OhioEPA

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

May 23, 2017

Barbara Nielsen, Project Manager
Cyprus Amax Minerals Company
333 N. Central Avenue
Phoenix, AZ 85004

RE: Satra Concentrate Steubenville
Investigation Report
Remedial Response
Jefferson County
441001068009

Subject: Draft Remedial Investigation Report and Human Health Risk Assessment for the Former Satralloy Site, Jefferson County, Ohio

Dear Ms. Nielsen,

Ohio EPA has completed the review of the Draft Remedial Investigation (RI) Report submitted on January 10, 2017 and the Human Health Risk Assessment Submitted on March 22, 2017. Ohio EPA met with you in person on April 12, 2017 to discuss our concerns regarding these submittals so that you would have a better understanding of the enclosed comments. Please revise the Remedial Investigation Report and the Human Health Risk Assessment in accordance with the requirements of the 2010 Consent Order.

If you have any questions regarding this correspondence, please do not hesitate to contact me at 740-380-5289 or maria.galanti@epa.ohio.gov.

Sincerely,

Maria Galanti
Site Coordinator
Division of Environmental Response and Revitalization

MG/cb

ec: John Rochotte, Supervisor, DERR-SEDO
Brian Tucker, DERR-CO
Lisa Shook, DERR-CO
Joe Laughery, DDAGW-SEDO
Lee Holder, Golder

Ohio EPA Comments on the Satralloy Draft Remedial Investigation Report

General Comments

1) The Draft RI Report does not discuss the on-site waste disposal area. Please provide any information regarding the time of operation, the type of wastes which may have been placed in the cell, size (vertical depth and acres), and any other pertinent information that may be available. Please revise the RI to discuss the potential human health risks, ecological risks and potential ground water impacts associated with the on-site disposal cell.

2) The Draft RI Report does not discuss the on-site production well. Please revise the report to include a discussion of the well, the depth, the construction dates, and any other information that is known. Additionally, if feasible, this well should be sampled to determine if there has been an impact to the aquifer from on-site activities in this area.

Executive Summary

1) **Pages ES-2 and ES-3**: The second paragraph on this page states, "An estimated 800,000 cubic yards of slag has been deposited across large tracts of both the upland and lowland areas of the site." Page ES-3 states, "the volume of slag on the Satralloy property is estimated to be between approximately 1.3 and 1.8 cubic yards. During the meeting on April 12, Golder acknowledged this discrepancy in the RI Report. Please revise the discrepancy in the estimated amount of slag on the Satralloy property to be consistent throughout the RI Report.

2) **Page ES-3**: Revise the Executive Summary of the RI Report to reference the tables which identify the Site chemicals of potential concern (COPCs) or include a list of the COPCs.

3) **Page ES-3**: Revise the RI Report to reference the figure(s) under section "Site Soils" which depicts the location where background samples were collected.

4) **Page ES-7, Conclusions**: As Ohio EPA, Freeport, and Golder discussed on April 12, several bullet items in the Conclusion Section require revision. The Draft RI states, "No aquifer used or potentially usable as a drinking water source (the Bedrock Aquifer and the Valley Fill Aquifer) has been adversely impacted by the site." This statement is incorrect because monitoring wells MW-5 and MW-16 show Cr(VI) in the Valley Fill Aquifer. As Ohio EPA discussed with Golder during the April 12 meeting, the Valley Fill Aquifer has been contaminated by the Site in some locations. Several of the Valley Fill Aquifer wells also show elevated manganese results (in excess of the lifetime health advisory level of 300 ug/L). Please revise this statement to reflect the adverse effects the Site has on the Bedrock and the Valley Fill Aquifer.

5) **Page ES-7, Conclusions 3rd bullet**: The third bullet should be revised to state, the Valley Fill Aquifer has been contaminated by the site in some locations. The data in the Draft RI Report supports this statement. During the April 12 meeting, Golder agreed that this change would occur in the revised RI Report. Please refer to comment 4 above.

6) **Page ES-7, Conclusions 6th bullet**: The sixth bullet should be revised to address the human health and ecological risks at the Site from all COPCs not just chromium. Ohio EPA does not agree that the Site does not pose an unacceptable risk to human health and the environment. As discussed during the April 12 meeting, the data in the report shows that there are unacceptable risks from Site activities to human health and the environment. Please refer to the comments below on the Human Health Risk Assessment.

