0.00200	NR	NR
Chromium	mg/L	< 0.0200	0.000859	< 0.00400	< 0.0200	< 0.0200	0.000963	0.000997	0.00113	NR	NR
Cobalt	mg/L	0.00102	0.00109	< 0.00200	0.00155	< 0.00200	0.00153	0.00155	0.00146	NR	NR
Fluoride	mg/L	0.715	0.643 JH	0.669 JH	0.809	0.627 JH	0.617 JH	0.525	0.712	NR	NR
Lead	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.0100	0.000155	< 0.00200	< 0.00200	NR	NR
Lithium	mg/L	< 0.0200	< 0.0200	< 0.100	0.0137	0.0341	0.0295	0.0427	0.0252	NR	NR
Mercury	mg/L	< 0.000200	< 0.000200	< 0.000200	0.0000690	< 0.000200	0.0000490	< 0.000200	< 0.000200	NR	NR
Molybdenum	mg/L	0.00779	0.00846	0.00875	0.0106	0.00908	0.00938	0.0107	0.0111	NR	NR
Selenium	mg/L	0.00992	0.00597	0.00479	0.00521	0.00370	0.00235	0.00188	0.00141	NR	NR
Thallium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.0100	< 0.00200	< 0.00200	< 0.00200	NR	NR
Radium-226	pCi/L	< 0.198 ± 0.197	0.615 ± 0.272	0.747 ± 0.323	0.195 ± 0.167	0.294 ± 0.192	< 0.241 ± 0.193	< 0.159 ± 0.191	0.746 ± 0.274	NR	NR
Radium-228	pCi/L	2.10 ± 0.907	< -1.37 ± 1.37	< 0.854 ± 0.724	1.08 ± 1.72	2.23 ± 0.949	< 0.658 ± 0.636	< 0.812 ± 0.604	1.43 ± 0.898	NR	NR

NOTES:

mg/L: Milligrams per Liter.
Std: Standard units.
pCi/L: Picocuries per Liter.
-- : Laboratory did not analyze sample for indicated constituent.
NR: Analysis of this constituent not required for detection monitoring.
<0.0360: Analyte not detected at laboratory reporting limit (Sample Detection Limit).
D: Sample diluted due to targets detected over highest point of calibration curve or due to matrix interference.
J: Analyte detected above method (sample) detection limit but below method quantitation limit.
H: Bias in sample result likely to be high.

TABLE 3
Groundwater Analytical Results Summary
CPS Energy - Calaveras Power Station
SRH Pond

		JKS-51 Upgradient									
	Sample Date	**12/8/16**	**2/22/17**	**3/28/17**	**5/3/17**	**6/20/17**	**7/25/17**	**8/30/17**	**10/10/17**	**4/4/18**	**10/30/18**
	Task	**Event 1 Dec 2016**	**Event 2 Feb 2017**	**Event 3 Mar 2017**	**Event 4 May 2017**	**Event 5 Jun 2017**	**Event 6 Jul 2017**	**Event 7 Aug 2017**	**Event 8 Oct 2017**	**Event 9 Apr 2018**	**Event 10 Oct 2018**
Constituents	**Unit**										
Appendix III - Detection Monitoring											
Boron	mg/L	0.512	0.517	0.494	0.565	0.512	0.525	0.453	0.509	0.465	0.347
Calcium	mg/L	267	292	322	266	261	232	236	256	246	149 D
Chloride	mg/L	403	331	414	447	424	455	384	375	395 D	301
Fluoride	mg/L	0.247	0.341 JH	0.415 JH	0.534	0.354	0.391	< 0.200	0.407 JH	0.305 J	0.291 J
Sulfate	mg/L	293	330	348	359	342	330	314	302	354 D	260
pH - Field Collected	Std	6.59	6.51	6.48	6.56	6.40	5.48	6.38	6.20	6.44	6.70
Total dissolved solids	mg/L	1650	1650	1490	1980	1530	1580	1390	1650	1320	916
Appendix IV - Assessment Monitoring											
Antimony	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	0.000953	< 0.00200	< 0.00200	< 0.00200	NR	NR
Arsenic	mg/L	< 0.0100	0.000412	0.000429	< 0.0100	0.000392	0.000344	0.000395	0.000418	NR	NR
Barium	mg/L	0.0655	0.0563	0.0529	0.0512	0.0534	0.0520	0.0520	0.0564	NR	NR
Beryllium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	0.000212	< 0.00200	< 0.00200	< 0.00200	NR	NR
Cadmium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Chromium	mg/L	< 0.0200	0.000941	< 0.00400	< 0.0200	0.000657	0.000874	0.00113	0.00133	NR	NR
Cobalt	mg/L	< 0.0100	0.0000770	0.0000940	< 0.0100	0.000124	0.0000940	0.0000800	0.000108	NR	NR
Fluoride	mg/L	0.247	0.341 JH	0.415 JH	0.534	0.354	0.391	< 0.200	0.407 JH	NR	NR
Lead	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Lithium	mg/L	< 0.0200	< 0.0200	< 0.100	0.0322	0.0874	0.0790	0.0958	0.0718	NR	NR
Mercury	mg/L	< 0.000200	< 0.000200	< 0.000200	< 0.000200	< 0.000200	0.000199	< 0.000200	< 0.000200	NR	NR
Molybdenum	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Selenium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Thallium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Radium-226	pCi/L	1.09 ± 0.376	< 0.104 ± 0.122	0.618 ± 0.247	0.197 ± 0.145	0.328 ± 0.195	< 0.0847 ± 0.186	4.83 ± 0.763	0.682 ± 0.309	NR	NR
Radium-228	pCi/L	< 0.312 ± 0.688	< 1.09 ± 1.37	2.32 ± 1.45	< -1.26 ± 1.37	< -0.799 ± 0.928	1.57 ± 0.786	< 0.762 ± 0.706	< 0.963 ± 0.954	NR	NR

NOTES:

mg/L: Milligrams per Liter.
Std: Standard units.
pCi/L: Picocuries per Liter.
-- : Laboratory did not analyze sample for indicated constituent.
NR: Analysis of this constituent not required for detection monitoring.
<0.0360: Analyte not detected at laboratory reporting limit (Sample Detection Limit).
D: Sample diluted due to targets detected over highest point of calibration curve or due to matrix interference.
J: Analyte detected above method (sample) detection limit but below method quantitation limit.
H: Bias in sample result likely to be high.

TABLE 3
Groundwater Analytical Results Summary
CPS Energy - Calaveras Power Station
SRH Pond

		JKS-52 Downgradient									
Sample Date		**12/7/16**	**2/21/17**	**3/28/17**	**5/2/17**	**6/21/17**	**7/25/17**	**8/29/17**	**10/10/17**	**4/4/18**	**10/30/18**
Task		**Event 1 Dec 2016**	**Event 2 Feb 2017**	**Event 3 Mar 2017**	**Event 4 May 2017**	**Event 5 Jun 2017**	**Event 6 Jul 2017**	**Event 7 Aug 2017**	**Event 8 Oct 2017**	**Event 9 Apr 2018**	**Event 10 Oct 2018**
Constituents	**Unit**										
Appendix III - Detection Monitoring											
Boron	mg/L	1.74	2.11	1.63	1.51	1.33	1.43	1.46	1.78	1.95	1.54
Calcium	mg/L	171	183	189	--	145	140	162	184	175	153 D
Chloride	mg/L	341	381	323	320	326	343	417	355	360 D	326
Fluoride	mg/L	0.796	0.665	0.718 JH	0.915 JH	0.705	0.996 JH	< 0.200	0.740	0.72	0.71
Sulfate	mg/L	282	322	299	290	287	292	171	289	278 D	292
pH - Field Collected	Std	7.01	6.47	6.91	6.94	6.87	5.87	6.81	6.63	6.79	6.76
Total dissolved solids	mg/L	1290	1380	1100	1250	1280	1250	1250	1340	1240	1210
Appendix IV - Assessment Monitoring											
Antimony	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Arsenic	mg/L	< 0.0100	0.000575	0.000398	0.000425	0.000427	0.000392	0.000412	0.000448	NR	NR
Barium	mg/L	0.0669	0.0583	0.0519	0.0483	0.0527	0.0558	0.0565	0.0616	NR	NR
Beryllium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Cadmium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Chromium	mg/L	< 0.0200	< 0.00400	< 0.00400	< 0.00400	0.000841	0.000860	0.00123	0.00108	NR	NR
Cobalt	mg/L	0.00202	0.00242	0.00112	0.00119	0.00211	0.00183	0.00159	0.00189	NR	NR
Fluoride	mg/L	0.796	0.665	0.718 JH	0.915 JH	0.705	0.996 JH	< 0.200	0.740	NR	NR
Lead	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	0.000292	< 0.00200	< 0.00200	< 0.00200	NR	NR
Lithium	mg/L	< 0.0200	0.0471	< 0.0200	--	0.0616	0.0605	0.0827	0.0588	NR	NR
Mercury	mg/L	< 0.000200	0.000234	< 0.000200	< 0.000200	< 0.000200	0.0000810	< 0.000200	< 0.000200	NR	NR
Molybdenum	mg/L	< 0.0100	0.00129	0.00115	0.00102	0.000911	0.000865	0.000843	0.000914	NR	NR
Selenium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Thallium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Radium-226	pCi/L	1.71 ± 0.465	0.608 ± 0.289	0.296 ± 0.169	< 0.00 ± 0.150	0.435 ± 0.241	0.449 ± 0.196	< 0.194 ± 0.194	0.704 ± 0.319	NR	NR
Radium-228	pCi/L	2.65 ± 1.12	< 0.744 ± 0.833	< 0.0645 ± 0.649	< 0.530 ± 1.10	< 0.928 ± 0.784	< 1.16 ± 0.867	< 0.716 ± 0.767	< 1.54 ± 1.22	NR	NR

NOTES:

mg/L: Milligrams per Liter.

Std: Standard units.

pCi/L: Picocuries per Liter.

-- : Laboratory did not analyze sample for indicated constituent.

NR: Analysis of this constituent not required for detection monitoring.

<0.0360: Analyte not detected at laboratory reporting limit (Sample Detection Limit).

D: Sample diluted due to targets detected over highest point of calibration curve or due to matrix interference.

J: Analyte detected above method (sample) detection limit but below method quantitation limit.

H: Bias in sample result likely to be high.

TABLE 3
Groundwater Analytical Results Summary
CPS Energy - Calaveras Power Station
SRH Pond

		JKS-53 Downgradient									
Sample Date		**12/8/16**	**2/23/17**	**3/29/17**	**5/2/17**	**6/21/17**	**7/26/17**	**8/30/17**	**10/11/17**	**4/4/18**	**10/30/18**
Task		**Event 1 Dec 2016**	**Event 2 Feb 2017**	**Event 3 Mar 2017**	**Event 4 May 2017**	**Event 5 Jun 2017**	**Event 6 Jul 2017**	**Event 7 Aug 2017**	**Event 8 Oct 2017**	**Event 9 Apr 2018**	**Event 10 Oct 2018**
Constituents	**Unit**										
Appendix III - Detection Monitoring											
Boron	mg/L	1.50	1.38	1.55	1.54	1.47	1.45	1.36	1.45	1.6	1.61
Calcium	mg/L	134	105	156	--	94.1	97.0	99.0	113	113	111 D
Chloride	mg/L	383	336	315	323	335	329	341	313	361	350
Fluoride	mg/L	0.230	0.377	0.408	0.547 JH	0.339	0.385	0.412	< 0.500	0.392 J	0.265 J
Sulfate	mg/L	283	267	238	243	236	234	227	214	249	236
pH - Field Collected	Std	6.80	6.63	6.54	6.56	6.67	6.69	6.62	6.50	6.67	6.65
Total dissolved solids	mg/L	1390	1250	1160	1230	1150	1220	1150	1140	1160	1140
Appendix IV - Assessment Monitoring											
Antimony	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Arsenic	mg/L	< 0.0100	0.000284	0.000266	0.000274	0.000276	< 0.00200	< 0.00200	< 0.00200	NR	NR
Barium	mg/L	0.0692	0.0633	0.0633	0.0623	0.0597	0.0638	0.0541	0.0617	NR	NR
Beryllium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Cadmium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Chromium	mg/L	< 0.0200	0.000701	< 0.00400	< 0.00400	< 0.00400	0.000557	0.000906	< 0.00400	NR	NR
Cobalt	mg/L	0.000356	0.000140	0.000135	0.000165	0.000137	0.000150	0.000163	< 0.00200	NR	NR
Fluoride	mg/L	0.230	0.377	0.408	0.547 JH	0.339	0.385	0.412	< 0.500	NR	NR
Lead	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Lithium	mg/L	0.0279	0.0816	< 0.0200	--	0.0931	0.104	0.125	0.109	NR	NR
Mercury	mg/L	< 0.000200	0.0000780	< 0.000200	< 0.000200	< 0.000200	< 0.000200	0.0000470	< 0.000200	NR	NR
Molybdenum	mg/L	< 0.0100	0.000290	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Selenium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Thallium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Radium-226	pCi/L	< 0.306 ± 0.261	0.909 ± 0.363	< 0.117 ± 0.211	0.519 ± 0.221	0.558 ± 0.232	0.385 ± 0.244	2.76 ± 0.582	0.451 ± 0.270	NR	NR
Radium-228	pCi/L	< 1.09 ± 1.24	2.33 ± 1.13	< 1.81 ± 1.61	< 0.906 ± 1.02	< -0.0622 ± 0.583	1.90 ± 1.24	1.44 ± 0.713	< 0.919 ± 0.853	NR	NR

NOTES:

mg/L: Milligrams per Liter.
Std: Standard units.
pCi/L: Picocuries per Liter.
-- : Laboratory did not analyze sample for indicated constituent.
NR: Analysis of this constituent not required for detection monitoring.
<0.0360: Analyte not detected at laboratory reporting limit (Sample Detection Limit).
D: Sample diluted due to targets detected over highest point of calibration curve or due to matrix interference.
J: Analyte detected above method (sample) detection limit but below method quantitation limit.
H: Bias in sample result likely to be high.

