Summer 8-16-2024

Re: Comment letter for the Butte Priority Soils Operable Unit (BPSOU) Diggings East 60% Remedial Design Package Submittal (dated April 23, 2024)

Emma Rott

REGION 8
DENVER, CO 80202

August 16, 2024

Mr. Josh Bryson
Liability Manager
Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

Re: Comment letter for the Butte Priority Soils Operable Unit (BPSOU) Diggings East 60% Remedial Design Package Submittal (dated April 23, 2024)

Dear Mr. Bryson:

The U. S. Environmental Protection Agency (EPA), in consultation with the Montana Department of Environmental Quality (DEQ), is providing comments on the Diggings East 60% Remedial Design Package Submittal (dated April 23, 2024) with the following comments. Please address the following comments in the 95% remedial design submittal.

GENERAL COMMENTS

1. The requirement is to provide capacity to treat 32 acre-feet. The design report indicates a total size of 47.9 acre-feet. Subtract 4.3 acre-feet for the forebay and 10.9 acre-feet for the permanent pools and the remaining capacity is 32.7. That meets the FRESOW. Make sure that the various documents consistently recognize this. It seems that some use a total pond size of 32 acre-feet.
2. Is there a revised drain time/retention percentage management report? If so, please provide to the agencies.
3. General comment on all documents – The FRESOW requires removal of "waste, tailings, and contaminated soils." The design documents often refer to "mine waste" and other variations. The design documents should be consistent with the FRESOW. Please use the term "waste, tailings, and contaminated soils" when referring to materials that fail the waste identification criteria.
4. Please revise all documents based on the June 25, 2024 notification issued by Atlantic Richfield Company. Please specify what backfill criteria will be used (e.g. A, B, or C).

SPECIFIC COMMENTS

DESIGN REPORT

5. **Section 3.0:** The evaluation of applicable, relevant, or appropriate elements was completed during the Record of Decision and this evaluation cannot be re-done unless a change to the

decision document is made. Therefore, please remove the evaluations presented in this section and add details for how this remedial design complies with the ARARs identified in the ROD.

6. **Section 4.1:** Surface water COCs in the ROD Amendment also include aluminum, iron, and silver. See Tables 1 and 2 of the ROD Amendment. Please include aluminum, iron, and silver in this section.

7. **Section 5.3:** Please list the remedial goals and performance standards for groundwater as presented in the ROD and surface water as presented in the ROD Amendment. Please include a new section, before or after Section 5.3, that presents the ground water and surface water remedial goals and performance standards.

8. **Section 6.1 Excavation Design:** Ground water data was taken from 2018-2020. At this time, EPA/DEQ request an update the three-year high data to 2021-2023. This three-year high level will need to be updated if the final RD is not completed by May 2025.

9. **Section 6.1 Excavation Design:** Excavation is between 0 and 15 feet. Will the undisturbed soils within the project boundaries outside of the stormwater infrastructure be subject to soil testing to determine the need for capping?

10. **Section 6.2 Backfill and Site Grading:** Please provide an explanation for the use of Criteria B material as backfill. Table 2 of the CD specifies that this material shall only be used as structural fill below the stormwater basins (including associated inlet and outlet structures). The current drawings indicate that Criteria B will be used in areas outside of those. Please provide more detail.

11. **Section 6.2.2 Geotechnical Analysis:** Please provide additional information on the type of material to be used for subgrade. The FRESOW Checklist suggests that this material will not meet the requirements of Criteria B Material as described in Table 2 of the CD.

12. **Section 6.3.1.1 Basin Stormwater Inputs:** Please specify any known adjustments that will be made to existing infrastructure.

13. **Section 6.3.2 Stormwater Design:** Please specify in the O&M Manual, the basins will be monitored and cleaned out as necessary.

14. **Section 6.3.2.4 Main Basin:** In a DE meeting, it was stated city water will be used for recirculation. The report states Silver Lake water. Please verify. If city water is used will that cause issues for vegetation (i.e., chlorinated water)? Please provide confirmation of Silver Lake water quality. Where are the design details for tying into make-up water source?

