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May 31, 2007

Via Certified Mail # 7002 1000 0005 6776 6627
Return Receipt Requested

Robert Casey, Manager
Water Quality Enforcement Unit
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

**Re: Mitigation Order on Consent No. P-50-06, Response to Comments on
Evaluation of the Current Effectiveness of the Sierrita Wellfield Report**

Dear Mr. Casey:

This letter is submitted in response to Arizona Department of Environmental Quality's (ADEQ) comment letter to Phelps Dodge Sierrita, Inc. (PDSI) dated April 17, 2007, on the Evaluation of the Current Effectiveness of the Sierrita Interceptor Wellfield Report (Report) prepared by Errol L. Montgomery and Associates.

Below, PDSI has reproduced ADEQ's comments from its April 17, 2007 letter, followed by PDSI's responses.

ADEQ Comment No. 1:

"In the Wellfield Report, PDSI concludes.... that while the south wellfield and most of the middle wellfield provide sufficient hydraulic barrier to groundwater flows, the northernmost middle wellfield and north wellfield are ineffective in capturing or containing the sulfate plume from the PDSI tailings. PDSI bases its conclusion that portions of the wellfield are ineffective on limited aquifer thickness that prevents sufficient pumping to capture any migration of sulfate through the groundwater. PDSI used groundwater monitoring and modeling to analyze the effectiveness of the interceptor wellfield.

Section III(C)(4) of the Mitigation Order requires PDSI to conduct "[a]n analysis of the effectiveness of PDSI's current groundwater sulfate source control system" as a component of an Aquifer Characterization Report (ACR). Although the Wellfield Report provides some valuable information regarding the hydrogeologic characteristics of the aquifer and its impact on the effectiveness of sulfate removal via the wellfield, more information is necessary to obtain a complete understanding of the current source control system. Specifically, the Wellfield Report does not attempt to quantify or model either the mass of sulfate that has escaped through the wellfield, nor the mass of sulfate that has and continues to travel from the impoundment to the wellfield. This information would provide a more objective basis for assessing the effectiveness of the wellfield."

Mr. Robert Casey

May 31, 2007

Page 2

PDSI's Response:

ADEQ is incorrect in stating that "...portions of the wellfield are ineffective on limited aquifer thickness that prevents sufficient pumping to capture any migration..." The northernmost middle wellfield and north wellfield are partially effective and do capture some of the seepage migrating from the Phelps Dodge Sierrita Tailings Impoundment (PDSTI). However, as was stated in the Report, the small aquifer thickness prevents sufficient pumping to develop an effective hydraulic barrier.

PDSI did not attempt to estimate the mass of sulfate that has escaped through the wellfield or the mass of sulfate that has traveled from the impoundment to the wellfield because there are data gaps and uncertainties regarding certain components of the tailings water balance which make it difficult to develop reasonable estimates of both historical and current tailings seepage rates and sulfate concentrations in tailings seepage. As part of a recently implemented geotechnical study of the PDSTI, PDSI is collecting additional data on the physical, hydraulic, and water retention characteristics of the tailings and site-specific reclaim pond evaporation rates. It is hoped that this information will fill certain data gaps and reduce uncertainties in the tailings water balance, making it possible to develop better estimates of tailings seepage rates and associated tailings mass fluxes. These data collection activities will continue through September 2007 and the results will be presented in a revised Report, as requested in ADEQ Comment No. 2. In addition, PDSI did not attempt to estimate the mass of sulfate that has escaped through the wellfield or the mass of sulfate that has traveled from the impoundment to the wellfield because Section III.C.4 of Mitigation Order on Consent P-50-06 requires that PDSI conduct an analysis of the effectiveness of PDSI's current groundwater sulfate source control system. It does not require that PDSI conduct an analysis of the historical effectiveness of the system.

ADEQ Comment No. 2:

"ADEQ believes the Wellfield Report reflects an assessment of pumping performance at the existing interceptor wells, and compares such performance over different time periods. However, the omission of information pertaining to annual sulfate mass discharged from PDSTI to the underlying aquifer does not allow for a complete evaluation of the wellfield performance. PDSI should address this matter in a revised Wellfield Report."