TABLE 3
Groundwater Analytical Results Summary
CPS Energy - Calaveras Power Station
SRH Pond

		JKS-54 Downgradient									
Sample Date		**12/8/16**	**2/23/17**	**3/28/17**	**5/2/17**	**6/21/17**	**7/26/17**	**8/30/17**	**10/11/17**	**4/5/18**	**10/30/18**
Task		**Event 1 Dec 2016**	**Event 2 Feb 2017**	**Event 3 Mar 2017**	**Event 4 May 2017**	**Event 5 Jun 2017**	**Event 6 Jul 2017**	**Event 7 Aug 2017**	**Event 8 Oct 2017**	**Event 9 Apr 2018**	**Event 10 Oct 2018**
Constituents	**Unit**										
Appendix III - Detection Monitoring											
Boron	mg/L	1.24	1.16	1.35	1.32	1.17	1.26	1.16	1.28	1.26	1.3
Calcium	mg/L	114	106	160	--	104	102	95.8	113	111	98.2 D
Chloride	mg/L	345	350	353	346	357	354	339	328	382	356
Fluoride	mg/L	0.718	0.731	0.655 JH	0.857 JH	0.638	0.728	< 0.200	0.661	0.742	0.643
Sulfate	mg/L	308	312	315	319	304	305	298	287	309	283
pH - Field Collected	Std	6.98	6.78	6.92	6.89	6.88	6.91	6.79	6.69	6.86	6.85
Total dissolved solids	mg/L	1370	1430	1310	1420	1410	1320	1360	1500	1230	1240
Appendix IV - Assessment Monitoring											
Antimony	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Arsenic	mg/L	< 0.0100	0.000369	0.000898	0.000371	0.000378	0.000484	0.000324	< 0.00200	NR	NR
Barium	mg/L	0.0631	0.0564	0.0611	0.0557	0.0569	0.0593	0.0471	0.0558	NR	NR
Beryllium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Cadmium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Chromium	mg/L	< 0.0200	0.000657	0.00186	< 0.00400	< 0.00400	0.000693	0.000765	< 0.00400	NR	NR
Cobalt	mg/L	0.000420	0.000212	0.00199	0.000253	0.000273	0.000532	0.000334	< 0.00200	NR	NR
Fluoride	mg/L	0.718	0.731	0.655 JH	0.857 JH	0.638	0.728	< 0.200	0.661	NR	NR
Lead	mg/L	< 0.0100	< 0.00200	0.000862	< 0.00200	< 0.00200	0.000241	< 0.00200	< 0.00200	NR	NR
Lithium	mg/L	< 0.0200	0.0452	< 0.100	--	0.0602	0.0599	0.0712	0.0608	NR	NR
Mercury	mg/L	< 0.000200	0.0000620	< 0.000200	< 0.000200	< 0.000200	< 0.000200	< 0.000200	< 0.000200	NR	NR
Molybdenum	mg/L	< 0.0100	0.000447	0.000367	0.000377	0.000342	0.000352	0.000260	< 0.00200	NR	NR
Selenium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Thallium	mg/L	< 0.0100	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	NR	NR
Radium-226	pCi/L	0.880 ± 0.339	0.878 ± 0.358	0.546 ± 0.213	< 0.217 ± 0.217	0.433 ± 0.249	< 0.313 ± 0.254	0.926 ± 0.324	0.420 ± 0.205	NR	NR
Radium-228	pCi/L	< 1.12 ± 1.11	1.94 ± 1.01	< 0.429 ± 0.781	< 0.574 ± 1.41	< 0.451 ± 0.660	< 0.766 ± 1.29	< 1.48 ± 0.968	< 1.17 ± 0.827	NR	NR

NOTES:

mg/L: Milligrams per Liter.
Std: Standard units.
pCi/L: Picocuries per Liter.
-- : Laboratory did not analyze sample for indicated constituent.
NR: Analysis of this constituent not required for detection monitoring.
<0.0360: Analyte not detected at laboratory reporting limit (Sample Detection Limit).
D: Sample diluted due to targets detected over highest point of calibration curve or due to matrix interference.
J: Analyte detected above method (sample) detection limit but below method quantitation limit.
H: Bias in sample result likely to be high.

Figures

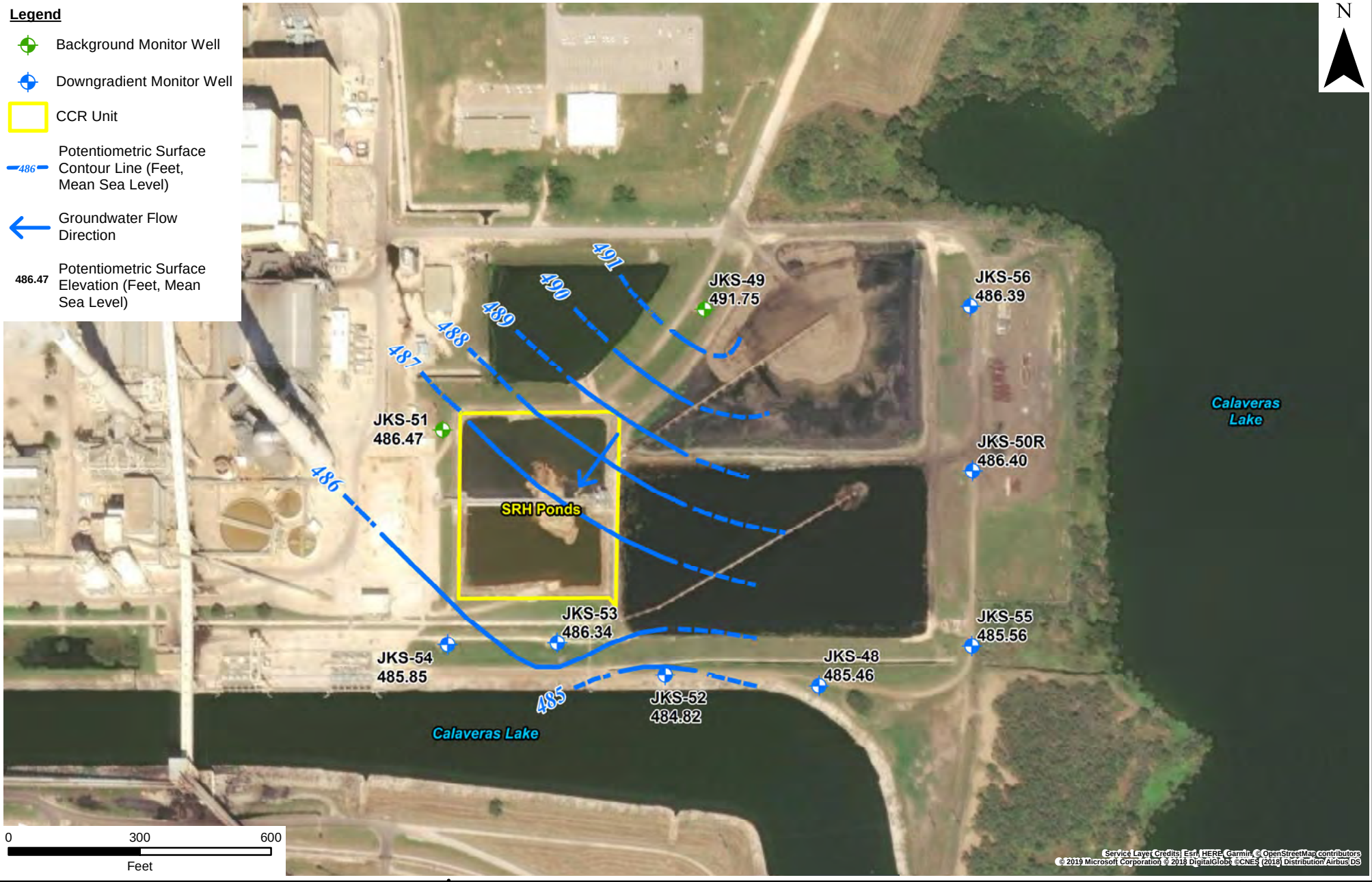
Environmental Resources Management

DESIGN:	NH	DRAWN:	EFC	CHKD.:	WZ
DATE:	1/8/2018	SCALE:	AS SHOWN	REVISION:	0

P:\Projects\0337367 CPS Energy CCR GW Investigation.WZ\Eight Background Sampling Events\GIS\MXD\2017_CAR\0337367_CPSCalv_WellsLocs.mxd

FIGURE 1
CCR WELL NETWORK LOCATION MAP
CPS Energy - Calaveras Power Station
San Antonio, Texas

ERM



Environmental Resources Management

DESIGN:	NH	DRAWN:	EFC	CHKD.:	WZ
DATE:	1/14/2019	SCALE:	AS SHOWN	REVISION:	1

P:\Projects\0337367 CPS Energy CCR GW Investigation.WZ\Sampling Events\2016-17\GIS\MXD\2018\0337367_CPSCalv_pmapS_SRHPonds_oct2018.mxd

FIGURE 2
POTENTIOMETRIC SURFACE MAP - OCTOBER 2018
SRH Ponds CCR Unit
CPS Energy - Calaveras Power Station
San Antonio, Texas

ERM

Laboratory Data Packages

Appendix A

(*Data Packages Available Upon Request*)

Statistical Analysis Tables and Figures

Appendix B

APPENDIX B - TABLE 1
Kruskal-Wallis Test Comparisons of Upgradient Wells
Calaveras Power Station
SRH Pond

Analyte	N	Num Detects	Percent Detect	DF	KW Statistic	p-value	Conclusion	UPL Type
Boron	20	20	1	1	14.3	<0.001	Significant Difference	Intrawell
Calcium	20	20	1	1	13.7	<0.001	Significant Difference	Intrawell
Chloride	20	20	1	1	0.0515	0.82	No Significant Difference	Interwell
Fluoride	20	19	0.95	1	13.7	<0.001	Significant Difference	Intrawell
pH	20	20	1	1	9.68	0.00186	Significant Difference	Intrawell
Sulfate	20	20	1	1	13.7	<0.001	Significant Difference	Intrawell
TDS	20	20	1	1	3.73	0.0535	No Significant Difference	Interwell

NOTES:

Non-detects were substituted with a value of half the detection limit for calculations.
N: number of data points
DF: degrees of freedom
statistic: Kruskal Wallis test statistic
p-value: P-values below 0.05 indicate that the median concentrations in the upgradient wells are significantly different from each other and the upgradient wells should not be pooled.
p-value: P-values equal or above 0.05 indicate that the median concentrations in the upgradient wells are not significantly different from each other and the upgradient wells can be pooled.

APPENDIX B - TABLE 2
Descriptive Statistics for Upgradient Wells
Calaveras Power Station
SRH Pond

Analyte	Well	Units	N	Num Detects	Percent Detect	Min ND	Max ND	Min Detect	Median	Mean	Max Detect	SD	CV	Distribution
Boron	JKS-49	mg/L	10	10	1			2.7	2.95	2.98	3.28	0.231	0.0777817	Normal
Boron	JKS-51	mg/L	10	10	1			0.347	0.51	0.488	0.565	0.0592	0.1214571	Normal
Calcium	JKS-49	mg/L	10	10	1			113	132	135	173	18	0.133359	Normal
Calcium	JKS-51	mg/L	10	10	1			149	258	253	322	45.1	0.1785115	Normal
Chloride	Pooled	mg/L	20	20	1			295	406	395	459	49.9	0.1262959	Normal
Fluoride	JKS-49	mg/L	10	10	1			0.525	0.681	0.673	0.809	0.0764	0.1136035	Normal
Fluoride	JKS-51	mg/L	10	9	0.9	0.048	0.048	0.247	0.348	0.333	0.534	0.128	0.3842755	Normal
pH	JKS-49	SU	10	10	1			6.16	7.09	6.98	7.19	0.301	0.0430987	NDD
pH	JKS-51	SU	10	10	1			5.48	6.46	6.37	6.7	0.342	0.0536342	NDD
Sulfate	JKS-49	mg/L	10	10	1			194	230	227	265	18.9	0.0830036	Normal
Sulfate	JKS-51	mg/L	10	10	1			260	330	323	359	31.1	0.0963728	Normal
TDS	Pooled	mg/L	20	20	1			916	1440	1430	1980	246	0.1725122	Normal

NOTES:

Non-detects were substituted with a value of half the detection limit for calculations.
Well = Pooled, indicates that the summary statistics were produced for the pooled upgradient wells based on the Kruskal-Wallis test (Table 1).
SU: Standard units
N: number of data points
ND: Non-detect
SD: Standard Deviation
CV: Coefficient of Variation (standard deviation divided by the mean)

APPENDIX B - TABLE 3
Potential Outliers in Upgradient Wells
Calaveras Power Station
SRH Pond

Well	Sample	Date	Analyte	Units	Detect	Concentration	UPL type	Distribution	Statistical Outlier	Visual Outlier	Normal Outlier	Log Statistical Outlier	Log Visual Outlier	Lognormal Outlier	Statistical and Visual Outlier	Notes	Final Outlier Determination
JKS-49	JKS-49549648-015	3/28/2017	Boron	mg/L	TRUE	3.28	Intrawell	Normal	X			X					
JKS-51	JKS-51549648-010	3/28/2017	Calcium	mg/L	TRUE	322	Intrawell	Normal		X			X				
JKS-49	JKS-49-WG-20170725	7/25/2017	pH	SU	TRUE	6.16	Intrawell	NDD	X	X	X	X	X	X	0		
JKS-49	JKS-49-WG-20171010	10/10/2017	pH	SU	TRUE	6.89	Intrawell	NDD		X			X				
JKS-51	JKS-51-WG-20170725	7/25/2017	pH	SU	TRUE	5.48	Intrawell	NDD	X	X	X	X	X	X	0		
JKS-51	JKS-51-WG-20171010	10/10/2017	pH	SU	TRUE	6.2	Intrawell	NDD		X			X				
JKS-49	JKS-49561478-007	8/29/2017	Sulfate	mg/L	TRUE	265	Intrawell	Normal		X							

NOTES:

NDD: No Discernible Distribution
SU: Standard units
Outer tests were performed on detected data only.
Statistical outliers were determined using a Dixon's test for N < 25 and with Rosner's test for N > 25.
Visual outliers were identified if they fall above the confidence envelope on the QQ plot.
Data points were considered potential outliers if they were both statistical and visual outliers.
NDD wells had data points considered as potential outliers if they were either a normal or lognormal outlier.
[Blank] data distribution indicates that the well data did not have enough detected data points for outlier analysis.
Lognormally distributed data was first log-transformed before visual and statistical outlier tests were performed.
Normal data distribution indicates that the well data was directly used for statistical and visual outlier tests.
NDD indicates that both the untransformed and transformed data were examined with statistical and visual outlier tests.
'0' indicates that the data point was a statistical and visual outlier but was retained after review by the hydrogeologist.

