Appendix I - Statement of Work for Bee Fork Creek Mitigation

I. Introduction: General Overview of Work and Statement of Purpose

This Statement of Work (SOW) contains a variety of elements required for a mitigation project in Bee Fork Creek located in Reynolds County, Missouri. The project will occur within the 8.5 mile segment of Bee Fork Creek extending from the most upstream inputs from the Fletcher Mine/Mill complex to its confluence with the West Fork of the Black River (approximate coordinates: upstream latitude and longitude 37.4426, -91.0915; downstream latitude and longitude 37.4598, -90.9851) that is on the Missouri list of impaired waters under Section 303(d) of the Clean Water Act based on Pb in sediment. The objective of the work under this SOW is, in general, to ameliorate conditions harmful to aquatic life, and specifically to mitigate sediment toxicity to benthic macroinvertebrates; other sediment-dwelling aquatic life; and reduce risks due to trophic transfer in the aquatic ecosystem due to Pb, Zn, Cd, and Ni discharged from the Fletcher Mine/Mill complex to Bee Fork Creek. The goals and methods described in this SOW are limited to this project and do not set a precedent for any other project or program.

Any modifications to this SOW or a schedule proposed by Defendants and approved by MDNR pursuant to the requirements of this SOW shall not be considered "material modifications" within the meaning of Section XXVI (Modifications) of the Consent Decree. Any proposed modifications to this SOW or a schedule approved by MDNR pursuant to the requirements of this SOW must be submitted to MDNR for review and prior approval pursuant to Section XII (Approval of Deliverables). Defendants shall submit all proposed modifications to MDNR and EPA at least thirty (30) Days prior to the due date of the milestone for which the extension is sought, unless otherwise approved by MDNR. Modification of this SOW or a schedule approved by MDNR pursuant to the requirements of this SOW shall not automatically extend any schedule to meet an interim or final compliance deadline under this Consent Decree.

In addition, if any review or analysis is conducted under the National Environmental Policy Act ("NEPA"), any deadlines or schedules of this SOW affected by the NEPA review or analysis will be extended by written agreement of the Parties for such time as necessary to complete the obligations affected by the review or analysis.

Doe Run shall commence implementation of the MDNR-approved Sampling and Analysis Plan and other mitigation work required under this Appendix and Section XIV (Additional Injunctive Relief) of the Consent Decree when all final permit conditions in the Fletcher Mine/Mill re-issued MSOP No. MO0001856 become effective or when the final permit conditions become effective pursuant

to alternative compliance schedules provided under the Consent Decree, whichever is later.

II. General Description of Work Required

This SOW includes the following activities:

A. Environmental sampling and testing of sediment quality, water quality, soil quality and other relevant conditions of the Bee Fork Creek channel and stream bank as described in a Sampling and Analysis Plan (SAP) for Stream Assessment in accordance with Section III of this SOW. The sediment mitigation goal (SMG) for this project will be the threshold mean Probable Effects Concentration Quotient for Pb, Zn, Cd, and Ni calibrated to Bee Fork Creek conditions, consistent with Ingersoll et al. (2001), Ingersoll et al. (2009), Long et al. (2006), Besser et al. (2009b) and MacDonald et al. (2009) (hereinafter "threshold mean PEC-Q) as provided in Section III. In addition, concentrations of sediment in Bee Fork Creek demonstrated to be toxic to sensitive organisms (e.g., crayfish and sculpins) from past and current investigations shall be evaluated in determining the SMG (Allert et al. 2008).

B. Development of a Stream Assessment Report and Geomorphology Characterization Work Plan in accordance with Section IV of this SOW. The Assessment Report will describe the analytical results for surface water, sediment pore-water, and sediment sampling in Bee Fork Creek and soil sampling in vegetated and unvegetated areas of wetlands, creek banks, and floodplains adjacent to Bee Fork Creek. The Geomorphology Characterization Work Plan will describe the methods that will be used to characterize the hydrology and geomorphological conditions of the 8.5 miles of Bee Fork Creek on the 303(d) list. Detailed analysis of geomorphology will focus on areas with sediment at or over the threshold mean PEC-Q, including erosional areas of the creek banks and floodplains.

