



Sierrita Operations
Environment, Land & Water Department
6200 W Duval Mine Road
PO Box 527
Green Valley, AZ 85622-0527

March 29, 2018

David Lelsz
Arizona Department of Environmental Quality
Water Quality Compliance Section
1110 West Washington Street
Phoenix, Arizona 85007-2935

**Re: Mitigation Order on Consent Docket No. P-50-06
Reporting Year 2017 Mitigation Facilities Monitoring Report**

Dear Mr. Lelsz:

In accordance with Section 5.1.1 of the Mitigation Plan¹, Freeport-McMoRan Sierrita Inc. (Sierrita) submits the enclosed *Mitigation Facilities Monitoring Report* for reporting year 2017.

Prior to March 2015, Sierrita has submitted this report annually under the title of *Well Field Operations Monitoring Report*, which Sierrita agreed to submit in the Mitigation Plan approval deferral letter sent to ADEQ on March 18, 2009².

Please do not hesitate to contact me at (520) 393-2014 if you have any questions regarding this submittal.

Sincerely,

William S Hart
Sr. Environmental Scientist

WSH:mw
20180329_001

xc: Stuart Brown, Freeport-McMoRan Inc.
Jim Norris, Clear Creek Associates

¹ Clear Creek Associates. 2013. Mitigation Plan for Sulfate with Respect to Drinking Water Supplies in the Vicinity of the Freeport-McMoRan Sierrita Inc. Tailing Impoundment, Mitigation Order on Consent Docket No. P-50-06. December 18, 2013.
² Correspondence from Chad D. Fretz, Sierrita, to Cynthia S. Campbell, ADEQ Water Quality Compliance Section, Re: Mitigation Order on Consent Docket No. P-50-06 - Mitigation Plan. March 18, 2010.

TECHNICAL MEMORANDUM REPORT



TO: Mr. William Hart, R.G.
Senior Environmental Scientist
Freeport--McMoRan Sierrita Inc.
6200 West Duval Mine Road
Post Office Box 527
Green Valley, AZ 85622-0527

FROM: BasinWells Associates, PLLC

PREPARED BY: Buck Schmidt, Principal Hydrologist
BasinWells Associates, PLLC

REVIEWED BY: Martin J. Rex, R.G.,
BasinWells Associates, PLLC

DATE: March 28, 2018

PROJECT NO.: 16-007

SUBJECT: 2017 Freeport – McMoran-Sierrita Inc. - Mitigation Facilities Monitoring Report.

1.0 INTRODUCTION

This Mitigation Facilities Monitoring Report documents groundwater pumping for the Freeport-McMoRan Sierrita Inc. (Sierrita) Sulfate Mitigation Action Well Field (Well Field) under the *Mitigation Plan for Sulfate with Respect to Drinking Water Supplies in the Vicinity of the Freeport-McMoran Sierrita Inc. Tailing Impoundment, Mitigation Order on Consent, Docket No. P-50-06* (Clear Creek Associates PLC, 2013). This report describes wellfield and conveyance operational conditions for calendar year 2017 and consists of data for pumping system availability, well pumping rates, and total system pumping. The actual system pumping is compared to design specifications to assess the mitigation facilities with respect to their mechanical capacity to pump and convey the required volumes of water.

The Well Field consists of two major parts: the Interceptor Well Field and the Mitigation Well Field. The Interceptor Well Field currently consists of 26 active interceptor wells (IWs). The Mitigation Well Field consists of four plume stabilization (PS) wells, four mass capture (MC) wells, and six focused feasibility study (FFS) wells. The PS, MC, and FFS wells were installed between 2011 and 2013 with full operation occurring in early 2014. The locations of the wells of the Well Field are shown on Figure 1. Table 1

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[illegible]

Figure 1. Sierrita Sulfate Mitigation Action Well Field

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TABLE 1. SIERRITA SULFATE MITIGATION ACTION WELL FIELD CONSTRUCTION INFORMATION																
Well	Cadastral Location	ADWR Reg. No. (55-)	2014-2020 Performance Goal Pumping Rates (gpm)	Target Pumping Rates (gpm)	Well Depth (ft)	Well Dia. (in.)	Borehole Diameter (in.)	Casing Material	Upper Screen Depth (ft bls)	Lower Screen Depth (ft bls)	Pump Gallery?/Interval (ft bls)	Current Pump Setting (ft bls)	Filter Pack Material	Basinfill Alluvium Base Depth (ft bls)	Drill Year	Well Age
IW-1	D-18-13 29DCD	623129	250	250	855	14		STEEL	234	843	No	480	GRAVEL	760	1978	39.6
IW-2A	D-18-13 28CCC	216464	300	300	1051	14	20	STEEL	350	1031	600-640	620	GRAVEL	1020	2008	10.0
IW-3A	D-18-13 28CBC	201732	500	500	1052	14	20	STEEL	400	1030	No	540	GRAVEL	820	2004	14.2
IW-8	D-18-13 28BCC	508236	350	350	783	14	20	STEEL	382	783	No	540	GRAVEL	759	1984	33.7
IW-9	D-18-13 28BCC	508238	200	200	853	14	20	STEEL	412	853	No	605	GRAVEL	740	1984	33.6
IW-4	D-18-13 28BCB	623132	40	40	946	14		STEEL	312	946	No	600	GRAVEL	490	1978	39.7
IW-24	D-18-13 28BBB	200556	50	50	884	14	20	STEEL	348	860	No	602	GRAVEL	410	2004	14.2
IW-5A	D-18-13 28BBB	219131	40	40	900	14.5	20	STAINLESS STEEL	382	890	620-640	630	TACNA	436	2010	7.9
IW-23	D-18-13 21CCB	200555	120	120	964	14	20	STEEL	375	935	No	550	TACNA	420	2004	14.2
IW-10	D-18-13 21CBC	508237	250	250	831	14	20	STEEL	420	831	No	600	GRAVEL	730	1984	33.6
IW-22	D-18-13 21CBC	200554	300	300	590	14	20	STEEL	359	560	No	550	GRAVEL	550	2004	14.2
IW-11	D-18-13 21CBC	508235	325	325	605	14	20	STEEL	371	605	No	500	GRAVEL	563	1984	33.6
IW-6A	D-18-13 21BCC	545565	80	80	497	12	20	STEEL	356	456	No	460	GRAVEL	456	1994	23.3
IW-12	D-18-13 21BCB	545555	125	125	600	12	20	STEEL	358	560	No	560	GRAVEL	498	1994	23.3
IW-13	D-18-13 21BBC	545556	0	0	497	12	20	STEEL	355	456	No	460	GRAVEL	452	1994	23.3
IW-14	D-18-13 21BBB	545557	60	60	549	12	20	STEEL	357	508	No	520	GRAVEL	509	1994	23.2
IW-15	D-18-13 16CCC	545558	40	40	547	12	20	STEEL	357	506	No	505	GRAVEL	507	1995	23.2
IW-19	D-18-13 16BCC	545562	150	150	540	12	20	STEEL	379	499	No	522	GRAVEL	498	1995	23.1
IW-20	D-18-13 16BCB	545563	0	0	502	12	20	STEEL	380	460	No	460	GRAVEL	470	1995	23.1
IW-21	D-18-13 16BBC	545564	100	100	601	12	20	STEEL	400	560	No	520	GRAVEL	520	1995	23.1
IW-25	D-18-13 28CBD	219596	400	400	782	16	24	STAINLESS STEEL	359	720	No	732	SILICA SAND	475	2010	7.4
IW-26	D-18-13 28BCD	219143	350	350	780	16	24	STAINLESS STEEL	340	720	No	732	SILICA SAND	475	2010	7.4
IW-27	D-18-13 28BBD	219136	100	100	720	14	22	STAINLESS STEEL	380	660	No	672	SILICA SAND	465	2010	7.4
IW-28	D-18-13 21CCA	219137	400	400	760	16	24	STAINLESS STEEL	380	700	No	712	SILICA SAND	680	2010	7.4
IW-29	D-18-13 21CDA	222865	-	-	770	16.62	24	STAINLESS STEEL	440	730	No		SILICA SAND	730	2014	3.9
PS-1	D-18-13 03BBA	220861	700	700	1020	16.62	24	HSLA	560	980	640-680	890	SILICA SAND	914	2011	6.3
PS-2	D-17-13 34CDC	220862	800	800	1130	16.62	24	HSLA	560	1090	640-680	870	SILICA SAND	1090	2012	5.8
PS-3	D-17-13 34CDD	220863	800	800	1200	16.62	24	HSLA	520	1160	600-640		SILICA SAND	1160	2012	5.9
PS-4	D-18-13 03BCA	220864	1000	1000	1060	16.62	24	HSLA	560	1020	640-680	893	SILICA SAND	1020	2012	5.8
MC-1	D-18-13 16DAA	221660	0	900	915	16.62	24	HSLA	479	875	599-639	824	SILICA SAND	875	2013	4.9
MC-2	D-18-13 10CCB	221761	0	700	980	16.62	24	HSLA	479	940	600-640	855	SILICA SAND	940	2013	5.0
MC-3	D-18-13 09AAA	221661	750	600	870	16.62	24	HSLA	530	810	No	830	SILICA SAND	810	2012	5.4
MC-4	D-18-13 04DDC	220842	600	600	830	16.62	24	HSLA	560	770	No	810	SILICA SAND	770	2012	5.7
FFS-1	D-18-13 21ABC	221662	338	800	790	16.62	24	HSLA	448	729	No	753	SILICA SAND	730	2013	5.0
FFS-2	D-18-13 16DCA	221663	300	700	750	16.62	24	HSLA	470	690	No	703	SILICA SAND	680	2013	5.0
FFS-3	D-18-13 16ACD	221664	225	400	800	16.62	24	HSLA	510	740	No	762	SILICA SAND	736	2013	5.2
FFS-4	D-18-13 16ABA	221665	150	200	871	16.62	24	HSLA	540	830	640-680	788	SILICA SAND	830	2012	5.2
FFS-5	D-18-13 09DBA	221666	225	1000	800	16.62	24	HSLA	569	739	No	775	SILICA SAND	740	2012	5.3
FFS-6	D-18-13 09ACA	221667	225	600	830	16.62	24	HSLA	528	769	No	750	SILICA SAND	770	2012	5.3