APPENDIX B - TABLE 4
Mann Kendall Test for Trends in Upgradient Wells
Calaveras Power Station
SRH Pond

Analyte	UPL Type	Well	N	Num Detects	Percent Detect	p-value	tau	Conclusion
Boron	Intrawell	JKS-49	10	10	1	0.00406	-0.719	Decreasing Trend
Boron	Intrawell	JKS-51	10	10	1	0.0725	-0.449	Stable, No Trend
Calcium	Intrawell	JKS-49	10	10	1	0.727	-0.111	Stable, No Trend
Calcium	Intrawell	JKS-51	10	10	1	0.00915	-0.644	Decreasing Trend
Chloride	Interwell	JKS-49, JKS-51	20	20	1	0.228	0.199	Stable, No Trend
Fluoride	Intrawell	JKS-49	10	10	1	1	-0.0222	Stable, No Trend
Fluoride	Intrawell	JKS-51	10	9	0.9	0.727	-0.111	Stable, No Trend
pH	Intrawell	JKS-49	10	10	1	0.308	-0.263	Stable, No Trend
pH	Intrawell	JKS-51	10	10	1	0.381	-0.244	Stable, No Trend
Sulfate	Intrawell	JKS-49	10	10	1	0.106	0.405	Stable, No Trend
Sulfate	Intrawell	JKS-51	10	10	1	0.472	-0.18	Stable, No Trend
TDS	Interwell	JKS-49, JKS-51	20	20	1	0.344	-0.157	Stable, No Trend

NOTES:

Non-detects were substituted with a value of zero for trend calculations.
N: number of data points
tau: Kendall's tau statistic
p-value: A two-sided p-value describing the probability of the H0 being true (a=0.05)
Trend tests were performed on all upgradient data, only if the dataset met the minimum data quality criteria (ERM 2017).

APPENDIX B - TABLE 5
Calculated UPLs for Upgradient Datasets
Calaveras Power Station
SRH Pond

Analyte	UPL Type	Trend	Well	N	Num Detects	Percent Detects	LPL	UPL	Units	ND Adjustment	Transformation	Alpha	Method	Final LPL	Final UPL	Notes
Boron	Intrawell	Decreasing Trend	JKS-49	10	10	1		2.71	mg/L	None	No	0.00584	NP Detrended UPL		X	
Boron	Intrawell	Stable, No Trend	JKS-51	10	10	1		0.599	mg/L	None	No	0.00584	Param Intra 1 of 2			
Calcium	Intrawell	Stable, No Trend	JKS-49	10	10	1		169	mg/L	None	No	0.00584	Param Intra 1 of 2			
Calcium	Intrawell	Decreasing Trend	JKS-51	10	10	1		231	mg/L	None	No	0.00584	NP Detrended UPL		X	
Chloride	Interwell	Stable, No Trend	JKS-49, JKS-51	20	20	1		476	mg/L	None	No	0.00584	Param Inter 1 of 2		X	
Fluoride	Intrawell	Stable, No Trend	JKS-49	10	10	1		0.816	mg/L	None	No	0.00584	Param Intra 1 of 2		X	
Fluoride	Intrawell	Stable, No Trend	JKS-51	10	9	0.9		0.556	mg/L	None	No	0.00584	Param Intra 1 of 2			
pH	Intrawell	Stable, No Trend	JKS-49	10	10	1	6.16	7.19	SU	None	No	0.0303	NP Intra (normality) 1 of 2		X	
pH	Intrawell	Stable, No Trend	JKS-51	10	10	1	5.48	6.7	SU	None	No	0.0303	NP Intra (normality) 1 of 2	X		
Sulfate	Intrawell	Stable, No Trend	JKS-49	10	10	1		263	mg/L	None	No	0.00584	Param Intra 1 of 2			
Sulfate	Intrawell	Stable, No Trend	JKS-51	10	10	1		382	mg/L	None	No	0.00584	Param Intra 1 of 2		X	
TDS	Interwell	Stable, No Trend	JKS-49, JKS-51	20	20	1		1830	mg/L	None	No	0.00584	Param Inter 1 of 2		X	

NOTES:

Non-detects were substituted with a value of half the detection limit for calculations.
UPL: upper prediction limit
LPL: Lower prediction limit. These were only calculated for pH
UPLs were constructed with a site wide false positive rate of 0.1 and a 1 of 2 retesting.
UPLs were calculated using Sanitas Software.
SU: Standard units
NP: non parametric
RL: Reporting Limit
Intra: indicates an intrawell UPL was used
Inter: indicates an interwell UPL was used
In the case where multiple UPLs were calculated for an analyte, the maximum UPL was used as the final UPL.
In the case where multiple LPLs were calculated for an pH the minimum LPL was used as the final LPL.

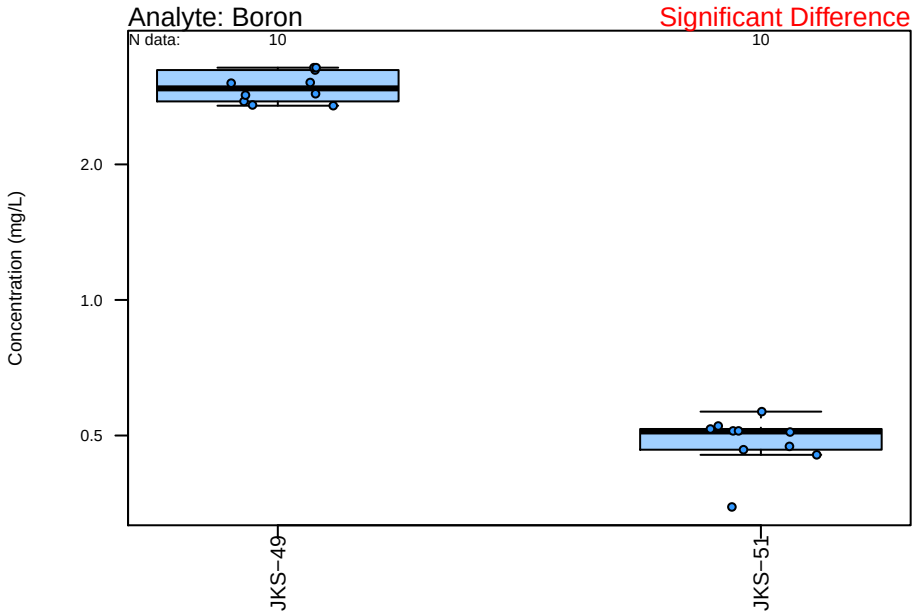
APPENDIX B - TABLE 6
Comparisons of Downgradient Wells to UPLs
Calaveras Power Station
SRH Pond

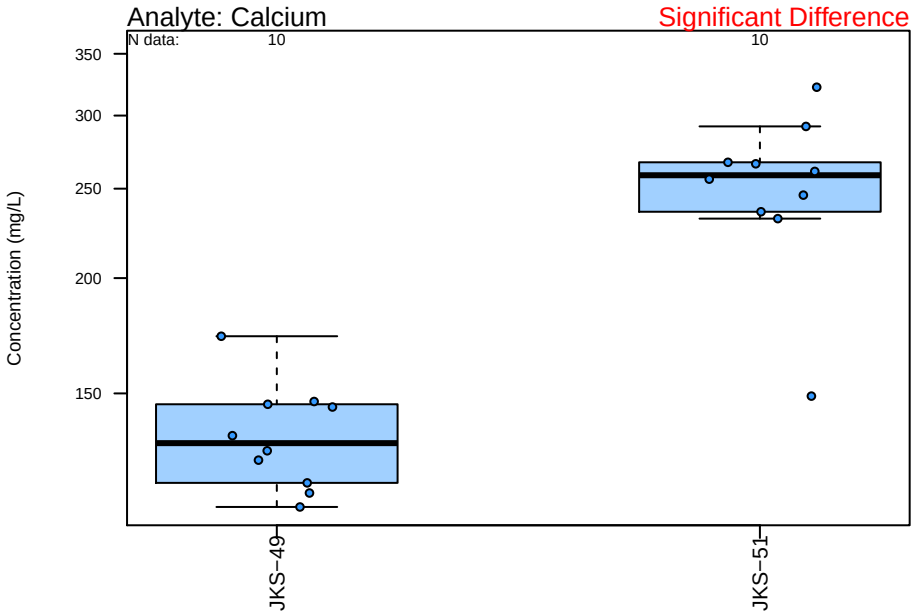
Analyte	Well	LPL	UPL	Units	Recent Date	Observation	Qualifier	Obs > UPL	Notes	Mann Kendall p-value	Mann Kendall tau
Boron	JKS-52		2.71	mg/L	10/30/2018	1.54					
Boron	JKS-53		2.71	mg/L	10/30/2018	1.61					
Boron	JKS-54		2.71	mg/L	10/30/2018	1.3					
Calcium	JKS-52		231	mg/L	10/30/2018	153					
Calcium	JKS-53		231	mg/L	10/30/2018	111					
Calcium	JKS-54		231	mg/L	10/30/2018	98.2					
Chloride	JKS-52		476	mg/L	10/30/2018	326					
Chloride	JKS-53		476	mg/L	10/30/2018	350					
Chloride	JKS-54		476	mg/L	10/30/2018	356					
Fluoride	JKS-52		0.816	mg/L	10/30/2018	0.71					
Fluoride	JKS-53		0.816	mg/L	10/30/2018	0.265					
Fluoride	JKS-54		0.816	mg/L	10/30/2018	0.643					
pH	JKS-52	5.48	7.19	SU	10/30/2018	6.76					
pH	JKS-53	5.48	7.19	SU	10/30/2018	6.65					
pH	JKS-54	5.48	7.19	SU	10/30/2018	6.85					
Sulfate	JKS-52		382	mg/L	10/30/2018	292					
Sulfate	JKS-53		382	mg/L	10/30/2018	236					
Sulfate	JKS-54		382	mg/L	10/30/2018	283					
TDS	JKS-52		1830	mg/L	10/30/2018	1210					
TDS	JKS-53		1830	mg/L	10/30/2018	1140					
TDS	JKS-54		1830	mg/L	10/30/2018	1240					

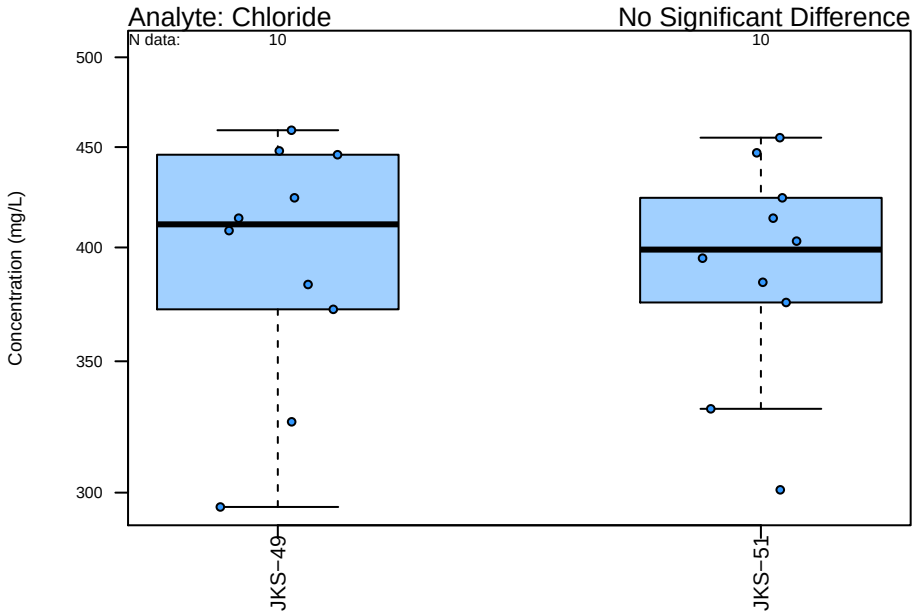
NOTES:

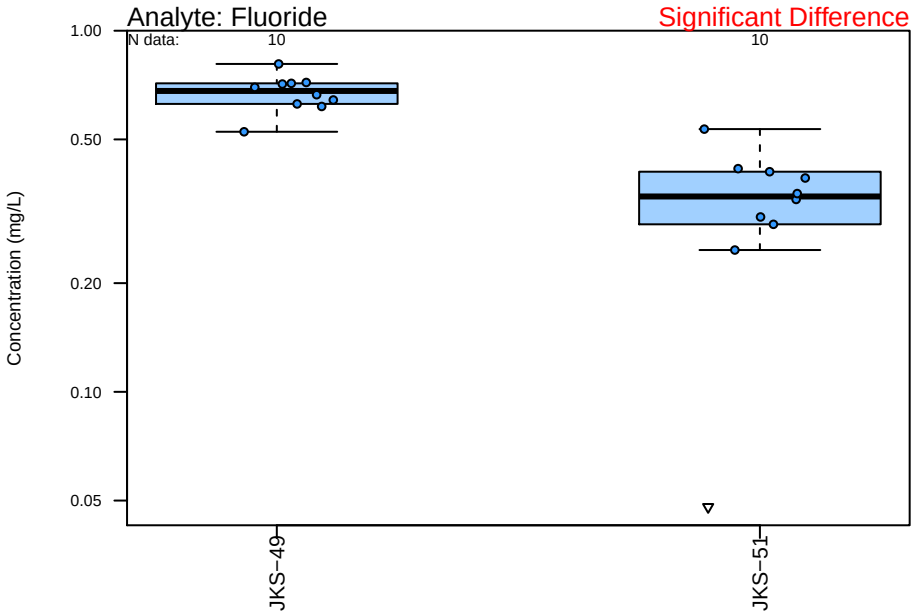
Non-detects were substituted with a value of zero for trend calculations.
UPL: Upper Prediction Limit
ND: Not detected
SU: Standard units
tau: Kendall's tau statistic
p-value: A two-sided p-value describing the probability of the H0 being true (a=0.05)
Exceed 'X' indicates that the most recent observed value is higher than the UPL (or out of range of the LPL and UPL in the case of pH).
Exceed 'X0' indicates that the two most recent values are higher than the UPL, but the upgradient well is 100% ND.
Exceed '0' indicated that the most recent observed value is higher than the UPL, but is not scored as an SSI due to Double Quantification Rule (ERM 2017).

