Appendix 5 – Aquifer Exemptions

Florence Copper Project Aquifer Exemption

EPA Permit # AZ396000001

May 1997

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

UNDERGROUND INJECTION CONTROL AQUIFER EXEMPTION

FOR

EPA PERMIT #AZ396000001

In compliance with provisions of the Safe Drinking Water Act, as amended, (42 USC 300f-300j-9, commonly known as the SDWA) and attendant regulations incorporated by the U.S. Environmental Protection Agency under Title 40 of the Code of Federal Regulations (CFR), the zone located:

(1) in the subsurface interval of approximately 400 feet to 1600 feet below ground surface (bgs); and

(2) below the upper aquifer exemption boundary which is 200 feet above the oxide zone, or the base of the Middle Fine-Grained Unit (MFGU), whichever is further below ground surface; and

(3) above the lower aquifer exemption boundary which is the base of the reactive interval amenable to copper leach solutions, encompassing the oxide zone, which contains an economical amount of copper, and copper in the sulfide zone that is leachable; and

(4) laterally within 500 feet of the mine zone boundary delineated in Appendix A of EPA Permit #AZ396000001, and within the line connecting the following coordinate system points:

From a point (point 1) in the southwest of the northwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 748028.6 and easting 646937.7

To a point (point 2) in the southeast of the northwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 748042.1 and easting 648619.5

To a point (point 3) in the southeast of the northwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona

Coordinate system Northing 747656.9 and easting 648617.4

To a point (point 4) in the southeast of the northeast of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 747675.3 and easting 650811.6

To a point (point 5) in the southeast of the northeast of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 747216.3 easting 650662.8

To a point (point 6) in the southeast of the northeast of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 747230.7 and easting 651548.8

To a point (point 7) in the southeast of the southeast of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 745379.4 and easting 651309.7

To a point (point 8) in the southeast of the southeast of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 745369.4 and easting 651019.1

To a point (point 9) in the northeast of the northeast of Section 33, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 743926.7 and easting 650758.8

To a point (point 10) in the northwest of the northeast of Section 33, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 743922.9 and easting 649898.8

To a point (point 11) in the northwest of the northeast of Section 33, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 743543.9 and easting 649897.6

To a point (point 12) in the northwest of the northwest of Section 33, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 743520.7 and easting 647281.7

To a point (point 13) in the southwest of the southwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 744512.8 and easting 649939.6

To a point (point 14) in the southwest of the southwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 745392.3 and easting 646862.4

To a point (point 15) in the southwest of the southwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 745391.8 and easting 646552.4

To a point (point 16) in the southwest of the northwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 747466.7 and easting 646824.3

To a point (point 17) in the southwest of the northwest of Section 28, Range 9 East, Township 4 North of the GS & R meridian at Arizona Coordinate system Northing 747468.8 and easting 646938.8

is exempted as an underground source of drinking water (USDW).

This aquifer exemption is granted in conjunction with the Class III Underground Injection Control permit issued to BHP Copper, for the injection of an acidic solution for the purpose of copper production at the Florence In-Situ Project, Pinal County, Arizona.

This aquifer exemption has no expiration date.

Signed this 1st day of May, 1997.

Alexis Strauss, Acting Director
Water Division, EPA Region 9

Florence Copper Project Aquifer Exemption Correction

EPA Permit # AZ396000001

August 2022

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, California 94105

From: Tomás Torres, Water Division Director
Region 9

To: File

Re: Corrected Delineation of the 1997 Aquifer Exemption Boundary for the Florence In-Situ Project in Pinal County, Arizona

Date and Signature : TOMAS TORRES Digitally signed by TOMAS TORRES Date: 2022.08.10 09:40:13 -07'00'

Memo to File

On May 1, 1997, EPA issued an aquifer exemption (the "1997 Aquifer Exemption") in conjunction with the Class III UIC Area Permit # AZ396000001 issued to BHP Copper, Inc. (the "1997 BHP Permit") for the injection of an acidic solution for the purpose of in-situ copper recovery in Pinal County, Arizona pursuant to the Underground Injection Control ("UIC") regulations under the Safe Drinking Water Act ("SDWA"). The 1997 Aquifer Exemption describes the lateral aquifer exemption boundary as "laterally within 500 feet of the mine zone boundary delineated in Appendix A of the [1997 BHP Permit], and within the line connecting the following coordinate systems points."[1]

This Memo to File corrects the coordinate point description in the 1997 Aquifer Exemption boundary and provides an accurate map of the 1997 Aquifer Exemption. EPA made this correction because EPA determined 1) that the coordinate points in the 1997 Aquifer

[1] The coordinate by coordinate description in the 1997 Aquifer Exemption does not articulate whether the points are connected by straight lines.

Exemption contain typographical errors that even if fixed would not consistently depict the lateral boundary as "500 feet from the mine zone boundary" as stated in the 1997 Aquifer Exemption, and 2) that Appendix A to the 1997 BHP Permit does not actually contain the map referenced in the 1997 Aquifer Exemption[2] and previous maps used by EPA do not accurately depict the lateral aquifer exemption boundary as 500 feet beyond the mine zone boundary.

FCI provided shapefiles (the "Shapefiles"), pursuant to its amended permit application, which are incorporated into the Administrative Record for the 1997 Aquifer Exemption by this Memo to File. The correction to the 1997 Aquifer Exemption in this Memo to File does not require public notice and comment pursuant to the UIC regulations under SDWA because this Memo to File is not a new aquifer exemption[3] and merely corrects the existing aquifer exemption which contained an incorrect coordinate point description and provides an accurate map of the 1997 Aquifer Exemption.

In summary, this Memo to File corrects the 1997 Aquifer Exemption to 1) replace the inaccurate coordinate points with Shapefiles that accurately correspond to the approved 500-foot distance from the mine zone boundary, and 2) attaches Figure 1 to this Memo as the map depicting the 1997 Aquifer Exemption.

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[2] The 1997 BHP Permit contains some maps, but it does not contain the map referred to in the 1997 Aquifer Exemption depicting the lateral aquifer exemption boundary.

[3] *See,* 40 C.F.R. §144.7(b)(3) (requiring public notice and comment for new aquifer exemptions).

