

Aquifer Protection Permit 100510  
 Place ID 2867, LTF 64411  
 Silver Bell Mine  
 Significant Amendment

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an amendment to an aquifer protection permit for the subject facility that covers the life of the facility, including operational, closure, and post closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. This document gives pertinent information concerning the issuance of the amended permit. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards (AWQS) at the Point of Compliance (POC), or if an AWQS is exceeded for a pollutant at the POC at the time of permit issuance, cause no additional degradation of groundwater quality at the POC relative to that pollutant; and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). The purpose of BADCT is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology), to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer or to prevent pollutants from reaching the aquifer.

## I. FACILITY INFORMATION

### Name and Location

Permittee:	Silver Bell Mining, L.L.C.
Address:	25000 W. Avra Valley Road Marana, Arizona 85653
Facility Name and Location:	Silver Bell Mine 25000 W. Avra Valley Road Marana, Arizona

### Amendment Description

The permittee submitted an application on November 30, 2016 for a significant permit amendment to:

- Submit the Ambient Groundwater Monitoring Report for point of compliance well MW-25 and propose alert levels and aquifer quality limits (Compliance Schedule Items 4 and 5)
- Submit clean closure documentation for the Oxide 1 PLS Pond and Main PLS Pond and propose removal from the permit

- Revise facility descriptions for the New Barren Pond, Oxide I Leach Facility, Oxide II Leach Facility and Oxide II Non-Municipal Solid Waste Landfill
- Update alert levels and aquifer quality limits in wells MW-25, MW-1, MW-16 and MW-19.
- Remove groundwater monitoring requirements for Mercury and Thallium in wells that have not historically detected these parameters.

### **Regulatory Status**

On November 27, 1991, Silver Bell Mining, L.L.C. (SBM) submitted an Aquifer Protection Permit (APP) application to the Arizona Department of Environmental Quality (ADEQ) for Silver Bell Mine. The APP was issued on September 8, 1994.

With the proposed amendment, the permittee is authorized to operate a hydrometallurgical base metal recovery facility. The current SBM operation includes leach dumps, four (4) in-situ (rubble) leach areas in each of the open pits (Oxide Pit, El Tiro Pit, North Silver Bell Pit, and West Oxide Pit), eight (8) overburden dumps, sixteen (16) process solution ponds, fourteen (14) non-stormwater ponds, one (1) surface pond, one (1) heap leach pad, and nine (9) other facilities for the production of electrowon cathode copper. As requested by ADEQ, Silver Bell Mining, L.L.C. will maintain an onsite list of all exempt, general-permitted, and non-discharging facilities at the Silver Bell Mine.

Silver Bell Mine operated for some time pursuant to the conditions of two (2) APPs; P-100510 issued on September 8, 1994, and P-103190 issued on January 20, 2004. Facilities at the site classified as "new" facilities were originally permitted under APP No. P-100510. The facilities considered to be "existing" were covered in APP No. P-103190 and included potentially discharging facilities that were not covered in APP No. P-100510.

Subsequent permitting actions for APP No. P-100510 include:

1. A "minor" amendment effective December 1, 1998 which; 1) reformatted the permit by increasing margins and modifying tab sets; 2) expanded the permit to forty-two (42) pages including three (3) new tables; 3) incorporated the June 13, 1996 transfer of ownership into official permit copy; 4) incorporated the September 26, 1995 minor modifications into official permit copy (Part II.A.5); and 5) deleted the underlined sentence in Part II.C.2.c.(2) which directed the permittee to submit an APP application for all existing facilities within twenty-four (24) months of the effective date of the original permit (as this was fulfilled). The minor amendment also added provisions for eight (8) consecutive quarterly or twelve (12) consecutive monthly analyses of groundwater samples to establish ambient groundwater quality data.

2. A “minor” amendment effective January 26, 2000 added alert levels (ALs) and aquifer quality limits (AQLs) for MW-08 and inserted well information for MWs 1, 8, 10, and 12.
3. An “other” amendment effective May 14, 2004 lifted a flow rate restriction to the Plant Feed PLS Pond and reset several ALs and AQLs.
4. A “significant” amendment effective November 8, 2012 included numerous changes to the permit including merging APP 103190 into APP 100510.
5. An “other” amendment effective September 18, 2013 replaced POC Well MW-7 with POC Well MW-7R.
6. A “significant” amendment effective October 19, 2015 to add a new heap leaching facility (Mammoth Heap Leach Facility), a new PLS Pond, and a new Event Pond.

### **Facility Description**

The permitted facility is a copper leaching operation consisting of leach dumps and in-situ leaching of rubblized ore within the existing Oxide and El Tiro open pits, and in the new West Oxide and North Silver Bell open pits. Copper ore placed in rock heaps is leached with a dilute sulfuric acid solution. Solutions from leaching called Pregnant Leach Solution (PLS) are collected in sumps or ponds and pumped via pipelines to a SX-EW plant for increasing the concentration of copper from which electrowon copper cathode is produced. Solutions stripped of copper (called raffinate) are recycled back to the leaching circuits. The SX-EW facility currently processes approximately 8,500 gallons of solution per minute and produces approximately 64 tons of copper of 99.99% purity per day.