15. **Section 6.3.3 Floodplain Analysis:** Please provide this encroachment analysis as soon as possible to the Agencies. Waiting until the final design to perform this analysis may cause delays in receiving approval of the final design submittal.

16. **Section 6.4.1 Leak Detection System/Monitoring Network:** Understanding a Leak Detection and Monitoring Technical Memorandum will be provided to the agencies, based on this section of the Design Report, EPA/DEQ have concerns on how leaks are detected. Without that memo, the agencies have the following preliminary questions: What will be done if a leak is detected? Is there a contingency plan in place? Please provide information to acceptable limits and/or

guidelines of constituents that will be found in detection wells. Please discuss protocol for when a leak is detected.

Also, please note that the CD requires, to the extent feasible, a leak detection system capable of detecting leakage at a rate of 1x10-6 cm/s. This detail was omitted from the FRESOW Checklist provided as part of this design package.

17. **Section 6.4.1 Leak Detection System/Monitoring Network:** Please specify when EPA/DEQ will receive the Groundwater Remedy Optimization Design? The details from this Groundwater Remedy Optimization Design should be provide prior submittal of the 95% Digging East remedial design.

18. **Figure 6-1 Approximate Area Requiring Dewatering During DE RA:** In this inset table, is the minimum and maximum values switched? Please confirm and revise as necessary.

Northside Tailings/East Buffalo Gulch Area & Diggings East Stormwater Basin Area Soil Characterization Data Summary Report (DSR)

19. **Section 3.2.3, Sample Shipping and Handling:** The text states that all chain of custody forms were prepared as specified in the standard operating procedures (SOP). The chain of custody for SDG 10456994 was not properly filled out and did not meet the Level B criteria as discussed in the data validation report (DVR). All samples associated with this sample delivery group (SDG) were designated as screening quality. This should be discussed in the data summary report (DSR).

20. **Section 4.2, Diggins East Stormwater Basin Area:** It appears three samples are missing from Table 1a: DE-BH-03D; DE-BH-09D-7.5-10.0 and DE-TP-07-D. Please confirm and update the table and text if required.

21. **Section 4.2, Diggins East Stormwater Basin Area:** It appears the BAK duplicate samples are not presented in Table 1c. It also looks like the duplicate and parent sample concentrations were averaged and reported in the table. Please confirm the process that was done for these duplicate samples. Both results should be presented in the table and not averaged.

Northside Tailings/East Buffalo Gulch Area and Diggings East Stormwater Basin Area Waters of the U.S. Delineation Report

22. Per General Comment 2 in the 30% Response to Comments, what is the process for removing/replacing the wetland soils that act as a sink for metal absorption?

23. Further detail on the capillary break design and how it pertains to the wetlands should be added. Please cross-reference pertinent sections in the Capillary Break Design Memo.

24. **Section 4.3:** The text states, “The FEWA assessment for the NST and DE combined units has an overall rating of 1.18 out of 3.0 (Table 2), with 1.00 being the lowest possible score.” Please describe in this section the rating system (i.e., 1.0 is low *what* and 3.0 is high *what*).

25. **Table 2:** Because the functional categories and their ratings seem to be largely user discretional, the table would benefit from additional discernment/reasoning behind how numeric ratings were chosen for each of the functional categories. For example, why was Hydrologic Support given a

rating of 1 and not 2? Please add text as to why these ratings were chosen and/or add a table column referencing the appropriate sections of the FEWA Evaluation Form.

CALCULATION SUMMARIES

Appendix B-1 uSBC Diversion Hydraulics

26. **Section 2.3:** The text states, "Additionally, to balance the forebay constraints and provide the recommended volume, the forebay spillway crest elevation was set at 5,455.0 feet." Please clarify what is meant by "balance the forebay constraints."

27. **Figure 2:** Please add elevations on the y-axis on the hydraulic profile.

