

TECHNICAL MEMORANDUM REPORT



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PROJECT NO.: 19-016

SUBJECT: 2019 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 2019 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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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	41.6
IW-2A	D-18-13 28CCC	216464	300	300	1051	14	20	STEEL	350	1031	600-640	620	GRAVEL	1020	2008	12.0
IW-3A	D-18-13 28CBC	201732	500	500	1052	14	20	STEEL	400	1030	No	540	GRAVEL	820	2004	16.1
IW-8	D-18-13 28BCC	508236	350	350	783	14	20	STEEL	382	783	No	540	GRAVEL	759	1984	35.6
IW-9	D-18-13 28BCC	508238	200	200	853	14	20	STEEL	412	853	No	605	GRAVEL	740	1984	35.6
IW-4	D-18-13 28BCB	623132	40	40	946	14		STEEL	312	946	No	600	GRAVEL	490	1978	41.6
IW-24	D-18-13 28BBB	200556	50	50	884	14	20	STEEL	348	860	No	602	GRAVEL	410	2004	16.1
IW-5A	D-18-13 28BBB	219131	40	40	900	14.5	20	STAINLESS STEEL	382	890	620-640	630	TACNA	436	2010	9.8
IW-23	D-18-13 21CCB	200555	120	120	964	14	20	STEEL	375	935	No	550	TACNA	420	2004	16.1
IW-10	D-18-13 21CBC	508237	250	250	831	14	20	STEEL	420	831	No	600	GRAVEL	730	1984	35.5
IW-22	D-18-13 21CBC	200554	300	300	590	14	20	STEEL	359	560	No	550	GRAVEL	550	2004	16.1
IW-11	D-18-13 21CBC	508235	325	325	605	14	20	STEEL	371	605	No	500	GRAVEL	563	1984	35.5
IW-6A	D-18-13 21BCC	545565	80	80	497	12	20	STEEL	356	456	No	460	GRAVEL	456	1994	25.2
IW-12	D-18-13 21BCB	545555	125	125	600	12	20	STEEL	358	560	No	560	GRAVEL	498	1994	25.2
IW-13	D-18-13 21BBC	545556	0	0	497	12	20	STEEL	355	456	No	460	GRAVEL	452	1994	25.2
IW-14	D-18-13 21BBB	545557	60	60	549	12	20	STEEL	357	508	No	520	GRAVEL	509	1994	25.2
IW-15	D-18-13 16CCC	545558	40	40	547	12	20	STEEL	357	506	No	505	GRAVEL	507	1995	25.1
IW-19	D-18-13 16BCC	545562	150	150	540	12	20	STEEL	379	499	No	522	GRAVEL	498	1995	25.1
IW-20	D-18-13 16BCB	545563	0	0	502	12	20	STEEL	380	460	No	460	GRAVEL	470	1995	25.1
IW-21	D-18-13 16BBC	545564	100	100	601	12	20	STEEL	400	560	No	520	GRAVEL	520	1995	25.1
IW-25	D-18-13 28CBD	219596	400	400	782	16	24	STAINLESS STEEL	359	720	No	732	SILICA SAND	475	2010	9.3
IW-26	D-18-13 28BCD	219143	350	350	780	16	24	STAINLESS STEEL	340	720	No	732	SILICA SAND	475	2010	9.3
IW-27	D-18-13 28BBD	219136	100	100	720	14	22	STAINLESS STEEL	380	660	No	672	SILICA SAND	465	2010	9.3
IW-28	D-18-13 21CCA	219137	400	400	760	16	24	STAINLESS STEEL	380	700	No	712	SILICA SAND	680	2010	9.3
IW-29	D-18-13 21CDA	222865	-	-	770	16.62	24	STAINLESS STEEL	440	730	No		SILICA SAND	730	2014	5.9
PS-1	D-18-13 03BBA	220861	700	700	1020	16.62	24	HSLA	560	980	640-680	890	SILICA SAND	914	2011	8.2
PS-2	D-17-13 34CDC	220862	800	800	1130	16.62	24	HSLA	560	1090	640-680	870	SILICA SAND	1090	2012	7.8
PS-3	D-17-13 34CDD	220863	800	800	1200	16.62	24	HSLA	520	1160	600-640		SILICA SAND	1160	2012	7.8
PS-4	D-18-13 03BCA	220864	1000	1000	1060	16.62	24	HSLA	560	1020	640-680	893	SILICA SAND	1020	2012	7.7
MC-1	D-18-13 16DAA	221660	0	900	915	16.62	24	HSLA	479	875	599-639	824	SILICA SAND	875	2013	6.8
MC-2	D-18-13 10CCB	221761	0	700	980	16.62	24	HSLA	479	940	600-640	855	SILICA SAND	940	2013	7.0
MC-3	D-18-13 09AAA	221661	750	600	870	16.62	24	HSLA	530	810	No	830	SILICA SAND	810	2012	7.3
MC-4	D-18-13 04DDC	220842	600	600	830	16.62	24	HSLA	560	770	No	810	SILICA SAND	770	2012	7.6
FFS-1	D-18-13 21ABC	221662	338	800	790	16.62	24	HSLA	448	729	No	753	SILICA SAND	730	2013	6.9
FFS-2	D-18-13 16DCA	221663	300	700	750	16.62	24	HSLA	470	690	No	703	SILICA SAND	680	2013	6.9
FFS-3	D-18-13 16ACD	221664	225	400	800	16.62	24	HSLA	510	740	No	762	SILICA SAND	736	2013	7.1
FFS-4	D-18-13 16ABA	221665	150	200	871	16.62	24	HSLA	540	830	640-680	788	SILICA SAND	830	2012	7.2
FFS-5	D-18-13 09DBA	221666	225	1000	800	16.62	24	HSLA	569	739	No	775	SILICA SAND	740	2012	7.2
FFS-6	D-18-13 09ACA	221667	225	600	830	16.62	24	HSLA	528	769	No	750	SILICA SAND	770	2012	7.3

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

2.0 WELL FIELD OPERATIONS

Total groundwater withdrawals in 2019 of the Well Field are tabulated on Table 2. The well field withdrew approximately 15,850 acre-feet (AF) of groundwater in 2019 (average pumping rate of 9,827 gpm).

TABLE 2. 2019 SIERRITA SULFATE MITIGATION ACTION WELL FIELD TOTAL GROUNDWATER WITHDRAWAL	
Total Gallons Pumped:	5,164,974,708
Total Acre-Feet Pumped:	15,850

The Well Field, in total, produced approximately 92.3 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 68.6 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 2019 on a well by well basis is tabulated in Attachment A. Run time percentages of the Interceptor Well Field wells ranged from 1.3 to 88.8 percent when active. Run time percentages of the Mitigation Well Field wells ranged from 46.0 to 92.2 percent with the exception of FFS-6 which was offline the entire year due to a well casing issue. IW-5A, IW-13 and IW-20 have zero runtime percentages in 2018 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-24, IW-4, IW-10, IW-6A, IW-14, IW-23, IW-15, and IW-21 have zero to minimum runtime percentages in 2019 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,
- Pipeline relocations during Sierrita Tailings Impoundment buttress construction,
- Exceedance of storage capacity of the Mill Reservoir.
- Increased barge pumping to reduce size of tailings reclamation pond.

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 2010 to 2020 are included in Attachment B.

3.0 SUMMARY OF WELL MAINTENANCE ACTIVITIES

Summary of well and pump maintenance activities performed in 2019 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. 2019 SIERRITA MITIGATION ACTION WELL FIELD SUMMARY OF WELL AND PUMP MAINTENANCE ACTIVITIES

Well	Approx. Months Off Line for Maintenance and/or Evaluation	Maintenance Activities
IW-3A	Dec	Pump refurbished
IW-8	Feb-May, Jul	Pump failure/new pump & motor
IW-4	Jan-Dec	Under evaluation for pump refurbish
IW-24	Jan-Dec	Under evaluation for pump refurbish
IW-5A	Jan-Dec	Low-flow conditions, no plans to refurbish
IW-23	Jan-Dec	Under evaluation for pump refurbish
IW-10	Jan-Dec	Under evaluation for pump refurbish
IW-22	Jan-May	Pump refurbished 05/19
IW-6A	Jan-Dec	Under evaluation for pump refurbish
IW-13	Jan-Dec	Low-flow conditions, no plans to refurbish
IW-14	Jan-Dec	Under evaluation for pump refurbish
IW-15	Jan-Dec	Under evaluation for pump refurbish
IW-19	Jan-Nov	Pump refurbished 12/19
IW-20	Jan-Dec	Low-flow conditions, no plans to refurbish
IW-21	Jan-Dec	Under evaluation for pump refurbish
IW-26	Jul-Aug	Pump failure/new pump & motor
IW-28	Sep-Dec	Under evaluation for pump refurbish
PS-1		Motor change 05/19
PS-2	Jan-Feb	Pump failure/new pump & motor
MC-1	Sep	Flow meter issue repaired
MC-3	Nov	Motor change 04/19
FFS-1		Top shaft replaced 04/19
FFS-2	Dec	Under evaluation for pump refurbish
FFS-6	Jan-Dec	Discharge w Gravel Pack, Videoed & Brushed & Bailed, Under Evaluation

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-4, IW-24, IW-23, IW-10, IW-6A, IW-14, IW-15, IW-21, IW-28, and FFS-2 have downhole pump issues and will be evaluated and likely refurbished in 2020. FFS-6 has a well casing issue revealed by gravel pack material in discharge and will be evaluated and likely refurbished in 2020.