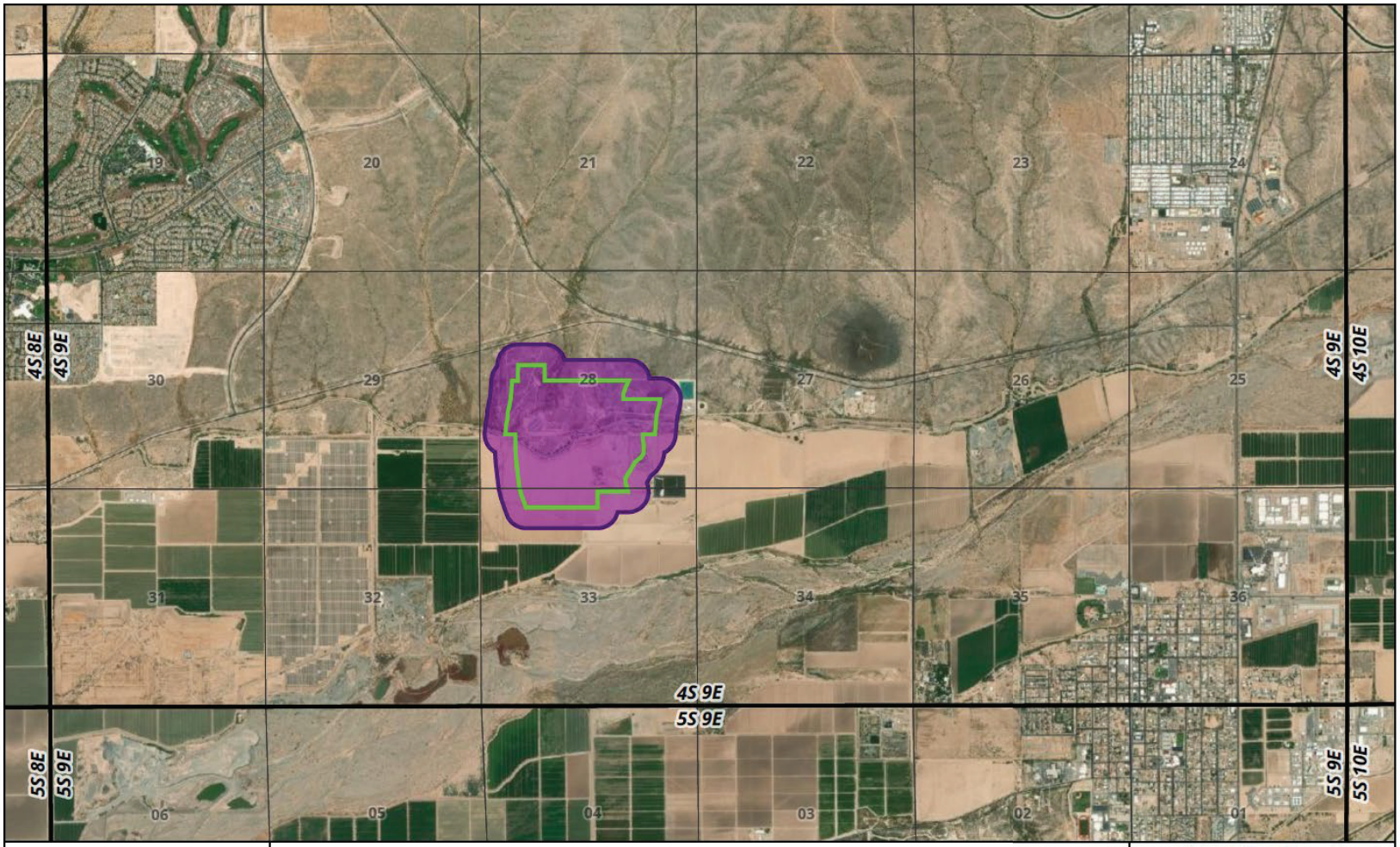


Figure 1

Florence Copper Aquifer Exemption Location Map

Florence, Pinal County, Arizona

Data source: Florence Copper, Inc.
Aquifer Exemption GIS files, 2022-0309.

EPA
Region 9 Tech Center

WTR-22-04497
March 31, 2022

Gunnison Copper Project Aquifer Exemption

EPA Permit # R9UIC-AZ3-FY16-1

June 2018

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

June 22, 2018

Stephen Twyerould, Ph.D.
Chief Executive Officer and President
Excelsior Mining Arizona, Inc.
Concord Place, Suite 300
2999 North 44th Street
Phoenix, Arizona 85018

Re: Aquifer Exemption Request for the Gunnison Copper Project Site, Cochise County, Arizona

Dear Mr. Twyerould:

Based on a thorough review of the material submitted by Excelsior Mining Arizona, Inc. as part of the Underground Injection Control Permit application for the Gunnison Copper Project, the United States Environmental Protection Agency, Region 9 (EPA) hereby provides notice of approval of an aquifer exemption request for portions of the aquifer in the oxide ore body in which the Gunnison Copper Project will be located and portions of the basal fill above it and the sulfide zone below it in Cochise County, Arizona.

The approved aquifer exemption boundaries and depths, along with EPA's analyses and rationale in support of the approval, are detailed in the enclosed Record of Decision, also available at: https://www.epa.gov/uic/uic-permits-pacific-southwest-region-9. In accordance with applicable regulations at 40 C.F.R. Parts 144, 145, and 146, EPA finds that this aquifer exemption request is a non-substantial program revision, and the requested formations meet federal exemption criteria:

- The portions of the formations proposed for exemption do not currently serve as a source of drinking water; and
- The portions of the formations proposed for exemption cannot now and will not in the future serve as a source of drinking water because they contain minerals that are expected to be commercially producible.

If you have any questions, please contact David Albright, Manager, Drinking Water Protection Section, at (415) 972-3971.

Sincerely,

June 22, 2018

Tomás Torres
Director, Water Division

Enclosure

cc (via email): Dave Dunaway, Arizona Department of Environmental Quality
Rebecca Sawyer, Excelsior

US Environmental Protection Agency (EPA) Region 9

Underground Injection Control (UIC) Program

AQUIFER EXEMPTION RECORD OF DECISION

This Record of Decision (ROD) provides the United States Environmental Protection Agency, Region 9's (EPA's) aquifer exemption (AE) decision, background information concerning the AE request, and the basis for the AE decision for the Gunnison Copper Project site in Cochise County, Arizona.

Primacy Agency: The EPA directly implements the UIC program under Section 1422 of the Safe Drinking Water Act for the State of Arizona.

Date of AE Request: February 2016 (Revised July 2017)

Substantial or Non-Substantial Program Revision: Non-Substantial

The approval process for this action differs depending on whether EPA determines the decision is a major or minor program revision. Because the AE decision is not a state-wide programmatic change or a revision with implications for the national UIC program, EPA has determined that this proposed action is a non-substantial program revision. The determination that this AE is a non-substantial program revision is consistent with the state program revision process described in EPA's "Guidance for Review and Approval of State Underground Injection Control (UIC) Programs and Revisions to Approved State Programs" ("Guidance 34").

Exemption Criteria: Excelsior Mining Arizona, Inc. requests this exemption based on the criteria at 40 CFR § 146.4(a) and § 146.4(b)(1).

Operator: Excelsior Mining Arizona, Inc. (Excelsior).

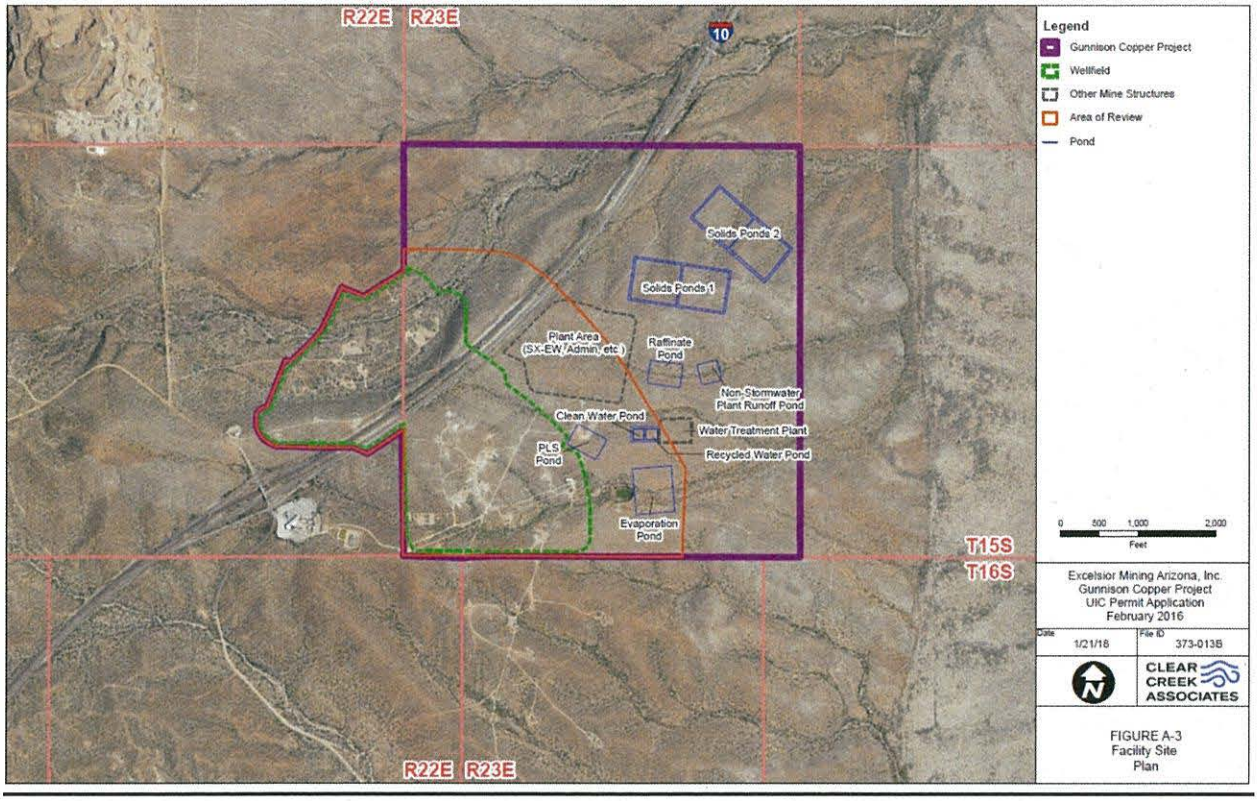
Project Name: Gunnison Copper Project.

