

**RIO ALGOM MINING LLC – AMBROSIA LAKE  
FACILITY DISCHARGE PERMIT – 169 (DP-169)  
SEMIANNUAL REPORT, FIRST HALF 2015**

***Prepared for:***

Rio Algom Mining, LLC  
P.O. Box 218  
Grants, New Mexico 87020

***Prepared by:***



6000 Uptown Boulevard NE, Suite 220  
Albuquerque, New Mexico 87110

**July 30, 2015**

# Rio Algom Mining LLC

July 30, 2015

CERTIFIED MAIL

Mr. David L. Mayerson  
New Mexico Environment Department  
1190 St. Francis Dr.  
P.O. Box 5469  
Santa Fe, NM 87502

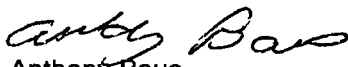
Re: **Discharge Permit - 169**  
**Semi-Annual Report, First Half 2015**

Dear Mr. Mayerson:

Attached is the *Rio Algom Mining LLC – Ambrosia Lake Facility Discharge Permit – 169 (DP-169) Semi-Annual Report, First Half 2015*, which presents the results of monitoring and sampling activities at the Ambrosia Lake site as required by DP-169.

An electronic copy of the report has been delivered by email and is also included, along with analytical results in the accompanying disc (NMED copy only). If you have any questions or need additional information, please call me or Theresa Ballaine at (209)736-4803.

Sincerely,



Anthony Baus  
Site Manager

Attachment: As stated

cc: NRC (MD) – License SUA-1473, Docket No. 40-8905  
T. Ballaine  
D. Murray

1145520

**RIO ALGOM MINING LLC – AMBROSIA LAKE  
FACILITY DISCHARGE PERMIT – 169 (DP-169)  
SEMIANNUAL REPORT, FIRST HALF 2015**

***Prepared for:***

Rio Algom Mining, LLC  
P.O. Box 218  
Grants, New Mexico 87020

***Prepared by:***



6000 Uptown Boulevard NE, Suite 220  
Albuquerque, New Mexico 87110

**July 30, 2015**

## TABLE OF CONTENTS

LIST OF TABLES.....	i
LIST OF APPENDICES .....	i
1.0 REVIEW OF DISCHARGE PERMIT - 169 .....	1
2.0 NRC ACLS.....	3
3.0 ALLUVIAL GROUNDWATER MONITORING.....	4
4.0 GROUNDWATER MONITORING IMPROVEMENTS .....	5
5.0 RECLAMATION ACTIVITIES PERFORMED DURING THE FIRST HALF OF 2015.....	6

## LIST OF TABLES

Table 1.	NRC-Approved ACLs for Alluvium .....	3
----------	--------------------------------------	---

## LIST OF APPENDICES

Appendix A	Analytical Results from the First Half 2015 for DP-169 Alluvial Wells
Appendix B	Time Concentration Plots for DP-169 Alluvial Wells
Appendix C	Alluvial Groundwater Elevation Contour Map
Appendix D	Total Dissolved Solids Iso-Contour Map
Appendix E	DP-169 Electronic Data – First Half 2015



## 1.0 REVIEW OF DISCHARGE PERMIT - 169

This report presents the results of monitoring and sampling activities for the first half of 2015 for the Rio Algom Mining LLC (RAML) Ambrosia Lake facility as required under New Mexico Environment Department (NMED) Discharge Permit – 169 (DP-169). DP-169 was approved on November 15, 1995, and establishes monitoring requirements for the Alluvium near the former Ambrosia Lake mill. DP-169 requires semiannual monitoring of alluvial wells for depth to water, total depth, chloride, sulfate, nitrate, and total dissolved solids (TDS). In addition, it requires semiannual and annual reporting to the NMED. In a meeting between RAML and NMED on May 4, 2015, RAML proposed eliminating the annual report by including the annual reporting requirements in each of the semiannual reports. This semiannual report includes all applicable requirements for both the annual and semiannual reports.

Requirements for annual and semiannual reporting per the July 12, 2000, DP-169 Renewal Request are listed below with an explanation relative to current conditions at the Site:

1. Analytical results of the 43 alluvial wells for chloride, sulfate, and nitrate.

Analytical results for all DP-169 alluvial wells that are still in service and meet the requirements of RAML's Groundwater Monitoring Standard Operating Procedure (SOP) have been included in **Appendix A**.

2. Time versus concentration plots depicting chloride, sulfate and TDS concentrations for all 43 alluvial wells.

Time versus concentration plots for chloride, sulfate, and TDS concentrations in all active DP-169 alluvial wells are included in **Appendix B**.

3. Monthly analysis of the reservoir water for chloride, sulfate, and TDS.

Monthly analysis of the reservoir is no longer applicable as the reservoir has been reclaimed.

4. Analytical results required under the Nuclear Regulatory Commission [NRC]-approved Corrective Action Program.

The NRC-approved Corrective Action Program was terminated in 2006 when Alternate Concentration Limits (ACLs) were approved. Groundwater monitoring for the ACL well network at the Site occurs semiannually. Reports containing analytical results are produced semiannually and submitted to both NRC and NMED. Analytical results from those monitoring events are submitted under separate cover and will not be included in this report.

5. Maps depicting the water level and TDS isopleths for the alluvium.

Maps with groundwater elevations and TDS concentrations in alluvial wells are included in **Appendices C and D**.

6. Flume discharge volumes.

Flume discharge volumes are no longer applicable due to reclamation.

7. Analytical data on computer disc.

Laboratory data in CSV and PDF format for the first half of 2015 are included on compact disc with this submittal.

## 2.0 NRC ACLS

The NRC approved ACLs for Alluvium in 2006. The ACLs address byproduct material seepage from the tailings disposal area, including but not limited to chloride, nitrate, sulfate, and TDS. The alluvial ACLs were established through review and consultation between NRC, NMED, and RAML. Alluvial ACLs are presented in **Table 1**.

**Table 1. NRC-Approved ACLs for Alluvium**

Constituent	ACL	Constituent	ACL
Molybdenum	176 mg/L	Sulfate	12,000 mg/L
Nickel	98 mg/L	TDS	26,100 mg/L
Selenium	49 mg/L	Gross alpha	8,402 pCi/L
Natural Uranium	23 mg/L	Lead-210	1,247 pCi/L
Chloride	7,110 mg/L	Radium-226 & 228	3,167 mg/L
Nitrate	351 mg/L	Thorium-230	13,627 mg/L

### 3.0 ALLUVIAL GROUNDWATER MONITORING

Groundwater monitoring was performed in February 2015. **Appendix A** presents the DP-169 groundwater monitoring data for the first half of 2015. All results are less than the non-hazardous ACLs established for the alluvial groundwater at the Site.

**Appendix B** contains time versus concentration plots for DP-169 wells. **Appendix C** contains a map showing alluvial monitoring well locations with the most recent groundwater elevation measurements. Modeling predictions projected that groundwater in the Alluvium will dissipate within 65 years. Decreasing groundwater elevation measurements continue to support this prediction. **Appendix D** contains a map with TDS concentrations plotted for each sampling location. **Appendix E** is the electronic data for the first half of 2015.

## 4.0 GROUNDWATER MONITORING IMPROVEMENTS

Several alluvial monitoring wells have been replaced in accordance with the NMED-approved Monitoring Well Replacement Work Plan. The well replacement project began in the fall of 2012, and field work was completed on February 2, 2013. The following monitoring wells replaced their counterparts and are designated with an “R” following the original well names: 5-03 ALL-R, 5-08 ALL-R, 30-04 R, 30-68 R, 31-05 R, 31-70 R, 32-01 R, 32-02 R, and 32-50 TRB-R. Note that monitoring well 32-50 TRB-R is screened across the Alluvium-Tres Hermanos B contact, as was the original 32-50. The former wells were plugged and abandoned. Monitoring well 30-03 was not replaced, but was plugged and abandoned.

In addition to conducting the well replacement program, dedicated bladder pumps have been installed in all alluvial wells that contain enough water to support that method of sample collection, including: 5-03 ALL-R, 5-08 ALL-R, 30-04 R, 30-68 R, 31-05 R, 31-70 R, 32-01 R, 32-02 R, 32-50 TRB-R, 30-47, 32-41, 32-43N, 32-58, 32-59 ALL, 32-60, 32-69, AW-1, AW-2, S-9, S-12, 5-02, 5-04 ALL, 30-48, 31-61 ALL, 31-65 ALL, 31-71, 32-51, 32-52, 32-57, and 32-72.

## **5.0 RECLAMATION ACTIVITIES PERFORMED DURING THE FIRST HALF OF 2015**

- Demolition of water treatment building, IX building and maintenance shop building
- Completed retirement of distribution lines and relocated 115kV transmission line
- Final grading of tailing cell #2 and started placement of radon barrier

