APPENDIX H

CONCEPTUAL CONSTRUCTION SEQUENCING AND HAULING PLANS

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1.1 GENERAL DESIGN AND CONSTRUCTION CONSIDERATIONS

There are a number of design and logistical requirements or considerations that are applicable to most of the removal alternatives and sub-areas. Examples include mine waste hauling, construction scheduling or sequencing, dewatering, stream diversion, and borrow of soil for backfill, cover, and topsoil. These common elements are discussed below and are intended to convey to the reader a general understanding of how the selected removal actions for each site wide alternative would be implemented. Project implementation will be developed in more detail as part of the final design and construction planning processes.

1.1.1 Staging Areas

One or more construction staging areas would be required to support construction activities across the site. A main staging area large enough to establish an office, store fuel and materials, and park large earth moving equipment would need to be established at the site. The heavily forested site and steep slopes along the main access road to the impoundment limit the availability of staging areas, although a number of suitable sites should be available. Some potential staging sites include:

- The Old Mike Horse Townsite near the Mike Horse Tailings Impoundment;
- The relatively flat, open area on the west abutment of the dam near the intake to the principal spillway;
- The smaller open area along the dam access road may be suitable for establishment of an initial staging area; and
- The large open area north of Mike Horse County Road and west of Shave Creek.

Because the amount of large equipment needed for Alternative 2 would likely be much less than for Alternatives 3 through 5, the staging area may be less of a problem for Alternative 2.

1.1.2 Security

Construction activities would require access controls to the site in order to prevent easy access to the construction contractor's equipment, tools, and materials and to protect the public from dangers that a large scale construction project can present, such as unstable earth excavations and large moving equipment with limited visibility. Therefore, it is likely that lockable gates may be placed on Mike Horse Mine Road during at least part of the construction season, and a road closure enacted in order to control access to the site.

1.1.3 Construction Sequencing

Construction sequencing refers to the schedule or order in which construction activities proceed. For the UBMC EE/CA activities, construction sequencing would be particularly important for timely and cost effective completion of removal activities based on the scope of work involved, the limited construction season, and the potential for conducting multiple removal actions concurrently. Construction sequence planning is important at the Mike Horse Tailings Impoundment as well as on a site-wide scale.

For site wide Alternatives 2 through 5, the following general sequence of events may occur, including several that may be initiated in Summer 2007:

1. Impoundment dewatering including diversion of Beartrap Creek and pumping down the pond;
2. Emplacement of storm water BMPs to minimize run-on to and control runoff from the impoundment structure and stream channels;
3. Temporary diversion of Beartrap Creek below the impoundment;
4. Site preparation, including development of construction staging area(s), haul road improvements or construction (for Alternative 5), and preparation of the selected repository site(s);
5. Materials dewatering and excavation; and
6. Water treatment (if necessary).

As currently planned, impoundment dewatering (described in Section 6.2.6) would occur in summer 2007. Dewatering the impoundment in 2007 would not only facilitate commencement of removal actions in 2008, but also to provide important information on impoundment conditions (tailings characteristics, groundwater response to dewatering) for use in developing final engineering designs and in selection of one or more repository sites. The level of dewatering necessary would depend on the Alternative selected, with minimal dewatering needed for Alternative 2, and complete dewatering of the pond needed for Alternatives 3 through 5.

Storm water controls (BMPs) would be required before excavation and related construction activities at the site begin. For much of the impoundment area excavation and construction activities, the dam embankment would be utilized to prevent runoff from the excavation area for the majority of the construction period. The dam would also control runoff from the West Impoundment repository area being considered for Alternatives 3 and 4. Sediment control measures, such as silt fence or runoff control ditches/berms would be needed to address runoff from removal areas which may drain to Lower Mike Horse Creek, Beartrap Creek, or the Blackfoot River. Run-on diversion ditches would also be used to reduce the amount of storm water run-on to the construction areas. Storm water control details for the impoundment and other sub-areas, including control of suspended sediment in runoff water, would be developed once a site-wide alternative is selected, and would be included in an erosion control plan to be developed with other construction documents. Some controls may be installed in 2007 if warranted by impoundment dewatering activities and other site investigation or preparation activities.