C. Following the Missouri Department of Natural Resources' (MDNR) approval of the Stream Assessment Report and Geomorphology Characterization Work Plan, Doe Run shall conduct the geomorphologic characterization.

D. Upon completion of the geomorphologic characterization, Doe Run shall develop a Mitigation Design Document (MDD) in accordance with Section V of this SOW. The MDD will consider the locations and geomorphological characteristics of the areas of sediment and soil at or over the threshold mean PEC-Q; identify areas of potential sediment removal or other mitigation approaches within Bee Fork Creek; describe any access issues; and evaluate the cost of sediment mitigation

alternatives to meet the objectives of this SOW, and include detailed provisions governing any removal of sediment, including complying with applicable local, state and federal statutes and regulations covering these activities, such as timely obtaining applicable permits.

E. As provided in Section V of this SOW, the MDD will consider the following actions to address sediments and soils at or over the SMG and to mitigate construction related impacts:

1. removal of sediment at or over the threshold mean PEC-Q potentially including from
    a. exposed bars in compliance with Missouri's gravel bar mining regulations, or
    b. behind (upstream) of low-water crossings.

2. stream bank or floodplain soil removal or stabilization in erodible areas with soil concentrations at or over the threshold mean PEC-Q that have the potential to cause sediment concentrations at or over the threshold mean PEC-Q;

3. riparian corridor mitigation particularly in areas that are adversely affected by soil or sediment mitigation construction activities;

4. in-stream habitat improvements (potentially including fish passage improvement, bridge reconstruction, bank reconfiguration and structure, and in-stream structure) in areas that are adversely affected by sediment removal activities; and

5. environmental covenants where it is necessary to maintain restored riparian corridor areas on private property.

F. The MDD will include a description of proposed construction monitoring and maintenance measures, including submission of monthly progress reports.

G. Monitoring and maintenance of mitigation measures for a five (5) year period following completion will be performed by Doe Run under MDNR oversight.

Doe Run shall not be required to spend more than $5,500,000, in 2010 dollars, on implementation of the work set forth in the approved MDD, approved Supplemental MDD, and item G, above. Doe Run shall have no obligation to undertake further actions to implement the work set forth in the approved MDD or Supplemental MDD or item G if, and at such time that, the costs incurred and documented to EPA and MDNR by Doe Run to implement such work are equal to or exceed $5,500,000. In the event that the costs to implement such work are

expected to equal or exceed $5,500,000, Doe Run shall promptly provide notice to EPA, MDNR and the United States, including a list of work set forth in the MDD, Supplemental MDD or item G that has not been completed. However, in the event that such costs equal or exceed $5,500,000, nothing in the Consent Decree or this Appendix shall preclude Doe Run from voluntarily performing additional work or expending additional funds to complete the work, provided that such additional work has been approved by MDNR and comports with the requirements of the Consent Decree and this Appendix.

III. Sampling and Analysis Plan For Stream Assessment

Within one year after the Effective Date of the Consent Decree, Doe Run shall submit a SAP for Stream Assessment for review and approval by the MDNR that details sampling and analysis protocols for items III.A. through H., discussed below. The SAP shall include quality assurance measures that identify analytical detection limits, toxicity test protocols (i.e., for development of the threshold mean PEC-Q), quality assurance/quality control measures, decontamination procedures, sample numbers, and locations, etc. The SAP will include a Quality Assurance Program Plan ("QAPP") that conforms to "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations" (EPA QA/R5. EPA/240/B-01/003 (March, 2001)) and "Guidance for Quality Assurance Plans" (EPA QA/G5. EPA/240/R-02/009 (December, 2002)). Doe Run shall plan and implement a sampling/survey regime that evaluates the following existing conditions:

A. Sediment Quality: Sediment sampling will be focused on depositional areas where fine sediment (i.e., sand, silt and clay) is expected to predominate, gravel bars, and areas impeded by low-water crossings or other impediments to flow within the 8.5 stream miles. Sediment quality analyses will include analysis of metal concentrations (i.e., Pb, Zn, Cd, and Ni) in sediments finer than gravel (i.e., the <2 mm size) fraction as determined through wet sieving using site water; the above metals in sediment pore water; analysis of conventional analytes (e.g., moisture content, grain size distribution and total organic carbon, etc.); acid volatile sulfide and simultaneously extracted metals in accordance with EPA guidance (EPA 2005a); and sediment toxicity testing at selected stations downstream and upstream of the Fletcher Mine/Mill complex to calibrate the threshold mean PEC-Q. Sediment quality sampling and evaluation will include analyses of sediment pore-water for Pb, Zn, Cd, and Ni;

B. Water Quality: Water quality sampling will include total and dissolved metals (Pb, Zn, Cd, and Ni), hardness, dissolved organic carbon, other contaminants of concern discharged from the Fletcher Mine/Mill complex and standard water quality parameters (e.g. pH, specific conductance, temperature, dissolved oxygen, turbidity, etc.);

C. Biological integrity of the stream macrobenthic community shall be determined by using Rapid Bioassessment as modified by MDNR (Sarver, R. 2001) within Bee Fork Creek, including mine-affected areas within the 8.5 stream miles and appropriate reference locations, and other indices of biotic integrity as proposed by Doe Run and approved by MDNR. Biotic sampling shall also include an evaluation of aquatic endpoints demonstrated to be sensitive to metals in the Viburnum Trend such as crayfish (Allert et al. 2009a) and sculpin (Allert et al. 2009b);

D. Soil Quality: soil sampling of wetlands, creek banks, and floodplains adjacent to Bee Fork Creek to determine whether those areas contain Pb, Zn, Cd, and Ni that could be transported to the Creek bed and result in sediment that is equal to or exceeds the threshold mean PEC-Q;

E. Potential locations for riparian corridor mitigation activities, to the extent foreseeable based on sediment and soil quality and likely access routes for sediment and/or soil removal or other mitigation construction activities;

F. Locations of wetlands, including Hines Emerald Dragonfly habitat (fens);

G. The SAP shall include an implementation schedule, which schedule shall be subject to approval by MDNR; and

H. The raw data generated from the SAP shall be submitted to MDNR within thirty (30) days of receipt by Doe Run.

IV. Stream Assessment Report/Geomorphology Characterization Work Plan

Doe Run shall prepare and submit to MDNR for review and approval a Stream Assessment Report and Geomorphology Characterization Work Plan within four months of the date Doe Run receives all validated analytical results from the sampling performed pursuant to the SAP. The Stream Assessment Report will summarize the information collected pursuant to the SAP and provide information necessary for preparation of the MDD to address in-stream sediments that are equal to or exceed the SMG. This information will include determination of the threshold mean PEC-Q for Pb, Zn, Cd, and Ni calibrated to Bee Fork Creek using toxicity testing across a representative gradient of metals concentrations in sediments from selected stations downstream and upstream of the Fletcher Mine/Mill complex consistent with Ingersoll et al. (2001), Ingersoll et al. (2009), Long et al. (2006) Besser et al. (2009b), and MacDonald et al. (2009). This calculation will provide the threshold mean PEC-Q at which site-specific toxicity

to benthic macroinvertebrates is likely to occur. The Stream Assessment Report will consider existing literature on aquatic ecotoxicity specific to the Viburnum Trend, other sediment dwelling aquatic life, risks due to trophic transfer in the aquatic system, and incorporate this data as well as ecotoxicity data discussed under this Appendix in the development of the SMG. The SMG for this mitigation project is to attain sediment concentrations below the threshold mean PEC-Q as determined by incorporating all Bee Fork Creek site-specific ecotoxicity under the SAP.

Based on the soil concentrations that are equal to or exceed the threshold mean PEC-Q, the Stream Assessment Report will also identify any areas of wetlands, floodplains or overbank deposits, fens and special and critical habitats that warrant further evaluation of sediment erosion and remobilization potential in the Geomorphology Characterization Work Plan.