---

## **APPENDIX A**

### **Analytical Results from the First Half 2015 for DP-169 Alluvial Wells**



**Appendix A**  
**Analytical Results and Field Measurements for DP-169 Monitoring Wells**

Monitoring Well	Sample Date	Depth to Water (ft)	Total Depth (ft)	Specific Cond. (uS/cm)	Temp. (°C)	pH	Cl (mg/l)	NO <sub>3</sub> /NO <sub>2</sub> (as N) (mg/l)	SO <sub>4</sub> (mg/l)	TDS (mg/l)
30-03	03/19/13	Plugged and abandoned during 2012/2013 Well Replacement Project								
30-04 R	02/25/15	58.1	72.25	6551	11.98	6.72	720	7.09	3340	5930
30-46	02/26/15	DRY	38.45	--	--	--	--	--	--	--
30-47	02/27/15	53.89	77.8	5474	11.11	5.77	840	<0.2	2250	4780
30-48	02/26/15	61.19	73.24	4869	11.97	7.01	704	<0.02	1850	4040
30-49	02/26/15	66.92	67.44	Insufficient water for sampling						
30-53	02/26/15	DRY	50	--	--	--	--	--	--	--
30-68 R	02/26/15	DRY	66.1	--	--	--	--	--	--	--
31-05 R	02/26/15	51.86	66.19	7010	11.78	6.66	680	7.29	3590	6180
31-61 ALL	02/13/15	16.07	29.04	14927	12.9	6.01	2300	2.69	5890	14100
31-63	07/17/07	Removed from service when the interceptor trench was discontinued								
31-65 ALL	02/11/15	13.04	41.43	15562	11.1	5.9	2400	<0.02	6500	14000
31-70 R	02/26/15	43.6	81.2	7779	11.8	6.59	1340	53	2690	6370
31-71	02/26/15	48.92	63.41	5108	12.04	7.08	640	0.40	2520	4330
32-01 R	02/26/15	19.96	60.95	17964	11.67	5.75	2400	0.09 B	9180	15600
32-02 R	02/25/15	52.87	70.35	4763	12.2	6.81	550	0.30	2160	3980
32-41	02/25/15	42.88	59.9	4611	11.71	7.21	1160	0.02 B	1060	2940
32-42	02/25/15	DRY	21.9	--	--	--	--	--	--	--
32-43N	02/26/15	26.31	76.35	10833	12.31	6.14	1460	0.19	3640	9160
32-50 TRB-R*	02/25/15	53.28	88.62	6227	12.23	6.65	640	2.04	3410	5710
32-51	02/26/15	35.67	74.25	5360	12.1	7.3	379	8.4	3000	4970
32-52	02/25/15	34.2	65.78	3877	12.39	9.28	236	<0.02	2140	3250
32-56	02/26/15	DRY	57.35	--	--	--	--	--	--	--
32-57	02/25/15	48.5	53.07	6664	11.94	6.68	220	8.9	3550	5980
32-58	02/26/15	17.58	34.51	16886	11.84	6.23	3840	21.2	5530	14000
32-59 ALL	02/10/15	20.22	28.31	5399	12.78	7.22	567	0.55	2380	4660
32-60	02/26/15	15.07	27.8	14246	12.12	6.1	1950	5.83	5930	11800
32-69	05/07/15	55.80	78.47	9979	12.75	6.36	1550	4.18	2930	7990
32-72	02/25/15	21.68	40.12	8305	12.48	6.46	640	3.63	5890	8700
5-01	02/27/15	29.03	43.96	4184	12.46	7.7	187	0.07 B	2370	3970
5-02	02/25/15	27.8	--	5940	10.51	6.83	1740	0.05 B	837	4430
5-03 ALL-R	02/10/15	25	55.87	4960	12.41	6.92	527	0.39	2220	4200
5-04 ALL	02/10/15	23.34	60.1	6018	12.58	8.09	807	<0.02	2850	5180
5-08 ALL-R	02/10/15	36.13	76.50	4130	12.68	7.11	240	12.3	2200	3770
5-73 ALL-R	02/10/15	20.05	27.05	7748	12.21	6.64	1530	4.5	2140	6100
AW-1	02/25/15	57.15	81.58	8292	11.99	6.48	1030	4.44	4650	7490
AW-2	02/25/15	36.06	86.26	5823	12.57	7.1	440	5.95	3080	5380
C-3	06/13/95	Plugged and abandoned to facilitate site reclamation activities								
D-4	02/27/06	Plugged and abandoned to facilitate site reclamation activities								
E-5	02/27/06	Plugged and abandoned to facilitate site reclamation activities								
MW-24 ALL	02/11/15	50.25	50.33	Insufficient water for sampling						
S-12	02/26/15	14.51	27.7	14334	12.42	6.22	2700	0.03 B	4540	11500
S-9	02/25/15	11.48	24.68	11617	11.21	8.49	2410	<0.02	4480	8610

**Notes:**

Reported wells are in the alluvium formation.

"R" indicated wells were replaced in 2012/2013 during the Monitoring Well Replacement Project.

"ALL" are alluvial wells also reported to the U.S. NRC in accordance with the Alternative Concentration Limit (ACL) criteria.

"<" indicates values are below the minimum detection limit (MDL).

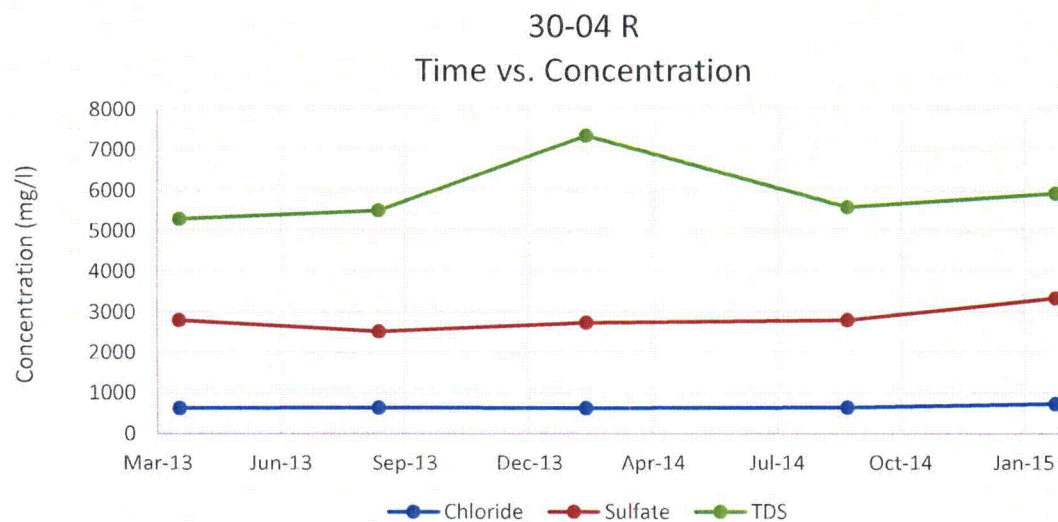
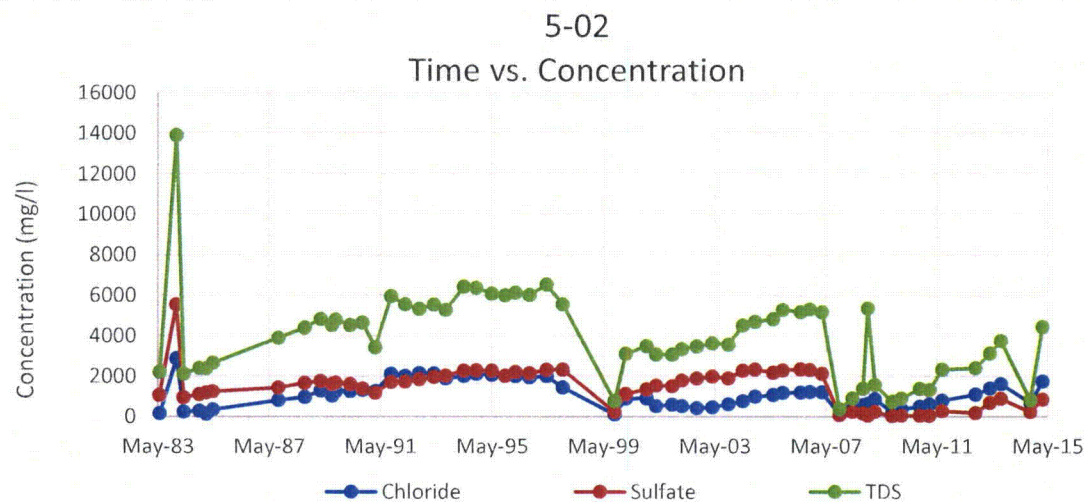
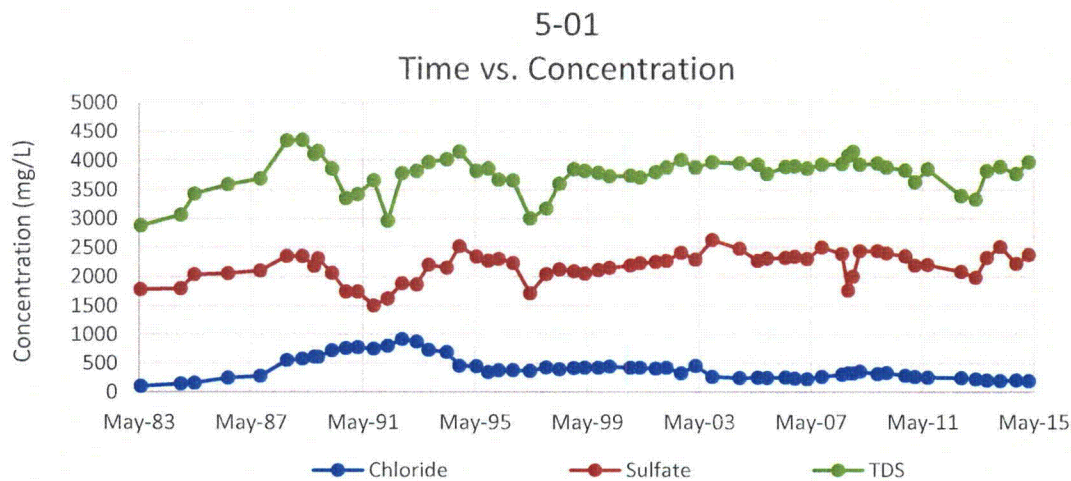
"B" indicates that the analyte concentration was detected at a value between the MDL and the practical quantitation limit (PQL).

