UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Ref: 8SEM-EMR

ACTION MEMORANDUM

SUBJECT: Action Memorandum for a Removal Action at the Silver Dyke Mine Adit and Drainage Site located within Operable Unit 3 (OU3) of the Carpenter-Snow Creek Mining District National Priority List (NPL) Site, near the Town of Neihart in Cascade County, Montana.

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TO: Ben Bielenberg, Acting Director
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I. Purpose

The purpose of this Action Memorandum is to request and document approval of the proposed removal and request exemption from the 12-month statutory limit limitation for the removal action described herein for the Silver Dyke Mine Adit and Drainage Site (Site). This Site is located within Operable Unit 3 (OU3) of the Carpenter-Snow Creek Mining District National Priorities List (NPL) Site (CSCMD Site), near the Town of Neihart, Cascade County, Montana. This emergency removal action addresses severe erosional damage to the area around and down-drainage of the Silver Dyke Mine adit that was caused by a high level of snowmelt followed by extremely heavy rains this past Spring. The Removal Actions described herein will install a series of drainage control

measures to protect the slope immediately above the adit; remove approximately 40,000 cubic yards of waste rock that are highly contaminated with lead and arsenic and located directly below the adit: install series of control ponds to regulate surge flows from the adit and drainage; and repair two downstream tailings ponds that were damaged by these highwater events. Conditions existing at the Site present a threat to public health, welfare or the environment and meet the criteria for initiating a removal action under 40 CFR 300.415(b)(2) of the National Contingency Plan (NCP).

An exemption from the 12-month statutory limit on removal actions is required due to the scale of the project, high elevation in conjunction with the difficult work conditions, and the short construction season in Montana. It is expected that most actions will be completed in 2023 but may extend into 2024. It is also anticipated that some Post Removal Site Control (PRSC) actions, such as the reestablishment of vegetation, will extend a few years further.

This removal action involves no nationally significant or precedent-setting issues. This emergency removal action will not establish any precedent for how future response actions will be taken and will not commit the US Environmental Protection Agency (EPA) to a course of action that could have a significant impact on future responses or resources. Currently, OU2 and OU3 of the CSCMD Site are in the Remedial Investigation/Feasibility Study (RI/FS) portion of the cleanup. The Final RI was completed in March of 2020 and the Record of Decision and Remedial Design are anticipated to be finalized by late 2024.

II. Site Information

A. Site Description

Site Name:	Silver Dyke Mine Adit and Drainage, part of OU3 located within the Carpenter-Snow Creek Mining District NPL Site
Superfund Site ID (SSID):	089X
Operable Unit:	OU3 of the CSCMD Site
CERCLIS Number:	MT0001096353
Site Location:	Cascade County, Montana
Lat/Long:	46.9765o North, -110.7007o West
Potentially Responsible Party:	
NPL Status:	Final on 9/13/2001
Removal Start Date:	06/28/2023

B. Site Background

1. Site Evaluation

   The CSCMD Site is located north of the Town of Neihart, Montana in the Little Belt Mountains. Mining activity in the Little Belt Mountains accounts for some of the earliest mining activity in Montana. Mining activity in the Carpenter-Snow Creek area began in 1880. Although silver was the primary mineral mined, deposits of copper, zinc, lead, and gold were also recovered.

Today the district suffers from heavy metal contamination in the watersheds and soils due to decades of historic mining. The district was added to the NPL in 2001. The EPA is the lead agency conducting site-wide remediation activities, in consultation with the Montana Department of Environmental Quality (MDEQ) and the United States Forest Service (USFS). Due to its geographic size, the CSCMD Site is divided into five operable units (OUs) – the Town of Neihart (OU1), Mine and Watershed (OU2), the Silver Dyke Complex (OU3), Mine Waste on the Neihart Slope Drainages (OU4), and Mine Wastes along Belt Creek (OU5).

During its operation, the Silver Dyke was the largest producer of ore in the Neihart mining district, and its silver production was second only to Silver Bow County (Schafer 1935). The operations at the Silver Dyke Mining Complex resulted in several tailings deposits at the CSCMD Site.