Notes: ft bls = feet below land surface; in. = inches; HSLA = High Strength Low Alloy Steel

2.0 WELL FIELD OPERATIONS

Total groundwater withdrawals in 2017 of the Well Field are tabulated on Table 2. The well field withdrew approximately 17,246 acre-feet (AF) of groundwater in 2017 (average pumping rate of 10,692 gpm).

TABLE 2. 2017 SIERRITA SULFATE MITIGATION ACTION WELL FIELD TOTAL GROUNDWATER WITHDRAWAL	
Total Gallons Pumped:	5,619,935,516
Total Acre-Feet Pumped:	17,246

The Well Field, in total, produced approximately 100.5 percent of the performance goals with respect to potential total groundwater withdrawal considering the 2014-2020 performance goal rates (Table 1) at a 100% duty cycle (total pumping rate of 10,643 gpm or 17,166 AF).

The Well Field, in total, produced approximately 74.6 percent of the target goals with respect to potential total groundwater withdrawal considering the target goal rates (Table 1) at a 100% duty cycle (total pumping rate of 14,330 gpm or 23,113 AF).

Well performance in 2017 on a well by well basis is tabulated in Attachment A. Run time percentages of the Interceptor Well Field wells ranged from 6.0 to 87.3 percent when active. Run time percentages of the Mitigation Well Field wells ranged from 77.8 to 89.0 percent. IW-5A, IW-13 and IW-20 have zero to limited runtime percentages in 2017 due to low flow conditions and considered for inactivation. (See Table 1. Both IW-13 and IW-20 have target and performance goals of 0 gpm.) IW-2A, IW-4, IW-24, IW-6A, IW-9, IW-23, IW-20, and IW-21 have zero to limited runtime percentages in 2017 due to pump equipment issues.

Shutdown of wells was required due the following:

- As needed well and transmission line maintenance activities,
- Perform non-pumping monitoring activities,
- Exceedance of storage capacity of the Mill Reservoir.

Well field data plots including a well construction diagram; static and pumping water levels; yield rates; calculated specific capacity; sulfate concentrations; static saturated thickness of basin fill alluvium; and annotated descriptions of maintenance activities from 2009 to 2018 are included in Attachment B.

3.0 SUMMARY OF WELL MAINTENANCE ACTIVITIES

Summary of well and pump maintenance activities performed in 2017 are tabulated on Table 3 below. All maintenance activities were performed following collection and evaluation of maintenance monitoring parameters as described in the *Sulfate Mitigation Action Well Field (Well Field) Operation and Maintenance Plan* (BasinWells, 2013).

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TABLE 3. 2017 SIERRITA MITIGATION ACTION WELL FIELD SUMMARY OF WELL AND PUMP MAINTENANCE ACTIVITIES

Well	Approx. Dates Off Line for Maintenance	Maintenance Activities
IW-9	01/2017-11/2017	Pump failure/ rebuilt & replaced
PS-1	12/2017	Pump failure/pending replacement
PS-4	-	Replaced motor; Upgrade pump 5/2017
MC-2	-	Bad center fuse; Tucson Electric Power repaired 8/2017
MC-4	-	Replaced motor 5/2017
FFS-6	6/2017-10/2017	Shaft wobble/replaced

4.0 FUTURE MAINTENANCE ACTIVITIES

Future maintenance activities will continue to adhere to activities and frequencies as described in *Sulfate Mitigation Action Well Field (Well Field) Operation and Maintenance Plan* (BasinWells, 2013). All maintenance activities to be performed following collection and evaluation of maintenance monitoring parameters.

Pump equipment in IW-2A, IW-4, IW-24, IW-6A, IW-9, IW-20, and IW-21 have downhole pump issues and will be evaluated and likely refurbished in 2018. IW-23 shut down at low flow and will be evaluated in 2018.

5.0 REFERENCES

- BasinWells Associates, PLLC, *Freeport-McMoran Sierrita Inc., Sulfate Mitigation Action Well Field (Well Field) Operation and Maintenance Plan*, December 31, 2013.
- Clear Creek Associates, PLC, *Mitigation Plan For Sulfate With Respect to Drinking Water Supplies in the Vicinity of the Freeport-McMoran Sierrita Inc. Tailing Impoundment, Mitigation Order on Consent, Docket No. P-50-06*, December 18, 2013.

ATTACHMENT A

SIERRITA SULFATE MITIGATION ACTION WELL FIELD PERFORMANCE SUMMARY

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**ATTACHMENT A.
SUMMARY OF 2017 INTERCEPTOR WELL PERFORMANCE
FREEPORT MCMORAN SIERRITA, INC.**

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-1	Jan	10,433,563	561	32.0	310
	Feb	9,624,063	517	29.5	310
	Mar	10,097,375	543	31.0	310
	Apr	10,825,000	582	33.2	310
	May	9,452,938	508	29.0	310
	Jun	7,514,688	404	23.1	310
	Jul	8,215,375	442	25.2	310
	Aug	5,981,250	322	18.4	310
	Sep	7,861,750	423	24.1	310
	Oct	6,228,000	335	19.1	310
	Nov	11,316,188	608	34.7	310
	Dec	11,168,813	600	34.3	310

IW-1 Total Gallons Pumped:	108,719,000
IW-1 Total Acre-Feet Pumped:	934
IW-1 Average Yield Rate (gpm):	310
IW-1 % Run Time:	66.7%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-2A	Jan	3,000	0	0.0	234
	Feb	3,000	0	0.0	234
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	61,000	4	0.2	234
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-2A Total Gallons Pumped:	67,000
IW-2A Total Acre-Feet Pumped:	0
IW-2A Average Yield Rate (gpm):	234
IW-2A % Run Time:	0.1%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)*
IW-3A	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	7,251,000	201	22.3	600
	Apr	25,152,875	699	77.2	600
	May	26,679,500	741	81.9	600
	Jun	15,052,625	418	46.2	600
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	2,000	0	0.0	600
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	19,355,000	538	59.4	600

IW-3A Total Gallons Pumped:	93,493,000
IW-3A Total Acre-Feet Pumped:	287
IW-3A Average Yield Rate (gpm):	600
IW-3A % Run Time:	29.6%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-8	Jan	2,898,125	139	8.9	348
	Feb	10,778,219	516	33.1	348
	Mar	11,184,656	536	34.3	348
	Apr	11,728,000	562	36.0	348
	May	9,943,594	476	30.5	348
	Jun	7,898,656	378	24.2	348
	Jul	7,735,750	370	23.7	348
	Aug	6,639,625	318	20.4	348
	Sep	8,727,375	418	26.8	348
	Oct	6,961,000	333	21.4	348
	Nov	6,218,125	298	19.1	348
	Dec	12,351,875	592	37.9	348

IW-8 Total Gallons Pumped:	103,065,000
IW-8 Total Acre-Feet Pumped:	316
IW-8 Average Yield Rate (gpm):	348
IW-8 % Run Time:	56.3%

*Flow meter calibration issue likely estimates approx. yield rate

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-9	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	6,386,000	527	19.6	202

IW-9 Total Gallons Pumped:	6,386,000
IW-9 Total Acre-Feet Pumped:	20
IW-9 Average Yield Rate (gpm):	202
IW-9 % Run Time:	6.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-4	Jan	3,238,109	425	9.9	127
	Feb	3,021,828	397	9.3	127
	Mar	1,179,063	155	3.6	127
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	391,719	51	1.2	127
	Jul	1,361,281	179	4.2	127
	Aug	284,000	37	0.9	127
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-4 Total Gallons Pumped:	9,476,000
IW-4 Total Acre-Feet Pumped:	29
IW-4 Average Yield Rate (gpm):	127
IW-4 % Run Time:	14.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-24	Jan	4,561,172	580	14.0	131
	Feb	4,850,906	617	14.9	131
	Mar	3,778,922	481	11.6	131
	Apr	2,917,195	371	9.0	131
	May	3,854,664	490	11.8	131
	Jun	2,090,141	266	6.4	131
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-24 Total Gallons Pumped:	22,053,000
IW-24 Total Acre-Feet Pumped:	68
IW-24 Average Yield Rate (gpm):	131
IW-24 % Run Time:	32.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-5A	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-5A Total Gallons Pumped:	0
IW-5A Total Acre-Feet Pumped:	0
IW-5A Average Yield Rate (gpm):	0
IW-5A % Run Time:	0.0%