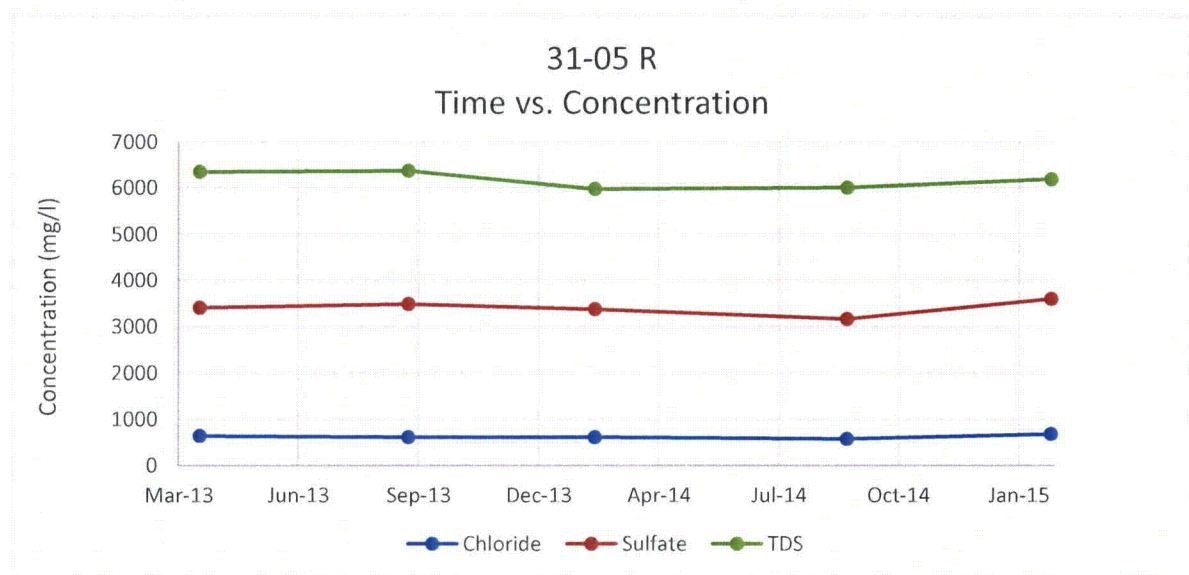
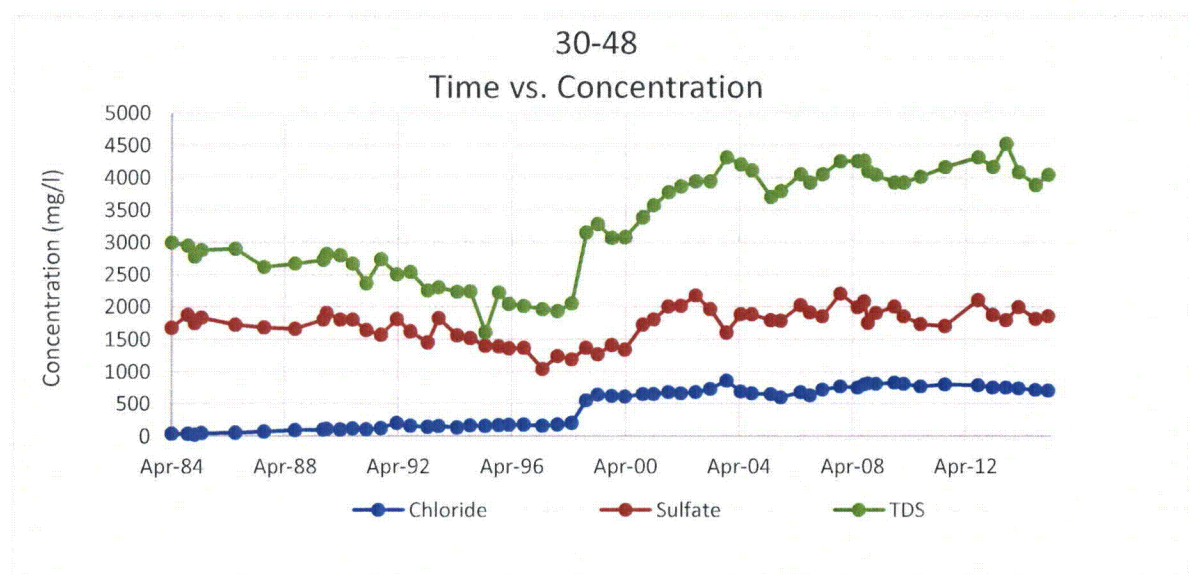
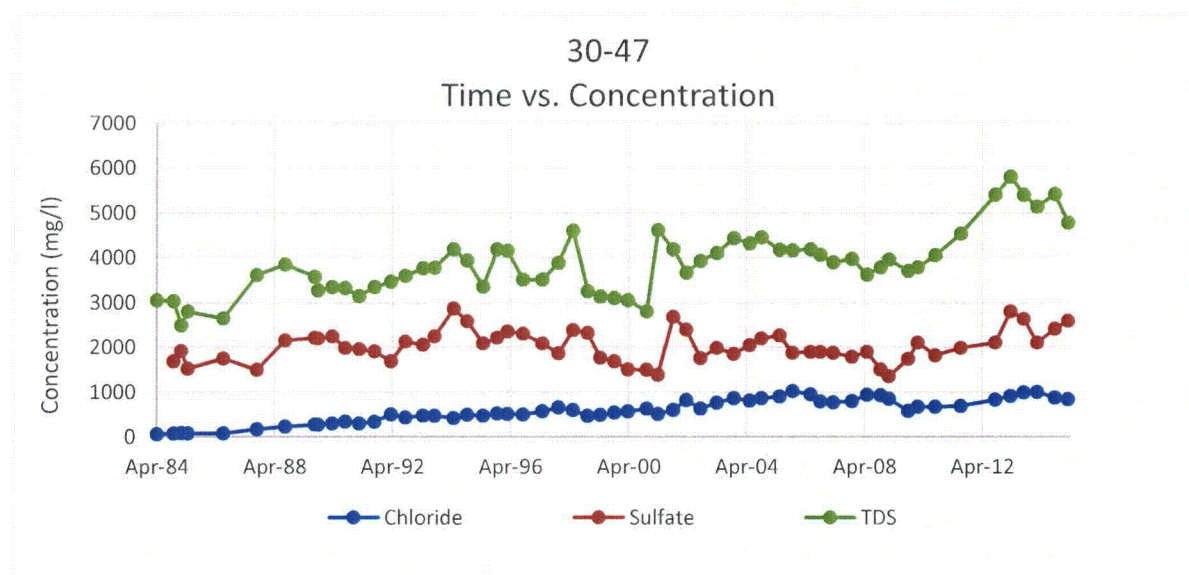
\* 32-50 TRB-R is screened across the TRB-Alluvial contact.

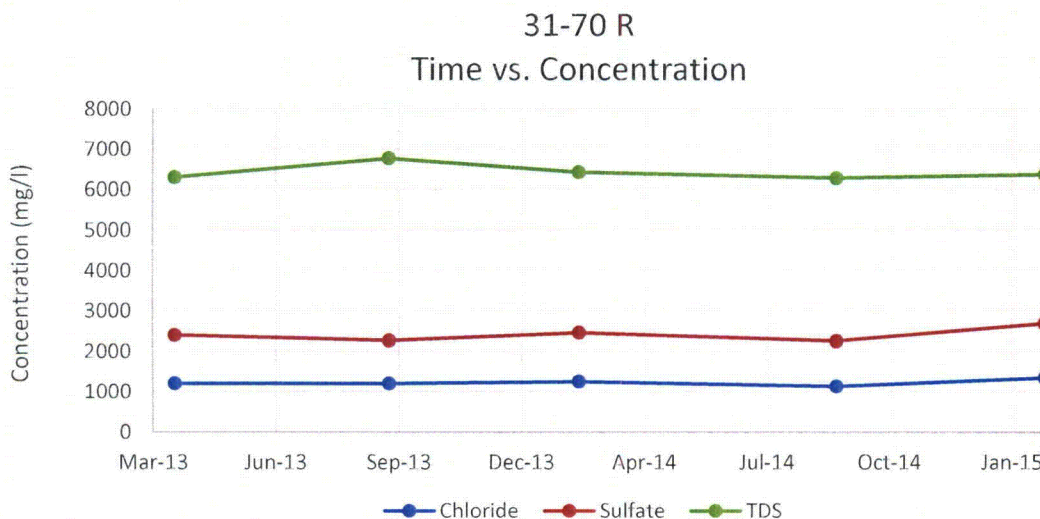
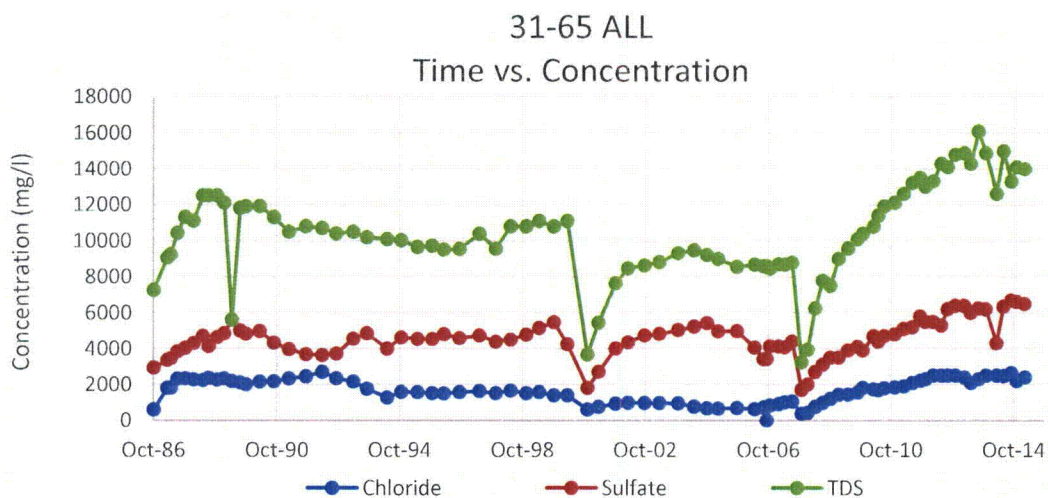
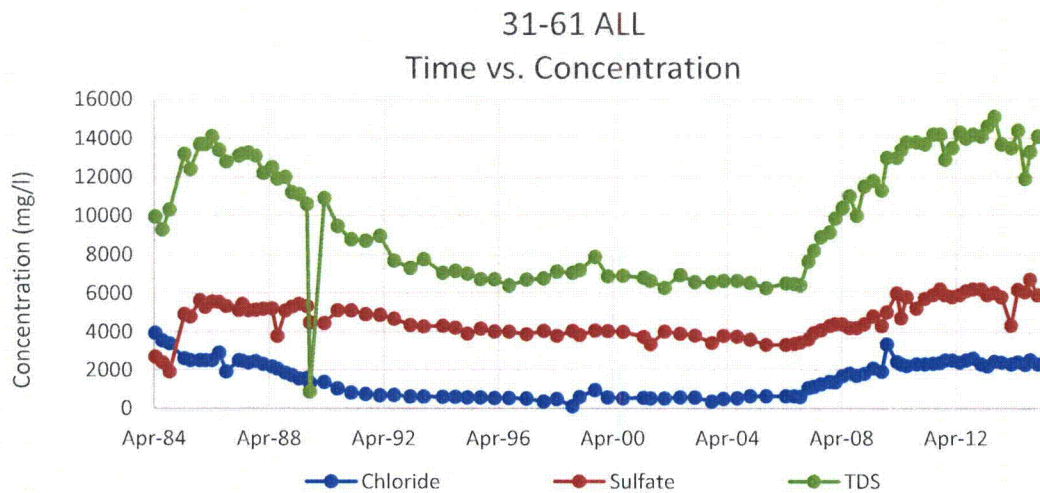
**APPENDIX B**  
**Time Concentration Plots for DP-169 Alluvial Wells**