Removal actions may commence as early as 2008, and could take anywhere from one construction season for Alternative 2, to two or more seasons to complete for Alternatives 3 through 5. As described in Section 6.2.2, minimal tailings dewatering and excavation would be required for Alternative 2 (spillway construction and lining of the interior dam face and limited tailings removal from Lower Mike Horse Creek, Bear Trap Creek, and Blackfoot River). Alternatives 3, 4 and 5 would all require significantly greater levels of tailings excavation and would be more reliant on successful dewatering of the tailings (as described in Section 6.2.6.1). If tailings cannot be dewatered adequately for excavation and hauling to a repository site, a materials handling/drying area would be necessary. For materials in the impoundment area and Lower Mike Horse Creek, a flat pad area (a few acres in size) would be constructed along the base on the interior dam face where excavated tailings could be spread out and dried prior to hauling and placement in a repository as necessary. For Bear Trap Creek and the Blackfoot River, a flat pad area near the Anaconda Wetland Treatment Cells or near Shave Gulch would be constructed for tailings to be spread out and dried prior to hauling and placement in the repository.

In the event that dissolved contaminants (i.e., metals, acidity) make the dewatering water unsuitable for discharge, advanced water treatment may be incorporated into the tailings dewatering plan. Advanced treatment may include chemical precipitation of metals through pH adjustment (or other means) followed by filtration, or mechanical treatment such as ion exchange or reverse osmosis technologies using a portable packaged water treatment plant.

Site-wide, major removal activities would start at the tailings impoundment and proceed in a downstream direction from there. Due to the proximity of the Lower Mike Horse sub-area to the tailings impoundment, the Lower Mike Horse Creek removal would likely take place concurrently with the impoundment removal action. Certain aspects of the Beartrap Creek and Blackfoot River removal actions, such as temporary stream diversions and removal of concentrated mine waste deposits, may also be implemented concurrently with upstream activities but final reclamation activities, such as cover soil placement and revegetation, would most likely not occur until upstream activities are completed or upstream removal areas are adequately stabilized. Final reclamation activities in Lower Mike Horse Creek, Beartrap Creek and the Blackfoot River sub-areas may also be dependent on completion of upgradient reclamation activities and mitigation of upgradient sources as described in Section 3.5.

1.1.4 Mine Waste Hauling

Construction activities would likely require improvement and widening of existing roads and construction of new roads. There exists an access road to the both the crest and the toe of the dam from Mike Horse Creek Road. This road also accesses the removal areas for Lower Mike Horse Creek. However, this road would need to be widened to allow large earth moving equipment to use it, and the turn on to Mike Horse Creek Road would need to be improved to allow a larger turning radius and longer site distance. For Alternative 4, similar improvements would be needed for the road to the Paymaster Repository. Although large trucks have used this road in the past to haul mine waste to the repository, if the volume of traffic increases substantially the road may need work to improve drainage and at least one

curve may need to be reconstructed to increase its turning radius and improve its site distance.

Mike Horse Road would need to be signed so that traffic will stop for trucks entering the road. This is especially true for Alternative 5, which proposes to dispose of tailings in an off-site repository. Alternative 5 would require additional improvements to Mike Horse Road and the dam access road in order to insure the safety of drivers. Pullouts would be needed so that trucks can pass each other safely going in opposite directions and site distances would need to be provided on corners, which would require the removal of some trees along the haul route. In order to access the proposed repository areas, improvements to existing or construction of new access roads would be required. Approximately 1.2 miles of road improvements would be required to access the First Gulch site, and over 1.5 miles of new road would be needed for the Horsefly Creek site. Haul road routes would be chosen that minimize tree clearing, maximize preservation of wetlands, and avoid stream corridors. However, a bridge across the Blackfoot River would be required on the access road to the Horsefly Creek repository site for Alternative 5. Silt fence, sediment traps and other BMPs would be needed along the route of the new access and haul road routes where disturbance occurs.