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**ATTACHMENT A.
SUMMARY OF 2017 INTERCEPTOR WELL PERFORMANCE
FREEPORT MCMORAN SIERRITA, INC.**

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-23	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-23 Total Gallons Pumped:	0
IW-23 Total Acre-Feet Pumped:	0
IW-23 Average Yield Rate (gpm):	0
IW-23 % Run Time:	0.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-10	Jan	5,033,938	289	15.4	290
	Feb	4,973,750	286	15.3	290
	Mar	3,054,250	176	9.4	290
	Apr	4,675,000	269	14.3	290
	May	459,000	26	1.4	290
	Jun	5,091,469	293	15.6	290
	Jul	6,174,531	355	18.9	290
	Aug	5,250,000	302	16.1	290
	Sep	7,001,000	402	21.5	290
	Oct	2,183,000	125	6.7	290
	Nov	629,000	36	1.9	290
	Dec	2,997,000	172	9.2	290

IW-10 Total Gallons Pumped:	47,521,938
IW-10 Total Acre-Feet Pumped:	146
IW-10 Average Yield Rate (gpm):	290
IW-10 % Run Time:	31.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-22	Jan	10,440,500	519	32.0	335
	Feb	11,352,438	565	34.8	335
	Mar	10,144,813	505	31.1	335
	Apr	11,355,313	565	34.8	335
	May	9,275,125	461	28.5	335
	Jun	7,557,813	376	23.2	335
	Jul	8,525,000	424	26.2	335
	Aug	3,413,000	170	10.5	335
	Sep	1,000	0	0.0	335
	Oct	0	0	0.0	0
	Nov	7,135,313	355	21.9	335
	Dec	7,622,688	379	23.4	335

IW-22 Total Gallons Pumped:	86,823,000
IW-22 Total Acre-Feet Pumped:	266
IW-22 Average Yield Rate (gpm):	335
IW-22 % Run Time:	49.3%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-11	Jan	9,488,688	485	29.1	326
	Feb	8,769,500	448	26.9	326
	Mar	9,295,813	475	28.5	326
	Apr	9,196,000	470	28.2	326
	May	8,951,813	458	27.5	326
	Jun	6,995,000	358	21.5	326
	Jul	6,783,188	347	20.8	326
	Aug	4,641,000	237	14.2	326
	Sep	7,166,000	366	22.0	326
	Oct	5,944,000	304	18.2	326
	Nov	5,240,375	268	16.1	326
	Dec	8,276,625	423	25.4	326

IW-11 Total Gallons Pumped:	90,748,000
IW-11 Total Acre-Feet Pumped:	278
IW-11 Average Yield Rate (gpm):	326
IW-11 % Run Time:	53.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-6A	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-6A Total Gallons Pumped:	0
IW-6A Total Acre-Feet Pumped:	0
IW-6A Average Yield Rate (gpm):	0
IW-6A % Run Time:	0.0%

Well	Month	Gallons Pumped*	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-12	Jan	4,869,000	592	14.9	137
	Feb	4,419,000	538	13.6	137
	Mar	4,923,000	599	15.1	137
	Apr	5,265,000	641	16.2	137
	May	4,716,000	574	14.5	137
	Jun	3,618,000	440	11.1	137
	Jul	3,546,000	431	10.9	137
	Aug	2,763,000	336	8.5	137
	Sep	4,149,000	505	12.7	137
	Oct	2,790,000	339	8.6	137
	Nov	5,337,000	649	16.4	137
	Dec	6,129,000	746	18.8	137

IW-12 Total Gallons Pumped:	52,524,000
IW-12 Total Acre-Feet Pumped:	161
IW-12 Average Yield Rate (gpm):	137
IW-12 % Run Time:	72.9%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-13	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-13 Total Gallons Pumped:	0
IW-13 Total Acre-Feet Pumped:	0
IW-13 Average Yield Rate (gpm):	0
IW-13 % Run Time:	0.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-14	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	1,174,000	326	3.6	60
	Apr	1,647,000	458	5.1	60
	May	1,335,000	371	4.1	60
	Jun	1,526,000	424	4.7	60
	Jul	1,180,000	328	3.6	60
	Aug	1,374,000	382	4.2	60
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-14 Total Gallons Pumped:	8,236,000
IW-14 Total Acre-Feet Pumped:	25
IW-14 Average Yield Rate (gpm):	60
IW-14 % Run Time:	26.1%

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Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-15	Jan	1,169,000	475	3.6	41
	Feb	784,000	319	2.4	41
	Mar	538,000	219	1.7	41
	Apr	1,163,000	473	3.6	41
	May	524,000	213	1.6	41
	Jun	657,008	267	2.0	41
	Jul	381,992	155	1.2	41
	Aug	305,000	124	0.9	41
	Sep	470,000	191	1.4	41
	Oct	593,000	241	1.8	41
	Nov	559,801	228	1.7	41
	Dec	736,199	299	2.3	41

IW-15 Total Gallons Pumped:	7,881,000
IW-15 Total Acre-Feet Pumped:	24
IW-15 Average Yield Rate (gpm):	41
IW-15 % Run Time:	36.6%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-19	Jan	2,941,922	314	9.0	156
	Feb	4,913,328	525	15.1	156
	Mar	6,266,234	669	19.2	156
	Apr	2,194,109	234	6.7	156
	May	4,787,703	512	14.7	156
	Jun	3,825,891	409	11.7	156
	Jul	4,408,813	471	13.5	156
	Aug	3,420,578	365	10.5	156
	Sep	4,210,422	450	12.9	156
	Oct	3,186,000	340	9.8	156
	Nov	4,431,359	473	13.6	156
	Dec	5,341,641	571	16.4	156

IW-19 Total Gallons Pumped:	49,928,000
IW-19 Total Acre-Feet Pumped:	153
IW-19 Average Yield Rate (gpm):	156
IW-19 % Run Time:	60.9%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-20	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-20 Total Gallons Pumped:	0
IW-20 Total Acre-Feet Pumped:	0
IW-20 Average Yield Rate (gpm):	0
IW-20 % Run Time:	0.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-21	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	0	0	0.0	0
	Apr	0	0	0.0	0
	May	0	0	0.0	0
	Jun	0	0	0.0	0
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	0	0	0.0	0
	Dec	0	0	0.0	0

IW-21 Total Gallons Pumped:	0
IW-21 Total Acre-Feet Pumped:	0
IW-21 Average Yield Rate (gpm):	0
IW-21 % Run Time:	0.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-25	Jan	14,607,250	494	44.8	493
	Feb	16,422,500	555	50.4	493
	Mar	14,650,063	495	45.0	493
	Apr	15,984,313	540	49.1	493
	May	13,348,750	451	41.0	493
	Jun	11,167,625	378	34.3	493
	Jul	12,758,500	431	39.2	493
	Aug	9,493,625	321	29.1	493
	Sep	11,369,375	384	34.9	493
	Oct	10,111,000	342	31.0	493
	Nov	8,694,875	294	26.7	493
	Dec	15,777,125	533	48.4	493

IW-25 Total Gallons Pumped:	154,385,000
IW-25 Total Acre-Feet Pumped:	474
IW-25 Average Yield Rate (gpm):	493
IW-25 % Run Time:	59.6%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-26	Jan	7,661,563	517	23.5	247
	Feb	7,741,188	522	23.8	247
	Mar	7,685,469	519	23.6	247
	Apr	8,694,375	587	26.7	247
	May	7,197,344	486	22.1	247
	Jun	5,958,688	402	18.3	247
	Jul	6,140,375	414	18.8	247
	Aug	4,888,313	330	15.0	247
	Sep	5,866,688	396	18.0	247
	Oct	5,189,000	350	15.9	247
	Nov	4,472,813	302	13.7	247
	Dec	8,268,188	558	25.4	247

IW-26 Total Gallons Pumped:	79,764,000
IW-26 Total Acre-Feet Pumped:	245
IW-26 Average Yield Rate (gpm):	247
IW-26 % Run Time:	61.4%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-27	Jan	8,410,000	535	25.8	262
	Feb	8,424,594	536	25.9	262
	Mar	6,490,000	413	19.9	262
	Apr	9,319,313	593	28.6	262
	May	7,264,094	462	22.3	262
	Jun	6,378,313	406	19.6	262
	Jul	7,355,688	468	22.6	262
	Aug	5,454,563	347	16.7	262
	Sep	6,506,438	414	20.0	262
	Oct	5,777,000	367	17.7	262
	Nov	5,029,875	320	15.4	262
	Dec	9,125,125	580	28.0	262

