ES 1.0 EXECUTIVE SUMMARY

ES 1.1 Introduction

The East Mission Flats (EMF) Repository site is a 23-acre parcel about three-quarters of a mile west of Cataldo, Idaho. It is bounded to the northeast by Canyon Road, to the southwest by Interstate 90 (I-90), and to the north and northwest by private property. The site lies about 2,130 feet above sea level, and slopes gently from north to south. The southern portion of the site is occupied by an easement granted to Avista for access to its power lines. The repository is not located on the site of the Old Mission; it is about one-quarter mile east of the nearest point of Old Mission State Park. The EMF site is north of I-90, across the freeway from the Old Mission.

The EMF Repository is designed to securely hold soil waste generated from the remediation of the lower Coeur d'Alene River basin area. Repositories are part of the Selected Remedy and are necessary to store the waste generated through the Bunker Hill Superfund Site cleanup process. The Bunker Hill Mining and Metallurgical Complex Operable Unit (OU) 3 Record of Decision (ROD) (USEPA 2002) specifies that contaminated soil will be removed from residential and certain non-residential areas to protect Silver Valley residents from exposure to metals. The contaminated soil will be stored in secure repositories designed, operated, and maintained for that purpose.

The EMF Repository is located in an area that has existing contamination from deposition of mining waste; therefore, it is considered to be within the Area of Contamination (AOC). The AOC includes source areas of mine and mill sites in the upper South Fork of the Coeur d'Alene River valley, and depositional areas such as the 100-year floodplain in the lower river valley, west of Cataldo, Idaho. Siting repositories in the AOC is an implementation policy of the United States Environmental Protection Agency (USEPA) and Idaho Department of Environmental Quality (IDEQ). The location of EMF is consistent with this policy.

The local vegetation is a mix of Ponderosa pine, cottonwood, alder and Rocky Mountain maple trees interspersed with open meadows. The site is currently vacant and has no history of development except for utility construction along the southern portion of the property and property access features installed at the southeastern end of the repository.

ES 1.2 Major Changes from the 60% Design Report

USEPA and IDEQ requested, recorded, and responded to comments on the *Coeur d'Alene Basin East Mission Flats Repository 60% Design Report* (TerraGraphics 2008a) for the EMF Repository. IDEQ is modifying the EMF Repository based upon those comments as follows:

1. The EMF Repository will have a bridge access from Exit 39 so that truck traffic will be reduced on Dredge and Canyon Roads.
2. With the bridge access, the phased construction was modified based upon initiating waste placement on the west end of the EMF Repository. Also, the decontamination facilities were relocated to the bridge access.

3. The perimeter protection system was changed to a system that is more cost-effective by protecting areas based upon the expected 100-year flood potential impacts. In locations where the greater affects from the 100-year flood are likely to occur, riprap will be installed. In other areas, where lesser affects are likely, grass will be installed. Both of these protective measures are in accordance with the U.S. Army Corps of Engineers (USACE) requirements.
4. The rest of the design was completed including the geotechnical analysis and modeling, cover modeling, electrical system, weather station, decontamination water well, specifications, and drawings. The construction sequence was modified to address the needed changes with the new bridge access.
5. The Institutional Controls Program Access Area was modified to facilitate users' access and communications for how to use the area.

ES 1.3 Need for EMF Repository

USEPA and IDEQ have developed a Basin-wide Waste Management Strategy to guide waste repository siting and design to safely contain contaminated soils from the Superfund cleanup. Waste sources and quantities have been forecast based on the interim OU3 ROD requirements and the Basin Institutional Controls Program (ICP). This Waste Management Strategy identified a Lower Basin repository as a high priority for the near-term. With much of the cleanup ahead of us, there is not enough room in the existing repositories to dispose of the wastes. In addition, there is no repository to serve the Lower Basin, where the Basin Property Remediation Program (BPRP) will soon be working. Also, the repository is needed to serve the community's ICP requirements. The EMF site has been selected to fulfill this requirement after carefully evaluating possible sites throughout the Basin. Material disposed of at the EMF Repository will be generated by the BPRP and ICP activities. After the EMF Repository is full, it will be closed and maintained in perpetuity.

ES 1.4 Project Description

The repository footprint is roughly triangular, covering an area of about 14 acres. The site is approximately 650 feet on the northwest side, 1,600 feet on the southwest side, and 1,350 feet on the northeast side. Based on this configuration, IDEQ and USEPA estimate the total volume of the repository to be approximately 445,000 cubic yards (cy). The change in volume from the 60% Design Report and the 90% Design Report is that the total volume of the repository presented in the 90% Design Report includes the volume of the cover. The cover volume is approximately 30,000 cy and will be constructed out of clean materials. The side slopes of the repository will be made at a three foot horizontal to one foot vertical (3:1) slope. There will not be any side benches or "steps" except for a temporary road on the northeast side during construction. The top of the repository will be no higher than 2,165 feet, to reduce visual impacts identified by the public during the 30% Design review. The top will be peaked and sloped at 3% from the top to where it meets the 3:1 side slope perimeter to blend in with the surrounding landscape.

The EMF Repository footprint will be about 60 feet inside of the northeastern and 20 feet inside of the northwestern property lines, and about 40 feet northeast of the power lines to ensure worker safety during construction. It will be built using perimeter protected side slopes on all sides. The perimeter protection features protecting the contents of the repository

from erosion during flood events include the installation of either (1) a 9-inch gravel filter layer below a 12-inch layer of 6-inch diameter riprap or (2) a vegetated surface that will be seeded with grasses and forbs. Riprap will be used as protection of side slopes where the shear stresses and velocities are highest. All other areas of the repository will have revegetation as protection of side slopes. The cover for the EMF Repository will include a topsoil layer consisting of 6 inches of clean loam soil and a storage layer consisting of 24 inches of clean silty clay loam soil. The storage layer will be used to store infiltrated water and the topsoil layer, along with native vegetation, will promote the use of stored water by means of evapotranspiration.