\_\_\_\_\_

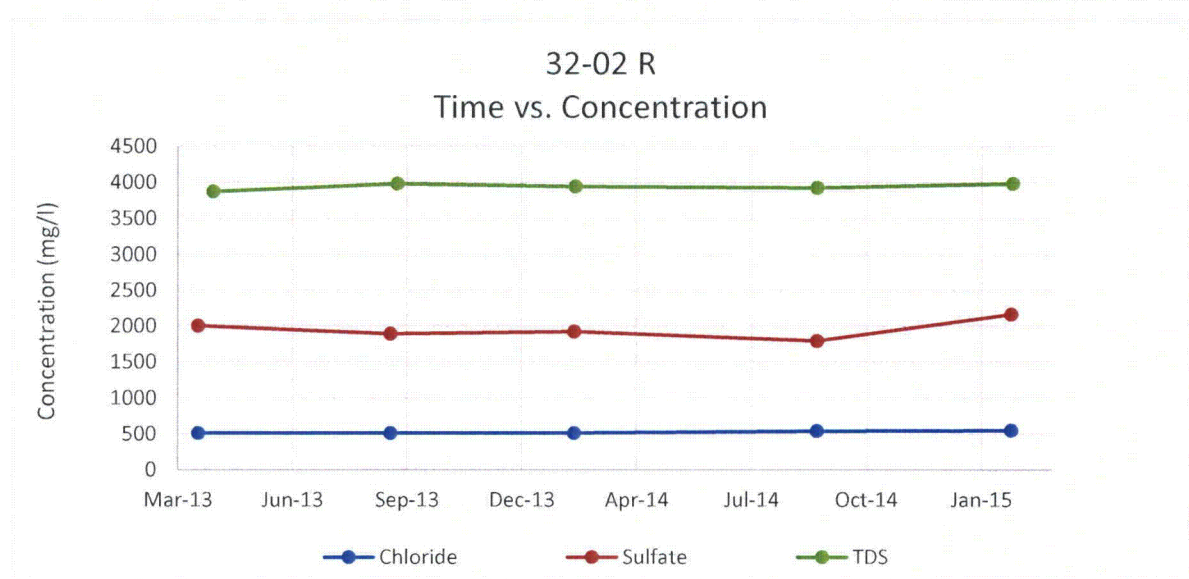
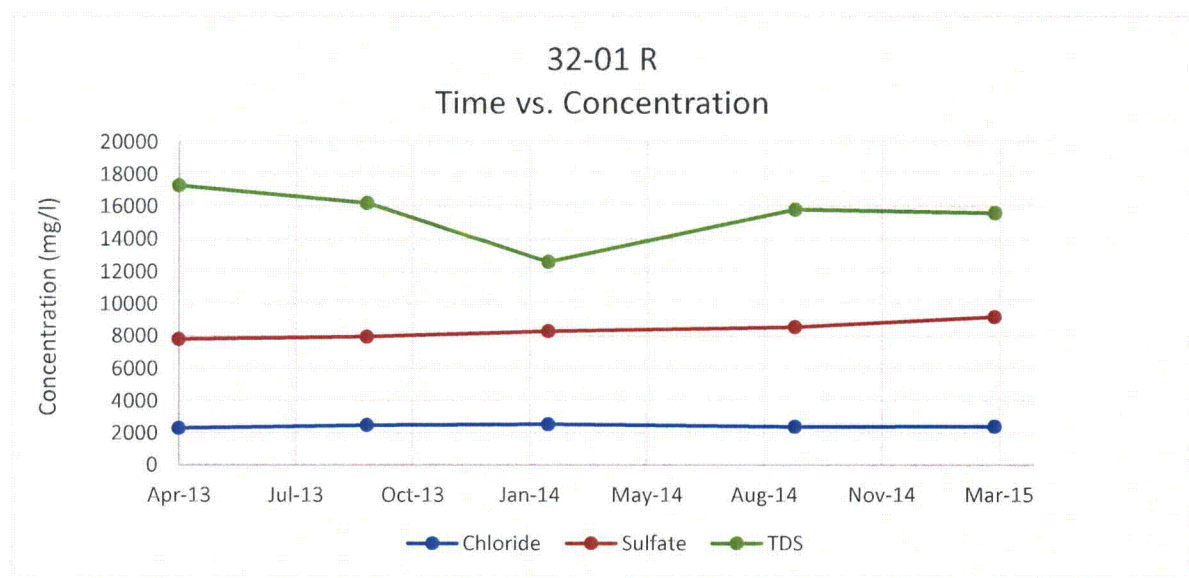
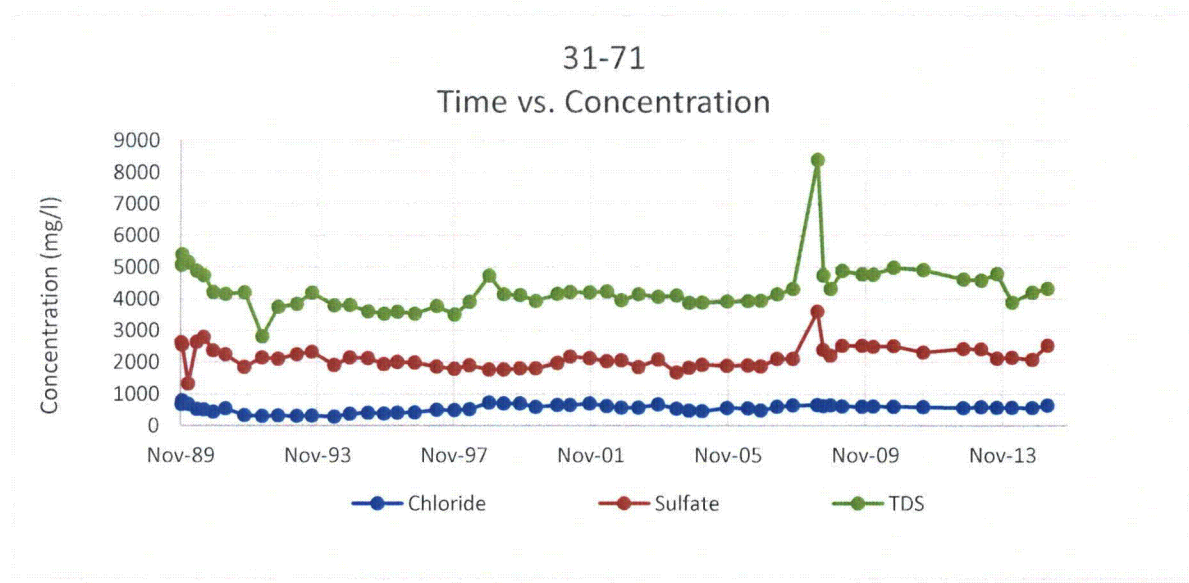
\_\_\_\_\_

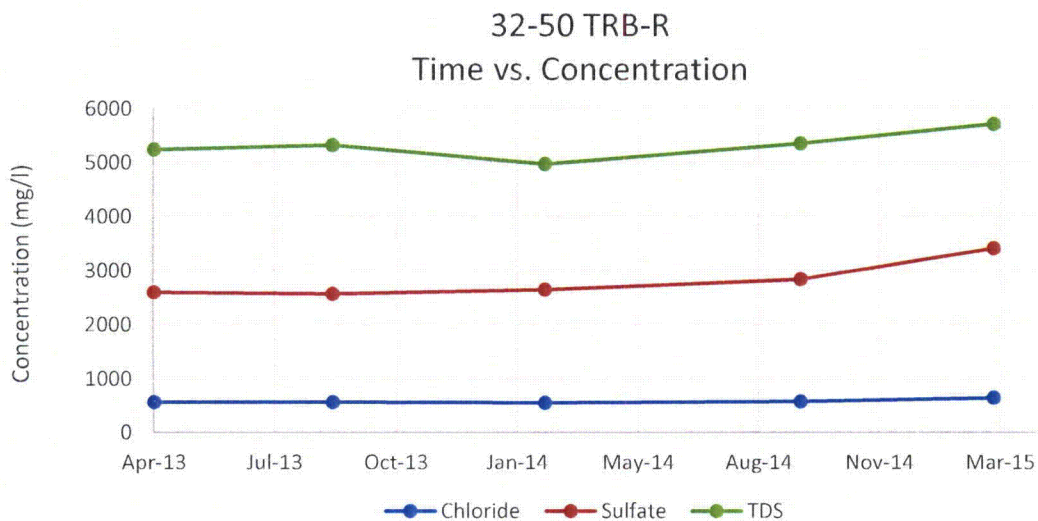
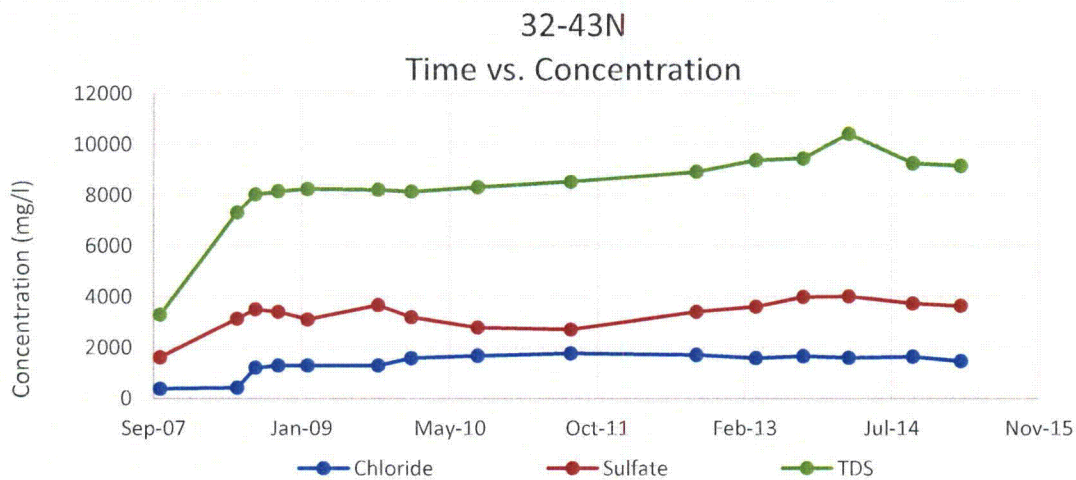
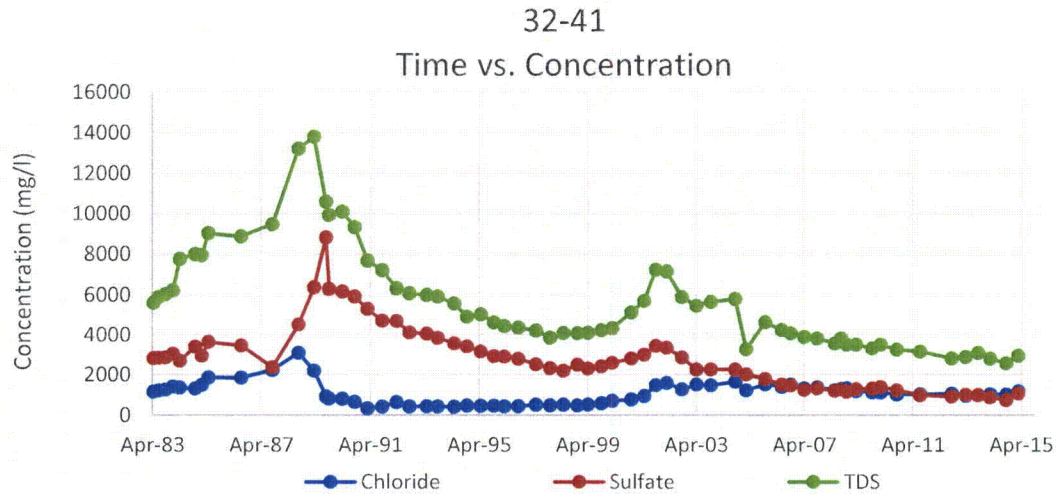