The Geomorphology Characterization Work Plan will describe the methods and schedule for evaluating geomorphologic characteristics including collection of the following information:

A. Hydrology of the Creek, including flow measurement if previous stream gauging information is not available.

B. Stream surface water elevations every ¼ mile throughout the 8.5 stream miles in the areas of potential sediment mitigation identified in the Stream Assessment Report, including longitudinal and perpendicular to flow cross sections. Stream cross sections will be conducted in accordance with approved methodology (Rosgen 1996 or 1998).

C. Identification and description of locations to remove sediments based on either:
    1. sediment concentrations equal to or exceeding the threshold mean PEC-Q for Pb, Zn, Cd, and Ni in sediment impounded behind low-water crossings or other obstructions that serve to trap sediment and provide grade controls during excavation; or

    2. sediment concentrations equal to or exceeding the threshold mean PEC-Q for Pb, Zn, Cd, and Ni in gravel bar deposits (if access can be obtained without importation of fill material or significant habitat loss).

D. Identification of sediment quantities that can be removed and still maintain the stream in a manner that prevents “sediment starved” conditions (i.e., conditions that would require additions of clean sediment to maintain a geomorphically stable sediment balance.) The

Geomorphology Characterization Work Plan will consider methods to evaluate quantity of sediment that could be removed from a given stream reach while avoiding head cuts or channel degradation in upstream locations.

E. Identification of areas that function as grade controls or conditions that prevent head-cutting or significant downward erosion of the stream (e.g. bedrock bottom or low-water crossings).

F. Identification of areas of sediment or soil in banks, overbanks, or floodplain deposits equal to or over the threshold mean PEC-Q that are located close to access roads and are in areas that are:
    1. likely to suffer damage by heavy equipment during construction;
    2. that are susceptible to erosion, deeply incised or other sources of recontamination of in-stream sediment; or
    3. likely to suffer impacts to floodplains or banks caused by the construction of roads to remove sediment.

G. Evaluation of the erosion and remobilization potential of the areas of wetlands, floodplains, or creek banks identified in the Stream Assessment Report as containing sediments equal to or in excess of the threshold mean PEC-Q that could be remobilized by flood and high water events.

H. An inventory of existing vegetation in the areas of potential sediment mitigation in order for the MDD to propose appropriate species for revegetation following any mitigation construction activities.

I. Identification of stream segments in areas of potential sediment mitigation that would benefit from potential in-stream habitat enhancements, such as segments with straightened channels, lacking in woody structure in stream, poor riffle/pool development, or other aquatic habitat limitations.

V. Mitigation Design Document

Doe Run shall submit an MDD to MDNR for review and approval within six months of the approval date of the Stream Assessment Report and Geomorphology Characterization Work Plan. The MDD will consider the areas and geomorphological characteristics of the sediment and soils equal to or in excess of the SMG; identify locations for potential removal or other management of such materials; describe any access issues; evaluate the costs of sediment mitigation alternatives to meet the objectives of this SOW; and present a prioritized inventory of sediment mitigation actions. The MDD will provide design criteria and specifications for sediment removal, transportation, and

disposal, bank stabilization, riparian corridor mitigation and in-stream habitat mitigation as applicable. Removal and mitigation methods that will be considered are described in sections A through I below:

A. Gravel Bar Mining: The Missouri natural resource agencies (MDNR, Missouri Department of Conservation, and U.S. Fish and Wildlife Service), have identified gravel bar mining as a method allowing removal of contaminated sediment within Ozark streams without seriously degrading other ecological and hydrologic functions of the stream. The gravel bar mining design should allow for periodic re-excavation of contaminated sediment, if necessary, from the same gravel bar with successive high water events. The following items shall be identified in the MDD and guide design and implementation of any gravel bar excavation to meet the SMG:

1. Gravel/sediment excavation detail, including the techniques and equipment used;
2. Restrictions on gravel bar excavation as identified within the Missouri Land Reclamation Act Sand and Gravel Mining Regulations (In-Stream Gravel Removal Requirements are specifically found at 10 CSR 40-10.050 (14) and are on page 10 of the Sand and Gravel Rules (found at http://www.sos.mo.gov/adrules/csr/current/10csr/10c40-10.pdf). In addition to these restrictions, Doe Run shall leave a 20 foot buffer of unexcavated deposits at the head (upstream end) of any gravel bar identified for excavation. This will increase stability of the bar and promote re-deposition of sediment during high water events.
3. The estimated periodicity (frequency) of sediment removal based on high flow or flood events and re-deposition of sediment;
4. An estimate of volume of sediment removal necessary to achieve the SMG in a specific gravel bar, not considering the unexcavated deposits at the head of the gravel bar;
5. Sediment transport and disposal methods, including opportunities for beneficial reuse or other management options consistent with Federal and State regulations;
6. Erosion/sediment migration controls (e.g., silt curtains);
7. Operational monitoring (e.g., water quality monitoring);
8. Mitigation of any constructed access roads; and
9. Maintenance and monitoring to ensure that mitigation measures are geomorphically stable over the long-term and mitigated areas do not become re-contaminated after construction completion.

B. In-stream Excavation: The natural resource agencies have identified removal of contaminated sediment behind low-water crossings as an effective method of removing contaminated sediment while minimizing unintended negative ecological and hydrological consequences within the stream. Similar to gravel bar mining, this mitigation method could be designed to be repetitive in one location over a period of years depending on high flow or flood events, contaminated sediment volume above the excavation point, and mobility of sediment. The first excavation of the sediment behind a low-water crossing or stream obstruction enhances the depositional capacity of this location for upstream sediment. In-stream sediment removal behind low-water dams or other identified stream impoundments or grade controls may be planned for multiple iterations if such iterations are determined to be effective in decreasing sediment metal concentrations in a given stream reach below the SMG. As appropriate, the MDD will identify:

1. Sediment excavation detail, including the techniques and equipment used;
2. Permitting requirements as identified within the federal Clean Water Act and state Clean Water Law (land disturbance, sections 401 and 404 permits, etc.);
3. Periodicity (frequency) of sediment removal based on high flow or flood events and re-deposition of contaminated sediment;
4. An estimate of volume of sediment removal necessary to achieve the SMG;
5. Sediment transport and disposal methods, including opportunities for beneficial reuse or other management options consistent with Federal and State regulations;
6. Erosion/sediment migration controls (e.g., silt curtains);
7. Operational Monitoring (e.g., water quality monitoring);
8. Mitigation of constructed access roads; and/or
9. Maintenance and Monitoring.

C. In-Stream Habitat Mitigation: The MDD will consider in-stream habitat mitigation actions either in conjunction with or in lieu of sediment removal actions as determined by MDNR. In-stream habitat mitigation actions are a lower priority to MDNR than sediment mitigation actions, riparian corridor mitigation pursuant to Section V.F and monitoring and maintenance pursuant to Section V.G. The MDD must reserve adequate funding for post construction riparian corridor mitigation and monitoring and maintenance of the stream mitigation project. In-stream habitat mitigation may include:

1. woody or rock structures that improve conditions for fish and other aquatic organisms;

2. fish passage improvements, including low-water bridge replacement;
3. construction of riffle/pool, or meander sequences; and/or
4. re-directing the channel away from eroding banks (or sections of the stream under construction), etc.

D. Stream Bank and Floodplain Excavation: The MDD shall consider options for stream bank or floodplain excavation or stabilization in areas identified in the Stream Assessment Report and Geomorphology Characterization as exhibiting a high potential for erosion and containing sediment equal to or exceeding the SMG that may be remobilized and distributed to the stream bed in concentrations equal to or exceeding the SMG.

E. Riparian Corridor Mitigation: In general, forested canopy is the most beneficial watershed land cover for stream health. A healthy wooded watershed provides for the interception and infiltration of rainfall, filters leaf litter, and slows runoff, and the extensive interlocking root systems of forests provide resistance to erosion. The structure of the forested canopy provides shelter for a variety of wildlife, provides food for insects and other wildlife while growing, and provides the base of the food chain for stream systems after leaf-fall. The roots of trees near stream channels provide resistance to erosion and downed wood supplies habitat within the stream. In addition, stream health is enhanced by easy (low gradient) transitions between the stream channel and floodplains. The MDD will consider riparian corridor mitigation activities to mitigate construction-related impacts from sediment or soil removal actions. Where deemed appropriate based on the results of the sediment evaluations in Bee Fork Creek, the MDD will give consideration to lowering banks to provide flood storage and riparian wetland habitat as a form of riparian corridor mitigation. The riparian corridor mitigation design will include:

1. Construction-related bank improvements where the bank or floodplain has been impacted by construction of roads necessitated for sediment removal actions. The MDD will identify bank re-grading, height, slope details, re-vegetation, and maintenance components. Low angles and low height banks are preferred over high banks and steep angles.

