Table 5, Well Information for Project Area.

24. (36) Please discuss the purpose of the many Env -Monitor wells or piezometers listed on this table. Also, please identify the zone(s) in which each well is open: basin fill, oxide bedrock, sulfide bedrock, or another zone/aquifer.

The purpose of the Env -Monitor wells or piezometers listed in Table 5 is not discussed in the prior response as requested.

Excelsior should provide the requested information.

Excelsior Response:

As per our discussion with EPA in our February 23 meeting, the Env -Monitor wells listed in Table 5 refer to groundwater investigation wells that Excelsior has insta lled as part of their investigation of groundwater conditions. Some of these may have initially been drilled as mineral exploration holes. Excelsior is not aware of any of these wells being used for the LUST site at The Thing truck stop. The table lists the following well types:

- Exempt: this is a water supply well with a pump that is capable of producing no more than 30 gpm.
- Non-exempt: this is a water supply well that is equipped with a pump capable of producing more than 30 gpm.
- SPCL – Mineral Exploration: this is a mineral exploration borehole.
- SPCL – Exploration: Same as above
- ENV- Monitor: this is a monitor well. It may have been drilled initially as an exploration hole.
- ENV – Monitor or Piezometer: same as above.
- SPCL – Geotechnical: A geotechnical borehole.
- SPCL – Cathodic Protection: a cathodic protection well, likely associated with an underground storage tank facility.

Table 5 provides the top of the screen and bottom of screen depths, if available. Arizona Department of Water Resources records do not indicate the zone in which the wells are completed.

Figure 16, Comparison of Fracture Intensity to Hydraulic Conductivity Data.

25. (37) R2 (R squared) presenting the goodness of the fit was added to the revised Figure 16 as requested. *The figure should replace the original figure in the application*.

Excelsior Response:

Figure 16 will be replaced as requested in the revised application.

Figures 48 to 56.

26. (40) Based on the prior response, the revised Figures 48 to 56 should replace the original figures in the application.

Excelsior Response:

The revised figures presented in our December 14, 2016 submittal will replace Figures 48 to 56 in the revised UIC Application.

Attachment B, Maps of Well/Area and Area of Review

27 (41). The revised Table B-1 referenced in the response document is not provided in the paper copy or CD of the response document.

Excelsior should provide the revised Table B-1.

Excelsior Response:

Table B-1 (in response to comment 42 of our December 16, 2016 document) is attached and will be incorporated in the revised UIC application.

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
87293	D(15-23) 33ABB		ASLD	EXEMPT	750434.81	397896.63		600
207383	D(16-23) 30ABB		JAMES A SCHMIDT II	EXEMPT	740123.33	370573.83		665
207589	D(16-23) 20DDB		CHERYL & RICHARD GLENN SR	EXEMPT	746668.44	374461.47		624
208253	D(16-23) 20DDC		DEBORAH A MECHIGIAN	EXEMPT	746412.17	372156.23		
208279	D(16-23) 29AAC		ROBERT HOPP TRUST	EXEMPT	746207.04	370766.66		260
208791	D(16-22) 13DDC		MARY JANE FORD	EXEMPT	736996.79	376899.36		570
209018	D(16-23) 18ACA		BOB & SUE SELFF	EXEMPT	739693.91	380222.88		620
210217	D(16-23) 33		ALPHA CALCITE ARIZONA	EXPLORATION	750011.83	363582.08		
211579	D(16-23) 29AAC		ROBERT HOPP TRUST	EXEMPT	746111.56	370873.79		755
212286	D(15-22) 35CCC		ROBERT C DURHAM	EXEMPT	727257.43	392944.14		
216067	D(15-22) 25		NORD RESOURCES CORP	EXPLORATION	734865.65	400564.3		
216068	D(15-22) 26		NORD RESOURCES CORP	EXPLORATION	729558.45	400539.69		
216142	D(16-22) 13DDA		CHARLES & LEWIS KETCHUM	EXEMPT	738865.62	377187.29		618
216962	D(16-23) 20CAB		ROBERT D. JENSEN	EXEMPT	743886.63	374035.18		605
218347	D(16-23) 20CBB		JUDY HOILINGER	EXEMPT	742687.64	373935.9		600
218431	D(16-23) 19BCD		WILLIAM BAKER	EXEMPT	738744.43	374405.96		600
218967	D(16-23) 22AAA		KINDER MORGAN ENERGY, SFPP	CATHODIC PROTECTION	757680.26	376570.43		
219408	D(16-23) 18BDD		ROBERT CAPUANO	EXEMPT	739293.58	378508.85		580
220255	D(16-23) 06		EXCELSIOR MINING CORP	EXPLORATION	740159.5	390028.86		
220392	D(16-22) 12		EXCELSIOR MINING CORP	EXPLORATION	735585.5	384744.72		
220472	D(16-23) 21ABA		EPNG	CATHODIC PROTECTION	751099.86	376542.44		500
220592	D(16-23) 19BCC		JOHN REICHLE	EXEMPT	738340.03	374326.47		620
221365	D(16-23) 07		EXCELSIOR MINING CORP	EXPLORATION	740183.77	384758.44		
221366	D(15-22) 36		EXCELSIOR MINING CORP	EXPLORATION	734870.1	395280.89		
221367	D(15-23) 31		EXCELSIOR MINING CORP	GEOTECHNICAL	740063.25	395283.43		
221772	D(16-23) 14CDC		ERLENE & MICHAEL PAUL SUHR	EXEMPT	759641.21	377237.86		525
223834	D(16-23) 06		EXCELSIOR MINING CORP	EXPLORATION	740159.5	390028.86		
223835	D(15-23) 31		EXCELSIOR MINING CORP	EXPLORATION	740063.25	395283.43		
223939	D(15-22) 36D		EXCELSIOR MINING CORP	EXPLORATION	736195.52	393961.3		
223968	D(16-23) 06		EXCELSIOR MINING CORP	EXPLORATION	740159.5	390028.86		
224098	D(15-23) 31CDC		EXCELSIOR MINING CORP	MONITOR	739374.33	393116.71		
224101	D(15-23) 31CAD		EXCELSIOR MINING CORP	MONITOR	739604.33	394341.7		
505586	D(16-23) 23BAB		ROBERTSON III, JOHN,	EXEMPT	759711.8	376348.66		515
507963	D(16-23) 20DBD		WILLIAMS,I	EXEMPT	745800.96	373022.12		625
512111	D(16-23) 06		SULLIVAN,J	EXPLORATION	740159.5	390028.86		0
515539	D(16-22) 02BBB		GEORGANA R. HIATT	EXEMPT	727610.08	393032.31		495
518838	D(16-23) 21CCC		LONG, PAMELA,J	EXEMPT	747481.77	372113.93		660
521849	D(15-22) 23		NORD RESOURCES CORP	EXPLORATION	729542.68	405800.23		150
521962	D(15-22) 14DDD		DURHAM, ROBERT C	EXPLORATION	731833.61	408775.34		423
524980	D(16-23) 14CDC		PURCELL, LEO,	EXEMPT	759641.21	377237.86		540
526189	D(15-22) 26		NORD RESOURCES CORP	EXPLORATION	729558.45	400539.69		0
526559	D(15-22) 36		SULLIVAN, JAMES,	EXPLORATION	734870.1	395280.89		0
526733	D(15-22) 26DBD		NORD RESOURCES CORP	MONITOR	730556.7	399560.62		0

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
527167	D(16-23) 23BAB		FOLINO, MARK,	EXEMPT	759422.74	376449.35		0
528611	D(16-22) 02BBB		GEORGANA R. HIATT	EXEMPT	727987.42	392285.46		495
531741	D(15-22) 26		NORD RESOURCES CORP	EXPLORATION	729558.45	400539.69		0
536175	D(15-22) 26		NORD RESOURCES CORP	EXPLORATION	729558.45	400539.69		0
536380	D(16-23) 06CCA		SULLIVAN, J.,	EXPLORATION	738949.01	388384.29		0
536381	D(16-22) 13AAA		SULLIVAN, J,	EXPLORATION	737904.03	381779.95		0
536382	D(16-22) 24		SULLIVAN, J.,	EXPLORATION	735610.83	374164.66		0
536431	D(15-22) 14ADD		SMITH,,B J	EXPLORATION	731764.61	411479.92		0
540631	D(16-23) 21DDA		EPNG	EXPLORATION	752394.32	372614.27		430
540874	D(16-23) 20CCB		LYNN, VALERIE TRUST,	EXEMPT	742619.23	372506.41		0
542932	D(16-23) 06BB0		BHP COPPER INC	EXPLORATION	738697.39	392005.83		1347
546058	D(15-22) 26		NORD RESOURCES CORP	EXPLORATION	729558.45	400539.69		0
547473	D(16-23) 14CCD		BEAULIEU, DEAN,	EXEMPT	758984.87	377233.08		0
549072	D(16-23) 06BBB		BHP COPPER INC	EXPLORATION	738453.82	392335.87		0
550080	D(16-23) 21CDC		PAUL & SUZANNE JORDAN	EXEMPT	749347.08	372501.55		650
553570	D(16-23) 33BCC		KENNECOTT EXPLOR CO,	EXPLORATION	747687.91	363934.71		770
553571	D(16-23) 32AAA		KENNECOTT EXPLOR CO,	EXPLORATION	747082.51	365941.14		0
556670	D(16-23) 30AAB		EPNG	EXPLORATION	741487.77	371221.68		500
560131	D(16-22) 24		PHELPS DODGE EXPLORATION	EXPLORATION	735610.83	374164.66		0
561123	D(16-22) 02ABD		BINGHAM TED MCRAE	EXEMPT	731170.96	391957.04		730
562209	D(16-23) 21DCC		KEPHART, WRAY,	EXEMPT	750239.64	372389.15		640
562252	D(16-23) 18		PHELPS DODGE EXPLORATION	EXPLORATION	740206.95	379471.63		0
562253	D(16-23) 07		PHELPS DODGE EXPLORATION	EXPLORATION	740183.77	384758.44		0
562254	D(16-23) 05CBB		PHELPS DODGE EXPLORATION	EXPLORATION	742441.97	389706.05		0
562256	D(15-23) 31CDC		PHELPS DODGE EXPLORATION	EXPLORATION	739122.72	392987.02		0
562257	D(16-23) 06BBD		PHELPS DODGE EXPLORATION	EXPLORATION	738940.96	391675.79		0
562302	D(16-23) 14DDA		IRVIN & LINDA VAN ENWYCK	EXEMPT	762503.89	378139.63		442
562340	D(16-23) 32ADD		USFS CORONADO NF	EXEMPT	747010.49	363920.25		400
562832	D(16-22) 12DDD		SULLIVAN, JAMES,	EXPLORATION	737902.25	382442.85		0
564616	D(16-23) 20CBC		GEORGE THORNBURGH SR	EXEMPT	742450.5	372897.95		620
564915	D(16-23) 20CCA		VALERIE LYNN TRUST	EXEMPT	743341.88	372363.15		660
567591	D(16-22) 13BBB		WILLIAM E THOMAS	EXEMPT	737759.16	380603.01		600
567714	D(16-23) 21DDD		WAYNE & BONNIE SCHEIBE	NON-EXEMPT	752350.08	371721.89		620
569725	D(16-23) 19DCA		WENDY H JEFFCOCK	EXEMPT	740648.11	372240.74		586
570713	D(15-22) 26BD0		NORD RESOURCES CORP	EXPLORATION	728894.39	401194.59		500
571358	D(16-23) 21CCC		BRYAN AND LYNN HAWKINS	EXEMPT	747811.64	372089.62		700
572349	D(16-23) 21CAD		WILLIAM F MENTZER	EXEMPT	749916.43	373474.37		643
573551	D(16-23) 21CBD		AGNES I KOSKI	EXEMPT	748469.19	373419.93		645
574536	D(16-23) 33CAA		ALPHA CALCITE ARIZONA	EXPLORATION	749651.99	363302.64		
576329	D(16-23) 19DCB		DALE & LORRAINE HEWIN	EXEMPT	740025.67	372276.01		560
576579	D(16-23) 19CCA		DALE & LORRAINE HEWIN	EXEMPT	739617.58	372544.26		520
577993	D(16-23) 23BAB		MARK FOLINO	EXEMPT	759714.41	376397.27		485
578009	D(15-22) 36BBD		NORD RESOURCES CORP	EXPLORATION	733214.85	396934.48		
578044	D(16-22) 13BBD		CLIVE AND SHIRLEY BAILEY	EXEMPT	733776.37	381424.02		220
578266	D(16-22) 24AAD		SAMUEL R LEE	EXEMPT	737925.84	375804		570