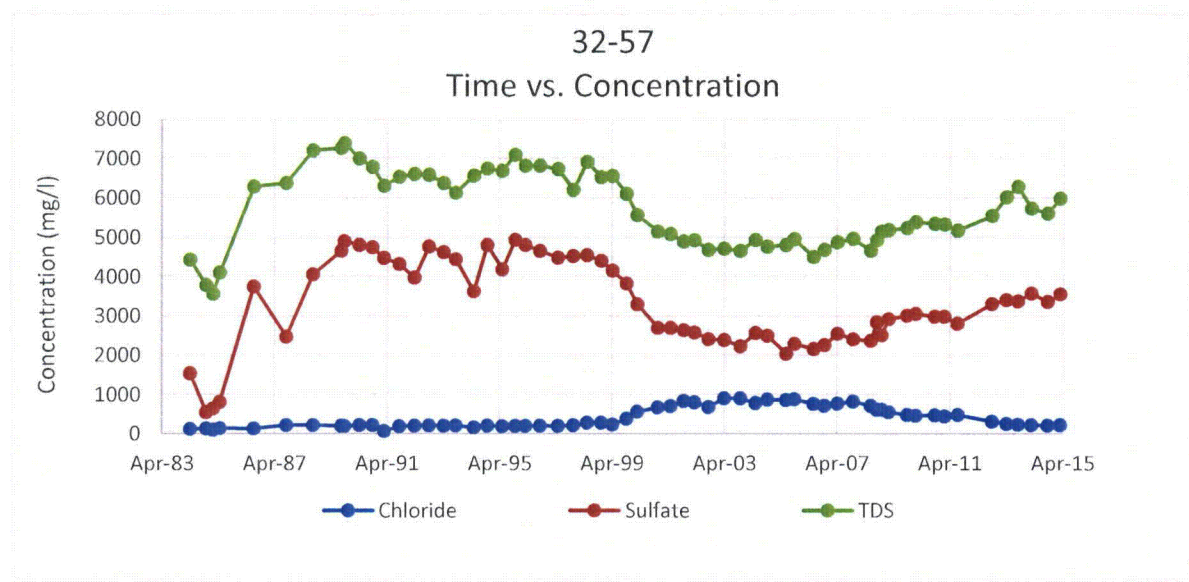
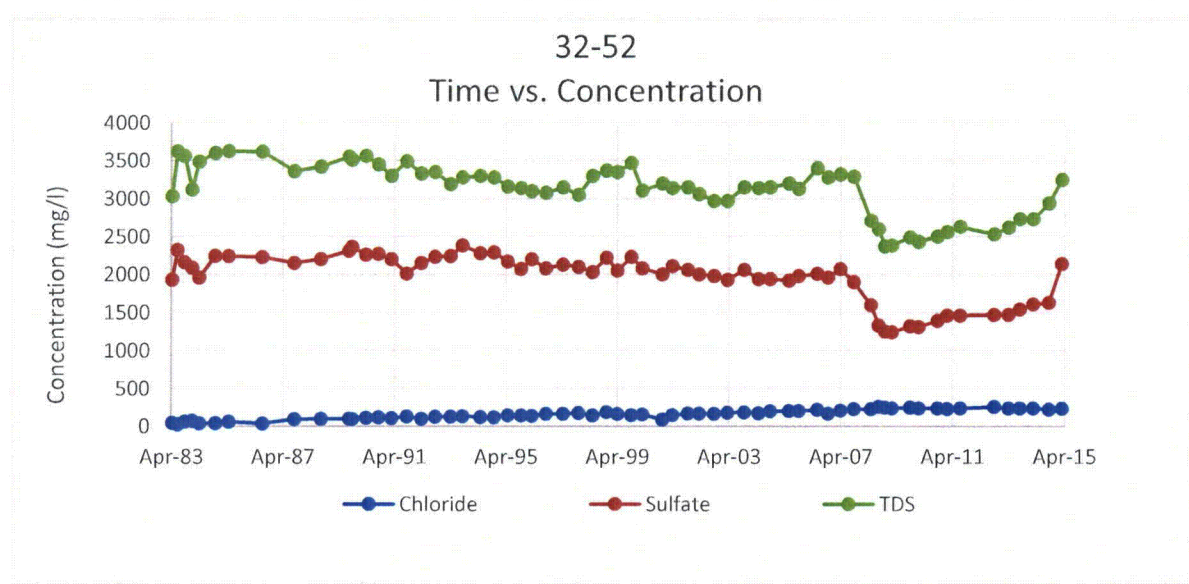
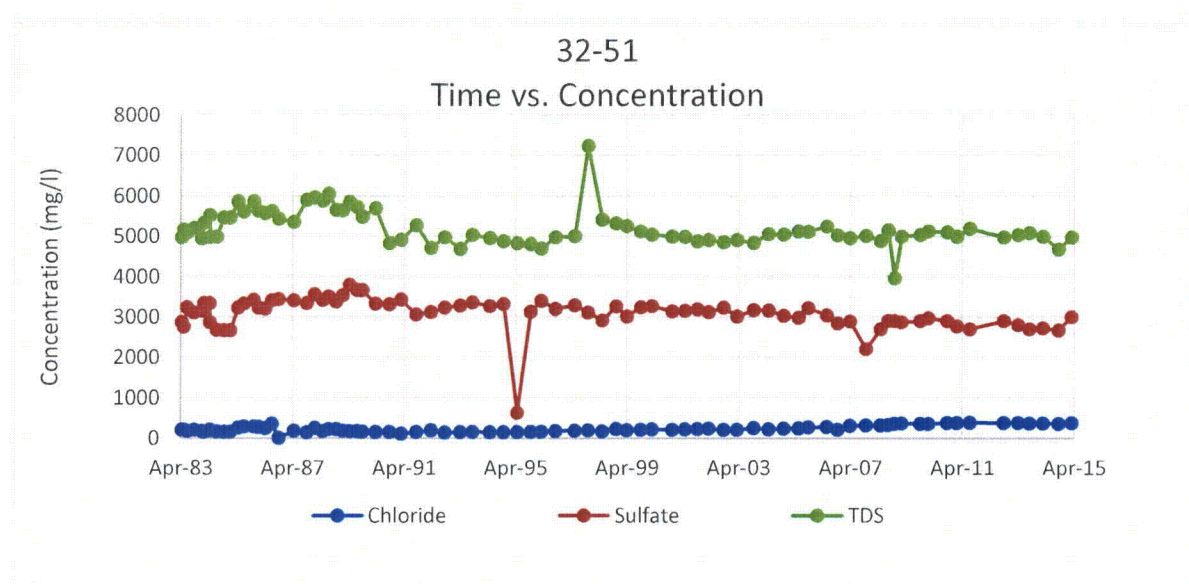




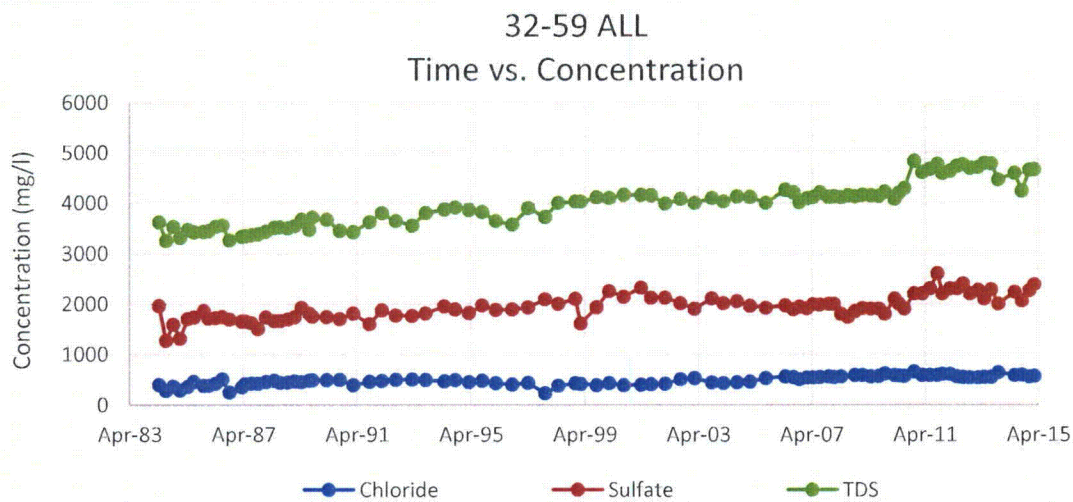
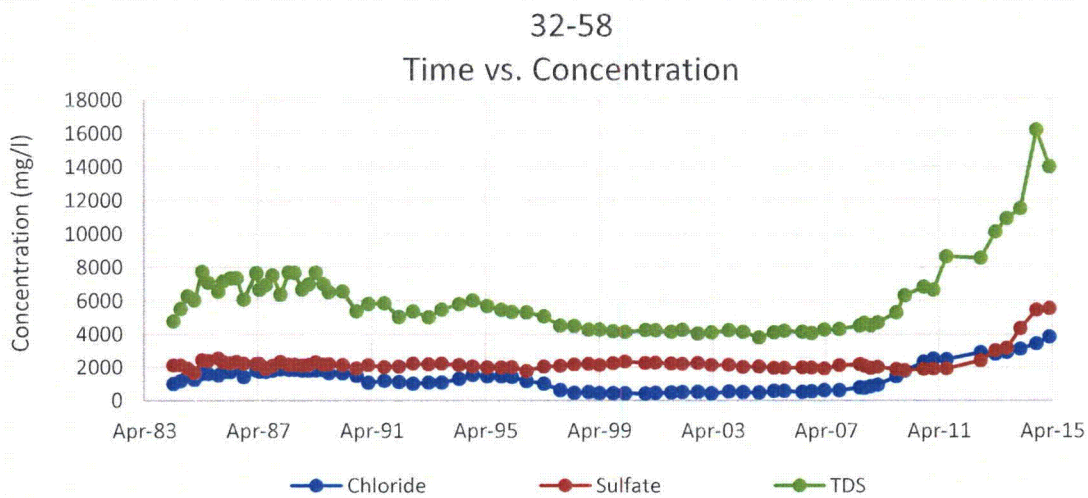