2. Heavy construction equipment, fertilizers, or pesticides will not be used within 100 feet of identified fens less than 400 square feet in area. For larger fens, the above activities are restricted to 500 feet on the upstream side and 300 feet on lateral and downstream sides. A greater set-back distance

may be necessary depending on topography, geology, and relative velocity of potential storm water runoff. In addition to Best Management Practices for land disturbance [10 CSR 20-6.200(1)(C)] applicable to all riparian corridor restoration, adequate storm water controls must be in place to limit impacts to fens to the extent practicable, including but not limited to, temporary diversion of storm water associated with land disturbance activities or pesticide application around fens. Permanent vegetative cover must be restored/established as soon as possible after land disturbance activities cease in areas that drain to fens. In the case that a variance from these setbacks and requirements is considered necessary to complete other tasks of the MDD, written concurrence must be secured from U.S. Fish and Wildlife Service prior to any activities. If concurrence is granted it may contain additional conditions. In the case of toxicological risk to fens, it may be desirable to waive construction restrictions. If toxicological risks are identified, written concurrence must be secured from U.S. Fish and Wildlife Service prior to any construction.

3. Site Preparation and Maintenance.
Many cleared areas are hotspots for invasive species, and other species that may compete with trees planted along the riparian corridor. Species of Conservation Concern, as determined by the Missouri Department of Conservation, may exist and should not be disturbed. In areas where construction activities under this SOW have disturbed stream banks or floodplains, the MDD will identify the degree of maintenance needed after tree planting and other revegetation efforts. The MDD will describe the frequency and type of herbicide treatments, fire, and frequency of mowing or other cultural practices used to facilitate the success of tree planting or other revegetation efforts.

4. Revegetation.
For areas to be reforested, the MDD will identify the native Missouri tree species to be planted, using the Terrestrial Natural Communities of Missouri (riverfront forest, mesic bottomland forest chapters) as a guide. Three gallon RPM (Root Production Method) trees shall be planted no closer than 30’ centers in rows that can accommodate future mowing to control competing vegetation. If invasive plants are problematic, an additional 50-100 native shrubs (such as gray dogwood, *Cornus obliqua*) per acre will be planted, and a

native cover crop (such as Virginia wild rye, *Elymus virginicus*) seeded.

Trees will be planted in the fall or early spring, with appropriate site preparation to control competing vegetation and eradication of invasive species beforehand. Appropriate maintenance mowing and/or herbicide application will be implemented afterward.

5. Other Mitigation Measures.
Doe Run will identify potential engineered or institutional controls to ensure long-term protection of stream and riparian corridor mitigation areas such as fencing, alternative water supplies for livestock, temporary or permanent conservation easements including land-owner payment, if necessary.

F. Construction monitoring measures to ensure water quality compliance and geomorphic stability during construction:
Construction monitoring procedures will be outlined in the MDD and will include, at a minimum, the following:

1. Water quality parameters to be sampled during in-stream or near-stream construction including, but not limited to, total and dissolved metals (Pb, Zn, Cd, and Ni), sulfate, TP, nitrate, pore water metals, hardness, dissolved oxygen, turbidity, pH, conductivity, temperature, and total suspended solids.
2. Stability or mechanical inspection and maintenance procedures during and after construction of gravel bar mining, low-water crossing, or in-stream habitat mitigation. Inspections should, at a minimum, specifically monitor for head cutting upstream of areas of excavated sediment.
3. During construction, water quality conditions shall be monitored and quantitatively measured twice daily depending on the amount of in-stream activity. Measurements of dissolved oxygen (DO) and turbidity shall be taken and recorded at one location upstream and two locations downstream from the in stream construction activity. In an instance of turbidity from the construction activity greater than 100 NTU Doe Run shall notify MDNR immediately. If the turbidity level greater than 100 NTU continues for 6 consecutive hours at the first downstream sample site, Doe Run shall modify operations to reduce turbidity levels. If a turbidity threshold level of 200 NTU from the construction activity is exceeded for 6 consecutive hours at the first downstream station, Doe Run shall cease operations and shall

mitigate the source of turbidity prior to resuming in-stream construction activities.