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
578985	D(15-22) 26DDD		NORD RESOURCES CORP	MONITOR	731886.48	398254.11		
578986	D(15-22) 26DDD		NORD RESOURCES CORP	MONITOR	731886.48	398254.11		
578987	D(15-22) 26DBD		NORD RESOURCES CORP	MONITOR	730556.7	399560.62		
578988	D(15-22) 26DBD		NORD RESOURCES CORP	MONITOR	730556.7	399560.62		
578989	D(15-22) 26DCD		NORD RESOURCES CORP	MONITOR	730559.65	398244.67		
580043	D(16-23) 18CCA		BONNIE L WHITE	EXEMPT	738899.43	377588.16		525
580164	D(16-23) 20CDB		WAYNE SPEER	EXEMPT	743851.89	372548.9		
591643	D(16-23) 10ADB		SHANNON KIZER	EXEMPT	756963.8	385784		696
592427	D(16-23) 20CCD		CLINTON KEITH & EDYTHE K. JACOBS	EXEMPT	743199.56	371857.25		680
594256	D(16-23) 19CDD		PAUL A BURBECK	EXEMPT	739226.95	372000.74		570
599297	D(15-22) 35BAA		C-BAR RANCH	EXEMPT	728590.0767	397676.4967		
602036	D(16-22) 03BC0		MCKINNEY,R W	EXEMPT	726804.66	392534.88		85
605729	D(15-23) 20CA		ELIZABETH F HUSBAND TRUST	EXEMPT	744499.78	405152.96		450
605730	D(15-23) 29ABD		ASLD	EXEMPT	746443.38	401863.02		600
611612	D(16-23) 06B		CYPRUS COPPER CO	EXEMPT	738636.09	390868.06		535
616095	D(16-23) 17CCC		ASLD	NON-EXEMPT	742063.39	377359.4		700
616964	D(16-22) 11AC0		FULTON ET AL,W D	NON-EXEMPT	730993.85	384798.41		0
620397	D(16-22) 03AD0		MCGOFFIN,R	EXEMPT	727102.17	389974.29		65
620398	D(16-22) 10DC0		MCGOFFIN,R	EXEMPT	725672.45	382707.9		95
622850	D(16-22) 01BAD		CYPRUS COPPER CO	EXEMPT	734240.93	391681.17		0
622852	D(15-23) 30AAD		BENSON 1550 LLC	EXEMPT	741962.11	402660.4		638
622853	D(16-22) 01BAD		CYPRUS COPPER CO	EXEMPT	734884.07	391625.05		70
625314	D(15-23) 20CB		LAMB,J A	EXEMPT	743176.67	405156.62		500
625315	D(16-22) 13AD0		LAMB,J A	EXEMPT	737067.96	380266.25		250
626713	D(16-23) 16DDC		ASLD	EXEMPT	750695.18	377213.59		554
627693	D(16-23) 29CCC		COMSTOCK,C	EXEMPT	743114.84	366833.97		600
631782	D(15-22) 35CC0		SMITH,B J	EXEMPT	727588.16	393276.31		30
633426	D(15-22) 34BCD		SMITH & DURHAM,	EXEMPT	722766.87	395516.41		263
633427	D(15-22) 34AAD		SMITH & DURHAM,	EXEMPT	726361.48	397004.31		125
633439	D(15-22) 35CCD		DURHAM, ROBERT C	EXEMPT	727904.34	393093.99		125
640865	D(16-23) 20DDD		ANDREWS,I	EXEMPT	747249.69	372043.17		700
641183	D(16-22) 11CAC		AMERINDIAN FOUNDATIO,	EXEMPT	729486.14	383647.29		18
643402	D(16-22) 12DAA		BLM-SAFFORD DISTRICT,	EXEMPT	737969.71	384549.38		0
644769	D(15-22) 25CC0		BYARS,R	EXEMPT	732881.39	398584.43		200
646841	D(15-22) 25B		DOBSON JR,C H	EXEMPT	733534.64	401880.67		0
650526	D(16-23) 23BB		SCOTT, WILLIAM,C	EXEMPT	759032.14	376575.35		565
651231	D(16-23) 20DDA		WILLIAMMEE,L O	EXEMPT	746862.73	372697.36		675
802786	D(16-22) 12		RIMSZA,A V	EXEMPT	736875.19	382472.75		700
803864	D(16-23) 20DAD		TAVA M. FITZGERALD	EXEMPT	747351.09	373219.61		650
805357	D(16-23) 15DBC		ASLD	EXEMPT	755694.25	378525.15		0
805594	D(16-22) 02BAD		ASLD	EXEMPT	730017.04	391789.44		0
903562	D(15-23) 21CBC		JANET CONAWAY	EXEMPT	748138.38	404813.07		
904015	D(16-23) 17		BHP COPPER INC	EXPLORATION	744813.85	379498.42		1500
904016	D(16-23) 08		BHP COPPER INC	EXPLORATION	744787.96	384775.4		

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
904017	D(16-23) 29		BHP COPPER INC	EXPLORATION	744823.74	368911.98		1698
904195	D(16-23) 30		BHP COPPER INC	EXPLORATION	740245.19	368901.34		
906149	D(16-23) 14DBC		DAVID SHIFLETT	EXEMPT	761259.37	378626.83		525
907248	D(16-23) 20CCC		JAMES & PATTY DAVIS	EXEMPT	742720.55	372099.63		
907414	D(16-23) 09CCA		RINKER MATERIALS WEST DIVISION	EXPLORATION	748426.01	383129.5		
907461	D(16-23) 20CCB		BILL J & GLORIA M WOOD	EXEMPT	742549.1	372485.07		665
907576	D(16-23) 14CAD		DAVID SHIFLETT	EXEMPT	760289.87	378542.19		
907713	D(16-23) 09CCB			MONITOR	747770.37	383131.28		
909281	D(15-23) 19BBB		C-BAR RANCH	NON-EXEMPT	738016.93	408200.75		
911489	D(15-23) 19BAA		C-BAR RANCH	NON-EXEMPT	739902.3641	407718.0782		
911560	D(15-23) 19BCA		C-BAR RANCH	NON-EXEMPT	738202.3605	406882.2536		
911939	D(16-23) 29CDD		ALBERT C. & MILDRED M. REV. TR COMSTOCK	EXEMPT	742839.94	367173.96		670
912483	D(16-22) 24AAB		CHRIS & DEBI CONYER	EXEMPT	737659.39	375377.47		0
912639	D(16-23) 29CDD		ALBERT C. & MILDRED M. REV. TR COMSTOCK	EXEMPT	742683.69	366878.82		
912652	D(15-22) 26		NORD RESOURCES CORP	EXPLORATION	729558.45	400539.69		
912653	D(15-22) 27		NORD RESOURCES CORP	EXPLORATION	724288.57	400504.95		
912984	D(15-22) 25		NORD RESOURCES CORP	EXPLORATION	734865.65	400564.3		
913724	D(16-23) 14DBA		JOE & LYNDA SMOTHERS	EXEMPT	761993.35	379298.92		545
914575	D(16-22) 24BDD		ROBERT W & KYLE ANNE ALLGOOD	EXEMPT	737345.7	374702.73		763
915269	D(16-23) 18ABC		FISTIKI FARMS	NON-EXEMPT	740448.46	381126.97		
916568	D(16-23) 14DAD		FRANK RHEA	EXEMPT	763009.44	378193.42		506
917431	D(15-22) 36DAA		EXCELSIOR MINING CORP	MONITOR	736904.35	395041.73		
	D(16-22) 12DCC		UNKNOWN	MONITOR	736057.35	382348.12		
628132	D(16-23) 18DDD	ADOT - Texas Canyon	ADOT	EXEMPT	740118.12	375095.69		700
611609	D(15-22) 23DB0	Black Prince Mine	NORD RESOURCES CORP	NON-EXEMPT	730402.88	405395.8		945
595923	D(15-22) 26DDD	Burro MW-8A	NORD RESOURCES CORP	MONITOR	731886.48	398254.11		350
	D(15-23) 26DAA	Burro Pit	NORD RESOURCES CORP	OTHER	731647.8288	399836.866		
563953	D(15-22) 25CAB	Cochise	NORD RESOURCES CORP	MONITOR	734060.73	400121.15		605
561565	D(15-22) 26ACA	Cross	NORD RESOURCES CORP	MONITOR	730644.27	401795.05		502
	D(16-22) 01AAA	CS-01	EXCELSIOR MINING CORP	EXPLORATION	738113.76	392637.26		
	D(15-23) 31CCA	CS-02	EXCELSIOR MINING CORP	EXPLORATION	738122.13	393675.99	n	1770
225068	D(15-22) 36ADA	CS-03	EXCELSIOR MINING CORP	EXPLORATION	738647.21	393212.04	n	2038
225069	D(16-23) 07BAA	CS-04	EXCELSIOR MINING CORP	EXPLORATION	739134.38	393245.21	n	2209
225070	D(15-22) 36DAA	CS-05	EXCELSIOR MINING CORP	EXPLORATION	738608.92	393694.89	n	2034
	D(15-23) 31DDD	CS-05-32	EXCELSIOR MINING CORP	EXPLORATION	742523.62	392664.69		
	D(15-23) 32DCC	CS-05-32B	EXCELSIOR MINING CORP	EXPLORATION	745399.29	392693.66		
	D(16-23) 32BCD	CS-05-32C	EXCELSIOR MINING CORP	EXPLORATION	743544.29	395683.66		
	D(16-23) 05BCC	CS-05-32D	EXCELSIOR MINING CORP	EXPLORATION	742559.31	389993.69		
	D(16-23) 05CDC	CS-05-32E	EXCELSIOR MINING CORP	EXPLORATION	743709.31	388043.68		
225071	D(15-22) 36DAA	CS-06	EXCELSIOR MINING CORP	EXPLORATION	738576.3	394194.54	n	2160

