



June 23, 2017

Project No. 123-93309-02

Maria Galanti
Division of Environmental and Remedial Response (DERR)
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138

**RE: RESPONSE TO COMMENTS ON THE REMEDIAL INVESTIGATION REPORT
FORMER SATRALLOY SITE**

Dear Maria:

On behalf of the Cyprus Amax Minerals Company (Cyprus Amax), Golder Associates Inc. (Golder) is providing this response to your comments dated May 23, 2017 on the draft Remedial Investigation (RI) Report for the Former Satralloy Site (the Site). The Site address is 4243 County Road 74 (Gould Road), Mingo Junction, Jefferson County, Ohio.

The comments are numbered as in your letter.

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.

Response: Available information indicates that the referenced disposal area was used for disposal of non-sanitary, non-putrescible waste similar to a construction and demolition debris (C&D) landfill. Available information, including results of the groundwater monitoring well for the area, will be added to the RI report.

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.

Response: We have been unable to find data on construction of the Site water supply well we located. We will remove the well pump, analyze the well water, and add the resulting data to the RI Report.



Comments on the 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.

Response: The Executive Summary and Introduction will be revised to match the slag volume estimate in Section 3.3.1.

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.

Response: A reference will be added to the table that lists 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.

Response: A reference to the figure showing background soil sampling locations will be added.

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.

Response: The Valley Fill Aquifer is monitored by 17 monitoring wells, of which only two (MW-5 and MW-16) have had detections of Cr(VI). MW-5 was sampled three times, but Cr(VI) was detected during only one of these sampling events. The absence of Cr(VI) detections in other Valley Fill monitoring wells indicates that the Cr(VI) detections are isolated to the vicinity of MW-5 and MW-16. It is likely that localized heterogeneities such as potential thinning of the overlying clay contribute to Cr(VI) detections at these locations. Given the isolated nature of the detections, these data show that Cr(VI) is quickly attenuated within the aquifer, which is consistent with the Cr(VI) attenuation pathways presented in the site conceptual model. Further, Cr(VI) is not detected in any regional bedrock aquifer monitoring well demonstrating that the site poses no impact to this aquifer.

The concentration range of manganese observed in the Valley Fill Aquifer is consistent within an order of magnitude of manganese levels observed in off-site wells. Soluble manganese concentrations are strongly controlled by local geochemical conditions (i.e., redox state). Reducing geochemical conditions enhance the reductive dissolution of naturally present manganese oxide minerals resulting in release of manganese to the aquifer. A published study by OEPA (<http://epa.ohio.gov/ddagw/gwqcp.aspx#120506221-manganese>) demonstrated that that "redox conditions in the sandstones and particularly buried valley aquifers are the best for elevated manganese. This is confirmed by the fact that many public water systems using buried valley aquifers need to remove manganese." As shown in the study, soluble manganese levels up to 4,500 µg/L are present in aquifers in Eastern Ohio. Additionally, the spatial concentration distribution of soluble manganese does not align with the spatial concentration distribution of manganese in soils as would be expected if the elevated manganese levels were due to site impacts. Therefore, manganese levels in the Valley Fill Aquifer are consistent with background and are not indicative of site impacts.

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.

Response: This bullet will be revised to be consistent with the discussion of the Valley Fill Aquifer in the main text (i.e., that there are localized impacts).

6) Page ES-7, Conclusions 61h 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.

Response: This bullet will be deleted.

Comments on the main text

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.

Response: ODNR will be contacted to make them aware of the oil/gas wells that we have located.

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.

Response: A discussion of COPCs selection will be added to Section 1.5.

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.

Response: Section 1.5 states that "The COPCs for the Site are listed in Table 1.5-1."

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.

Response: We do not know where the USEPA obtained their background samples.

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.

Response: We acknowledge your comment, which does not request a revision to the RI.

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.

Response: We will conduct a field survey to find unrecorded private water supply wells, and will add this information to the RI Report.

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.

Response: Section 2.12 will be revised to note that a formal bat study has not been performed for the Site.

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.

Response: We have no reliable information on how much slag was removed from the Site or where it went.

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.

Response: The two references cited in the RI support the statement. Additional references may be added.

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.

Response: See responses to Comments #4 and #5 above. The detections of manganese in the Valley Fill Aquifer are consistent with background levels of soluble manganese in Eastern Ohio; thus, evidence indicates that the manganese is the result of localized geochemical conditions that enhance the solubility of manganese, and are not the result of historical site activities.

With the exception of one groundwater sample collected from RBA-05I prior to well redevelopment, arsenic was not detected above the MCL (10 µg/L) in any Valley Fill Aquifer monitoring well. Further, the levels of arsenic observed on-site are consistent with background levels, and are not the result of historical Site activities.

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).

Response: It is stated in Section 4.8.6.2 that "Total arsenic was detected in groundwater samples from RBH-03 in June 2014 (130 µg/L; 100 µg/L in RPP sample) and October 2014 (53 µg/L). The absence of significant detections of chromium during these sampling events (non-detect to 5.2 µg/L) indicates that the arsenic is unlikely to be from industrial activities at the Site. Rather, the arsenic may be background or due to localized geochemical conditions (e.g., naturally reducing geochemical environment)."

The text comment on localized geochemical conditions is based on arsenic behavior commonly observed at other sites. The text will be revised to include that ORP measurements collected from RBH-03 ranged from -150 to -280 millivolts, showing a reducing geochemical environment that enhances the solubility of naturally occurring arsenic in soil.

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.

Response: Discussion of the fate and transport of other Site COPCs will be added to the RI Report.

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 RBH01 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.

Response: See responses to Comments #4, #16, and #17.

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.

Response: The conclusions in Section 7.2 will be revised the same as in the Executive Summary.

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.

Response: This bullet will be deleted.

Comments on 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.

Response: All figures showing analytical data will be reviewed and any errors in data presentation corrected.

Comments on the Human Health Risk Assessment (HHRA)

We are currently in discussions with you and other personnel from the Ohio Environmental Protection Agency on potential revisions to the HHRA, and therefore defer written responses to these comments until after completion of these discussions.

Comments on the Ecological Risk Assessment (ERA)

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.

Response: Per this comment, the ERA will not be revised. Some comments on the ERA will be addressed by revisions to the RI Report, as discussed below. Actions to address seep discharges affected by Site COPCs of contaminated shallow ground water will be considered in the Feasibility Study.

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.

Response: A map identifying three terrestrial exposure areas will be added to the RI Report.

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.

Response: Maps visually showing concentration distributions of key COPCs will be added to the RI Report.

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.

Response: This discrepancy will be corrected, and the entire RI Report will be reviewed to address 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.

Response: Where prey tissue concentrations were available, they were used in the ERA. Bioaccessibility was evaluated at 100% in the foodweb model included in the Uncertainty Section.

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.

Response: The RI Report will be reviewed and figure number references corrected where necessary.

CLOSING

We look forward to working with you to finalize the RI.

Sincerely,

GOLDER ASSOCIATES INC.



Lee K. Holder, P.E.
Golder Associates Project Manager

LKH/