Project Permit Number: UIC Class III area permit number R9UIC-AZ3-FY16-1.

Project Location: The AE is located in portions of Township 15 South Range 22 East Section 36 and all of Township 15 South Range 23 East Section 31. [Refer to Figure A-3.]

County: Cochise **State:** Arizona

Well Class/Type: Class III in-situ recovery (ISR) wells for Copper.



DESCRIPTION OF PROPOSED AQUIFER EXEMPTION

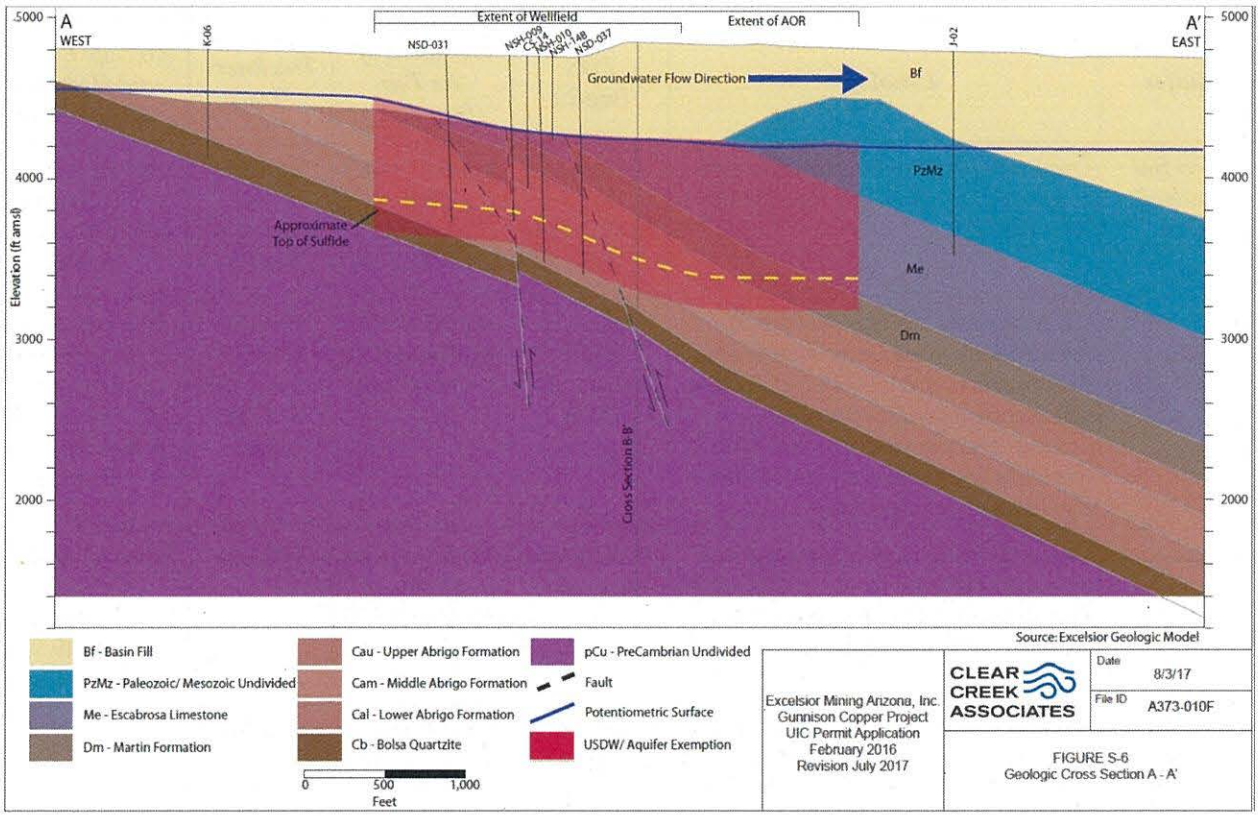
Aquifer to be Exempted: The aquifer to be exempted is in the oxide ore body in which the ISR wellfield will be located and portions of the basal fill above it and the sulfide zone below.

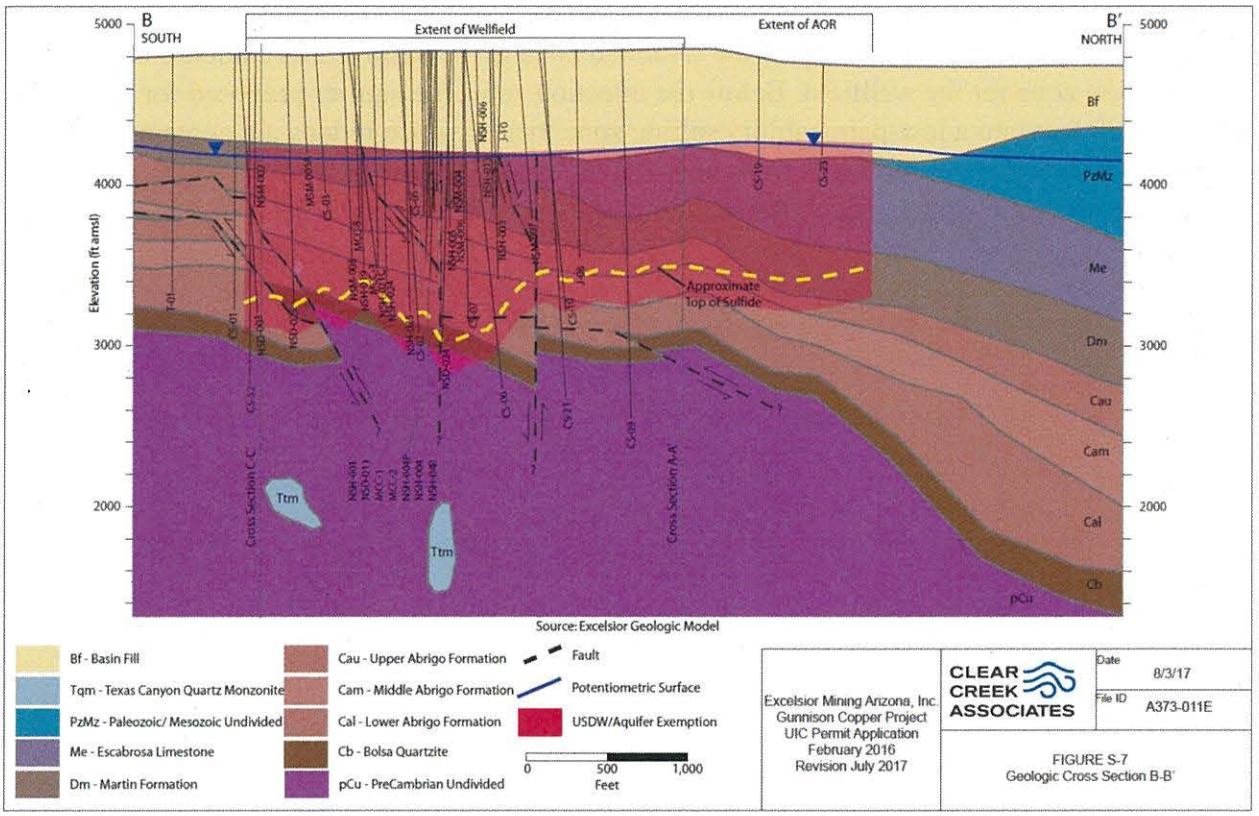
Areal Extent of Aquifer Exemption: The proposed aquifer exemption encompasses 332 acres. This includes the area of the wellfield associated with the mining project plus approximately 1,200 feet to the east (the direction of ground water flow) and at least 250 feet to the north. The extent of the exempted area coincides with the area of review (AOR) delineated for the Class III permit application. The AOR represents the area where injected fluids may endanger an underground source of drinking water (USDW), based on modeling of fluid movement performed by the applicant. This modeling approach, evaluated by the EPA as part of the Class III permit application evaluation, incorporates the geologic and operational characteristics of the proposed project.

