UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 8
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Ref: 8SEMD-EMB

ACTION MEMORANDUM

SUBJECT: Request for Approval, Funding and Exemption from 12-month Statutory Limit for Time-Critical Removal Action (TCRA) at the Silver Dyke Mill Jig Tailings 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.

FROM: Duc Nguyen
Federal On-Scene Coordinator

Joyel Dhieux
Federal On-Scene Coordinator

Roger Hoogerheide, Remedial Project Manager
Remedial Section C

THRU: Joe Vranka, Supervisor
Remedial Section C

Kerry Guy, Supervisor
Emergency Response Section

Deirdre Rothery, Manager
Emergency Management Branch

Aaron Urdiales, Manager
Superfund Remedial Branch

TO: Betsy Smidinger, Director
Superfund and Emergency Response Management Division

Site ID#: 089X – OU3

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 Mill Jig Tailing (Site). This Site is located within Operable Unit

3 (OU3) of the Carpenter-Snow Creek Mining District (CSCMD) National Priorities List (NPL) Site, near the Town of Neihart in Cascade County, Montana. This time-critical removal action (TCRA) involves the removal of tailings that are highly contaminated with lead and arsenic. There are approximately 34,000 cubic yards of jig tailings and 1,000 cubic yards of eroded tailings in the floodplain located within the Sih-mem Creek area, which is approximately 800 yards downstream from the jig tailings. 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 2022 but may extend into 2023.

This removal action involves no nationally-significant or precedent-setting issues. This time-critical 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 2022.

II. SITE CONDITIONS AND BACKGROUND

Site Name:	Jig Tailings, 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:	See Enforcement Addendum
NPL Status:	Final on 9/13/2001
Planned Removal Start Date:	06/2022

A. Site Description

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). The Jig Tailings Site is located within the Silver Dyke Complex OU3 (Figure 1).

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.

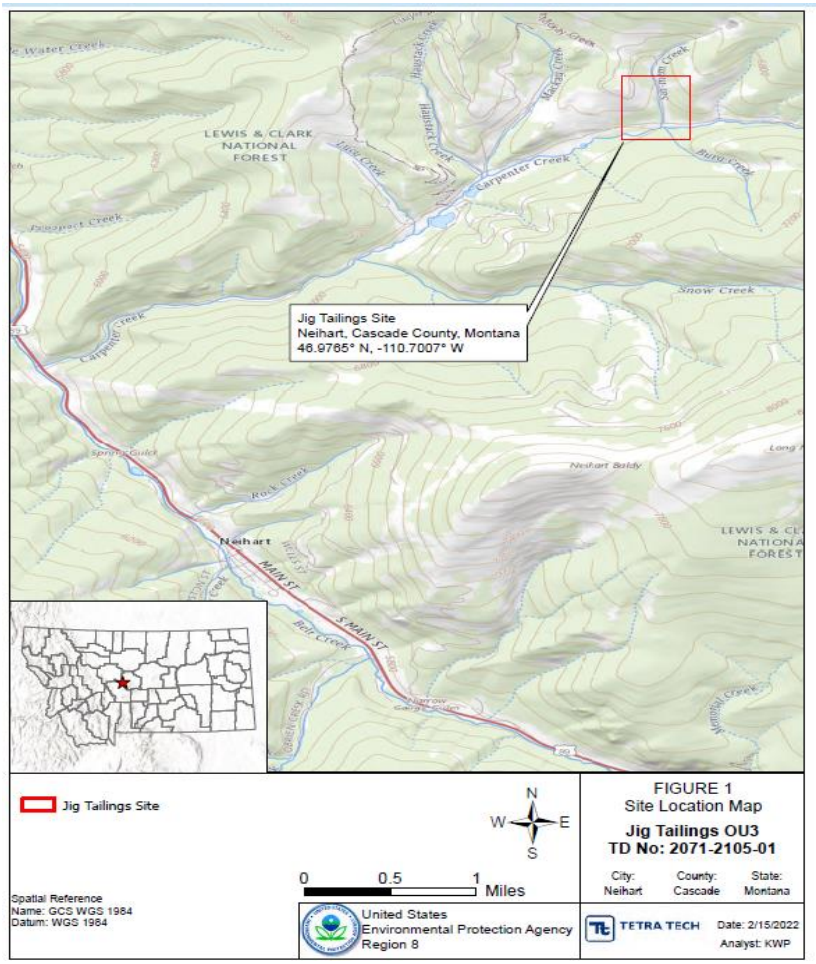

Figure 1: Silver Dyke Mill Jig Tailings Site.

1. Removal Site Evaluation

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.