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
225072	D(15-22) 36DAA	CS-07	EXCELSIOR MINING CORP	EXPLORATION	738071.33	394162.26	n	1796
225073	D(16-23) 06BAD	CS-08	EXCELSIOR MINING CORP	EXPLORATION	739077.57	394231.13	n	2304
225074	D(16-23) 06BAD	CS-09	EXCELSIOR MINING CORP	EXPLORATION	738551.02	395144.23	n	2337
225075	D(16-23) 06BAA	CS-10	EXCELSIOR MINING CORP	EXPLORATION	738060.5	394653.38	n	1656
225076	D(15-22) 36DAA	CS-11	EXCELSIOR MINING CORP	EXPLORATION	737554.82	394166.14	n	2084
224159	D(15-23) 31BCC	CS-13	EXCELSIOR MINING CORP	EXPLORATION	737558.77	395152.18	n	1251
224160	D(15-23) 31BCC	CS-14	EXCELSIOR MINING CORP	EXPLORATION	737557.34	395698.82	n	1375
225077	D(15-22) 36ADC	CS-15	EXCELSIOR MINING CORP	EXPLORATION	737561.5	396153.55	n	492
225078	D(15-22) 36DAB	CS-19	EXCELSIOR MINING CORP	EXPLORATION	738065.04	395870.87	n	580
225079	D(16-23) 06BBB	CS-21	EXCELSIOR MINING CORP	EXPLORATION	738532.95	394655.34	n	2171
225080	D(16-23) 06BBD	CS-23	EXCELSIOR MINING CORP	EXPLORATION	738556.65	396154.06	n	622
	D(16-22) 01ADA	CS-25	EXCELSIOR MINING CORP	EXPLORATION	738084.06	391169.81		
	D(16-22) 01AAD	CS-26	EXCELSIOR MINING CORP	EXPLORATION	738069.95	391670.92		
	D(16-22) 01ADA	CS-27	EXCELSIOR MINING CORP	EXPLORATION	738070.05	390673.93		
	D(16-22) 01ADD	CS-28	EXCELSIOR MINING CORP	EXPLORATION	738069.05	390174.83		
225081	D(16-23) 06BAC	CS-31	EXCELSIOR MINING CORP	EXPLORATION	740152.63	387206.99		1317
	D(16-22) 12DAA	CS-33	EXCELSIOR MINING CORP	EXPLORATION	737904.37	384283.74		
	D(16-23) 07CDC	CS-35	EXCELSIOR MINING CORP	EXPLORATION	739479.36	382343.73		
	D(16-22) 12DDA	CS-36	EXCELSIOR MINING CORP	EXPLORATION	737974.37	382953.74		
	D(16-23) 07BBD	CS-37	EXCELSIOR MINING CORP	EXPLORATION	738984.35	386443.73		
	D(16-23) 07BDD	CS-38	EXCELSIOR MINING CORP	EXPLORATION	739769.35	385243.72		
	D(16-23) 08CAD	CS-39	EXCELSIOR MINING CORP	EXPLORATION	744634.32	384093.68		
	D(16-23) 18CBD	CS-40	EXCELSIOR MINING CORP	EXPLORATION	738909.17	378958.24		
225082	D(16-23) 06CAA	CS-41	EXCELSIOR MINING CORP	EXPLORATION	739537.3	394653.69		
225083	D(16-23) 06ABC	CS-51	EXCELSIOR MINING CORP	EXPLORATION	739035.96	392707.85	n	1838
225084	D(16-23) 06ACC	CS-52	EXCELSIOR MINING CORP	EXPLORATION	738455.56	392667.84	n	1551
912816	D(15-22) 25CDD	CW-1	NORD RESOURCES CORP	EXEMPT	734490.05	398128.3		
223161	D(15-22) 25CDD	CW-1A	NORD RESOURCES CORP	MONITOR	734538.66	398253.3		
912814	D(15-22) 25DBB	CW-2	DURHAM, ROBERT C	EXEMPT	735193.91	400236.89		
223486	D(15-22) 25	CW-2A	NORD RESOURCES CORP	MONITOR	734865.65	400564.3		
912817	D(15-22) 24CBD	CW-3	NORD RESOURCES CORP	MONITOR	733371.14	404876.41		
223162	D(15-22) 24BDB	CW-3A	NORD RESOURCES CORP	MONITOR	733835.89	406804.02		
912818	D(15-22) 25DBB	CW-4	NORD RESOURCES CORP	EXEMPT	735193.91	400236.89		
223163	D(15-22) 25DBC	CW-4A	NORD RESOURCES CORP	MONITOR	735196	399573.99		
912819	D(15-22) 36ABB	CW-5	DURHAM, ROBERT C	EXEMPT	735201.33	397588.58		
223487	D(15-22) 36	CW-5A	NORD RESOURCES CORP	MONITOR	734870.1	395280.89		
912815	D(15-22) 25BDB	CW-6	NORD RESOURCES CORP	EXEMPT	733865.84	401553.23		
223164	D(15-22) 25BDB	CW-6A	NORD RESOURCES CORP	MONITOR	733865.84	401553.23		
	D(15-23) 32CCC	CYS-1	EXCELSIOR MINING CORP	EXPLORATION	742584.31	392743.68		
225085	D(16-23) 06ADA	DC-09	EXCELSIOR MINING CORP	EXPLORATION	737203.44	396082.94		1500
595924	D(15-22) 25DDD	Donkey MW-8B	NORD RESOURCES CORP	MONITOR	732205.2	398341.44		500
578984	D(15-22) 25ADC	Dragoon	NORD RESOURCES CORP	MONITOR	734292.75	398888.79		495
631739	D(16-23) 19BAC	Dragoon Water 1	DRAGOON WATER CO INC	NON-EXEMPT	740361.24	373766.67		987
631738	D(16-23) 19ACC	Dragoon Water 2	DRAGOON WATER CO INC	NON-EXEMPT	739786.43	375315.08		760
595927	D(15-22) 35ABA	Durham	NORD RESOURCES CORP	MONITOR	730371.17	397830.79		273

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
561562	D(15-22) 26DBB	EPB-1 core	NORD RESOURCES CORP	MONITOR	729931.85	400120.53		398
622849	D(15-23) 31CBA	HIGGINBOTHOAM	RONALD B & VENICE J HIGGINBOTHAM FAMILY TRUST	NON-EXEMPT	738756.28	394926.73		1350
563955	D(15-22) 26DCC	Hill	NORD RESOURCES CORP	MONITOR	729401.41	398554.3		180
	D(15-23) 31DBC	J-01	EXCELSIOR MINING CORP	EXPLORATION	740078.54	394723.65	y	
	D(15-23) 31ACC	J-02	EXCELSIOR MINING CORP	EXPLORATION	740219.32	395638.69	y	
	D(15-23) 31ACC	J-03	EXCELSIOR MINING CORP	EXPLORATION	739882.99	395995.15	y	
225086	D(16-23) 06AAA	J-04	EXCELSIOR MINING CORP	EXPLORATION	737987.71	393154.24	n	1509
225087	D(15-23) 31CCD	J-05	EXCELSIOR MINING CORP	EXPLORATION	737444.95	393699.86	n	1475
225088	D(15-23) 31CDB	J-06	EXCELSIOR MINING CORP	EXPLORATION	737434.29	392728.1	n	937
225089	D(15-23) 31CDC	J-07	EXCELSIOR MINING CORP	EXPLORATION	737878.08	394483.65	n	938
225090	D(15-23) 31CAC	J-08	EXCELSIOR MINING CORP	EXPLORATION	738233.34	394829.84	n	1350
225091	D(15-23) 31CBC	J-09	EXCELSIOR MINING CORP	EXPLORATION	737859.91	394645.39	n	1158
225092	D(15-23) 31CAC	J-10	EXCELSIOR MINING CORP	EXPLORATION	738111.75	394409.48	n	1062
	D(15-23) 31BDA	JD-01	EXCELSIOR MINING CORP	EXPLORATION	738804.34	390483.72	y	
	D(16-23) 08BCA	JD-03	EXCELSIOR MINING CORP	EXPLORATION	739104.34	390568.72	y	
	D(16-23) 08BCC	JD-06	EXCELSIOR MINING CORP	EXPLORATION	738397.45	390263.92	y	
	D(16-23) 06BCC	JD-07	EXCELSIOR MINING CORP	EXPLORATION	738564.34	390493.72	y	
225093	D(15-23) 31CAB	JS-05	EXCELSIOR MINING CORP	EXPLORATION	736922.48	394882.63	n	588
225094	D(15-23) 31CBD	JS-06	EXCELSIOR MINING CORP	EXPLORATION	736941.08	394790.93	n	599
225095	D(15-23) 31CBC	JS-07	EXCELSIOR MINING CORP	EXPLORATION	736922.17	394976	n	478.5
	D(15-22) 36ADB	K-04	EXCELSIOR MINING CORP	EXPLORATION	736560.02	396162.76	y	
	D(15-22) 36ADA	K-05	EXCELSIOR MINING CORP	EXPLORATION	737062.06	396625.03		
	D(15-22) 36ADA	K-06	EXCELSIOR MINING CORP	EXPLORATION	735567.84	394717.52	y	
	D(15-22) 36DBD	K-07	EXCELSIOR MINING CORP	EXPLORATION	735574.42	395156.35	y	
	D(15-22) 36ACD	K-08	EXCELSIOR MINING CORP	EXPLORATION	735571.81	395648.54	y	
	D(15-22) 36ACA	K-09	EXCELSIOR MINING CORP	EXPLORATION	735566.6	396156.34	y	
	D(15-22) 36BCA	K-10	EXCELSIOR MINING CORP	EXPLORATION	733046.66	396683.5		
	D(15-22) 36BCA	K-11	EXCELSIOR MINING CORP	EXPLORATION	733541.88	396174.16		
	D(15-22) 36BDB	K-13	EXCELSIOR MINING CORP	EXPLORATION	734057.51	396170.68		
	D(15-22) 36BDB	K-14	EXCELSIOR MINING CORP	EXPLORATION	734559.23	396663.73		
	D(15-22) 36BDA	K-15	EXCELSIOR MINING CORP	EXPLORATION	734583.54	396193.24		
	D(15-22) 36BDD	K-16	EXCELSIOR MINING CORP	EXPLORATION	734564.44	395675.88		
	D(15-22) 36CAA	K-18	EXCELSIOR MINING CORP	EXPLORATION	734569.22	395169.38		
	D(16-22) 12CCC	K-20-X	EXCELSIOR MINING CORP	EXPLORATION	733444.4	382223.78		
	D(15-23) 36BBA	Keystone Shaft	NORD RESOURCES CORP	EXPLORATION	733180.8635	397543.9834		
225096	D(15-23) 31BCB	MCC-1	EXCELSIOR MINING CORP	EXPLORATION	738115.44	393891.8	y	
225097	D(15-23) 31BCD	MCC-2	EXCELSIOR MINING CORP	EXPLORATION	738341.25	393919.23	y	
225098	D(15-23) 31CBD	MCC-3	EXCELSIOR MINING CORP	EXPLORATION	738377.4	393414.04	y	1340
	D(16-23) 06BBD	MCC-4	EXCELSIOR MINING CORP	EXPLORATION	738801.68	391756.12		
225099	D(15-23) 31BDA	MCC-5	EXCELSIOR MINING CORP	EXPLORATION	738754.84	392013.98		
225100	D(15-23) 31CAD	MCC-6	EXCELSIOR MINING CORP	EXPLORATION	739155.82	391443.74		
225101	D(15-23) 31CDC	MCC-7	EXCELSIOR MINING CORP	EXPLORATION	738756.38	392046.83		
549073	D(15-23) 31CCA	MCC-8	EXCELSIOR MINING CORP	EXPLORATION	738499.34	393416.72	y	0
611607	D(15-22) 23CD	Moore Shaft	NORD RESOURCES CORP	NON-EXEMPT	728793.93	403967.64		680

