



FACT SHEET

Aquifer Protection Permit P-101679

Place ID No. 1567, LTF (None)

Phelps Dodge Sierrita, Inc. (PDSI) Mine

The Arizona Department of Environmental Quality (ADEQ) proposes to issue 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 permit. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program (APP): 1) meet Aquifer Water Quality Standards at the Points of Compliance, or that no pollutants discharged will further degrade at the applicable Points of Compliance the quality of any aquifer that at the time of permit issuance violates the aquifer water quality standard for that pollutant; and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). BADCT's purpose 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's Name: | Phelps Dodge Sierrita, Inc. (PDSI) |
| Mailing Address: | P.O. Box 527, Green Valley, Arizona 85622-0527 |
| Facility name and location: | Phelps Dodge Sierrita Mine 6200 West Duval Mine Road, Green Valley, Arizona 85622 |

Regulatory Status

The PDSI mining operations are operating under a Notice of Disposal received January 21, 1985. Cyprus Mining Company bought the property in 1986 and a pre-application meeting for the APP was held on October 12, 1993. An application for an APP, dated September 7, 1994, was received by ADEQ on November 13, 1994 from Cyprus Sierrita Corporation. Subsequently, additional information was submitted by Cyprus Sierrita Corporation in support of the APP application. Cyprus Sierrita Corporation changed its name to Phelps Dodge Sierrita, Inc. (PDSI) in 1999 as a result of a stock merger. Additional correspondence related to the APP has been submitted by PDSI in support of the application.

A Multi-Sector General Stormwater Permit (MSGP 2000), #AZR05B216, exists for PDSI, which was issued on January 28, 2001.

Facility Description

Phelps Dodge Sierrita, Inc. is operating an open pit mine and mineral concentration facility which is located approximately six (6) miles northwest of Green Valley, in Pima County, Arizona. Green Valley lies approximately twenty five (25) miles south of the city of Tucson, Arizona. PDSI operations, previously Cyprus Sierrita Corporation (CSC), include conventional crushing and flotation followed by differential flotation, leaching and roasting of molybdenum disulfide, rhenium recovery, molybdenum disulfide production and packaging, molybdenum trioxide production and packaging, and leach dump, solvent extraction/electrowinning.

PDSI produces copper concentrate and cathode copper, along with molybdenum products. Copper and molybdenum are the primary products produced by PDSI. Copper and molybdenum disulfide are produced through conventional milling and froth flotation and pure copper is produced through solution extraction and electrowinning. Molybdenum trioxide is produced through roasting. Rhenium is also recovered in the molybdenum roasting operations.

The Sierrita property consists of three open-pits: Sierrita-Esperanza pit, a molybdenum satellite pit, and the Ocotillo pit; a 115,000-ton-per-day concentrator, two molybdenum roasting plants, a ferromolybdenum plant, a rhenium plant, an oxide and low grade sulfide dump leaching operation, and copper sulfate plant. Ore production from each pit is highly variable; however the aggregate production is limited to the capacity of the plant operation. The mine is capable of producing up to 250 million pounds of copper and, as a co-product, 25 million pounds of molybdenum annually.

II. BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY (BADCT)

Outlined below is the BADCT summary for permitted facilities in three principal drainages at the mine site, with other discharging facilities concentrated in the Mill Area and the tailings impoundments. Also included in the permitted facilities are the two vehicle washes used for cleaning mine haulage trucks and other vehicles.

The three (3) principal drainages are: (1) Amargosa Wash which trends east from the waste rock piles and flows into Demetrie Wash; (2) Demetrie Wash which trends southeast from the Sierrita mine-mill area across the southwest side of the Sierrita Tailings Impoundment to the confluence with the Santa Cruz River approximately seven miles southeast of the Sierrita Mill; and (3) Tinaja-Esperanza Wash which trends southeast from the waste rock piles. The three (3) washes are ephemeral tributaries to the Santa Cruz River;

Amargosa Wash Drainage

The major storage and surface impoundments in the Amargosa Drainage Area, including Amargosa Pond, Raffinate Pond No. 2, Drain Pond No. 2, SX-1 Drain Pond, SX-1 Tank Farm Pond, and the Amargosa Spillway are lined with geomembranes. Headwall No. 1 and Bailey Lake are unlined impoundments, with both facilities serving to collect subsurface drainage

from the active oxide leach area. Duval Canal (conveyance channel) is now completely lined with the recent installation of an HDPE geomembrane along the previously unlined portion of the canal between Demetrie Wash to the Sierrita Tailings Impoundment. Amargosa Pond collects overflow from Headwall No. 1, Bailey Lake, Raffinate Pond No. 2, Drain Pond No. 2, and SX-1 Tank Farm Pond. Collected solutions are pumped to Raffinate Pond No. 2, Bailey Lake, or the LTO Box which returns liquids to the leach circuit.