The Silver Dyke mine, mill, and associated wastes are located within OU3 of the CSCMD. During its operation, the Silver Dyke was the largest producer of ore in the CSCMD Site, and the mine's silver production was second only to Silver Bow County (Schafer 1935). One million tons of ore were blocked out by the Silver Dyke Mining Company beginning in 1921 and a 500-ton flotation mill was constructed. Ore production and milling operations began during the winter of 1923. The initial ore block was 80 feet wide, 200 feet long, and 150 feet thick. Raises were installed at 45-foot centers and ore was extracted from the bottom up. The diameter of the raises was increased to produce additional ore. Ore from the vertical raises was dropped through inclined raises to bulldozing chambers and then through loading chutes to ore carts on the lower level. The development of the initial ore block was almost complete in early 1924 when spring melting occurred. Surface water and groundwater entered the mine and turned the broken ore into sticky mud that was difficult to remove. The ore block was therefore re-mined from the top down to keep up ore production. The re-mining occurred from early summer 1923 through winter and spring of 1924. Ore production was difficult and costly. To reduce costs, the mining methods were modified to include vertical slicing completed by blasting sections of ore around a raise. The ore was then bulldozed to chutes for loading into ore carts. By mining from the bottom up, production was possible from late fall through late spring. During the summer, the stopes were extended to the surface. Table 1 presents the production of the Silver Dyke mine during the period of operation (Hayes 1936). The Silver Dyke mine operated until 1929, when the blocked-out ore was depleted, and no new deposits could be found. Mine development resulted in a "Glory Hole" with an airspace of approximately 450,000 cubic yards (Tetra Tech,

2017) and a circular tunnel connected to the glory hole by an unknown number of raises. The raises currently have no surface expression in the Glory Hole and were filled with ore or waste rock during mine shutdown, during subsequent mining explorations, or through erosion.

Figure 1: Silver Dyke Mine Ore Production

Year	Tons of Ore
1923	106,076
1924	148,664
1925	167,847
1926	223,924
1927	263,868
1928	192,583
Total	1,102,962

The Silver Dyke mill constructed and operated concurrently with the mine and concentrated the valuable portion for shipment off-site. In 1926, after three years of operation, costs needed to be reduced without significant capital expenditure (Hayes 1936). One solution was to increase the ore feed rate through the mill by screening out material greater than two inches in diameter. A vibrating screen was installed, and the larger material was conveyed to a pile located north of the mill. Two workers were stationed along the conveyor to hand pick mineralized rock for return to the mill. As a result of the screening process, 30 percent of the ore was discarded as low grade. In 1927, almost 80,000 tons were discarded. The waste rock consisted of 0.51 percent lead, and 0.32 percent copper and contained approximately 1.35 ounces silver per ton. By using the screening method, mill capacity increased 43 percent while reducing costs 24 percent. An attempt was also made to install a flotation circuit, but the throughput was too slow to be practical.

In 1928, a Joplin type cooley jig was installed along with a cone crusher that crushed the ore to minus one-half inch. The jig then removed material greater than 0.065 inch. The larger grained material was dumped down the hill west of the mill. Up to 45 percent of the mill feed was disposed of as jig tailings (Figure 2). Installation of the jig increased mill capacity another 20 percent. The metal content of the jig tails was very similar to the metal content of the flotation tails, indicating that recoverable metals were not removed.