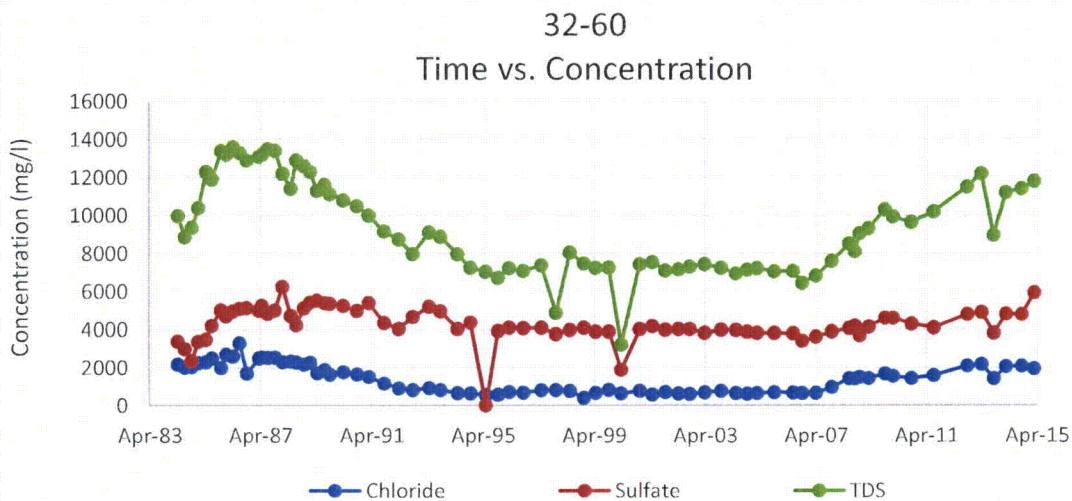


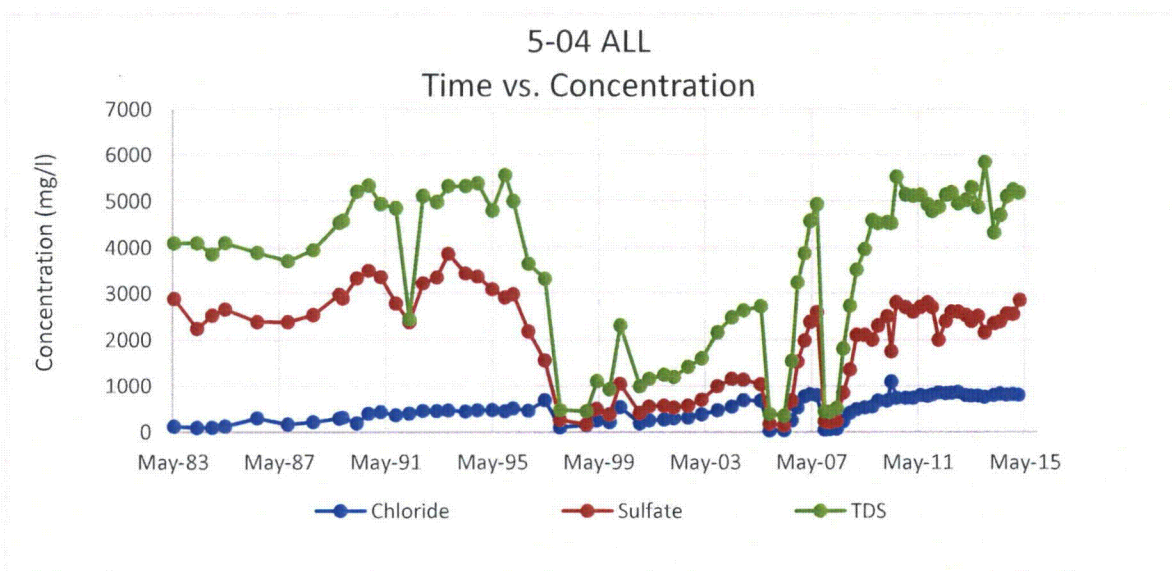
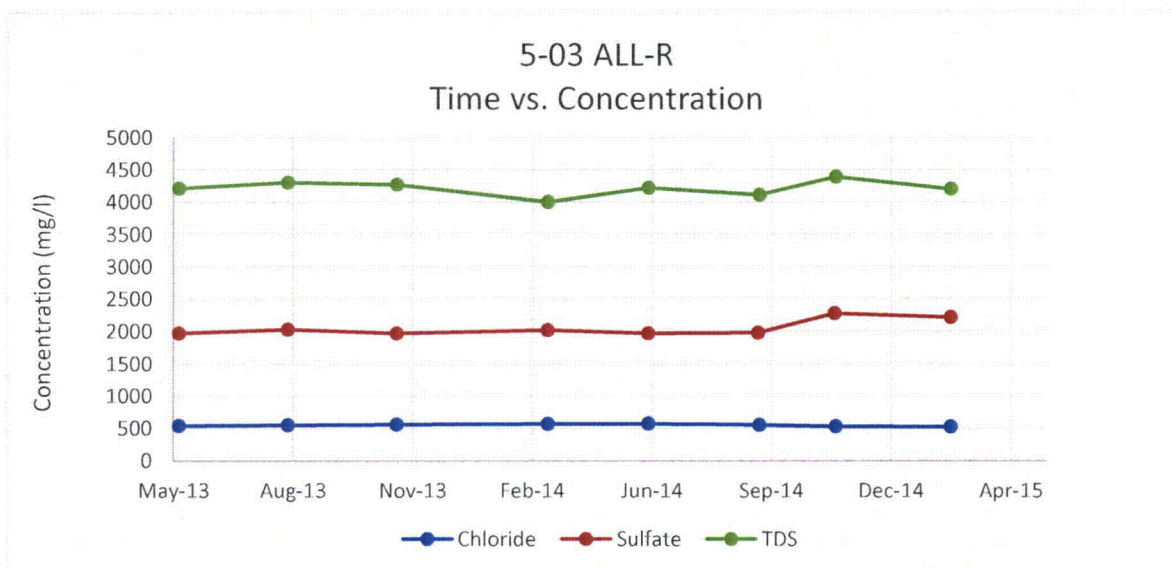
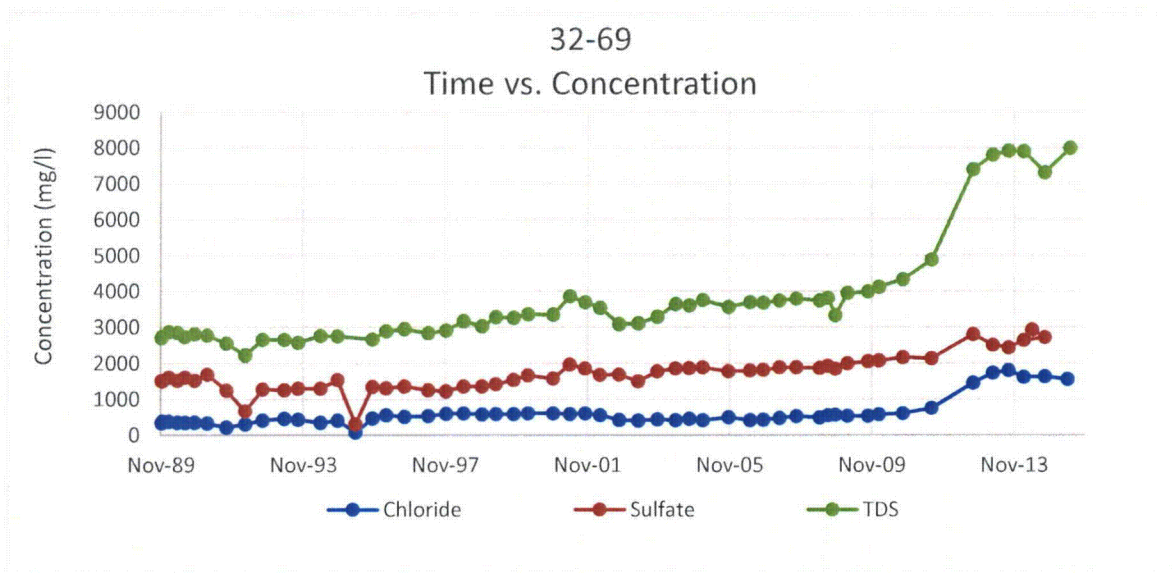