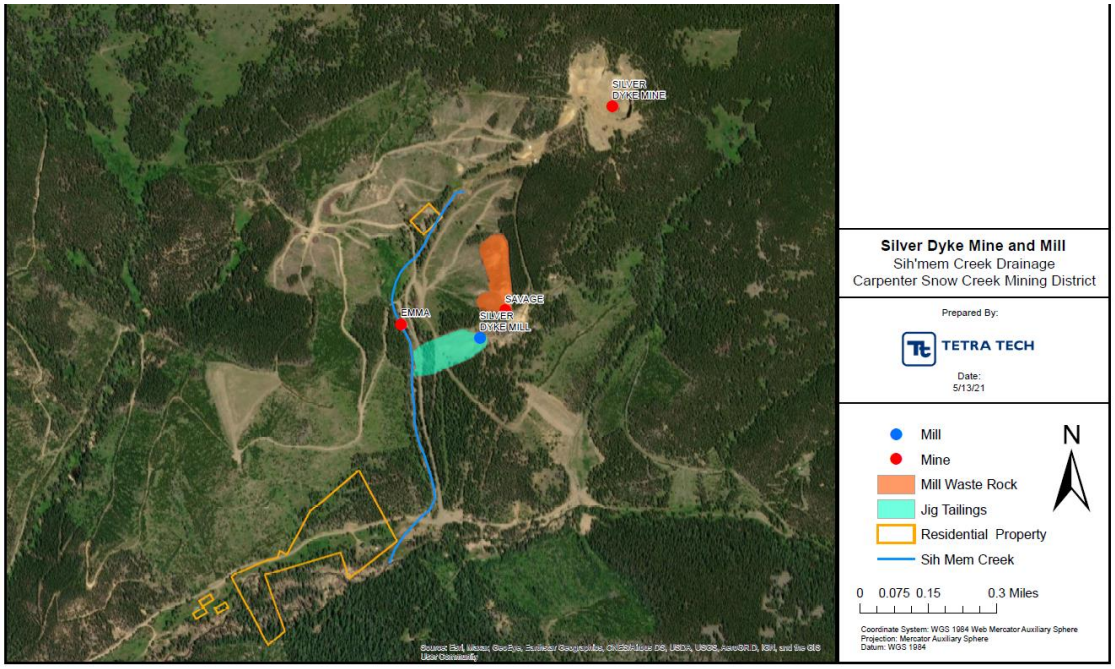

Figure 2: Silver Dyke Mine, Jig Tailings, and Sih-mem Creek Flood Plain Locations

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).

During the 2011 high spring runoff, a large volume of tailings eroded from the hill side of the jig tailings impoundment and flooded the Sih-mem Creek. As a result, Sih-mem Creek formed a new channel between the creek that goes under Pioneer Lane and its entrance to Carpenter Creek. This new channel increased the infiltration of contaminated surface water (Table 1). The lack of a defined channel caused the stream, including tailings, to spread out into a meadow and saturate the soil in the flood plain area of Sih-mem Creek. This area occasionally floods an adjacent property owner's house near the intersection of Sih-mem Creek and Carpenter Creek. Tests of the wells in the confluence area show elevated concentrations of metals including copper, lead and zinc after the new channel was formed (Sih-mem Creek Reroute and Treatment, Dan Armstrong Report, December 11, 2019). The flooded Sih-mem Creek channel was reconstructed in 2020 (TCRA Memorandum - September 8, 2020).

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

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 this proposed removal action. Evidence of severe rill erosion and gullies cutting into the tailings on the hill side were observed. This indicates that a significant volume of tailings has 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).

2. Physical Location

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 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.

3. Site Characteristics

The Silver Dyke mill jig tailings impoundment has no vegetative cover and is composed of clay to fine sand tailings. Private claims within the watershed were logged in 2017. This Site lies within the Carpenter Creek floodplain and is threatening to release contaminated sediment 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 tailings impoundment and erodes the tailings and associated hazardous substances into the stream.

Based on the Carpenter-Snow Creek OU3 Erosion Model Technical Memo (Tetra Tech, October 20, 2020), the largest mass of sediment losses occurs 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).

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.

4. Release or Threatened Release into the Environment of Hazardous Substances, Pollutants or Contaminants

Sampling and analysis of the jig tailings impoundment 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 cardial 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 ores, 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.

5. NPL Status

The CSCMD Site was listed on the NPL on September 13, 2001.

B. Other Actions to Date

1. Previous Actions

Three 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)

2. Current Actions

There are no current on-site activities at this Site.

C. Federal, State and Local Authorities' Roles

1. Federal, State and Local Actions to Date

The MDEQ and USFS are directly assisting the EPA with various portions of the Site and have been extensively involved in planning and coordinating this removal action. In 2021, USFS and MDEQ sent the letters of support expressing their concerns and support for this proposed removal action (Attachment 4 – Letters of Support).

"*…Approximately 35,000 cubic yards of jig tailings, ranging from 4,000 ppm to 10,000 ppm of lead and other heavy metals, should be mitigated in a timely manner because the jig tailings area has eroded into Sih-mem Creek and downstream and will be potentially transported to the nearby residential yards and surrounding area, which present an increased threat to human health and the environment. Recent modeling conducted by Tetra-Tech demonstrates that the jig tailings are highly erodible. The proposed TCRA will relocate mining waste to the Mackay Gulch Repository Area and should help improve water quality in Sih-mem Creek, which has consistently been sampled above the EPA MCL and DEQ-7 standards."*

2. Potential for Continued State/Local Response

Neither the state nor the local authorities have the resources to conduct the proposed removal action at the Site.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions existing at the Site meet the criteria for initiating a removal action under 40 CFR 300.415 (b) (2) of the NCP. Levels of contamination found in the jig tailings impoundment and tailings deposited in the Sih-mem flood plain, in conjunction with the unconfined nature of the on-

going releases during storm events and spring runoff support the decision to perform a TCRA.

