ATTACHMENT D-1

EXAMPLE
(Further Remediation Required)

5.5 COMPARISON OF REMEDIATION PROPOSAL TO ALTERNATIVES

Section 75-10-734(3)(b), MCA, requires a brief comparison of the remediation proposal to reasonable alternatives based on the remedy selection criteria in § 75-10-721, MCA. Based on the information available about the facility and knowledge and experience with remedies for other similar facilities, four remedial alternatives have been identified as the most reasonable alternatives for the facility.

Alternative 1: No action (this alternative is retained as a basis for comparison to other alternatives)

Alternative 2: Remove all mine/mill waste and dispose in active offsite mine waste repository with associated institutional controls

Alternative 3: Consolidation of wastes in an existing capped onsite repository with its associated institutional controls

Alternative 4: Construction of a new onsite repository with additional institutional controls

These four alternatives are evaluated based on the following seven criteria (giving due consideration to institutional controls) included in § 75-10-721, MCA.

Protectiveness – The proposed remedy must be demonstrated protective of public health, safety and welfare and the environment.

Compliance – The proposed remedy must comply with applicable and relevant state or federal environmental requirements, criteria, or limitations.

Mitigation – The proposed remedy must be demonstrated to mitigate exposure to risks to public health, safety, and welfare and the environment to allowable levels.

Effectiveness and Reliability – The proposed remedy must be effective and reliable in the short and long term.

Practicability and Implementability – The proposed remedy must be practicable and implementable.

Applicable Technology – The proposed remedy must be chosen in consideration of treatment and resource recovery technologies, giving due consideration to engineering controls.

Cost-Effectiveness – The proposed remedy must be cost-effective relative to the risk reduction it would achieve.

5.5.1 Alternative 1: No Action

The no action alternative would leave the facility in its present condition without further remediation, monitoring, or institutional controls. The no action alternative is used as a baseline against which other remedial options may be compared.

Protectiveness – This alternative would not be protective of public health, safety and welfare and the environment as it would not prevent contact with impacted soil, surface water, or sediment, runoff to surface water, or contaminants leaching to groundwater.

Compliance – The no action alternative does not comply with ERCLs as it does not prevent leaching to groundwater or runoff to surface water that may result in exceedance of DEQ-7 standards. In addition, the no action alternative includes leaving contaminated material in a floodplain.

Mitigation – This alternative would not mitigate exposure to risks to public health, safety, and welfare and the environment.

Effectiveness and Reliability – This alternative is not effective and reliable in the short or long term.

Practicability and Implementability – This alternative is practicable and implementable.

Applicable Technology – This alternative does not use treatment technologies, resource recovery technologies, or engineering controls.

Cost-Effectiveness – The no further action alternative has no cost but does not reduce risks.

5.5.2 Alternative 2: Mine/Mill Waste Removal and Disposal in an Active Offsite Mine Waste Repository

This is the proposed remedy described in detail in Section 5.1. The remedy involves excavating, hauling, and placing all mine/mill waste materials, including soil contaminated above cleanup levels, in an active offsite mine waste repository and reconstructing the stream channel and floodplain. Institutional controls will only be required to prevent disturbance of the offsite repository. Long-term operation and maintenance of the offsite repository would be required.

Protectiveness – This alternative is protective of public health, safety and welfare and the environment because all contaminated materials would be placed in a permitted, maintained facility isolated from human contact and the environment (i.e., non-leaching).

Compliance – This alternative complies with all applicable and relevant ERCLs as described in Section 5.3.

Mitigation – This alternative mitigates exposure to risks by reducing contaminant concentrations remaining onsite to allowable levels as described in Section 5.2.

Effectiveness and Reliability – This alternative is effective and reliable in the short and long term because it will be conducted with adequate controls to prevent the spread of contamination during the remediation and the waste repository will be maintained in perpetuity.

Practicability and Implementability – This alternative is practicable and implementable because the technology exists to remove the contaminated materials and place them in an appropriate repository.

Applicable Technology – Although this alternative does not involve treatment or resource recovery technologies, it does make good use of available engineering controls.

Cost-Effectiveness – This alternative would cost approximately $600,000 to implement, which is cost-effective relative to the level of long-term risk reduction achieved.