ES 1.5 Phased Construction—Phases 1 through 7

The waste fill rates and yearly placement/production volumes at EMF are estimated, as is the total active lifespan of the repository; therefore, the placement sequence described below is a phased approach. Placement volumes for Phases 1 thru 3 are fixed amounts required for completion of the operational facilities. For Phases 4 through 6 estimated yearly waste material production volumes will be provided by IDEQ to the Repository Contractor by February 1 in order to produce an annual waste placement plan prior to commencement of each year's waste placement. The annual waste placement plan will account for projected yearly waste volumes, field conditions, weather conditions, and lifespan of the repository. This plan will be reviewed by IDEQ. The typical annual waste placement plan will consist of the following:

- Location of waste placement,
- Elevation to which waste will be placed,
- Retention basin construction or modification,
- Perimeter protection installation,
- Site grading,
- Maintenance to erosion and settlement control features,
- Repair of any damage that may have occurred during seasonal closure, and
- Traffic plan.

The waste placement sequence for construction phases 1 through 7 is illustrated in Sheets C3 through C18 in Appendix A, Drawings. Please refer to the figures to get an understanding of site development features discussed below.

Waste placement will commence at the westernmost corner near Dredge Road and proceed to the northeast along the northwest boundary. Once an advancing waste pile/slope has been established along the northwest boundary of the repository footprint, placement will proceed southeastward until a base pad at elevation 2,140 feet is established. This pad will facilitate a dry work area above the average yearly flood elevation. With this pad in place the waste pile will advance from the Dredge Road access of the repository back to the ICP Access Area to an elevation of 2,152 feet. Once the final waste placement has reached elevation 2,152 feet, the top of the repository will be constructed to an elevation of 2,165 feet, including the evapotranspiration (ET) cover. Construction of the ET cover will proceed from the ICP Access Area in the direction towards the Dredge Road access and will be installed after the waste material for the top, as described in Phase 6, is completed.

Waste will be placed in 6- to 12-inch lifts and compacted in accordance with the specifications. The compaction requirements will be specific to the location within the repository. The waste placed within the interior of the repository will be compacted to 90% of optimum, while the waste placed at the perimeter will be compacted to 95% of optimum. Slopes which are complete, that are part of the perimeter protection embankment will have the protective layer installed prior to seasonal closure for the year. ES Figure 1 depicts the perimeter protection embankment, the construction pad, and the waste slopes. Exposed slopes that will not have perimeter protection installed will be stabilized for seasonal closure during EMF operation by a spray-on soil stabilizer prior to winter closure. These design elements will provide continual protection for the fill during the construction season as well as provide winter protection from severe storms or flooding.

The use of waste material to construct the perimeter of the repository is acceptable to both IDEQ and USEPA based upon the following:

- Perimeter slopes will be constructed at a 3H:1V angle to encourage runoff and reduce the amount of time that runoff is in contact with the perimeter slopes.

- The perimeter protection will be installed over the waste and will cover the waste with a minimum of 21 inches of clean material and be installed on the repository prior to seasonal closure.

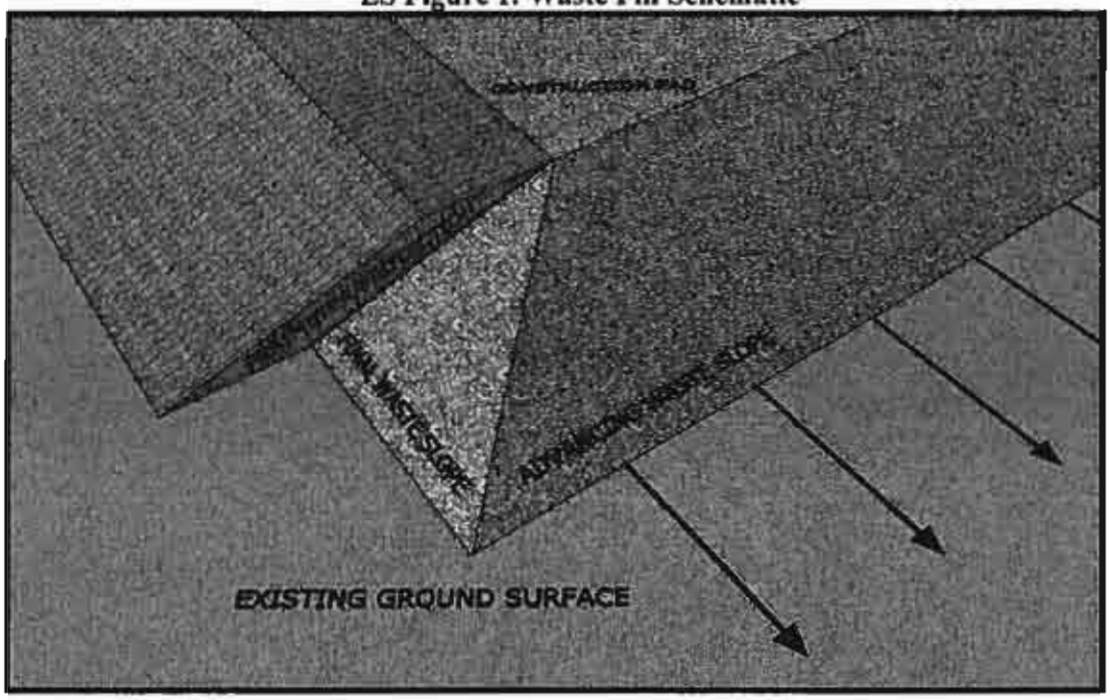
- Any surface water runoff that comes in contact with waste material that has been stabilized, would only do so for a limited amount of time due to the short precipitation/snowmelt exposure before the perimeter protective layer is installed.

- The relatively level nature of the existing topography would make it very unlikely that runoff would leave the site and discharge to surface water.

- Stormwater retention basins will be constructed to collect stormwater within the perimeter of the repository.

The perimeter slopes being constructed of waste material, protected from runoff by a minimum 21-inch thick protective layer, and the other aspects of the repository design provide an acceptable means of placing waste at the perimeter of the repository.

ES Figure 1. Waste Fill Schematic



Note: Waste placement will proceed through seven phases as presented in ES Table 1. These placement phases are illustrated in Sheets C3 – C18 in Appendix A, Drawings.