Appendix B − Figure 1
Unit: SRH Pond
Boxplots of Upgradient Wells

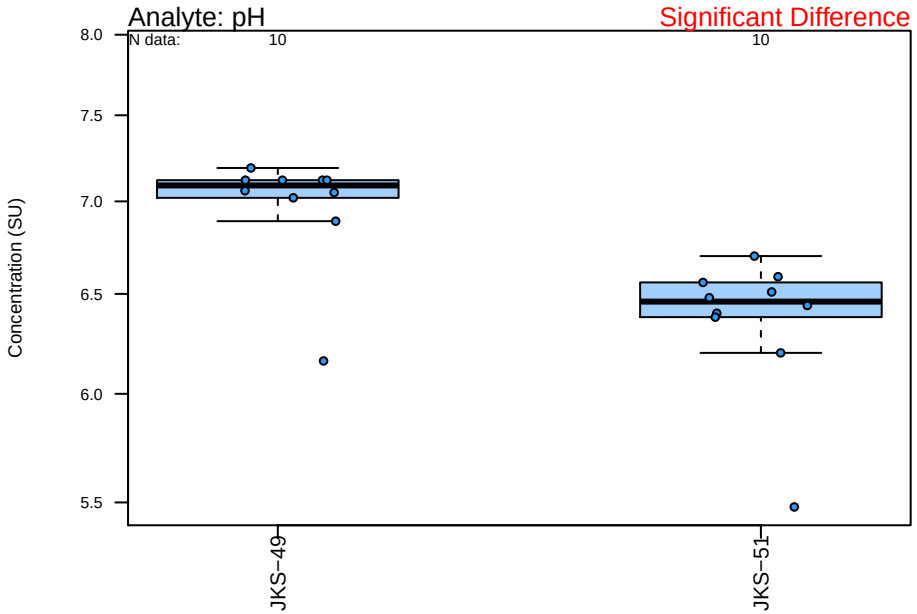


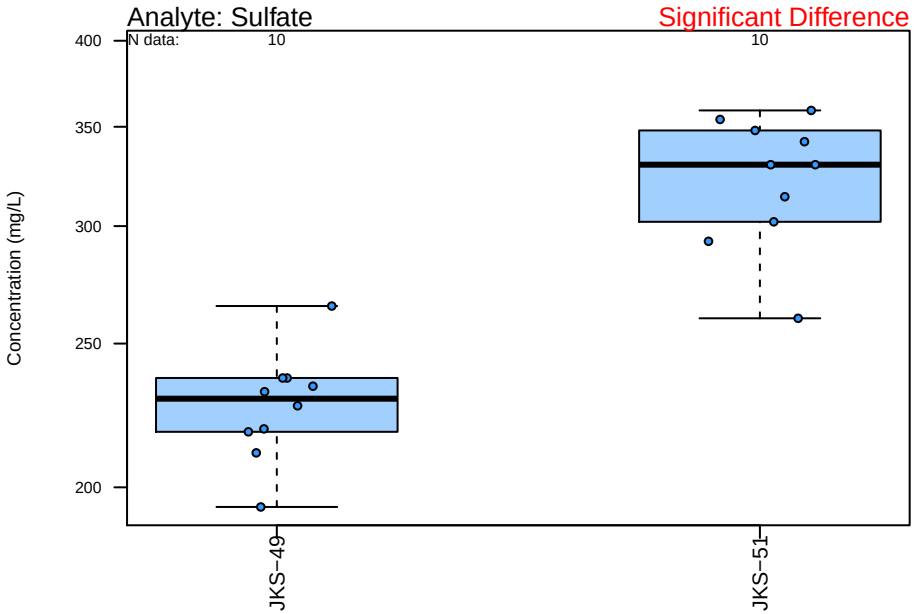


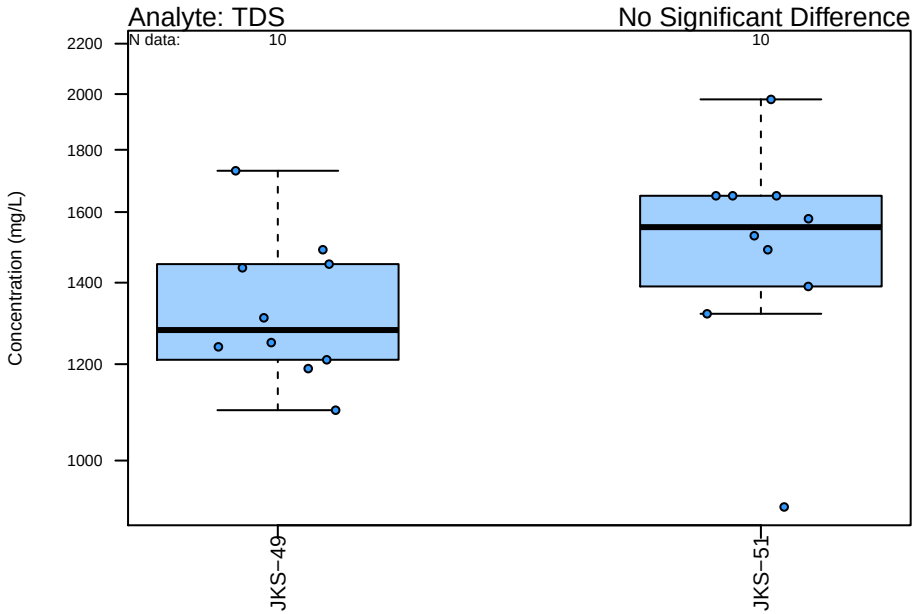




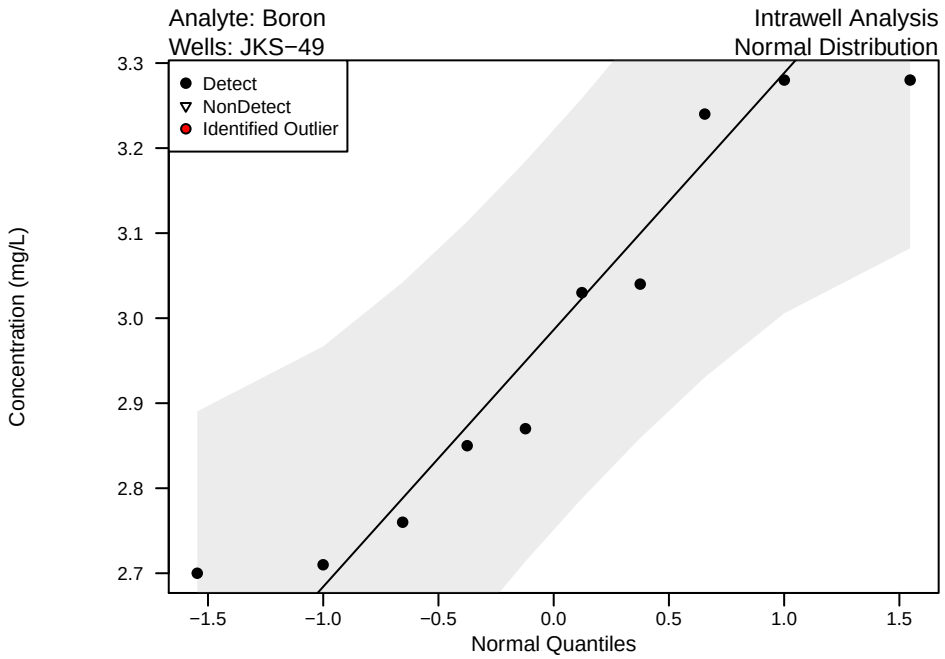
Appendix B − Figure 1
Unit: SRH Pond
Boxplots of Upgradient Wells







Appendix B − Figure 2
Unit: SRH Pond
QQ Plots of Upgradient Wells



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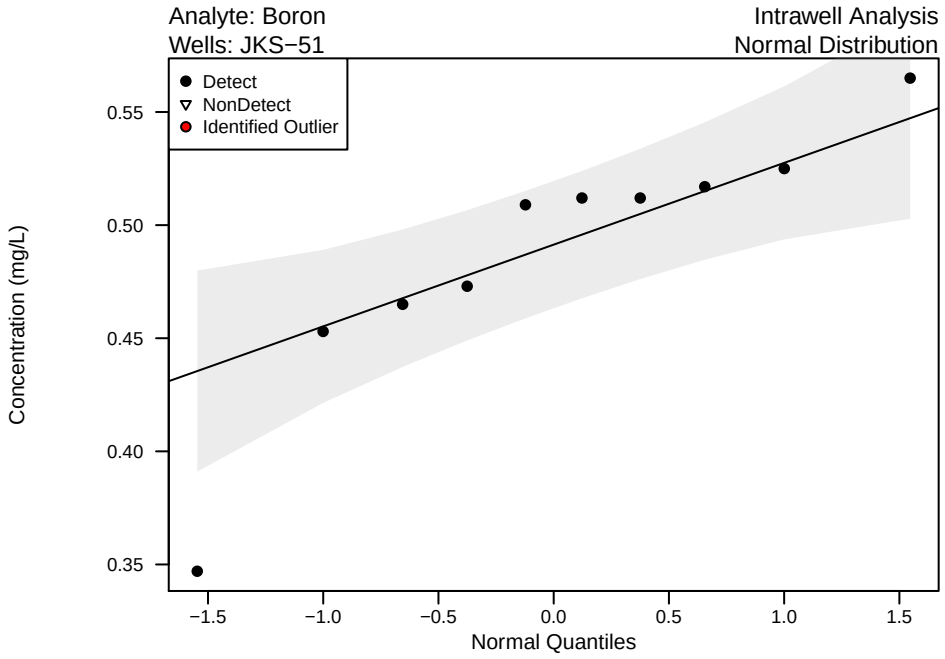
not Lognormal/NDD distribution.



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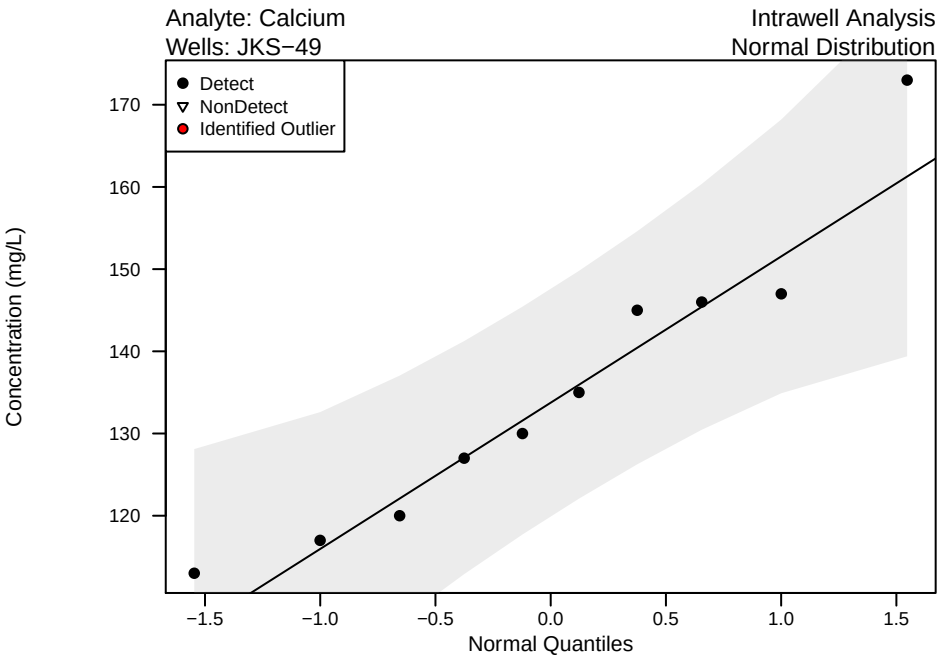
not Lognormal/NDD distribution.

Appendix B − Figure 2
Unit: SRH Pond
QQ Plots of Upgradient Wells



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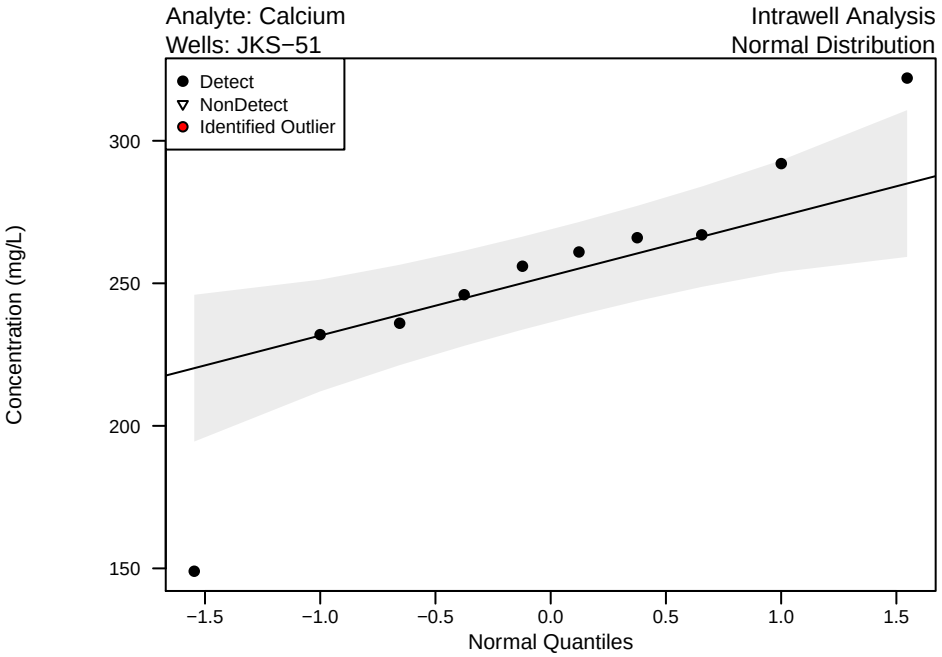

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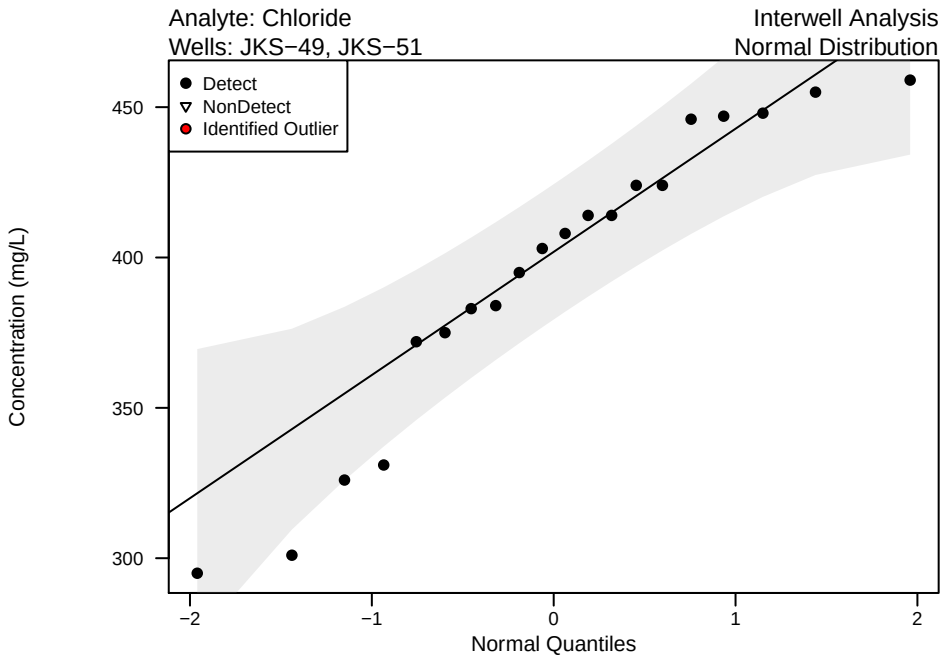
not Lognormal/NDD distribution.