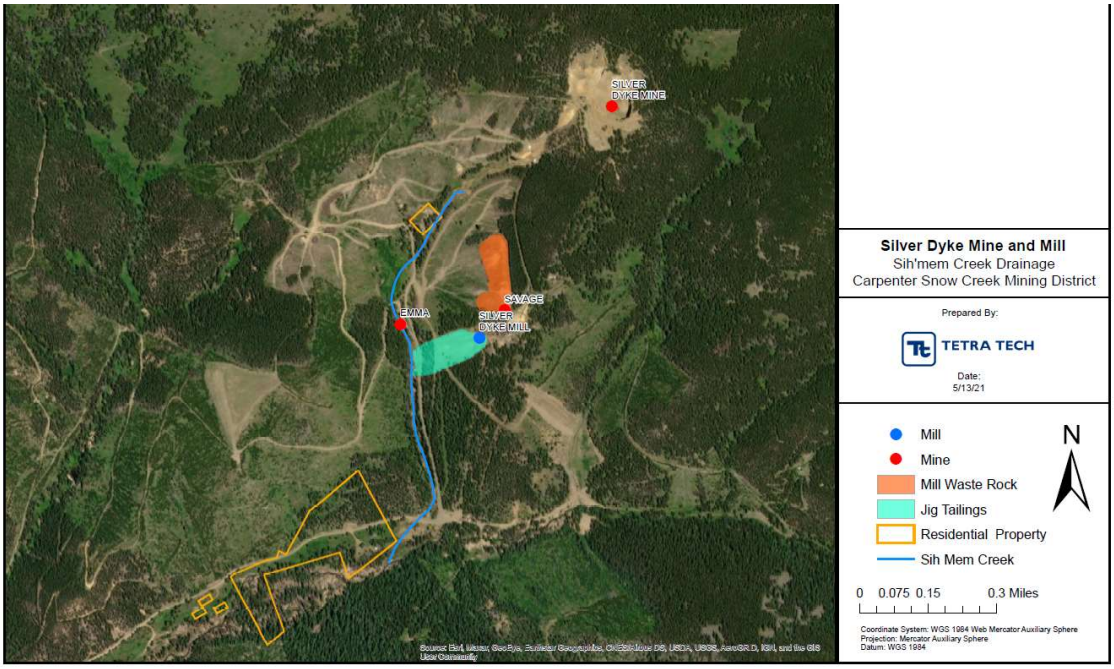

Figure 2: Silver Dyke Mine, Jig Tailings, and Sih-mem Creek Flood Plain Locations

Jig tailings from the milling operations were disposed via gravity into a coulee approximately 600 yards from the Silver Dyke Mine portal entrance on the opposite side of the hill and an earthen dam was constructed at the mouth of the coulee to impound the tailings. The impoundment has experienced significant erosion damage from summer storms and spring runoff. A survey from the light detection and ranging (LiDAR) flight estimated 35,000 cubic yards of the rejected jig tailings were disposed on the steep hill slope of the impoundment (Figure 3).

Figure 3: Jig Tailings Impoundment (located on the right below the burned mill).

Above the Silver Dyke Adit and Glory Hole are a series of access roads, logging roads, and ATV trails. Unfortunately, because of their orientation and construction, these roads largely drain into a gulley that lies between the Glory Hole and directly above the Silver Dyke Adit.

On June 21, 2023, an EPA OSC, and the Remedial Project Manager (RPM) for OU3 of the CSCMD, accompanied by an EPA Community Involvement Coordinator, personnel from MDEQ, the USFS OSC and the USFS Forrest Supervisor, and ERRS (Environmental Restoration) and START (Tetra Tech) contractor personnel conducted a Removal Site Inspection (RSI). This evaluation had been requested by the RPM after he had observed damage to the Site resulting from the Spring runoff.

During the 2023 high spring runoff a large volume of water from the hill drained through the gulley, resulting in large amounts of erosion and mudslides (see Figure 4). This damage resulted in a blockage of the Adit drainage, that induced large fluctuations in the adit flow (Tetra Tech 2023). At some points, the flow leaving the Adit proper were reduced to 0.0 gallons per minute for extended periods of time, followed by rapid increases in the measured flowrate to above 600 gpm. The interpretation offered by the Tetra Tech Mine Engineer was that the adit drain was periodically plugging. Thus, backing up water until the head pressure was sufficient to clear the blockage. This raises the possibility that if the pressure builds up too rapidly, or too

high, that a catastrophic failure of the Adit closure could occur. This situation would be expected to get worse if the pattern of rain and erosion continues.

Figure 4: Photograph taken on June 21, 2023, from the Silver Dyke Adit looking upslope at the eroded gulley.

Additionally, the high flow concentrated down the gulley eroded large cuts into the waste rock below the adit (see Figure 5). This resulted in large slugs of contaminated waste rock to be washed into Sih-mem Creek, with visible evidence apparent downstream into Carpenter Creek. The Remedial Investigations, as well as other prior assessments (see discussion below), had already concluded that the Adit drainage, the waste rock and tailings on-site all negatively impact Sih-mem Creek and downstream with heavy metals (Tetra Tech,2017; see Table 1). These impacts could only be further exacerbated by the conditions observed on June 20, 2023.

Figure 5: Photograph taken on June 21, 2023, from just below the Silver Dyke Adit looking downslope at the eroded gulley.

