Appendix A

Excavation
&
Wash Plant
Operations

Emerald Creek Garnet Area
Final Environmental Impact Statement

Appendix A

DESCRIPTION OF PROPOSED EXCAVATION AND WASH PLANT OPERATIONS

PROJECT SUMMARY

The proposed operations involve the excavation and development of approximately 23,500 bank cubic yards (bcy) of gem garnet-bearing placer material from the 281 Gulch and Garnet Gulch drainage basins, located in the East Fork Emerald Creek watershed, situated in Sections 7 and 8, T42N R1E, Latah County, Idaho over a 15-25 year period. The operations will also involve removal and temporary stockpiling of approximately 37,400 bcy of overburden to recover the gem garnet resources. The proposed recreational garnet recovery sites are located entirely on National Forest System lands. The garnet-bearing gravels will be excavated from the floodplain and adjacent terrace (upland) placer deposits with a tracked excavator, possibly a small drag line, or in some cases a dozer and loader. They will then be moved to a secured stockpile area in an adjacent uplands area with a small wheeled or tracked loader and/or dump trucks or with a mobile conveyor belt system. Excavations will start on the upper end of each mining panel and progress sequentially downstream through the respective placer deposits. Panel sizes will be optimized to provide sufficient material for a season's worth of collecting, but also will be designed to limit the amount of active riparian disturbance as much as practical.

The public will obtain gravel material from the stockpile which will be washed through screens in a sheet metal-lined flume carrying water to wash the gem garnets from their host gravels. Coarse rejects from the screening will be collected and stockpiled adjacent to the flume for eventual return to the excavation site. Slimes and finer-grained material that pass through the screens will be collected in a series of settling ponds at the end of the flume, and the water will be recycled to the extent possible to limit the need for active water withdrawals from the adjacent drainages. Slimes and fine-grained material that accumulate in the settling ponds will be removed and stockpiled as required. Excavation sites will be backfilled concurrently by backfilling with reject material obtained from the previous season's operations or in the case of the initial year, the backfill material will be derived from the settling pond system and existing stockpiles from previous operations. The duration of the project is expected to last approximately 15-25 years using conventional excavation techniques assuming the number of annual visitors approximates current visitor counts and that assumptions on the volume of gravel washed per day per person are reasonably accurate. A larger or smaller number of visitors or errors in the estimates of average daily visitor wash volumes may reduce or increase the project lifespan accordingly. Total disturbance over the life of the project is expected to be approximately 10-12 acres, although at any given time due to concurrent reclamation there will be two to three acres of active disturbance (counting roads, settling ponds, flumes and stockpiles and the administrative structures). Approximately three acres of upland terrace deposits and 3.2 acres of wetland deposits will be mined during the life of the operations.

ACCESS

Equipment access to the 281Gulch staging area will be via an existing, native-surfaced, low-standard road, FS 3781, which is approximately 1,774 feet (0.35 miles) in length. The current recreational garnet recovery site check-in facility, a small A-Frame building, and parking area (restricted to administrative and disabled access use only) are located in a small clearing at the

end of the road in the drainage divide directly above the confluence with the East and West Forks of 281 Gulch. Equipment will be walked up FS 3781 from the main 281 Gulch public parking lot along Emerald Creek to the A-Frame site. Access to the individual excavation panels will be along four short temporary trails to be constructed off of FS 3781. These four temporary trails, to be located on previously cleared cross-country access routes used to access exploration test sites, will range in length from 150 feet to 300 feet with a cumulative length of approximately 1,000 feet. Temporary access road bed widths will be approximately 12 feet with an additional six feet on either side cleared for the road right of way for a total road disturbance width of approximately 24 feet which equates to approximately 0.6 acres of total temporary road disturbance. Including existing disturbance from FS 3781 the total ground disturbance associated with all roads in the 281 Gulch operations area will total approximately 1.8 acres.

There is no existing access road to the Garnet Gulch operations area and a new road approximately 3,600 feet (0.68 miles) in length will be constructed from FS 447, the existing graveled road along the East Fork of Emerald Creek. Total road right of way will be approximately 30 feet which equates to roughly 2.5 acres of disturbance associated with the road, including roadbed, road right of way clearing and erosion control structures.