Lithology, Total Dissolved Solids (TDS), Depth, Thickness, Porosity, and Hydraulic Conductivity of the Aquifer: Sampling data provided in the operator's Class III permit application reflects samples taken between 2012 and 2015 at various depths within the basin fill, oxide zone, and sulfide zone. The following table presents the lithology, TDS levels, depth, thickness, and average porosity and hydraulic conductivity information about the formations that comprise the aquifer proposed for exemption.

Aquifer	*Lithology*	*TDS (mg/L)*	*Elevation of the Top (feet, amsl)*	*Thickness (feet)*	*Average Porosity and Hydraulic Conductivity*
Basin fill/ saturated zone	Unconsolidated to semi-consolidated conglomerate, sand, and fine-grained lake deposits.	Average: 267.3 (range: 238-284)	4,190 to 4,650 feet (top of the saturated zone)	Variable from approx. 0-200 feet	Porosity: 10-20 % Hydraulic conductivity: 1-2 ft./day
Oxide zone	Occurs mainly as chrysocolla and/or malachite that formed as coatings on rock fractures and as vein fill. Azurite and secondary chalcocite are also present. The remainder of the oxide mineralization occurs as replacement patches and disseminations.	Average: 270.8 (range: 210-324)	Variable from approx. 4,000 to 4,600 feet	Variable from approx. 600 to 1,000 feet	Porosity: 2.77% Hydraulic conductivity: 1.1 ft./day avg. (range: 0.01-9.8 ft./day)
Sulfide zone	Comprised of primarily consolidated carbonate bedrock ranging in age from Precambrian to Mississippian, from west to east in the AE area.	622 (based on a single value)	Variable from approx. 3,800 to 2,800 feet from west to east	200 feet	Porosity: less than 1% Hydraulic conductivity: 0.001- 0.03 ft./day
Sources of information: Excelsior's UIC Class III permit application, Attachments A-1 (AOR Methods), A-2 (Groundwater Modeling Report, Gunnison Copper Project), and I (Formation Testing Program).					

Exempted Zone(s): The aquifer proposed for exemption is contained laterally by high hydraulic gradient (to the west) and hydraulic control wells (to the south, east, and north). The top of the exempted area is defined as the top of the saturated zone in the basin fill formation that overlies the injection zone for the wellfield. Below the injection zone, the aquifer proposed for exemption extends 200 feet into a low-permeability sulfide zone, below which it does not contain a sufficient quantity of ground water to be considered feasible for use as a public water system due to its poor hydraulic conductivity. [Refer to Figures S-6, S-7, S-8, and S-9.]


A
WEST
A'
EAST
Extent of Wellfield
Extent of AOR
K-06
NSD-031
NSH-009
CS-24
NSH-010
NSH-148
NSD-037
J-02
Groundwater Flow Direction
Bf
PzMz
Me
Dm
Approximate Top of Sulfide
Cross Section B-B'
Elevation (ft amsl)
5000
4000
3000
2000
Source: Excelsior Geologic Model
Bf - Basin Fill
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/ Aquifer Exemption
0
500
1,000
Feet
Excelsior Mining Arizona, Inc.
Gunnison Copper Project
UIC Permit Application
February 2016
Revision July 2017
CLEAR CREEK ASSOCIATES
Date
8/3/17
File ID
A373-010F
FIGURE S-6
Geologic Cross Section A - A'


B
SOUTH
B'
NORTH
Extent of Wellfield
Extent of AOR
Bf
PzMz
Me
Dm
Cau
Cam
Cal
Cb
pCu
Approximate Top of Sulfide
Cross Section C-C'
Cross Section A-A'
Ttm
Elevation (ft amsl)
5000
4000
3000
2000
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/Aquifer Exemption
0
500
1,000
Feet
Excelsior Mining Arizona, Inc.
Gunnison Copper Project
UIC Permit Application
February 2016
Revision July 2017
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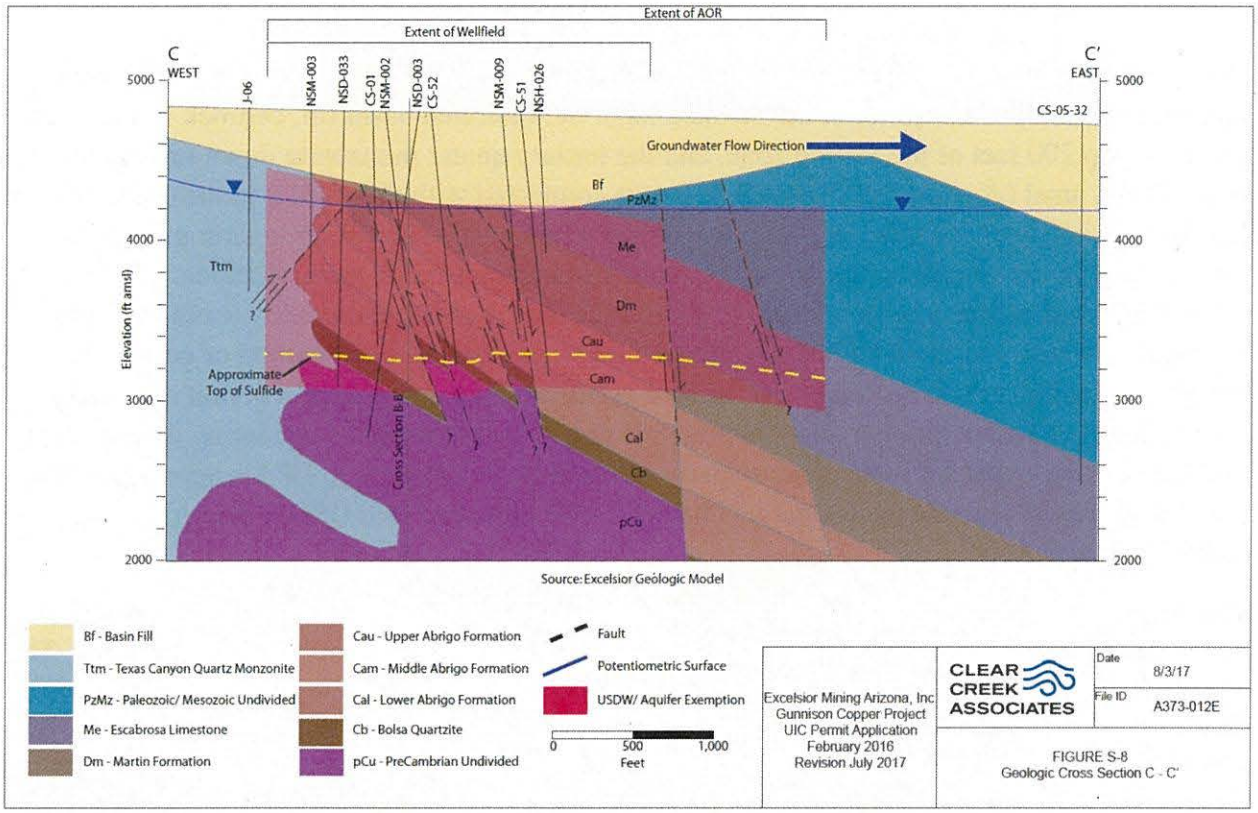
Date
8/3/17
File ID
A373-011E
FIGURE S-7
Geologic Cross Section B-B'