The EPA has considered all the factors described in 40 CFR section 300.415(b)(2) of the NCP and determined that the following factors apply at the ESM Site:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

High levels of hazardous substances, pollutants or contaminants found at the Site, largely at or near the surface, may migrate. The highest lead concentrations were dominantly found in samples collected from the Sih-mem Creek floodplain, near the residential area. In this area, lead concentrations ranged from 7,110 mg/kg to 54,900 mg/kg. 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. Numerous residences are located within one-half mile downgradient of the impoundment. Human exposure and the potential for continued exposure exists.

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

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.

(iii) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate;

The Site's high concentrations of total and dissolved heavy metals, which are found at the surface and subsurface of the impoundment, 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 eroding from the Site during runoff events.

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.

(iv) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

Annual snowmelt run-off conditions and thunderstorms contribute to the continuing release of the hazardous substances from the unstable tailings impoundment 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.

(vii) The availability of other appropriate federal or state response mechanisms to respond to the release;

Local and state governments do not have the capability to conduct this removal action in a timely manner.

IV. ENDANGERMENT DETERMINATION

Actual or threatened release of hazardous substances from the Site, if not addressed by implementing the response actions described in this Action Memorandum, may present an imminent and substantial threat to public health, welfare or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

This TCRA will include excavation of approximately 35,000 cubic yards from the lower portion (dispersed tailings piles), the upper portion (jig tailings), and tailings deposited in the Sih-mem floodplain. The excavated tailings may require stabilization with Triple Super Phosphate (TSP) or other products (i.e. quick lime, cement, etc.) prior to disposal at the OU3 MacKay Gulch Repository. Best management practices for erosion controls will be implemented such as construction of surface run-on and run-off ditches and a diversion channel to reduce rain and snowmelt runoff from the upper area of the impoundment and installation of terraces and armoring with riprap material, wood debris generated from logging, and erosion mat on the steep hill of the impoundment. The excavated areas will be restored with backfill/topsoil materials and Cascade County-certified seed mix.

2. Contribution to Remedial Performance

This TCRA 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. Engineering Evaluation/Cost Analysis

An engineering evaluation/cost analysis (EE/CA) is not required for a TCRA.

4. Applicable or Relevant and Appropriate Requirements (ARARs)

Removal actions conducted under CERCLA are required, to the extent practicable considering the exigencies of the situation, to attain ARARs. In determining whether compliance with an ARAR is practicable, the lead agency may consider appropriate factors, including the urgency of the situation and the scope of the removal action to be conducted. Attachment 2 contains the ARARs for this proposed removal action.

5. Project Schedule

The proposed removal action is scheduled to be completed in one construction season of 2022. However, response activities could extend into the 2023 season depending on the weather.

B. Estimated Costs*

Extramural Costs:

Contractor Costs	**Totals**
ERRS Construction	$1,400,000
START Sampling and Removal Support	$100,000
SUBTOTAL	$1,500,000
Contingency 20%	$300,000
Removal Project's Total Ceiling	**$1,800,000**
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	 $1,473,000 $100,000 $420,000
SUBTOTAL	$1,993,000
Total Removal Project Ceiling/All Actions to Date	**$3,793,000**

*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.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

A delay in action or no action at the Site would increase the actual or potential threats to public health and the environment. Heavy metal contaminants will continue to migrate off-Site from the Carpenter Creek and Silver Dyke jig mill tailings impoundment during the frequent, high-intensity thunderstorms that occur in this area in the summer as documented in 2011, and during annual spring run-off. The erosion of the tailings impoundment will continue to degrade water quality in Carpenter Creek via Sih-mem Creek and its downstream tributary Belt Creek, which has residents living year-long adjacent to the stream.

VII. OUTSTANDING POLICY ISSUES

None.

VIII. ENFORCEMENT

A separate enforcement addendum has been prepared providing a confidential summary of current and potential future enforcement activities.

IX. RECOMMENDATION

This decision document represents the selected removal action for the Silver Dyke Mill Jig Tailings Site which is part of OU3 of the CSCMD Site in Cascade County, Montana, developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based on the administrative record for the Site.

Conditions at the Site meet the NCP 40 section 300.415(b)(2) criteria for a removal action, and I recommend your approval of the proposed removal action. The total cost ceiling for the Site, if approved, is $1,8000,000; this amount will be funded from the Blue Tee Settlement special account and from the Removal Allowance. The cumulative cost ceiling for removal actions at OU3 of the CSCMD Site will be $3,793,000.