5.5.3 Alternative 3: Consolidation of Wastes in Existing Capped Onsite Repository

This alternative involves excavating, hauling, and placing all mine/mill waste materials, including soil contaminated above cleanup levels, in the existing, capped, onsite repository. To accomplish this, approximately seven acres of the existing cap, which consists of soil cover, geotextile filter fabric layer, and capillary barrier rock layer, must be removed to expose the tailings previously placed in the repository. Based on the anticipated waste volume, the wastes could most likely be placed in the repository without expanding the repository footprint. However, the existing runon control ditch would require relocation. Removal and replacement of the cap materials would be costly for the small amount of additional waste placement and would destroy the existing vegetative cover, which would require replacement. Segregation of the cap materials would be difficult. The geotextile layer would likely be destroyed during the removal and would require replacement. Excavation and removal of the capillary barrier rock could not be accomplished without cross-contamination from tailings in the repository. Therefore, the existing capillary barrier would be left in place and the additional mine/mill wastes would be placed on top of it. This would require the placement of a new capillary barrier layer, which results in additional repository volume. If the waste volume were to exceed the capacity of the existing repository footprint, expansion of the repository would require removal and relocation of the existing repository terrace and subsurface riprap protections, which is cost prohibitive. Existing institutional controls would be maintained to prevent disturbance of the repository. Long-term operation and maintenance of the repository would be required.

Protectiveness – This alternative would be protective of public health, safety and welfare and the environment because all contaminated materials would be placed in a maintained facility isolated from human contact and the environment (i.e., non-leaching).

Compliance – This alternative would comply with all applicable and relevant ERCLs.

Mitigation – This alternative mitigates exposure to risks by reducing contaminant concentrations remaining onsite to allowable levels as described in Section 5.2.

Effectiveness and Reliability – This alternative is effective and reliable in the short and long term because it will be conducted with adequate controls to prevent the spread of contamination during the remediation and the waste repository would be maintained in perpetuity.

Practicability and Implementability – This alternative is practicable and implementable because the technology exists to remove the contaminated materials and place them in the existing repository.

Applicable Technology – Although this alternative does not involve treatment or resource recovery technologies, it does make use of available engineering controls.

Cost-Effectiveness – This alternative would cost approximately $645,000 to implement, which is not as cost-effective relative to the level of long-term risk reduction achieved as Alternative 2.

5.5.4 Alternative 4: Construction of New Onsite Repository

This alternative involves excavating and placing all mine/mill wastes, including soils above cleanup levels, in a new onsite repository. The repository would be constructed in the northwest area of the facility. The repository would be designed to contain the estimated waste volume of 41,000 cubic yards plus a 20 percent contingency for additional waste volume, which is a total volume of approximately 49,000 cubic yards. Figure 5-5-1 (fictitious) shows the conceptual design of an onsite repository with top dimensions of 92 feet by 250 feet and 4H:1V site slopes, which results in a waste storage volume of 49,940 cubic yards. The repository would be keyed into the elevation of the main level of the area (4,800 feet above mean sea level). As shown on Figure 5-5-1, a repository of this size would cross the gravel road on the east side of the area onto adjacent private property proposed for residential cleanup and would encroach on the paved county road. Because of the presence of relatively shallow groundwater (15 feet), the coalluvial nature of the underlying soil and the potential for acid generation, the repository would be constructed with top and bottom geosynthetic clay liners and a geocomposite drainage layer to prevent leaching of the mine/mill waste into the soil and groundwater.

Several problems exist with this alternative. 1) Although the applicant has been designated a potentially liable person for the facility, it does not currently own any portion of the facility. Implementation of this alternative would require the applicant to construct, operate and maintain a repository on property it does not own. This is not desirable from the standpoint of long-term access for operation and maintenance, and it may be difficult for the applicant to prevent the current or future property owners from disturbing the repository or changing its intended use. Purchasing the property from the current owners would add considerable cost to the overall project costs. 2) The repository would be located directly adjacent to the nearby town with virtually no separation from the paved county road. This coupled with the repository ownership issues, make it difficult to keep the repository secure and prevent long-term exposure to the mine/mill wastes. 3) This alternative would require rerouting or closing the gravel road on the east side of the facility and would deposit mine/mill waste on property owned by private individuals in the nearby town. Institutional controls would be required to prevent disturbance of the repository. Long-term operation and maintenance of the repository would be required.

Protectiveness – This alternative may be protective of public health, safety and welfare and the environment because all contaminated materials would be placed in a maintained facility isolated from human contact and the environment (i.e., non-leaching). However, significant long-term risk may exist because of the proximity of the repository to residential areas.