ES Table 1. Phases of Waste Placement

Phase	Location	Elevation	Approximate Volume
Phase 1	Northwest corner at base of bridge	Existing Ground to Elev. 2,152 ft	Phase 1 = 3,000 cy Cumulative = 3,000 cy
Phase 2	Operations pad and access ramp	Existing Ground to Elev. 2,152 ft	Phase 2 = 14,000 cy: Cumulative = 17,000 cy
Phase 3	Northwest boundary, advancing ≈ 330 ft	Existing Ground to Elev. 2,140 ft	Phase 3 = 33,000 cy: Cumulative = 50,000 cy
Phase 4	Leading edge of Phase 3 to South end	Existing Ground to Elev. 2,140 ft	Phase 4 = 60,000 cy: Cumulative = 110,000 cy
Phase 5	Entire EMF Repository footprint	Elev. 2,140 to Elev. 2,152 ft	Phase 5 = 182,000 cy: Cumulative = 292,000 cy
Phase 6	Entire EMF Repository footprint	Elev. 2,152 to Elev. 2,162.5 ft	Phase 6 = 123,000 cy: Cumulative = 415,000 cy
Phase 7	Top portion of EMF with 3% slope	Elev. 2,162.5 to Elev. 2,165 ft	Phase 7 = 30,000 cy (clean cover material) Cumulative = 445,000 cy

Phase 1

Phase 1 is limited to the construction and installation of the Dredge Road access bridge and the material directly adjacent to the bridge foundation. For construction vehicles and equipment to access the site for Phase 1 construction, a temporary ramp will be constructed from Dredge Road. At the end of Phase 1 construction, the temporary ramp will be removed and ramp materials will be used as part of the approximately 3,000 cy of clean fill needed for Phase 1 construction. Construction of the Dredge Road access bridge will begin with the installation of steel piles which will serve as the deep foundation that the pile cap and bridge will rest upon. Piles will be driven at each end of the bridge as specified by the geotechnical report provided by STRATA in Appendix W, Geotechnical Engineering Evaluation, Proposed EMF Repository Bridge.

Prior to erection of the bridge superstructure, the area surrounding the foundations must be filled and perimeter protection installed. This is necessary at this point because once the bridge is erected, the areas underneath the bridge will not be accessible to machinery. On the Dredge Road embankment, perimeter protection will entail installation of the protective riprap layer after the required piling for the bridge approach has been installed. To properly construct Phase 1 during 2009, approximately 3,000 cy of clean fill, which meets the specifications provided in Appendix I, will be installed around the exposed portion of the foundation piles on the repository end of the bridge. This material will be compacted to the same specifications as the waste material within the repository. The protective layer of riprap will be installed beneath the bridge and extend out as shown on Sheet C5 of Appendix A.

The next step in the construction of Phase 1 is the installation of the bridge superstructure. The components of the concrete structure will be fabricated off-site and shipped to the site where they will be erected. Once the structural members are erected, the surface will be topped with an asphalt layer that will extend to the edge of pavement of Dredge Road. Guard rails will be installed on the bridge, and Jersey barriers will be placed along Dredge Road for safety.

Phase 2

Phase 2 will complete the Dredge Road access and construct the operations facilities. To properly construct Phase 2 during 2010, the placement of 14,000 cy of waste material will be needed to create a pad at elevation 2,152 feet and an access ramp with an 8% slope from the operations pad to the existing surface elevation of EMF. This material will be compacted to 95% of optimum compaction. The operations pad will contain the decontamination facility, employee parking, employee's building, well house, and portable toilet. These items, as well as the production well to supply water for the decontamination facility, will be constructed and/or installed during Phase 2. The pad and ramp will be covered with a layer of crushed gravel that is contiguous with the access bridge. Final waste slopes will have the perimeter protection installed prior to seasonal repository shut down. Advancing waste slopes, see ES Figure 1, will be protected for seasonal closure by means of a spray-on soil stabilizer. Exposed slopes, which will not have perimeter protection installed prior to the end of construction for that season, will have a stormwater retention berm installed to collect stormwater runoff during seasonal closure; the spray-on soil stabilizer will be applied to the exposed surfaces. See Appendix A, Sheet C7 for details.

Phase 3

To properly construct Phase 3 during 2011, the placement of approximately 33,000 cy of waste material will be needed to create a pad from the existing elevation to an elevation of 2,140 feet. Waste placement will commence at the Dredge Road access, adjacent to the material placed in Phases 1 and 2 and will proceed northeast along the northwest boundary of the repository footprint. Once placement reaches the northernmost tip of the repository, the waste pile will advance parallel to the northwest boundary and proceed to the southeast. Phase 3 will advance approximately 330 feet to the southeast at which time a retention basin will be constructed at the leading edge of the waste pile. This retention basin will be modified as necessary in the annual placement plans and will remain the primary retention basin in one form or another until completion of repository operations.

The construction of Phase 3 will create a construction pad which will stay dry during the average yearly flooding observed at the site. Should the site become inundated and remain so below the 2,140 feet elevation during seasonal operation, then waste placement planned for Phase 5 may commence and continue until the site has become dry enough to place waste as described in Phase 4. Further, before the end of the seasonal operation, additional precautions will be installed to control the waste materials if the site is inundated.

Final waste slopes will have the perimeter protection installed prior to seasonal repository shut down. Advancing waste slopes will be protected for seasonal closure by means of a spray-on soil stabilizer. See ES Figure 1.

Phase 4

Waste placement during Phase 4, approximately 60,000 cy, will continue the placement procedure initiated in Phase 3 with the leading edge of waste material advancing parallel to the northwest boundary of the repository and proceeding to the southeast until the entire repository footprint has been elevated to 2,140 feet. In the event the site remains inundated due to seasonal flooding after the construction season has begun, waste placement may commence on the pad at elevation 2,140 feet. This modified waste placement shall be in accordance with the Phase 5 placement plan and shall revert to the Phase 4 placement plan once the previously inundated site is suitable for waste placement.

The retention basin shall be modified and expanded as necessary to accommodate the potential surface water runoff generated from the pad at elevation 2,140 feet. The general location of the retention basin shall remain the same, as specified in Phase 3 drawings.