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
909280	D(15-23) 19BBB	New Section 19 Well	C-BAR RANCH	NON-EXEMPT	738015.71	408227.77		1140
	D(15-22) 36BBD	NK-01	EXCELSIOR MINING CORP	EXPLORATION	733031.37	396922.76		
	D(15-22) 36BBD	NK-02	EXCELSIOR MINING CORP	EXPLORATION	733017.37	396849.76		
	D(15-22) 36BBD	NK-03	EXCELSIOR MINING CORP	EXPLORATION	732988.37	396754.76		
	D(15-22) 36BBD	NK-04	EXCELSIOR MINING CORP	EXPLORATION	733227.37	396807.75		
	D(15-22) 36BBD	NK-05	EXCELSIOR MINING CORP	EXPLORATION	733237.37	396734.75		
	D(15-22) 36BBD	NK-06	EXCELSIOR MINING CORP	EXPLORATION	733176.37	396648.76		
	D(15-22) 36BBD	NK-07	EXCELSIOR MINING CORP	EXPLORATION	733121.37	396828.76		
	D(15-22) 36BBD	NK-08	EXCELSIOR MINING CORP	EXPLORATION	733097.37	396739.76		
	D(15-22) 36BBD	NK-09	EXCELSIOR MINING CORP	EXPLORATION	733085.37	396654.76		
	D(15-22) 36BBD	NK-10	EXCELSIOR MINING CORP	EXPLORATION	732920.37	396937.76		
	D(15-22) 36BBD	NK-11	EXCELSIOR MINING CORP	EXPLORATION	732899.37	396846.76		
	D(15-22) 36BBD	NK-12	EXCELSIOR MINING CORP	EXPLORATION	732844.37	396921.76		
	D(15-22) 36BBD	NK-13	EXCELSIOR MINING CORP	EXPLORATION	733335.37	396798.75		
	D(15-22) 36BBD	NK-14	EXCELSIOR MINING CORP	EXPLORATION	733430.37	396798.75		
	D(15-22) 36BBD	NK-15	EXCELSIOR MINING CORP	EXPLORATION	733456.37	396868.75		
	D(15-22) 36BBD	NK-17	EXCELSIOR MINING CORP	EXPLORATION	733313.37	396700.75		
224940	D(15-23) 31CCB	NSD-001	EXCELSIOR MINING CORP	EXPLORATION	737801.3	393537.11	n	1505.5
224941	D(15-23) 31CCC	NSD-002	EXCELSIOR MINING CORP	EXPLORATION	737726.8	392950.87	n	1907
224942	D(15-23) 31CCD	NSD-003	EXCELSIOR MINING CORP	EXPLORATION	738449.28	392692.12	n	2008
224950	D(16-23) 06BBC	NSD-004	EXCELSIOR MINING CORP	EXPLORATION	738343.84	391660.14		1309
224949	D(16-23) 06BCC	NSD-005	EXCELSIOR MINING CORP	EXPLORATION	738514.66	390551.58		1908
224948	D(16-23) 06BCA	NSD-006	EXCELSIOR MINING CORP	EXPLORATION	739302.44	391150.74		2000
224951	D(16-23) 06BAC	NSD-007	EXCELSIOR MINING CORP	EXPLORATION	739662.03	391510.94		1800
224952	D(16-23) 06BBA	NSD-008	EXCELSIOR MINING CORP	EXPLORATION	739201.98	392332.14		1772.5
224943	D(15-23) 31CDD	NSD-009	EXCELSIOR MINING CORP	EXPLORATION	739417.77	393047.95	n	1793
224953	D(16-23) 06BBB	NSD-010	EXCELSIOR MINING CORP	EXPLORATION	738613.65	392024.22		1509
224944	D(15-23) 31CCA	NSD-011	EXCELSIOR MINING CORP	EXPLORATION	738326.23	393923.43	n	1438
224954	D(16-23) 06BCA	NSD-012	EXCELSIOR MINING CORP	EXPLORATION	738896.21	391039.29		1732
224955	D(16-23) 06BCA	NSD-013	EXCELSIOR MINING CORP	EXPLORATION	739390.45	391051.03		2007
224956	D(16-23) 06BCD	NSD-014	EXCELSIOR MINING CORP	EXPLORATION	739006.16	390547.97		1913
224957	D(16-23) 06CBA	NSD-015	EXCELSIOR MINING CORP	EXPLORATION	739152.81	390012.43		1956
224958	D(16-23) 06CAC	NSD-016	EXCELSIOR MINING CORP	EXPLORATION	739516.26	389066.94		1689
224959	D(16-23) 06CDC	NSD-017	EXCELSIOR MINING CORP	EXPLORATION	739703.96	387977.44		1349
224960	D(16-22) 12DDA	NSD-018	EXCELSIOR MINING CORP	EXPLORATION	738058.61	382790.27		1200
224945	D(15-23) 31CCB	NSD-019	EXCELSIOR MINING CORP	EXPLORATION	737674.27	393873.59	n	1454
224946	D(15-23) 31CDB	NSD-020	EXCELSIOR MINING CORP	EXPLORATION	738950.33	393545.51	n	660
224947	D(16-23) 06BBD	NSD-022	EXCELSIOR MINING CORP	EXPLORATION	738811.18	391741.29		1339
224930	D(15-23) 31CBC	NSD-023	EXCELSIOR MINING CORP	EXPLORATION	737808.48	394173.78	n	1546
224931	D(15-23) 31CAC	NSD-024	EXCELSIOR MINING CORP	EXPLORATION	738799.08	394051.36	n	1972
224932	D(15-23) 31CDC	NSD-025	EXCELSIOR MINING CORP	EXPLORATION	738697.88	393061.4	n	1643.5
224154	D(15-22) 36DAA	NSD-026	EXCELSIOR MINING CORP	EXPLORATION	737356.24	394752.25	n	1168
224936	D(15-22) 36DAD	NSD-027	EXCELSIOR MINING CORP	EXPLORATION	736806.45	394419.15	n	1004.5
224937	D(15-22) 36DAC	NSD-028	EXCELSIOR MINING CORP	EXPLORATION	736291.67	394433.4	n	755
224938	D(15-22) 36DAB	NSD-029	EXCELSIOR MINING CORP	EXPLORATION	736101.29	395247.79	n	279
224848	D(15-22) 36DBA	NSD-030	EXCELSIOR MINING CORP	EXPLORATION	736012.13	394822.54	n	767

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
224155	D(15-22) 36ADD	NSD-031	EXCELSIOR MINING CORP	EXPLORATION	737024.7	395487.5	n	1008
224939	D(15-22) 36DAB	NSD-032	EXCELSIOR MINING CORP	EXPLORATION	736626.53	395306.53	n	905
224846	D(15-23) 31CCC	NSD-033	EXCELSIOR MINING CORP	EXPLORATION	737855.83	392788.24	n	1579
224852	D(16-23) 06CDA	NSD-034	EXCELSIOR MINING CORP	EXPLORATION	739255.66	388536.35		
224853	D(16-23) 06CAD	NSD-035A	EXCELSIOR MINING CORP	EXPLORATION	738969.49	389027.58		
224854	D(15-22) 36DBD	NSD-036	EXCELSIOR MINING CORP	EXPLORATION	735758.93	394267.19	n	793.3
224059	D(15-23) 31BCC	NSD-037	EXCELSIOR MINING CORP	EXPLORATION	737845.93	395606.72	n	1284.4
224855	D(16-23) 06DBC	NSD-038	EXCELSIOR MINING CORP	EXPLORATION	739848.83	388711.57		
224856	D(16-23) 06DBB	NSD-039	EXCELSIOR MINING CORP	EXPLORATION	739552.76	389535.73		
224857	D(16-23) 06DBC	NSD-040	EXCELSIOR MINING CORP	EXPLORATION	739854.88	390291.1		
224858	D(16-23) 06DBB	NSD-041	EXCELSIOR MINING CORP	EXPLORATION	739956.31	391838.22		1600
224859	D(16-23) 06BAB	NSD-042	EXCELSIOR MINING CORP	EXPLORATION	738269.08	392040.53		1700
224860	D(15-23) 31CDB	NSD-043	EXCELSIOR MINING CORP	EXPLORATION	739255.99	393741	n	1736
223938	D(16-23) 07BAA	NSD-044	EXCELSIOR MINING CORP	EXPLORATION	739707.02	387338.17		
	D(15-23) 31CCA	NSH-001	EXCELSIOR MINING CORP	MONITOR	738265.2	393874.58	n	1114
	D(16-23) 06BDA	NSH-002	EXCELSIOR MINING CORP	MONITOR	739092.38	390927.9		1140
221520	D(15-23) 31CBD	NSH-003	EXCELSIOR MINING CORP	MONITOR	738201.82	394344.15	n	1432
221521	D(15-23) 31CBD	NSH-004	EXCELSIOR MINING CORP	MONITOR	738403.34	393938.71	n	880
221603	D(15-23) 31CCA	NSH-004B	EXCELSIOR MINING CORP	MONITOR	738406.35	393880.07	n	1031
	D(15-23) 31CCA	NSH-004P	EXCELSIOR MINING CORP	MONITOR	738387.34	393906.72	n	1060
221604	D(15-23) 31CBD	NSH-005	EXCELSIOR MINING CORP	MONITOR	738525.68	394033.38	n	1040
	D(15-23) 31CCA	NSH-005P	EXCELSIOR MINING CORP	MONITOR	738555.33	394023.71	n	1046
221519	D(15-23) 31CBD	NSH-006	EXCELSIOR MINING CORP	MONITOR	738463.33	394237.3	n	684
917430	D(15-22) 36DAB	NSH-007	EXCELSIOR MINING CORP	MONITOR	736757.42	394889.08	n	640
917429	D(15-22) 36DAA	NSH-008	EXCELSIOR MINING CORP	MONITOR	736856.77	395088.59	n	900
917433	D(15-23) 31BCC	NSH-009	EXCELSIOR MINING CORP	MONITOR	737455.53	395561.03	n	1060
917434	D(15-23) 31BCC	NSH-010	EXCELSIOR MINING CORP	MONITOR	737605.1	395490.01	n	720
224058	D(16-23) 05BCA	NSH-011	EXCELSIOR MINING CORP	MONITOR	743019.77	391244.73	n	602
917435	D(15-23) 31BCC	NSH-012	EXCELSIOR MINING CORP	MONITOR	737755.85	395538.41	n	504
917436	D(15-23) 31CBC	NSH-013	EXCELSIOR MINING CORP	MONITOR	738056.78	394338.52	n	1070
917432	D(15-23) 31BCC	NSH-014B	EXCELSIOR MINING CORP	MONITOR	737667.63	395577	n	1277
224029	D(15-23) 31CCC	NSH-015	EXCELSIOR MINING CORP	MONITOR	737606.14	393140.05	n	820
224030	D(15-23) 31CCC	NSH-016	EXCELSIOR MINING CORP	MONITOR	737458.64	393175.02	n	820
224099	D(15-23) 31CCC	NSH-017	EXCELSIOR MINING CORP	MONITOR	737758.07	393157.78	n	1200
224100	D(15-23) 31CAD	NSH-018	EXCELSIOR MINING CORP	MONITOR	739687.04	394387.46	n	997
224031	D(15-23) 31CCB	NSH-019	EXCELSIOR MINING CORP	MONITOR	738155.23	393436.53	n	1410
224035	D(15-23) 31CAD	NSH-020	EXCELSIOR MINING CORP	MONITOR	739685.67	394225.67	n	1600
224032	D(15-23) 31CCA	NSH-021B	EXCELSIOR MINING CORP	MONITOR	738204.34	393491.72	n	1260
224032	D(15-23) 31CCA	NSH-021C	EXCELSIOR MINING CORP	MONITOR	738178.3	393503.73	n	1400
224097	D(15-23) 31CDC	NSH-022	EXCELSIOR MINING CORP	MONITOR	739140.53	393037.93	n	1170
224034	D(15-23) 31CCA	NSH-023	EXCELSIOR MINING CORP	MONITOR	738405.09	393587.65	n	1446
224033	D(15-23) 31CCA	NSH-024	EXCELSIOR MINING CORP	MONITOR	738342.91	393552.51	n	1145
224158	D(15-23) 31CDC	NSH-025	EXCELSIOR MINING CORP	MONITOR	738294.61	393685.78	n	1596
224036	D(15-23) 31CDC	NSH-026	EXCELSIOR MINING CORP	MONITOR	739146.28	392899.09	n	905
224157	D(16-23) 06BAD	NSH-027	EXCELSIOR MINING CORP	MONITOR	738815.79	391870.38		1022
224156	D(16-23) 06BAA	NSH-028	EXCELSIOR MINING CORP	MONITOR	738869.72	392021.67		800
917777	D(15-23) 31CDA	NSH-029	EXCELSIOR MINING CORP	MONITOR	739681.74	393940.42	n	710