Extent of AOR
Extent of Wellfield
C
WEST
C'
EAST
J-06
NSM-003
NSD-033
CS-01
NSM-002
NSD-003
CS-52
NSM-009
CS-51
NSH-026
CS-05-32
5000
4000
3000
2000
Elevation (ft amsl)
Groundwater Flow Direction
Bf
PzMz
Me
Dm
Cau
Cam
Cal
Cb
pCu
Ttm
Approximate Top of Sulfide
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/ Aquifer Exemption
0
500
1,000
Feet
Excelsior Mining Arizona, Inc.
Gunnison Copper Project
UIC Permit Application
February 2016
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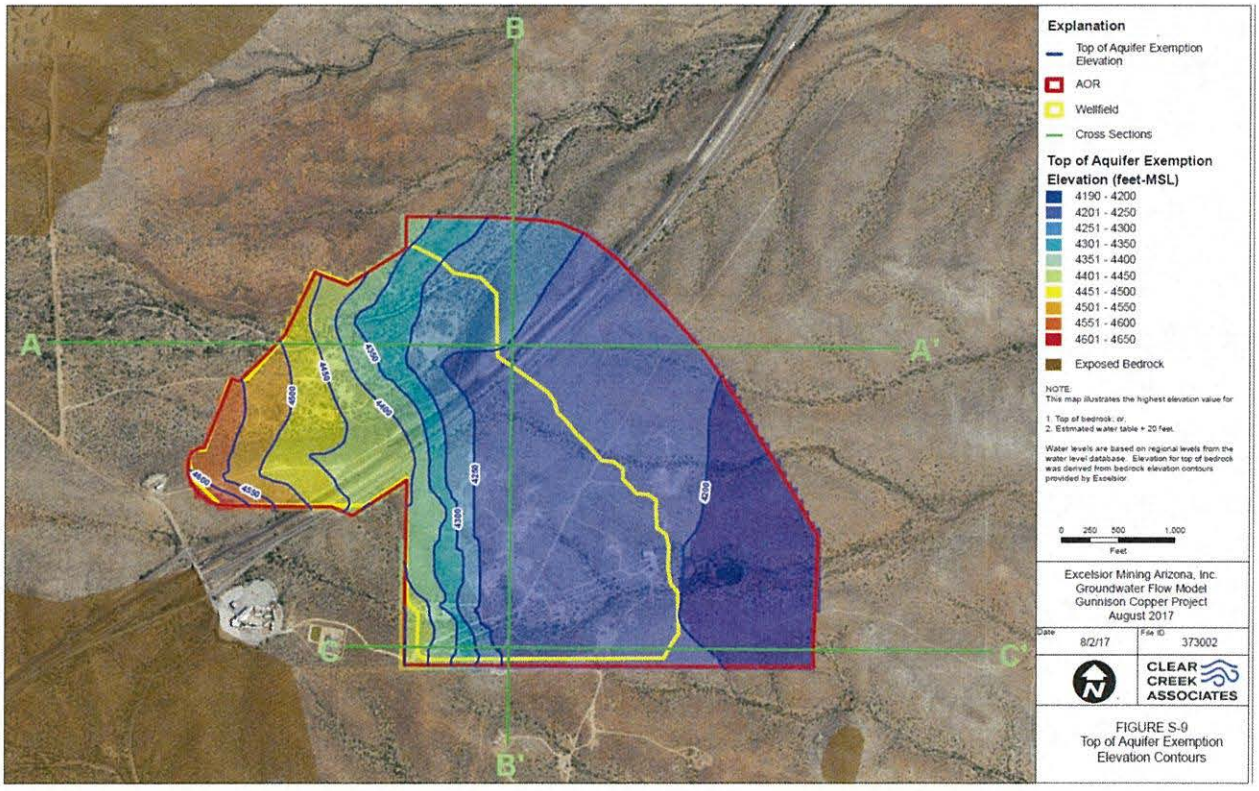
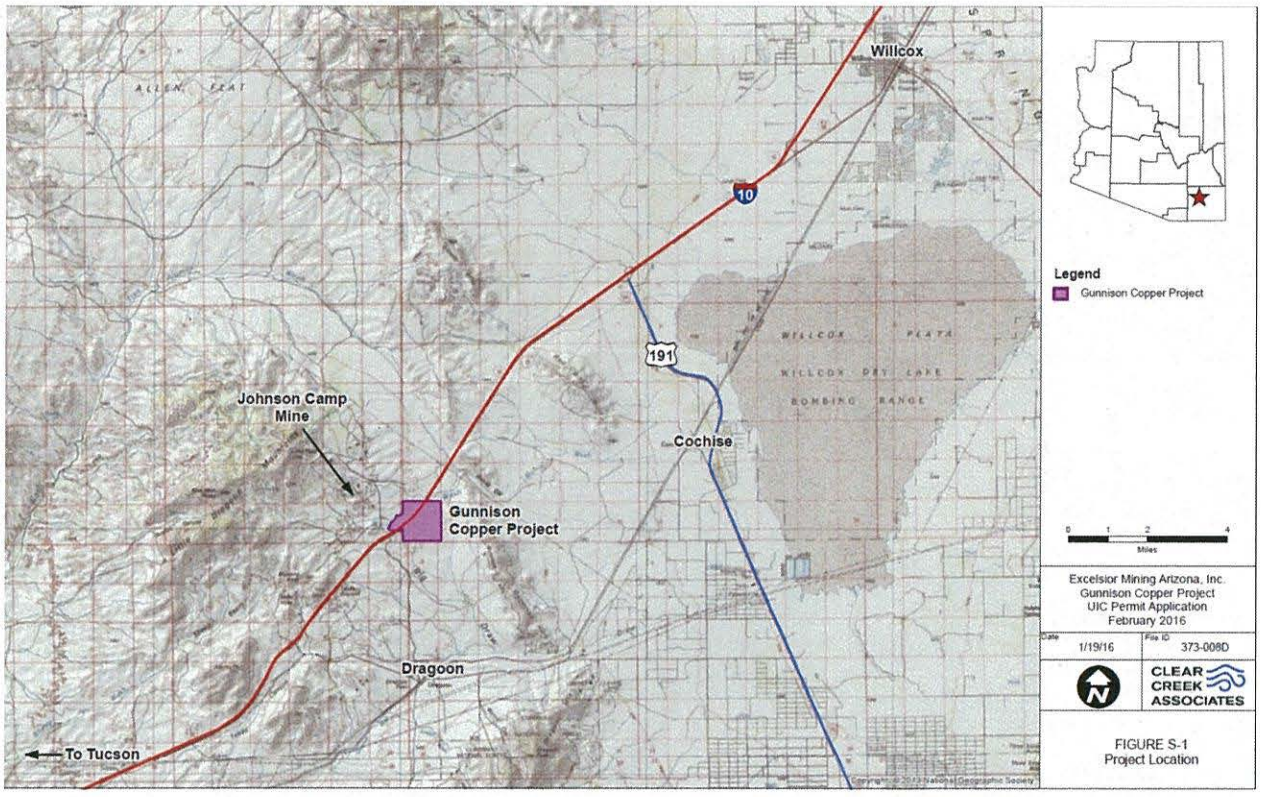
CLEAR CREEK ASSOCIATES
Date
8/3/17
File ID
A373-012E
FIGURE S-8
Geologic Cross Section C - C'