4. No equipment maintenance will be performed in the vicinity of the stream or riparian work areas. Equipment fueling and other maintenance shall be performed outside the stream channel and in a manner that prevents over filling, leaks, and spills. Equipment shall be maintained to minimize drips and leaks. Any accidental spills or leaks shall be immediately cleaned up and reported to MDNR.
5. The MDD shall identify a schedule of sampling and reporting of construction monitoring measures during active construction.

G. Long-Term Monitoring and Maintenance – Monitoring and maintenance measures shall continue for five years following completion of construction activities. Monitoring and maintenance measures for this period will be outlined in the MDD and will include, at a minimum, the following:

1. Water quality parameters to be sampled include, but are not limited to, pH, conductivity, temperature, hardness, total and dissolved metals for Pb, Zn, Cd, and Ni, turbidity, total suspended solids;
2. Stability or mechanical inspection and maintenance procedures after construction of gravel bar mining, low-water crossing, or in-stream habitat mitigation. Inspections should specifically monitor for head cutting upstream of areas of excavated sediment;
3. Inspection and maintenance procedures necessary to ensure long-term vegetation success; and
4. Sampling to assess the biological integrity of the stream macrobenthic community conducted pre-construction may be repeated to determine the degree of recovery one year after construction completion.

H. Schedule for Implementation: The MDD shall include a schedule for implementation of the mitigation work. The mitigation work (excluding monitoring and maintenance) shall be completed as expeditiously as possible, but no later than within one year of achieving the SMG.

I. Supplemental MDD:

1. Within three months after completion of the initial sediment removal effort (e.g., in-stream sediment removal behind low water crossings and/or gravel bar mining) Doe Run shall submit a Supplemental MDD based on its experience with that effort. The Supplemental MDD shall include, but is not limited

to, an updated cost analysis, a revision of the volume of contaminated sediment, and/or anticipated frequency of in-stream sediment removal behind low water crossings, and/or gravel bar mining. The Supplemental MDD shall identify the shortest possible timeframe sufficient to achieve the SMG.

2. Based on the initial sediment removal, anticipated sediment removal volume, frequency, and resultant costs identified in the Supplemental MDD, Doe Run shall refine its design of sediment mitigation measures and any related riparian corridor and in-stream improvement as needed to meet the objectives of this SOW.
3. The Supplemental MDD shall be submitted to MDNR for review and approval. Doe Run shall not commence the next sediment removal activity until the Supplemental MDD has been approved by MDNR, after consultation with the EPA.

VI. Implementation

A. Doe Run shall submit the required documents (SAP, Stream Assessment Report and Geomorphology Characterization Work Plan, MDD and Supplemental MDD) and implement the activities in accordance with all approved documents and the schedules set forth therein, and in this Appendix.

B. Construction Start. Construction shall commence within two months of Doe Run receiving all necessary approvals and permits on the MDD. Approved activities shall proceed in the following general sequence, to the extent applicable:
   1. Excavation behind low-water crossings concurrently with construction of haul roads for gravel bar mining;
   2. Initial excavation of gravel bars;
   3. Repeated excavation of re-deposited contaminated sediment after high water events as identified in the MDD;
   4. Identification of in-stream habitat mitigation projects (if any);
   5. Construct in-stream habitat mitigation projects (if any);
   6. Riparian corridor mitigation.

VII. Other Requirements

A. Any submission required by this Appendix shall be submitted to EPA and MDNR in accordance with Section XXIII (Notices) of this Consent Decree. For any submission requiring approval, MDNR, after consultation with EPA, will be the approving authority in accordance with Section XII (Compliance Requirements: Approval of Deliverables) of this Consent Decree.