Chapter 1

7) **Section 1.1.2 Site History**: The document states at least 23 oil and gas wells were drilled on the Site, predominantly in the northern portion, as noted in Figure 1.1-3. The RI notes that only five of these wells were found during the RI field work and does not provide any details regarding the condition of these wells. Additionally, the RI does not provide any information to determine if these wells were properly abandoned. These wells could be acting as a conduit to ground water contamination now and in the future. The Ohio Department of Natural Resources (ODNR), should be contacted to discuss proper abandonment of the oil and gas wells that have been located to date, and any other wells which may be found during future remedial activities.

8) **Section 1.5 Chemicals of Potential Concern**: This section provides no discussion or explanation for how COPCs were initially chosen or reevaluated. Please add a discussion explaining the evaluation process and any changes in the list of COPCs from the Remedial Investigation/Feasibility Study (RI/FS) Work Plan. The RI Report should include the evaluation of each chemical that was determined to be a COPC and any chemicals that were originally identified as COPCs in the RI/FS Work Plan but eliminated during the remedial investigation process.

9) **Section 1.5 Chemicals of Potential Concern**: Revise this section to include a table listing the chemicals of potential concern to allow the reader to easily identify the COPCs for the Site.

Chapter 2

10) **Section 2.1.1 Soil and Slag**: Please revise this section to clarify where US EPA obtained the background samples. Figure 2.1-1 does not show a soil sample taken west of the Site that could be used as background and shows only one soil sample east of the site that may have been used as background. The RI should note that slag from the site was not moved to these areas where the background samples were located.

11) **Section 2.1.2 Groundwater**: The section stated that the MW-1/MW-1D monitoring well-cluster was not found during the 2005 and 2006 site visits. As noted during the April 12 meeting, if the monitoring well-cluster or remnants of the cluster are identified in the future, these wells must be properly abandoned.

12) **Section 2.10 Private Water Supply Wells**: The Draft RI references Figure 2.10-1 that shows the location of private wells in the vicinity of the Site. This figure does not include a well at the Gould Wildlife Club. If there is a private well at this location, then please locate this well on the figure. It also appears based on aerial photos that there are additional homes in the vicinity of the Site including along Sheeprock Road that do not have wells associated with them on the figure. Since there is no public water available in the area, it is likely that these residents have private wells. If there is no publicly available record of these wells, a survey of these homes is needed to gather information about the private wells, if they exist, and to locate them on the figure. Please revise the RI Report to specifically address any potential for Site activities/COPCs to affect these private water wells.

13) **Section 2.12 Endangered Species**: This section discusses the presence of the Indiana Bat and the Northern Long-Eared Bat in Jefferson County and the presence of suitable habitat for both species at the Site. Add additional discussion on suitable habitat abundance and the likelihood of these species being present at the Site. Ohio EPA is not aware of any records of occurrence for these two species at or near the Site. However, without a proper bat study, it would be difficult to verify that these bats are not present on-Site. Modify this section to note that a proper bat study has not been completed at the site, so it is unclear if these species exist on or near the Site.

Chapter 3

14) **Section 3.3.1 Extent of Slag**: This section of the Draft RI Report discusses the extent of the slag on-site. This section should also include the amount of slag that may be beyond the Site boundaries including any that may have been used for road base or other purposes.

Chapter 4, Nature and Extent of Contamination

15) **Section 4.1 Slag**: This section of the Draft RI Report States, "The low Cr(VI) content in the slag compared to the total chromium content is consistent with published studies on chromium slag." This section references only two specific studies. Are these the only two references used to derive this conclusion? If not, please reference the other studies used to provide information regarding the consistency of the low Cr(VI) content in the slag and revise the RI Report to include those references.

16) **Section 4.8.5 Valley Fill Aquifer**: The RI states: "With the exception of MW-05 and MW-16, Site-related impacts were not detected in any of the monitoring wells screened in the Valley Fill Aquifer (including on in Kolmont)." Several of the Valley Fill Aquifer wells appear to have elevated arsenic and manganese which are

COPCs. The Draft RI Report did not provide data that demonstrated the elevated arsenic and manganese are not related to the Site activities. Please revise this statement to note that the Valley Fill Aquifer has been impacted by site activities. Please refer to comment #4 and 5 above. Revise the RI Report to state that Site activities have impacted the Valley Fill Aquifer at the Site.