Practices outlined in the State of Idaho Best Management Practices for Mining, Forest Service Specifications for Roads and Bridges (1996) and current Mine Safety and Health Administration (MSHA) regulations will be followed in locating, constructing, operating and reclaiming access roads with the objective of minimum resource damage. Road drainage structures such as rolling dips, water bars, or culverts will be installed and maintained throughout the life of the project as needed and removed upon completion of reclamation operations.

Roads will be managed to control public access to meet Forest Service objectives for the area. This will entail the installation of gates during operations. When no longer needed for access all cross-country access trails (existing and new) utilized for the project will be recontoured to the extent practical and revegetated with plant species appropriate to the specific site soil, canopy and hydrologic conditions. There will be a net decrease in roads in the project area after the completion of the project. Please see the RAPS for details (PF: T-2).

TIMBER CLEARING

Timber will be cut only to the extent necessary for timely relocation of the operations. Limbs, unmerchantable trees, and brush will be utilized in construction of sediment control features or for reclamation to the extent practical, otherwise the excess material will be piled and burned where it can be done without damage to standing live trees and physical improvements such as fences, poles, buildings, signs, tables, grills, and cattleguards. Disposal of all slash and reclamation of disturbed areas will proceed concurrently with operations.

EXCAVATION AND STOCKPILING PROCEDURES

Wetland Panel Mining

A large percentage of the potentially recoverable gem garnet resources in the project area falls within jurisdictional wetlands as defined by the USACE Wetlands Delineation Manual (1987). The boundaries of the wetlands areas likely to be disturbed or impacted by the proposed action or in the immediate vicinity were outlined using routine mapping procedures and collection of information on the sites' vegetation, soils, and hydrologic characteristics using detailed topographic and slope maps, aerial photography, hand auger soil sampling and field

examinations. Operations in these wetland areas will require special operating procedures to minimize impacts to aquatic environments.

Prior to excavation activities, trees will be felled with a chainsaw and delimbed from the upper end of the panel. Slash will be bundled and placed between the excavation area and the active channel. Felled logs will be removed by skidding or lifting to an adjacent log stockpile with an excavator or possibly by hand or winching and saved for use later during reclamation if at all practical. If required, a small interceptor trench will be constructed either with hand tools or the smallest excavator practical to divert surface and/or groundwater flow around the excavation site following established State of Idaho Best Management Practices for Placer Mining. Interceptor trenches will be armored if necessary and lined with woody debris, straw bales or baffles to minimize sediment release and reduce velocities of flow should a storm occur while the interceptor trench is open. Water will be diverted to a water containment/recycle system located at the lower end of the panel to collect water from the cut and load out areas and direct it into a land application system or the wash plant water make-up pond system. Typically the containment system will consist of a small 5- to 10-feet wide and 4- to 5-feet deep trench oriented perpendicular to the long axis of the floodplain. The system will be constructed so there will be no direct discharge to active waters. Given the short duration of excavations and seasonal timing on wetland work the risk from overflow is minimal.

In cases where the panel will involve excavation immediately adjacent to or through an active water-bearing channel, a plastic-lined temporary surface diversion structure will be constructed. Block nets will be utilized to remove fish from affected stream reaches prior to diversion. The diversion will be routed around the excavation site and be sized slightly larger than the channel width to be diverted to sustain storm flows. The diversion may be lined with gravel or armored with coarser material if site conditions dictate. In some cases, it may be possible and practical to construct the diversion channel a year in advance with hand tools or a small excavator to allow vegetation to establish itself prior to diversion. Use of coir fabric, coconut cloth or other biodegradable geotextiles may be utilized where appropriate to stabilize the banks and channel of the diversions.

Once the water control features are established and determined to be functional by a qualified engineer or hydrologist, topsoil will be excavated from the area being mined. It will be sorted, stockpiled, and pushed to the edge of the active cut and used to construct a berm separating the area to be excavated from any active water-bearing channels. Overburden will then be removed and stockpiled one cut at a time until a complete panel is cleared using a trackhoe or bulldozer equipped with low ground pressure tracks. Alternatively, equipment may operate on construction matting or excavation may be completed utilizing long-reach excavators if the site permits and equipment is available. Overburden will be placed onto the exiting open cut or on adjacent upland panels if possible and practical without significantly increasing ground disturbance.