B. During implementation of the MDD and until MDNR determines that the implementation activities are complete pursuant to Section VII.E. of this Appendix, Doe Run shall submit monthly progress reports to MDNR and EPA delineating the status of the project. The progress report for each month shall be submitted by the 10th day of the following month. The frequency of the progress reports may be reduced as agreed to by the EPA and MDNR. The progress report shall include, at a minimum, a description of:

1. Activities conducted during the reporting period;
2. Problems encountered during the reporting period;
3. Refined estimate of sediment mitigation (volume and/or frequency);
4. Schedule variances and corrective actions, if necessary;
5. Projected activities for the next reporting period and estimated costs (for Supplemental MDD and MDD implementation work);
6. Status of permits and applications; and
7. An accounting of costs incurred to date for the Supplemental MDD and MDD implementation work, including supporting documentation.

C. Doe Run shall use best efforts to obtain all necessary access agreements to conduct work required by this Appendix within three months of submitting the MDD to MDNR for review and approval. "Best efforts" shall include, at a minimum, a certified letter, a phone call, and a personal visit; it shall also include payment of reasonable sums of money in consideration of granting access. The access agreements shall also provide access for the State of Missouri, Missouri Department of Conservation ("MDC"), EPA, U.S. Fish & Wildlife Service ("USFWS"), U.S. Forest Service ("Forest"), and their representatives to move freely in order to conduct oversight and monitoring actions they determine necessary. The access agreements shall specify that Doe Run is not the State of Missouri's, MDC's, EPA's, Forest's, or USFWS's agent with respect to any liabilities associated with activities to be performed. Doe Run shall provide MDNR with copies of all access agreements. Doe Run shall immediately notify MDNR if, after using best efforts, it is unable to obtain such agreements within the time required. Doe Run shall, within ten (10) days of its receipt of a denial of access, submit to MDNR a written description of its efforts to obtain access. MDNR may, in its discretion, assist Doe Run in obtaining access. In the event MDNR obtains access, Doe Run shall undertake the work on such property. Nothing in this Appendix shall be construed to limit the State of Missouri's, MDC's, EPA's, Forest's, and USFWS's right of

access, entry, inspection, and information gathering pursuant to applicable law.

D. Doe Run shall perform all actions required by this Appendix in accordance with all applicable local, state and federal laws and regulations. Doe Run shall obtain or cause its representatives to obtain all permits and approvals necessary under such laws and regulations in a timely manner so as not to delay the work required by this Appendix.

E. Construction Completion. Within thirty (30) days of completing work set forth in the approved MDD and Supplemental MDD Doe Run shall submit a final progress report to MDNR for approval and determination that the mitigation project is completed. Stream Mitigation Completion shall be determined by, among other considerations, evidence that the sediment excavation has achieved the SMG; magnitude of sediment removal; and completion of additional stream habitat or riparian corridor mitigation measures identified in the approved Supplemental MDD.

VIII. Oversight

The Missouri Department of Natural Resources shall oversee the stream mitigation project. The oversight will be provided in consultation with Missouri Department of Conservation, U.S. EPA, and U.S. Fish and Wildlife Service. In addition, where the stream mitigation project involves activities on, or that impact, National Forest System land, additional oversight will be provided by the U.S. Forest Service. Oversight activities shall include, but are not limited to, plan and document review and approval, permitting, compliance with applicable environmental laws and regulations, contracting costs, data review, and construction inspection and oversight.

MDNR will bill Doe Run on a periodic basis for oversight costs and such costs, with the exception of oversight costs related to agency review or approval of the site specific PEC-Q that will be used as the SMG, will be subtracted from Doe Run's commitment to expend $5,500,000 on implementation of the stream mitigation. Any other agency oversight costs billed to Doe Run in connection with the Bee Fork Creek mitigation project, with the exception of oversight costs related to any agency review or approval of the site specific PEC-Q that will be used as the SMG, will also be subtracted from Doe Run's commitment to expend $5,500,000 on implementation of the stream mitigation.

IX. References

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