Figure 6: Photographs from June 21, 2023, of Silver Dyke Adit drainage cutting through waste rock below the Adit.

Below the waste pile, that is essentially bisected by the adit flow and surface drainage, the flow joins Sih-mem Creek. Orange iron staining, as well as

visible accumulations of waste rock were observed along this drainage (Figure 7).

Figure 7: Photograph from June 21, 2023, showing waste rock and iron staining below the Waste Pile.

In 2014, the MDEQ, in cooperation with the EPA and the USFS, tasked Tetra Tech, Inc. to complete a supplemental remedial investigation (RI) in the vicinity of the Silver Dyke Mill to determine the areal extent of the mine waste. Investigations showed that the mine waste contains elevated

concentrations of metals and arsenic that may pose a risk to ecological receptors and to human recreational and residential users (Silver Dyke Mill Soil Investigation, Tetra Tech May 15, 2015).

On May 5, 2021, the EPA conducted a joint-agency site visit together with MDEQ and USFS in support of Removal Actions taken in 2021-2022. Evidence of severe rill erosion cutting into the tailings on the hill side were observed. This indicates that a significant volume of tailings had already eroded into the Sih-mem creek from the hill side of the impoundment during spring runoff and episodic rain events. In addition, access to the Site is unrestricted and the area is frequently used by off road enthusiasts.

On August 31, 2021, a Superfund Technical Assessment and Response Team (START) conducted further sampling to refine excavation depths and assess metal concentrations. Elevated concentrations of lead were dominantly found at the Site. The highest lead concentrations were found from samples collected in the flood plain area (54,900 milligram/kilogram (mg/kg)), jig tailings (7,110 mg/kg) and along the Sih-mem Creek (7,310 mg/kg). (Jig Tailings Sampling Technical Memorandum, Tetra Tech, Feb. 18, 2022).

Table 1: EPA Survey of surface water metal concentrations of Sih-mem Creek. Surface water concentrations are in micrograms per liter. (From Tetra Tech SAR Reports 2017-2018)

Site ID	Date	Analysis	Aluminum	Cadmium	Copper	Iron	Lead	Magnesium	Manganese	Zinc
CSC-117	June 2017	Dissolved metals	161	120	1230	1560	71.7	26800	20300	24000
CSC-117	June 2017	Recoverable metals	3110	120	1880	10600	752	26500	20400	28200
CSC-117	Sept 2017	Dissolved metals	1430	305	3230	<500	323	70700	51800	56400
CSC-117	Sept 2017	Recoverable metals	1410	289	3150	153	321	68100	43700	53500
CSC-117	July 2018	Recoverable metals	669	223	2700	1510	315	51000	42800	48600
EPA		MDL	100	0.72	5.00	1000	3.2	500	10.0	120

After Sih-mem Creek runs past the Jig Tailings piles it joins Carpenter Creek. Carpenter Creek in turn runs through two large fluvial Tailings Impoundments that were constructed in the 1920s (Engineering and Mining Journal, Volume 123, No. 6). These impoundments consisted of cribbing dams constructed across the Carpenter Creek Drainage which simply back up the tailings in the creek and surrounding floodplain. The upper impoundment holds approximately 90,000 cubic yards of tailings, while the lower is nearer to 200,000 cubic yards. Previous Removal Actions have been taken by the USFS and EPA to stabilize these impoundments, as well as to limit run-on on

top of them. However, the June 21, 2023, RSI found that portions of the berms of both impoundments had been partially damaged and/or undercut by this Spring's run-off (see Figure 8). Additionally, during and immediately following this RSI, this run off was continuing and was being exacerbated by heavy rains. As large storms continued to impact the area, this was causing significant erosion above the adit. Approximately one week after this RSI, it became evident that this erosion had buried the limited infrastructure at the adit that was allowing mining impacted water to drain.

Figure 8: Photograph taken on June 21, 2023, showing the undercutting of the Lower Tailings Impoundment

2. Physical location and Site characteristics

The CSCMD Site is in west-central Montana within the Little Belt Mountains in Township 14N, Range 8E, Section 15, 16, and 21. The Silver Dyke Mine Adit and drainage is located near the Jig Tailings Site (46.9765° North, -110.7007° West) is located within OU3, approximately 2 ½ miles northeast of the Town of Neihart in the Carpenter Creek watershed. The Site's elevation is approximately 6280 feet. As of the 2020 census, Neihart's population was 81 individuals. There are numerous seasonal and regular residents within a one-mile radius of the Site.