Demetrie Wash Area

All the facilities contained in the Demetrie Wash Area are non-stormwater, lined impoundments, with the exception of Tailing Pipeline Containment Structures. The containment structures, which are compacted to 95 percent maximum dry density, within 3 percent of optimum moisture content, provide secondary containment in the event there is a breach in the reclaim pipeline or tailing slurry pipeline. The newly constructed, single-lined Copper Sulfate Ponds 1 and 2 provide secondary containment during upset conditions in the Copper Sulfate Plant area.

Esperanza Wash Drainage

The solutions applied to the leach areas tend to move laterally in the subsurface because of the low permeability zone beneath the veneer of alluvium. Natural topography promotes surface drainage into the washes where solution is captured by headwalls. Headwall Channel No. 2, Headwall No. 3, and Headwall No. 5 are partially lined facilities and have either a cut-off trench or headwall keyed into bedrock or interceptor trench to capture subsurface flows. Each of the non-storm water facilities, Headwall No. 2 Channel, and Raffinate Pond No. 3 are lined facilities.

Raffinate Pond No. 3 receives solutions pumped from Headwalls 2, 3, and 5, subsurface flow from Interceptor No. 3, and upset solutions and stormwater pumped from SX-3 Stormwater Pond. Solution from Raffinate Pond No. 3 is pumped either to Bailey Lake (Amargosa Wash Drainage) or back to the leach area. SX-3 Stormwater Pond can accept overflow flows from Raffinate Pond No. 3, Headwall No. 3, and SX-3 Drain Pond via lined channels. Solutions can be pumped to Amargosa Pond when needed. Cat Ponds 1 and 2 are non-stormwater ponds with lined spillways to manage stormwater from upgradient native terrain, run-off from the Sierrita Waste Rock Pile, and overflows from Headwall No. 5 during upset conditions.

Mill Area

All of the permitted facilities in the Mill Site Area are lined with geomembrane or soil-bentonite admix or concrete-lined. The concrete-lined Decant Ponds and Pad Area captures overflow from the copper-moly thickeners and returns it to the Sierrita milling process. The Tailings Thickeners are four (4) tanks with concrete walls and a soil/bentonite liner at the base; the liquid content is deposited in the Tailings Impoundment. The Raw Water Reservoir has a 3-ft thick

soil/bentonite liner and is used to store water from the Canoa wellfield, decant water from the decant ponds, water from the tailings thickeners, and water recovered from the tailings.

Tailings Impoundments

The Sierrita Tailings Impoundment has low permeability slimes coating the floor of the impoundment to reduce seepage. The Tailings Impoundment is underlain by a thick sequence of poorly to moderately consolidated Quaternary sediments. Caliche layers near ground surface are common in the area. Diversion channels to the west and upgradient divert surface water run-on. Duval Canal controls interior stormwater runoff into the Tailings Impoundment. Runoff on the exterior flows to catchment basins. Twenty-three (23) interceptor wells are installed east and south of the impoundment to capture potentially impacted groundwater. There is quarterly monitoring of piezometers and inclinometers along the dam to ensure dam safety.

Vehicle Washes

The vehicle washes use concrete slabs for waste wash-water, with the water from the Truck Wash discharged to the Sierrita Pit, and from the Vehicle Wash to the West Plant drainage channel.

III. COMPLIANCE WITH AQUIFER WATER QUALITY STANDARDS

Monitoring and Reporting Requirements

Groundwater at the Sierrita Mine occurs in weathered and fractured bedrock, in faults, in poorly to moderately consolidated Quaternary basin-fill sediments, and in recent alluvium. The depth to bedrock ranges from surface and near surface exposures in the west to 400 to 1800 feet bgs from the toe of the Tailings Impoundment to the river in the basin of the Santa Cruz River on the east. Depths to water range from less than ten (10) feet below ground surface (bgs) to seventy-five (75) feet in the West-half, and from 250 to 400 feet bgs in the East-half. Groundwater movement generally mimics topography, with flow from higher elevation in the West-half to the lower elevations of the Santa Cruz basin in the East-half. Except in the vicinity of the Sierrita-Esperanza pit, overall flow direction is from west to east with flow direction changing to northeast on the lower basin near the Santa Cruz River. In the vicinity of the Sierrita-Esperanza Pit, direction of groundwater flow is toward the pit.