Appendix B-2 Basin and Outlet Structure Hydraulics

28. **Section 1.1:** The text states, "Convey flow through the outlet structure to uSBC that allows a range of flows associated with the four-stage discharge scheme (TREC Inc., 2022a) for the basin to settle out fine silt and clay in the top of the water column." Please describe the four-stage discharge scheme.

29. **Section 3.1:** The text states, "Next, the headwater depth of the weir discharge was determined by using Stokes' Law to determine the dropout of 0.001-millimeter (mm) (fine silt) and 0.011 mm (fine clay) particle sizes." Fine silt is listed as having a diameter smaller than fine clay particles. These should be switched, as clay particles are smaller than silt particles. If this affects subsequent calculations, please revise.

30. **Section 3.1:** Equation 4 says that (trash rack area / outlet area) x Ratio = outlet area, or simplified, trash track area x Ratio = outlet area. The simplification of the equation is not true. For example: if the trash rack area is 96 square feet, the outlet area is 16 square feet, and the ratio is 5, that would equal (96/16) * 5 = 30. The simplification of the formula results in 96 * (1/5) = 16. If this affects subsequent calculations, please revise.

31. **Section 4.1:** Check the calculated values in Section 4.1, based on previous comments.

32. **Section 4.3.1:** This is a universal comment. State missing equations (e.g., missing weir flow equation in Section 4.3.1).

Appendix B-6 Off-Site Stormwater Inputs

33. **Section 2:** The text states, "Not currently modeled in HydroCAD, stormwater enters the site as shown on Figure 1 and flow is conveyed via an existing storm drainpipe and surface water channel to uSBC. Each of the identified outfalls and off-site stormwater inputs will be adjusted to reroute flow to the uSBC diversion structure, DE forebay, and main basin (Figure 1)." The HydroCAD model should be updated with the rerouting to verify impacts.

34. **Section 3.2.3:** The text states, "These existing outfalls were not included as sub-catchment outfalls during HydroCAD modeling efforts for MSD-R-06 and MSD-R-07." The HydroCAD model should be updated to reflect the existing outfalls.

35. **Figure 1:** Have details been provided somewhere for the new oil/grit separator vault?

Appendix B-8 Wave Height

36. Please confirm values used to calculate wave height (see comment in Attachment A below).

Appendix B-9 Structural Calculations: Geotechnical

37. **Table 1** Structural Loads and Design Parameters:
    - Active, At-rest, and Passive earth pressures do not match values provided in the Geotechnical Report. Please review and revised as necessary.
    - Seismic Loads for S_s and S_1 do not match values provided in the Geotechnical Report. Please review and revised as necessary.
    - Recommend using values in Geotechnical Report for Table 1 and all calculations. Please review and revised as necessary.
38. ASCE 7 Hazards Report seems to have errors. The elevation shows 0 ft whereas the ASCE Hazards Report from the Geotech Report shows an elevation of 5454.95 ft which tracks with Google Earth. The ASCE Hazard Report in the calculations indicates a Risk Category of III which does not match Table 1 but values for S_s and S_1 are from this Report. Recommend using Geotechnical Report ASCE Hazard Report values.
39. Subgrade modulus used in calculations was 100 psi/in which does not match the value provided in the Geotechnical Report (200 psi/in). Recommend providing an explanation for the different value or use the value in the Geotechnical report.

3-YEAR GROUND WATER MEMO

40. **Section 2:** The second paragraph indicates the three-year period of data being analyzed is 2018 to 2020. The same period is indicated in Sections 4.1 and 4.2.3. Figures 1 and 2 and Table 1 indicate the period to be 2019 to 2021. At this time, EPA/DEQ request an update the three-year high data to 2021-2023. This three-year high level will need to be updated if the final RD is not completed by May 2025.
41. **Table 1:** Using the data contained in the dataset spreadsheet, we were unable to recreate Table 1. A spot check found different elevations and dates. Several wells were listed in Table 1 but missing from the spreadsheet. Please recreate the spreadsheet and verify Table 1.
42. **Figures 1 and 2**, **Table 1:** These figures and table contain several wells not shown on the figures. Why are these omitted?
43. **Section 4.2.2:** Please show the break lines and artificial data points on the figure.