APPROVE

BETSY SMIDINGER Digitally signed by BETSY SMIDINGER Date: 2022.06.06 11:33:20 -06'00'

Betsy Smidinger, Director Date
Superfund and Emergency Management Division

DISAPPROVE

Betsy Smidinger, Director Date
Superfund and Emergency Management Division

Attachments:

Attachment 1: Mine Site Category Determination for Fiscal Year 2022 Planned Silver Dyke Mill Tailings Site
Attachment 2: ARARs
Attachment 3: Request Memo for Removal Support 2021 from Remedial Program
Attachment 4: USFS and MDEQ Letters of Support

SUPPLEMENTAL DOCUMENTS

Support/reference documents which may be helpful to the reader and/or have been cited in the report may be found in the administrative record file located at:

U.S. EPA, Region 8 Montana Office
Federal Building
10 West 15th Street, Suite 3200
Helena, MT 59626
406-457-5000
866-457-2690 (toll free)

Great Falls Public Library
301 2nd Ave North
Great Falls, MT 59401
406-453-0181
Hours: Tues-Thu 10 a.m. to 8 p.m.
Fri-Sat 10 a.m. to 6 p.m.

Belt Creek Ranger Station
c/o Neihart, Montana 59465
406-236-5309

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
FEDERAL BUILDING, 10 W. 15th STREET, SUITE 3200
HELENA, MONTANA 59626

March 3, 2022

SUBJECT: **Mine Site Category Determination for Fiscal Year 2022 Planned Time-Critical Removal Action at the Silver Dyke Mill Jig Tailings Site, Carpenter Snow Creek Mining District Superfund Site, Operable Unit 03, Cascade County, Montana**

FROM: **Roger Hoogerheide, Remedial Project Manager (RPM)**
Duc Nguyen, On-Scene Coordinator (OSC)
Joyel Dhieux, OSC Joyel Dhieux

THRU: **Joe Vranka, Remedial Section Chief, Section C**
Kerry Guy, Emergency Response Unit Leader

TO: **Project File**

This memorandum is written in order to document the Mine Site Category Determination as required by the EPA Headquarters' memorandum (Woolford-Cheatham) dated April 4, 2017.

Fluid Conceptual Site Model

The Silver Dyke Mill Jig Tailings Site is located within Operable Unit 3 (OU3) of the Carpenter Snow Creek Mining District NPL Site. The mine operated from 1921 to 1929 and included a mine and mill and three tailings impoundments. Beginning in 1921, one million tons of ore were blocked out and a 500-ton flotation mill was constructed. The Silver Dyke operated until 1929, when the blocked-out ore was depleted and no new deposits could be found.

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.

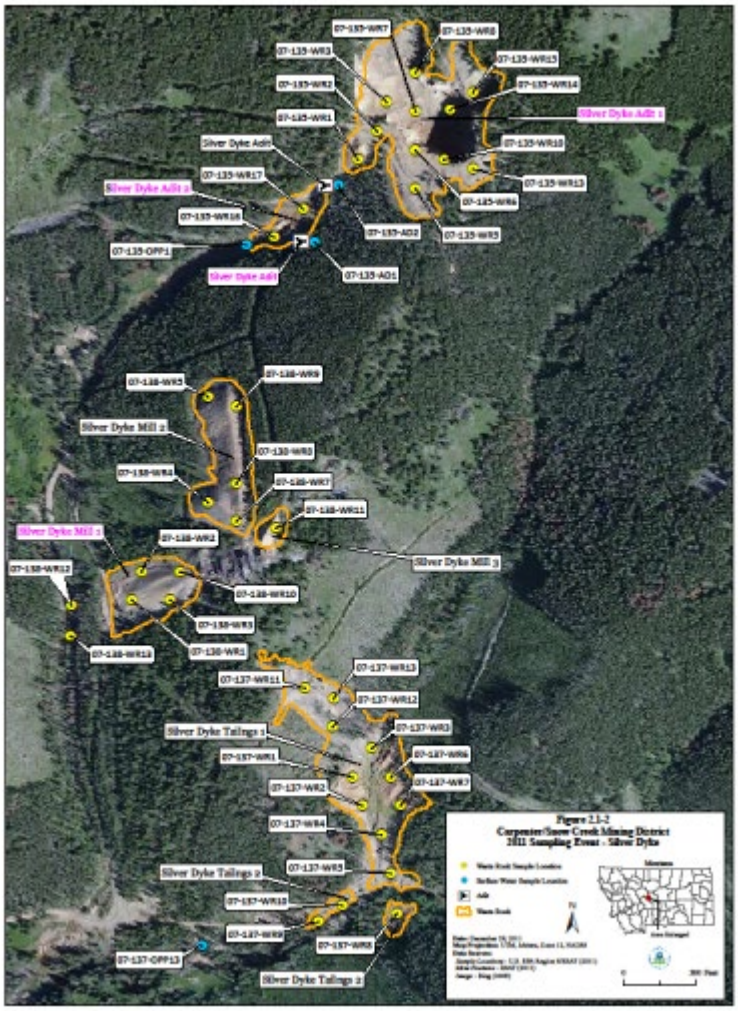

Figure 1: Jig Tailings and Adit Locations

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.

Based on the Carpenter-Snow Creek OU3 Erosion Model Technical Memo (TetraTech, October 20, 2020), the largest mass of sediment losses occurs from the Silver Dyke Jigs Tailings and the Silver Dyke Tailings Impoundment, followed by waste rock piles at the Silver Dyke Mine and other mines included. The Silver Dyke Tailings Impoundment located on the same hill slope of jig tailings was removed in 2014. A survey from the light detection and ranging (LiDAR) flight estimated 35,000 cubic yards of the rejected jig tailings disposed on the hill slope.