IW-27 Total Gallons Pumped:	85,535,000
IW-27 Total Acre-Feet Pumped:	262
IW-27 Average Yield Rate (gpm):	262
IW-27 % Run Time:	62.1%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-28	Jan	7,763,063	503	23.8	257
	Feb	8,746,875	567	26.8	257
	Mar	7,668,563	497	23.5	257
	Apr	8,382,938	544	25.7	257
	May	6,969,625	452	21.4	257
	Jun	5,586,063	362	17.1	257
	Jul	6,687,875	434	20.5	257
	Aug	4,915,188	319	15.1	257
	Sep	5,911,813	383	18.1	257
	Oct	5,202,000	337	16.0	257
	Nov	4,536,000	294	13.9	257
	Dec	8,252,000	535	25.3	257

IW-28 Total Gallons Pumped:	80,622,000
IW-28 Total Acre-Feet Pumped:	247
IW-28 Average Yield Rate (gpm):	257
IW-28 % Run Time:	59.7%

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Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-29	Jan	22,582,469	724	69.3	520
	Feb	21,039,781	674	64.6	520
	Mar	22,262,313	714	68.3	520
	Apr	20,800,781	667	63.8	520
	May	21,224,250	680	65.1	520
	Jun	19,175,781	615	58.8	520
	Jul	20,427,188	655	62.7	520
	Aug	18,367,063	589	56.4	520
	Sep	19,098,938	612	58.6	520
	Oct	18,578,063	595	57.0	520
	Nov	12,632,875	405	38.8	520
	Dec	22,440,313	719	68.9	520

IW-29 Total Gallons Pumped:	238,629,813
IW-29 Total Acre-Feet Pumped:	732
IW-29 Average Yield Rate (gpm):	520
IW-29 % Run Time:	87.3%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-1	Jan	26,444,438	535	81.1	824
	Feb	306,188	6	0.9	824
	Mar	0	0	0.0	0
	Apr	33,316,438	674	102.2	824
	May	35,782,313	724	109.8	824
	Jun	34,112,063	690	104.7	824
	Jul	32,867,375	665	100.9	824
	Aug	34,974,375	707	107.3	824
	Sep	31,995,438	647	98.2	824
	Oct	30,238,750	612	92.8	824
	Nov	19,660,250	398	60.3	824
	Dec	2,000	0	0.0	824

PS-1 Total Gallons Pumped:	279,699,625
PS-1 Total Acre-Feet Pumped:	858
PS-1 Average Yield Rate (gpm):	824
PS-1 % Run Time:	64.6%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-2	Jan	2,884,438	56	8.9	855
	Feb	23,644,438	461	72.6	855
	Mar	32,996,563	643	101.3	855
	Apr	36,931,375	720	113.3	855
	May	36,312,750	708	111.4	855
	Jun	34,598,938	674	106.2	855
	Jul	34,124,750	665	104.7	855
	Aug	35,313,250	688	108.4	855
	Sep	32,125,938	626	98.6	855
	Oct	35,196,375	686	108.0	855
	Nov	36,103,375	704	110.8	855
	Dec	36,780,375	717	112.9	855

PS-2 Total Gallons Pumped:	377,012,563
PS-2 Total Acre-Feet Pumped:	1157
PS-2 Average Yield Rate (gpm):	855
PS-2 % Run Time:	83.9%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-3	Jan	27,021,250	439	82.9	1027
	Feb	41,567,313	675	127.6	1027
	Mar	44,853,063	728	137.6	1027
	Apr	42,528,875	690	130.5	1027
	May	42,483,125	689	130.4	1027
	Jun	41,182,125	668	126.4	1027
	Jul	39,641,250	643	121.6	1027
	Aug	40,714,125	661	124.9	1027
	Sep	37,906,875	615	116.3	1027
	Oct	32,258,500	524	99.0	1027
	Nov	42,507,750	690	130.4	1027
	Dec	43,125,625	700	132.3	1027

PS-3 Total Gallons Pumped:	475,789,875
PS-3 Total Acre-Feet Pumped:	1460
PS-3 Average Yield Rate (gpm):	1027
PS-3 % Run Time:	88.1%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-4	Jan	34,320,750	491	105.3	1164
	Feb	31,502,375	451	96.7	1164
	Mar	34,087,625	488	104.6	1164
	Apr	1,501,500	21	4.6	1164
	May	49,044,750	702	150.5	1164
	Jun	47,849,250	685	146.8	1164
	Jul	42,093,625	603	129.2	1164
	Aug	41,877,625	600	128.5	1164
	Sep	44,229,750	633	135.7	1164
	Oct	51,254,375	734	157.3	1164
	Nov	49,528,875	709	152.0	1164
	Dec	50,124,125	718	153.8	1164

PS-4 Total Gallons Pumped:	477,414,625
PS-4 Total Acre-Feet Pumped:	1465
PS-4 Average Yield Rate (gpm):	1164
PS-4 % Run Time:	78.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-1	Jan	38,747,000	734	118.9	880
	Feb	35,646,250	675	109.4	880
	Mar	38,707,250	733	118.8	880
	Apr	34,230,000	648	105.0	880
	May	38,519,750	730	118.2	880
	Jun	35,162,625	666	107.9	880
	Jul	27,424,500	519	84.2	880
	Aug	32,410,750	614	99.5	880
	Sep	33,104,750	627	101.6	880
	Oct	33,582,000	636	103.1	880
	Nov	37,051,750	702	113.7	880
	Dec	28,978,250	549	88.9	880

MC-1 Total Gallons Pumped:	413,564,875
MC-1 Total Acre-Feet Pumped:	1269
MC-1 Average Yield Rate (gpm):	880
MC-1 % Run Time:	89.4%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-2	Jan	26,939,125	737	82.7	609
	Feb	20,824,625	570	63.9	609
	Mar	26,856,313	735	82.4	609
	Apr	25,504,750	698	78.3	609
	May	26,693,000	731	81.9	609
	Jun	22,347,688	612	68.6	609
	Jul	4,123,688	113	12.7	609
	Aug	24,774,438	678	76.0	609
	Sep	22,571,875	618	69.3	609
	Oct	26,605,563	728	81.6	609
	Nov	25,747,313	705	79.0	609
	Dec	26,645,188	729	81.8	609

MC-2 Total Gallons Pumped:	279,633,563
MC-2 Total Acre-Feet Pumped:	858
MC-2 Average Yield Rate (gpm):	609
MC-2 % Run Time:	87.4%