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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.

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ATTACHMENT A

SIERRITA SULFATE MITIGATION ACTION WELL FIELD PERFORMANCE SUMMARY

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**ATTACHMENT A.
SUMMARY OF 2019 INTERCEPTOR WELL PERFORMANCE
FREEPORT MCMORAN SIERRITA, INC.**

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-1	Jan	10,401,125	542	31.9	320
	Feb	11,794,250	614	36.2	320
	Mar	6,776,000	353	20.8	320
	Apr	11,844,000	617	36.3	320
	May	42,000	2	0.1	320
	Jun	3,195,563	166	9.8	320
	Jul	12,733,750	663	39.1	320
	Aug	14,276,688	744	43.8	320
	Sep	13,499,750	703	41.4	320
	Oct	13,658,500	711	41.9	320
	Nov	12,512,250	652	38.4	320
	Dec	10,614,688	553	32.6	320

IW-1 Total Gallons Pumped:	121,348,563
IW-1 Total Acre-Feet Pumped:	372
IW-1 Average Yield Rate (gpm):	320
IW-1 % Run Time:	72.1%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-2A	Jan	7,732,875	556	23.7	232
	Feb	8,907,125	640	27.3	232
	Mar	7,795,750	560	23.9	232
	Apr	10,030,375	721	30.8	232
	May	8,244,000	592	25.3	232
	Jun	9,754,875	701	29.9	232
	Jul	9,068,438	651	27.8	232
	Aug	10,186,125	732	31.3	232
	Sep	9,322,750	670	28.6	232
	Oct	9,093,063	653	27.9	232
	Nov	8,546,063	614	26.2	232
	Dec	9,567,375	687	29.4	232

IW-2A Total Gallons Pumped:	108,248,813
IW-2A Total Acre-Feet Pumped:	332
IW-2A Average Yield Rate (gpm):	232
IW-2A % Run Time:	88.8%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)*
IW-3A	Jan	18,342,625	536	56.3	570
	Feb	21,802,750	638	66.9	570
	Mar	18,428,250	539	56.6	570
	Apr	6,663,500	195	20.4	570
	May	17,749,375	519	54.5	570
	Jun	21,207,625	620	65.1	570
	Jul	21,076,625	616	64.7	570
	Aug	25,355,750	741	77.8	570
	Sep	23,865,750	698	73.2	570
	Oct	21,698,625	634	66.6	570
	Nov	15,910,250	465	48.8	570
	Dec	0	0	0.0	0

IW-3A Total Gallons Pumped:	212,101,125
IW-3A Total Acre-Feet Pumped:	651
IW-3A Average Yield Rate (gpm):	570
IW-3A % Run Time:	70.8%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-8	Jan	154,063	6	0.5	413
	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	734,000	30	2.3	413
	Jul	0	0	0.0	0
	Aug	3,060,750	124	9.4	413
	Sep	17,788,688	718	54.6	413
	Oct	18,344,750	740	56.3	413
	Nov	16,560,500	668	50.8	413
	Dec	18,114,188	731	55.6	413

IW-8 Total Gallons Pumped:	74,756,938
IW-8 Total Acre-Feet Pumped:	229
IW-8 Average Yield Rate (gpm):	413
IW-8 % Run Time:	34.4%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-9	Jan	6,641,156	515	20.4	215
	Feb	7,858,750	609	24.1	215
	Mar	6,752,375	523	20.7	215
	Apr	865,688	67	2.7	215
	May	3,401,156	264	10.4	215
	Jun	5,918,094	459	18.2	215
	Jul	7,998,625	620	24.5	215
	Aug	9,600,156	744	29.5	215
	Sep	8,662,531	672	26.6	215
	Oct	8,315,125	645	25.5	215
	Nov	7,448,219	577	22.9	215
	Dec	8,090,844	627	24.8	215

IW-9 Total Gallons Pumped:	81,552,719
IW-9 Total Acre-Feet Pumped:	250
IW-9 Average Yield Rate (gpm):	215
IW-9 % Run Time:	72.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-4	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-4 Total Gallons Pumped:	0
IW-4 Total Acre-Feet Pumped:	0
IW-4 Average Yield Rate (gpm):	0
IW-4 % Run Time:	0.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-24	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-24 Total Gallons Pumped:	0
IW-24 Total Acre-Feet Pumped:	0
IW-24 Average Yield Rate (gpm):	0
IW-24 % Run Time:	0.0%

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.
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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	1,000	0	0.0	290
	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-10 Total Gallons Pumped:	1,000
IW-10 Total Acre-Feet Pumped:	0
IW-10 Average Yield Rate (gpm):	290
IW-10 % Run Time:	0.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-22	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	1,359,188	63	4.2	360
	Jul	13,875,188	642	42.6	360
	Aug	15,975,125	740	49.0	360
	Sep	15,103,938	699	46.3	360
	Oct	15,160,938	702	46.5	360
	Nov	14,541,438	673	44.6	360
	Dec	16,108,375	746	49.4	360

IW-22 Total Gallons Pumped:	92,124,188
IW-22 Total Acre-Feet Pumped:	283
IW-22 Average Yield Rate (gpm):	360
IW-22 % Run Time:	48.7%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-11	Jan	6,735,188	398	20.7	282
	Feb	10,705,438	633	32.9	282
	Mar	4,274,625	253	13.1	282
	Apr	1,149,750	68	3.5	282
	May	2,265,500	134	7.0	282
	Jun	6,325,500	374	19.4	282
	Jul	8,400,125	496	25.8	282
	Aug	10,875,125	643	33.4	282
	Sep	11,276,188	666	34.6	282
	Oct	11,173,500	660	34.3	282
	Nov	10,926,125	646	33.5	282
	Dec	12,121,125	716	37.2	282

IW-11 Total Gallons Pumped:	96,228,188
IW-11 Total Acre-Feet Pumped:	295
IW-11 Average Yield Rate (gpm):	282
IW-11 % Run Time:	64.9%

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	4,261,688	568	13.1	125
	Feb	5,023,500	670	15.4	125
	Mar	4,322,875	576	13.3	125
	Apr	526,063	70	1.6	125
	May	1,618,375	216	5.0	125
	Jun	3,211,563	428	9.9	125
	Jul	4,889,000	652	15.0	125
	Aug	5,597,500	746	17.2	125
	Sep	5,322,563	710	16.3	125
	Oct	5,309,625	708	16.3	125
	Nov	4,999,813	667	15.3	125
	Dec	5,334,875	711	16.4	125

IW-12 Total Gallons Pumped:	50,417,438
IW-12 Total Acre-Feet Pumped:	155
IW-12 Average Yield Rate (gpm):	125
IW-12 % Run Time:	76.7%

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	1,000	0	0.0	60
	Feb	1,000	0	0.0	60
	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-14 Total Gallons Pumped:	2,000
IW-14 Total Acre-Feet Pumped:	0
IW-14 Average Yield Rate (gpm):	60
IW-14 % Run Time:	0.0%

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Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-15	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-15 Total Gallons Pumped:	0
IW-15 Total Acre-Feet Pumped:	0
IW-15 Average Yield Rate (gpm):	0
IW-15 % Run Time:	0.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-19	Jan	18,000	2	0.1	161
	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	6,078,344	629	18.7	161

IW-19 Total Gallons Pumped:	6,096,344
IW-19 Total Acre-Feet Pumped:	19
IW-19 Average Yield Rate (gpm):	161
IW-19 % Run Time:	7.2%

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	14,782,625	548	45.4	450
	Feb	17,285,375	640	53.0	450
	Mar	13,463,875	499	41.3	450
	Apr	2,089,375	77	6.4	450
	May	4,313,375	160	13.2	450
	Jun	11,974,500	444	36.7	450
	Jul	13,955,625	517	42.8	450
	Aug	18,714,375	693	57.4	450
	Sep	18,165,750	673	55.7	450
	Oct	18,160,000	673	55.7	450
	Nov	15,576,375	577	47.8	450
	Dec	20,120,625	745	61.7	450

IW-25 Total Gallons Pumped:	168,601,875
IW-25 Total Acre-Feet Pumped:	517
IW-25 Average Yield Rate (gpm):	450
IW-25 % Run Time:	71.3%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-26	Jan	8,045,250	552	24.7	243
	Feb	9,488,688	651	29.1	243
	Mar	6,713,750	460	20.6	243
	Apr	1,086,813	75	3.3	243
	May	2,248,875	154	6.9	243
	Jun	1,753,313	120	5.4	243
	Jul	0	0	0.0	0
	Aug	0	0	0.0	0
	Sep	6,056,375	415	18.6	243
	Oct	10,204,750	700	31.3	243
	Nov	8,599,938	590	26.4	243
	Dec	10,836,063	743	33.3	243