The Pollutant Management Area (PMA) in general, circumscribes the periphery of the discharging facilities on the north, south and east sides. POC wells are strategically placed to monitor sub-flow in all major drainages in the West-half. On the east side, the PMA approximately coincides with the tailing impoundment dam. A series of twenty three (23) interceptor wells (IW wells) are aligned along the edge of the dam to capture impacted groundwater migrating from the impoundment. The IW wells pump groundwater from within the basin-fill sediment. Water levels in these wells generally range from about 318 to 444 feet

bgs. POC wells are located immediately downgradient from the IW wells to monitor groundwater quality below the impoundment. Elevated levels of sulfate have been identified in Sierrita Mine production wells and in Community Water Company wells to the east of the tailings dam near the community of Green Valley. Delineation of the Discharge Impact Area (DIA) is currently underway by the permittee. Delineation of the sulfate plume will be addressed under a WQARF Mitigation Order (A.R.S. § 49-286).

Point of Compliance (POC) monitoring wells for hazardous constituents are located either at or within 750 feet of the Pollutant Management Area in both the West-half and East-half of the contiguous Sierrita mine property. A total of twelve (12) hazardous/non-hazardous POC wells are required in the permit.

Seven (7) of these POC wells are located strategically downgradient from discharging facilities in the Tinaja, Esperanza, Amargosa and Demetrie Washes in the West-half of the property. Six (6) of these wells were installed during the 1990s and have Aquifer Quality Limits (AQLs) and Alert Levels (ALs) established in the permit. Well MH-27 was installed in 2004. AQLs and ALs for this well will be calculated based on eight (8) months of ambient monitoring when completed in accordance with the Compliance Schedule in the permit. The West-half includes the open pit mines, the concentrator, copper sulfate plant, molybdenum plant, the two (2) solvent extraction plants, various waste rock and leach rock dumps, PLS, raffinate, non-stormwater and stormwater ponds, and various supporting facilities. The remaining five (5) wells are located in the East-half of the property and are sited along the base of the Sierrita Tailings Impoundment. Three (3) of these wells were installed in 1990, and AQLs and ALs are established in the permit. Two (2) additional wells were installed in 2005 and 2006. Ambient sampling will be conducted for eight (8) consecutive months in these wells, with AQLs and ALs amended in the permit within three (3) months of completion of the ambient period.

In order to ensure compliance with Aquifer Water Quality Standards at the POCs, alert levels will be established for constituents that have an AWQS. All hazardous/non-hazardous POC wells will be sampled quarterly for an abbreviated list of parameters. A longer comprehensive list of parameters is required biennially in the POC wells. AQLs and/or ALs are established in the permit for all constituents where sufficient groundwater quality data have been collected by the effective date of the permit. Where additional data are required and for wells to be installed in accordance with the Compliance Schedule, the AQLs and ALs are listed as "reserved." ALs and AQLs for constituents with reserved notation will be amended into the permit when sufficient data are available from the ambient monitoring, as required in the Compliance Schedule.

The parameters to be monitored quarterly in the POC wells are:

Depth to water, water level elevation, field pH, field specific conductance, field temperature, cadmium, cobalt, copper, molybdenum, fluoride, nitrate + nitrite, sulfate, TDS, beryllium, nickel, selenium, magnesium, antimony, arsenic, chromium, lead, and thallium.

The extended list of parameters to be monitored biennially in the POC wells are:

Depth to water, water level elevation, field pH, field specific conductance, field temperature, cadmium, cobalt, copper, molybdenum, fluoride, nitrate + nitrite, sulfate, TDS, calcium, magnesium, nitrate+nitrite, fluoride, aluminum, antimony, arsenic, beryllium, barium, cadmium, chromium, iron, lead, mercury, nickel, selenium, thallium, copper, cobalt, manganese, molybdenum, zinc, gross alpha, radium 226+228, uranium, benzene, toluene, ethylbenzene, total xylene, carbon disulfide, and total cyanide.