The advancing edge of the waste placement pile will be protected from erosion during seasonal closure by means of a spray-on soil stabilizer. Side slopes which will not have additional material placed against them, other than a perimeter protection, will have the protective layer installed prior to seasonal repository shut down.

Phase 5

With a pad covering the repository footprint constructed to elevation 2,140 feet, waste placement of approximately 182,000 cy will commence at the west end of the repository and proceed to the east up to elevation 2,152 feet. At the completion of Phase 5, the repository

will be complete to above the water surface elevation (WSE) of a 100-year flood event (2,148.5 feet). Perimeter protection will be installed on the slopes which are complete on a yearly basis, and the retention basin will be modified as Phase 5 progresses.

Phase 6

By the start of Phase 6 the construction surface elevation is above the WSE of a 100-year flood event and all perimeter protection is in place, the side slopes at 3H:1V are complete and the remaining waste will be placed at 100H:3V (3%) slope. The 123,000 cy of waste material for Phase 6 will be placed such that the expected yearly waste will create a finished block ready for installation of the ET cover prior to seasonal shutdown of the repository. Installation of the ET cover is described in Phase 7 and will occur during the same years as Phase 6.

Phase 7

Installation of the ET cover will take place in Phase 7. The ET cover is approximately 30 inches thick and will consist of approximately 32,000 cy of uncontaminated cover material. Phase 7 may take place in conjunction with Phase 6.

ES 1.6 Floodplain and Existing Contamination

The site is located within the 100-year floodplain of the Coeur d'Alene River. Flood events over the last century have deposited two to four feet of fine-grained silts and sands contaminated with mining wastes at the EMF site.

Soil tests confirmed the presence of mining waste contaminated soil at the EMF site. Soil samples were collected in a vertical sequence from soil borings at the site and taken to a laboratory for analysis. Results show lead concentrations over 8,000 parts per million (ppm) in the upper three feet of soil. To put this in terms of the on-going cleanup in the Silver Valley, soils above 700 ppm of lead exceed the human health risk threshold. Below four feet, the metals concentrations decrease sharply, suggesting that the mine tailings are limited to the uppermost soil layers at the EMF site. The thickness of the contaminated soil layer probably varies across the site. The estimated four-foot thick layer is based on soil samples collected from four borings done to install monitoring wells.

Detailed hydraulic modeling has been done to estimate flood elevations, flooded areas, flow conveyance features, water flow velocities, and shear stresses that will result from building the EMF Repository, including the access bridge from Exit 39. Federal regulation 44 CFR Part 60 Section 60.3(c)(10) requires that proposed construction be done in a way that does not cause a rise in water levels of one foot or more in the surrounding areas. The regulations also require that floodplain management practices be applied and that construction of the repository includes acceptable flood protection measures.

An analysis was performed to identify the impacts the repository would have on the 100-year floodplain. A steady-state model was analyzed for a rise in water surface elevation between the existing and proposed repository conditions. The results show a maximum rise in water surface elevation of 0.7 foot at a point about 1,500 feet east of the site. There are no observed effects downstream. Due to the lack of development in the area between the repository and 1,500 feet east of the site, there are no predicted adverse effects in the area of elevated water levels.

The model indicated a 100-year flood elevation of 2,148.5 feet at the EMF Repository site. This is about 14 feet above the current ground surface elevation, assuming a base elevation of 2,135 feet. The model also showed water velocities and shear stresses to be low, with a maximum velocity of about six feet per second and a maximum shear stress of about 1.6 pounds per square foot. The EMF Repository will be constructed using perimeter protection to prevent waste from being eroded by water currents during a 100-year flood event. The perimeter protection will consist of embankments created from compacted contaminated fill with either (1) a 9-inch gravel filter layer below a 12-inch layer of 6-inch diameter riprap or (2) a vegetated surface that will be seeded with grasses and forbs over a 21-inch soil layer. This perimeter protection is designed to withstand the estimated velocities and shears from the 100-year flood analysis and restrict infiltration and contaminant transfer to surface water. Construction of the perimeter protection will provide continual protection for the fill during the construction season and will provide winter protection from severe storms or flooding.

ES 1.7 Surface Water Quality Protection

The water table below the site is very shallow; however, monitoring of groundwater levels does not show that the groundwater does intercept with the surface.

In high-water events such as observed in Spring 2008, water may enter the property from the south side of I-90 through culverts beneath the freeway. When the water level rises in the river and covers the floodplain south of the freeway, water flows north onto the EMF site. As the flood water recedes, water running through the culverts reverses direction; flowing south from the EMF site back to the floodplain next to the Coeur d'Alene River. During the 2008 flood event, no flow across the site was observed. Water appeared to pond at the site, then drain away through the culverts as it receded.

The high-water event of Spring 2008 gave IDEQ and USEPA an opportunity to collect flood water samples as water flowed onto the site, and as the flood waters left the site. The sampling locations included the Coeur d'Alene River upstream of EMF, water flowing into EMF from the river and wetland, stagnant water in the planned repository footprint, and water flowing out of EMF to the river and wetland. ES Table 2 shows the levels of total recoverable and dissolved arsenic, lead, and zinc in surface water samples taken at the EMF Repository on May 20, 2008 and then on May 28, 2008. The samples on May 20, 2008 were collected as the high-water event started flowing onto the EMF Repository. The second samples were collected as the high-water event had started draining from the EMF Repository. This allowed the agencies to compare metals concentrations in surface water coming onto and leaving the EMF site. These results show a general decrease in total metals in the surface water at EMF during the flood event. This is likely a result of metals-laden sediment settling

out of the water at EMF. The EMF Flood Water Sampling Report is included in Appendix T, Surface Water Sampling Data.