IW-26 Total Gallons Pumped:	65,033,813
IW-26 Total Acre-Feet Pumped:	200
IW-26 Average Yield Rate (gpm):	243
IW-26 % Run Time:	50.9%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-27	Jan	8,207,969	582	25.2	235
	Feb	9,483,719	673	29.1	235
	Mar	3,583,531	254	11.0	235
	Apr	2,004,000	142	6.1	235
	May	2,217,813	157	6.8	235
	Jun	1,466,188	104	4.5	235
	Jul	2,701,281	192	8.3	235
	Aug	10,349,313	734	31.8	235
	Sep	9,747,469	691	29.9	235
	Oct	9,591,125	680	29.4	235
	Nov	7,633,563	541	23.4	235
	Dec	9,802,656	695	30.1	235

IW-27 Total Gallons Pumped:	76,788,625
IW-27 Total Acre-Feet Pumped:	236
IW-27 Average Yield Rate (gpm):	235
IW-27 % Run Time:	62.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-28	Jan	7,240,188	300	22.2	402
	Feb	8,073,688	335	24.8	402
	Mar	5,988,750	248	18.4	402
	Apr	753,250	31	2.3	402
	May	4,237,313	176	13.0	402
	Jun	6,091,750	253	18.7	402
	Jul	6,399,938	265	19.6	402
	Aug	6,032,000	250	18.5	402
	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-28 Total Gallons Pumped:	44,816,875
IW-28 Total Acre-Feet Pumped:	138
IW-28 Average Yield Rate (gpm):	402
IW-28 % Run Time:	21.2%

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Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
IW-29	Jan	14,458,563	504	44.4	478
	Feb	19,031,250	664	58.4	478
	Mar	21,390,875	746	65.6	478
	Apr	1,882,500	66	5.8	478
	May	7,705,750	269	23.6	478
	Jun	13,034,750	454	40.0	478
	Jul	19,591,625	683	60.1	478
	Aug	20,880,063	728	64.1	478
	Sep	20,140,250	702	61.8	478
	Oct	20,295,750	708	62.3	478
	Nov	19,655,438	685	60.3	478
	Dec	10,206,375	356	31.3	478

IW-29 Total Gallons Pumped:	188,273,188
IW-29 Total Acre-Feet Pumped:	578
IW-29 Average Yield Rate (gpm):	478
IW-29 % Run Time:	74.9%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-1	Jan	27,850,000	537	85.5	865
	Feb	34,967,000	674	107.3	865
	Mar	35,864,500	691	110.1	865
	Apr	33,310,500	642	102.2	865
	May	32,587,000	628	100.0	865
	Jun	32,378,875	624	99.4	865
	Jul	36,918,375	711	113.3	865
	Aug	37,489,500	722	115.0	865
	Sep	35,120,750	677	107.8	865
	Oct	35,372,500	682	108.5	865
	Nov	35,214,125	678	108.1	865
	Dec	37,684,125	726	115.6	865

PS-1 Total Gallons Pumped:	414,757,250
PS-1 Total Acre-Feet Pumped:	1273
PS-1 Average Yield Rate (gpm):	865
PS-1 % Run Time:	91.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-2	Jan	0	0	0.0	0
	Feb	0	0	0.0	0
	Mar	16,478,500	324	50.6	848
	Apr	34,046,500	669	104.5	848
	May	35,026,375	688	107.5	848
	Jun	35,610,625	700	109.3	848
	Jul	36,936,500	726	113.3	848
	Aug	37,504,375	737	115.1	848
	Sep	35,022,500	688	107.5	848
	Oct	35,158,625	691	107.9	848
	Nov	35,147,750	691	107.9	848
	Dec	37,713,875	741	115.7	848

PS-2 Total Gallons Pumped:	338,645,625
PS-2 Total Acre-Feet Pumped:	1039
PS-2 Average Yield Rate (gpm):	848
PS-2 % Run Time:	76.0%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-3	Jan	31,567,750	534	96.9	985
	Feb	39,869,500	675	122.3	985
	Mar	43,537,125	737	133.6	985
	Apr	38,741,625	656	118.9	985
	May	39,476,000	668	121.1	985
	Jun	40,457,125	685	124.2	985
	Jul	41,745,375	706	128.1	985
	Aug	42,326,875	716	129.9	985
	Sep	39,305,500	665	120.6	985
	Oct	39,570,125	670	121.4	985
	Nov	38,962,250	659	119.6	985
	Dec	41,643,500	705	127.8	985

PS-3 Total Gallons Pumped:	477,202,750
PS-3 Total Acre-Feet Pumped:	1464
PS-3 Average Yield Rate (gpm):	985
PS-3 % Run Time:	92.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
PS-4	Jan	36,494,000	531	112.0	1145
	Feb	45,981,750	669	141.1	1145
	Mar	50,066,750	729	153.6	1145
	Apr	44,471,500	647	136.5	1145
	May	45,490,000	662	139.6	1145
	Jun	46,339,500	675	142.2	1145
	Jul	48,053,750	699	147.5	1145
	Aug	48,687,000	709	149.4	1145
	Sep	42,693,000	621	131.0	1145
	Oct	45,754,750	666	140.4	1145
	Nov	44,136,750	642	135.4	1145
	Dec	48,519,500	706	148.9	1145

PS-4 Total Gallons Pumped:	546,688,250
PS-4 Total Acre-Feet Pumped:	1678
PS-4 Average Yield Rate (gpm):	1145
PS-4 % Run Time:	90.8%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-1	Jan	25,810,875	500	79.2	860
	Feb	34,759,500	674	106.7	860
	Mar	19,718,875	382	60.5	860
	Apr	27,032,750	524	83.0	860
	May	29,012,875	562	89.0	860
	Jun	32,673,125	633	100.3	860
	Jul	22,504,625	436	69.1	860
	Aug	8,971,375	174	27.5	860
	Sep	0	0	0.0	0
	Oct	28,862,875	559	88.6	860
	Nov	25,253,875	489	77.5	860
	Dec	36,703,500	711	112.6	860

MC-1 Total Gallons Pumped:	291,304,250
MC-1 Total Acre-Feet Pumped:	894
MC-1 Average Yield Rate (gpm):	860
MC-1 % Run Time:	64.4%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-2	Jan	18,792,500	514	57.7	609
	Feb	23,780,875	651	73.0	609
	Mar	13,508,875	370	41.5	609
	Apr	17,352,750	475	53.3	609
	May	1,969,875	54	6.0	609
	Jun	23,143,125	633	71.0	609
	Jul	15,896,500	435	48.8	609
	Aug	21,585,500	591	66.2	609
	Sep	22,769,250	623	69.9	609
	Oct	20,980,750	574	64.4	609
	Nov	18,597,375	509	57.1	609
	Dec	26,060,375	713	80.0	609

MC-2 Total Gallons Pumped:	224,437,750
MC-2 Total Acre-Feet Pumped:	689
MC-2 Average Yield Rate (gpm):	609
MC-2 % Run Time:	70.1%

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Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-3	Jan	11,998,000	395	36.8	506
	Feb	16,395,750	540	50.3	506
	Mar	10,104,125	333	31.0	506
	Apr	15,427,125	508	47.3	506
	May	14,864,000	490	45.6	506
	Jun	16,184,000	533	49.7	506
	Jul	11,304,000	372	34.7	506
	Aug	16,687,750	550	51.2	506
	Sep	15,825,625	521	48.6	506
	Oct	14,179,625	467	43.5	506
	Nov	176,000	6	0.5	506
	Dec	14,431,250	475	44.3	506

MC-3 Total Gallons Pumped:	157,577,250
MC-3 Total Acre-Feet Pumped:	484
MC-3 Average Yield Rate (gpm):	506
MC-3 % Run Time:	59.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
MC-4	Jan	14,499,875	531	44.5	455
	Feb	18,348,625	672	56.3	455
	Mar	14,304,000	524	43.9	455
	Apr	16,288,500	597	50.0	455
	May	16,585,500	608	50.9	455
	Jun	17,268,500	633	53.0	455
	Jul	11,511,000	422	35.3	455
	Aug	17,506,875	641	53.7	455
	Sep	16,711,250	612	51.3	455
	Oct	15,857,875	581	48.7	455
	Nov	16,298,000	597	50.0	455
	Dec	18,776,125	688	57.6	455

MC-4 Total Gallons Pumped:	193,956,125
MC-4 Total Acre-Feet Pumped:	595
MC-4 Average Yield Rate (gpm):	455
MC-4 % Run Time:	81.1%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-1	Jan	25,097,000	510	77.0	820
	Feb	32,524,375	661	99.8	820
	Mar	22,777,625	463	69.9	820
	Apr	30,089,000	612	92.3	820
	May	33,756,125	686	103.6	820
	Jun	34,369,250	699	105.5	820
	Jul	35,175,250	715	107.9	820
	Aug	35,928,125	730	110.3	820
	Sep	33,943,375	690	104.2	820
	Oct	34,194,625	695	104.9	820
	Nov	34,031,250	692	104.4	820
	Dec	36,722,000	746	112.7	820