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Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-3	Jan	22,592,625	738	69.3	510
	Feb	20,665,375	675	63.4	510
	Mar	22,367,125	731	68.6	510
	Apr	21,136,563	691	64.9	510
	May	21,169,688	692	65.0	510
	Jun	19,619,813	641	60.2	510
	Jul	11,599,250	379	35.6	510
	Aug	17,662,313	577	54.2	510
	Sep	17,662,000	577	54.2	510
	Oct	20,907,250	683	64.2	510
	Nov	20,110,563	657	61.7	510
	Dec	20,650,875	675	63.4	510
MC-3 Total Gallons Pumped:					236,143,438
MC-3 Total Acre-Feet Pumped:					725
MC-3 Average Yield Rate (gpm):					510
MC-3 % Run Time:					88.1%
Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-4	Jan	22,912,500	742	70.3	515
	Feb	20,826,500	674	63.9	515
	Mar	22,636,000	733	69.5	515
	Apr	19,669,313	637	60.4	515
	May	19,019,063	616	58.4	515
	Jun	20,177,625	653	61.9	515
	Jul	19,927,563	645	61.2	515
	Aug	20,437,563	661	62.7	515
	Sep	18,189,188	589	55.8	515
	Oct	21,519,875	696	66.0	515
	Nov	20,662,000	669	63.4	515
	Dec	20,792,438	673	63.8	515
MC-4 Total Gallons Pumped:					246,769,625
MC-4 Total Acre-Feet Pumped:					757
MC-4 Average Yield Rate (gpm):					515
MC-4 % Run Time:					91.2%
Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-1	Jan	35,162,625	689	107.9	850
	Feb	34,297,500	673	105.2	850
	Mar	37,033,125	726	113.6	850
	Apr	33,812,625	663	103.8	850
	May	35,502,625	696	108.9	850
	Jun	31,531,125	618	96.8	850
	Jul	28,666,125	562	88.0	850
	Aug	30,298,500	594	93.0	850
	Sep	31,749,500	623	97.4	850
	Oct	31,432,750	616	96.5	850
	Nov	29,229,125	573	89.7	850
	Dec	35,909,875	704	110.2	850
FFS-1 Total Gallons Pumped:					394,625,500
FFS-1 Total Acre-Feet Pumped:					1211
FFS-1 Average Yield Rate (gpm):					850
FFS-1 % Run Time:					88.3%
Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-2	Jan	32,992,000	637	101.2	863
	Feb	32,537,250	628	99.8	863
	Mar	36,073,000	697	110.7	863
	Apr	34,149,000	660	104.8	863
	May	33,888,875	654	104.0	863
	Jun	28,927,750	559	88.8	863
	Jul	23,451,500	453	72.0	863
	Aug	27,362,250	528	84.0	863
	Sep	31,715,750	613	97.3	863
	Oct	22,850,500	441	70.1	863
	Nov	31,530,750	609	96.8	863
	Dec	19,236,750	372	59.0	863
FFS-2 Total Gallons Pumped:					354,715,375
FFS-2 Total Acre-Feet Pumped:					1089
FFS-2 Average Yield Rate (gpm):					863
FFS-2 % Run Time:					78.2%
Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-3	Jan	8,604,484	732	26.4	196
	Feb	7,934,125	675	24.3	196
	Mar	8,642,391	735	26.5	196
	Apr	8,000,938	680	24.6	196
	May	7,426,063	631	22.8	196
	Jun	6,434,250	547	19.7	196
	Jul	6,148,000	523	18.9	196
	Aug	6,336,594	539	19.4	196
	Sep	6,978,406	593	21.4	196
	Oct	6,007,188	511	18.4	196
	Nov	6,770,719	576	20.8	196
	Dec	7,407,844	630	22.7	196
FFS-3 Total Gallons Pumped:					86,691,000
FFS-3 Total Acre-Feet Pumped:					266
FFS-3 Average Yield Rate (gpm):					196
FFS-3 % Run Time:					84.2%
Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-4	Jan	5,115,984	729	15.7	117
	Feb	4,735,484	675	14.5	117
	Mar	5,122,406	730	15.7	117
	Apr	4,629,141	659	14.2	117
	May	4,526,063	645	13.9	117
	Jun	4,229,797	603	13.0	117
	Jul	4,157,172	592	12.8	117
	Aug	4,537,859	646	13.9	117
	Sep	3,995,141	569	12.3	117
	Oct	4,131,484	589	12.7	117
	Nov	4,379,391	624	13.4	117
	Dec	772,125	110	2.4	117
FFS-4 Total Gallons Pumped:					50,332,047
FFS-4 Total Acre-Feet Pumped:					154
FFS-4 Average Yield Rate (gpm):					117
FFS-4 % Run Time:					81.8%
Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-5	Jan	43,929,563	729	134.8	1005
	Feb	40,615,688	674	124.6	1005
	Mar	44,097,250	731	135.3	1005
	Apr	40,087,000	665	123.0	1005
	May	42,149,000	699	129.3	1005
	Jun	37,234,500	617	114.3	1005
	Jul	36,338,375	603	111.5	1005
	Aug	38,318,375	635	117.6	1005
	Sep	37,469,625	621	115.0	1005
	Oct	36,662,750	608	112.5	1005
	Nov	39,886,250	661	122.4	1005
	Dec	42,532,000	705	130.5	1005
FFS-5 Total Gallons Pumped:					479,320,375
FFS-5 Total Acre-Feet Pumped:					1471
FFS-5 Average Yield Rate (gpm):					1005
FFS-5 % Run Time:					90.7%
Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-6	Jan	21,335,563	571	65.5	623
	Feb	20,639,750	552	63.3	623
	Mar	19,503,813	522	59.9	623
	Apr	20,033,125	536	61.5	623
	May	20,237,563	541	62.1	623
	Jun	9,798,250	262	30.1	623
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	0	0	0.0	0
	Oct	0	0	0.0	0
	Nov	3,945,781	106	12.1	623
	Dec	26,872,438	719	82.5	623
FFS-6 Total Gallons Pumped:					142,366,281
FFS-6 Total Acre-Feet Pumped:					437
FFS-6 Average Yield Rate (gpm):					623
FFS-6 % Run Time:					43.5%

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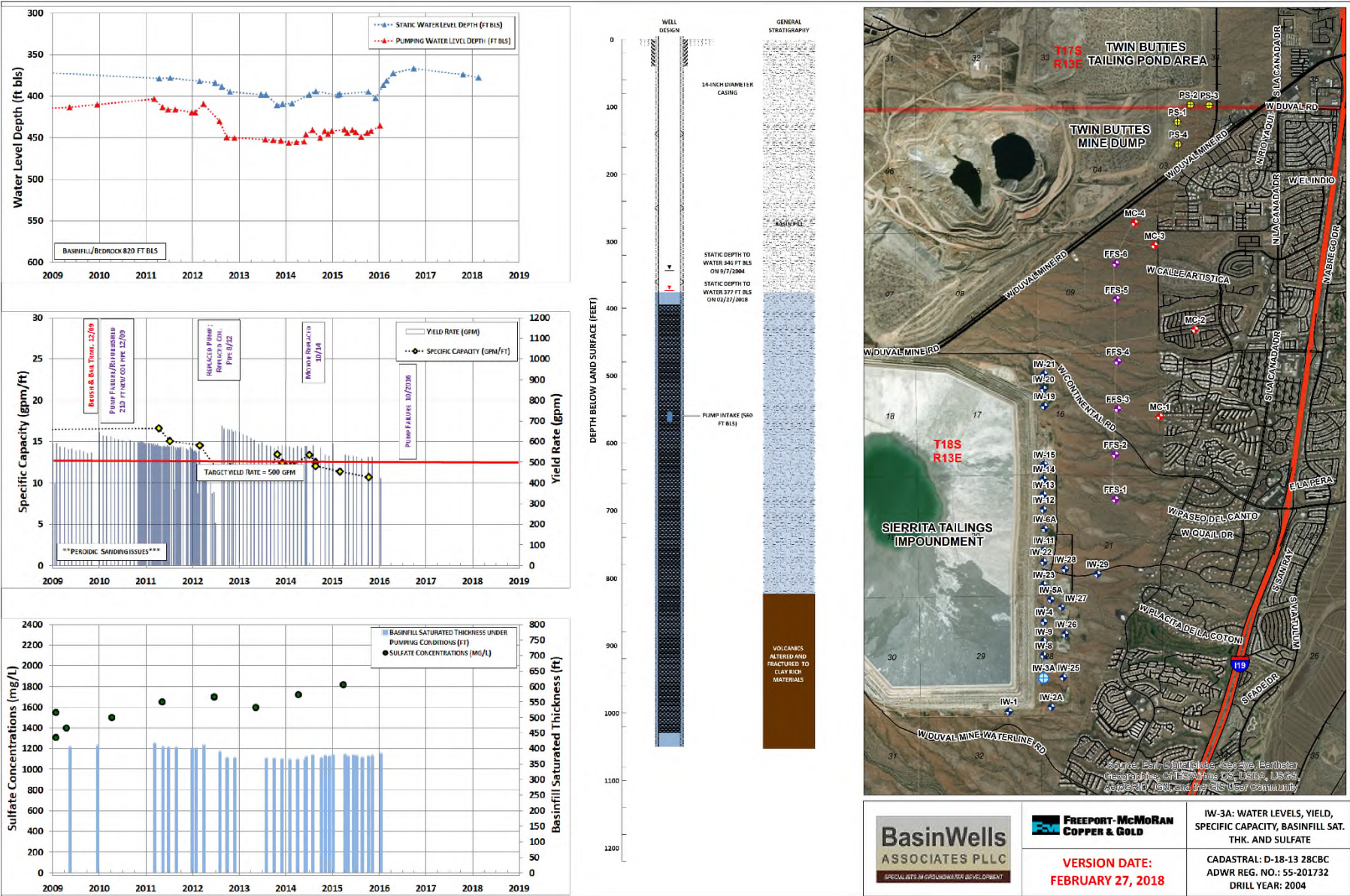
ATTACHMENT B