Appendix B − Figure 2
Unit: SRH Pond
QQ Plots of Upgradient Wells



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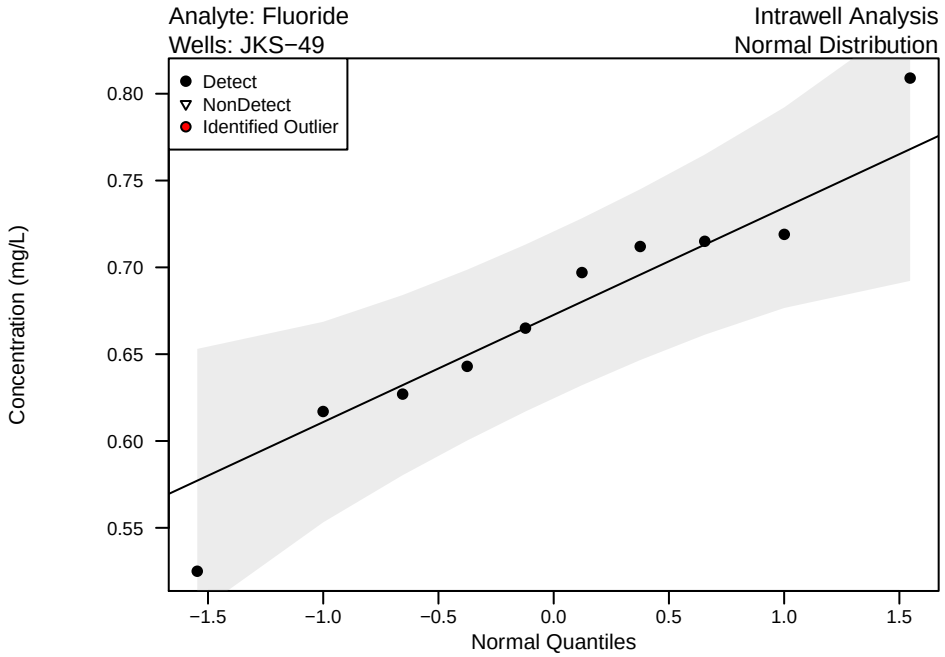

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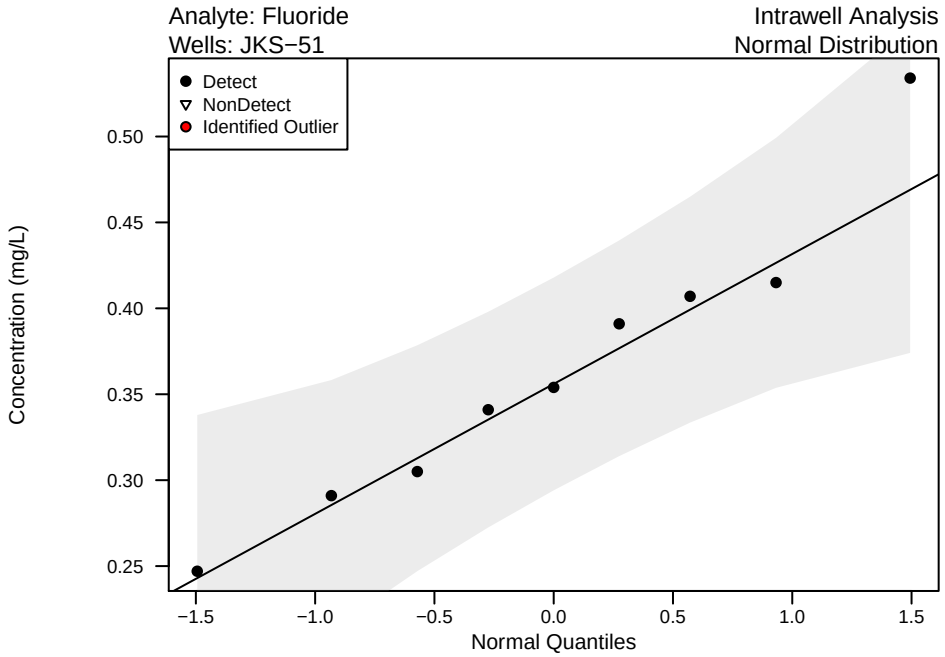
Appendix B − Figure 2
Unit: SRH Pond
QQ Plots of Upgradient Wells



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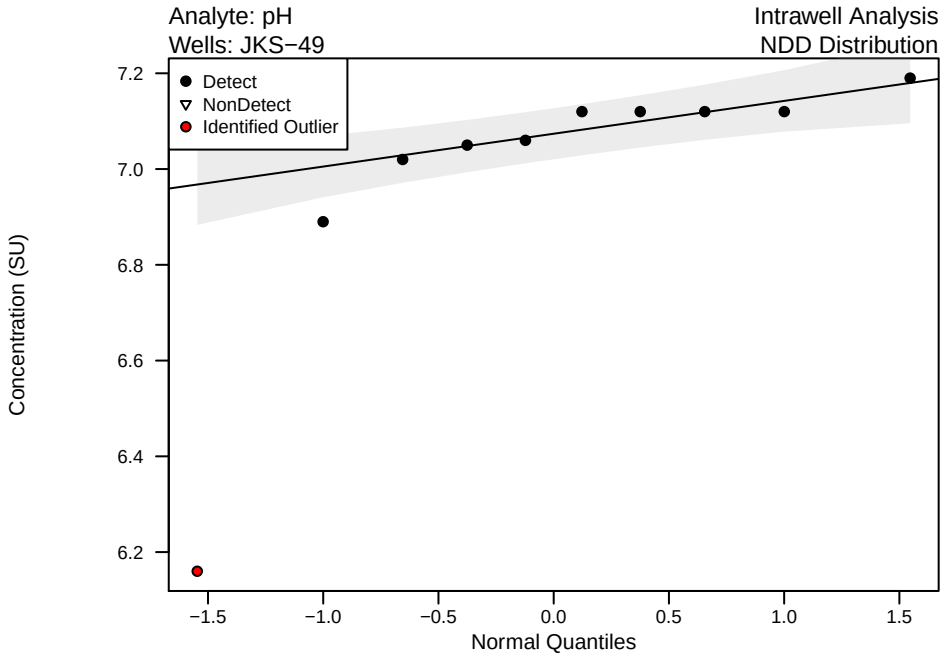
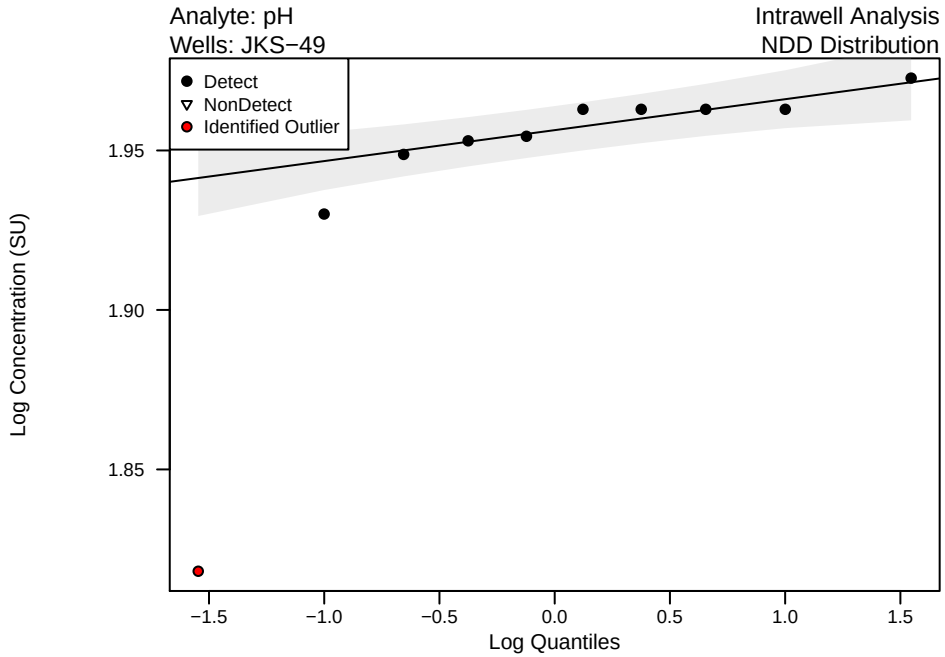
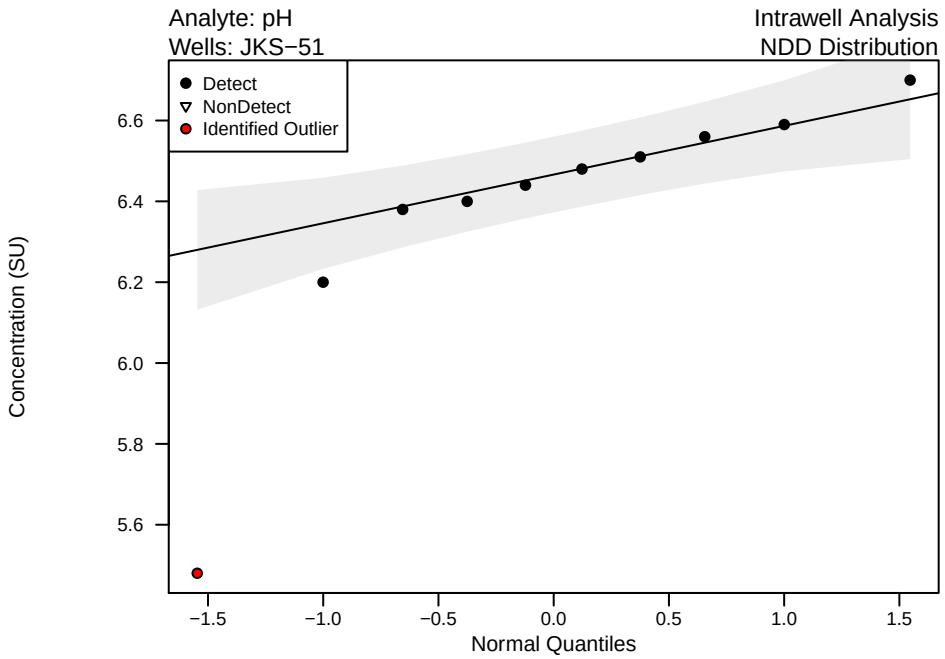
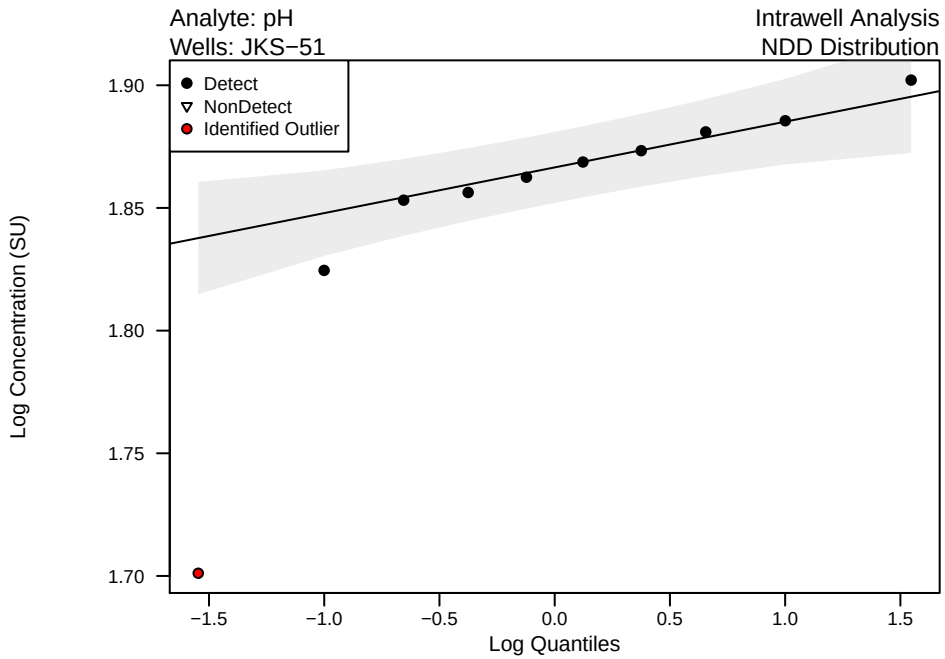
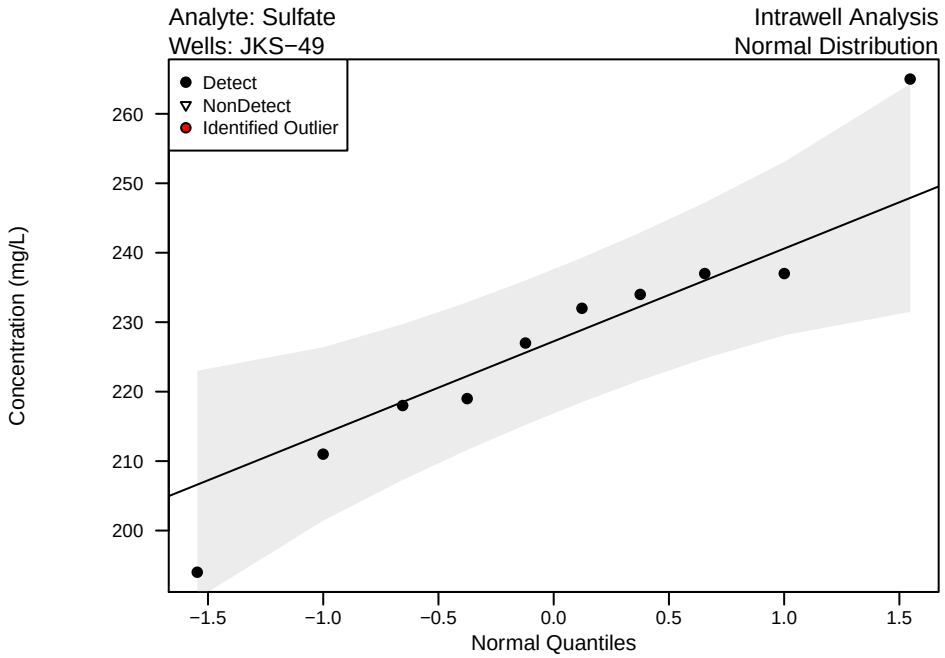