FFS-1 Total Gallons Pumped:	388,608,000
FFS-1 Total Acre-Feet Pumped:	1193
FFS-1 Average Yield Rate (gpm):	820
FFS-1 % Run Time:	90.2%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-2	Jan	25,792,000	500	79.1	860
	Feb	34,726,375	673	106.6	860
	Mar	36,496,625	707	112.0	860
	Apr	29,216,000	566	89.7	860
	May	34,870,375	676	107.0	860
	Jun	35,620,125	690	109.3	860
	Jul	33,732,625	654	103.5	860
	Aug	30,174,000	585	92.6	860
	Sep	35,194,875	682	108.0	860
	Oct	35,513,750	688	109.0	860
	Nov	27,018,250	524	82.9	860
	Dec	0	0	0.0	0

FFS-2 Total Gallons Pumped:	358,355,000
FFS-2 Total Acre-Feet Pumped:	1100
FFS-2 Average Yield Rate (gpm):	860
FFS-2 % Run Time:	79.3%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-3	Jan	5,792,125	561	17.8	172
	Feb	6,776,375	657	20.8	172
	Mar	7,682,375	744	23.6	172
	Apr	7,288,125	706	22.4	172
	May	7,157,563	694	22.0	172
	Jun	7,442,000	721	22.8	172
	Jul	7,203,688	698	22.1	172
	Aug	7,179,219	696	22.0	172
	Sep	6,750,938	654	20.7	172
	Oct	6,606,531	640	20.3	172
	Nov	6,494,969	629	19.9	172
	Dec	6,452,844	625	19.8	172

FFS-3 Total Gallons Pumped:	82,826,750
FFS-3 Total Acre-Feet Pumped:	254
FFS-3 Average Yield Rate (gpm):	172
FFS-3 % Run Time:	91.6%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-4	Jan	1,937,000	482	5.9	67
	Feb	2,475,031	616	7.6	67
	Mar	2,839,969	706	8.7	67
	Apr	2,537,000	631	7.8	67
	May	2,644,000	658	8.1	67
	Jun	2,904,469	723	8.9	67
	Jul	2,843,500	707	8.7	67
	Aug	2,784,031	693	8.5	67
	Sep	2,714,000	675	8.3	67
	Oct	2,971,000	739	9.1	67
	Nov	2,599,469	647	8.0	67
	Dec	2,613,531	650	8.0	67

FFS-4 Total Gallons Pumped:	31,863,000
FFS-4 Total Acre-Feet Pumped:	98
FFS-4 Average Yield Rate (gpm):	67
FFS-4 % Run Time:	90.5%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-5	Jan	20,749,000	307	63.7	1125
	Feb	23,460,000	348	72.0	1125
	Mar	11,342,375	168	34.8	1125
	Apr	48,408,625	717	148.6	1125
	May	30,300,750	449	93.0	1125
	Jun	32,054,250	475	98.4	1125
	Jul	9,580,560	142	29.4	1125
	Aug	7,072,560	105	21.7	1125
	Sep	20,311,750	301	62.3	1125
	Oct	25,544,250	378	78.4	1125
	Nov	20,212,500	299	62.0	1125
	Dec	23,324,400	346	71.6	1125

FFS-5 Total Gallons Pumped:	272,361,020
FFS-5 Total Acre-Feet Pumped:	836
FFS-5 Average Yield Rate (gpm):	1125
FFS-5 % Run Time:	46.1%

Well	Month	Gallons Pumped	Estimated Hours	Yield (Acrefeet)	Approx. Yield Rate (gpm)
FFS-6	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

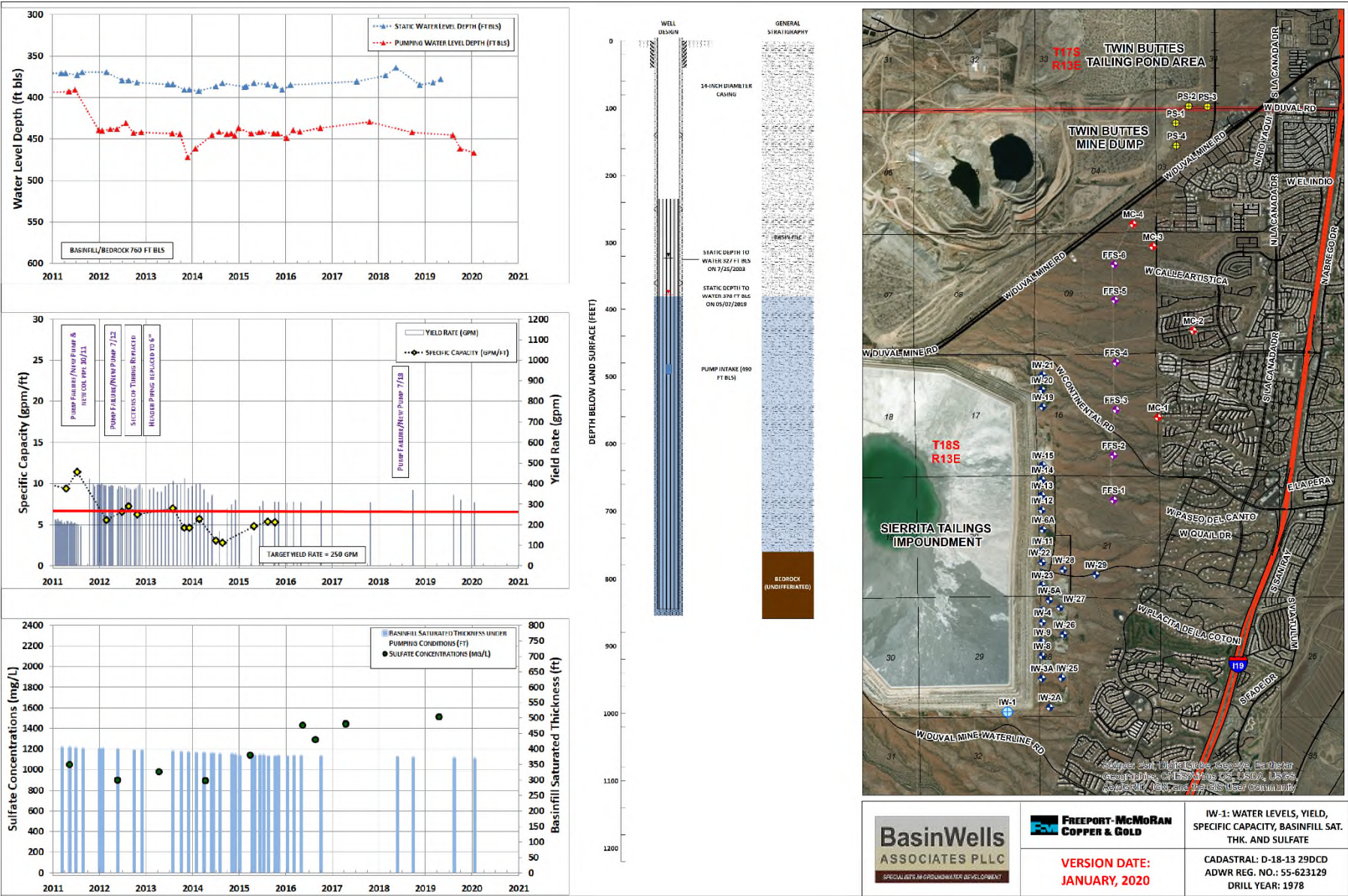
FFS-6 Total Gallons Pumped:	0
FFS-6 Total Acre-Feet Pumped:	0
FFS-6 Average Yield Rate (gpm):	0
FFS-6 % Run Time:	0.0%