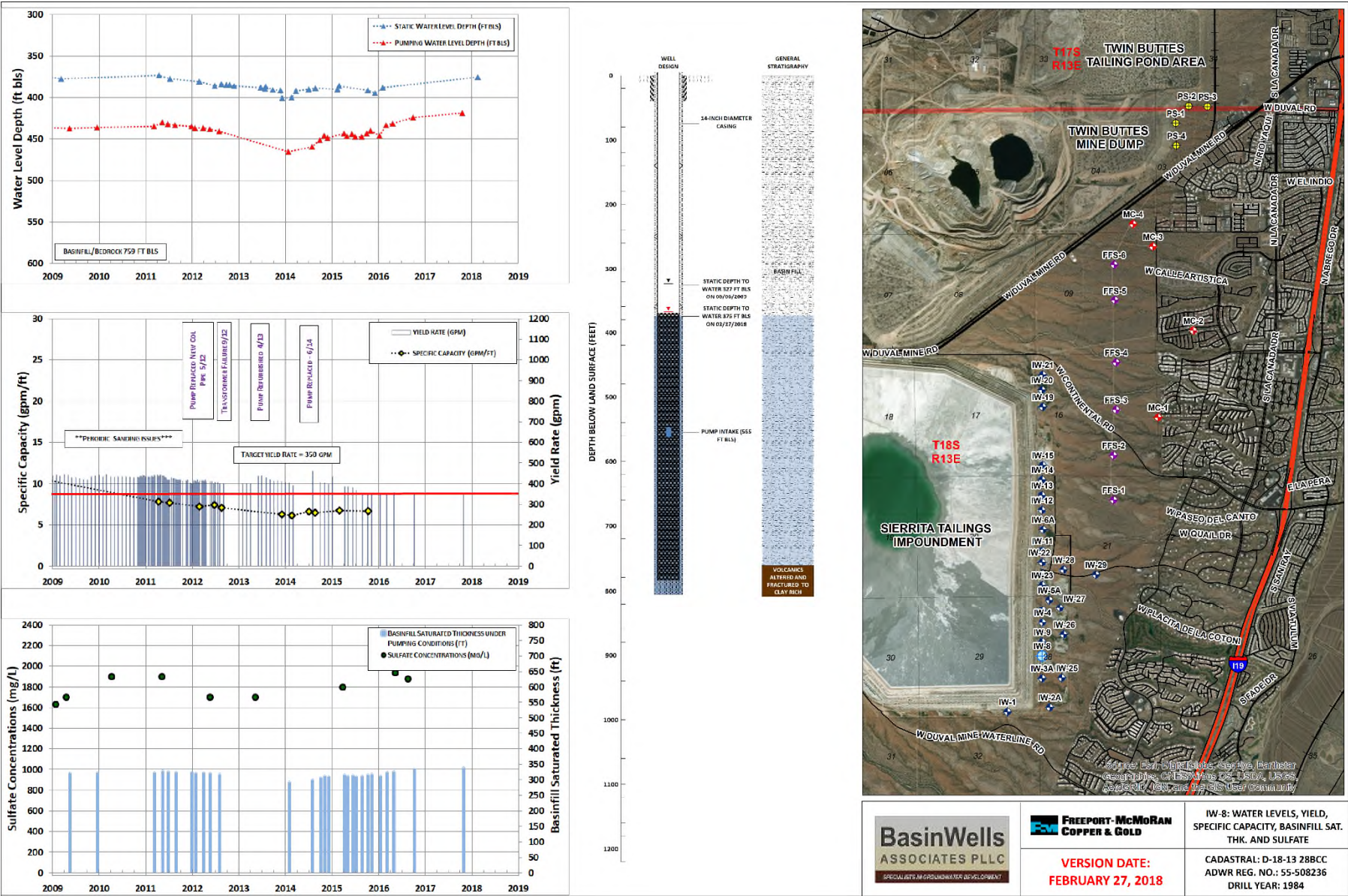
SIERRITA SULFATE MITIGATION ACTION WELL FIELD WELL FIELD DATA PLOTS

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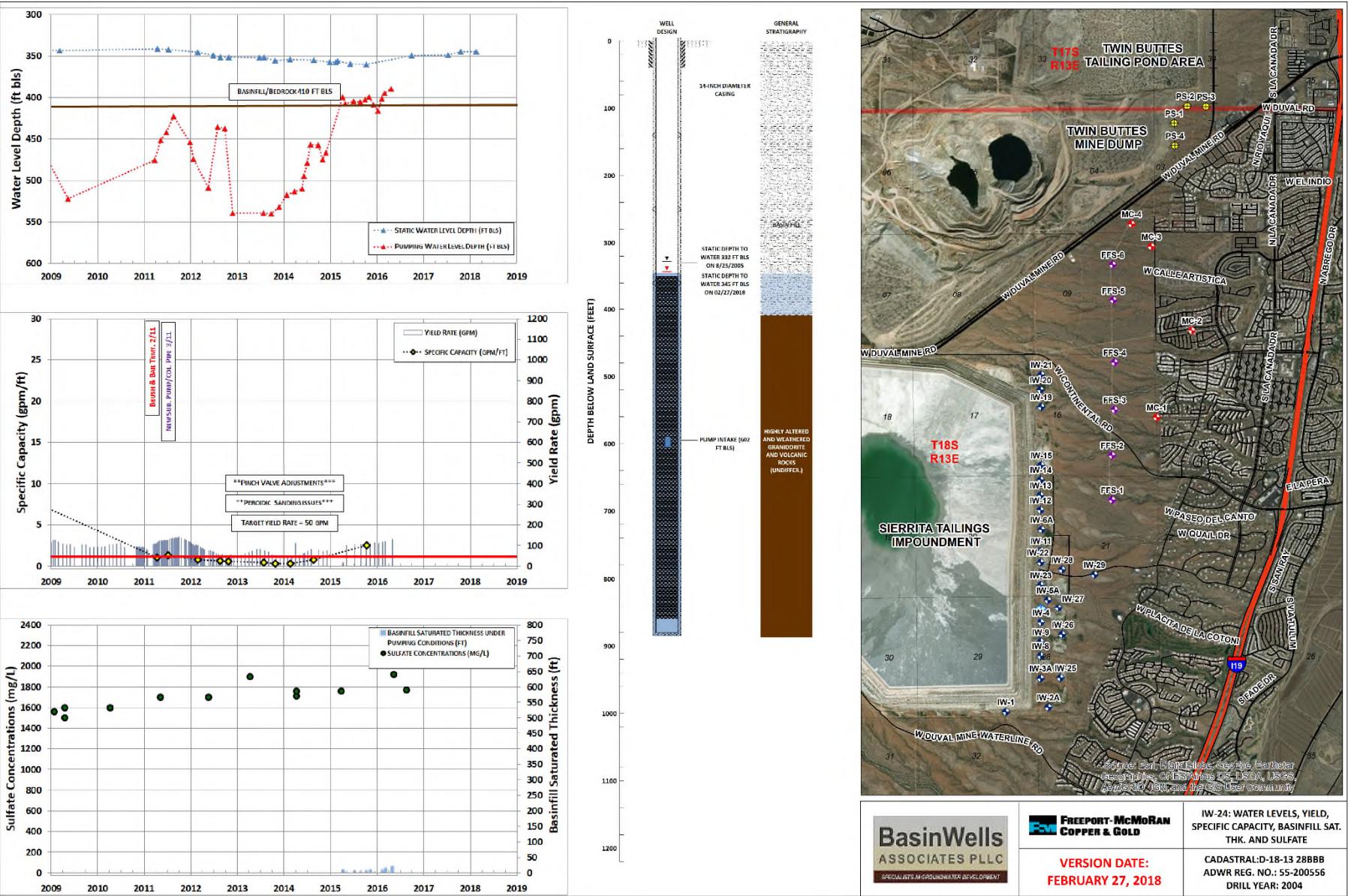