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
917775	D(15-23) 31CAD	NSH-030	EXCELSIOR MINING CORP	MONITOR	739691.19	394683.79	n	740
917782	D(15-23) 31BCB	NSH-031	EXCELSIOR MINING CORP	MONITOR	737236.87	395991.56	n	820
917783	D(15-23) 31CDA	NSH-032	EXCELSIOR MINING CORP	MONITOR	737550.79	395796.75	n	820
224933	D(15-23) 31CBD	NSM-001	EXCELSIOR MINING CORP	EXPLORATION	738051.78	394181.02	n	1150
224934	D(15-23) 31CCD	NSM-002	EXCELSIOR MINING CORP	EXPLORATION	738195.42	392736.92	n	1000
224935	D(15-23) 31CCC	NSM-003	EXCELSIOR MINING CORP	EXPLORATION	737701.35	392934.29	n	1028
224842	D(15-23) 31CBD	NSM-004	EXCELSIOR MINING CORP	EXPLORATION	738506.71	393990.27	n	1114.5
224841	D(15-23) 31CCD	NSM-005A	EXCELSIOR MINING CORP	EXPLORATION	738781.26	393106.74	n	1171.5
224840	D(15-23) 31CBC	NSM-006	EXCELSIOR MINING CORP	EXPLORATION	737927.87	394038.78	n	1217
224843	D(15-23) 31CBC	NSM-007	EXCELSIOR MINING CORP	EXPLORATION	737986.92	394488.9	n	1167.9
224844	D(15-23) 31CCB	NSM-008	EXCELSIOR MINING CORP	EXPLORATION	738095.92	393386.62	n	1275
224845	D(15-23) 31CDC	NSM-009	EXCELSIOR MINING CORP	EXPLORATION	738954.82	392689.54	n	1349.1
224849	D(16-23) 06BDD	NSM-010A	EXCELSIOR MINING CORP	EXPLORATION	739040.96	390550.17		839
224850	D(16-23) 06BAA	NSM-011	EXCELSIOR MINING CORP	EXPLORATION	739056.69	392037.78		1340
224851	D(16-23) 06BAD	NSM-012	EXCELSIOR MINING CORP	EXPLORATION	739006.79	391439.05		
224847	D(15-22) 36DAC	NSM-013	EXCELSIOR MINING CORP	EXPLORATION	736785.02	394382.74	n	953

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
563954	D(15-22) 26BCB	Pioneer	NORD RESOURCES CORP	MONITOR	726957.27	401512.6		365
611608	D(15-22) 25BC	Republic Well	NORD RESOURCES CORP	NON-EXEMPT	732439.46	401628.75		862
225102	D(15-23) 31CCD	S-01	EXCELSIOR MINING CORP	EXPLORATION	737274.78	395034.29	y	
225103	D(15-23) 31CCD	S-03	EXCELSIOR MINING CORP	EXPLORATION	736599.02	395756.74	y	
225104	D(15-23) 31CCB	S-04	EXCELSIOR MINING CORP	EXPLORATION	736497.89	394892.23	y	
561563	D(15-22) 26CCA	Saddle	NORD RESOURCES CORP	MONITOR	727974.28	399220.68		123
	D(16-22) 13DAC	SD-111	EXCELSIOR MINING CORP	EXPLORATION	737306.78	378795.96		
	D(16-22) 13DCD	SD-112	EXCELSIOR MINING CORP	EXPLORATION	736351.9	377164.07		
	D(16-22) 13CDB	SD-113	EXCELSIOR MINING CORP	EXPLORATION	734381.51	377701.39		
	D(16-23) 18ADC	SD-114	EXCELSIOR MINING CORP	EXPLORATION	741560.35	378917.72		
	D(16-23) 17CAA	SD-115	EXCELSIOR MINING CORP	EXPLORATION	744685.23	379055.59		
	D(16-22) 13CDB	SD-116	EXCELSIOR MINING CORP	EXPLORATION	734589.81	378144.88		
	D(16-22) 13CDD	SD-117	EXCELSIOR MINING CORP	EXPLORATION	735402.3	376909.68		
	D(16-22) 13AAC	SD-118	EXCELSIOR MINING CORP	EXPLORATION	737173.08	380930.55		
	D(16-22) 13DAB	SD-80	EXCELSIOR MINING CORP	EXPLORATION	737150.58	379143.16		
	D(16-22) 13CDB	SD-81	EXCELSIOR MINING CORP	EXPLORATION	734381.51	377701.39		
	D(16-22) 13CDD	SD-82	EXCELSIOR MINING CORP	EXPLORATION	735518.6	377181.38		
	D(16-23) 17CCC	SD-83	EXCELSIOR MINING CORP	EXPLORATION	742532.45	377268.11		
	D(15-23) 32DAA	SD-84	EXCELSIOR MINING CORP	EXPLORATION	747187.76	395311.43		
	D(15-23) 32DDB	SD-85	EXCELSIOR MINING CORP	EXPLORATION	746782.77	393786.34		
	D(15-23) 32DBA	SD-86	EXCELSIOR MINING CORP	EXPLORATION	745761.97	395257.25		
	D(15-23) 29CCA	SD-87	EXCELSIOR MINING CORP	EXPLORATION	743779.78	399239.06		
611610	D(15-23) 19BBB	Section 19 Well	NORD RESOURCES CORP	NON-EXEMPT	737604	408296.24		1155
633424	D(15-22) 35BA	Smith	DURHAM, ROBERT C	EXEMPT	728586.31	397678.2		500
561564	D(15-22) 25CCD	Southern	NORD RESOURCES CORP	MONITOR	733248.61	398080.08		425
562255	D(15-22) 36DAD	SULLY 97-7	EXCELSIOR MINING CORP	EXPLORATION	736854.35	394663.73	y	0
	D(16-23) 05BCC	SULLYI97-1	EXCELSIOR MINING CORP	EXPLORATION	742154.1	390080.58		
	D(16-23) 07BAD	SULLYI97-2	EXCELSIOR MINING CORP	EXPLORATION	739754.35	386663.72		
	D(16-22) 12DDD	SULLYI97-3	EXCELSIOR MINING CORP	EXPLORATION	737654.37	382263.75		
	D(16-23) 18BBB	SULLYI97-4	EXCELSIOR MINING CORP	EXPLORATION	738562.59	381819.02		
	D(16-23) 18BBC	SULLYI97-5	EXCELSIOR MINING CORP	EXPLORATION	738554.37	381363.74		
225105	D(15-23) 31CCC	T-01	EXCELSIOR MINING CORP	EXPLORATION	738515.39	392383.75		
225106	D(15-23) 31CBC	T-02	EXCELSIOR MINING CORP	EXPLORATION	739041.35	391527.12		
225107	D(15-23) 31CBA	T-03	EXCELSIOR MINING CORP	EXPLORATION	738560.37	391104.29		
	D(16-23) 06BCD	T-04	EXCELSIOR MINING CORP	EXPLORATION	738897.59	390336.18		
225108	D(15-23) 31CBC	T-05	EXCELSIOR MINING CORP	EXPLORATION	739142.8	389662.46		
	D(16-23) 06CBC	T-06	EXCELSIOR MINING CORP	EXPLORATION	738594.35	389423.72		
225109	D(15-23) 31CBD	T-07	EXCELSIOR MINING CORP	EXPLORATION	739507.1	392026.77		
225110	D(15-23) 31CCA	T-08	EXCELSIOR MINING CORP	EXPLORATION	739579.26	390719.9		
225111	D(15-23) 31CCA	T-09	EXCELSIOR MINING CORP	EXPLORATION	740193.91	391074.49		
225112	D(15-23) 31CCA	T-10	EXCELSIOR MINING CORP	EXPLORATION	740145.33	392206.7		2085
	D(16-23) 07DBB	T-11	EXCELSIOR MINING CORP	EXPLORATION	740162.68	389593.45		
	D(16-23) 06DCA	T-12	EXCELSIOR MINING CORP	EXPLORATION	740763.9	388349.55		
565198	D(15-22) 35ADA	Tungsten	NORD RESOURCES CORP	MONITOR	731403.63	396152.38		280
563956	D(15-22) 25BCB	Twin	NORD RESOURCES CORP	MONITOR	732779.23	401419.23		624
	D(16-23) 06AAB	USBM-18	EXCELSIOR MINING CORP	EXPLORATION	741270.64	392193.23		
	D(16-23) 06AAB	USBM-19	EXCELSIOR MINING CORP	EXPLORATION	741064.51	392076.93		

TABLE B-1
Wells within 1/2-Mile of the Project Boundary

ADWR Well Registry ID	Cadastral	Well Name	Owner Name	Well Type*	Easting (NAD 83 Feet)	Northing (NAD 83 Feet	Abandoned (y/n)	Well Depth (feet)
	D(16-23) 06CCD	USBM-20	EXCELSIOR MINING CORP	EXPLORATION	738998.28	387685.53		
	D(16-23) 06CCA	USBM-21	EXCELSIOR MINING CORP	EXPLORATION	738835.58	387832.81		
625316	D(16-22) 12DC0	Well location bad	LAMB,J A	EXEMPT	736038.63	382740.75		250

Groundwater rules are set in Arizona Revised Statute Title 45 Chapter 2. Wells that are installed for non-irrigation purposes and that have pumps with a capacity less than 35 gallons per minute are exempt from certain requirements of Chapter 2 pursuant to Section 45-454. Exempt wells are generally domestic drinking water and stock wells. The wells are exempt from certain rules because of their limited withdrawal and small number of users. Non-Exempt wells are subject to the requirements of Chapter 2.

28. (44) The POC well locations have been moved to inside of the proposed AOR and aquifer exemption boundary as requested. Intermediate monitoring wells are proposed around and between the mine block and HC well locations as discussed in the response to comment 10.

The revised Figures H -2 and P -1 should replace the original figures in the application and the Excelsior response should be documented in the updated application.

Excelsior Response:

Revised figures H -2 and P -1, which were provided to USEPA in the previous responses will replace the original figures in the UIC application. The text of the application will similarly be revised.

29. (45)Permit conditions may require that the AOR be expanded at the southern and western boundary later during ISR operations if monitoring and observation well data indicate a loss of hydraulic containment and excursion of ISR fluids beyond the proposed AOR. The EPA aquifer exemption guidance document includes a recommendation for a buffer zone. Intermediate monitoring and observation wells should provide early detection of an excursion before it reaches the AOR boundary. Refer to Comment 5 for more discussion of this issue.

Excelsior Response:

Comment noted. See response to Comment 5, above.

Attachment C, Corrective Action Plan and Well Data

1. Introduction

30. (46) The basin fill saturated zones should be included in the exempted portion of the bedrock aquifer as described in Comment 2.

Excelsior should amend and update the application accordingly

Excelsior Response:

The introduction to Attachment C will be modified as follows:

> *As presented in Attachment S, saturated basin fill above the oxide ore body will be included in the aquifer exemption. Based on water level data from NSH -006 and NSD -020, the top of saturated basin fill is at an elevation of approximately 4185 fee t. In addition, the bottom of the aquifer exemption will include the upper 200 feet of the sulfide ore zone below the oxide ore body.*

2. Wells within the Area of Review

31. (47) Table C-1. The record of construction, completion, and status all wells are not provided in the revised Table C of the prior response or referenced elsewhere in the application.

Excelsior should amend and update the application accordingly.

Excelsior Response:

Table C-1, as revised in December 2016, will be included in the revised application.

Attachment D Maps and Cross Sections of USDWs

1. Underground Source of Drinking Water

32. (51) Monitoring wells may be required in the sulfide zone as described above. The absence of a confining layer between the oxide and sulfide zones means that an exchange or mixing of aquifer fluids between the oxide and sulfide zones during ISR operations is likely to occur where injection and recovery wells are situated near a fault zone and the oxide -sulfide interface. The exchange or mixing of the sulfide zone fluids with oxide zone fluids will be enhanced due to the drawdown of the hydraulic control wells in the oxide zone. Refer to Comment 3 for more discussion of this issue.

Excelsior should amend and update the application to include the additional relevant information provided in connection with conference calls with EPA and add a proposal to include the upper 200 feet of the sulfide zone in the aquifer exemption zone. Additional monitoring wells in the sulfide zone near the fault zones may not be required if the upper 200 feet of the sulfide zone is exempted.

Excelsior Response:

See response to comment 3, above. Excelsior will include the upper 200 feet of the sulfide zone in the aquifer exemption. Figures D -3, D -4, and D -5 have been revised accordingly. Please note on these figures that the USDW does not necessarily correspond to the potentiometric surface. There are locations on the cross sections (for example at the western end of section A -A') that show a potentiometric surface above the bedrock surface. This does not represent saturated alluvium —it represents confined conditions in bedrock.