ES Table 2. Spring 2008 Flood Water Sampling Results

EMF Water Sample Analysis				
Date	**Sample ID**	**Levels Arsenic (mg/L)**	**Levels Lead (mg/L)**	**Levels Zinc (mg/L)**
5/20/2008	EMF 052008-01	<0.00300	0.06560	0.2100
5/20/2008	EMF 052008-01A	<0.00300	0.00305	0.1530
5/20/2008	EMF 052008-02	0.00376	0.07060	0.1880
5/20/2008	EMF 052008-02A	<0.00300	0.00326	0.1350
5/20/2008	EMF 052008-03	0.00542	0.05730	0.4400
5/20/2008	EMF 052008-03A	<0.00300	0.00490	0.2590
5/20/2008	EMF 052008-04	<0.00300	0.08790	0.1250
5/20/2008	EMF 052008-04A	<0.00300	<0.00300	0.0492
Date	**Sample ID**	**Levels Arsenic (mg/L)**	**Levels Lead (mg/L)**	**Levels Zinc (mg/L)**
5/28/2008	EMF 052008-01	<0.00300	0.00885	0.1080
5/28/2008	EMF 052008-01A	<0.00300	0.00449	0.1090
5/28/2008	EMF 052008-02	<0.00300	0.00911	0.1290
5/28/2008	EMF 052008-02A	<0.00300	0.00519	0.1260
5/28/2008	EMF 052008-03	0.00317	0.00535	0.0821
5/28/2008	EMF 052008-03A	<0.00300	0.00324	0.0802
5/28/2008	EMF 052008-04	<0.00300	0.02740	0.0874
5/28/2008	EMF 052008-04A	<0.00300	<0.00300	0.0658

Note: Sample ID ending in 'A' indicates sample was filtered and tested for dissolved metals.

Drainage from areas holding waste will be collected in retention basins sized to hold runoff from a 25-year 24-hour rainfall event in accordance with applicable requirements. Drain water and stormwater from the fill areas will be managed to reduce the chance of sediment and additional contaminants from getting into nearby surface water bodies. Residual water will be held and used during dry periods for dust control. If disposal of excessive stormwater is necessary, operations will be coordinated with the local IDEQ office and USEPA to meet requirements of the Clean Water Act.

The material placed during Phase 1 construction will consist of clean fill placed around the steel pile foundation of the Dredge Road access bridge. The slopes beneath and adjacent to the bridge will have the final protective layer of riprap installed prior to installation of the bridge superstructure. The remaining slopes will have a silt fence placed at the toe of slope to prevent the runoff of sediment, but because the material consists of clean fill there is no risk of contaminant transport from these slopes.

Phase 2 material will complete the elevated pad that will house the decontamination facility and the operations facilities. Finished waste slopes will have the final protective layer of riprap installed prior to seasonal closure of the repository. The remaining slopes will have a retention berm constructed at the toe of slope to collect stormwater runoff and a silt fence will be placed at the toe of slope just outside of the retention berm.

During Phase 3 waste placement, a retention basin will be constructed that will serve as the basis for all future stormwater collection. This retention basin will be modified as construction of the repository proceeds. Until the completion of the repository base at the end of Phase 4, a stormwater retention berm will also be constructed at the toe of the advancing waste pile to collect runoff from the waste slope. In addition, a silt fence will be installed just outside of the retention basin.

Surface water samples were collected from the Coeur d'Alene River in 2007. The samples were collected and analyzed for metals from two locations, one upstream of EMF and one downstream of EMF. Results show no significant differences in metal concentrations between upstream and downstream stations during the testing. The similarity between data upstream and downstream indicates that the discharge into the river of groundwater from the area around the repository does not impact river water quality.

ES 1.8 Groundwater Quality Protection

Review of soil boring logs from the Idaho Department of Water Resources suggests that three layers of unconsolidated deposits lie under the Mission Flats area: (1) an upper unconfined aquifer composed of alluvial sand and gravel, (2) a clay/silt confining unit; and (3) a lower confined aquifer of alluvial sand and gravel. Within the EMF Repository area, the upper aquifer is covered by 9 to 19 feet of silt and clay. Groundwater in the upper aquifer in the Mission Flats area discharges to the Coeur d'Alene River.

Four monitoring wells were drilled at the site during October 2007 by IDEQ contractors. One of these four monitoring wells is upgradient of the repository site. The wells reach to about 30 feet below ground surface, in the upper aquifer. A broader look at the soil samples reveals two general soil types are under the site. The upper 12 to 15 feet below ground surface is made up of light brown silt, clay, and fine sandy clay. The top two to three feet of this material has bright orange-brown streaks in it from mining waste. Gravel and sand beds are underneath this fine-grained material. These beds are saturated and are the first water bearing zone beneath the site. The monitoring wells were constructed to sample water from this zone. In addition to the four monitoring wells installed at the site, two monitoring wells were installed to the west and to the south of the repository site during October 2008.

Five groundwater monitoring events were completed between December 2007 and November 2008. Results from the five events showed that groundwater meets USEPA drinking water quality thresholds for the following metals: antimony, cadmium, lead, and zinc. During the five monitoring events, the only concentration to exceed the applicable USEPA drinking water quality thresholds was dissolved arsenic in a monitoring well located west of the repository site, which had a concentration of 0.0148 mg/l compared to a National Primary Drinking Water Regulation (NPDWR) maximum contaminant level (MCL) of 0.010 mg/l.

The groundwater monitoring effort will continue through construction and operation and maintenance, at a minimum, to evaluate whether the repository has an effect on local groundwater conditions. If future tests indicate the repository is responsible for impacts to groundwater quality, measures will be implemented to address the contamination source..

As part of site characterization, a report was prepared summarizing the hydrogeology of the greater Mission Flats area in connection with the possible construction of a waste material repository. The report concluded that construction and operation of the proposed repository has a low potential to impact groundwater quality in the immediate area. The report concluded it is very unlikely that potential groundwater quality impacts from the repository will cause measurable increases to contaminated groundwater flowing into the Coeur d'Alene River.

The groundwater gradient is very low across the EMF site, and studying water level elevations suggests two possible flow paths to the Coeur d'Alene River. The shortest flow path is south from the repository, with groundwater moving east of the Old Mission. The other flow path is west from the repository, with discharge to the river west of the Old Mission site (downstream). To monitor groundwater movement to the Coeur d'Alene River, one additional monitoring well was constructed along each of these possible groundwater flow paths.