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ATTACHMENT B

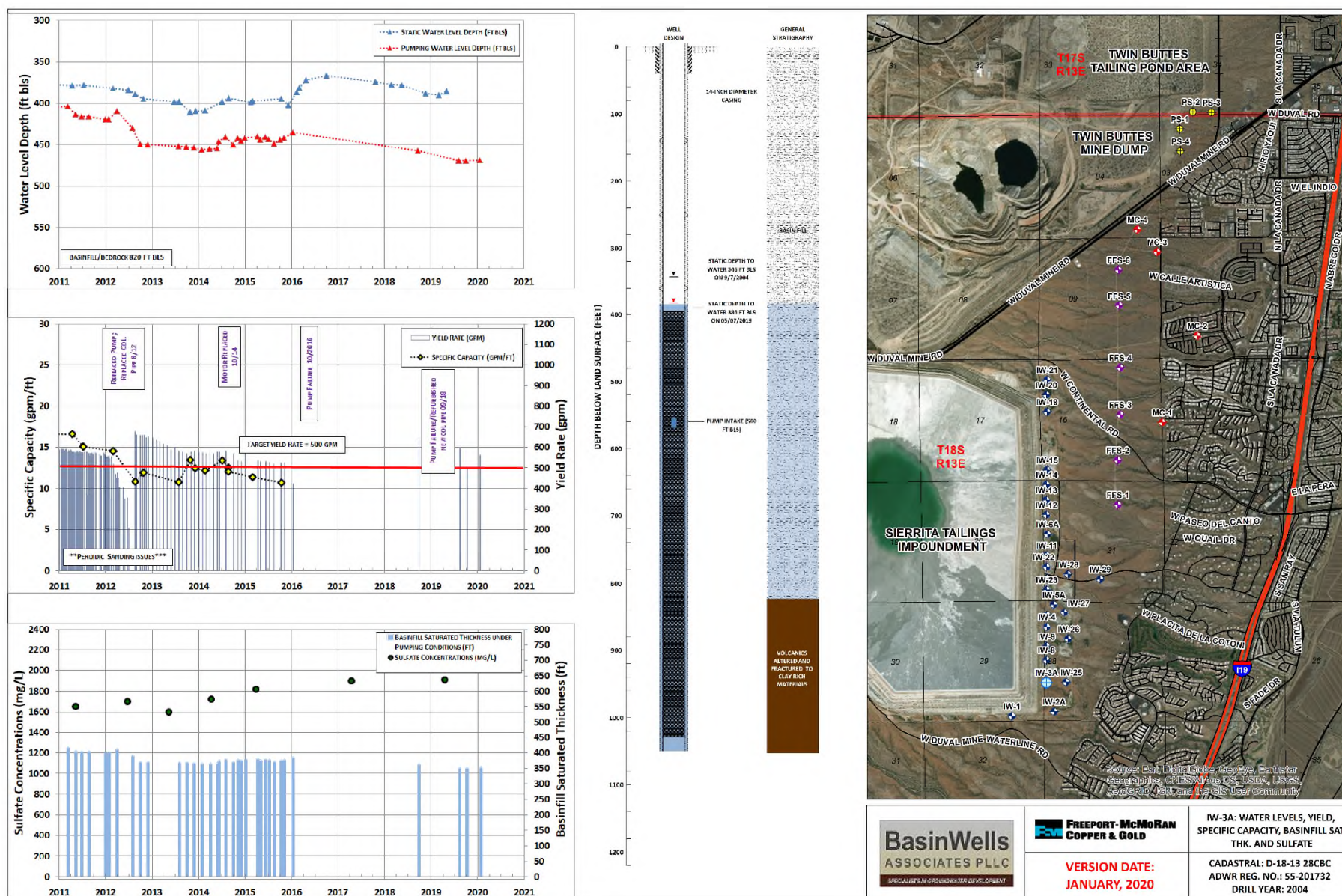
SIERRITA SULFATE MITIGATION ACTION WELL FIELD WELL FIELD DATA PLOTS

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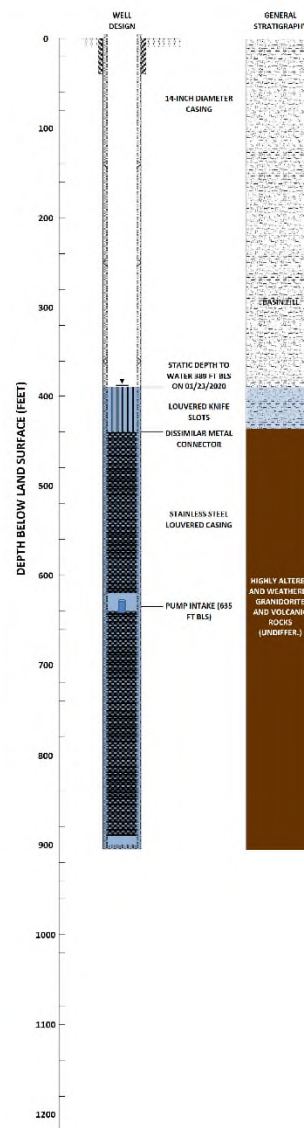