Point(s) of Compliance (POC)

| GROUNDWATER MONITORING POINTS | | | | |
|---|--------------------------------|-----------------------|---------------|----------------|
| WELL ID | ADWR REGISTRATION NUMBER | CADASTRAL LOCATION | LATITUDE | LONGITUDE |
| Point of Compliance (POC) Wells - Hazardous/Non-hazardous - West-half | | | | |
| MH-18 | 55-561874 | (D-18-12)20cdd | 31/ 50' 28.4" | 111/ 08' 26" |
| MH-19 | 55-561878 | (D-18-12)21ccc | 31/ 50' 29.1" | 111/ 07' 43.7" |
| MH-20 | 55-561880 | (D-18-12)21dda | 31/ 50' 38" | 111/ 06' 47.1" |
| MH-21 | 55-561881 | (D-18-12)11bbc | 31/ 52' 58.7" | 111/ 05' 36.3" |
| MH-22 | 55-561872 | (D-18-12)14cdd1 | 31/ 51' 50.8" | 111/ 05' 17.5" |
| MH-23 | 55-561871 | (D-18-12)14cdd2 | 31/ 51' 51.6" | 111/ 05' 17.4" |
| MH-27 | 55-203702 | (D-18-12)21add | 31/ 51' 02" | 111/ 06' 54" |
| Point of Compliance (POC) Wells - Hazardous/Non-hazardous - East-half | | | | |
| MH-14 | 55-528098 | (D-18-13)16bcc2 | 31/ 51' 48.8" | 111/ 01' 28.8" |
| MH-15W | 55-528093 | (D-18-13)21cbc | 31/ 50' 44" | 111/ 01' 28.5" |
| MH-16W | 55-528099 | (D-18-13)28cbb3 | 31/ 49' 58.3" | 111/ 01' 28.7" |
| MH-28 | 55-903648 | (D-18-13)21bbb3 | 31° 51' 19.6" | 111° 01' 29.2" |
| MH-29 | 55-903649 | (D-18-13)28bba3 | 31° 50' 20.9" | 111° 01' 29.2" |

IV. MANAGEMENT OF POTENTIAL SULFATE IMPACTS

The permittee has signed a Mitigation Order on Consent that requires: 1) Preparation and submittal of a Work Plan for ADEQ review and approval, which is designed to complete characterization of the vertical and horizontal extent of the sulfate plume down gradient of PDSI and include an inventory of all existing registered private wells used as a drinking water source and public drinking water system wells located within a one mile radius of the sulfate plume's outer edge; 2) Preparation and submittal of a Mitigation Plan for ADEQ review and approval, which identifies and evaluates alternatives (e.g. containment, collection and discharge with or without treatment, institutional controls, alternative water supplies (including, but not limited to, a new supply well, use of an existing supply well,

modifying the screened interval of an existing supply well, connection to an existing public water supply system, and bottled water), mixing or blending, technically practicable treatment, and no action) to practically and cost effectively provide a drinking water supply that meets applicable drinking water quality standards and with sulfate concentrations less than 250 mg/L to the owner/operator of an existing drinking water supply; and 3) Establishment of a community advisory group (CAG) consisting of at least ten (10) persons, chosen from a cross section of the community, for the purpose of identifying and improving the public's access and understanding of information regarding this Consent Order.

Elevated concentrations of sulfate have been identified in groundwater samples collected from both monitor wells and public water supply wells in the area downgradient from the Phelps Dodge Sierrita Mine tailings impoundment near Green Valley. Public water supply wells owned and operated by the Community Water Company (CWC) serving the community of Green Valley have been adversely affected by the sulfate contamination. Two CWC wells, CWC-7 and CWC-8, have been impaired by the sulfate contamination, and have been shut down. As a temporary solution, Phelps Dodge Sierrita Inc. (PDSI) has proposed to use water from several wells in their Esperanza wellfield downgradient of CW-8 to supplement the loss in production from the CWC wells. The negotiations and improvements necessary for the use of the Esperanza wells have been completed, and CWC has been using them since June 2005 under a temporary license agreement.

The Sierrita Mine complex and tailings impoundment is located approximately one mile southwest of the Town of Green Valley. The impoundment is upgradient from the community in relation to the direction of groundwater flow in the regional aquifer. A series of 23 interceptor wells are aligned along the toe of the dam and are used to prevent migration of contaminated groundwater from the tailings. Groundwater quality is monitored in a series of fourteen wells located approximately 500 to 1000 feet downgradient from the dam. Sulfate levels in recent samples from the monitor wells have ranged between 1000 and 2000 milligrams per liter (mg/L), and have remained relatively constant over the last five years. Sulfate levels above 1000 mg/L are present in the aquifer in an area of approximately six square miles, downgradient of the tailings impoundment and the interceptor wells. Three wells are located on the pediment approximately 5000 feet east of the dam and are periodically sampled by PDSI for sulfate and other constituent concentrations. Samples collected from these wells show sulfate levels ranging from approximately 1050 mg/L in MH-12 at the north end to approximately 1600 mg/L in wells MH-11 and MH-13. Because all of the wells are screened over long intervals, the actual depth of the contamination in the wells cannot be determined.