PDSI's Response:

As was discussed above, PDSI will issue a revised Report that provides an estimate of current tailings seepage rates and associated tailings mass fluxes for comparison with the sulfate mass captured by the wellfield. Given that the additional data collection activities will not be completed until September 2007, PDSI proposes that the revised report be submitted to ADEQ on November 16, 2007.

ADEQ Comment No. 3:

"Under the section entitled "Tailing Impoundment Development and Operation" at page 6, paragraph 2, PDSI outlines the time periods during which it discharged tailing slurry from the Esperanza Concentrator to the Esperanza Tailing Impoundment ("ETI"). However, the Wellfield Report does not provide the location of the ETI with respect to the PDSTI, and does not comment on whether sulfate from the ETI is being discharged to the aquifer and is contributing additional loading to the plume under investigation. PDSI should address this matter in a revised Wellfield Report. In the same section at paragraph 3, PDSI provides a brief overview of the manner in which it discharges tailing slurry from the Sierrita Concentrator to the PDSTI. However, PDSI does not provide any quantitative information or data regarding slurry flow rates to the PDSTI, sulfate concentration and/or mass."

Mr. Robert Casey

May 31, 2007

Page 3

PDSI's Response:

As was discussed on page 6 of the Report, the intermittent discharge of tailings to the Esperanza Tailings Impoundment (ETI) ceased 26 years ago; the continuous discharge of tailings ceased 3 years earlier. The primary drain-down of "excess" water in the tailing pore space would have occurred within this period. Therefore, the tailing would have a water content at or near "specific retention", which represents the pore water status at which further gravity-driven flow of water becomes asymptotically small. Moreover, the ETI was capped which further reduced the potential for seepage. Even if some residual downward movement of solution through the ETI were occurring, the magnitude of this slow potential seepage via unsaturated flow processes would be very small and any mass flux of sulfate would clearly be negligible relative to the seepage presently occurring through the PDSTI. The conclusion that little, if any, seepage is coming from "readily drainable" water is corroborated by field observations made during the recent installation of a piezometer on a lower bench at the east side of the ETI (within 100 feet of the PDSTI reclaim pond) as part of the tailing impoundment characterization work described above. Tailing samples collected from the borehole were observed to be damp to moist, but were clearly not saturated.

PDSI does have quantitative information regarding tailings slurry discharge rates to the PDSTI. There are some historical data gaps that PDSI is attempting to fill. This information will be included in the revised Report.

ADEQ Comment No. 4:

"In the section entitled "Interceptor Wellfield Development and Operation," PDSI states that Well IW-7 has been capped due to "small pumping capacity." Considering the fact that this well is in the south portion of the wellfield where the basin fill thickness is greatest, ADEQ believes that maintenance, operation and capacity issues associated with this well should be addressed to provide additional removal capability. To affect maximum wellfield sulfate capture, it is imperative that all interceptor wells are optimized and fully functional at all times."

PDSI's Response:

PDSI records indicate that well IW-7 was drilled in 1979 and was in operation from 1981 through 1983. When IW-7 was constructed, the aquifer thickness was approximately 43 feet. Pumping rates during the period of operation ranged from 250 to 300 gallons per minute (gpm). The sulfate concentration was approximately 375 mg/L.

Well rehabilitation and performance testing was conducted at well IW-7 in 2006, including a short-term pumping test and groundwater sampling. At that time, the aquifer thickness had decreased to approximately 17 feet. Results of the pumping test indicated that the optimal pumping rate was only 10 gpm, indicating that the more permeable parts of the basin-fill deposits aquifer were no longer saturated and the well could no longer sustain the previously recorded pumping rates. The measured sulfate concentration in 2006 was 360 mg/L. The well was capped in 2006 because of its small pumping capacity and relatively low sulfate concentration.