Appendix B − Figure 2
Unit: SRH Pond
QQ Plots of Upgradient Wells







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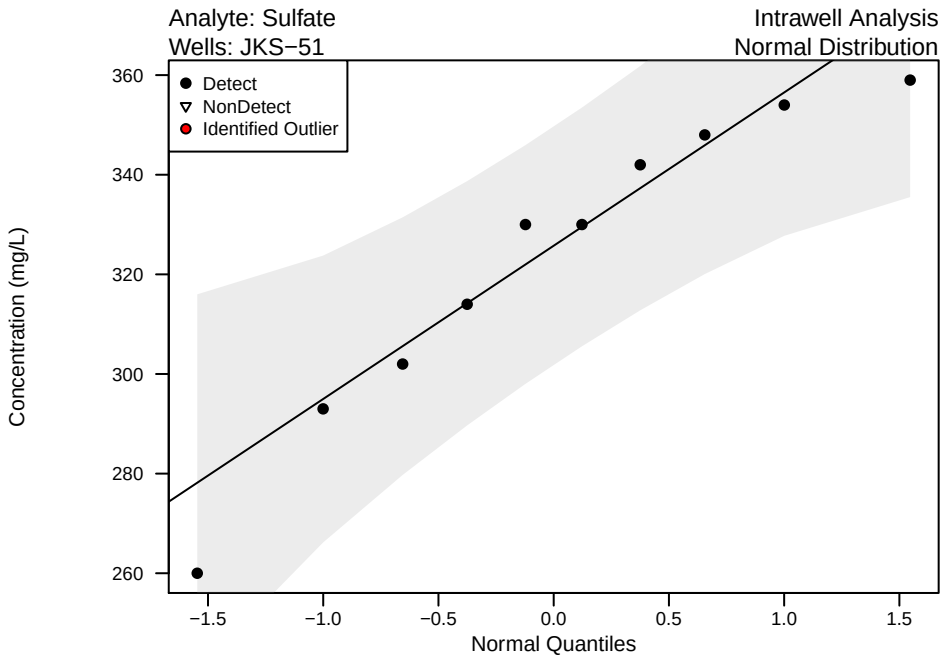
Appendix B − Figure 2
Unit: SRH Pond
QQ Plots of Upgradient Wells



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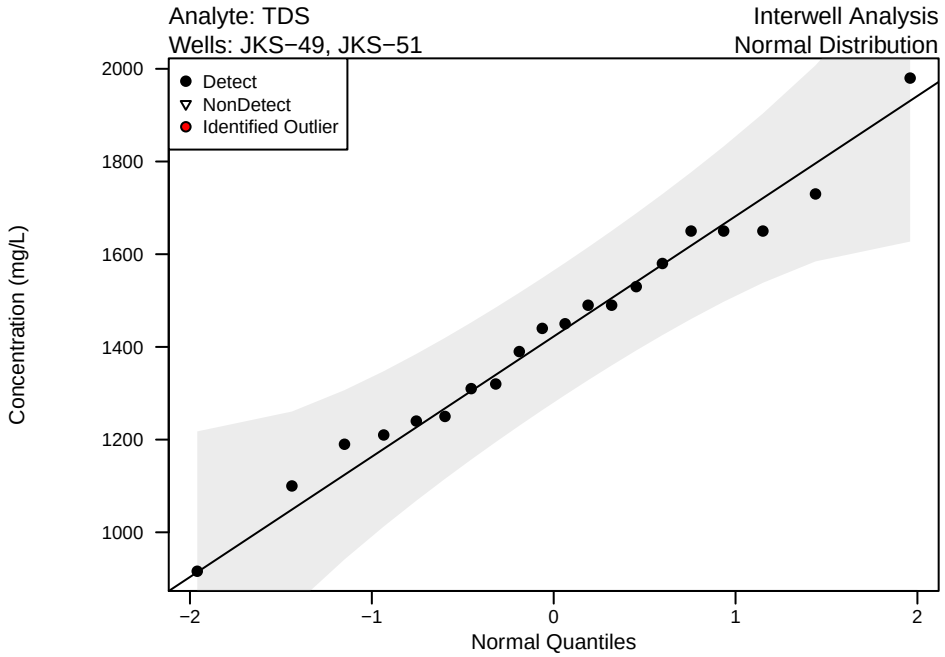

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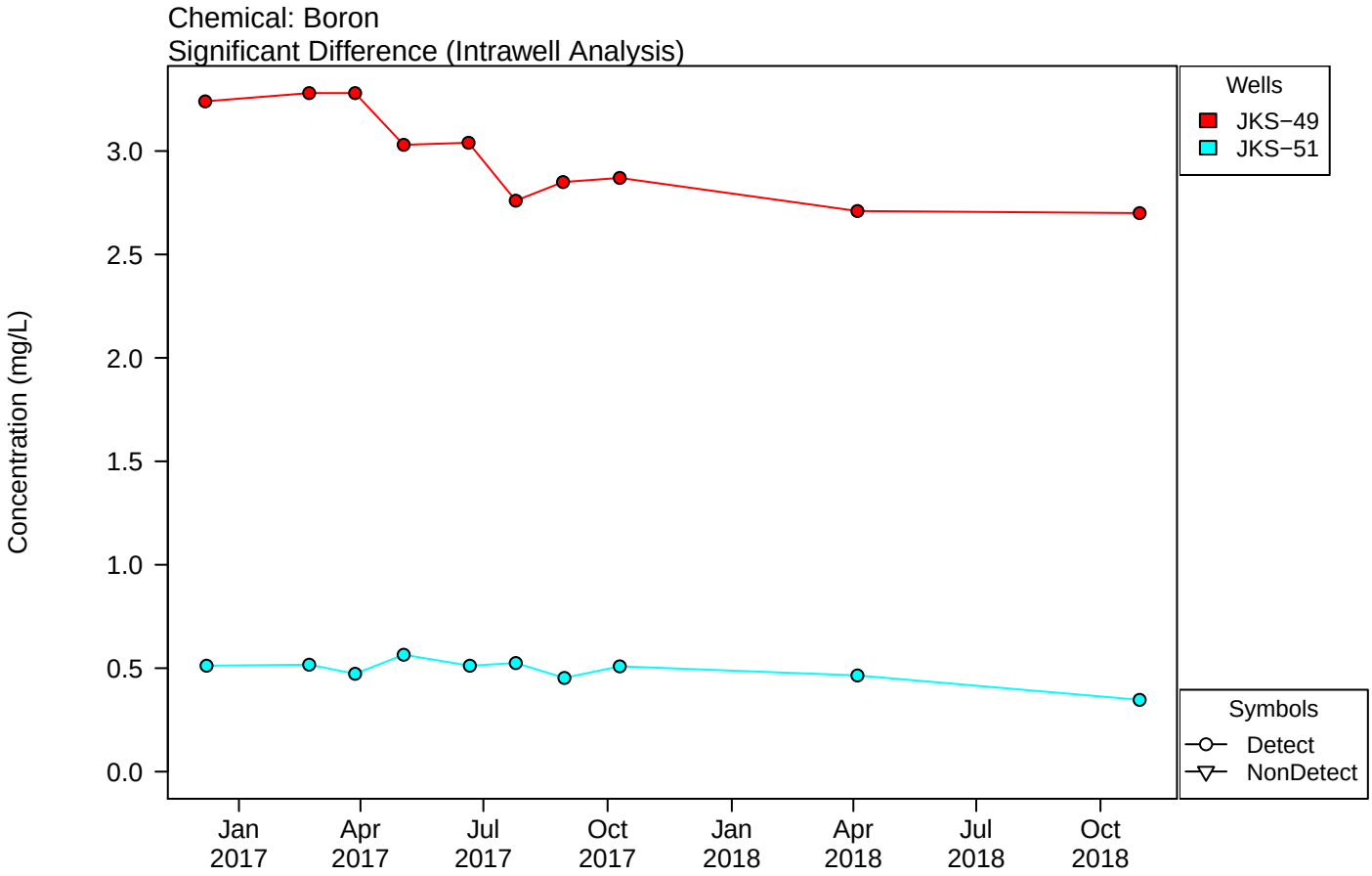
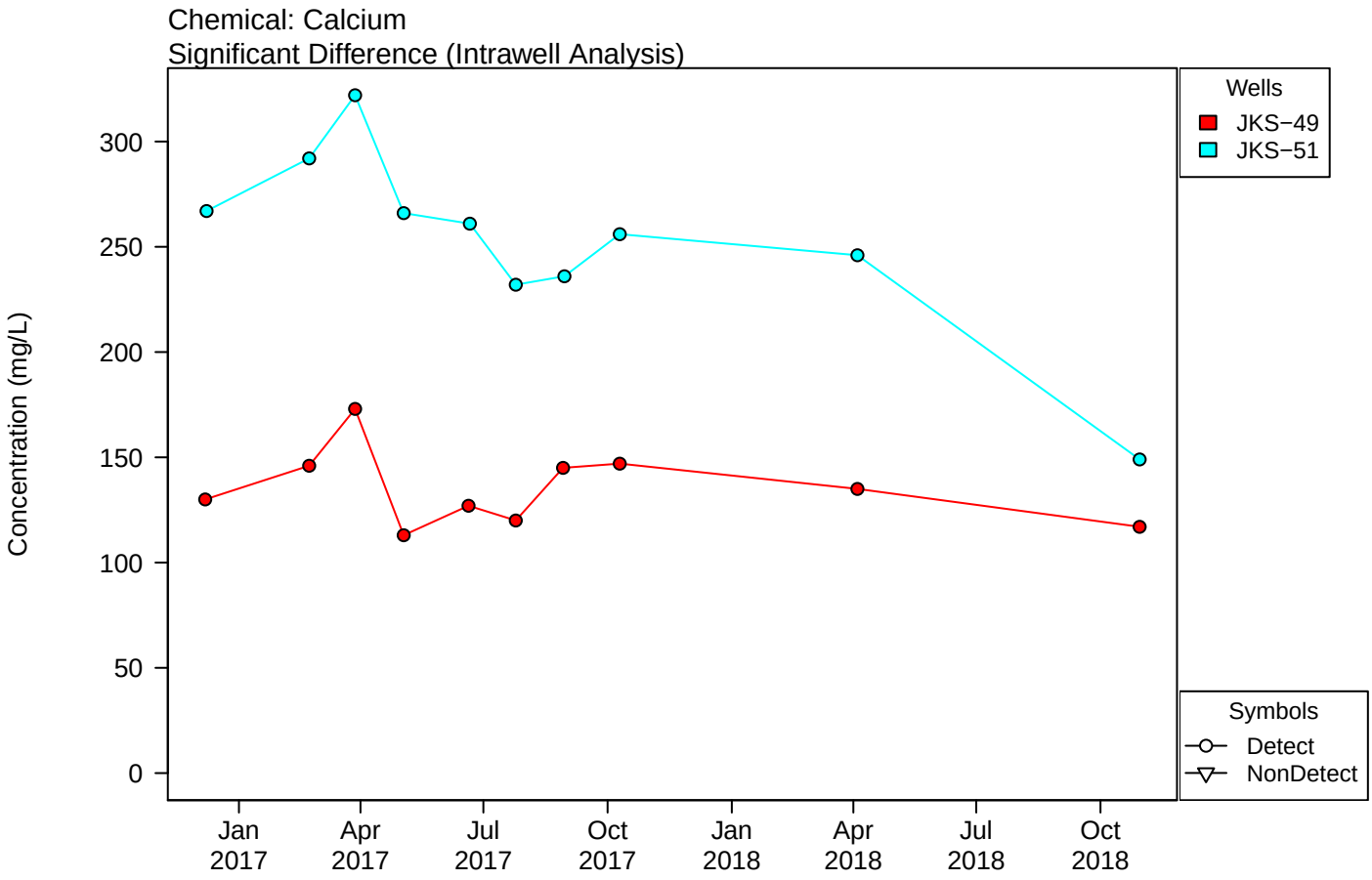
Appendix B − Figure 3
Unit: SRH Pond
Timeseries of Upgradient Wells