A
A'
B
B'
C
C'
4500
4450
4400
4350
4300
4250
4200
Explanation
Top of Aquifer Exemption Elevation
AOR
Wellfield
Cross Sections
Top of Aquifer Exemption Elevation (feet-MSL)
4190 - 4200
4201 - 4250
4251 - 4300
4301 - 4350
4351 - 4400
4401 - 4450
4451 - 4500
4501 - 4550
4551 - 4600
4601 - 4650
Exposed Bedrock
NOTE:
This map illustrates the highest elevation value for
1. Top of bedrock; or,
2. Estimated water table + 20 feet.
Water levels are based on regional levels from the water level database. Elevation for top of bedrock was derived from bedrock elevation contours provided by Excelsior.
0
250
500
1,000
Feet
Excelsior Mining Arizona, Inc.
Groundwater Flow Model
Gunnison Copper Project
August 2017
Date
8/2/17
File ID
373002
N
CLEAR CREEK ASSOCIATES
FIGURE S-9
Top of Aquifer Exemption
Elevation Contours

BACKGROUND

On February 2, 2016 (as revised in July 2017), Excelsior submitted a request for EPA Region 9 approval to exempt the aquifer in the formations of the saturated basin fill, bedrock in the oxide zone, the top 200 feet of the sulfide zone, and the tertiary quartz monzonite down to an elevation of 3100 feet amsl (as shown in Figure S-8) that is connected with the aquifer in the oxide zone or has the possibility of fracture connections with the oxide zone. The tertiary quartz monzonite present only in the southwest corner of the AOR also contains oxide mineralization. The AE request is based on the criteria at 40 CFR § 146.4(a): that it does not currently serve as a source of drinking water; and at 40 CFR § 146.4(b)(1): that it is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible. Subsequent to EPA's approval of the AE, the exempt aquifer in the formations would not be protected as a USDW under the Safe Drinking Water Act.

Concurrent with the request to exempt the aquifer, Excelsior is applying to the EPA for a UIC Class III area permit to install a wellfield for ISR of copper at the Gunnison Copper Project. The Project is a proposed ISR copper mine located in Cochise County, Arizona, approximately 62 miles east of Tucson and 17 miles west of Willcox (see Figure S-1). The location is along Interstate 10 (I-10) on the southeastern flank of the Little Dragoon Mountains, in the Cochise Mining District.



The wellfield will consist of Class III injection wells, recovery wells, hydraulic control wells, observation wells, and monitoring wells. A sulfuric acid solution will be injected into the copper oxide deposit, and pregnant leach solution will be pumped from the recovery wells and routed to a solvent extraction/electrowinning (SX-EW) plant where copper cathode will be produced. Injection and recovery wells will be interspaced approximately 71 feet apart in an alternating and repeating pattern throughout the wellfield. In addition, the ISR wellfield will be bounded in downgradient areas by a series of hydraulic containment wells that will provide net positive pumping throughout the life of the project. Observation wells at the wellfield perimeter will be used to monitor water levels and electrical conductivity of formation fluids; additionally, monitoring wells will be placed between the active mine blocks and the wellfield perimeter to monitor and facilitate the reversal of ISR fluid movement from active mine blocks.

BASIS FOR DECISION

Regulatory Criteria under which the AE is Requested and Approved

40 CFR § 146.4(a): ***It does not currently serve as a source of drinking water.***

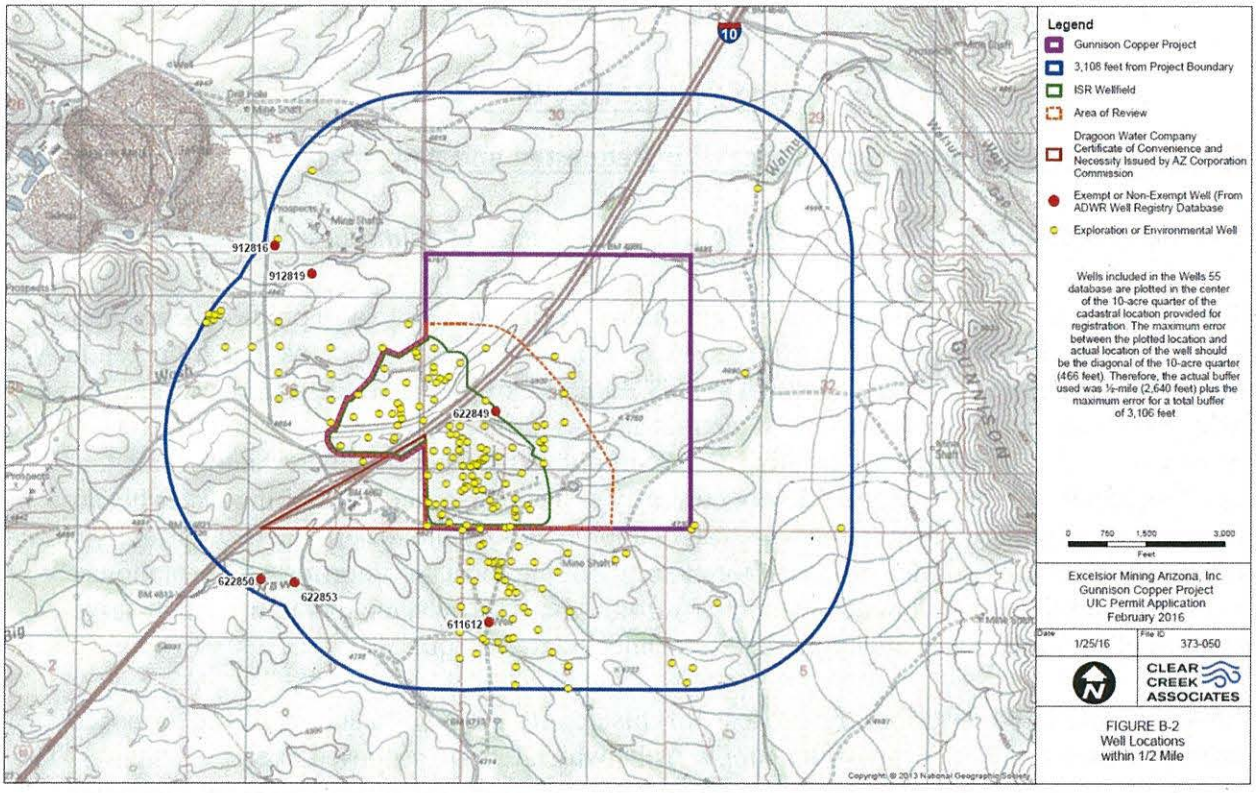
To demonstrate this, Excelsior modeled ground water flow in the area to predict the extent to which injected fluids will move within the oxide zone and other formations that are potentially hydraulically connected to aquifers that supply domestic or public water supply wells within the area. Excelsior also searched database records and performed follow-up research to examine nearby wells that may serve as drinking water supply wells. These reviews demonstrate that the aquifers identified for exemption do not currently serve as a source of drinking water because there are no identified current drinking water supply wells, public or private that currently would draw water from the aquifer proposed for exemption, the formation/portions of formations are vertically and laterally contained (separated) from other USDWs, and no aquifers that serve as sources of drinking water are hydraulically connected to the aquifer.

