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Berkely Pit Repository Cost Comparison

Josh Bryson

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April 25, 2024

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RE: Berkely Pit Repository Cost Comparison

Agency Representatives:

Implementing the selected remedy within the Silver Bow Creek Conservation Area (SBCCA) of the Butte Priority Soils Operable Unit (BPSOU) will result in significant quantities of excavated tailings and other materials requiring disposal in an approved repository. The BPSOU Record of Decision (ROD) and Consent Decree (CD) identified Timber Butte and the Butte Mine Waste Repository (BMWR) as approved disposal locations. However, during public comment on the proposed CD and the ROD Amendment, the community expressed concern related to use of the Timber Butte repository. Consistent with the final CD, EPA, in consultation with DEQ, issued the *Butte Priority Soils Operable Unit Repository Siting Criteria and Community Engagement Plan process throughout remedial work* (EPA, June 2020), directing Atlantic Richfield Company and Butte-Silver Bow (Settling Defendants) to perform community engagement activities, assemble a Repository Siting Committee, and consider multiple criteria to identify and recommend a preferred repository location. This Repository Siting Study (RSS) process in turn identified three suitable alternatives: the Berkeley Pit, Kelley Mine Area, and Shields Avenue locations. The next step in the process is for Atlantic Richfield to conduct further technical evaluations and design and develop a specific repository(s) recommendation for EPA approval.

Use of the Berkeley Pit would require disposal of excavated materials in what is effectively a wet closure facility, which was not expressly contemplated by the CD or ROD Amendment. To better understand the potential significance of this alternative, EPA requested that Atlantic Richfield Company develop a cost comparison for use of the Berkeley Pit versus the BMWR. Atlantic Richfield understands that EPA will use this letter and the attached cost comparison table in developing an Explanation of Significant Differences (ESD) to align the CD and the ROD

and create flexibility in the selection of the repository(s), including the potential use of the Berkeley Pit.

The current estimated quantity of SBCCA excavated materials requiring disposal in a repository is 912,000 loose cubic yards (lcy). This includes materials excavated from the Butte Reduction Works, Buffalo Gulch, Diggings East, Northside Tailings, and Blacktail Creek project sites. The quantity of waste material requiring disposal may be adjusted as material characterization and remedy designs are refined, but this estimate is considered suitable for ESD cost comparison. The attached Table 1 outlines the estimated costs for disposing of 912,000 lcy of waste either in the originally approved BMWR (via truck hauling and dry closure), or in the Berkeley Pit (via slurry delivery system and wet closure).

The cost evaluation addresses the following fundamental work items that are considered directly comparable between the two options:

- Infrastructure Improvements (Haul Roads vs. Slurry Delivery System)
- Repository Expansion (Dry Closure vs. Wet Closure)
- Transporting of Waste Materials (Truck Haul vs. Slurry Delivery System)
- Water Treatment (Butte Treatment Lagoons vs Polishing Plant)
- Permanent Containment of Waste (Soil Cover vs. Wet Closure)
- Stabilization of Repository (Vegetation vs. Wet Closure)
- Operation and Maintenance (Vegetated Cover vs. Wet Closure)

The cost analysis provides a sub-task and unit cost breakdown based on actual historic costs for similar work with explanatory notes clarifying the assumptions used. The costs are provided as summary totals with relative percent difference (RPD) cost changes. Because many of the specific details of the work scope and implementation logistics are still being developed as designs progress, the attached costs are qualified as estimates with an expected accuracy of +50% to -30% in accordance with EPA guidance for ESD's.

Based on the attached preliminary cost analysis, Atlantic Richfield estimates that disposal in the Berkeley Pit will cost ~9% more than disposal in the BMWR or an equivalent dry closure location. This is not a significant cost impact to the overall BPSOU remedial action.

We can provide additional supporting information for this cost comparison if requested by EPA. Atlantic Richfield supports the consideration and use of the Berkeley Pit as a repository location. At the conclusion of the RSS process, Atlantic Richfield believes that the Settling Defendants will be able to provide a recommendation of one or more repository locations that meet community, project, and regulatory needs.

Atlantic Richfield Company

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If you have any questions or comments, please call me at (406) 723-1834.