Compliance – This alternative would comply with all applicable and relevant ERCLs.

Mitigation – This alternative mitigates exposure to risks by reducing contaminant concentrations remaining onsite to allowable levels as described in Section 5.2. However, significant long-term risk may exist because of the proximity of the repository to residential areas.

Effectiveness and Reliability – This alternative is effective and reliable in the short-term because it will be conducted with adequate controls to prevent the spread of contamination during the remediation. However, the close proximity of the repository to the residential areas in the nearby town reduces the long-term effectiveness and reliability of the remedy for preventing exposures.

Practicability and Implementability – This alternative is practicable and implementable because the technology exists to remove the contaminated materials and place them in the existing repository. However, landowner and road issues may provide limitations to the remedy's implementation.

Applicable Technology – Although this alternative does not involve treatment or resource recovery technologies, it does make use of available engineering controls.

Cost-Effectiveness – This alternative would cost approximately $536,000 to implement, without the cost of purchasing property, which is not cost-effective relative to the level of long-term risk reduction achieved.

5.5.5 Summary of Alternatives Comparison

Alternative 1 was retained for comparative reasons but does not meet the seven criteria included in § 75-10-721, MCA. Alternative 3 meets the evaluation criteria; however, it does not provide a greater level of incremental risk reduction for the additional cost above that of Alternatives 2 and 4 and has greater cost uncertainty because of the potential to exceed the capacity of the existing repository footprint. Alternative 4 does not reduce long-term risks to an acceptable level and is not cost-effective relative to the level of long-term risk reduction achieved. There are also land ownership issues that may affect the implementability of this alternative. Alternative 2 meets all of the evaluation criteria, provides greater long-term protection of public health, safety and welfare and the environment than Alternative 4 and is more cost-effective relative to risk reduction that Alternative 3. Based on this analysis, Alternative 2, mine/mill waste removal and disposal in an active offsite mine waste repository, is the proposed remedy for the facility. Table 5-1 summarizes this evaluation.

EXAMPLE
(No Further Remedial Action Required)

5.5 COMPARISON OF REMEDIATION PROPOSAL TO ALTERNATIVES

Section 75-10-734(3)(b), MCA, requires a brief comparison of the remediation proposal to reasonable alternatives based on the remedy selection criteria in § 75-10-721, MCA. Based on the information available about the facility and knowledge and experience with remedies for other similar facilities, four remedial alternatives have been identified as the most reasonable alternatives for the facility.

Alternative 1: No further action

Alternative 2: Remove and dispose of all wastes at an appropriate offsite land disposal facility

Alternative 3: Consolidation and capping of materials onsite

These three alternatives are evaluated based on the following seven criteria (giving due consideration to institutional controls) included in § 75-10-721, MCA.

Protectiveness – The proposed remedy must be demonstrated protective of public health, safety and welfare and the environment.

Compliance – The proposed remedy must comply with applicable and relevant state or federal environmental requirements, criteria, or limitations.

Mitigation – The proposed remedy must be demonstrated to mitigate exposure to risks to public health, safety, and welfare and the environment to allowable levels.

Effectiveness and Reliability – The proposed remedy must be effective and reliable in the short and long term.

Practicability and Implementability – The proposed remedy must be practicable and implementable.

Applicable Technology – The proposed remedy must be chosen in consideration of treatment and resource recovery technologies, giving due consideration to engineering controls.

Cost-Effectiveness – The proposed remedy must be cost-effective relative to the risk reduction it would achieve.

5.5.1 Alternative 1: No Further Action

The no action alternative would leave the facility in its present condition without further remediation, monitoring, or institutional controls.

Protectiveness – This alternative is protective of public health, safety and welfare and the environment because contaminant levels remaining at the facility are appropriate for current and reasonable anticipated future usage of the facility.

Compliance – The no further action alternative complies with the ERCLs identified in Section 5.3 because no contaminant levels remaining at the facility are above levels that may result in leaching to groundwater or runoff to surface water that may result in exceedance of DEQ-7 standards. In addition, the no action alternative does not involve leaving contaminated material in a floodplain. All other ERCLs are similarly met by the no further action alternative as explained in Section 5.3.

Mitigation – The no further action alternative does not include mitigation of risks as the risks posed by the contaminant levels remaining are the facility are at allowable levels (see Section 5.2).