Maintenance and operation of well IW-7 would require aggressive well rehabilitation. While well rehabilitation might improve sustained pumping rates at well IW-7, poor well efficiency and small aquifer thickness will likely cause large amounts of cascading water and increased entrained air, turbulent flow, and potential damage to the pump due to pumping water level surging at the pump intake.

Pumping well IW-7 would not substantially improve sulfate capture along the south side of the PDSTI. As Figure 18 in the Report illustrates, additional extraction in this location is not needed because the capture zones for the other interceptor wells in the south wellfield encompass Well IW-7 and extend along the south side of the PDSTI.

ADEQ Comment No. 5:

"While the Wellfield Report provides valuable information that will be useful in preparing the ACR, both PDSI and ADEQ agree that characterization of the sulfate plume is not yet complete. Moreover, decisions regarding the Mitigation Plan, including selection of a method to address the source of the sulfate plume, are premature until PDSI completes the ACR."

PDSI's Response:

PDSI agrees that the characterization work identified in the Work Plan needs to be completed before a final Mitigation Plan can be developed.

ADEQ Comment No. 6:

"PDSI has proposed conducting a feasibility study to review alternatives to address the deficiencies of the wellfield. The stated purpose of the feasibility study is to identify a method to improve the effectiveness of the existing interceptor wellfield and subsequently implement the selected method in an expedited fashion instead of waiting for approval and implementation of the Mitigation Plan required by Section III(D) of the Mitigation Order. PDSI has requested that ADEQ "approve" this proposal as part of the Mitigation Order. ADEQ appreciates the benefits of conducting additional study of the interceptor wellfield and proposals to improve the performance of the wellfield in capturing and containing the source of the sulfate plume, especially as an immediate interim measure. Increasing the effectiveness of the wellfield would certainly have a positive impact on limiting the further migration and volume of the sulfate plume."

Although ADEQ does not object to PDSI's proposal to conduct a feasibility study, it is not within the scope of the current Mitigation Order for ADEQ to "approve" the study. ADEQ is concerned that "approval" of PDSI's proposed feasibility study to address deficiencies in the existing interceptor wellfield might be misconstrued as selection of an alternative to address source control of the PDSI tailings impoundment. According to the Mitigation Order, the Mitigation Plan must include evaluation of more alternatives ("e.g. containment, collection and discharge with or without treatment . . .") to source control than may be provided solely by increasing the effectiveness of the existing interceptor wellfield. Although PDSI's proposed feasibility study and subsequent implementation of a method to increase the effectiveness of the existing interceptor wellfield might provide one alternative to source control, the proposed study would not be a substitute for the comprehensive feasibility study required by Section III(D) of the Mitigation Order."

PDSI's Response:

As PDSI stated during its March 6, 2007 meeting with ADEQ, the intent of the focused feasibility study is to identify, evaluate and recommend an interim action that will improve the effectiveness of the current interceptor wellfield. It is not intended to select a final source control alternative for the PDSTI or substitute for the comprehensive feasibility study required by the MO.

Mr. Robert Casey
May 31, 2007
Page 5

ADEQ Comment No. 7:

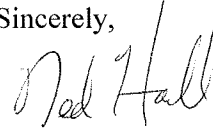
"In the event PDSI elects to conduct the proposed feasibility study for the interceptor wellfield, ADEQ is interested in reviewing the data or other information as part of the ACR. ADEQ appreciates the opportunity to review PDSI's progress in addressing the sulfate plume in Green Valley in order to provide a drinking water supply that is safe for all residents."

PDSI's Response:

PDSI has elected to complete the proposed focused feasibility study. The results of that study, including a recommended interim action to improve the effectiveness of the current interceptor wellfield, will be submitted to ADEQ for review.

If you have any questions regarding these responses, please contact me at (520) 648-8857 or PDSI's project manager Mr. Stuart Brown at (503) 675-5252.

Sincerely,



E. L. (Ned) Hall
Chief Environmental Engineer
Phelps Dodge Sierrita, Inc.

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