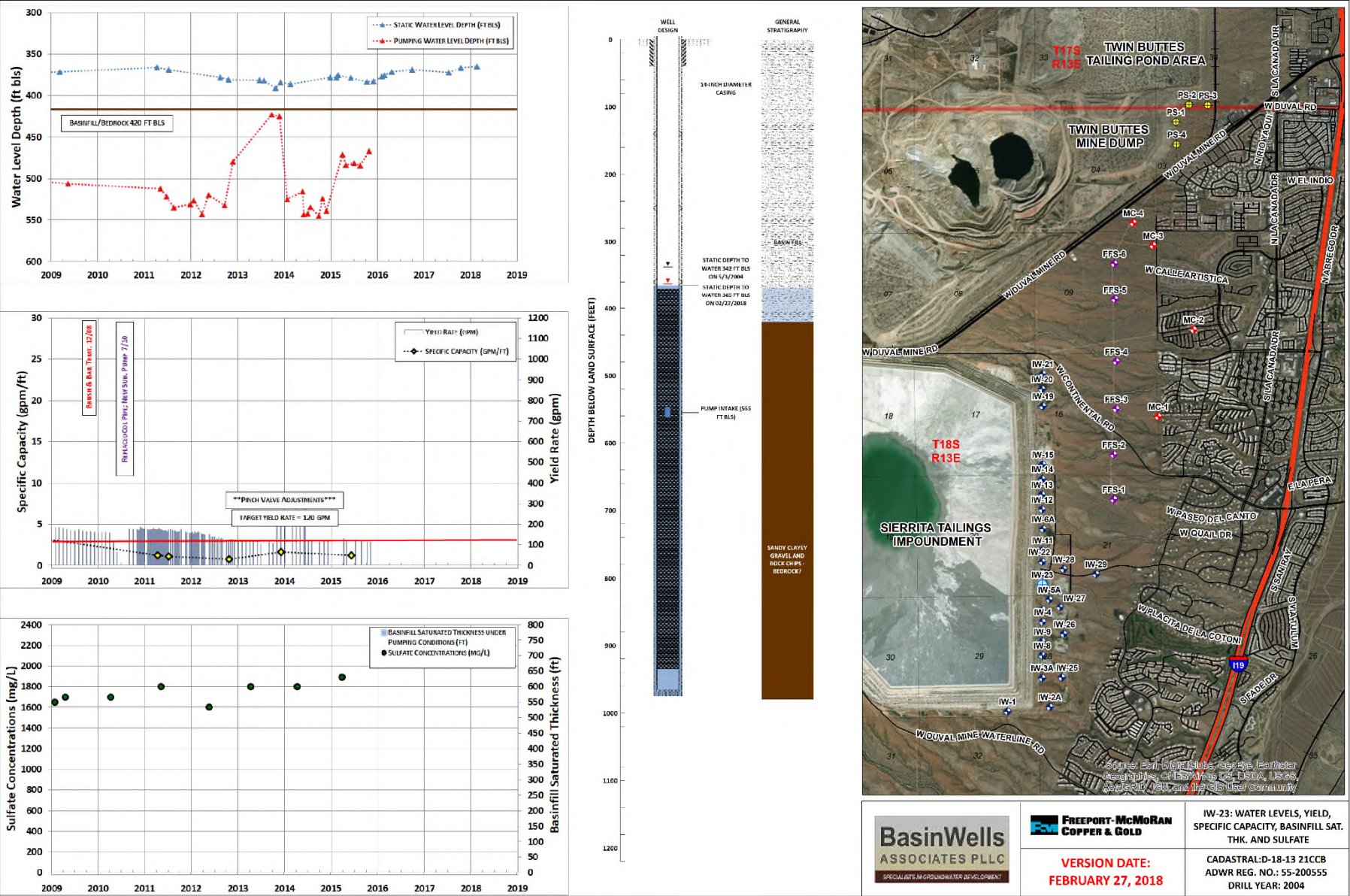






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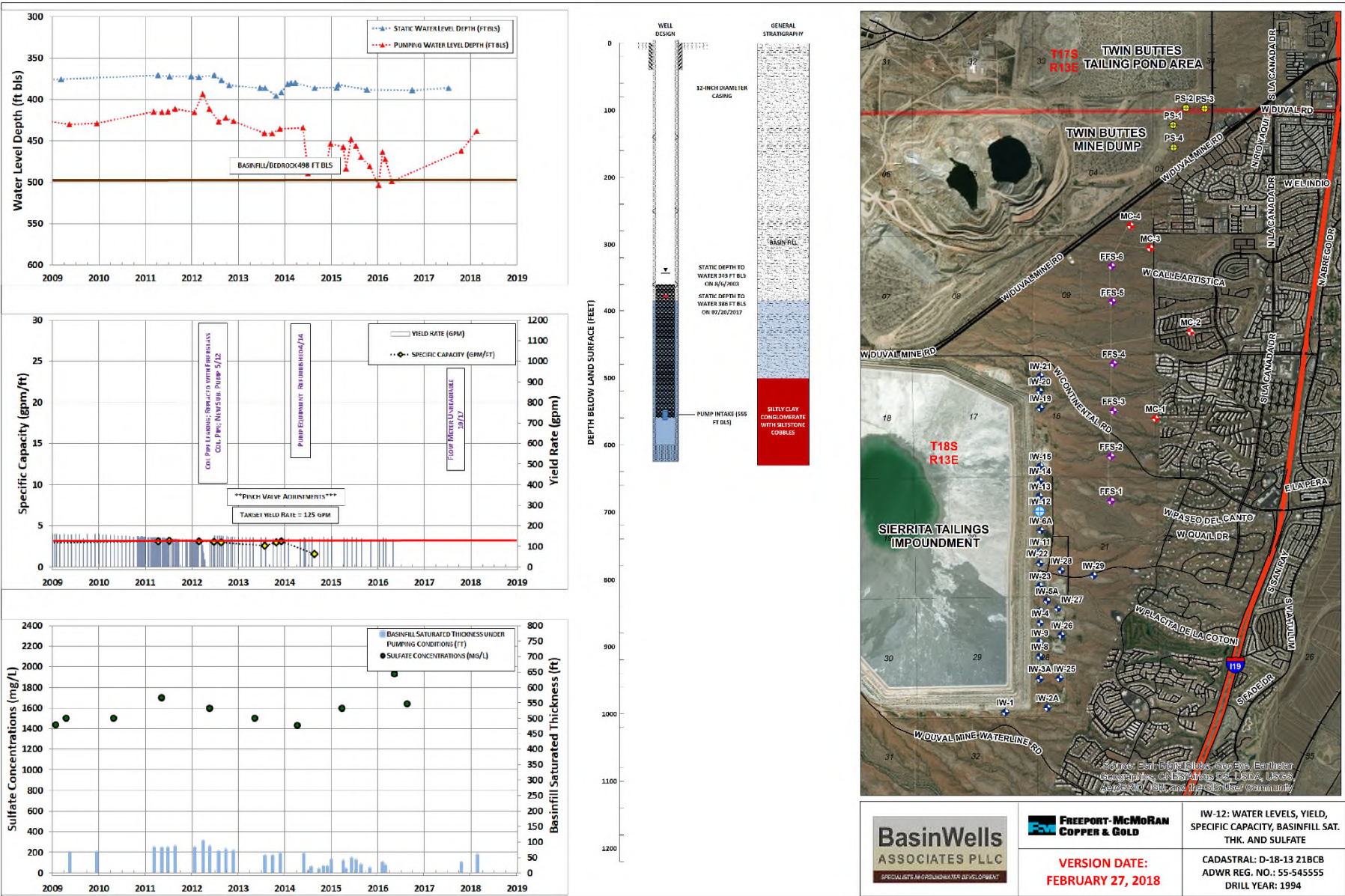








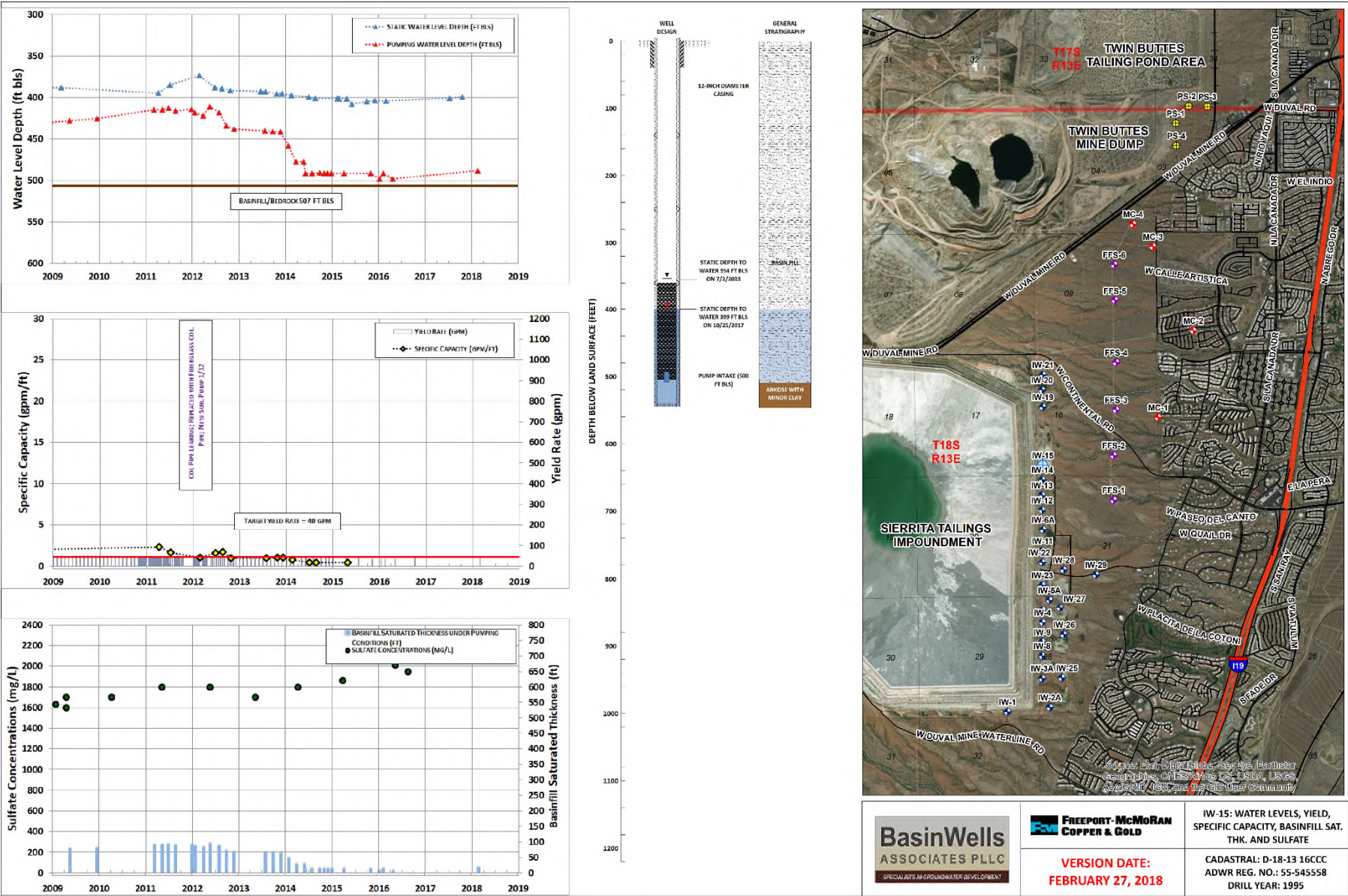




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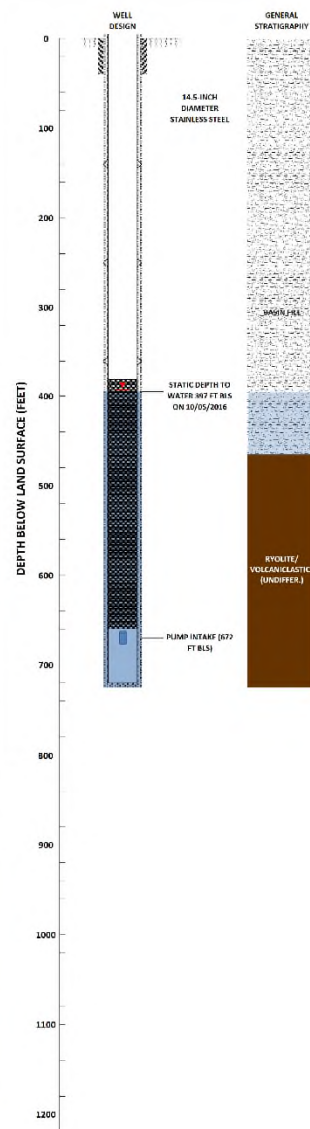