In addition to haul road improvements or haul road construction, locating a repository at the First Gulch or Horsefly Creek sites would require highway hauling on MT-200. Due to the dangerous intersection of Mike Horse Road and MT-200 and the significant increase in traffic volume to MT-200, a detailed traffic control plan would need to be implemented if either of these sites is selected as the preferred repository location. The traffic control plan may include the use of significant speed limit reductions, pilot cars, stoplights, or flag persons. In addition to safety concerns, hauling the volume of tailings and soil required for implementation of Alternative 5 would more than double the daily truck volume on highway MT-200. Increasing the truck volume by this much would most likely result in excessive wear or rutting of the pavement. Therefore, milling, resurfacing and striping of MT-200 would potentially be required once hauling has been completed.

1.1.5 Borrow Soil Sources

1.1.5.1 Paymaster Area

Potentially 45,000 cubic yards of material would be available to be used for cover soil material. Approximately two-feet of material would be stripped from the site before construction of the repository would begin.

1.1.5.2 Clayey Dam Fill

As much as 40,000 cubic yards of clayey dam fill would potentially be available for construction fill or cover soil material. This would not only provide a local borrow source for fill or cover soil, but would also reduce the volume of material requiring disposal in a repository by up to 40,000 cubic yards. Based on preliminary testing of metals concentrations in the clayey fill with a field portable XRF, the soils may be suitable for use as construction material from a chemical standpoint. Additional chemical and physical testing would be required to confirm the material suitability.

1.1.5.3 First Gulch Area

Potentially 45,000 cubic yards of material would be available to be used for cover soil material. Approximately two-feet of material would be stripped from the site before construction of the repository would begin. Additional cover soil material may be obtained from this site by stripping material outside the repository footprint.

1.1.5.4 Horsefly Creek Area

Potentially 50,000 cubic yards of material would be available to be used for cover soil material. Approximately two-feet of material would be stripped from the site before construction of the repository would begin. Additional cover soil material may be obtained from this site by stripping material outside the repository footprint.

1.1.5.5 West Impoundment Area

As much as 104,000 cubic yards of excavated material would potentially be available for construction fill or cover soil material. This material would be removed from the hill slope along the west side of the impoundment during construction of the West Impoundment Repository.

1.2 CONCEPTUAL CONSTRUCTION PLANS

Once dewatering of the tailings impoundment has begun and the preliminary work items have been completed, the construction contractor can begin on the major work items. A conceptual construction plan for each site wide alternative is described below.

1.2.1 Alternative 2: In-Place Dam Stabilization/Seepage Reduction and Concentrated Tailings Removal.

Alternative 2 would likely require the least amount of material and equipment. Dewatering of the impoundment several feet below elevation 5476 would be required before starting construction, in order to allow installation of the upstream face liner and excavation of the downstream toe drain. Significant dewatering is not anticipated for the removal of concentrated tailings in Lower Mike Horse Creek, Beartrap Creek, or the Blackfoot River under this alternative. Once the appropriate BMP's have been put in place, and the selected repository has been prepared, construction can begin at any of the sub areas.

Installation of the liner would require the upstream face of the dam to be graded level and rolled smooth. The liner would be installed on the face of the dam by anchoring one end of a role in an upper anchor trench and unrolling a panel of liner down the face of the dam embankment and anchored securely in a lower anchor trench. Placement of cover soil over the liner is needed to protect the liner from the weather and sunlight, but may wait until excavation of the emergency spillway channel in order to use the excavated material for this purpose.

Installation of the downstream toe drain would require a trench that is approximately 8 to 10 feet deep. It would likely be excavated as deep as possible and still be able to daylight into

the existing channel downstream of the dam. This trench is expected to extend along the entire dam toe below elevation 5432. Existing monitoring wells may need to be abandoned and then replaced with new wells after construction of the toe drain trench.