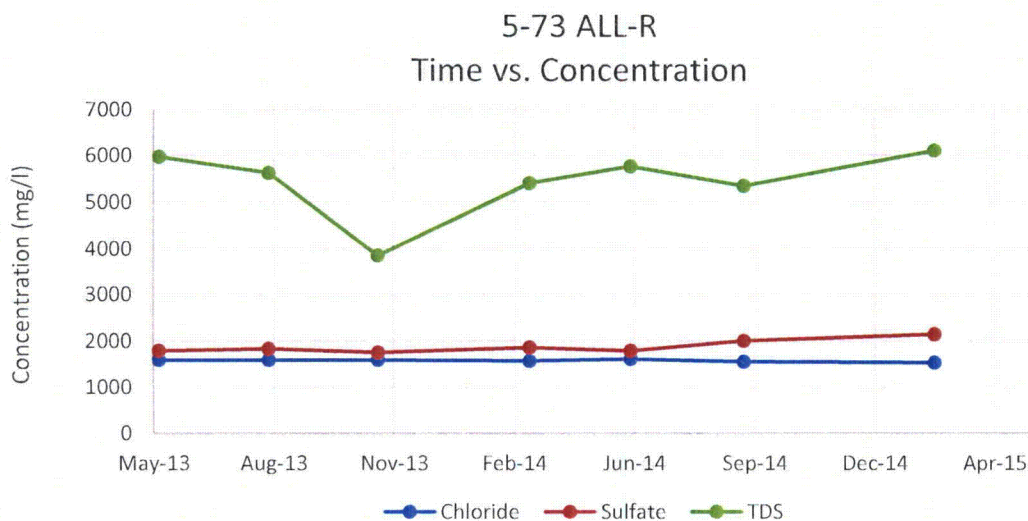
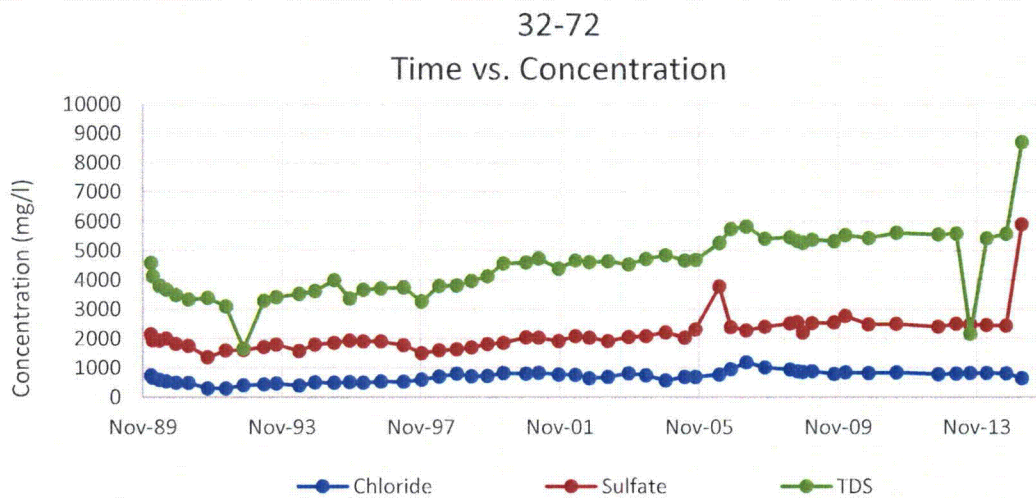
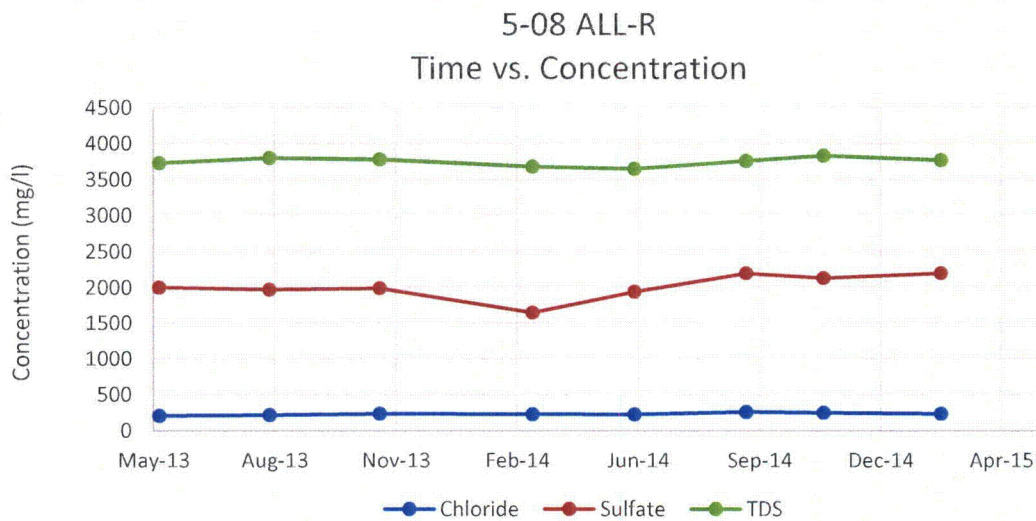




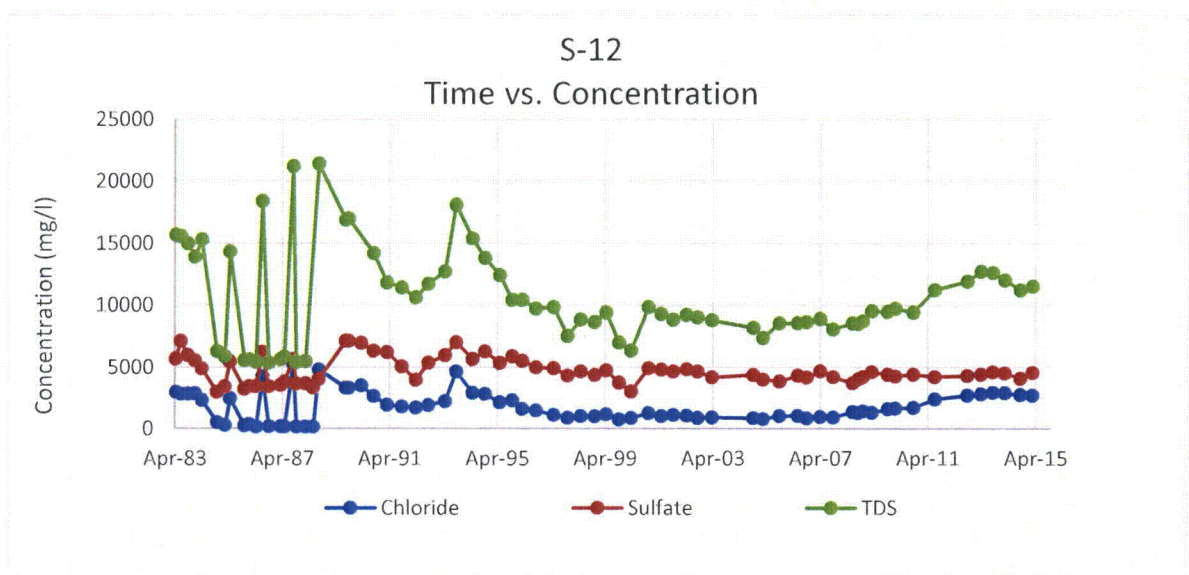
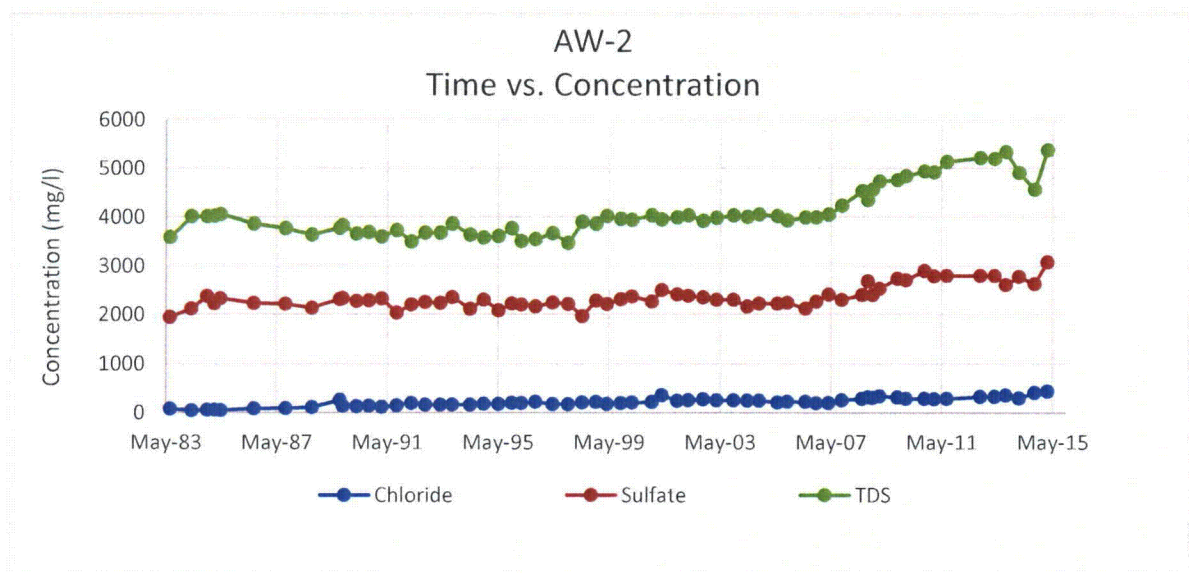
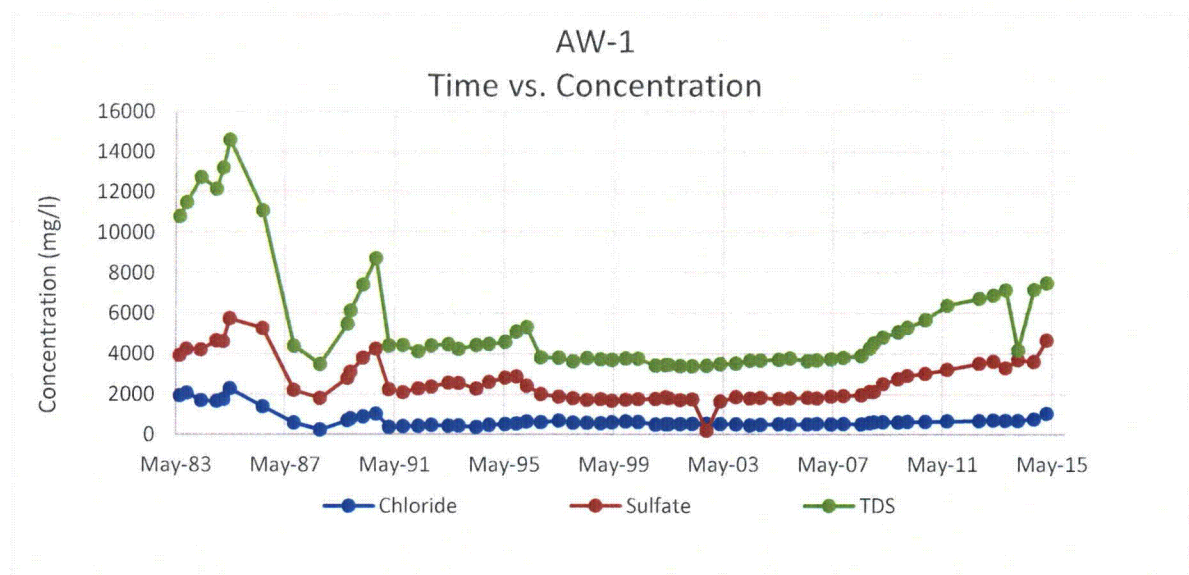
\*Historic data reported as nitrate and more recent data (>2009) is nitrate/nitrite.