Sincerely,



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An affiliate of **Atlantic Richfield Company**

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Dan Janosko / BSB – email
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Scott Bradshaw / TREC – email
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Emily Evans / W&C – email
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Deah Baker / W&C – email
Brad Archibald / Pioneer – email
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CTEC of Butte – email
Scott Juskiewicz / Montana Tech – email

File: RMO – upload
BPSOU SharePoint – upload

Table 1 - Remedy Cost Changes for Waste Disposal at Berkeley Pit

Primary Comparable Remedy Items	Approved Remedy (2006 ROD, 2020 Ammendment, CD and FRESOW) (Including SBCCA waste disposal at BMWR or equivalent repository near Berkeley Pit) ^{1,2}						2024 Revised Remedy (Including SBCCA waste disposal at Berkeley Pit) ¹					
	Work Task	Subtask	Quantity	Units	Unit Cost	Total	Work Task	Subtask	Quantity	Units	Unit Cost	Total
Haul Road/Infrastructure Development	1.0a Haul Road Development to BMWR ³	1.1a Mobilization	1	LS		\$42,865	1.0b Slurry Delivery System Installation to Berkeley Pit ⁴	1.1b Mobilization	1	LS		\$274,603
		1.2a Supervision	1	LS		\$49,216		1.2b Supervision	1	LS		\$315,285
		1.3a Safety, Dust, Traffic Control	1	LS		\$66,680		1.3b Infrastructure Improvements	1	LS		\$427,160
		1.4a Haul Road Alignment Subgrade	11,472	LF	\$7.19	\$82,484		1.4b Alignment Prep/Fencing	13,464	LF	\$33.72	\$454,006
		1.5a Stormwater Improvements	1	LS	\$748,734	\$748,734		1.5b Pump/Electrical Install	9	Each	\$691,465	\$6,223,185
		1.6a Borrow Development	50,987	LCY	\$1.93	\$98,404		1.6b Dual Pipe Install	26,928	LF	\$78.80	\$2,121,926
		1.7a Material Hauling/ Placement	50,987	LCY	\$11.65	\$593,995		1.7b Controls, Checks, Monitoring	26,928	LF	\$23.56	\$634,424
		1.8a Fuel and Incidentals	1	LS		\$63,992		1.8b Screen, Slurry Tank, Conveyor	1	LS	\$736,930	\$736,930
Repository Expansion	2.0a Repository Expansion/ Development ⁵	2.1a Mobilization	1	LS		\$16,399	2.0b Repository Expansion Not Required for Berkeley Pit ⁶		0			\$0
		2.2a Supervision	1	LS		\$18,829						
		2.3a Investigation and Design	24	Acres	\$17,495	\$419,880						
		2.4a Grading and Subgrade Prep	24	Acres	\$6,792	\$163,020						
		2.5a Fuel and Incidentals	1	LS		\$24,482						
Transport and Place Waste in Repositories	3.0a Truck Haul and Placement BMWR ⁷	3.1a Mobilization	1	LS		\$419,255	3.0b Slurry Delivery to Berkeley Pit ⁴	3.1b Mobilization	1	LS		\$227,836
		3.2a Supervision	1	LS		\$481,367		3.2b Supervision and Safety	1	LS		\$261,589
		3.3a Safety, Dust, Traffic Control	1	LS		\$652,175		3.3b Excavation and Stockpiling	912,000	BCY	\$2.60	\$2,371,200
		3.4a Excavation and Stockpiling	912,000	LCY	\$2.60	\$2,371,200		3.4b Material Processing	314,400	BCY	\$3.64	\$1,144,416
		3.5a 2-Stage Hauling/ Placement	912,000	LCY	\$13.74	\$12,530,880		3.5b Mix & Slurry to Berkeley Pit	912,000	BCY	\$7.52	\$6,858,240
		3.6a Fuel and Incidentals	1	LS		\$625,887		3.6b Fuel and Incidentals	1	LS		\$435,702
Water Treatment	4.0a Treatment of Dewatering Water ⁸	4.1a Supervision and Safety	1	LS		\$19,232	4.0b Treatment of Berkeley Pit Water From Waste Volume Displacement ⁹	4.1b Supervision and Safety	1	LS		\$36,808
		4.2a Water Treatment at BTL	341	MGAL	\$2,090	\$712,302		4.2b Water Treatment at HBWTP	454	MGAL	\$3,000	\$1,363,258
		4.3a Monitoring and Maintenance	1	LS		\$29,917		4.3b Monitoring and Maintenance	1	LS		\$57,257
Permanent Cover over Repositories	5.0a Expansion and Coversoil Placement at BMWR or Equivalent/ Location Near Berkeley Pit (24 acres) ¹⁰	5.1a Mobilization	1	LS		\$40,831	5.0b Surface Cover at Berkeley Pit Not Required for Wet Closure ⁶		0			\$0
		5.2a Supervision	1	LS		\$46,880						
		5.3a Safety, Dust, Traffic Control	1	LS		\$63,515						
		5.4a Repository Preparation/ Grading	24	Acres	\$3,697.48	\$88,740						
		5.5a Borrow Development (Helehan)	69,696	LCY	\$1.93	\$134,513						
		5.6a Material Hauling/ Placement	69,696	LCY	\$17.62	\$1,228,044						
5.7a Fuel and Incidentals	1	LS		\$60,954								
Surface Stabilization/ Revegetation of Repositories	6.0a Surface Stabilization at BMWR or Equivalent/ Location Near Berkeley Pit (24 acres) ¹¹	6.1a Supervision	1	LS		\$1,887	6.0b Surface Stabilization at Berkeley Pit Not Required for Wet Closure ⁶		0			\$0
		6.2a Organics	24	Acres	\$1,057.64	\$25,383						
		6.3a Fertilizer	24	Acres	\$820.15	\$19,684						
		6.4a Seeding	24	Acres	\$658.62	\$15,807						
Repository O&M Costs	7.0a Annual Vegetation Monitoring, Management and Reporting ¹²	7.1a Weed Spraying	24	Acres	\$342.31	\$8,215	7.0b Annual H ₂ S Monitoring, Pit Stability Monitoring and Reporting ¹³	7.1b Monitoring System Install	1	LS	\$26,100.00	\$26,100
		7.2a Vegetation Repair	24	Acres	\$657.28	\$15,775		7.2b Data Collection/ Monitoring	10	Years	\$5,560.00	\$55,600
		7.3a Monitoring and Reporting	15	Years	\$10,357.42	\$155,361		7.3b Data Analysis and Reporting	10	Years	\$9,432.00	\$94,320
Total¹⁴ \$22,136,782						Total¹⁵ \$24,119,843						