In accordance with Attachment 1 of the previously referenced April 4, 2017, memorandum, **this Silver Dyke Mill Jig Tailings Site is a Category 1, "Sites with no known water in the mine, or sites containing fluids with no or low fluid hazard."**

FY22 Planned Activities

Similar to the response action conducted at the Silver Dyke Tailings Impoundment Site in 2014, the Jig Tailings Site is proposed to be a time-critical removal action by excavating approximately 35,000 cubic yards from the lower portion (dispersed tailings piles) and the upper portion (jig tailings), and approximately 1,000 cubic yards of tailings-contaminated soils eroded onto a wooded area surrounding residential properties. The excavated tailings will be disposed of at the MacKay Gulch Repository, which is located approximately one-half mile from the Site and in OU3). The proposed removal action is scheduled to complete in one construction season of 2022; however, the remaining restoration could extend into 2023 season depending on the weather.

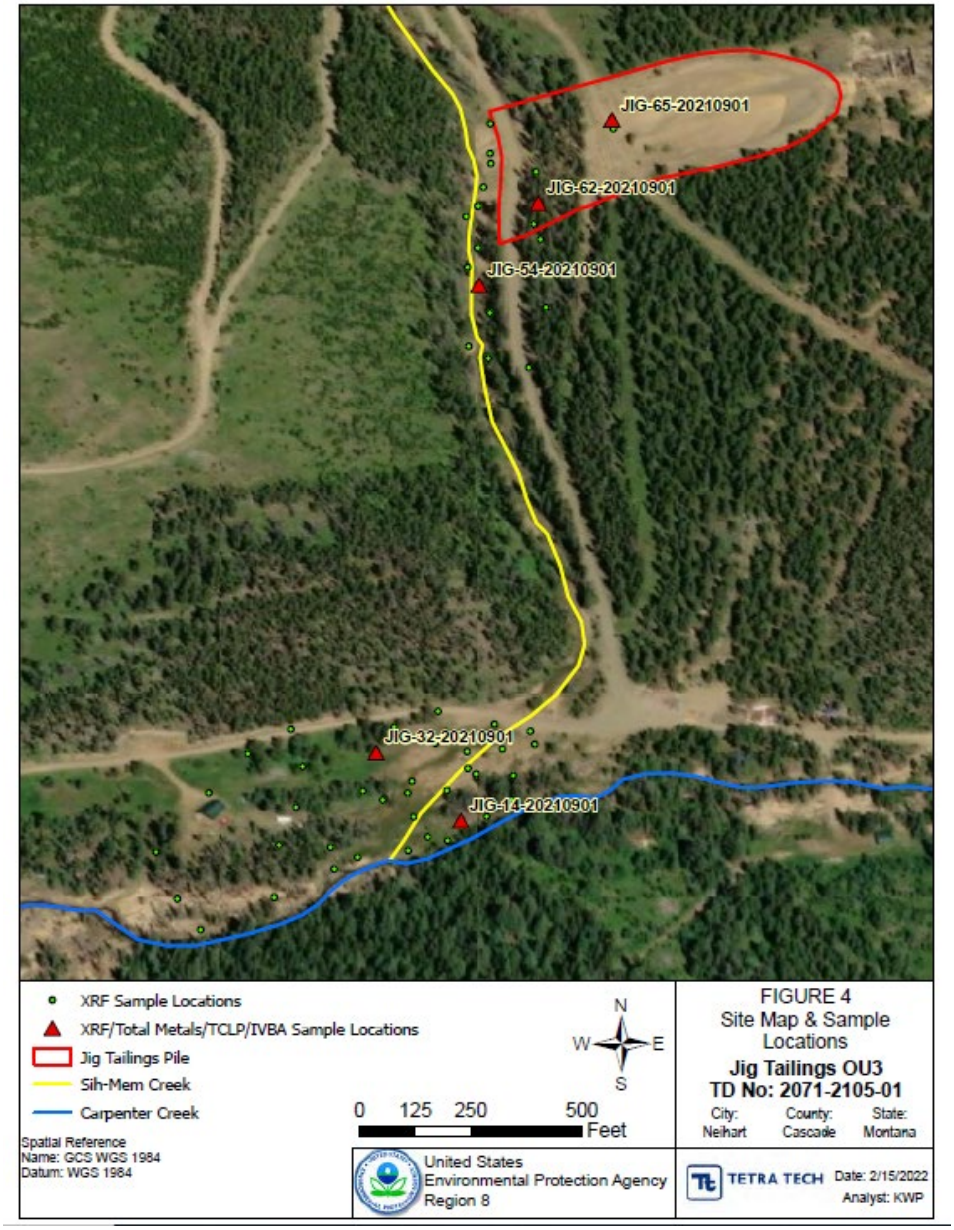

Figure 2: Upper and Lower Portions of Jig Tailings

It is **not** anticipated that any of these activities will result in a fluid release hazard since the Silver Dyke adit is located approximately 600 yards on the opposite side of the hill and No Name Creek is not impacted by any mines. All work will be done on a dry hillside and BMPs will be installed to ensure material on the slope doesn't erode into the Sih-Mem Creek.