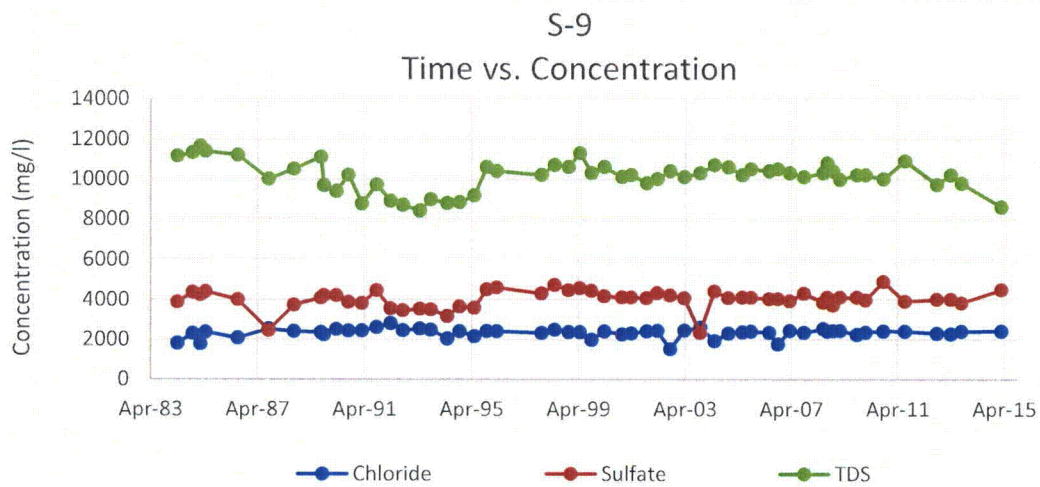






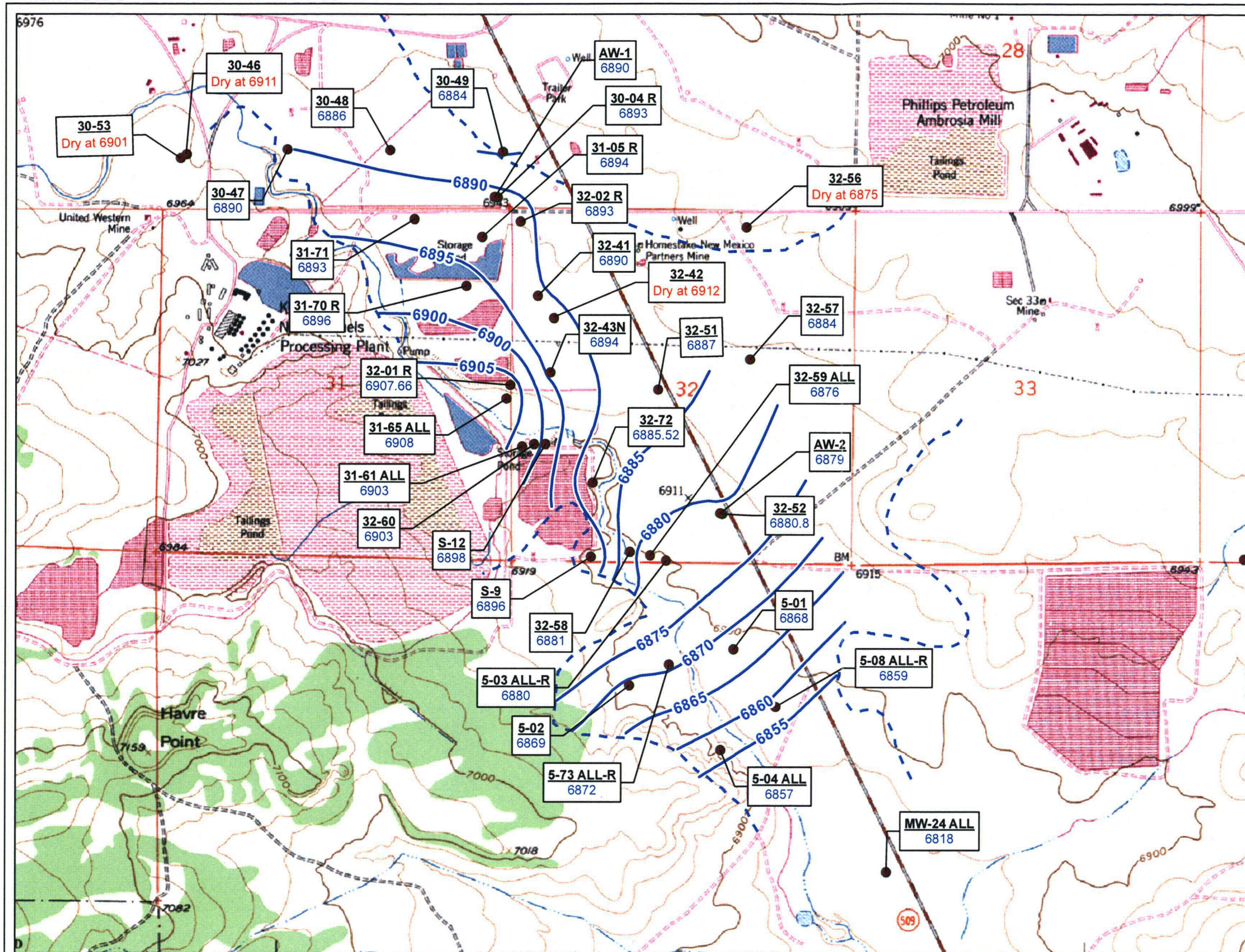




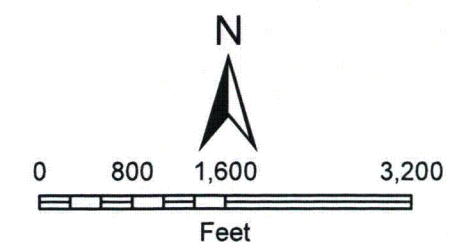


**APPENDIX C**  
**Alluvial Groundwater Elevation Contour Map**





INTERA



USGS 7.5 Minute Topographic Maps:  
Ambrosia Lake Quadrangle, 1957/rev.1980;  
Contour Interval 20 Feet

#### Legend

- Alluvial Monitoring Well Location
- Alluvial Groundwater Surface Elevation (ft amsl)
- - - Estimated Boundary of Saturated Alluvium

#### Well ID

Groundwater Surface Elevation (ft amsl)

Note: All data collected 1st quarter, 2015

Appendix C  
Alluvial Groundwater Elevation  
Contour Map  
Rio Algom DP-169 Semi-Annual Report

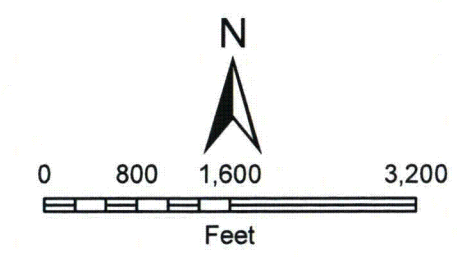


**APPENDIX D**  
**Total Dissolved Solids Iso-Contour Map**

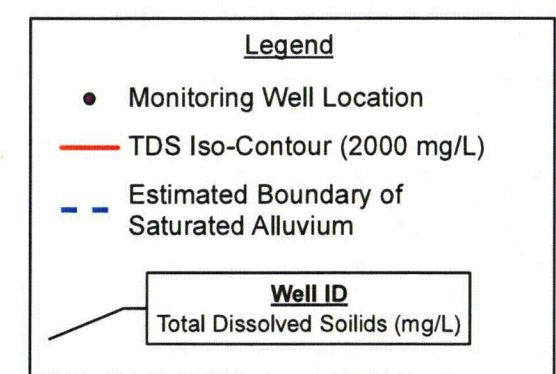
-----

-----

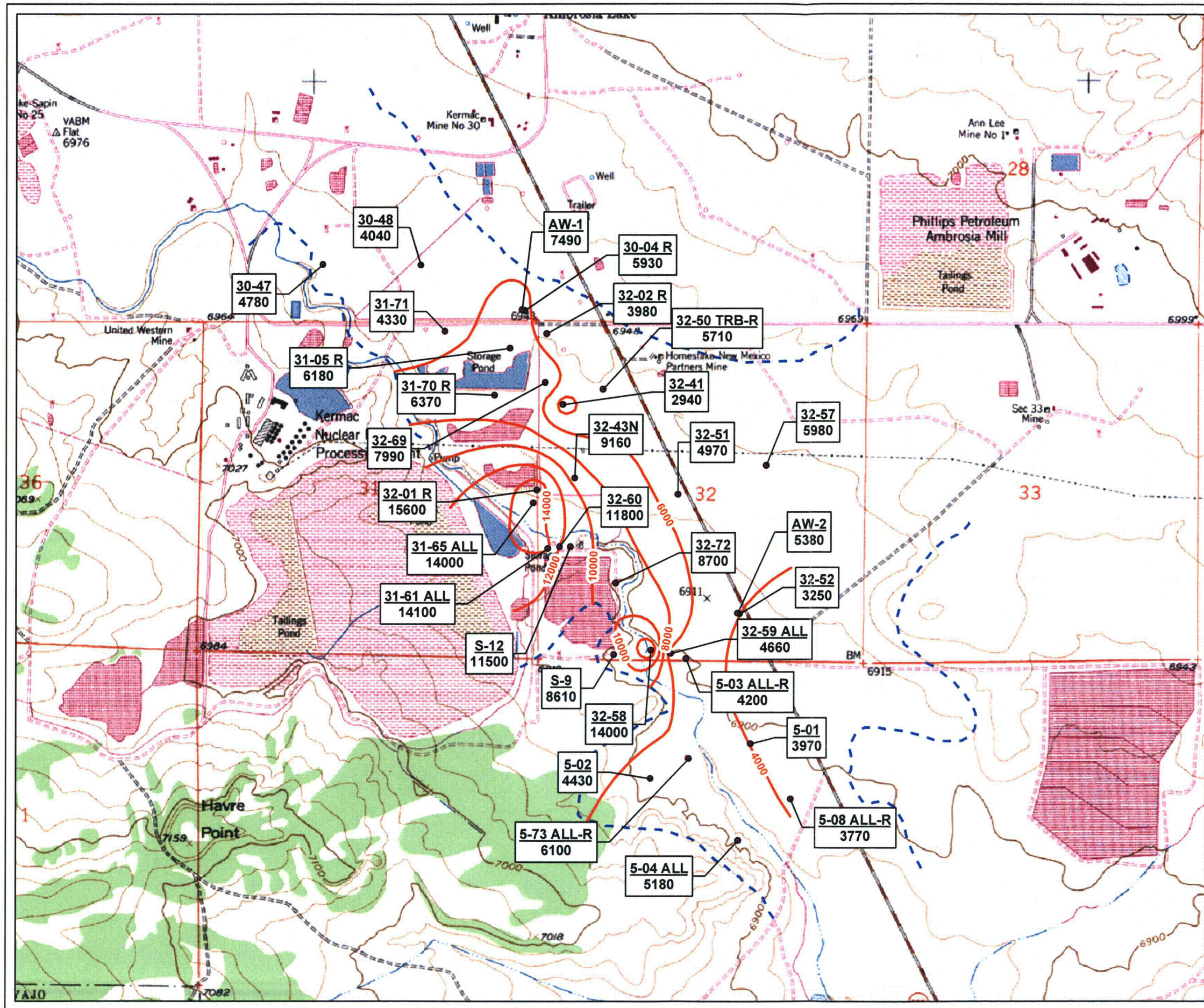




USGS 7.5 Minute Topographic Maps:  
Ambrosia Lake Quadrangle, 1957/rev.1980;  
Contour Interval 20 Feet



Note: All data collected 1st quarter, 2015



Appendix D  
Total Dissolved Solids  
Iso-Contour Map  
Rio Algom DP-169 Semi-Annual Report



## **APPENDIX E**

### **DP-169 Electronic Data – First Half 2015**

(CD is included in a pocket on the inside of the front cover.)