Excavation of a new emergency spillway would require construction of a large enough channel to not only be able to handle extreme flood flows, but to allow installation of layers of rock to protect the channel from erosion. As the channel is excavated, the material would be hauled to the repository unless chemical test show the material can be used as cover soil. The excavated channel would be graded, compacted, and rolled smooth. Once the subgrade is prepared, a filter fabric would be placed over the subgrade as the first layer of protection against erosion. This fabric would be covered with a layer of bedding stone to provide a stable base for the riprap. Covering the bedding stone, the third and final layer of erosion protection is placed. The channel riprap would be comprised of much larger stones that can resist displacement during a ½-Probable Maximum Flood (PMF) for which the channel is designed.

Excavation of mine waste along Lower Mike Horse Creek, Beartrap Creek, and the Blackfoot river would likely be done with a large track mounted excavator typically working from upstream to downstream. Once the tailings have been excavated, they would be loaded directly into trucks where they would be spread, dried to their optimum moisture content, and compacted in lifts. Because the majority of the tailings to be removed are not located within the active stream channel, rerouting of Lower Mike Horse Creek, Beartrap Creek, or the Blackfoot River or significant dewatering is not anticipated.

Once all excavation has been completed for Alternative 2, placement of filter fabric, bedding stone, riprap, clean backfill and cover soil can begin. Once all the construction items have been completed, the stream bypass can be removed and the pool level allowed to return to it's normal level.

1.2.2 Alternative 3: Partial Removal with Engineered Channel and Removal of Concentrated and Dispersed Tailings

Alternative 3 would likely require significantly more material and equipment than Alternative 2. As explained in Section 6.2.1.6, dewatering of the impoundment to an elevation several feet below the tailings would be necessary before excavation within the impoundment can begin, and time would be required for the surface material to dry enough for equipment to operate. The tailings would initially be dewatered by excavating sumps around the perimeter of the impoundment, where it is accessible by heavy equipment, and pumping the inflow to maintain a water level near the bottom of each sump. In the event that dissolved contaminants (i.e., metals, acidity) make the process water unsuitable for discharge, advanced water treatment may be needed. Advanced treatment may include chemical precipitation of metals through pH adjustment (or other means) followed by filtration, or mechanical treatment such as ion exchange or reverse osmosis technologies using a portable packaged water treatment plant.

Once the surface tailings have dried sufficiently to operate tracked equipment, trenches that lead to the sumps would be excavated in a rough grid pattern to increase the rate at which the tailings will drain. While this is occurring, excavation of the adjacent hillside can proceed in

order to prepare a stable foundation for the repository. Some of the excavated hillside soil would be placed and compacted to construct a stability toe berm at the base of the repository. Excess soil would be screened to remove oversized rock and then stockpiled along the western shoreline or upstream face of the dam embankment for use as cap cover soil. Topsoil would be stockpiled separately.

Once the tailings have been dewatered and dried sufficiently to allow wheeled equipment, trucks and scraper would begin removing tailings to form an excavation for the new stream channel. The dam embankment would be left in place until last to act as a sediment trap for the construction site. As layers of tailings are removed, the drain trenches and sumps would be deepened to keep the water table well below the excavated surface. The low shear strength of the saturated tailings may limit how deep trenches can be expected to remain open, and this in turn may limit the pace of tailings removal. Preliminary testing and stability analyses outlined in Section 6.2, suggests that the sides of the channel excavation would need to be sloped at 3.6:1 (Horizontal: Vertical) or shallower in order to provide adequate stability. With proper dewatering, staged excavation, and the maintenance of appropriate side slopes, the new stream channel can be excavated to a depth appropriate for the new stream channel.

Excavation of tailings from Lower Mike Horse Creek, Beartrap Creek, and the Blackfoot River would be the same as Alternative 2. Once the tailings have been excavated, they would be either taken to an initial drying area or hauled directly to the repository site where they would be spread, dried to their optimum moisture content, and compacted in lifts.

Both the repository and the remaining tailings in the impoundment area would be capped to prevent infiltration of precipitation as outlined in Section 6.1. Construction of the cap would likely include leveling and compaction of the tailings surface before covering them with a liner, drainage layer, cover soil, and topsoil. Removal areas from Lower Mike Horse Creek, Beartrap Creek, and the Blackfoot River would be backfilled with clean soil and graded for proper drainage. Once tailings removal has been completed at all areas, a final layer of topsoil would be placed on all disturbed surfaces and vegetated. A cover of mulch or erosion matting may be necessary to hold the topsoil in place until the vegetation takes hold.