1. BPSOU Project Sites Include Buffalo Gulch, Diggings East, Butte Reduction Works, Northside Tailings, and Blacktail Creek.

2. Assumes additional repository space needed to accommodate all waste generated from BPSOU Project Sites would be at a similar location (with similar haul distances) as the BMWR.

3. Assumes a dedicated off-street haul road will be required to transport waste materials from a centralized loading area near the Butte Civic Center to the BMWR. Wastes would be hauled in two-stages with Stage 1 from SBCCA Project Sites to the centralized loading area and Stage 2 to the BMWR.

4. Assumes dual 8" HDPE slurry lines will be used to transport wastes with mid-stage pumps and portable temporary pumps at load-out locations. A screen and pug-mill will be situated at the slurry loading end with guided pipe discharge at the terminal end at the west wall of the Berkeley Pit.

5. Assumes waste can be consolidated to a total 20ft fill depth (in individual compacted lifts) in the repository expansion area. Assumes no land acquisition will be required.

6. Assumes Berkeley Pit will remain in its current form and function as an open water pit suitable for containment and wet closure of wastes.

7. Includes fuel, dust control, safety, supervision, traffic control for two stage hauling and placement of wastes from SBCCA project sites to centralized loading area (Stage 1) and then to BMWR (Stage 2) . Assumes waste is placed in compacted lifts to 20 ft total height and area of 24 acres.

8. Assumes dewatering water generated from SBCCA project site excavations will require treatment at Butte Treatment Lagoons and is not going to Berkeley Pit.

9. Assumes dewatering water generated from SBCCA project site excavations will be used for slurry make-up water and will go to Berkeley Pit without requiring treatment. Also assumes additional Berkeley Pit water will require treatment at Horseshoe Bend Treatment plant to offset slurry displacement volume and meet pit water elevation objectives.

10. Includes fuel, dust control, safety, supervision, traffic control for street legal hauling and placement of 18" coversoil from Helehan Borrow Area. Assumes waste is placed in compacted lifts to 20 ft for a total area of 24 acres to accommodate 912,000 lcy of waste.

11. Assumes standard revegetation practices with native species to requirements identified in the BPSOU Technical Specifications.

12. Assumes standard level of care for weed spraying and vegetation repair with maintenance activities ceasing upon compliance determination 5 years following construction completion at SBCCA Project Sites.

13. Assumes continuous (24/7) H₂S monitoring and annual reporting will be required at Berkeley Pit from start to end of construction to confirm compliance with air quality standards.

14. ESD Cost Estimate Range (-30%/+50%) = \$15,495,747/\$33,205,173

15. ESD Cost Estimate Range (-30%/+50%) = \$16,883,890/\$36,179,765

Cost Difference Between Approved and Revised Remedy	\$1,983,061
% Difference from Approved Repository Approach	9%
% Difference in Overall Remedy	2%