EPA's Guidance 34 describes the process for this determination as a survey of the proposed exempted area to identify any water supply wells which tap the proposed exempted aquifer. The area to be surveyed should cover the exempted zone and a buffer zone outside the exempted area. Although Guidance 34 recommends a buffer zone of a minimum of a 1/4 mile from the boundary of the exempted area, the determination of the appropriate area is on a case-by-case basis. EPA decided that one-half mile from the proposed exempted area was sufficient in this case because of the minimal groundwater development in the area as described in the following section.

Water Supply Wells: Based on the survey of the area, the aquifer does not currently serve as a source of drinking water. As described in Attachment B to the Class III permit application (Maps of Wells in the AOR), Excelsior examined the area within one-half mile from the property boundary by reviewing the USGS Dragoon 7.5 minute quadrangle map, searching the Arizona Department of Water Resources (ADWR's) Well Registry Database (Wells 55), searching the ADWR Groundwater Site Inventory (GWSI), and reviewing borehole data. Based on this review of records, Excelsior identified 201 wells within one-half mile of the project boundary. Of these wells, 195 are monitoring, exploration, or other well types; one well is listed as non-exempt; and

five wells are listed as exempt. There are no active, producing water supply wells (at any depths) within this one-half mile of the project boundary. [Refer to Figure B-2 for Well Locations within ½ Mile.]

Excelsior further investigated each of the six wells and determined that none of them serve as public water supply wells. Three of the wells are used by Excelsior for water level monitoring. Another well is on mine property and there are no buildings or potential users nearby. The remaining two wells were installed by Cyprus Copper Company when it operated the site between 1970 and 1973; Excelsior has been unable to locate these wells, however there are no residences near these wells that would indicate potential use of the wells for water supply.



According to the Aquifer Protection Permit application for the Gunnison Copper Project that Excelsior submitted to the Arizona Department of Environmental Quality (ADEQ) in December 2015, the project will be located in a sparsely populated area with minimal groundwater development. Few wells in the area have been drilled for purposes of water use; most were drilled for mineral exploration or hydrogeologic investigations in and around the project.

The closest water production wells to the AE boundary are located more than 2 miles northeast of the project property, providing an operating water supply for the Johnson Camp Mine. The nearest public drinking water wells operated by the Dragoon Water Company are more than 3.3 miles southeast of the project, near the town of Dragoon. EPA believes that an evaluation of the capture zone for these wells is not necessary because EPA's review of hydrogeologic conditions (i.e., groundwater elevations, groundwater flow direction and velocity) and the wells' considerable distance from the project boundary supports that groundwater from the project

would not be captured by the Dragoon public drinking water wells. (Sources of information: The Excelsior's UIC Class III permit application Attachment A-2, Groundwater Modeling Report, and Attachment B, Table B-1 lists all well locations in the area.)

Ground Water Flow Patterns: Based on hydrogeologic evaluations, water level data, and modeling studies, ground water flow in the area is to the east. Therefore, the exempted area includes the wellfield where Class III injection will occur, plus an area extending approximately 1,200 feet to the east of the wellfield.

As noted above, the area of the aquifer proposed for exemption coincides with the Class III AOR. The applicant predicted ground water flow under the proposed operating conditions using MODFLOW-NWT, a Newton Formulation of MODFLOW 2005. MODFLOW-NWT is a numerical code that was constructed using a number of extensive datasets, including detailed mapping of fracture intensity, which is key to groundwater flow in the project area. This model also supports the Aquifer Protection Permit application that Excelsior submitted to ADEQ.

The EPA evaluated the modeling approach and the site-specific geologic and hydrogeologic information and planned operational data that served as inputs, in connection with other information in the Class III UIC permit application (including geologic maps, logs, hydrologic information, etc.). Based on this, the EPA determined that the model accurately represents the extent of fluid movement and demonstrates that the aquifer to be exempted is not in contact with any formations that serve as a drinking water supply within one-half mile of the aquifer exemption boundary.

Containment of Fluids to the AE Boundaries: Modeling of ground water flow at the proposed site demonstrates that the use of hydraulic control wells will contain the mining fluids to the AE area, preventing migration to any surrounding aquifers. The lateral and vertical boundaries of the exempted aquifers are described in Attachment A-1 to the Class III UIC permit application (AOR Methods).

The proposed lateral distance of the AE boundaries from the wellfield is based on existing hydraulic gradients and modeled predictions of the areas of influence of the hydraulic control wells on the east side of the wellfield. These lateral boundaries are as follows:

- West: The western boundary of the area proposed for exemption is the boundary of the Gunnison Mine property, which is approximately 100 feet from the nearest proposed injection well. Ground water flows from the west into the wellfield along its western boundary. Due to the high eastward hydraulic gradient, injection flows will be contained by the extraction and hydraulic control wells.

- East and North: The area proposed for exemption extends approximately 1,200 feet to the east and at least 250 feet north of the outermost wells in the ISR wellfield. The northeastern boundary of the area proposed for exemption is based on the maximum capture zones for hydraulic control wells on the east and northeastern sides of the wellfield. These hydraulic control wells serve as a barrier to contain pollutants, and the hydraulic control wells' areas of influence, which are critical to pollutant containment,

are also predicted by groundwater modeling to be within the AE area along the northeastern and eastern boundaries.

- South: The southern boundary of the area proposed for exemption is the south side of the wellfield, which coincides with the property boundary. Modeling predicts that hydraulic containment wells along this boundary will provide containment. Eastward flow gradients and the hydraulic control wells are predicted to provide adequate containment.

The top of the exempted zone is the top of the saturated zone in the basin fill formation, at a depth of 4,190 to 4,650 feet above mean sea level. See Figure S-9 above. This elevation is based on water level mapping of the project area and groundwater levels in wells NSH-006 and NSD-020, which are the only two wells screened solely in the basin fill that have saturated alluvium.

The bottom of the exempted zone is within the low-permeability sulfide zone that occurs below the Class III injection zone. The upper 200 feet of the sulfide zone is incorporated into the exemption area. This is based primarily on poor hydraulic conductivity and aquifer characteristics and on the depth to the bottom of the transition zone (where copper oxide deposits transition to primarily copper sulfide deposits). The sulfide zone is less fractured; therefore, its use as a public water supply is not considered feasible. However, there is a possibility of fracture connections between the oxide and sulfide zones that were not identified by aquifer testing, and such connections would make portions of the sulfide zone a USDW. For this reason, the upper 200 feet of the sulfide zone are proposed for exemption.