17) **Section 4.8.6.1 Perched Bedrock Groundwater**: Please provide the data or reference the data in the RI Report to show that the arsenic detected may be due to localized geochemical conditions (*e.g.*, naturally reducing geochemical environment).

Chapter 5, Conceptual Site Model

18) **Section 5.5 Contaminant Fate and Transport**: The Draft RI Report provides a discussion regarding the fate and transport of chromium and chromium (VI). However, there is very little information regarding the fate and transport of other contaminants of concern at the Site. Chromium at the site appears to attenuate quickly with distance from the source material but elevated manganese at the Site is much more widespread. Revise the RI Report to include additional discussion about the fate and transport of all the identified contaminants of potential concern.

19) The Draft RI Report does not provide a discussion of rate and extent/fate and transport of the COPCs in the area of the Kolmont mine and how former mining operations may influence rate and extent of site COPCs. Monitoring well RBHO1 and several seeps in the area indicate high concentrations of manganese, arsenic, and other metals. Please revise the RI Report to add discussion of the rate and extent/fate and transport of identified Site COPCs in this area and how the abandoned Kolmont mine may affect the rate and extent of the COPCs.

Chapter 7, Summary and Conclusions

20) **Section 7.2 Conclusions**: Please revise this section of the RI Report to be consistent with the changes to the conclusions in the Executive Summary regarding impacts to ground water at the Site.

21) **Section 7.2 Conclusions**: The last bullet in this section of the report concludes that there are no human health and environmental risk due to Site activities. This conclusion is incorrect. (Refer to the enclosed comments on the human health risk assessment). Revise the last bullet in this section to summarize the risks from the identified COPCs on Site.

Figures

1) **Figure 4.9-1A** presents seep and surface water monitoring data located on a map of the Site. The data on this figure is incorrect for some parameters, specifically the hexavalent chromium and manganese data appear to be transposed. Please review this figure and other similar figures to ensure that all data is correct.

Ohio EPA Comments on the Human Health and Ecological Risk Assessment as submitted on March 22, 2017.

1) **CSM and Exposure Areas**: The provided conceptual Site model (CSM) in Volume I is inconsistent with the Human Health Risk Assessment (HHRA) text sent electronically on March 22, 2017. The CSM in Volume 1 does not include exposure pathways or receptors. Figure 2 in the Draft RI Report as cited in the HHRA is inadequate in defining the exposure areas assessed in the draft risk assessment and is inconsistent with the text. Site-wide, lowland, and upland exposure areas are not appropriate (unless supported as discussed below). Smaller exposure areas based on the delineated extent of contaminants need to be developed. Ohio EPA, Freeport and Golder discussed this issue during the April 12 meeting. Please revise the RI Report to provide adequate figures for defining exposure areas as was discussed and agreed upon during the April 12 meeting.

   New exposure areas should be displayed with maps using isopleths for COPCs, both vertically and horizontally based on the extent of contamination (greater than Risk Screening Levels (RSLs). Alternatively, and as discussed during the April 12 meeting, the current map 3.3-1 which identifies locations of slag, could be used to estimate exposure areas and estimated permissible concentrations (EPCs) for the individual slag areas (areas 5, 6, and 7 can be combined into one area) at 0-2' and 0-10'. The remaining plant area and upland area would also have separate EPCs for COPCs (maximum concentrations exceeding RSLs) for both areas at the same soil depth intervals. Please provide a map that clearly identifies these areas and concentrations of COPCs. Ohio EPA believes the map would result in a minimum of 7 exposure areas. These maps and concentrations should be reviewed by Ohio EPA for concurrence prior to updating the risk assessment as many items depend on the exposure areas, EPCs, and selected COPCs. Using Table 4b, arsenic, chromium (total, +3 and +6), lead, manganese, and thallium all have elevated concentrations that warrant individual delineations and/or inclusion into the risk estimates for the new areas.