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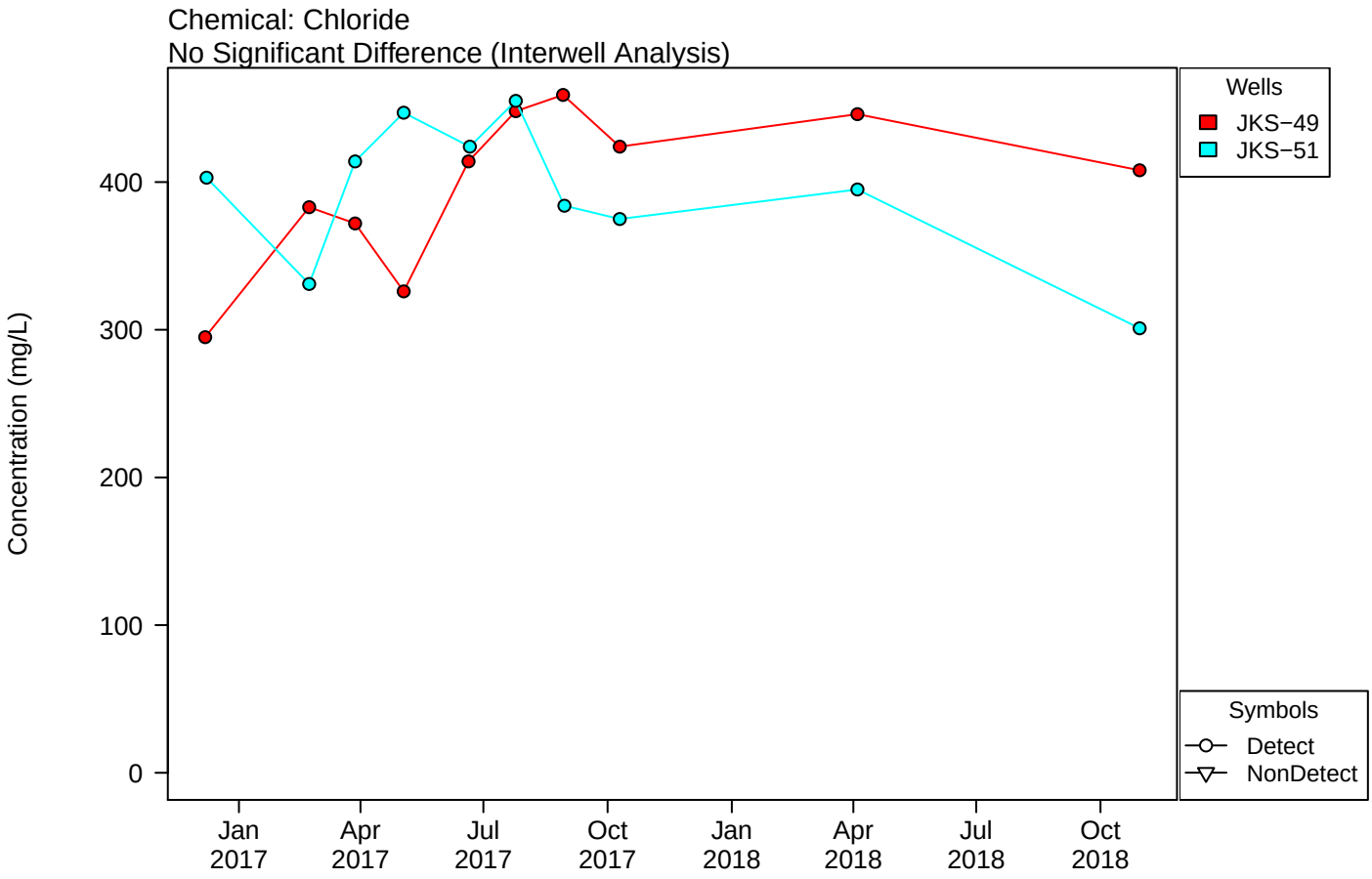
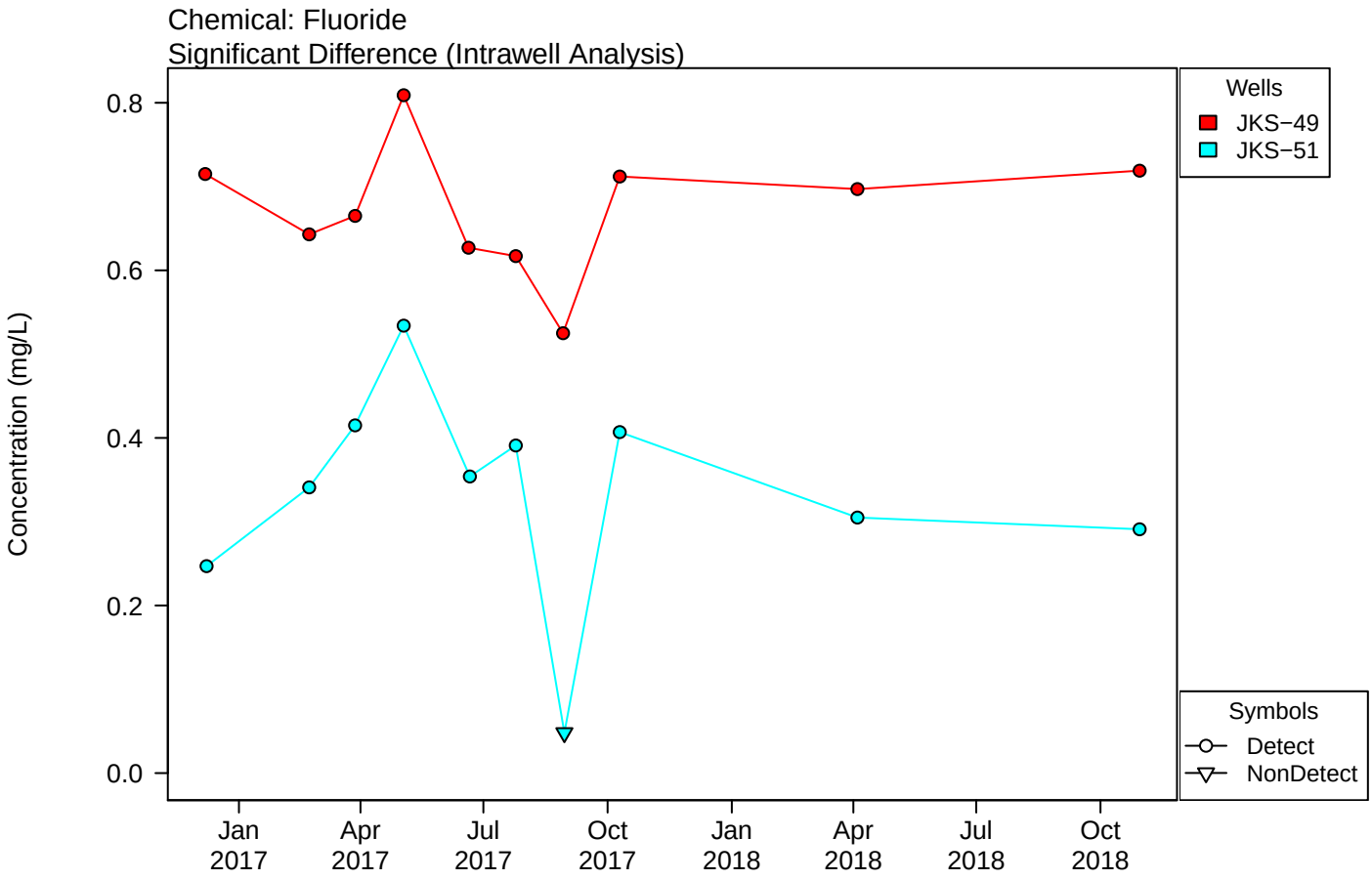
Timeseries of Upgradient Wells





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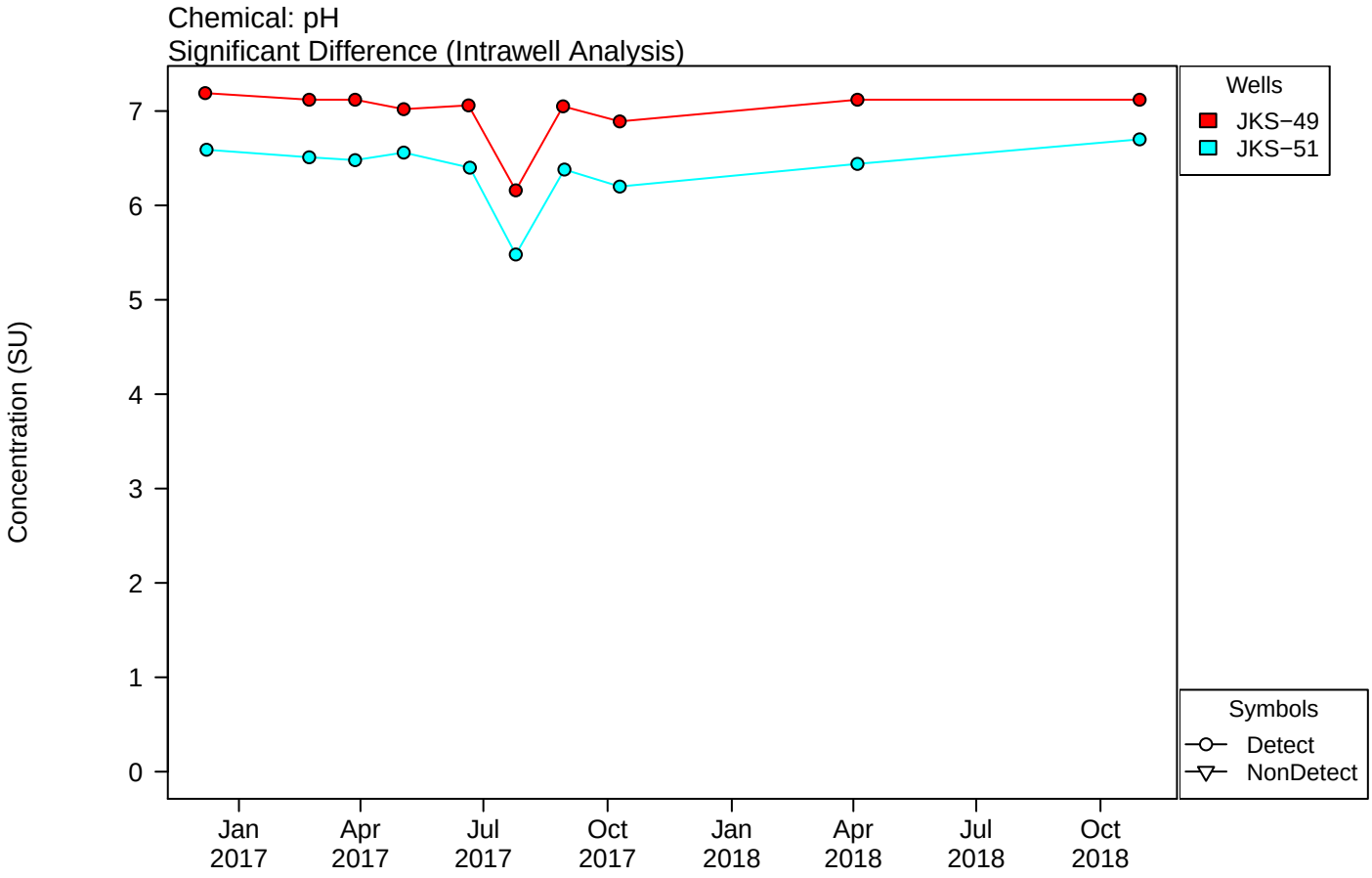
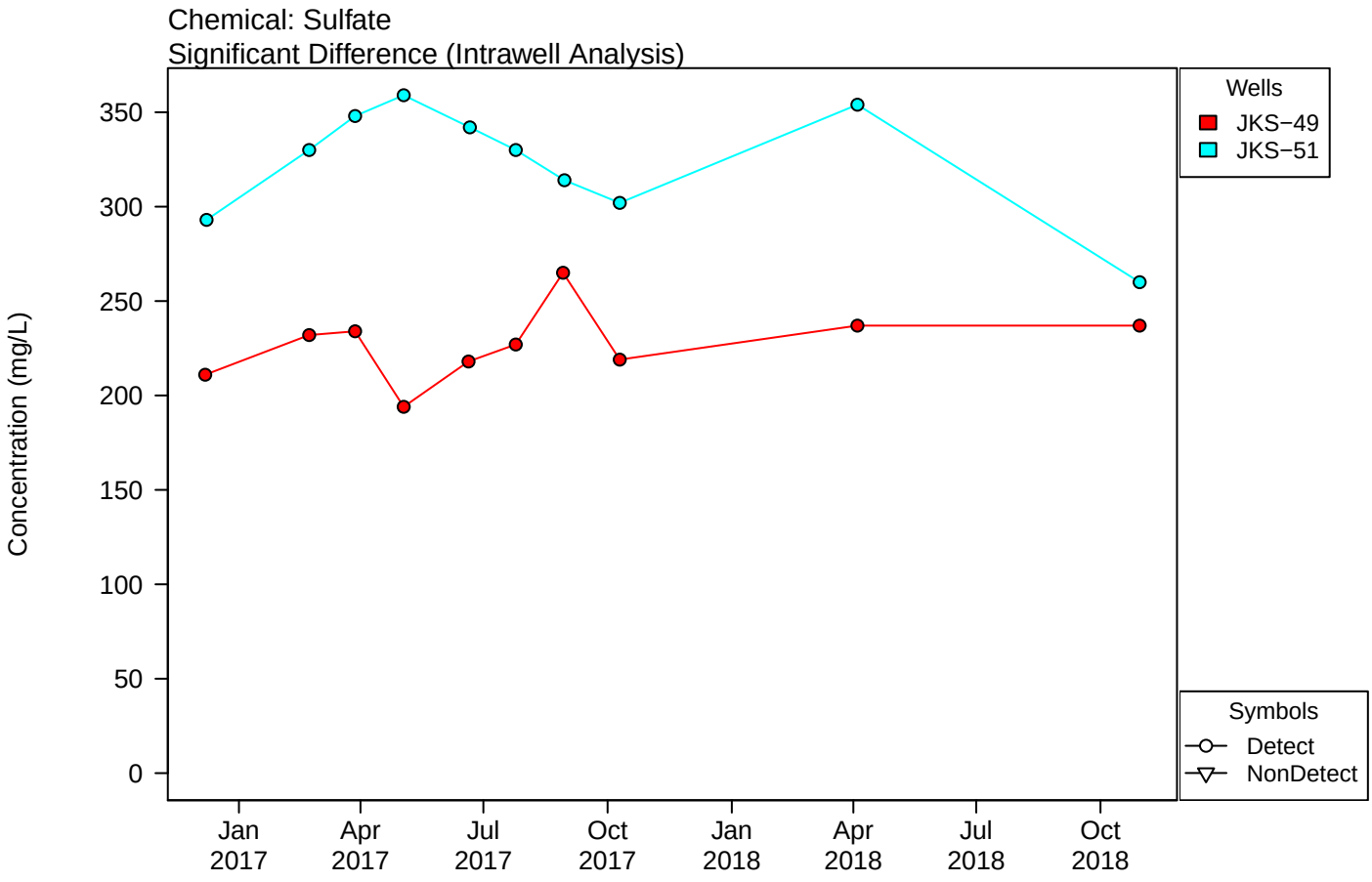
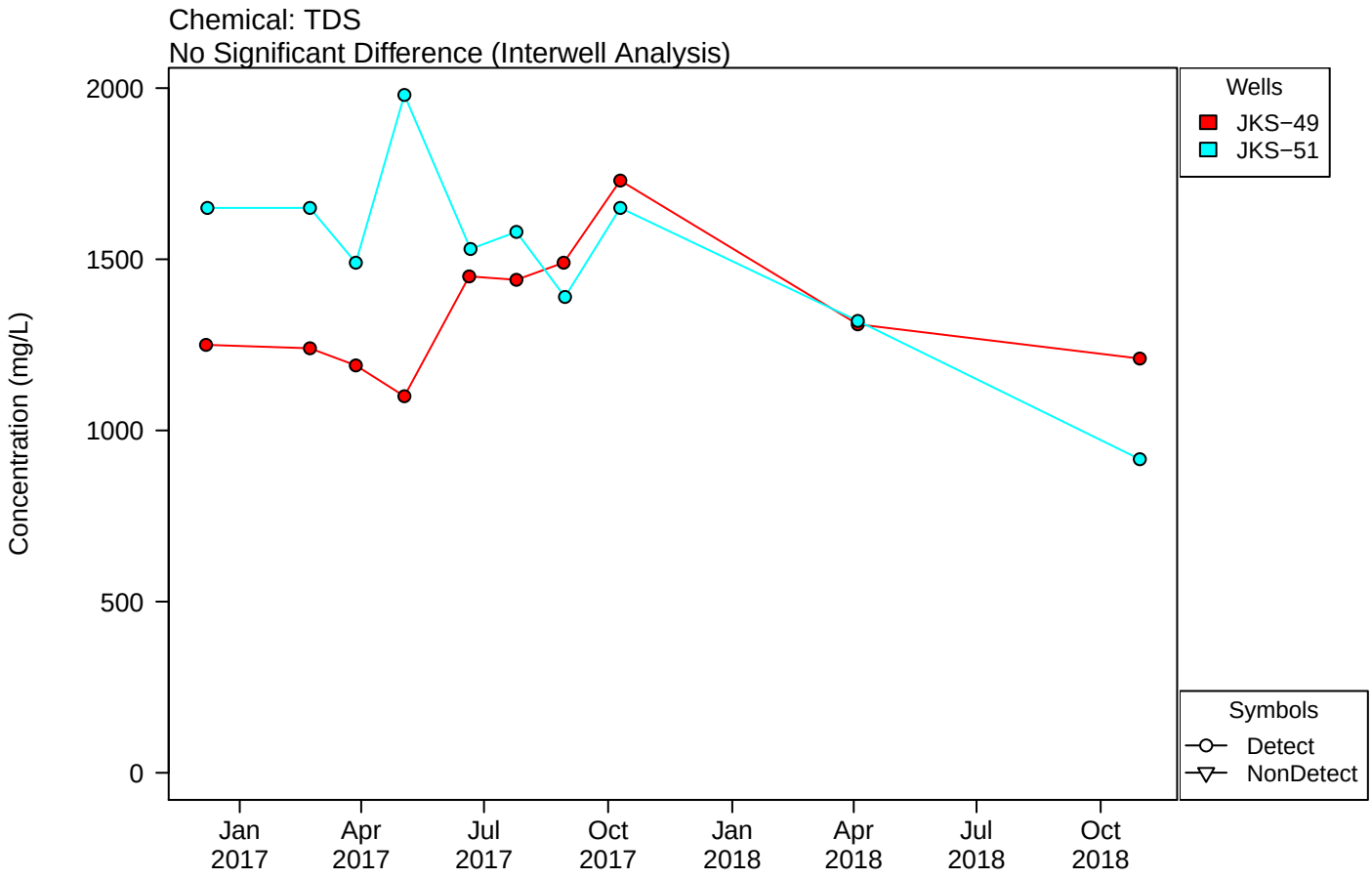
Unit: SRH Pond
Timeseries of Upgradient Wells