1.2.3 Alternative 4: Total Removal to Extent Practicable with Placement in In-Drainage Repository

Alternative 4 would likely require significantly more material management and equipment than Alternative 3.

As discussed in Section 6.2.1.6, dewatering of the impoundment would proceed much the same as for Alternative 3. However because of the significant increase in the amount of tailings to be excavated, adequate drying of the impoundment to allow use of large, wheeled equipment would be even more important in Alternative 4. Removal of Lower Mike Horse Creek tailings would likely coincide with excavation of the impoundment tailings. As in Alternative 3, the dam embankment would be left in place until last to act as a sediment trap for the impoundment construction site.

Alternative 4 activities would also require Lower Beartrap Creek to be temporarily rerouted in order to remove tailings from within the existing channel and to reconstruct a meander belt and floodplain for the stream. Material removed from the Beartrap Creek channel consists of fine tailings mixed with large inert rock. The large inert rock may be screened from the excavated material and a screening plant may be set up in the lower portion of the drainage or other suitable location. The fine grain tailings would be hauled to the repository while the coarse rock would be stockpiled and used as hardscape for the new meander belt. Construction activities for the Blackfoot River removal would be similar to, and coincide with, those described for Beartrap Creek.

The Paymaster Repository would be expanded to the west by stripping the topsoil and subsoil from the repository footprint, cutting into the hillside to level the repository area, and then compacting the subgrade to prepare a stable foundation for the repository. The stripped subsoil would be screened to remove oversized rock and then stockpiled near the repository for use as cap cover soil. Topsoil would be stockpiled separately. Waste material would be placed in the repository in large flat successive lifts, which would allow the site to be covered with temporary geosynthetic liners during temporary winter closure. Once construction has been completed in all areas and all waste has been placed, a liner, drain layer, and final coversoil layer would be placed on the repository and vegetated.

The final task for implementing Alternative 4 would be to relocate the Blackfoot River into its historical channel. This channel would be developed as a self-sustaining stream system, rather than providing hard armoring for erosion protection. Erosion protection would still be needed, but soft armoring methods such as plantings and construction of pools and riffles would be employed.

Once construction has been completed in all areas, a final layer of topsoil would be placed on all disturbed surfaces and vegetated. A cover of mulch or erosion matting may be necessary to hold the topsoil in place until the vegetation takes hold.

1.2.4 Alternative 5: Total Removal to Extent Practicable with Placement in Out-of-Drainage Repository

The amount of material management for Alternative 5 would be very similar to that for Alternative 4. However, Alternative 5 would likely require significantly more equipment than Alternative 4 in order to haul the tailings to an off-site repository. For Alternative 5, the excavation and dewatering of the tailings, removal of tailings at Lower Mike Horse Creek, and removal of tailings from the Blackfoot River would use the same procedure as in Alternative 4. However, Alternative 5 would require complete removal of all mine wastes from Beartrap Creek and the reconstruction of the creek to a self-sustaining system consisting of soft armoring such as plantings, riffles and pools. All waste material being hauled from each subarea would be loaded in covered trucks and hauled to the selected offsite repository location.

The offsite repository would be constructed by stripping the topsoil and subsoil from the repository footprint and compacting the subgrade to prepare a stable foundation for the repository. The stripped subsoil would be screened to remove oversized rock and then

stockpiled near the repository for use as cap cover soil. Topsoil would be stockpiled separately. Waste material would be placed in the repository in large flat successive lifts, which would allow the site to be covered with temporary geosynthetic liners during winter shutdown. Because the repository would be located out of drainage, construction activities at the repository may occur simultaneously with the individual subarea removals.

Once construction has been completed in all areas and all waste has been placed and lined in the repository, a final layer of topsoil would be placed on all repository and other disturbed surfaces and vegetated. A cover of mulch or erosion matting may be necessary to hold the topsoil in place until the vegetation takes hold.