The repository will be exposed to rain and snow. Although the top of the repository will be gently sloped to help water flow off and away from the soil mound, a very small amount of water will seep into the soil mass. When the waste material has reached total design height, an evapotranspiration (ET) cover will be constructed to cover the waste. Based on results from a cover analysis, the ET cover will reduce the amount of water percolating past the base of the root zone from 95.8 to 98.3 per cent based on the wettest annual recorded and average annual precipitation, respectfully. This amounts to approximately two inches of leachate fully penetrating the ET cover and underlying two-foot root zone in the "wet" year and approximately one-half inch in the "average" year. Given the height of the waste soil column, up to 32 feet high, the post-placement compaction and top surface grading, it is unlikely a significant quantity of leachate will fully penetrate the waste soil mass and come into contact with underlying soil. In addition, as explained above, the underlying clean soil has demonstrated an ability to sorb dissolved metals from leachate.

Water that seeps through the waste soil is called leachate. The leachate may dissolve metals from the waste soil and transport them through the repository material to the native soil underlying the repository. Some of the leachate may mix with groundwater, and could result in elevated metals in the groundwater. However, the soil at the site appears to remove metals from leaching groundwater by a process called sorption. Based on the reduction in leachate volume and the demonstrated ability of the soil at the site to sorb dissolved metals, the potential for significant impacts to groundwater from the presence of the repository is low. Column tests were completed simulating leaching from the repository waste material and interactions of leachate with underlying native soil. Results of the tests confirm the assessment that impacts to groundwater will be negligible.

Building the repository with the ET cover will greatly reduce or eliminate the amount of leachate generated beneath the repository. Based on Daily weather data from 1970-1973 and 1975-2005 from the National Weather Service weather station located in Kellogg, Idaho, the wettest year occurred in 1996 with an annual precipitation amount of approximately 49 inches. Based on the two-dimensional cover modeling results using the wettest year data, the efficiency of the ET cover at the base of the root zone is approximately 96%. This means the EMF ET cover significantly reduces the amount of percolation through the waste materials to approximately 2 inches, and reduces potential impacts to groundwater underneath the EMF Repository. In addition, the two inches of leachate would then have to pass through the upper existing soil layer at the site, which has shown the ability to effectively remove metals from percolating groundwater.

Leachate generated by precipitation infiltrating through yard waste soil in the repository is not expected to contain elevated levels of metals. Based on column tests closely approximating conditions at the proposed repository, arsenic, cadmium, and lead will not be present, and only very low concentrations of antimony and zinc will be present. The column tests actually indicate that the existing native deposits, which include the historic fluvial tailings horizon, have the potential to generate more metals than yard waste soil, specifically cadmium and zinc. Cadmium, leached from the existing native deposits, may be in the range of the NPDWR MCL, and zinc could exceed the National Secondary Drinking Water Regulation (NSDWR) MCL.

Additionally, the total volume of leachate generated will be reduced by the construction and establishment of a vegetative cap, which will reduce infiltration by promoting evapotranspiration. Periodic inundation by flood waters will only saturate a small volume of soil around the perimeter of the repository, and only for a brief period. The extent of infiltration based on the 2008 flood event indicates that during a standing water event of 75 days, water will penetrate the repository mass 15 to 17 feet. The thickness of the saturated zone will range between 0.5 and 0.7 feet. This model was developed using *in-situ* natural soil conditions. During repository construction, soil placed on the perimeter will be compacted to $\geq$ 95% maximum density. This compaction will likely reduce the hydraulic conductivity of the waste soil by an order of magnitude or more. Based on this reduced hydraulic conductivity, it is likely that the flood waters will penetrate two feet or less into the waste soil mass. Long-term saturation of the base of the repository and the development of reducing conditions are not expected. Because the existing soils generate higher levels of metals than the proposed yard waste, the reduction in infiltration should result in an overall decrease in metals leached to shallow groundwater, and an improvement in water quality

ES 1.9 Protecting Wetlands

Since the site is in a floodplain and the water table is very shallow, the presence of wetlands is a concern. It is possible to determine the presence and extent of wetlands at the site by observing vegetation, soils, and hydrology. This is called a wetlands delineation study.

An IDEQ subcontractor conducted a wetlands delineation study over the entire 23-acre site and adjoining areas in 2007. The study concluded that regulated (naturally-occurring) wetlands occur immediately east of the site, northwest of the site, and along a narrow sliver

on the northeast property boundary. There is a small man-made wetland in the north-central part of the repository associated with a small gravel pit. Since it is man-made, this small wetland is not regulated. The repository location was chosen to ensure that no regulated wetlands were covered by its footprint. The boundary of the EMF Repository was adjusted to avoid the regulated wetland area. The repository footprint was situated so as to avoid filling regulated wetland areas and to ensure minimal impacts to wetlands.

ES 1.10 Air Quality Protection

The Repository Contractor will visually monitor dust generated on site by vehicles. Water trucks will be on site at all times to comply with state air quality regulations and to prevent unsightly dust arising, which may be visible from the Old Mission State Park. If visible dust is observed at the repository, the Repository Contractor will immediately take steps to control the dust. Dust control will include spraying the roadways with a water truck or covering with magnesium chloride. If dust is excessive, the Repository Contractor will temporarily stop hauling and disposal. However, other dust sources will be present in the area that are outside the control of the repository.

ES 1.11 Threatened and Endangered Species

Northern Idaho is home to several plant and animal species whose numbers are dwindling. Some of these species have been added to the threatened and endangered species (TES) list. The US Fish and Wildlife Service (USFWS) maintains the TES list. The USFWS also identified that Critical Habitat for bull trout may be impacted. A Biological Evaluation (BE) is required to assess the effects to TES by building and running the EMF Repository. The BE identifies the listed species within the project area and the effects the project may have on them.

The EMF Repository was evaluated for potential impacts to the listed or proposed threatened and endangered species. One such species, bull trout (*Salvelinus confluentes*), may be found in the Coeur d'Alene River near the site. Although only a single bull trout has been confirmed in this reach of the river over the last 20 years, for purposes of this evaluation bull trout are assumed to have the potential to migrate through or stay through the winter in this area. In February 2008, the *Biological Evaluation for East Mission Flats Repository* (TerraGraphics 2008b) was submitted by IDEQ to the USFWS for Endangered Species Act Section 7 informal consultation.