The EPA reviewed the analyses in the AE application and the UIC permit application as described above, and accordingly, the EPA concludes that the aquifer does not currently serve as a source of drinking water, pursuant to 40 CFR § 146.4(a).

40 CFR § 146.4(b)(1): ***It cannot now and will not in the future serve as a source of drinking water because it is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.***

The EPA evaluated available information on mineral resource estimates as informed by samples from core and reverse circulation drill holes that support a demonstration of the presence of producible mineral deposits in the area of the aquifer proposed for exemption.

The project is in a district where copper, zinc, silver and tungsten mining have occurred since the 1880s. The deposit was discovered in the 1960s, when exploratory drilling was conducted following detection of a magnetic anomaly. Several million tons of low-grade acid soluble copper mineralization were identified by early 1974. Since that time, extensive exploration has occurred, including 55 coreholes drilled between 2010 and 2014. No mining has occurred at the project site. However, the project does fall within an active mining district.

As Excelsior describes in their aquifer exemption request, the project area contains commercially-producible grades of copper. A Prefeasibility Study (PFS) of the process and infrastructure design, capital cost, operating cost, and an independent Technical Report was issued in 2014. The PFS was updated and re-issued in January, 2017. Excelsior submitted this

report to demonstrate that commercially producible minerals are present, pursuant to §146.4(b)(1).

Excelsior's Probable Mineral Reserve is defined from a copper resource estimate developed in 2015. The estimation of copper resources within the proposed aquifer exemption area is based on 6,427 assay samples from 96 core and reverse circulation drill holes totaling 140,034 linear feet. Forty-two of the contributing drill holes were drilled by Excelsior between 2011 and 2015; the remainder were drilled by other companies between 1970 and 1997. Excelsior controls and has verified the historical drill data.

The table below summarizes the reserve within the oxide zone. To create the reserve, the mineral resource estimate was constrained and evaluated in accordance with Excelsior's mining plan. The conservative estimate includes material from the Measured and Indicated categories of the mineral resource and excludes Inferred mineral resources. It does not include material from the sulfide zone. The estimate assumes the use of in-situ recovery as a mining method, which requires a wellfield (injection and recovery wells) and pumping of pregnant leach solution to an SX/EW plant to recover the copper. The boundaries of the Probable Mineral Reserve were defined using economic parameters. Excelsior developed a wellfield/production schedule for the Project. The mineral reserve estimate is the sum of the production schedule within the proposed aquifer exemption area.

Mineral Reserves Within the Oxide Zone

	Tons	Total Cu (%)	Metal (lbs.)	Recovered Metal (lbs.)
Total	307,314,401	0.33	2,002,432,410	989,101,608

Based on a review of information such as historical drilling data and copper resource estimates and given the long history of mineral production and the implementation of in situ recovery techniques, the EPA has determined that the aquifer in the area proposed for exemption meets the criteria at 40 CFR § 146(b)(1).

PUBLIC NOTICE AND COMMENT

EPA provided public notice of the proposed AE on October 25, 2017 and notice for a public hearing on January 24, 2018. EPA concurrently provided notice on the Draft UIC Area Permit, No. R9UIC-AZ3-FY16-1, for Excelsior Mining Arizona, Inc.'s Gunnison Copper Project Permit and held a public hearing on February 27, 2018. The public comment period ended on February 27, 2018.

Since EPA held a concurrent public comment process for the proposed AE and the Draft UIC Area Permit, the Agency is issuing a response to comments that addresses all significant comments submitted in writing and orally at the public hearing. The EPA's Response to Comments document, the Public Hearing transcript, and this Aquifer Exemption Record of Decision are available on EPA's web page at https://www.epa.gov/uic/uic-permits-pacific-southwest-region-9.

CONCLUSION AND DECISION

Based on a review of the entire record, including all the written and oral comments submitted to EPA during the public comment process, the EPA finds that the exemption criteria at 40 CFR §§ 146.4(a) and 146.4(b)(1) have been met and the EPA approves the aquifer exemption request as a non-substantial program revision.

Effective Date: June 22, 2018

Santa Cruz Project Aquifer Exemption

EPA Permit # AZ397000001

October 1997

UNDERGROUND INJECTION CONTROL AQUIFER EXEMPTION

FOR

EPA PERMIT #AZ397000001

In compliance with provisions of the Safe Drinking Water Act, as amended, (42 USC 300f-300j-9, commonly known as the SDWA) and attendant regulations incorporated by the U.S. Environmental Protection Agency under Title 40 of the Code of Federal Regulations (CFR), the zone located:

(1) in the subsurface interval of approximately 1000 feet to 4000 feet below ground surface (bgs); and

(2) below the upper aquifer exemption boundary which is 200 feet below the top of the conglomerate unit; and

(3) above the lower aquifer exemption boundary which is the base of the reactive interval amenable to copper leach solutions, encompassing the copper oxide, chalcocite, and primary sulfide zones; and

(4) laterally as delineated in Appendix A of Permit #AZ397000001, which is in Pinal County, Arizona and is described by the following township, range, and section--Gila and Salt River Base Line and Meridian:

S1/2 SE1/4 SE1/4, section 12, T. 6 S., R. 4 E. (20 acres)
S1/2 SW1/4 SE1/4, section 12, T. 6 S., R. 4 E. (20 acres)
SE1/4 SE1/4 SW1/4, section 12, T. 6 S., R. 4 E. (10 acres)
NE1/4, section 13, T. 6 S., R. 4 E. (160 acres)
E1/2 NE1/4 NW1/4, section 13, T. 6 S., R. 4 E. (20 acres)
E1/2 SE1/4 NW1/4, section 13, T. 6 S., R. 4 E. (20 acres)
E1/2 NE1/4 SW1/4, section 13, T. 6 S., R. 4 E. (20 acres)
E1/2 SE1/4 SW1/4, section 13, T. 6 S., R. 4 E. (20 acres)
SE1/4, section 13, T. 6 S., R. 4 E. (160 acres)
N1/2 NE1/4, section 24, T. 6 S., R. 4 E. (80 acres)
N1/2 SW1/4 NE1/4, section 24, T. 6 S., R. 4 E. (20 acres)
N1/2 SE1/4 NE1/4, section 24, T. 6 S., R. 4 E. (20 acres)

E1/2 NE1/4 NW1/4, section 24, T. 6 S., R. 4 E. (20 acres)
NE1/4 SE1/4 NW1/4, section 24, T. 6 S., R. 4 E. (10 acres)

S1/2 SW1/4 SW1/4, section 7, T. 6 S., R. 5 E. (20 acres)
W1/2 NW1/4, section 18, T. 6 S., R. 5 E. (80 acres)
SW1/4, section 18, T. 6 S., R. 5 E. (160 acres)
W1/2 NW1/4 SE1/4, section 18, T. 6 S., R. 5 E. (20 acres)
W1/2 SW1/4 SE1/4, section 18, T. 6 S., R. 5 E. (20 acres)
NW1/4 NW1/4, section 19, T. 6 S., R. 5 E. (40 acres)
N1/2 SW1/4 NW1/4, section 19, T. 6 S., R. 5 E. (20 acres)

is exempted as an underground source of drinking water (USDW).

This aquifer exemption is granted in conjunction with the Class III Underground Injection Control permit issued to Santa Cruz Joint Venture (SCJV), consisting of ASARCO Santa Cruz, Inc. and Freeport-McMoRan Copper & Gold Inc., for the injection of an acidic solution for the purpose of copper production at the Santa Cruz In-Situ Project.

This aquifer exemption has no expiration date.

Signed this 13th day of October, 1999.

Alexis Strauss

Alexis Strauss, Director
Water Division, EPA Region 9