PDSI has taken a pro-active approach in the recognition and characterization of the sulfate plume downgradient from the tailing impoundment. The lateral and vertical extent of the sulfate has not been adequately characterized and is currently under investigation by PDSI. Two new monitor wells were installed during November 2003, between the tailings

impoundment and Green Valley, in an effort to identify the northern extent of the plume. Wells MH-25A and MH-26A were drilled to a depth of 545 feet below ground surface (bgs) and screened within the upper 100 feet of the aquifer. The results from five rounds of water samples collected in these wells showed sulfate values of less than 20 mg/L. In 2005, PDSI installed two additional deeper wells at each site and conducted depth specific sampling to determine the presence and depth of the sulfate, at these sites. In addition, monitor well MH-13 was replaced with a cluster of three wells, each completed to a specific depth to determine the presence and depth of sulfate at this site. The additional monitor wells and depth specific sampling has allowed for more precise characterization of the source and distribution of sulfate within the aquifer. The new data will be incorporated into the current groundwater flow and transport model to identify the location and extent of the plume.

PDSI will actively manage the sulfate plume through a series of interceptor wells. If PDSI fails to manage the sulfate plume and potential impacts according to its commitments, ADEQ has the right to amend the permit and impose technically and legally appropriate conditions to ensure protection of impacted drinking water supply wells.

V. STORM WATER and SURFACE WATER CONSIDERATIONS

The mine and plant site areas are contained within the west flank of the Santa Cruz River Basin. The Santa Cruz River is an ephemeral stream through this reach. There are no nearby surface water bodies. The main surface water drainages through the project area are Demetrie and Esperanza Washes. Both drainages are ephemeral and flow in a southeast direction towards the Santa Cruz River. Stormwater and non-stormwater are collected in several small impoundments in Tinaja Wash and several un-named washes that flow into Esperanza Wash. Stormwater and non-stormwater from Amargosa Wash and stormwater from the upper Demetrie Wash are diverted through the lined Duval Canal into the Sierrita Tailings Impoundments.

VI. COMPLIANCE SCHEDULE

The compliance schedule requires the completion of numerous items related to engineering, hydrologic and general issues.

The compliance schedule sets ambient monitoring requirements for three POC wells, and compliance monitoring requirements for all 12 permitted POC wells.

Also included is a requirement to submit a report with a re-evaluation of the passive containment demonstration at five year intervals, and the submission of a Contingency and Emergency Response Plan.

Action Leakage Rate and Rapid and Large Leakage Rates are required for five facilities that

contain LCRS in their construction. Also required is the installation of sufficient dedicated pumps in these systems to remove collected fluid.

Eight facilities require the submission of analyses to determine the necessity of design upgrades, provision for ADEQ approval of proposed upgrades, and construction deadlines for upgrades deemed necessary. Four other facilities require the submission of technical/design information to the ADEQ, to complete the BADCT evaluation for operation or closure.

VII. OTHER REQUIREMENTS FOR ISSUING THIS PERMIT

Technical Capability

PDSI has 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). Consultants and contractors hired to design and/or build facility upgrades have also demonstrated the appropriate technical competence.

ADEQ requires that appropriate documents be sealed by an Arizona registered geologist or professional engineer. This requirement is a part of an on-going demonstration of technical capability. The permittee is expected to maintain technical capability throughout the life of the facility.

Financial Capability

The permittee has demonstrated financial capability under A.R.S. § 49-243(N) and A.A.C. R18-9-A203. The permittee shall maintain financial capability throughout the life of the facility. The estimated closure and post-closure costs are \$17,729,265 and \$705,341, respectively. The financial capability was demonstrated through A.A.C. R18-9-A203(C)(8).

Zoning Requirements

Mines are exempt from zoning requirements per A.R.S. § 11-830.

VIII. ADMINISTRATIVE INFORMATION

Public Notice (A.A.C. R18-9-108(A))

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft permit or other significant action with respect to a permit or application. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to a permit

application or permit. This permit has been public noticed in a local newspaper after a pre-notice review by the applicant and other affected agencies.

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

The aquifer protection program rules require that permits be public noticed in a newspaper of general circulation within the area affected by the facility or activity and provide a minimum of 30 calendar days for interested parties to respond in writing to ADEQ. 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.

IX. ADDITIONAL INFORMATION

Additional information relating to this proposed permit may be obtained from:

Arizona Department of Environmental Quality
Water Quality Division – Groundwater Section, Technical Support Unit
Attn: Jeff Emde
1110 W. Washington St., Mail Code 5415B-3
Phoenix, Arizona 85007
Phone: (602) 771- 4590