LINER DESIGN

44. **Section 3.0 Liner System Constraints:** Third paragraph states, “In addition to the hydrostatic uplift force, the potential to trap air or gas (e.g. methane from underlying organic materials) below the liner system will control the liner system grade design.” Please provide additional details as to how the air/gas will be released.
45. **Section 4.1.4 DE Main Basin:** The report states, “A HDPE liner system will meet the requirements of the leakage performance specification.” Please clarify that this is only post installation, prior to backfill and prior to use.
46. **Section 4.1.4 DE Main Basin:**

- Please include discussion on any and all liner penetrations, location/depth, pipe size and liner boot installation and testing.
- Please include information on dewatering at basin depths, and liner bedding material specifications as well as compaction requirements.
- Please include information on construction sequencing from dewatering to bedding and subgrade preparation to liner installation to testing to geotextile installation to backfill above liner and subsequently to turning off dewatering and liner buoyancy inspection requirements.
- Please include information on liner venting frequency and locations.
- Please include anchor trench discussion and backfill requirements in the 95% design.
- Please include requirements for above liner protective rub sheets at maintenance access locations.

47. **Section 4.2 Leakage Monitoring System and Plan:** Please add detail to describe how the bullets listed below the optimize bullet will support in optimizing the monitoring network.

48. **Section 4.2 Leakage Monitoring System and Plan:** Please clarify what the Agencies can anticipate for the Leak Detection Monitoring Plan. A Leak Detection and Monitoring Technical Memorandum is referenced in multiple documents provided as part of the 60% Design. This section, however, only specifies the forthcoming GWRO design. Please check for consistency throughout all documents.

49. Please demonstrate how the leak detection rate of 1×10^{-6} cm/s, as stated in the FRESOW, will be achieved.

50. **Section 4.4 Lifespan and Maintenance:** It states the liner's typical lifetime is 36 years when exposed to the elements, will there be a plan to replace the liner on year 37? Will ice potentially injure the liner?

51. **Section 5.0 Summary:** What is a protected area? Please define.

52. **Section 5.0 Summary:** How will leakage that is detected be addressed?

INSTRUMENTATION AND CONTROLS

General Comments

53. **Section 4.3.2:** The volumes indicated in the second paragraph are not consistent with the volumes described in the Design Report. Please revise. If this affects flow rates described in the section, revise accordingly.

CAPILLARY BREAK DESIGN

54. **Section 2.1 Results and Conclusions:** The D_{10} of the Diggings East is about 10% higher compared to a slightly smaller D_{10} of an alternative location. Given the uncertainty surrounding the empirical constant (C) and void ratio (e) needed to complete the equation, the agencies do not think this is sufficient justification to suggest capillary rise in the media would be lower in Diggings East than an alternate location. Please provide additional discussion to support your design approach and analysis.

55. **Section 2.1 Results and Conclusions:** The conservative empirical approach proposed to overcome the uncertainty associated with the Peak and Hansen equation is valid. However, the agencies would suggest a more thorough literature review. Only one study in the Liu et al. 2014 citation evaluates the loamy soils characterized as the lower D_{10} bound proposed for the backfill.

56. **Section 4.1 Purpose and Design Criteria:** The measured backfill sieve data is not presented alongside the concrete sieve data in this memo, but the D_{10} of the backfill is presented as ~0.03 mm in Section 2. Considering the MDT sand proposed for this study has a minimum grain size of 0.3-0.075 mm, the EPA is skeptical that the sand would not be clogged by the silts which compromise at least 10% of the backfill by volume. The authors have checked the USACE design guidance for compatibility but do not present the design compatibility information in the memo.