Based upon planned FY2021 activities, **this work should be categorized as a sub-Category 1N, as the "Region has conducted studies or investigation and has determined that the site has no known or potential fluid hazard. EPA actions will not create a fluid release hazard."**

Due to the 1N sub-category determination for the planned time-critical removal activities at the Silver Dyke Mill Jig Tailings at the Carpenter Snow Creek Mining District Site**, no consultation with Headquarters is required prior to initiating the above-mentioned activities for FY22.**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region8

May 18, 2021

Ref: SEMD-C

MEMORANDUM

SUBJECT: Request for Region 8 Superfund Emergency Response Program Assistance for the Carpenter Snow Creek Mining District (CSCMD) Superfund Site, Jig Tailings located in Operable Unit 3 (OU3), near the Town of Neihart, Cascade County, Montana

FROM: Roger Hoogerheide
Superfund Remedial Project Manager

THRU: Joe Vranka
Unit C Supervisor

TO: Laura Williams, Supervisor
Emergency Response Section

- Carpenter Snow Creek/Operable Unit 3/NPL Status: Final
- Account Code to Charge Staff Time and Travel: 089XRV0308LTDC6
- Estimated Project Cost: $1,200,000
- Source of Project Funding (including travel) Available: $570,000 is currently available in the special account to fund this action with another approximately $150,000 in unliquidated obligations in the ERRS contract. The remaining funds will need to come from removal advice of allowance.
- Authority for Removal Project (Action Memo, IROD)/Schedule: a new Time-Critical Removal Action Memorandum is required for this response action.
- Removal Project Duration/ Deadline (SCAP or other): Two field seasons – Material, labor and equipment to remove the lower and upper portions of the jig tailings and place them in a new cell to be constructed in the MacKay Gulch repository. The schedule for completing this work is two construction seasons (2021 and 2022). Currently, the OU2 and OU3 are in the Remedial Investigation/Feasibility Study (RI/FS) portion of the cleanup while OU1 is awaiting remedial action funding. The Final RI was completed in March 2020 and a Record of Decision for OU3 is anticipated in late 2022.
- Is this a mine site? Yes. Since the proposed removal actions are not anywhere in the vicinity of Silver Dyke adit and there is no known seep nearby, the Site is a sub-category "1N" site. That is "planned activities at the Site will not create a fluid release hazard" as described in Attachment 1 of the April 4, 2017 Woodford-Cheatham Memorandum. The fluid release hazard determination memo is included as Attachment I – Jig Tailings Site Category Determination for Fiscal Year 2021.

- Is this a lead site? Yes – Samples collected from jig tailings in 2011 indicate lead concentrations between 7620 and 10,000 milligrams per kilogram. Additional soil samples will be collected by EPA's START contractor for metals analysis and relative bioavailability and in vitro bioaccessibility of lead. The On-Scene Coordinator and Remedial Project Manager will consult with the site toxicologist to develop a lead justification memo that will be included as an appendix to the Action Memorandum.
- EPA has consulted with the Site supporting agencies, the Montana Department of Environmental Quality (DEQ) and the US Forest Service (USFS). The DEQ Project Officer and USFS On Scene Coordinator have agreed that this response action will help to reduce solid source metal loading to Carpenter Creek. Numerous residences are located within one-half mile downgradient of the jig tailings.
- This memorandum requests assistance from the Emergency Response Program to excavate the estimated 35,000 cubic yards of jig tailings associated with the Silver Dyke Mill and dispose of these jig tailings in an on-site repository located within OU3 (Figure 3).