## **II. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY (BADCT)**

The facility BADCT relies on a combination of engineered design and site-specific hydro-geologic characteristics. BADCT for each discharging facility was evaluated according to A.R.S. § 49-243(B)(1) with special attention to sub-parts (a) through (h) for existing facilities. For such facilities, special consideration is allowed for the age of the facility as it relates to the evaluation of alternative demonstrated control technologies (DCTs) and their cost effectiveness for additional discharge reduction. In addition to alternative DCTs, facility operating alternatives were considered.

The Mammoth Heap Leach facility is designed to prescriptive BADCT for heap leach pads with an engineering equivalent geosynthetic clay liner underlying an 80-mil LLDPE liner. The associated Mammoth PLS Pond and Event Pond are also designed to prescriptive BADCT.

### III. COMPLIANCE WITH AQUIFER WATER QUALITY STANDARDS

All rubble leaching shall be conducted within the zone of capture, or the hydrologic sinks (cone of depression), associated with the open pits. The permittee has documented the existence of hydrologic sinks associated with three (3) of the four (4) existing open pits. Hydrologic sinks, driven by a combination of evaporation and pumping, are effective in capturing contaminated groundwater and are used to prevent the migration of pollutants to water supply wells down-gradient from the facility. All leaching and non-stormwater solutions are captured by ponds constructed down-gradient from the permitted leach dumps; therefore, AWQS will be maintained at the various POCs (or, if AWQS were exceeded at the time of permit issuance, no further degradation will occur).

#### **Pollutant Management Area (PMA)**

Arizona Revised Statutes (A.R.S.) § 49-244(1) defines the PMA as “the limit projected in the horizontal plane of the area on which pollutants are or will be placed”. Where more than one discharging facility is included in a permit, the PMA is described as an imaginary line circumscribing the multiple discharging facilities at the site.

#### **Discharge Impact Area (DIA)**

The DIA is defined by A.R.S. § 49-201(13). The DIA means the potential aerial extent of pollutant migration, as projected on the land surface, as a result of a discharge from a facility.

Silver Bell Mine is authorized to operate under an area-wide permit. The DIA is essentially equivalent to the area-wide PMA.

#### **Monitoring and Reporting Requirements**

An extensive monitoring well network is in place to facilitate groundwater monitoring in accordance with the APP for assessing groundwater gradients, demonstrating capture by the open pits, and characterizing the hydrologic setting. Monitoring is conducted at 23 POC wells for hazardous and non-hazardous constituents. Twenty-one wells are constructed and two (2) are slated for future construction should the tailings dam ever be reopened.

**Point(s) of Compliance**

<b>POC WELL NO.</b>	<b>DESIGNATION</b>	<b>CADASTRAL</b>	<b>LATITUDE</b>	<b>LONGITUDE</b>	<b>ADWR NUMBER</b>
MW-01	Hazardous/Non-Hazardous	(D-11-8)32 dab	32° 25' 40" N	111° 32' 57" W	55-577498
MW-02	Hazardous/Non-Hazardous	(D-11-8)32 abb	32° 26' 00" N	111° 32' 51" W	55-547411
MW-03	Hazardous/Non-Hazardous	(D-11-8)29 ddd	32° 26' 13" N	111° 32' 32" W	55-547412
MW-04R	Hazardous/Non-Hazardous	(D-11-8)28 dca	32° 26' 17" N	111° 31' 48" W	55-218550
MW-05	Hazardous/Non-Hazardous	(D-11-8)34 abb	32° 26' 06" N	111° 31' 00" W	55-547414
MW-07R	Hazardous/Non-Hazardous	(D-12-8)5 abb	32° 25' 10" N	111° 32' 54" W	55-916136
MW-08	Hazardous/Non-Hazardous	(D-12-8)4 ccc	32° 24' 12" N	111° 32' 21" W	55-547679
MW-10	Hazardous/Non-Hazardous	(D-12-8)10 cbb	32° 23' 42" N	111° 31' 26" W	55-571866
MW-11R	Hazardous/Non-Hazardous	(D-12-8)14 aad	32° 23' 21" N	111° 29' 59" W	55-596599
MW-12	Hazardous/Non-Hazardous	(D-12-8)13 cda	32° 22' 37" N	111° 29' 00" W	55-571868
MW-13	Hazardous/Non-Hazardous	(D-12-9)20 abb	32° 22' 40" N	111° 26' 45" W	TBD*
MW-14	Hazardous/Non-Hazardous	(D-12-8)14 bcd	32° 23' 52" N	111° 30' 39" W	55-571869
MW-15	Hazardous/Non-Hazardous	(D-12-8)5 bca	32° 25' 00" N	111° 33' 06" W	55-203176
MW-16	Hazardous/Non-Hazardous	(D-12-8)5 bdd	32° 24' 46" N	111° 33' 29" W	55-203175
MW-17	Hazardous/Non-Hazardous	(D-12-8)5 dcc	32° 24' 17" N	111° 32' 56" W	55-203178
MW-18	Hazardous/Non-Hazardous	(D-12-8)5 ddc	32° 24' 14" N	111° 32' 44" W	55-203177
MW-19	Hazardous/Non-Hazardous	(D-12-8)10 dcd	32° 23' 23" N	111° 30' 54" W	55-203144
MW-20	Hazardous/Non-Hazardous	(D-12-8)15 aad	32° 23' 12" N	111° 30' 41" W	55-203145
MW-21	Hazardous/Non-Hazardous	(D-12-8)9 acc	32° 23' 49" N	111° 31' 52" W	55-203191
MW-22	Hazardous/Non-Hazardous	(D-12-9)19 baa	32° 22' 39" N	111° 28' 05" W	55-203192
MW-23	Hazardous/Non-Hazardous	(D-12-9)17 acc	32° 23' 12" N	111° 26' 41" W	TBD*
MW-24	Hazardous/Non-Hazardous	(D-12-8)12 dbc	32° 23' 36" N	111° 28' 53" W	55-203193
MW-25	Hazardous/Non-Hazardous	(D-12-8)1 dac	32° 23' 33.3" N	111° 31' 12" W	55-9152846