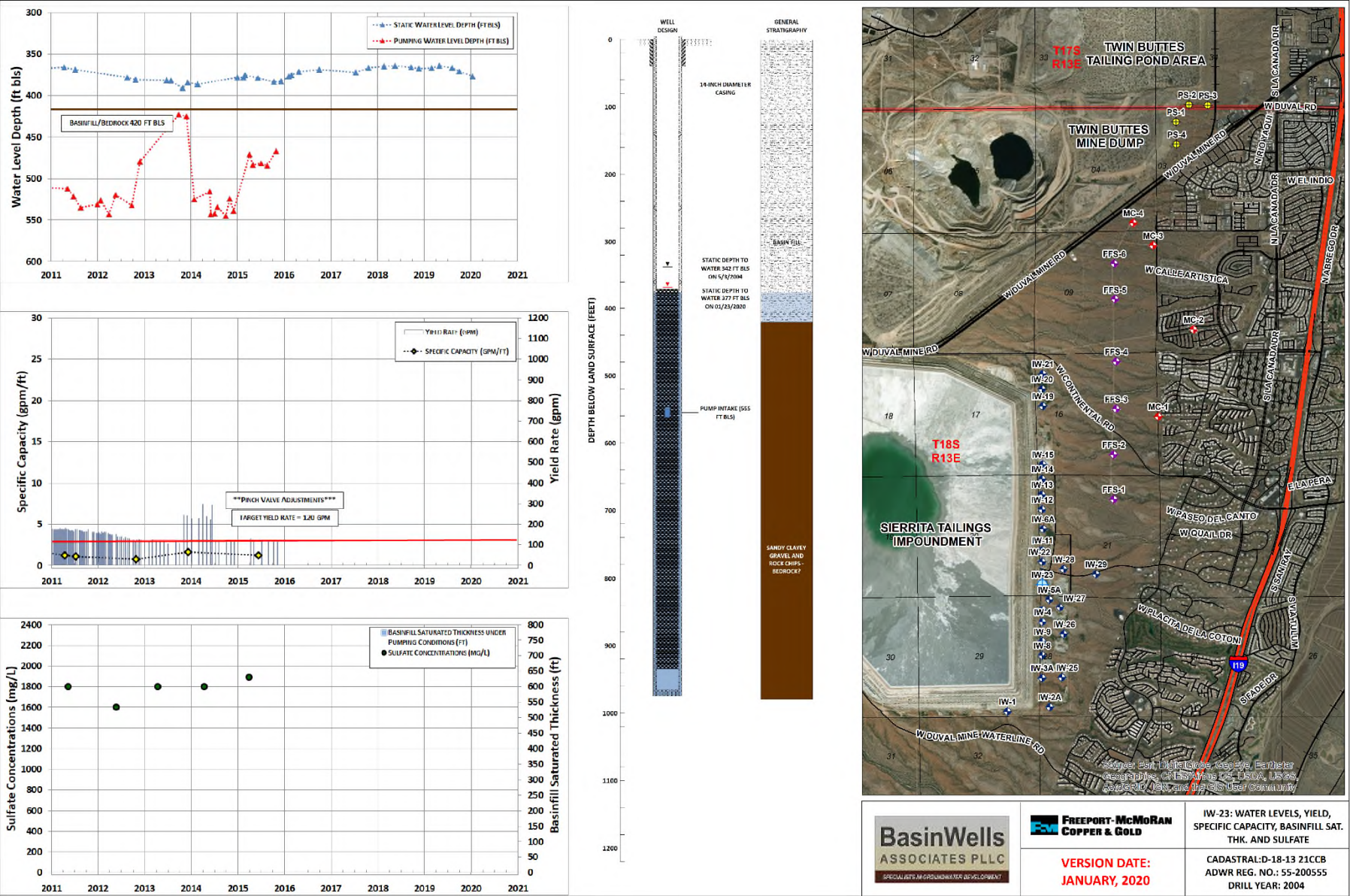




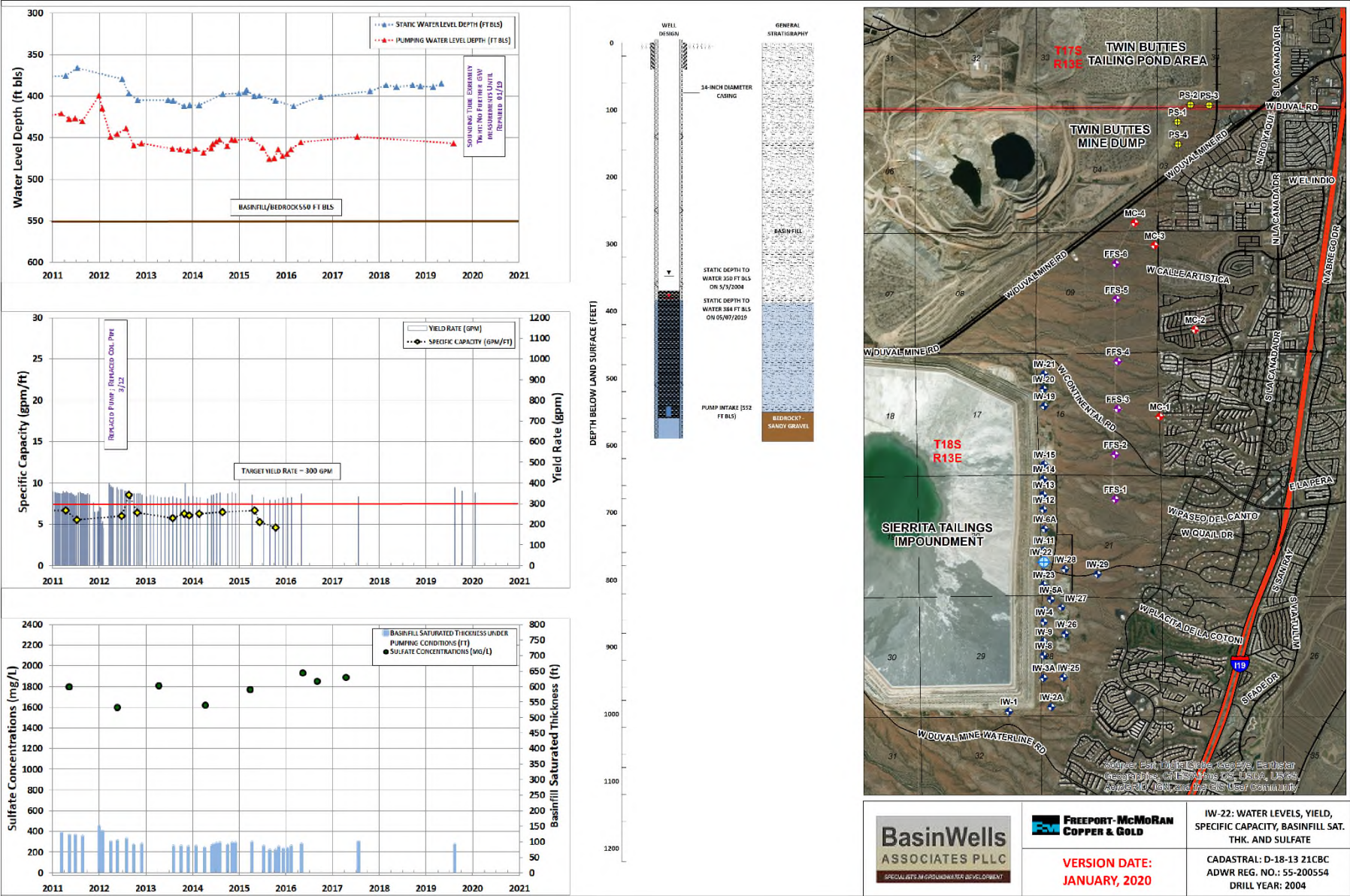


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ADWR REG. NO.: 55-219131
DRILL YEAR: 2010

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2020 well field quarterly monitoring\deliverable\2019 facilities report\basinwells fmi 2019 sulfate mitigation facilities monitoring tm final 031320.docx\3/13/2020\ws

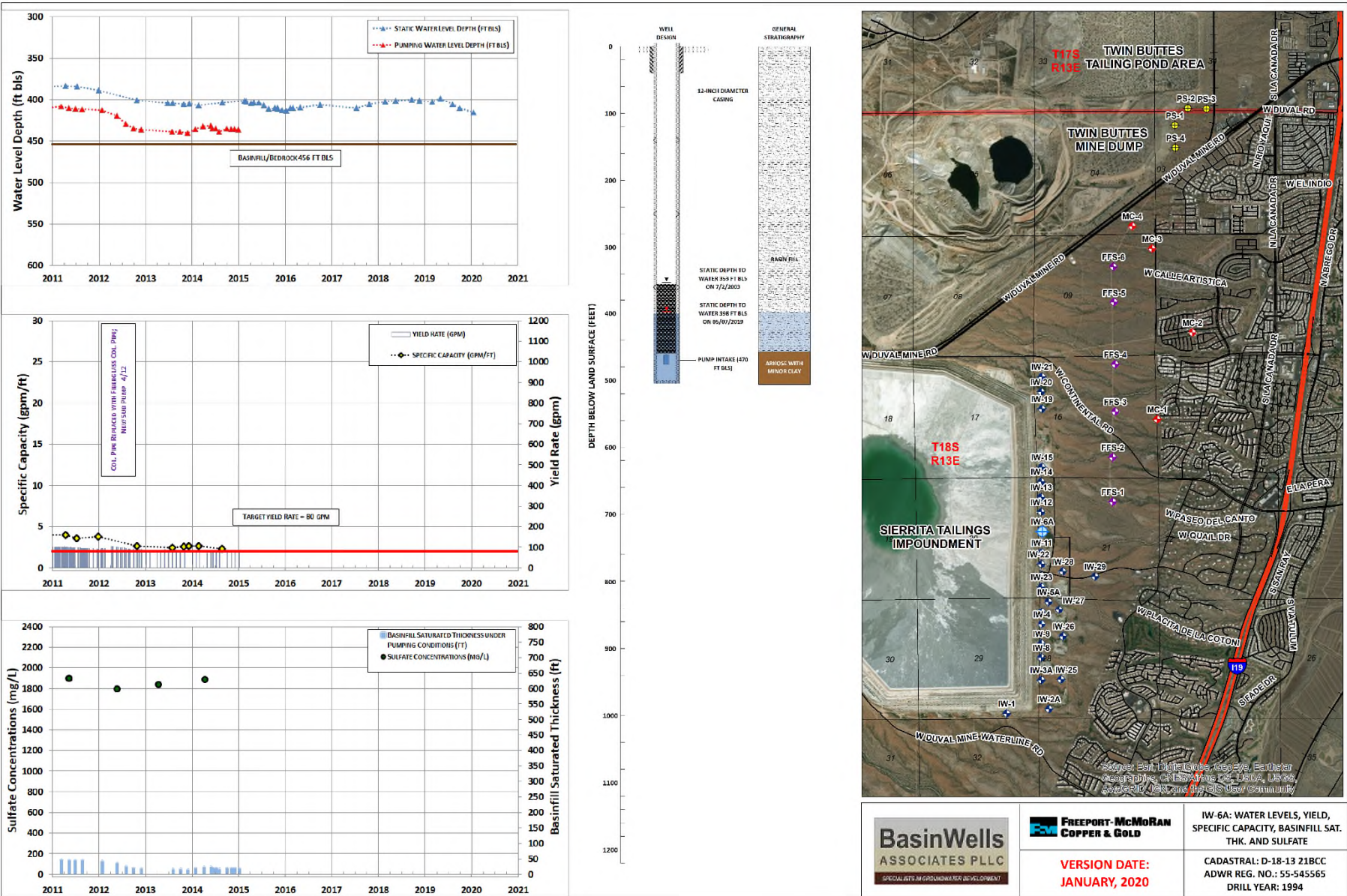






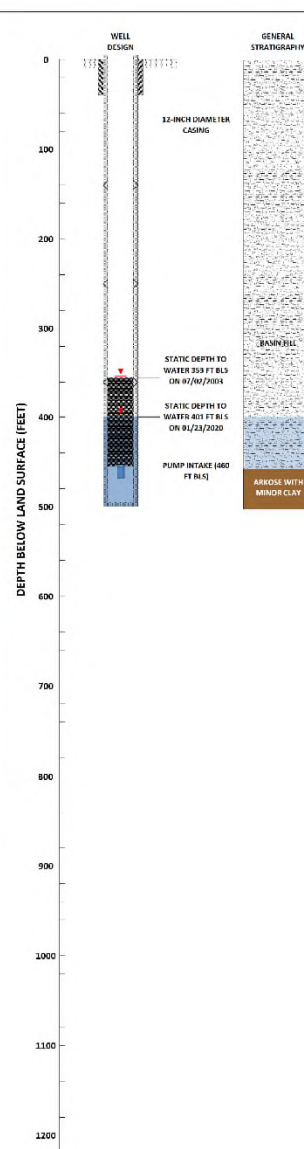
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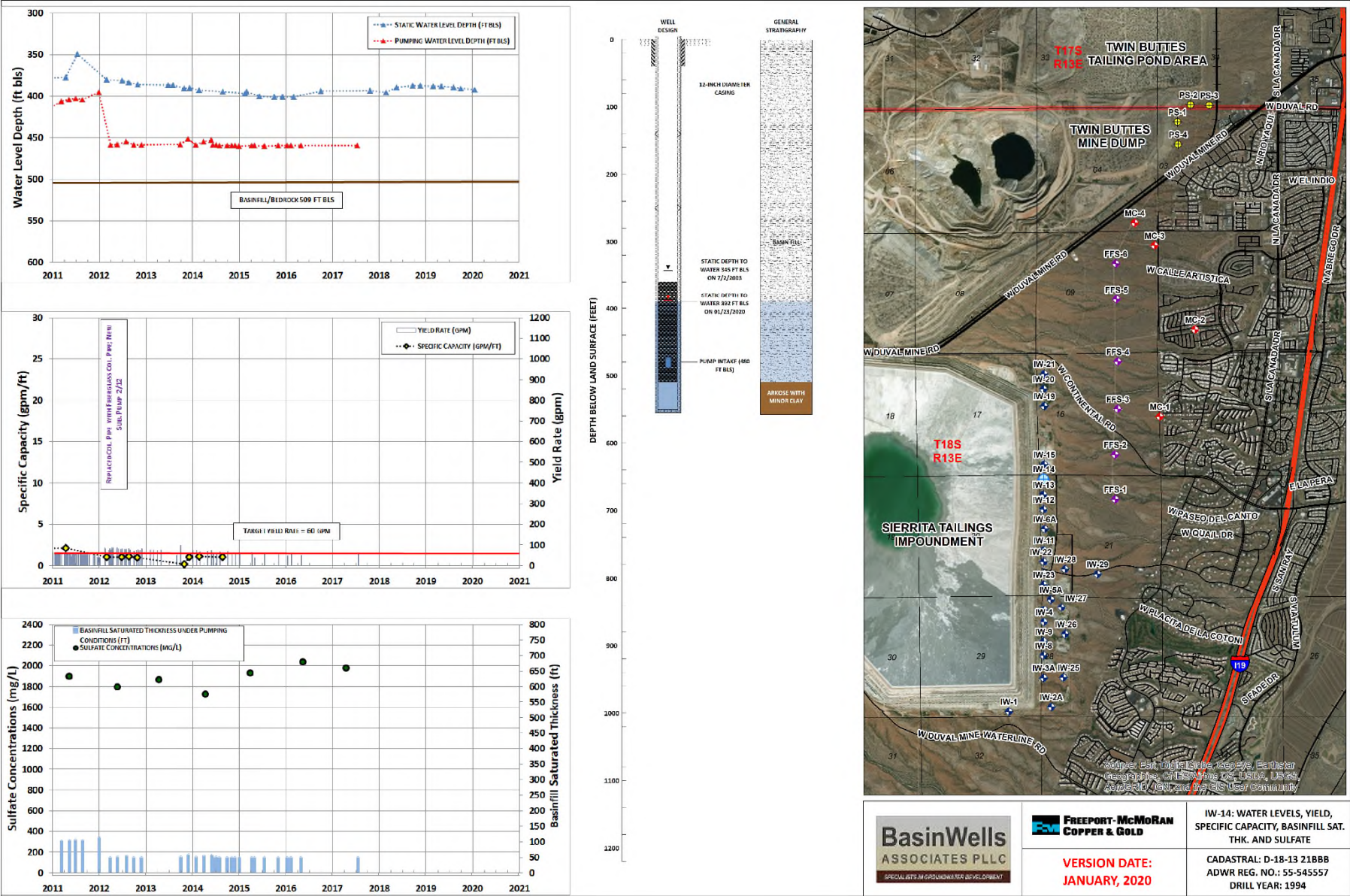