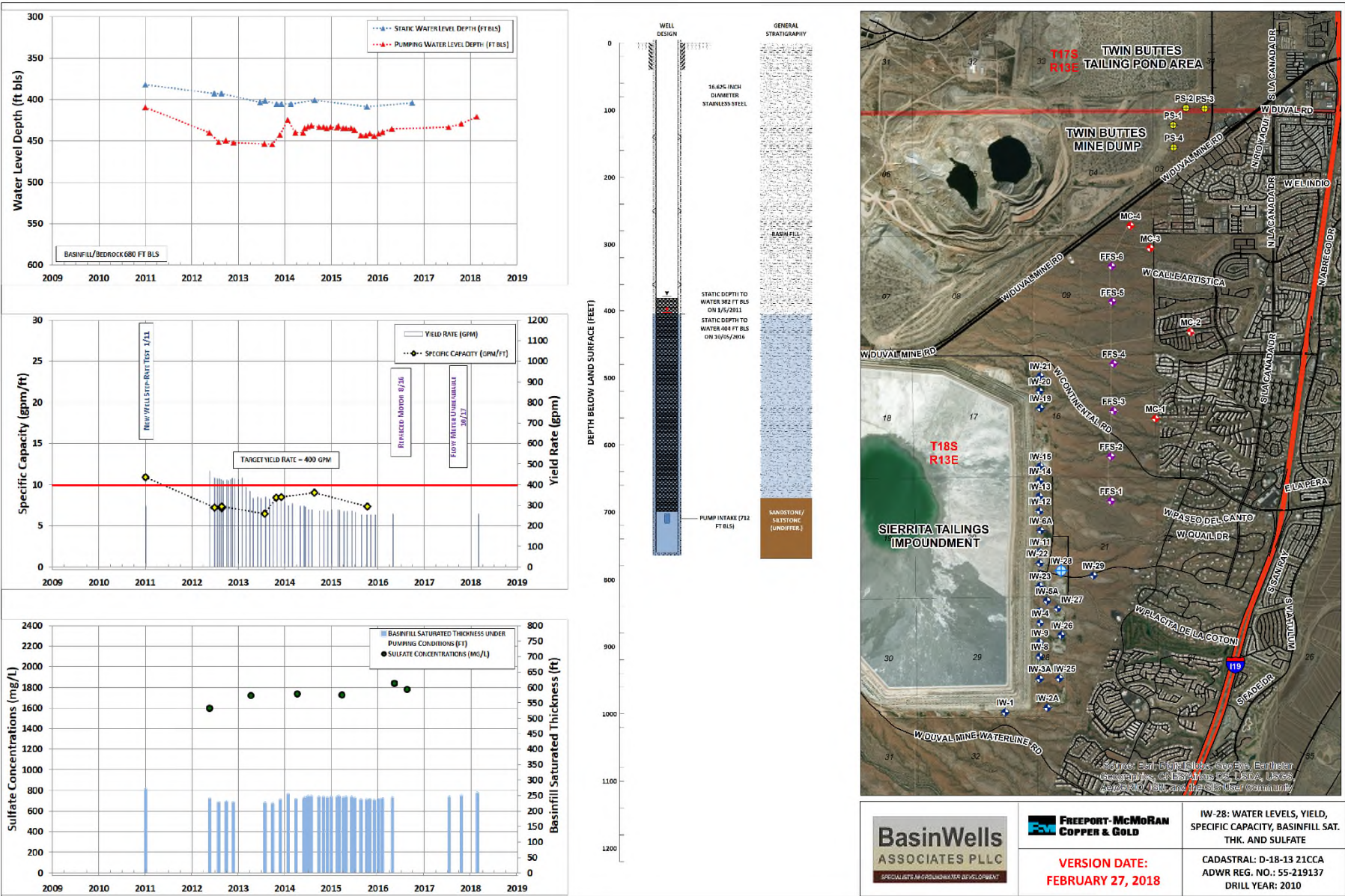






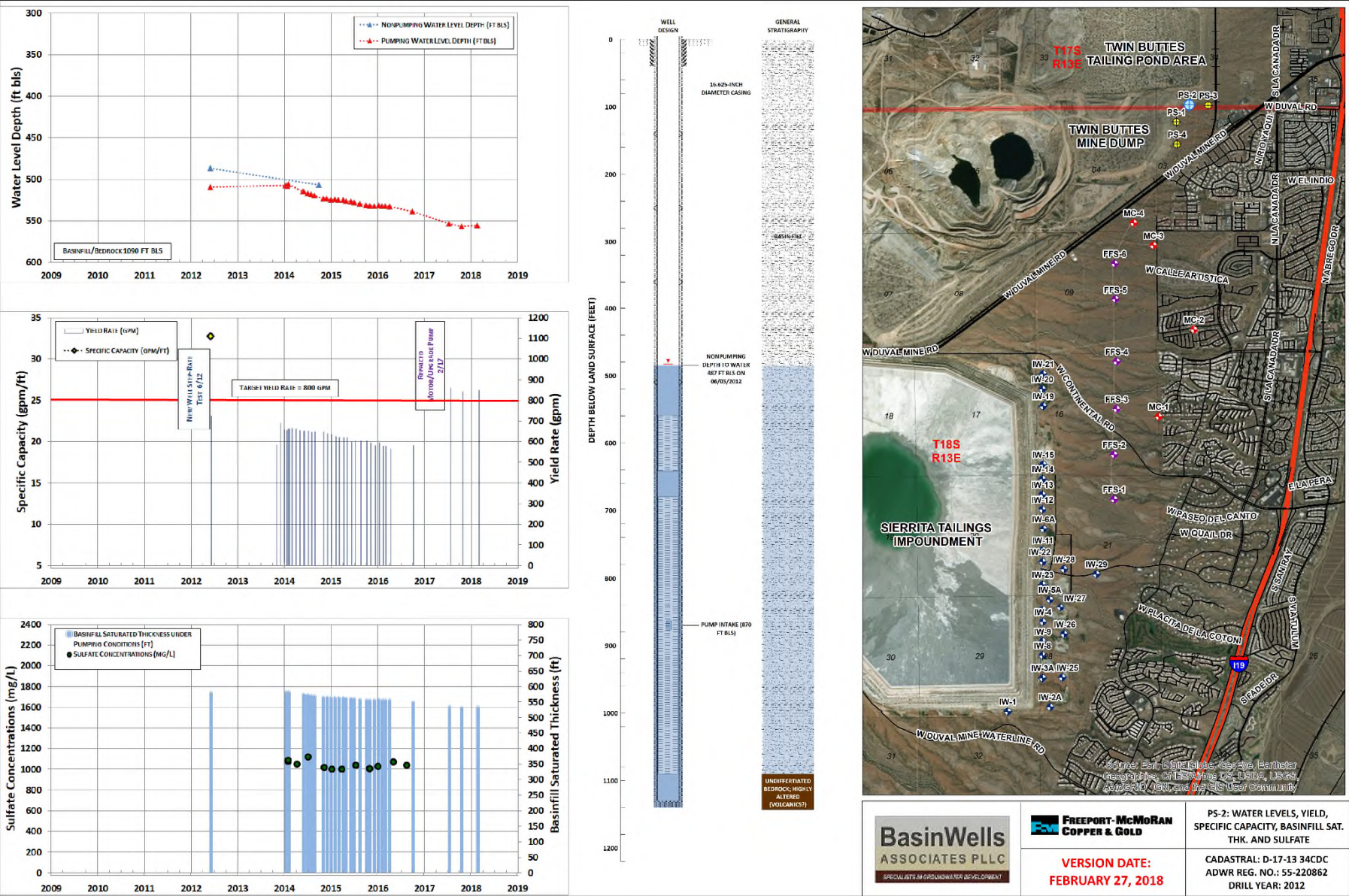
IW-27: WATER LEVELS, YIELD, SPECIFIC CAPACITY, BASINFILL SAT. THK. AND SULFATE
CADASTRAL: D-18-13 28BBD ADWR REG. NO.: 55-219136 DRILL YEAR: 2010

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2018 well field quarterly monitoring\deliverable\2017 facilities report\basinwells final fmi 2017 sulfate mitigation facilities monitoring tm 02282018.docx\3/28/2018\bs









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