The BE contains a summary of the biological requirements for the bull trout and the existing water quality. These are measured against the effects the EMF Repository may have on surface water quality. The BE concluded that the EMF Repository is "not likely to adversely effect" bull trout. This report was forwarded to the USFWS for review. In a letter dated May 15, 2008, the USFWS concurred with the opinion that the EMF Repository will not adversely impact bull trout. The USFWS concurrence is subject to review if the EMF Repository operations change or other species are added to the TES list.

ES 1.12 Cultural Resources Protection

The EMF site is located in an area that has long been occupied by Native Americans for subsistence hunting and gathering. In recent times, the river corridor has been a conduit for

passage from the Montana Territory to the Oregon Territory, first by horse, then later on wagon roads and via railway. Former users have left their mark on the area.

One prominent former use in the area is preserved at the Old Mission State Park, which is south of I-90 about 1,500 feet west of the EMF Repository site. The park grounds were used as a Christian mission as early as the 1850s, and the surrounding area was used as a campground for both Native Americans and colonists living in the area or visiting the Mission. Due to the proximity of the EMF site to ancestral human migration corridors and the Old Mission, there is a reasonable chance that the site may contain significant archaeological or cultural resources. Documenting these resources is an important part of the site development process.

An intensive archaeological reconnaissance was conducted in 2007 before starting ground disturbing activities. Despite how close the repository is to the historic mission and other sites, the 2007 survey concluded there were no known archaeological deposits at EMF, nor were there any surface indications of cultural resources.

During 2007, a total of 22 subsurface excavations were performed at the EMF site. These excavations included 12 soil borings and 10 pits dug to remove tree roots. An archaeologist was on-site to observe the soil removed from each of the 22 excavations. No archaeological and cultural resources were observed in any of the 22 excavations.

Due to the sensitivity of the area in connection with the Coeur d'Alene Tribe and local and state historians, an archaeological and cultural resources monitoring program is in place. The monitoring program has been developed by the IDEQ, Coeur d'Alene Tribe, and the State Historic Preservation Office (SHPO). The program is being performed in agreement with these participants. The monitoring program requires notification of qualified state and Tribal archaeologists when any subsurface activities are planned. This includes digging holes to plant trees, trenching for stormwater conveyance structures, or clearing and grubbing the site in preparation for repository construction. If the excavation reveals any archaeological or cultural resources, excavation in that area will be stopped until the archaeologists assess the nature of the find(s) and develop a site-specific mitigation plan. Although archaeologist notification of pending subsurface activities is required, observation of the subsurface activities is left to the discretion of the archaeologists.

The monitoring program also includes a checklist of steps to protect archaeological or cultural resources. The checklist will be filled out and signed by the Repository Contractor's on-site supervisor before and after each construction activity. For planned excavations greater than two feet, the checklist is completed and must be approved by the IDEQ Project Manager prior to excavation. In addition, after the planned work is approved by the IDEQ Project Manager, an archaeologist must be present on-site during the excavation.

ES 1.13 Visual Assessment and Impacts

The repository will be a sloped mound of soil over most of the 23-acre site. Although the repository surface will be revegetated with native grass and shrubs to blend into the surrounding landscape, it will be visible to users of the surrounding area, including visitors to

the Old Mission State Park. To portray the visual impacts to observers in the local area, visual simulations of the repository from local view points were prepared.

The visual simulations were prepared from six view points. The view points included: two points on the Old Mission State Park grounds; one point on the Exit 39 overpass; one point on the west-bound I-90 off-ramp at Exit 39; one point along Canyon Road northwest of the site; and one point in the town of Cataldo, Idaho.

Results of the simulation indicated the site would not be visible from the Canyon Road or Cataldo view points. The greatest visual impact would occur to observers on I-90 and on the Exit 39 overpass. These observers would have a generally unscreened view of most of the repository.

Smaller impacts were noted from the two view points at the Old Mission State Park. One view point was located near the Visitors Center, and the second view point was near the front steps of the Old Mission. The observation points were first photographed in October 2007, when the deciduous trees were in full canopy. The October photographs show the repository would be totally screened by the tree canopy at the Visitors Center, and a small fraction of the top portion of the repository would be visible as a minor background element from near the Old Mission front steps.

The two sites on the Old Mission grounds were re-photographed in December 2007, after the deciduous trees had dropped their leaves. Short portions of the top of the western end of the repository would be visible as a background element through the bare tree branches near the Visitors Center. At the observation point near the Old Mission steps, the bare trees of December afforded a slightly expanded view of a small portion of the top of the repository as a background element between a house and garage. The visual simulations can be downloaded and viewed from the Basin Commission web site:

http://www.basincommission.com/default.asp

Click on the "East Mission Flats Repository Info" and then select the "EMF Visual Simulation 3/19/2008" file.

To address potential concerns regarding visual impact when viewed from I-90, more trees were planted between I-90 and the existing power lines. The existing trees in the buffer zone will be left in place and continue to grow to reduce visual impacts from Canyon Road. Mitigation efforts, including enhanced vegetation screening by planting additional trees between I-90 and the EMF site and revegetation of the repository slopes will reduce visual contrasts and help the repository blend in with the background. Therefore, the overall visual impact is expected to be small.

ES 1.14 Access Roads

Once the BPRP is fully operational in the Lower Basin, the repository will be frequented by BPRP contractor vehicles and other disposal contractor vehicles. As many as 100 trucks per day will haul waste materials to the repository during a typical Monday through Thursday

work week (special arrangements may require the repository to operate on Fridays as well). Due to this increased use, it is critical to select a safe, efficient, and cost-effective way to circulate the truck traffic in and out of the repository.

All truck traffic coming to the EMF site will be routed to Exit 39 off of I-90. This is necessary because the load limit on the Old Bridge on Canyon Road in Cataldo does not allow for passage of the heavy trucks typically used by BPRP contractors. To reduce the expenses related with hauling BPRP waste along Dredge Road and Canyon Road, an access point was selected in coordination with the Kootenai County East Side Highway District, the Idaho Transportation District, USEPA, and IDEQ. The selected entrance for the BPRP utilizes a small portion of Dredge Road, approximately 145 feet after exiting I-90 at Exit 39. The repository will be accessed from Dredge Road by a single span precast concrete bridge. Users of the ICP Access Area will enter the repository via the Canyon Road entrance, which consists of clean gravel and will place their load in the designated dumping area. By limiting the access to other portions of the repository and providing a clean gravel access area, ICP users will not be required to decontaminate their vehicles upon leaving the repository. It is anticipated that minimal maintainace will be required to maintain clean access for users of the ICP area.