Appendix B − Figure 3
Unit: SRH Pond
Timeseries of Upgradient Wells



April 2018 Groundwater Sampling Event – Calaveras Power Station CCR Units

Appendix C

Environmental Resources Management

CityCentre Four
840 West Sam Houston Pkwy N.
Suite 600
Houston, Texas 77024
(281) 600-1000
(281) 600-1001 (Fax)

June 20, 2018

Mr. Michael Malone
CPS Energy
145 Navarro Street
San Antonio, Texas 78205

Project No. 0337367

Subject: April 2018 Groundwater Sampling Event
Calaveras Power Station CCR Units
San Antonio, Texas

Dear Mr. Malone:

Introduction

Title 40, Code of Federal Regulations, Part 257 (40 CFR §257) (a.k.a. the Coal Combustion Residual (CCR) Rule) was published in the Federal Register in April 2015 and became effective in October 2015. One of the many requirements of the CCR Rule was for CPS Energy to determine if there are impacts to groundwater from the surface impoundments [Evaporation Pond (EP), Bottom Ash Ponds (BAPs), and Sludge Recycling Holding (SRH) Pond] and the landfill [Fly Ash Landfill (FAL)] that contain CCR at the Calaveras Power Station.

In the initial *Annual Groundwater Monitoring and Corrective Action Report* for each CCR unit, the downgradient monitoring well results from the October 2017 sampling event were compared to the Upper Prediction Limits (UPLs) and Lower Prediction Limits (LPLs). UPLs and LPLs were calculated in the respective *Annual Groundwater Monitoring and Corrective Action Reports* for the purpose of determining a potential statistically significant increase (SSI) over background levels. The initial evaluation of the groundwater sample results indicated a potential SSI for a limited number of constituents from the EP, FAL, and BAPs. Groundwater sample results from the SRH Pond did not indicate a potential SSI.

According to the CCR Rule [§257.94(e)], if the owner or operator of a CCR unit determines there is a SSI over background levels for one or more Appendix III constituents, the owner or operator may demonstrate that a source other than the CCR unit caused the SSI over background levels or that the SSI resulted from error in sampling, analysis, statistical evaluation or natural variation in groundwater quality. The CCR Rule also indicates that the owner or operator must complete the written demonstration within 90 days of detecting a SSI over the background levels. If a successful demonstration is completed within the 90-day period, the owner or operator may continue with a detection monitoring program.

To address the potential SSIs identified in the initial *Annual Groundwater Monitoring and Corrective Action Reports*, CPS Energy prepared *Written Demonstration – Responses to Potential Statistically Significant Increases (Written Demonstration) (*dated April 4, 2018). Based on the evidence provided in the *Written Demonstration*, no SSIs over background levels were determined for any of the CPS Energy CCR units (EP, FAL, BAPs, and SRH Pond) and therefore, CPS Energy continued with a detection monitoring program that would include semiannual sampling.

Sampling Event Summary

The first semiannual groundwater sampling event was conducted in April 2018. The sampling event included the collection of water level measurements and groundwater samples from all the background and downgradient monitoring wells in the CCR monitoring program. The groundwater samples were analyzed for Appendix III constituents.

For each CCR unit, the downgradient monitoring well results from the April 2018 sampling event were compared to the UPLs and LPLs calculated in their respective *Annual Groundwater Monitoring and Corrective Action Report*. The April 2018 groundwater sample results for the downgradient monitoring wells in each CCR unit are summarized in Attachment 1.

Groundwater sample results from the SRH Pond did not indicate a potential SSI. Although the evaluations of the April 2018 groundwater sample results indicated a potential SSI for a limited number of constituents from the EP, FAL, and BAPs, the constituents associated with the potential SSIs are the same constituents, detected at similar concentrations, that were previously identified in the *Written Demonstration*. The evaluations of the April 2018 groundwater sample results with potential SSIs are summarized below.

EP – The constituents associated with potential SSIs include fluoride and pH. As previously presented in the *Written Demonstration*, the concentrations of fluoride and pH appear to reflect natural variation in groundwater quality in the vicinity of the CCR unit. The reported April 2018 concentrations were within the range of naturally occurring concentrations identified in the *Written Demonstration*.

FAL – The constituents associated with potential SSIs include calcium, chloride, and pH. As previously presented in the *Written Demonstration*, the concentrations of calcium, chloride, and pH appear to reflect natural variation in groundwater quality in the vicinity of the CCR unit. The reported April 2018 concentrations were within the range of naturally occurring concentrations identified in the *Written Demonstration*.

BAPs – The constituents associated with potential SSIs include fluoride and boron. As previously presented in the *Written Demonstration*, the concentrations of fluoride and boron appear to reflect natural variation in groundwater quality in the vicinity of the CCR unit. The reported April 2018 concentrations were within the range of naturally occurring concentrations identified in the *Written Demonstration*.

Conclusions

Based on the April 2018 groundwater sample results and the evidence provided in the *Written Demonstration* dated April 4, 2018, no SSIs over background levels have been determined for any of the CPS Energy CCR units (EP, FAL, BAPs, and SRH Pond) and therefore, CPS Energy should continue with a detection monitoring program. The second semiannual sampling event should be performed in October 2018.

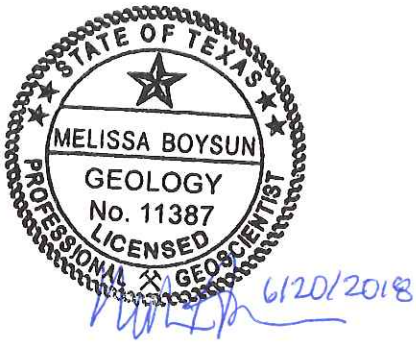
We appreciate the opportunity to work with you on this project. Please contact me if you should have any questions.

Sincerely,

Environmental Resources Management

Melissa Boysun, P.G.

Texas Professional Geoscientist No. 11387



Attachment 1
April 2018 Groundwater Sample Results

June 2018
Project No. 0337367
CPS Energy

Environmental Resources Management
CityCentre Four
840 West Sam Houston Pkwy N. Suite 600
Houston, Texas 77024
(281) 600-1000

April 2018 Groundwater Sample Results
CCR Unit: Evaporation Pond
CPS Energy Calaveras Power Station
San Antonio, TX

			CCR Unit	EP	EP	EP
			Well Designation	Downgradient	Downgradient	Downgradient
			Well ID	JKS-36	JKS-61	JKS-62
			Sample Date	04/05/2018	04/05/2018	04/05/2018
			Sample Type Code	N	N	N
Chemical	Units	2017 LPL - EP	2017 UPL - EP			
Boron	mg/L	--	1.53	0.625	1.09	0.522
Calcium	mg/L	--	1380	281	171	160
Chloride	mg/L	--	2180	347	285	312
Fluoride	mg/L	--	0.465	1.95	0.406 J (1)	0.353 J (1)
pH, Field	SU	5.68	6.75	3.48	6.42	6.72
Sulfate	mg/L	--	1970	816	562	200
Total dissolved solids	mg/L	--	6640	1650	1620	1110

NOTES:

Shaded cell indicates exceedance in either the Upper Prediction Limit (UPL) or the Lower Prediction Limit (LPL) for this CCR unit.
N - Normal
J - Estimated concentration. Qualified due to high matrix spike % recovery.
U - Analyte was not detected.
(1) Sample result was updated; updated result is provided in revised analytical report.

April 2018 Groundwater Sample Results
CCR Unit: Fly Ash Landfill
CPS Energy Calaveras Power Station
San Antonio, TX

			CCR Unit	FAL	FAL	FAL	FAL
			Well Designation	Downgradient	Downgradient	Downgradient	Downgradient
			Well ID	JKS-31	JKS-33	JKS-46	JKS-60
			Sample Date	04/04/2018	04/05/2018	04/04/2018	04/04/2018
			Sample Type Code	N	N	N	N
Chemical	Units	2017 LPL - FAL	2017 UPL - FAL				
Boron	mg/L	--	3.62	0.485	0.990	0.828	0.399
Calcium	mg/L	--	450	187	552	140	363
Chloride	mg/L	--	314	253 D	786	11.6	366 D
Fluoride	mg/L	--	3.62	0.839	1.85	2.16	0.220 J (1)
pH, Field	SU	4.02	6.73	3.74	6.33	3.15	6.09
Sulfate	mg/L	--	4680	771 D	1810	864 D	801 D
Total dissolved solids	mg/L	--	8040	1420	3970	1300	1860

NOTES:

Shaded cell indicates exceedance in either the Upper Prediction Limit (UPL) or the Lower Prediction Limit (LPL) for this CCR unit.

N - Normal

D - Sample was diluted due to targets detected over the highest point of the calibration curve or due to matrix interference. Dilution factors are included in the results.

J - Estimated concentration. Qualified due to high matrix spike % recovery.

U - Analyte was not detected.

(1) Sample result was updated; updated result is provided in revised analytical report.

April 2018 Groundwater Sample Results
CCR Unit: Bottom Ash Ponds
CPS Energy Calaveras Power Station
San Antonio, TX

			CCR Unit	BAP	BAP	BAP	BAP	BAP
			Well Designation	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
			Well ID	JKS-48	JKS-50R	JKS-52	JKS-55	JKS-56
			Sample Date	04/04/2018	04/04/2018	04/04/2018	04/04/2018	04/04/2018
			Sample Type Code	N	N	N	N	N
Chemical	Units	2017 LPL - BAP	2017 UPL - BAP					
Boron	mg/L	--	3.52	2.03	3.52	1.95	0.645	3.95
Calcium	mg/L	--	334	143	127	175	134	126
Chloride	mg/L	--	523	433 D	170	360 D	387 D	121
Fluoride	mg/L	--	0.857	1.35	0.335 J (1)	0.720	0.791	0.370 J (1)
pH, Field	SU	5.56	7.33	6.91	6.67	6.79	6.75	6.64
Sulfate	mg/L	--	380	282 D	131	278 D	168	193
Total dissolved solids	mg/L	--	1830	1400	883	1240	1300	992

NOTES:

Shaded cell indicates exceedance in either the Upper Prediction Limit (UPL) or the Lower Prediction Limit (LPL) for this CCR unit.

N - Normal

D - Sample was diluted due to targets detected over the highest point of the calibration curve or due to matrix interference. Dilution factors are included in the results.

U - Analyte was not detected.

(1) Sample result was updated; updated result is provided in revised analytical report.

April 2018 Groundwater Sample Results
CCR Unit: SRH Pond
CPS Energy Calaveras Power Station
San Antonio, TX

			CCR Unit	SRH Pond	SRH Pond	SRH Pond
			Well Designation	Downgradient	Downgradient	Downgradient
			Well ID	JKS-52	JKS-53	JKS-54
			Sample Date	04/04/2018	04/04/2018	04/05/2018
			Sample Type Code	N	N	N
Chemical	Units	2017 LPL - SRH	2017 UPL - SRH			
Boron	mg/L	--	3.46	1.95	1.60	1.26
Calcium	mg/L	--	326	175	113	111
Chloride	mg/L	--	516	360 D	361	382
Fluoride	mg/L	--	0.835	0.720	0.392 J (1)	0.742
pH, Field	SU	5.56	7.32	6.79	6.67	6.86
Sulfate	mg/L	--	374	278 D	249	309
Total dissolved solids	mg/L	--	1780	1240	1160	1230

NOTES:

N - Normal

D - Sample was diluted due to targets detected over the highest point of the calibration curve or due to matrix interference.

J - Estimated concentration. Qualified due to high matrix spike % recovery.

U - Analyte was not detected.

(1) Sample result was updated; updated result is provided in revised analytical report.