Effectiveness and Reliability – The no further action alternative is effective and reliable in the short and long term because, as it is, the facility is protective of current and reasonably anticipated future use.

Practicability and Implementability – The no further action alternative is practicable and implementable as it does not require any further action.

Applicable Technology – Although the no further action alternative does not employ treatment or resource recovery technologies or engineering controls, these technologies are not necessary to meet the other evaluation criteria.

Cost-Effectiveness – The no further action alternative has no cost and no risk reduction is required.

5.5.2 Alternative 2: Waste Removal and Disposal in an Offsite Land Disposal Facility

This alternative involves excavation, hauling, and disposal of residually contaminated soil at an offsite land disposal facility. To accomplish this, approximately 100 yards of material with residual contaminant concentrations below the cleanup levels included in Section 5.2 would require excavation, hauling, and disposal.

Protectiveness – This alternative would be protective of public health, safety and welfare and the environment because all contaminated materials would be placed in a permitted maintained facility isolated from human contact and the environment (i.e., non-leaching).

Compliance – This alternative would comply with all applicable and relevant ERCLs.

Mitigation – This alternative mitigates exposure to risks by reducing contaminant concentrations remaining onsite. However, this mitigation is not required because contaminant concentrations remaining onsite are below allowable levels as explained in Section 5.2.

Effectiveness and Reliability – This alternative is effective and reliable in the short- and long-term because it would be conducted with adequate controls to prevent the spread of contamination during the remediation and the permitted waste disposal facility would be maintained in perpetuity. However, excavation and hauling involve unnecessary short-term risks (risk of accidents during remediation and hauling) as the material may be appropriately left in place.

Practicability and Implementability – This alternative is practicable and implementable because the technology exists to remove and dispose of the contaminated materials. However, the no further action alternative is more practicable and implementable.

Applicable Technology – This alternative does not involve treatment or resource recovery technologies, it does make use of available engineering controls.

Cost-Effectiveness – This alternative would cost approximately $100,000 to implement, which is not as cost-effective relative to the level of long-term risk reduction achieved as Alternative 1.

5.5.3 Alternative 3: Consolidation and Capping Onsite

This alternative involves consolidating and capping all residually contaminated soil onsite. To accomplish this, approximately 50 yards of material with residual contaminant concentrations below the cleanup levels included in Section 5.2 would require excavation and consolidation. This remedy would also include construction and long-term maintenance of a 100 foot by 100 foot asphalt cap. Institutional controls would be required to prevent disturbance of the cap. Long-term operation and maintenance of the cap would be required.

Protectiveness – This alternative would be protective of public health, safety and welfare and the environment because all contaminated materials would be placed under a maintained cap isolated from human contact and the environment (i.e., leaching prevented).

Compliance – This alternative would comply with all applicable and relevant ERCLs.

Mitigation – This alternative mitigates exposure to risks by reducing contaminant concentrations remaining onsite. However, this mitigation is not required because contaminant concentrations remaining onsite are below allowable levels as explained in Section 5.2.

Effectiveness and Reliability – This alternative is effective and reliable in the short- and long-term because it would be conducted with adequate controls to prevent the spread of contamination during the remediation and the cap would be maintained in perpetuity. However, excavation and consolidation involve unnecessary short-term risks (risk of accidents during remediation) as the material may be appropriately left in place.

Practicability and Implementability – This alternative is practicable and implementable because the technology exists to consolidate and cap the contaminated materials. However, the no further action alternative is more practicable and implementable.

Applicable Technology – This alternative does not involve treatment or resource recovery technologies, but it does make use of available engineering controls.

Cost-Effectiveness – This alternative would cost approximately $50,000 to implement, which is not as cost-effective relative to the level of long-term risk reduction achieved as Alternative 1.

5.5.5 Summary of Alternatives Comparison

Alternative 2 meets some of the evaluation criteria; however, it does not provide a greater level of incremental risk reduction for the additional cost above that of Alternative 1 and includes additional unnecessary risks during excavation and hauling. Alternative 3 meets some of the evaluation criteria; however, it does not provide a greater level of incremental risk reduction for the additional cost above that of Alternative 1 and includes additional unnecessary risks during excavation and capping. Based on this analysis, Alternative 1, no further action, is the proposed remedy for the facility. Table 5-2 summarizes this evaluation.