ES 1.15 Stormwater Pollution Prevention Plan (SWPPP)

Stormwater controls for the EMF Repository will use many measures to limit environmental impacts from soil erosion. A SWPPP has been prepared for the EMF Repository that will guide stormwater management practices and controls.

ES 1.16 Following Laws that Apply:

Applicable Relevant and Appropriate Requirements (ARARs)

The full list of chemical, action and location-specific ARARs has been evaluated for the EMF Repository. Based upon the 90% design features, the EMF Repository is in substantive compliance with ARARs specifically identified for this project.

ES 1.17 Community Involvement Timeline

Construction of the EMF Repository is the culmination of a five-year site selection process. Site selection has taken place in accordance with applicable Comprehensive Environmetnal Response, Compensation, and Liability Act (CERCLA) statues for public notificaction and review. The Basin Environmental Improvement Project Commission (BEIPC) was created to coordinate cleanup, environmental restoration and related measures in the Basin and has assisted with communication regarding site selection. A timeline of the opportunities for public review and/or comment on the EMF site selection and design process is online at www.basincommission.com, or call Andy Mork of IDEQ at 208-373-0141 for a hard copy. The following list of events is a summary of the community involvement during the site selection process.

2003

- Location and Construction of Repositories included in BEIPC annual and 5-year workplans, November 2003.
- BEIPC Repository Project Focus Team (PFT) formed.
- IDEQ approached by private landowner about potential repository location near Mission Flats.

2004

- IDEQ began initial site evaluations of the EMF site.
- Repository PFT met to consider repository issues, including reporting initial technical information on the EMF. July 27, 2004.
- Repository PFT Meeting to consider repository locations, IDEQ presented more information requested by the PFT on the EMF. November 18, 2004.

2005

- Repository presentation at BEIPC Citizens Coordinating Council (CCC) meeting. January 26, 2005.
- USEPA and IDEQ Frequently Asked Questions memo sent to Mission Flats adjacent residents. February 4, 2005.
- IDEQ Mission Flats presentation to Basin Information Forum, CDA Casino. February 15, 2005.
- Why This Site presentation by IDEQ at BEIPC meeting. May 15, 2005.
- BEIPC Technical Leadership Group (TLG) EMF site tour. February 24, 2005.
- February 2005 meeting with cultural representative from the CDA Tribe.
- IDEQ and USEPA meeting concerning EMF with Kootenai County Commissioner Currie and staff April 26, 2005 and all Commissioners May 7, 2005.
- Door-to-door visitation of adjacent residents by USEPA and IDEQ. May 2005.
- Press announcement of pending meeting at Mission. July 2005.
- USEPA and IDEQ sponsored community meeting at the Mission. July 20, 2005.
- EMF article in USEPA Basin Bulletin. Summer 2005.
- EMF presentation by IDEQ at CCC meeting. October 12, 2005.
- IDEQ Repositories Update Presentation at November, 2005 BEIPC meeting.

2006

- Repository PFT meeting on EMF. February 7, 2006.
- Press announcement of pending meeting at Canyon School. March 2006.
- IDEQ and USEPA sponsored community meeting at Canyon School. March 7, 2006.
- EMF presentation at CCC meeting. May 17, 2006.
- IDEQ announces purchase of property for EMF, USEPA Basin Bulletin. Winter 2006.

2007

- EMF update presentation at CCC meeting. February 22, 2007
- EMF update article in USEPA Bulletin. Spring 2007.
- EMF roads meeting with Kootenai County Commissioners and East Side Highway District. April 24, 2007.

- EMF update presentation at CCC meeting. May 3, 2007.
- IDEQ EMF presentation to TLG meeting. May 1, 2007
- IDEQ request for public input on 30% Design Report. May 16-July 6, 2007.
- EMF Public Site Tour. June 22, 2007.
- Response to public comments on the 30% Design Report presented to public on BEIPC and IDEQ Website. September 12, 2007.
- USEPA release of EMF Frequently Asked Questions September 14, 2007. Presented to public on USEPA, BEIPC and IDEQ Websites. Notification also sent out in the mail to concerned citizens.
- Press announcement concerning CCC sponsored EMF 30% Design discussion at Canyon School. October 2007.
- Press Op-Ed article concerning BEIPC and EMF. October 10, 2007.
- CCC meeting at Canyon School with EMF 30% Design discussion. October 16, 2007.

2008

- CCC Meeting; Coeur d'Alene, Idaho – presented status report on EMF: archeological monitoring, Phase 1 Design Draft Report, 60% Design Draft Report, groundwater monitoring results from December 2007 sampling event. February 6, 2008
- CCC Meeting, Kellogg, Idaho – summarized Basin Waste Management Strategy, identified public opportunities within the Basin Commission structure, presented EMF site plan diagram with repository footprint and groundwater monitoring results from February 2008 sampling event. April 23, 2008
- The Lands Council Meeting, Spokane, WA – summarized groundwater monitoring results from February 2008 sampling event, column leach testing, flood monitoring, updates on 60% and 90% Design Reports, and presented visual simulation of the EMF Repository from the Old Mission at Cataldo. May 13, 2008
- Basin Commission Meeting, Wallace, Idaho – announced Community Review Opportunity for the 60% EMF Design Report, scheduled for July 2008. Also announced that the repository will open for limited operations in spring 2008. May 14, 2008.
- Basin Commission Website – Response to Suggestions, 60% Design Report, East Mission Flats Repository, Kootenai County, Idaho. October 3, 2008.
- November 2008 – first waste was unloaded in the ICP Access Area.

For more information on the EMF siting, design, construction, and operation, please reference the Basin Commission website: http://www.basincommission.com/, or call Andy Mork of IDEQ at 208-373-0141.