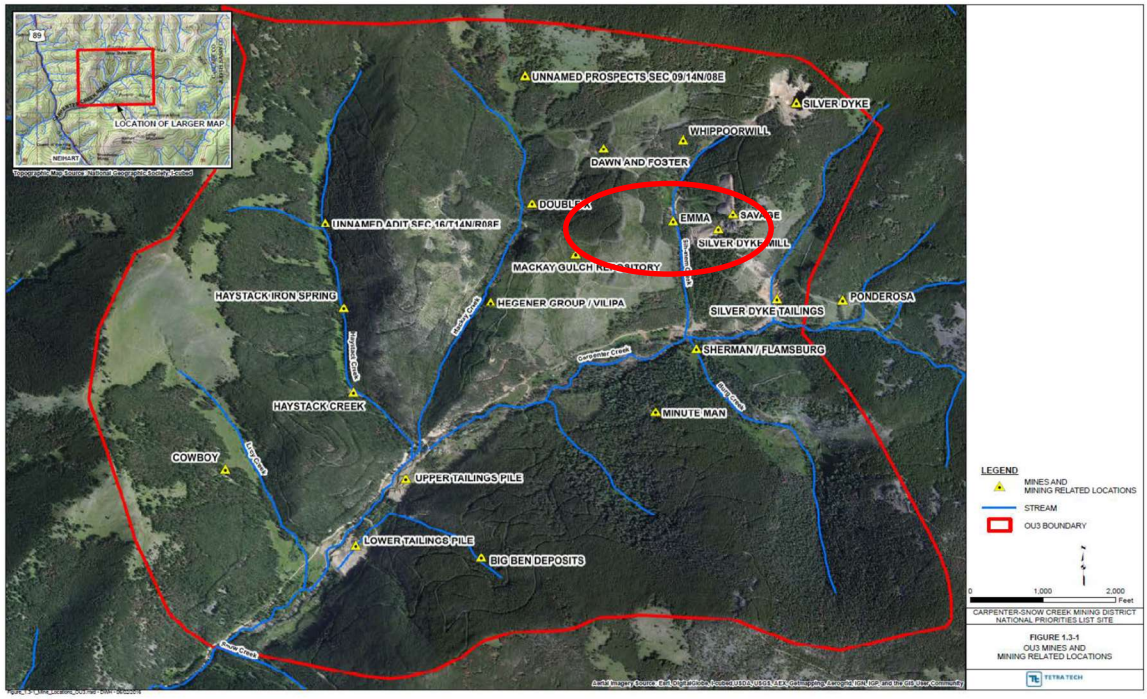

Figure 1: OU3 Boundary including Silver Dyke Jig Tailings and MacKay Repository

PROJECT DESCRIPTION/ STATUS:

The Silver Dyke mine, mill, and associated wastes are located within OU3. During its operation, the Silver Dyke mine was the largest producer of ore in the CSCMD Site, and the mine's silver production was second only to Silver Bow County. One million tons of ore were blocked out by the Silver Dyke Mining Company 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 1923 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. Exhibit 1.3-1 presents the production of the Silver Dyke mine during the period of operation. 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 the glory hole and a circular tunnel connected to the glory hole by an unknown number of raises. The raises currently have no known surface expression in the glory hole and were likely filled with ore or waste rock during mine shutdown, during subsequent mining explorations, or through erosion.

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 operated concurrently with the mine. The mill crushed the ore, followed by floatation in tanks to remove the sulfides. The floatation tails were then tabled to recover oxidized ore. The initial milling results were below expectations, with mill head recoveries of 61.8 percent of silver, 40.7 percent of lead, and 51.6 percent of copper. The primary reason for low recovery was development of colloidal slimes that inhibited both gravity and floatation concentration. The problem was addressed by adding a small amount of barium sulfide to disperse the pulp before lime was added to coagulate the slime. The result was modification of the mill to include two independent mill circuits: one for slimes, and one for granular material. The slime portion was sent directly to the slime circuit flotation machines. The granular material was re-ground and passed through the granular circuit flotation machines. The slime circuit produced low recoveries, and experimentation showed that the ore feed rate had to be about five tons per 24 hours. The low feed rate did not economically justify processing the slimes, and the decision was made to discharge the slimes. The de-sliming process improved mill head recovery of silver to 82.8 percent, lead to 73.5 percent, and copper to 73 percent.

In 1926, after three years of operation, costs needed to be reduced without significant capital expenditure. One solution was to increase the ore feed rate through the mill by screening out material greater than 2 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 had approximately 1.35 percent silver, 0.51 percent lead, and 0.32 percent copper. Through this method, mill capacity was increased 43 percent while reducing costs 24 percent. An attempt was made to install a floatation 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 inches. This larger grained material was dumped down the hill west of the mill and resulted in what is today called the jig tailings. Up to 45 percent of the mill feed was disposed of as jig tailings - sized between 0.065 and 0.5 inches in diameter.

In 2011, EPA's contractor, TechLaw, collected samples from the jig tailings pile and downgradient areas where eroded tailings were several feet deep. Samples results contained lead between 7670 and 13,900 milligrams/kilogram. These coarse grain sized jig tailings are estimated cover three acres. Erosion modelling estimates between 262 and 426 tons of mine waste per year erodes into Sih Mem Creek. This results in a significant threat to the health downstream residents and recreationists and to the habitat loss in the Carpenter Creek and Belt Creek floodways.

Figure 2: Silver Dyke Mill Jig Tailings

Supporting Agencies:

USFS and MTDEQ support the time-critical removal action being proposed for the Jig Tailings Site. Letters of support have been received expressing concerns about the on-going severe erosion problem occurred and providing support for this response action. (Letters of Support – Attachment II).

2014 and 2020 Work Efforts in OU3:

In 2014, a removal action was initiated to address the unsecured Silver Dyke tailings that remained in the No Name Creek drainage, which is located adjacent to the jig tailings pile. The goal of this action was to prevent continued releases of tailings from the estimated 35,000 cubic yards of solid waste that remained at the Silver Dyke Tailings Impoundment within the No Name Creek drainage area. The action included the following elements: (a) Removing the tailings from the hillside slopes and staging for disposal; (b) Constructing the onsite MacKay Gulch repository; (c) Placing the tailings in the onsite repository; and (d) Reclaiming/restoring removal area slopes. The removal action occurred between September and October 2014**.**

In 2020, a time-critical removal action (TCRA) was conducted at the same Silver Dyke Tailings Impoundment to address the surface soil contaminated with elevated concentrations of lead and repair the significant erosion damage.