The Silver Dyke Mine Adit sits beneath a denuded gulley directly downhill from the Glory Hole. The Adit drainage, as well as the surface drainage collected from the roads above the gulley drain into Sih-mem Creek, past the Silver Dyke Mill and Jig tailings. The flow then joins Carpenter Creek and runs past the two fluvial tailings impoundments, which have no vegetative cover and is composed of clay to fine sand tailings. This Site lies within the Carpenter Creek floodplain and is threatening to release contaminated sediment, waste rock, and tailings into the Sih-mem Creek during storm events and spring run-off. Overland flow and run-off from side gulches drain over the mine workings and erodes mine wastes tailings and associated hazardous substances into the stream system.

Prior to the damage done by this year's run-off the Carpenter-Snow Creek OU3 Erosion Model Technical Memo (Tetra Tech, October 20, 2020), concludes the largest mass of sediment lost occurred from the Silver Dyke Jig Tailings and the Silver Dyke Tailings Impoundment, followed by waste rock piles at the Silver Dyke Mine and other mines. The Silver Dyke Tailings Impoundment located on the same slope as the jig tailings was removed in 2014 (TCRA- June 11, 2013, and TCRA Amendment - Sept. 2, 2014). The Silver Dyke Jig Tailings and Impoundment were addressed by a TCRA in 2022. These prior Removal Action areas appear to have weathered the Spring 2023 run-off well. Standard PRSC efforts are planned for these. However, conditions of the Silver Dyke Mine Adit and Drainage have deteriorated, and now are dumping large amounts of mine wastes, into the Carpenter Creek watershed. Also, the Silver Dyke Mine Adit also appears to have become less stable than in previous years.

A 2011 survey by Tetra Tech EM Inc, in cooperation with the USFS, the EPA, and MDEQ found that mining contamination had migrated down the Carpenter Creek drainage to Belt Creek. Contaminated ground and surface water that is produced when precipitation infiltrates the mine tailings, also contains elevated concentrations of heavy metals.

According to EPA's Environmental Justice (EJ) Screening and Mapping Tool, the data do not indicate potential areas of EJ concern at or near the Site.

3. Release or threatened release into the environment of a hazardous substance, pollutant or contaminant.
Sampling and analysis of the Silver Dyke Mine Adit, wastes rock piles, fluvial tailings impoundments and in the flood plain indicate the presence of high concentrations of heavy metals, including arsenic, lead, cadmium, chromium, and barium. In addition, these same hazardous substances are found in surface waters and sediment many miles downstream of the Site. These heavy metals are "hazardous substances" as defined by Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended (CERCLA), 42 U.S.C. § 9601(14). The release of these hazardous substances into the environment may pose an imminent and substantial threat to public health and the environment.

Arsenic

Large doses of arsenic may be acutely fatal to humans. Symptoms include fever, loss of appetite, an enlarged liver, and heart rhythm abnormalities. Sensory loss in the peripheral nervous system may also occur. Chronic exposure to arsenic generally results in skin lesions, liver damage, and peripheral vascular disease.

Peripheral vascular disease may progress to endarteritis obliterans and gangrene of the lower extremities (Blackfoot disease). Arsenic is a human carcinogen based on data of increased lung cancer mortality due to inhalation exposure. Skin cancer also increases in individuals exposed to arsenic via drinking water.

Arsenic poisoning can represent a toxic syndrome among domestic animals. Arsenic causes hyperemia and edema of the gastrointestinal tract, hemorrhage of the cardiac serosal surfaces and peritoneum, and pulmonary congestion and edema. It may cause liver necrosis.

Lead

Lead is classified as a B2 carcinogen by the EPA. Lead can enter the body via ingestion and inhalation. Children are the segment of the population at greatest risk from lead toxicity.
The most serious effects associated with markedly elevated blood lead levels include neurotoxic effects such as irreversible brain damage. Children have exhibited nerve damage, permanent mental retardation, colic, anemia, brain damage, and death due to lead exposure.