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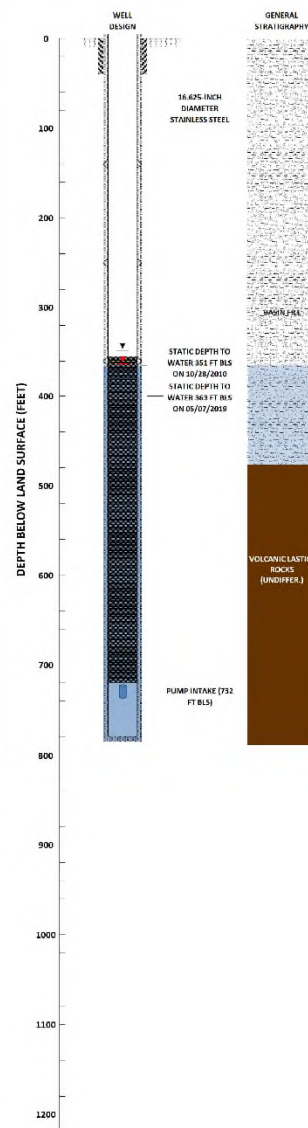








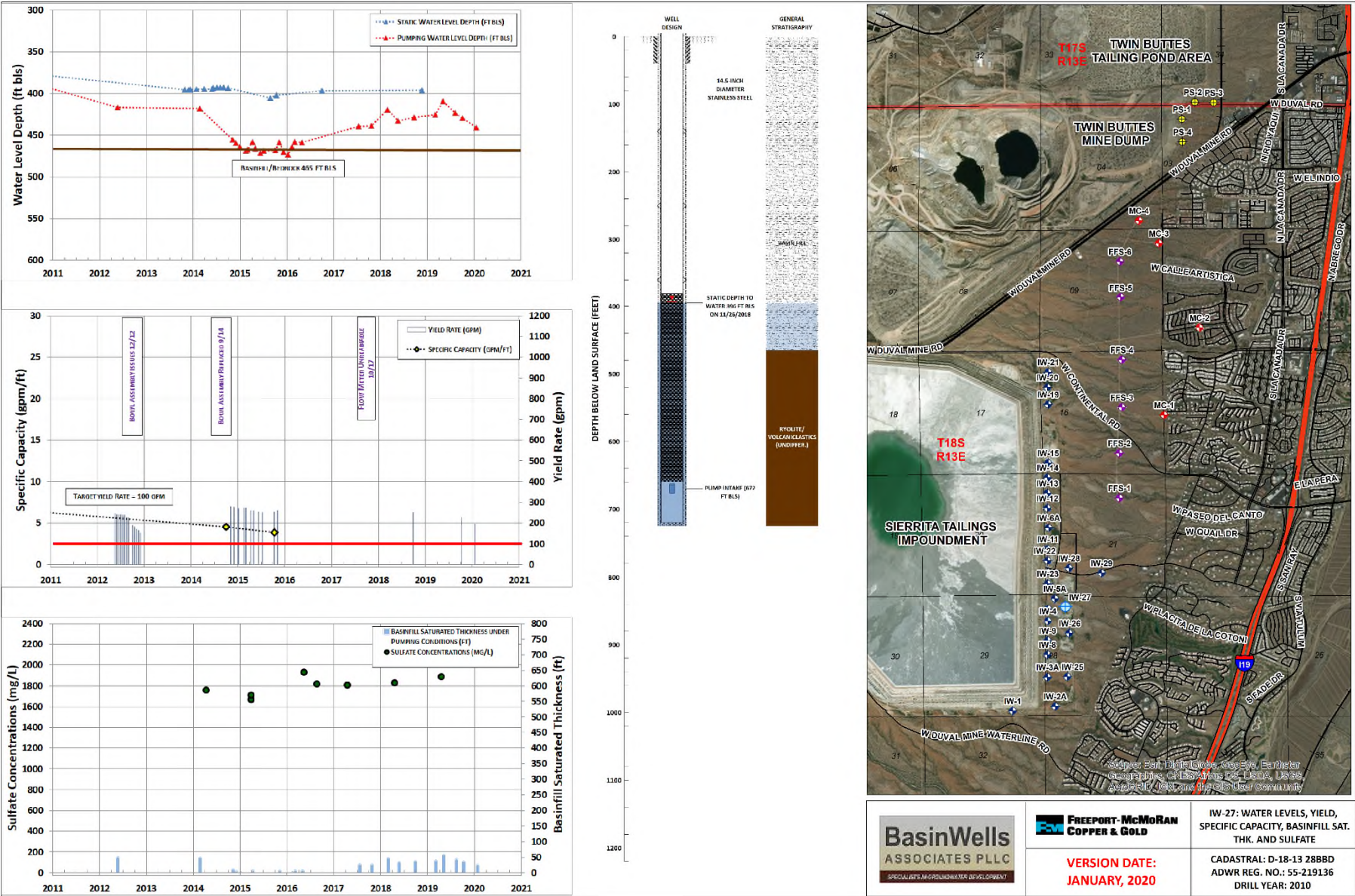




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DRILL YEAR: 2010

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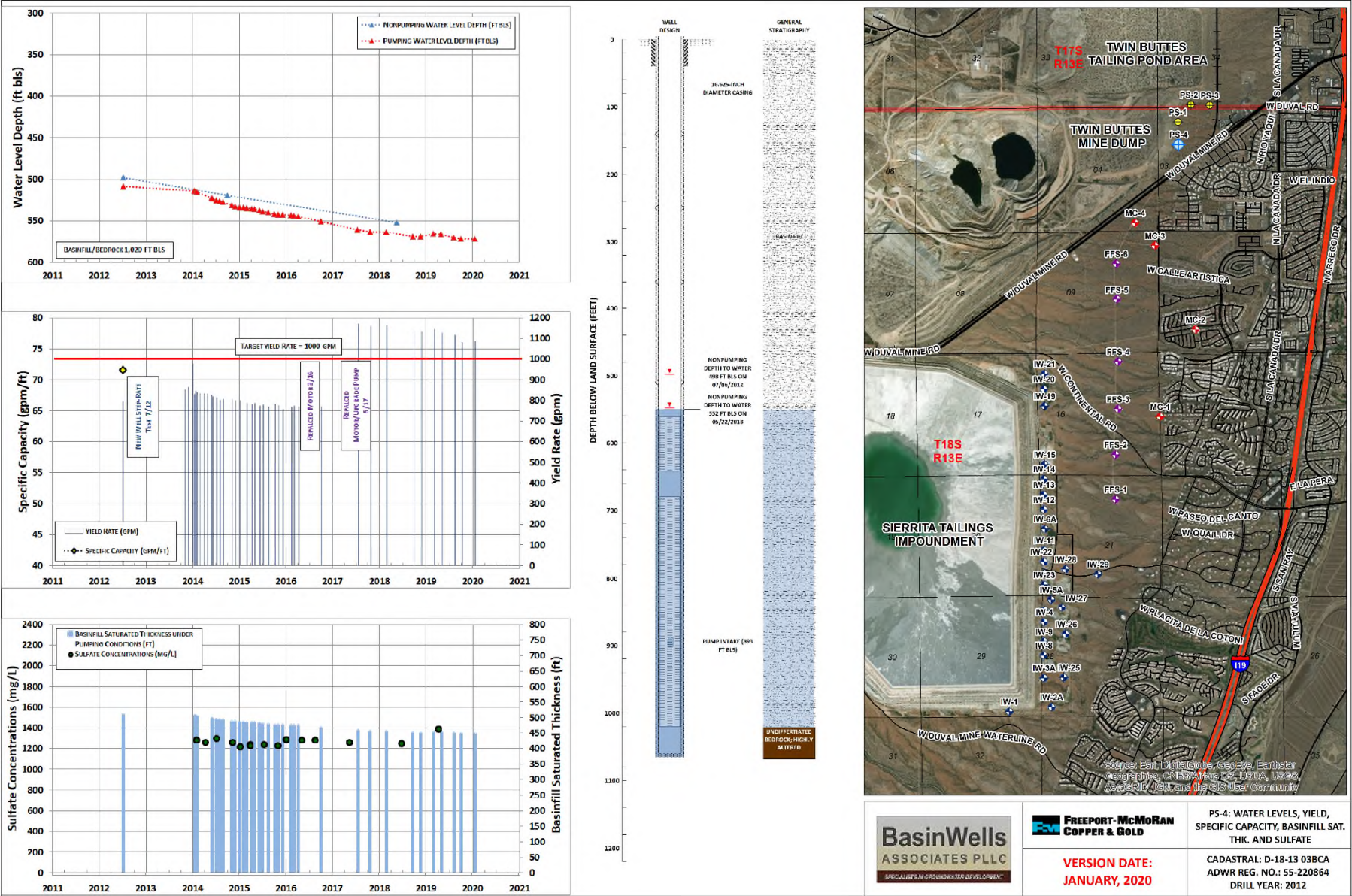