57. **Section 4.3 Capillary Break Thickness:** It is not clear what empirical constant and void ratio was used for the calculation to justify a 0.7 ft rise in a sand with a D_{10} of 0.11 mm. Considering the uncertainty these terms present, the EPA does not believe this analysis is sufficient to justify a maximum capillary rise of .7 feet. Can you please provide additional discussion to support your analysis. To support this discussion, the EPA would suggest a "high-low" sensitivity analysis of the void ratio and empirical constant be conducted. This would require using the maximum empirical constant value with a minimum void ratio value to maximize the capillary rise, and vice versa to estimate minimize the capillary rise. This may provide a better justification for the range 0.5-1 feet proposed which currently lacks justification.

58. Please provide further discussion on the potential for groundwater rising higher than the proposed capillary break.

59. Please provide a cross section of a typical capillary break area and additional details on the planned location(s) of the capillary break. These both could be added to the construction drawings.

CONSTRUCTION DRAWINGS

60. **Excavation Cross Sections:** These sheets use the term "Fill Materials" in the legend. Please define.

61. **Sheet G2.1:** General Notes has no mention of dewatering. Please consider adding notes

62. **Sheet C2.0:** Note 3 states that vertical extents of excavation are set at maximum observed groundwater elevation as recorded 2018-2020, however, cross sections on subsequent sheets show excavation up to 12 feet below this GW elevation in several areas? Please update the note to reflect the excavation strategy.

63. **Sheet 2.6.8:** Note 3 states excess stormwater will pass over George Street as an emergency spillway into USBC. What options have been considered and please confirm this approach has been discussed with BSB and DOT?

64. In the 95% design, please provide drawings showing staging areas designated for soil segregation and stockpiling, equipment, materials staging, etc.

COMMENTS FOR CONSIDERATION

65. Several of the reports would benefit from the addition of an acronym list.

FRESOW Checklist

66. *Regrading, Revegetation and Capping:* The fourth column states "Any potential impacts to the groundwater remedy due to implementation of the Diggings East RA will be assessed as a component of Groundwater Remedy Optimization." EPA agrees with the proactive approach to consider GWRO concurrent with construction of the stormwater basins. However, EPA would note that per the CD requires an evaluation of the remedial performance of the subdrain following the 4th and final cycle BMP implementation. Proactive GWRO work does not preclude the requirement for a future evaluation, however, this work will likely support that future evaluation.

DESIGN REPORT

67. **6.3.2.4 Main Basin:** Please confirm that 6" minus is suitable for placing under the liner. Has a geotextile been considered to be used between the liner and the ballast material for protection of the liner?

68. **6.3.2.5 Outlet Structure:** Please consider providing a table of outlet structure elevations or reference Appendix B-1.

SSHASP

69. SSHASP does not fully detail specific activities expressed in the remedial design. Consider prior to the commencement of work, a SSHASP that encompasses all design related construction activities for the remedial contractor, including but not limited to: specific site location of work, task risk assessments, SDSs, field forms, inspections, etc.

Appendix B-3 Recirculation Headloss

70. Please consider going to the 100DLF611 (15HP) Pump or a pump that will give more flexibility for future needs (i.e. more recirculation due to stagnation).

If you have any questions or concerns, please call me at (406) 438-0823.

Sincerely,

EMILIE ROTT

Digitally signed by EMILIE ROTT
Date: 2024.08.16 12:58:59 -06'00'