2021/2022 Proposed Response Action at Jig Talings Pile Site:

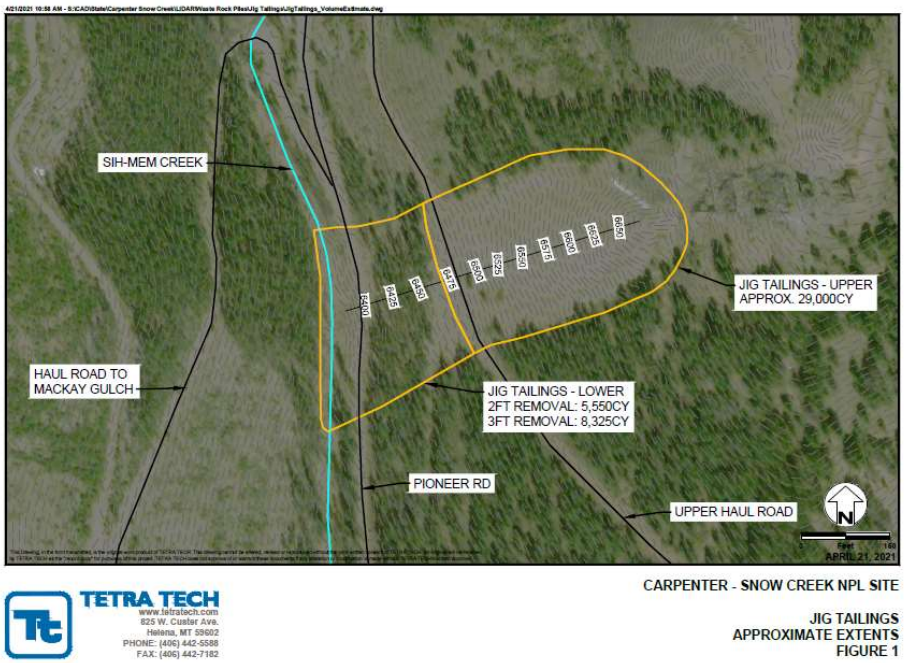

Figure 3**:** Jig Tailings Removal Areas

Similar to the response action conducted at the Silver Dyke Tailings Impoundment Site in 2014, the Jig Tailings Site is proposed to be a time-critical removal action by placing approximately 35,000 cubic

yards from the lower portion (dispersed tailings piles) and the upper portion (jig tailings) in an on-site repository located at the MacKay Gulch Repository (Figures 2 and 3).

The proposed removal action will be implemented in two construction seasons. The 2021 action includes the following elements: (a) Removing the dispersed tailings from the hillside slope (lower portion) and staging for disposal; (b) Constructing an on-site permanent cell for the jig tailings at the MacKay Repository; and (c) Placing the tailings in the onsite repository; and (d) Reclaiming/restoring removal area slopes. The 2022 action includes the removal of upper portion of the jig tailings. Additional work will include construction of appropriate drainage features, armoring and site restoration / re-vegetation measures.

Attachment I – Jig Tailings Site Category Determination for Fiscal Year 2021

Attachment II – USFS and DEQ Letters of Support

United States Department of Agriculture **Forest Service** **Region One**

Northern Region
26 Fort Missoula Road
Missoula, MT 59804

File Code: 2160
Date: May 18, 2021

Duc Nguyen
Federal On-Scene Coordinator
US EPA - Region 8
Emergency Response Unit (8SEM-EMR)
1595 Wynkoop St.
Denver, CO 80202-1129

RE: USFS Letter of Support for Proposed 2021 Time Critical Removal Action of Silver Dyke Tailings

Dear Mr. Nguyen:

The intent of this letter is to document the United States Forest Service's (USFS) support for the United States Environmental Protection Agency's (USEPA) efforts to gain approval and funding for the proposed 2021 Time Critical Removal Action (TCRA) at the Carpenter Snow Creek Mining District (CSCMD) NPL Site. The proposed 2021 TCRA work will address potential threats to public health and the environment from the Silver Dyke mill jig tailings located within Operable Unit 3 at the Site.

Approximately 35,000 cubic yards of jig tailings, ranging from 4,000 ppm to 10,000 ppm of lead and other heavy metals, should be mitigated in a timely manner because the jig tailings area has eroded into Sih-mem Creek and downstream and will be potentially transported to the nearby residential yards and surrounding area, which present an increased threat to human health and the environment. Recent modeling conducted by Tetra-Tech demonstrates that the jig tailings are highly erodible. The proposed TCRA will relocate mining waste to the Mackay Gulch Repository Area and should help improve water quality in Sih-mem Creek, which has consistently been sampled above the EPA MCL and DEQ-7 standards.

This work would be complimentary to several previous Removal Actions that have been completed by the USEPA and USFS. The USFS appreciates your attention to this issue and looks forward to the continued work to help clean up the CSCMD Site.

Sincerely,

LEANNE M. MARTEN
Regional Forester

cc: Gary Danczyk, Dan Hager, Bob Wintergerst, Steve Opp, williams.laura@epa.gov, Hoogerheide.Roger@epa.gov, klarge@mt.gov