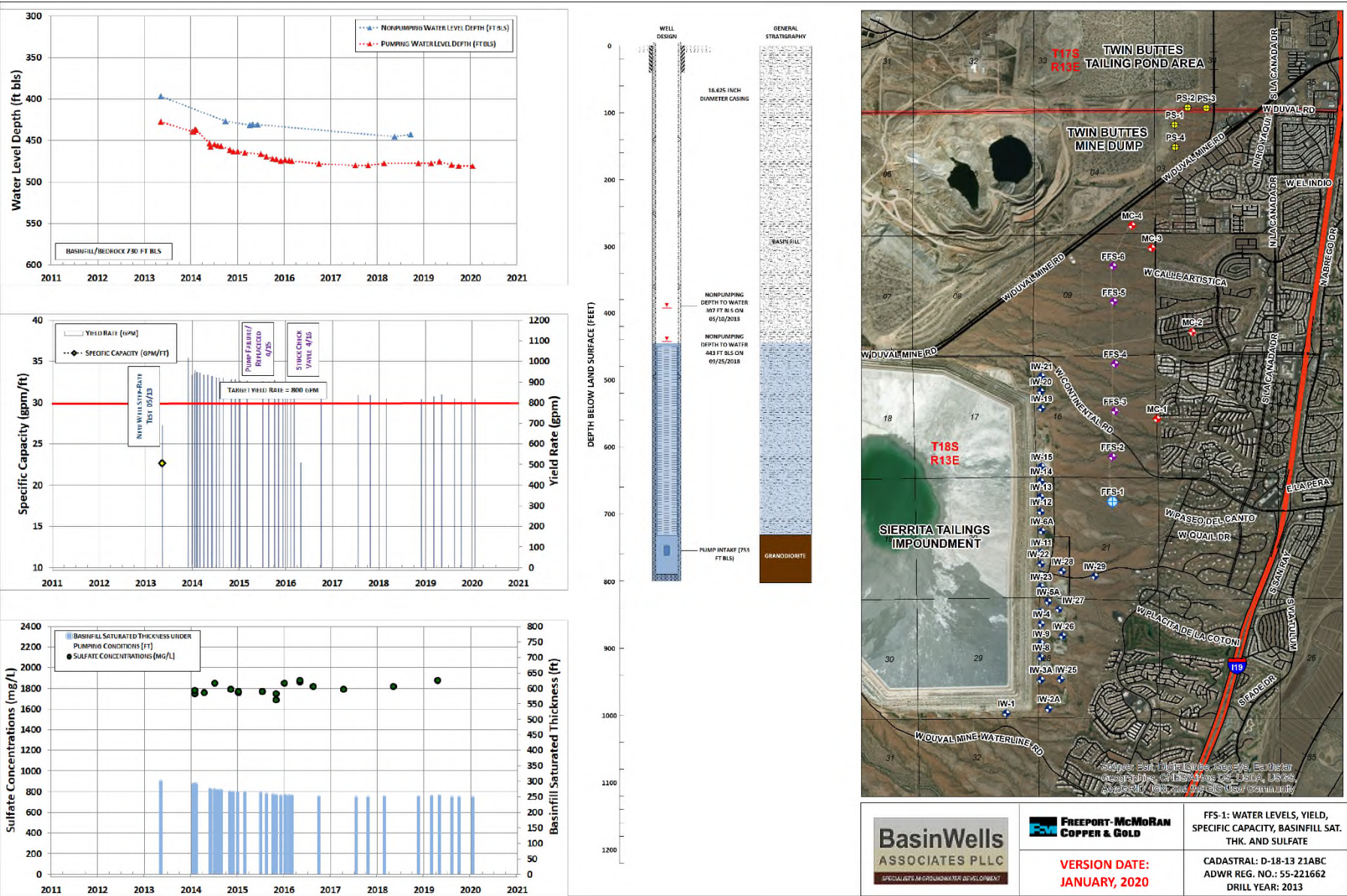








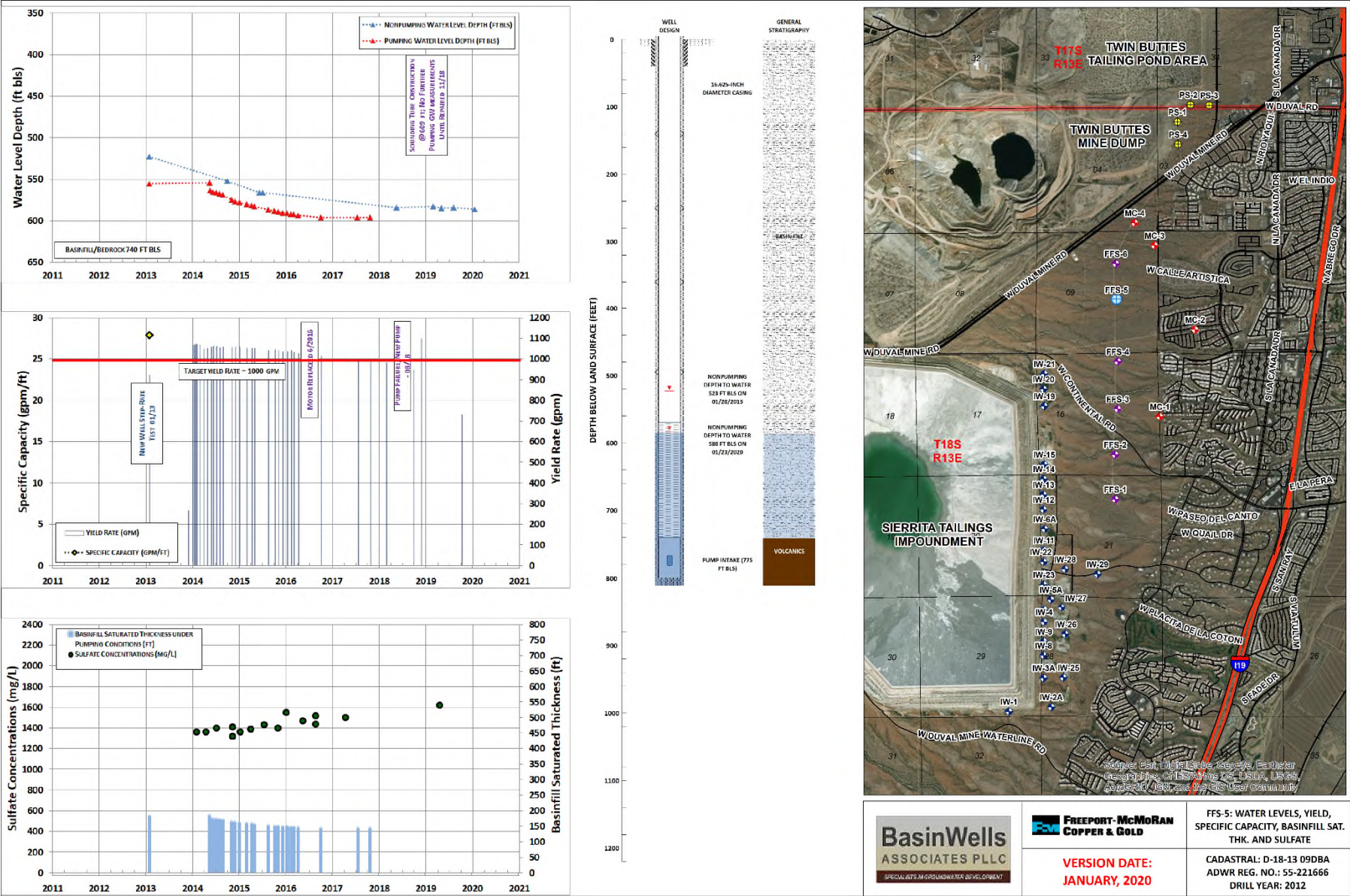












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