Based on this revision, Section 1 of Attachment D will be revised as follows:

Underground Sources of Drinking Water

This Attachment was prepared in support of Excelsior Mining Arizona, Inc.'s (Excelsior's) Underground Injection Control (UIC) Permit application to the United States Environmental Protection Agency (USEPA). Excelsior is applying for an area Class III UIC permit to install a wellfield for in-situ recovery (ISR) of copper at the Gunnison Copper Project (Project), located in Cochise County, Arizona.

This attachment includes maps and cross sections that depict the vertical limits of underground sources of drinking water (USDWs) within the Area of Review (AOR) as defined in Attachment A of this UIC application. Figure D -1 shows the surficial geology of the Project area, Figure D -2 shows the bedrock surface geology, and figures D-3, D-4, and D-5 are cross sections through the AOR that show USDWs (shaded), the injection formation, and the direction of water movement.

The following units within the AOR are considered USDWs:

- *Saturated Basin Fill,*

- *Bedrock in the oxide zone,*
- *The top 200 feet of the sulfide zone,*
- *Tertiary quartz monzonite down to an elevation of 3100 feet above mean sea level (as shown on Figure D-5).*

The USDW within the AOR is saturated, fractured Paleozoic bedrock in the oxide zone. This will be the zone of injection. A thin, isolated area of saturated basin fill (alluvium) exists below an elevation of 4185 feet within the AOR. Therefore, basin fill below this elevation is also considered a USDW. The extent of saturated basin fill is shown on revised figure I -2 in Attachment I. Additional discussion regarding the degree of saturat ed basin fill is provided in Attachment S of this UIC application.

Investigations of the deeper bedrock (i.e. the sulfide zone) have shown that:

- *Hydraulic conductivity values are low. Two aquifer tests conducted in the sulfide zone (wells NSH -014B and NSH -025) indicated hydraulic conductivity values of 0.01 ft/day and 0.07 feet/day (Attachment A-3).*
- *Fracture intensity is lower in the sulfide zone than in the oxide zone (Attachment A-2).*
- *Beryllium and fluoride exceeded the maximum contaminant level and Aq uifer Water Quality Standard for beryllium and fluoride in 2015 (as discussed in Attachment H).*

Nevertheless, because the sulfide zone may be connected by faults or fractures to the oxide zone, Excelsior proposes to include the top 200 feet of the sulfid e zone within the aquifer exemption. This 200 foot layer will be an "exclusion zone", i.e. there will be no injection of lixiviant into this zone.

The vertical extent of the oxide zone will be further refined during drilling of the injection/ recovery, hydraulic control, and observation wells in the AOR.

The Tertiary Texas Canyon Quartz Monzonite (shown on Figure D -5) where it is present within the AOR is also considered a USDW because, although aquifer tests show very low hydraulic conductivity, fractures may connect it to the adjacent USDWs, primarily the oxide zone.

Additional information regarding the regional geologic setting, orogenic history, and geologic formations is provided in Attachment F of this UIC Application.

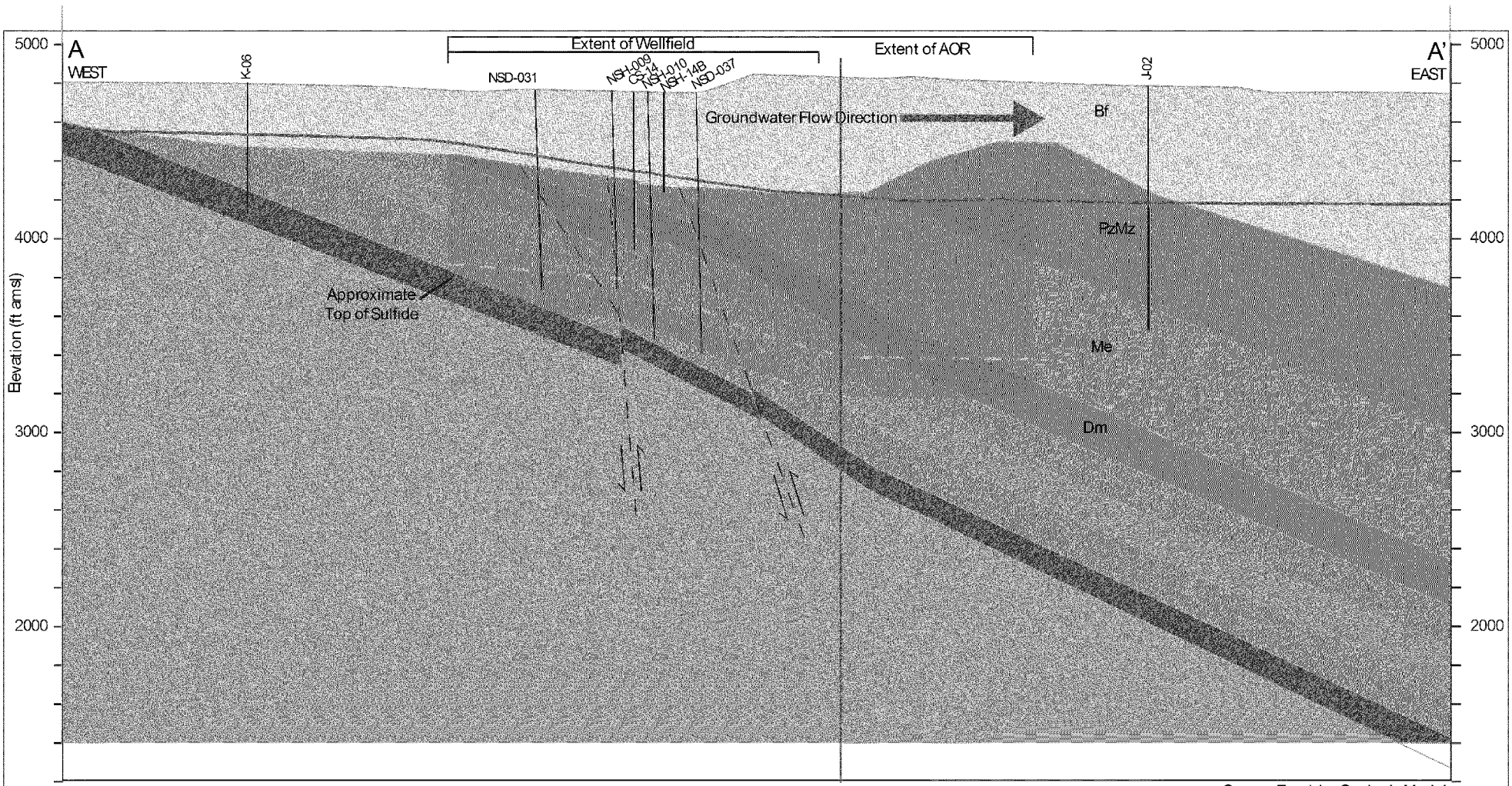

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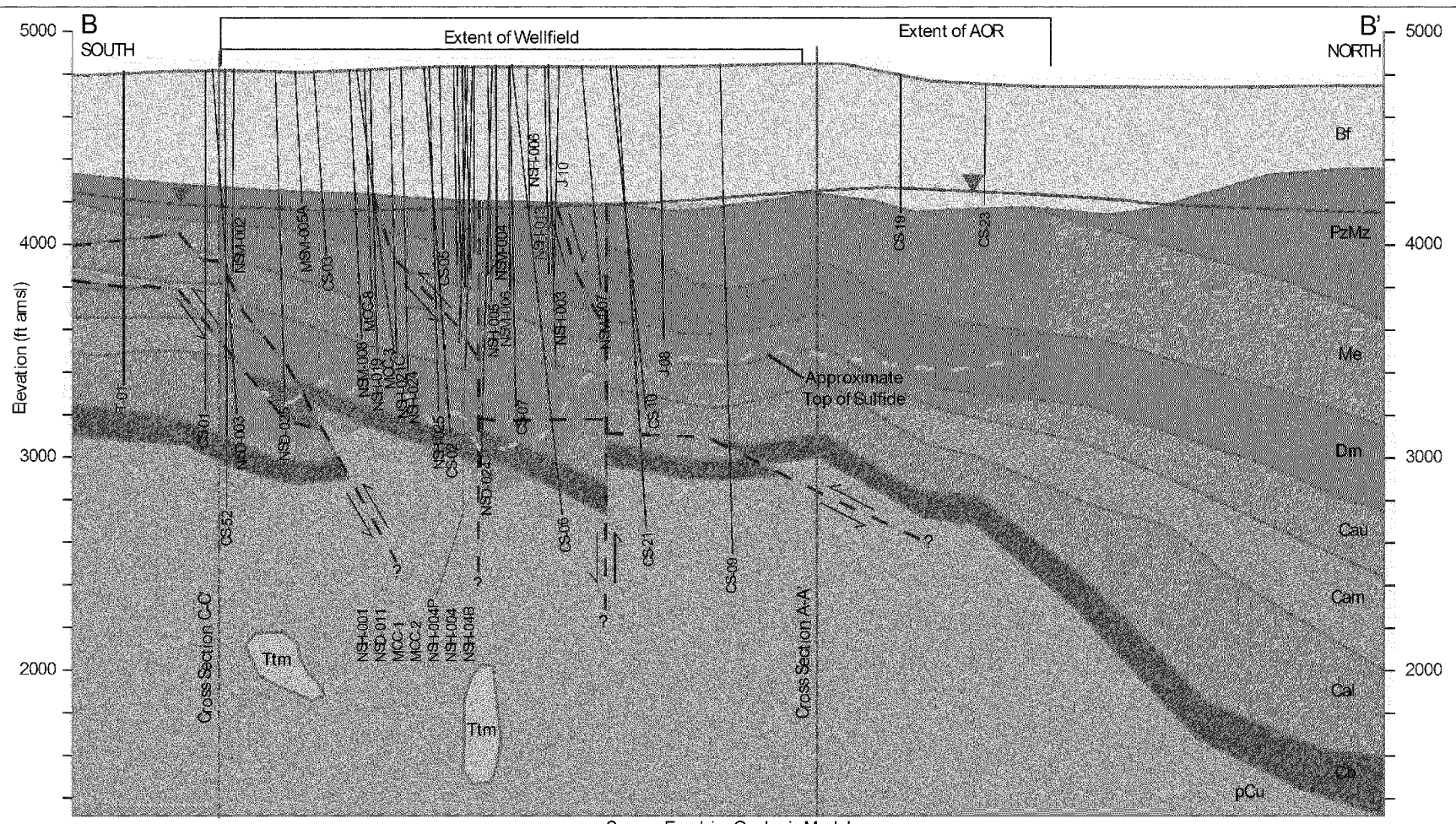
FIGURE D-3
Geologic Cross Section A - A'



Source: Excelsior Geologic Model

Bf - Basin Fill
Tqm - Texas Canyon Quartz Monzonite
PzMz - Paleozoic/ Mesozoic Undivided
Me - Escabrosa Limestone
Dm - Martin Formation
Cau - Upper Abrigo Formation
Cam - Middle Abrigo Formation
Cal - Lower Abrigo Formation
Cb - Bolsa Quartzite
pCu - PreCambrian Undivided
Fault
Potentiometric Surface
USDW/Area of Exemption