\*MW-13 and MW-23 are intended for future Tailings Dam No. 3 and have not been installed at the time of permit issuance.

#### **IV. STORM WATER AND SURFACE WATER CONSIDERATIONS**

No perennial or intermittent streams are located in the vicinity of the Silver Bell Mine, and all surface water flow is ephemeral. The drainages in the proposed project area have been deemed non-jurisdictional by the U.S. Army Corps of Engineers pursuant to an approved jurisdictional determination issued in 2011.

The leach dumps and process solution ponds will be protected from the run-on from the 100-year, 24-hour storm event. All surface impoundments and leach pads are constructed and operated to contain the direct precipitation resulting from the 100-year, 24-hour storm event plus the normal operating volume of solution without overtopping the impoundments or the 10-year, 24-hour storm event with downstream emergency containment as described in Section 4.0. Sufficient freeboard shall be maintained in all surface ponds except during storm events in accordance with 4.2.1. Excess flows from the No. 1 and No. 2 Dump Leach Facilities will report to the pit bottom. All flows contacting the rubble leach areas will report to the pit bottoms.

#### **V. COMPLIANCE SCHEDULE**

Compliance schedule items are included in Section 3.0 of the permit.

#### **VI. OTHER REQUIREMENTS FOR ISSUING THIS PERMIT**

##### **Technical Capability**

Silver Bell Mining, L.L.C. and its consultants for this project, have demonstrated the technical competence necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A202(B). The permittee is expected to maintain technical capability throughout the life of the facility.

##### **Financial Capability**

Silver Bell Mining, L.L.C. has demonstrated the financial responsibility necessary to carry out the terms and conditions of the permit in accordance with A.R.S. § 49-243(N) and A.A.C. R18-9-A203. The permittee is expected to maintain financial capability throughout the life of the facility. The estimated closure and post-closure cost is \$8,082,561. The financial assurance was demonstrated through a combination of two mechanisms: \$2,372,471 for the Mammoth Heap Leach Facility, PLS Pond, and Event Pond under a financial test for self-assurance (A.A.C. R18-9-A203(C)(1)(a)) and \$5,710,090 for the remaining discharging facilities under a trust fund (A.A.C. R18-9-A203(C)(4)).

### **Zoning Requirements**

Mining activity on greater than five (5) contiguous acres is exempt from zoning requirements pursuant to A.R.S. § 11-811(C)(2).

## **VII. ADMINISTRATIVE INFORMATION**

### **Public Comment Period (A.A.C. R18-9-109(A))**

The Department shall accept written comments from the public prior to granting the significant amendment. The written public comment period begins on the publication date of the public notice and extends for 30 calendar days. After the closing of the public comment period, ADEQ is required to respond to all significant comments at the time a final permit decision is reached or at the same time a final permit is actually issued.

### **Public Hearing (A.A.C R18-9-109(B))**

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if the Director determines there is a significant amount of interest expressed during the 30-day public comment period, or if significant new issues arise that were not considered during the permitting process.

## **VIII. ADDITIONAL INFORMATION**

Additional information relating to this permit may be obtained from:

Arizona Department of Environmental Quality  
Water Quality Division  
Attn: Maribeth Greenslade  
1110 West Washington Street, Mail Code: 5415B-3  
Phoenix, Arizona 85007  
Phone: (602) 771- 4578