Lead is ubiquitous in the environment and bioaccumulation is known to occur, being found in the tissue of many wild animals, including birds, mammals, fishes, and invertebrates. The most publicized effects of lead have been on the impact of the ingestion of lead by waterfowl. Acute and chronic lead toxicity

has been demonstrated as a definite threat to bird populations. There is also evidence that lead at high concentrations can eliminate populations of bacteria and fungi on leaf surfaces and in soil.

Zinc

Zinc is ubiquitous in the environment, found mainly as zinc oxide or sphalerite (ZnS). Zinc is released into the environment as the result of mining, smelting of zinc, lead and cadmium, steel production, etc. Ingestion is the primary means of exposure to the general population.

Gastrointestinal symptoms reported in humans with zinc exposure include vomiting, abdominal cramps, and diarrhea with possible bleeding. In addition, zinc produces acute toxicity in freshwater organisms over a range of concentrations less than those found on the Site. Acute toxicity is similar for freshwater fish and invertebrates. In many types of aquatic plants and animals, growth, survival and reproduction can be adversely affected by elevated zinc levels.

Cadmium

Laboratory experiments suggest that cadmium may have adverse effects on fish reproduction at levels present in lightly to moderately polluted waters. Cadmium is highly toxic to wildlife. It is cancer-causing and teratogenic and potentially mutagenic, with severe sublethal and lethal effects at low environmental concentrations. Cadmium bio-accumulates at all trophic levels, accumulating in the livers and kidneys of fish. Crustaceans appear to be more sensitive to cadmium than fish and mollusks. Cadmium can be toxic to plants at lower soil concentrations than other heavy metals and is more readily taken up than other metals.

III. Threats to Public Health Welfare or the Environment

A. Nature of Actual or Threatened Release of Hazardous Substances, Pollutants or Contaminants.

A catastrophic release of metal laden water from the Silver Dyke Mine would cause a significant release of metals to the Sih-mem Creek, Carpenter Creek and would also result in a cascading effect mobilization of additional metals from the immediate waste pile downstream and subsequent tailings impoundments. Potential detrimental effects on public health and welfare are described in Section B below.

B. **Check applicable factors (from 40 CFR 300.415) which were considered in determining the appropriateness of a removal action:** EPA has considered all the factors described in 40 CFR 300.415(b)(2) of the NCP and determined that the following factors apply at the Site.

_x_ Actual or potential exposure to nearby human populations, animals or the food chain from hazardous substances or pollutants or contaminants [300.415(b)(2)(i)].

High levels of hazardous substances, pollutants or contaminants found at the Site, largely at or near the surface, may migrate. Historically, lead concentrations collected in the Sih-mem Creek floodplain, have ranged 7,110 mg/kg to 54,900 mg/kg near the residential area. In addition, high winds generate visible dust emissions from this unvegetated impoundment, which results in the continuous release of total suspended solids containing heavy metal concentrations. The area is also heavily trafficked by recreational users and loggers. Numerous residences are located within one-half mile downgradient of the mine works. Human exposure and the potential for continued exposure exists.

_x_ Actual or potential contamination of drinking water supplies or sensitive ecosystems [300.415(b)(2)(ii)].
All Montana waters are classified for multiple uses. Carpenter Creek is classified as a B-1 stream, which designates that all the following uses must be supported: drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (Sih-mem Creek discharges into Carpenter Creek). Currently, Carpenter Creek cannot be used for any of its designated uses. Carpenter Creek is listed as impaired on the State of Montana's 303(d) list due to concentrations of cadmium, copper, iron, lead, mercury, silver, and zinc.

__ Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that pose a threat of release [300.415(b)(2)(iii)].

_x_ High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate [300.415(b)(2)(iv)].
The Site's high concentrations of total and dissolved heavy metals, which are found at the surface and subsurface of the mine works, waste rock piles, and fluvial impoundments, including in the flood plain, may pose a threat to human health and aquatic life. Sampling results and a recent site visit show evidence of large volumes of tailings and/or waste rock eroding from the Site during runoff events. The current physical instability of the area above and around the Silver Dyke Adit raise concerns about a potential blowout. This type of event would likely spread contamination miles downstream.