0 500 1,000
Feet

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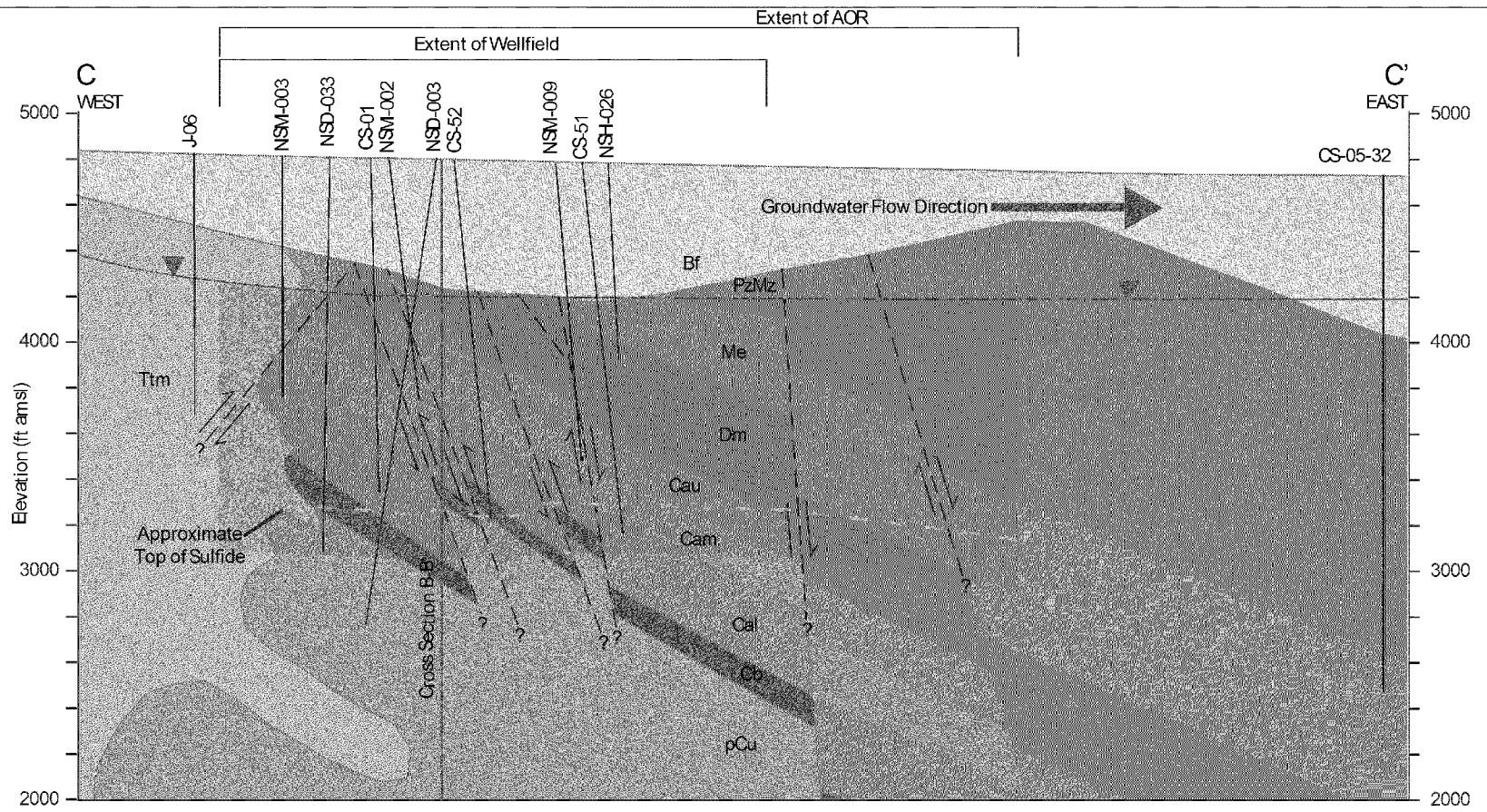
FIGURE D-4
Geologic Cross Section B-B'



Source: Excelsior Geologic Model

Bf - Basin Fill
Ttm - Texas Canyon Quartz Monzonite
PzMz - Paleozoic/ Mesozoic Undivided
Me - Escabrosa Limestone
Dm - Martin Formation
Cau - Upper Abrigo Formation
Cam - Middle Abrigo Formation
Cal - Lower Abrigo Formation
Cb - Bolsa Quartzite
pCu - PreCambrian Undivided
Fault
Potentiometric Surface
USDW
0 500 1,000
Feet

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FIGURE D-5
Geologic Cross Section C - C'

Figures D-3, D-4, and D-5, Geologic Cross Sections

33. (53) Figure D-5 in the prior response should be revised to illustrate the presence of the USDW/area of exemption in the Quartz Monzonite zone.

Excelsior Response:

The cross section presented in Figure D -5 is modified to show the exemption to the furthest western limit of the wellfield as depicted on the figure. We have also added the top 200 feet of the sulfide zone as a USDW in D-3, D-4 and D-5 small zones of saturated basin fill as USDWs on Figures D-4 and D-5.

Attachment H, Operating Data

2. Description of Operations.

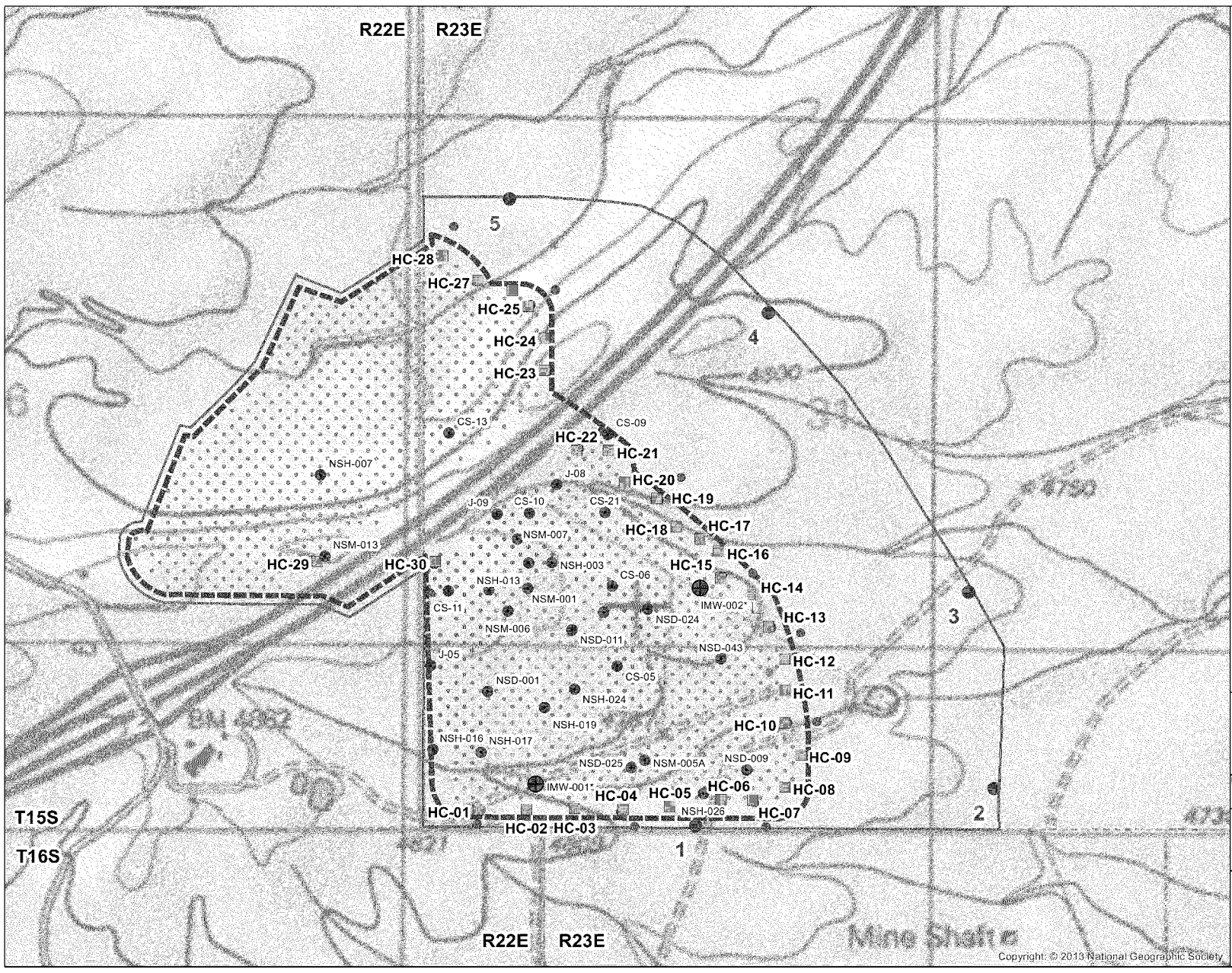
2.1 Process Description

34. (56) Figures H-1 and H-2 in the prior response were revised as requested except for addition of the additional HC, observation, and POC wells in Figure H -2 as discussed above. Refer to Comment 5 and other related comments for more information.

The use of intermediate monitoring wells, as described in the Excelsior presentation of February 9th, addresses these concerns. The relevant discussion and figures included in the PPT presentation should be added to the application.

Excelsior Response:

Figure H-2 will be revised to show the locations of all existing and planned intermediate monitoring wells (IMWs). Text will be added to explain the planned use of IMWs in Attachment A -1 (Section 3.2.1) and in Attachment P (Monitoring Program). See responses to comments 4 and 57.



Legend

- Area of Review
- ISR Wellfield
- POC-Wellfield
- Observation Well
- Hydraulic Control Well
- Stage 1 Mining Wells
- Stage 2 Mining Wells
- Stage 3 Mining Wells
- Existing IMWs
- IMWs to be installed

Observation Wells will have same number as associated hydraulic control well.

Example: At HC-1, observation wells will be named:

OW-1-I (inner)
OW-1-O (outer)

0 250 500 1,000
Feet

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FIGURE H-2
Area of Review, Point of Compliance, Hydraulic Control, Intermediate Monitor Wells, Observation Well, and Stage 1-3 Wells

2.2 Injection Rates

35. (57) As discussed in Comments 8 and 9 above, the permit will require re -balancing on a 48 -hour basis unless the applicant demonstrates that the 30 -day rolling average re -balancing of volumes is as protective as re -balancing on a 48 -hour basis during initial Stage 1 ISR operations. The intermediate monitoring and observation well data, collected over a sufficient period of time, may provi de an adequate demonstration during start-up operations.

Excelsior should propose and submit an operational and monitoring plan for the demonstration and amend the application accordingly. The full response to the comment should be added to Section 2.2 in the permit application, including the table titled "Estimated Average Injection Rates by Year."

Excelsior Response:

See responses to comments 8 and 9. Excelsior agrees to record the pumping volumes for injection, recovery, and HC on a daily basis and rebal ance on a 48 -hour basis. These data will be evaluated at the end of 60 days of operations and assessed as to whether a longer interval such as 30 days would be as protective. In addition to the flow rate data, Excelsior will consider water level data colle cted from intermediate monitor wells. Section 2.2 will be modified as directed.

Section 2.2 of Attachment H-1 will be revised to read as follows:

> *Mining will be conducted in stages. Estimated production and duration of stages are provided below. The actu al duration of each stage may change, based on operational and economic conditions.*

Stage	*Production (million lbs/year)*	*Years (estimated)***
Stage 1	*25*	*1-10*
Stage 2	*75*	*11-13*
Stage 3	*125*	*14-20*
Post-production rinsing	*0*	*21-23*

> *Injection rates and volumes will depend on a number of factors including:*
>
> 1. *The number of active injection wells (either in production, rinsing, or conditioning),*
> 2. *The rate at which the injection zone can accept lixiviant,*
> 3. *The rate at which recovery wells can be pumped.*
>
> *Injection will include conditioning, leaching and rinsing operations. According to Excelsior's production schedule, there will be approximately 1400 Class III injection/recovery wells in the*

wellfield. The number of wells active at any one time will vary. Over the life of the Project, Excelsior estimates that the average injection rate will be 12,250 gpm or 17,637,500 gallons per day. The maximum injection rate is anticipated to be 26,800 gpm or 38,543,000 gallons per day. Estimated average and maximum injection rates during the Project stages are:

		Estimated Injection for Early Rinsing (gpm)	Estimated Injection for Late Rinsing (gpm)	Estimated Total for Rinsing (gpm)	Estimated Injection for Leaching (gpm)	Estimated Injection for Wellfield Conditioning (gpm)	Estimated Total Injection (gpm)
STAGE 1	Year 1	0	0	0	4,800	312	5,112
	Year 2	0	0	0	4,800	264	5,064
	Year 3	0	0	0	4,800	264	5,064
	Year 4	0	0	0	4,800	288	5,088
	Year 5	165	0	248	4,800	270	5,318
	Year 6	99	0	149	4,800	216	5,165
	Year 7	88	110	297	4,800	216	5,313
	Year 8	77	66	215	4,800	264	5,279
	Year 9	99	59	237	4,800	312	5,349
	Year 10	99	51	226	4,800	1,032	6,058*
	AVERAGE	63	29	137	4,800	344	5,281
STAGE 2	Year 11	88	66	231	14,400	720	15,351
	Year 12	88	66	231	14,400	768	15,399
	Year 13	99	59	237	14,400	1,805	16,441*
	AVERAGE	92	64	233	14,400	1,098	15,730
STAGE 3	Year 14	88	59	220	24,000	1,269	25,489
	Year 15	418	66	726	24,000	2,040	26,766*
	Year 16	297	59	534	24,000	660	25,194
	Year 17	275	279	831	24,000	0	24,831
	Year 18	672	198	1,305	24,000	0	25,305
	Year 19	991	183	1,761	24,000	0	25,761
	Year 20	809	448	1,885	24,000	0	25,885
	AVERAGE	507	185	1,037	24,000	567	25,604
Post Production	Year 21	271	660	1,398	0	0	1,398*
	Year 22	0	539	809	0	0	809
	Year 23	0	181	271	0	0	271

*Max flow year in Stage.