2) **Exposure Point Concentrations (EPCs)**: The main text indicates EPCs were calculated using a UTL approach. The HHRA and ERA have used the appropriate approach (95% UCL via ProUCL) for the statistical method. However, much of the Draft RI Volumes I and II need to be updated to be consistent with the HHRA and supporting information.

3) Bioavailability of arsenic should not be changed from the default (60%). Revise the HHRA and see previous comments provided by Ohio EPA in February 2016.

4) Fraction Ingested and Fraction Contaminated (FI and FC) terms are both to be set at unity for all receptors (most have been corrected). If an FC value is appropriate based on newly developed exposure areas, then those can be discussed and approved before the revised estimates of risk and hazard are completed.

5) The RSL tables currently have not been updated, however, the toxicity information for benzo(a)pyrene has been updated and should be utilized in future revisions.

6) PAHs and other detected COPCs should not be excluded from the cumulative risk evaluation unless they present less than 1% of the total cumulative risk for a receptor. If COCs are screened out, please include a table in the RI Report demonstrating their contribution to cumulative risk calculations.

7) Future development and movement of the slag is undetermined at this time, therefore, limiting the risk evaluation to soil in the top 10 feet is inappropriate. Soil impacted below 10 feet should be considered for all receptors in the human health risk assessment. Revise the human health risk assessment in the RI Report to address soil impacts below 10 feet.

8) An evaluation and presentation of risk in the assessment of potable use ground water for the Valley Fill Aquifer is needed. The drinking water screening levels(RSLs)/MCLs (if available) should be compared on a well by well, and COPC basis, or an EPC may be calculated for each COPC in the core of the ground water plume.

   Please review https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917 and related guidance for specific information. Given the localized contamination of ground water, a well by well evaluation appears to be more appropriate. The RI and HHRA should discuss and clarify that the reporting limits for hexavalent chromium were often not low enough to eliminate many wells as not contaminated by Site COPCs and should be carried through the risk assessment (Table 3). Ground water remediation technologies will need to be included in the feasibility study (FS).

Ohio EPA Comments on the Ecological Risk Assessment

1) In general, the terrestrial areas of the Site are not considered of significant ecological importance due to the long term effects of industrial activities, and therefore the focus of the ERA was/is Cross Creek. The evidence on the general health of Cross Creek supports the draft ERA's conclusion of no significant harm. Therefore, the comments on the terrestrial risk assessment do not require changes to the document. However, one noteworthy point is the seep with discharges of contaminated shallow ground water flowing into the creek. This seep should be evaluated (at a minimum, qualitatively) in the FS for alternatives to reduce and eliminate COPCs greater than the chemical specific water quality standards (OMZA) or health risk based value.

2) Map(s) identifying the three terrestrial exposure areas should be added to the ERA. The text cites Section 2.3.4 for exposure assessment information. However, the cited section does not correctly describe the three exposure areas. Please Revise the RI Report to include these maps.

3) As part of the exposure areas, include a map or maps, the same, or similar to those provided in the HHRA, that identify COPCs that exceed screening values for soil. These maps should be used to discuss extent of contamination and in the calculation of exposure point concentrations. A map is not needed for Cross Creek.

4) Section 4.6 cites Appendix C as the source of bioaccessibility calculations. Appendix C presents the 2006 and 2012 bio-criteria evaluations. Please correct this discrepancy and a review of the entire RI Report is needed to address multiple updates to the ERA and HHRA.

5) The RI Report is not clear when determining if a Site-specific uptake or accumulation factor, versus a true bioaccessibility value was developed for the ERA. Measured tissue concentrations are preferred as inputs into the ecological risk assessment over any modelled values. Bio-accessibility and/or bio-availability should be 100% for estimating risk when empirical tissue values are known/estimated. If enough prey of food tissue contaminant concentrations is available, then the empirical values should be used in any food-web models. For example, if the "bioaccessibility" value was used to estimate tissue concentrations instead of using the measured values, then the risk estimates should be recalculated.

6) Please review and correct map numbers and legends in the RI Report. For example, Section 4.3 cites map 3.5-1 when it appears to be 3.6-1. Also, surface soil samples shown on map 3.6-1 have no such identifying reference numbers. Please revise the RI report to ensure that the correct map numbers and legends are referenced.