Humans and the surrounding surface and aquatic environment can be adversely affected by heavy metals released from the Site through the discharge of mine-influenced waters mixed with elevated concentrations of lead and other heavy metals into Belt Creek below the Site. Carpenter Creek is approximately six miles long, flows from the northeast to the southwest, and discharges into Belt Creek about one and a half miles north of the Town of Neihart. In addition, human

consumption of fish taken from Belt Creek could result in adverse human exposure to released contaminants.

Aquatic life surveys, conducted in Carpenter Creek below the confluence with Sih-mem Creek, indicate that populations of benthic invertebrates are severely impaired. Currently, fish populations in Carpenter Creek are absent. Investigations conducted by Montana Fish, Wildlife & Parks and the EPA in 2010 and 2011 (FWP, 2011, 2012) indicate that metals contamination associated with ongoing contaminant releases severely inhibit aquatic life in Carpenter Creek below Sih-mem Creek. The investigations suggest that the contamination is contributing to the impairment of aquatic life in Belt Creek below the confluence.

__ Weather conditions that may cause hazardous substances or pollutants to migrate or to be released [300.415(b)(2)(v)].
Annual snowmelt run-off conditions and thunderstorms contribute to the continuing release of the hazardous substances from the unstable mine works, waste pile, and fluvial tailings impoundments into Sih-mem Creek and its floodplain. Erosion at the tailings impoundment has led to a significant volume of sediment and streamside tailings contamination downstream. In addition, acute exposure to aquatic species can occur during thunderstorms and spring run-off, leading to reductions in the number and diversity of the aquatic and aquatic-dependent community. These events contribute to deposition of tailings near downstream residences.

__ Threat of fire or explosion [300.415(b)(2)(vi)].

_x_ The availability of other appropriate federal or state response mechanisms to respond to the release [300.415(b)(2)(vii)].
Local and state governments do not have the capability to conduct this removal action in a timely manner.

__ Other situations or factors that may pose threats to the public health or welfare of the United States or the environment [300.415(b)(2)(viii)].

IV. Selected Removal Action and Estimated Costs

A. Situation and Removal Activities to Date

1. Current Situation.
   Four time-critical removal actions were previously conducted within OU3:

   - Carpenter Creek and Silver Dyke Tailings Impoundments (TCRA - June 11, 2013, and TCRA Amendment - Sept. 2, 2014)
   - Sih-mem Creek Channel and a Former Foreman Residential Yard (TCRA, Sept. 8, 2020)
   - Silver Dyke Tailings Impoundment (TCRA, Sept. 13, 2020)
   - Jig Tailings Pile (TCRA, June 2022)

PRSC work is also planned for the work on the Jig Tailings Pile completed last year.

2. Removal activities to date:
   In response to the buried drainage infrastructure at the portal, EPA's Emergency Response and Remediation Services (ERRS) contractor conducted limited activities at the adit to re-establish drainage. ERRS also conducted run-on protections in the drainage above the adit to redirect water flows causing the erosion.

   Additionally, PRSC work is planned for the work on the Jig Tailings Pile completed last year. The EPA Remedial Program plans to initiate Remedial Action at OU1 in 2024 and recently received a Feasibility Study for OU2 for review. At OU3, the Remedial Program is reviewing its Feasibility Study for the Fluvial Tailings Impoundments and the Silver Dyke Adit with a Record of Decision anticipated in late 2024.

   a) Federal Government/Private Party

   The USFS is directly assisting the EPA with various portions of the Site and has been extensively involved in planning and coordinating this removal action. In 2021, USFS sent the letters of support expressing their concerns and support for those removal actions.

   b) State/local

   MDEQ actions mirror USFS actions described above in all respects.

   During the June 21, 2023, Removal Site Inspection both MDEQ and the USFS supported the actions proposed herein.

3. Enforcement
   Where the responsible parties are known, an effort initially shall be made, to the extent practicable, to determine whether they can and will perform the necessary removal action promptly and properly.