The actual field conditions encountered during operation will determine the pumping and injection rates. Compliance with a specific net volume or net rate of extraction in excess of injection is not proposed as a permit condition, as it is expected to vary depending on the block(s) being mined and rinsed.

The proposed permit conditions regarding injection flow are as follows:

- *total injection, production, and hydraulic control volumes will be monitored and recorded daily;*
- *the hydraulic control volume will be re-balanced relative to the injection rate every 48 hours*
- *after 60 days of operations, the injection, production, and hydraulic control volume data will be assessed to determine if a less frequent rebalancing interval can be applied that is as protective as the 48 hour interval.*
- *an inward hydraulic gradient will be maintained around the active portions of the wellfield, as measured in observation wells located near the hydraulic control wells (Figure H-2).*

Excelsior agrees to initially pump the HC wells at a rate of one (1) percent of the injection rate and monitor the inward hydraulic gradient at observation wells adjacent to the HC wells. If excessive drawdown is observed at the HC wells such that the measured hydraulic gradient greatly exceeds 0.01 ft/ft, Excelsior will notify EPA and reduce the HC pumping so that the hydraulic gradient is closer to 0.01 ft/ft, minimum. Excessive, unnecessary drawdown is of concern for this particular mining operation because the oxide ore extends to and in some places above the groundwater table.

36. (58) The revised application should include a proposed minimum net extraction to injection ratio or percentage within wellfields as a means to maintain hydraulic control of ISR fluids in addition to pumping from the HC wells. Please design the ISR operations an d groundwater model to provide and simulate containment of ISR fluids to the wellfield as it expands during the life of the project, not merely to the ultimate wellfield planned for year 21.

During our recent conference calls, Excelsior discussed that the proposed intermediate monitoring wells and additional observation wells should suffice for monitoring and maintaining containment of individual mine block fluids and detection of excursions.

The full response to this comment, including the relevant PPT p resentations and Excelsior responses provided during the recent conference calls, should be added to the updated application.

Excelsior Response:

See more detailed responses to comments 4 and 7, above. Excelsior proposes to initially pump the HC wells at a rate of one (1) percent of the injection rate and monitor the inward hydraulic gradient at observation wells adjacent to the HC wells. If excessive drawdown is observed in the adjacent mining block(s), Excelsior will notify EPA and reduce the HC pumping s o that the hydraulic gradient is closer to 0.01 ft/ft, minimum. Excessive, unnecessary drawdown is of concern for this particular mining operation because the oxide ore extends to and in some places above the groundwater table.

Groundwater modeling of the containment of ISR fluids has been conducted for the life of the mining operation. Containment is demonstrated using particle tracking where particles are introduced to the model around each active mining block at the end of each mining year. Revised Figur es 57, 58, and 59, presented in our December 14, 2016 response document show the paths of released particles throughout the life of the mine for layers 3, 4, and 5 of the groundwater model.

3. Injection Pressure

37. (61) As discussed in our conference call on February 23rd, the methods used to estimate the fracture pressure are useful, but are different from the standard step -rate testing EPA requires. A gradient of 0.75 pounds per square inch per foot (psi/ft) is acceptable as an initial limitation for injection pressure, and EPA will require confirmation by step -rate testing in a representative number of injection wells in the wellfield as a permit condition. The discussion of fracture pressure in Attachments H and I of the application states that injection pressures will be measured daily.

Permit conditions will require continuous monitoring and daily recording of injection pressures. The revised application should modify your description, accordingly, under Section 3 Injection Pressure in Attachment H and Section 3 Fracture Pressure in Attachment I.

Excelsior Response:

The EPA step rate testing method referred to in the comment only differs from the Intercept method used by Excelsior to obtain the fracture gradient by requiring that each pressure "step " be maintained for 30 to 60 minutes. From a rock mechanics standpoint, this is not an appropriate methodology because rock fracturing will either occur or not regardless of the amount of time that the pressure is applied. Requiring long duration steps wil l greatly add to the length of time that testing would take and therefore the cost of doing the tests. The methodology used by Excelsior is a standard approach used in oil and gas industry to assess the fracture gradient needed for oil field fracking.

Excelsior also used the Peak Pressure method to calculate the fracture pressure and found that the Intercept method resulted in a slightly lower value of fracture pressure than the Peak Pressure method. Nevertheless, the value of fracture gradients was very close using either method giving confidence in the test measurements.

RAS Inc. conducted 31 fracture gradient tests and analyzed the data using two methods (intercept and peak pressure methods). The fracture gradients ranged from 0.78 to 2.22 psi/ft. The av erage fracture gradient using the intercept method was 1.55 psi/ft and 1.67 using the peak pressure method. Based on the extensive testing and analyses conducted, Excelsior has proposed a conservative fracture gradient of 0.75 psi/ft, which is less than the lowest gradient measured.

From a mining perspective, Excelsior does not want to cause fracturing because the new fractures would be barren of ore minerals and therefore would not improve the PLS grade generated by injection/recovery wells. It is ther efore in the best interest of the mine to make sure that excessive pressures that cause rock fracturing are not used.

The referenced sections in Attachments H and I do state that injection pressures will be measured on a daily basis. However, Excelsior will modify the paragraph in both attachments as follows:

> *Excelsior proposes a conservative maximum injection pressure gradient of 0.75 psi/ft to prevent hydraulic fracturing and propagation of existing fractures. Injection pressures will be measured and recorded daily.*

4. Nature of Annulus Fluid

38. (62) Annulus fluid refers to the fluid in the annulus of injection wells with packers installe d, as in Figure M -3 in Attachment M. The prior response is somewhat inconsistent with the discussion of annulus fluids.

Excelsior should clarify why corrosion resistant fluids would not be placed in the annulus of wells constructed with steel casing and packers.

Excelsior Response:

It is not necessary to fill the annulus above a properly-installed packer with a fluid. After development of the well, groundwater may be present inside the cased interval, which would then be isolated from the injection zone after the packer is installed. This groundwater, if present, will not pose integrity problems for the casing, which is designed to be in contact with groundwater.

4.1 The Evolution of the Process Solution Chemistry during Mine Operations

39. (64) "EPA water quality standards" is the correct terminology. It means primary MCLs or pre -mining background concentrations, whichever is higher. Groundwater must be restored to background levels if greater than primary MCLs.

Excelsior should amend and update the application accordingly.

Excelsior Response:

Comment noted. Table H -1 of the UIC application will be amended to include a column labeled "EPA water quality standards."

TABLE H-1
Forecast Compositions of In-Situ Recovery Process Solutions, Gunnison Copper Project, Cochise County, Arizona
revised December 2016

Analyte	Estimated Composition of Makeup Water or Rinse Water[a,b]	Sulfuric Acid (93.0 - 98.5 %)[b]	Forecast Composition of Mature Barren Leach Solution[b]	Forecast Composition of Mature Raffinate[c]	Forecast Composition of Mature Pregnant Leach Solution[b]	Forecast Composition of Initial Rinsate Solution to Evaporation Pond (50 % PLS)[c]	Forecast Composition of Groundwater After Block Proposed Rinse-Rest-Rinse Closure[b]	Arizona AWQS[d]	EPA MCL[e]
	(mg/l)	(mg/kg)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
METALS									
Aluminum	<0.04	NR	8000	8000	8000	4000	<0.04	none	none
Antimony	<0.00019	0.05 - 0.5	<0.005	<0.005	<0.005	<0.005	<0.00019	0.006	0.006
Arsenic	0.002	0.1 - 4	<0.005	<0.005	<0.005	<0.005	0.002	0.05	0.01
Barium	0.1	NR	0.05	0.05	0.05	0.07	0.1	2	2
Beryllium	0.0003	NR	4	4	4	2	<0.000048	0.004	0.004
Cadmium	<0.000072	0.1 - 10	4	4	4	2	<0.000072	0.005	0.005
Calcium	50	NR	500	500	400	200	600	none	none
Chromium	0.006	1	1	1	1	0.5	0.005	0.1	0.1
Cobalt	0.00008	NR	20	20	20	10	0.003	none	none
Copper	0.01	0.2 - 0.5	150	150	1500	800	0.01	none	1.3
Iron	0.05	7 - 50	1000	1000	1000	700	<0.026	none	none
Lead	0.00009	0.1 - 10	0.005	0.005	0.005	0.003	<0.000031	0.05	0.015
Magnesium	10	NR	6000	6000	6000	3000	100	none	none
Manganese	0.007	0.05 - 1	1000	1000	1000	500	0.04	none	none
Mercury	<0.0002	1	<0.001	<0.001	<0.001	<0.001	<0.0002	0.002	0.002
Nickel	0.001	2	20	20	20	8	0.001	0.1	none
Potassium	1	NR	100	100	100	50	2	none	none
Selenium	0.003	0.1	0.05	0.05	0.05	0.03	0.002	0.05	0.05
Silver	<0.000021	NR	0.2	0.2	0.2	0.08	<0.000021	none	none
Sodium	30	NR	100	100	100	70	30	none	none
Thallium	<0.000026	NR	4	4	4	2	<0.000026	0.002	0.002
Zinc	0.9	1 - 2	800	800	800	400	0.8	none	none
ANIONS									
Alkalinity (mg/kg as $CaCO_3$)[f]	200	NR	<1.0	<1.0	<1.0	<1.0	6	none	none
Chloride	30	5 - 16	30	30	30	30	30	none	none
Fluoride	3	NR	900 - 1200	900 - 1200	900 - 1200	400 - 600	3	4	4
Nitrate (as N)[g]	2	5	5	5	5	4	2	10	10
Sulfate	20	965000	90000	90000	90000	40000	2000	none	none
WATER QUALITY PARAMETERS									
pH (s.u.)	7.5	-1.3	0.6 - 1.8	0.6 - 1.8	1.6 - 2.1	1.9	8.0	none	none
Total Dissolved Solids	300	965000	100000	100000	100000	50000	3000	none	none
RADIOLOGICALS									
Ra-226 + Ra-228 (pCi/L)[h]	0.4	NR	<1.3	<1.3	<1.3	<1.3	<1.3	5	5
Uranium	0.004	NR	1	1	1	1	0.003	none	0.030

Notes: mg/l = milligrams per liter; mg/kg = milligrams per kilogram; mg/kg as $CaCO_3$ = milligrams per kilogram as calcium carbonate; s.u. = standard units; NR = not reported

[a] Estimated makeup water composition based on analysis of Gunnison site groundwater (Well NSH-006, sampled 13 May 2015).

[b] Solute concentrations from Duke HydroChem LLC, 2016 (Attachment H-2)

[c] Clear Creek Associates, 2016. Geochemical Modeling of Process Solution Evaporation and Solids Formation. January 2016.

[d] AWQS = Aquifer Water Quality Standards (Arizona Administrative Code R18-11-406)

[e] EPA National Primary Drinking Water Regulations Maximum Contaminant Levels

[f] Alkalinity as equivalent calcium carbonate

[g] Nitrate as nitrogen

[h] Radium-226 plus radium-228 in picocuries per liter

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