Emma Rott, PE
Remedial Project Manager

Attachments:
Agency notes on Calculation Summaries: Wave Height Calculation

cc: (email only)
Butte File
Chris Greco / Atlantic Richfield

Mike Mcanulty / Atlantic Richfield
Loren Burmeister / Atlantic Richfield
Dave Griffis / Atlantic Richfield
Jean Martin / Atlantic Richfield
Irene Montero / Atlantic Richfield
David A. Gratson / Environmental Standards
Mave Gasaway / DGS
Adam Cohen / DGS
Brianne McClafferty / Holland & Hart
Daryl Reed / DEQ
Logan Dudding / DEQ
Jon Morgan / DEQ
Kevin Stone / DEQ
Amy Steinmetz / DEQ
Dave Bowers / DEQ
Katie Garcin-Forba / DEQ
Doug Martin / NRDP
Jim Ford / NRDP
Pat Cunneen / NRDP
Katherine Hausrath / NRDP
Ted Duaime / MBMG
Gary Icopini / MBMG
Becky Summerville / MR
John DeJong / UP
Robert Bylsma / UP
John Gilmour / Kelley Drye
Leo Berry / BNSF
Robert Lowry / BNSF
Brooke Kuhl / BNSF
Lauren Knickrehm / BNSF
Doug Brannan / Kennedy Jenks
Matthew Mavrinac / RARUS
Harrison Roughton / RARUS
Mark Neary / BSB
Eric Hassler / BSB
Chad Anderson / BSB
Brandon Warner / BSB
Abigail Peltomaa / BSB
Eileen Joyce / BSB
Sean Peterson/BSB
Josh Vincent / WET
Scott Bradshaw / W&C
Emily Evans / W&C
Pat Sampson / Pioneer
Andy Dare / Pioneer
Karen Helfrich / Pioneer
Randa Colling / Pioneer
Scott Sampson / Pioneer

Jesse Schwarzrock / Pioneer
Ian Magruder/ CTEC
CTEC of Butte
Scott Juskiewicz / Montana Tech
David Shanight / CDM Smith
Curt Coover / CDM Smith
Chapin Storrar / CDM Smith
Erin Agee / EPA
Will Lindsey / EPA
Jamie Miller / EPA
Carolina Balliew / EPA
Charlie Partridge / EPA

Attachment:
Agency notes on Calculation Summaries: Wave Height Calculation

ATTACHMENT A: Wave Height Calculation

Wave Calculation

Consider design wind velocity, U_z, of 46 mph (20.56 m/s) at an elevation, z, of 9.84 feet (3 m) above the mean water surface with an 814.89 feet (248.38 m) fetch, F, and approximately 8.20 feet (2.5 m) water depth. Acceleration of gravity, g, is 9.81 m/s^2 used in this calculation process. The equations used are in metric units and have been converted to English units.

Using the design wind speed of 20.56 m/s, U_z, the wind speed at 10 m above the water surface is calculated below:

Wasn't z defined as 3 m per above?

$$\textbf{Equation 1}: \; U_{10} = U_z\left(\frac{10}{z}\right)^{\frac{1}{7}} = 20.56\left(\frac{10}{2.5}\right)^{\frac{1}{7}} = 25.06\frac{m}{s} = 56.06\ mph$$

The wind stress factor, U_A, is then calculated:

$$\textbf{Equation 2}: \; U_A = 0.71U_{10}^{1.23} = 0.71(25.06^{1.23}) = 37.33\frac{m}{s} = 83.49\ mph$$

Check minimum duration, t_{min}, of the design wind (conservatively assumed constant during this time period):

$$\textbf{Equation 3}: \; t_{min} = \frac{108.2 * U_A * \left(\frac{g*F}{U_A^2}\right)^{0.28}}{g} = \frac{108.2(37.33)\left(\frac{9.81*377.56}{37.33^2}\right)^{0.28}}{9.81} = 533.84\ sec = 8.90\ min$$

The significant wave height used in design, H_{mo}, and peak period, T_p, are then calculated as follows:

Wasn't U_A Defined as 37.33 m/s previously?

$$\textbf{Equation 4}: \; H_{mo} = \frac{0.0025 * U_A^2 * \left(\frac{g*F}{U_A^2}\right)^{0.44}}{g} = \frac{0.0025(36.16^2)\left(\frac{9.81*248.38}{36.16^2}\right)^{0.44}}{9.81} = 0.45\ m = 1.49\ ft$$

$$\textbf{Equation 5}: = T_p = \frac{0.4147 * U_A * \left(\frac{g*F}{U_A^2}\right)^{0.28}}{g} = \frac{0.4147(36.16)\left(\frac{9.81*248.38}{36.16^2}\right)^{0.28}}{9.81} = 1.85\ sec$$