B. Planned Removal Actions

1. Planned action description
   This proposed Emergency Removal Action (RA) will follow this basic outline:
   a. Erosion Control
      i. Road and Drainage Repair above the Glory Hole, Gulley, and Adit to divert water away from the works.
      ii. The Gulley above the Adit will be graded with at least for benches laid across to divert water out of the drainage
      iii. A bench will be laid around the Adit discharge pipe to protect it from damage and clogging
   b. Waste Rock Removal
      i. The Glory Hole will be prepped to receive waste.
      ii. Approximately 40,000 cubic yards of waste rock will be removed from the area directly below the Silver Dyke Adit.

iii. The waste rock will be placed and graded into the Glory Hole.
iv. The area below the adit will be benched and graded for stability.
v. An appropriately armoured flow channel will be installed.

c. Catastrophic Release Mitigation/Prevention
   i. Three catch basins will be installed along the flow path below the adit to catch and hold water in the event of a catastrophic release from the mine (approximately 1.5 to 2 million gallons)
   ii. Piping/culverts will be used to allow water to flow through under normal circumstances, with valving to be installed to close off the flow while work on the adit is in progress.
   iii. Additional RSE work will also evaluate installation of a monitoring well into the adit for the purpose of assessing water level and pumping down the mine pool. Non-invasive techniques such as geophysics or seismic evaluation may also be used to evaluate the mine pool.
   iv. Open and secure adit to eliminate the possibility of a catastrophic release (this action contingent upon Region 8 SEMD division director concurrence).

d. Repair the undercut/damage portions of the fluvial tailing impoundments.

2. Contribution to remedial performance
   The proposed actions will, to the extent practicable, contribute to the efficient performance of any long-term remedial action at the site. This action is consistent with the overall objectives for the CSCMD Site. The objectives are to prevent or mitigate the risks to human health and the environment due to direct contact with tailings containing elevated concentrations of heavy metals, and from releases of these hazardous substances to surface water.

3. ARARs
   Removal actions conducted under CERCLA are required to attain ARARs to the extent practicable. In determining whether compliance with ARARs is practicable, the OSC may consider appropriate factors, including the urgency of the situation and the scope of the removal action to be conducted.

4. Project Schedule
   The proposed removal action is scheduled to be completed in one construction season of 2023. However, response activities could extend into the 2024 season depending on the weather. Because of the elevation and steep portions of the Site, it is anticipated that PRSC activities such as revegetation and drainage control will take 1-2 additional summers to implement.

C. Estimated Costs*

Contractor Costs	**Totals**
ERRS Construction	$1,500,000
START Sampling and Removal Support	$100,000

SUBTOTAL	$1,500,000
Contingency 20%	$320,000
Total Removal Projects Ceiling	**$1,920,000**
Previous CERCLA Action Costs (OU3): • 2013 &2014 TCRA Carpenter Creek and Silver Dyke Impoundments • 2020 TCRA Silver Dyke Impoundment • 2020 Sih-mem Creek Channel and a Former Residential Yard • **2022 Jig Tailings Pile**	 $1,473,000 $100,000 $420,000 $1,800,000
SUBTOTAL	$3,793,000
Total Removal Ceiling for All Actions to Date	**$5,713,000**

*EPA direct and indirect costs, although cost recoverable, do not count toward the removal ceiling for this removal action. Liable parties may be held financially responsible for costs incurred by the EPA as set forth in Section 107 of CERCLA.

V. Expected Change in the Situation Should Action Be Delayed or Not Taken

A delay in action or no action at this Site would increase the actual or potential threats to the public health and/or the environment. Heavy metal contaminants will continue to migrate off-Site from the Silver Dyke Mine Works and Drainage. In addition, a failure to repair the Fluvial Tailing Impoundments could result in a large-scale failure, especially during high run-off years. A failure to protect and secure the Silver Dyke Mine Adit could result in a catastrophic release.

VI. Outstanding Policy Issues

None

VII. Approvals

This decision document represents the selected removal action for this Site, developed in accordance with CERCLA as amended, and is not inconsistent with the National Contingency Plan. This decision is based on the administrative record for the Site.

Conditions at the site met the NCP section 300.415(b) criteria for a removal action and through this document, I am approving the proposed removal actions. The total project ceiling is $1,920,000, this amount will be funded from the Regional removal allowance. The cumulative cost ceiling for removal actions at OU3 of the CSCMD Site will be $5,713,000.

BEN BIELENBERG Digitally signed by BEN BIELENBERG Date: 2023.07.13 12:25:49 -06'00'

Ben Bielenberg, Date
Acting Director, Superfund and Emergency Management Division