A cut will consist of a long, narrow area that is excavated in one continuous pass. Panels generally will run perpendicular to the length of the valley, and will typically consist of a series of cuts. Panels will range from 70-150 feet in length and from 50-100 feet in width, and will typically be close to 0.1 acre in size. All panels would be excavated to the base of the garnet-bearing gravel layers, typically down to bedrock. The garnet-laden gravels will then be excavated from the open panel and loaded into a tracked or wheeled loader, a dump truck, or possibly a portable conveyor belt system for transport to the wash site or garnet gravel stockpile.

Upon completion of one panel, the process will be repeated for each subsequent panel. Overburden from the next panel will be cast into the previous panel before the next panel is excavated. This sequence will continue until extraction of the gem-bearing garnet gravels in the area is completed. In this fashion, a wet panel will be open for only a short period of time during the operations minimizing the risk of sediment release or long-term riparian habitat impacts. All wet panels will be backfilled and rough-graded at the end of the each cycle and mulched and reseeded as soon as practical, typically within one week of completion of the earthwork. Backfill material will consist of spoils, collected and stockpiled from the previous season's flume wash plant operation's settling ponds. Backfilling with these materials will insure volumetric balances and original stream gradients are restored to their pre-mining conditions by maintaining stream cross sections and longitudinal profiles. In addition, subsurface hydrologic conditions will be maintained within the floodplains and adjacent upland panels because the wash plant rejects, once emplaced, will mimic the porosity and permeability of the pre-mining subsurface hydrologic regime because they will essentially be the same materials.

Dry Panel Mining

For dry panel excavations, timber clearing will be completed and water control features will be emplaced prior to excavation activities in the same manner as the wet panels. Topsoil will be excavated, sorted, and stockpiled with a track hoe or bulldozer and be stockpiled in a corner of the mining unit. Overburden will excavated and pushed to one side of the cut and be stockpiled. Garnet-bearing gravels will be excavated and loaded into dump trucks and be hauled to the wash plant or upland stockpile site. When this panel is completely mined, a second, adjacent panel will be opened. The overburden from the second panel will be backfilled with returned washed rock into the first panel, compacted, and leveled to the pre-excavation elevation and grade and the process repeated sequentially throughout the mining cycle. Panels will be backfilled and re-graded at the end of each cycle. Although located in upland terrace areas, excavation of dry panels may intercept minor amounts of shallow groundwater. Should this occur the water will be diverted around the open cuts into a vegetated buffer strip or catch basin or possible pumped into the water make-up pond or land applied. The difference between wet or dry panel operations primarily lies in the types of equipment that might be utilized and water management requirements.

EQUIPMENT

Specialized earthmoving and processing equipment will be used during the extraction, transport, and processing of the gem garnet-bearing gravels. The types of equipment and sediment-erosion control structures that may be utilized on the project site will be selected based on a combination of estimated operation and maintenance costs, potential for environmental impacts, speed and effectiveness and other logistical considerations. Common equipment types that may be utilized on the project include, but are not limited to:

Track-mounted Excavators

Track-mounted excavators are self-propelled tracked vehicles with articulated hydraulic lever arms with buckets. They operate by extending the lever arm and pushing the bucket down into the substrate and then pulling the bucket back towards the body of the excavator. Track-mounted hydraulic excavators will likely be the most common piece of equipment utilized in site operations because of the versatility and ability for operators to precisely manipulate the excavator bucket for selective excavating. Excavators are available in a variety of sizes and bucket capacities. They will be used for road construction and reclamation, diversion ditch

installation, and garnet extraction operations in both wet and dry panel mining. Other common names for these types of equipment are trackhoe, hydraulic excavator, and hoe. Some excavators are equipped with Low Ground Pressure (LGP) pads, which enable them to work in soft areas or on wet ground with minimal impacts or compaction issues.

Draglines

Draglines are typically self-propelled or towed machines consisting of an elongated arm with a large bucket or scraper attached to a cable and pulley system. The arm is extended over the area to be excavated, the bucket or scraper dropped to the ground surface and then pulled across the ground toward the dragline. The rock or sediment-filled bucket is then hoisted and rotated and the contents of the bucket dumped into waiting trucks or into a stockpile. Drag lines are typically effective in removal of horizontally layered, soft unconsolidated materials and are often used under wet conditions. However, they are typically used only in large operations. Smaller draglines do exist and may be utilized in wetlands excavation operations if conditions warrant and the equipment can reduce ground impacts and prove to be cost efficient. Use of draglines typically produces considerable mixing of excavated materials due to the nature of the bucket dragging and dumping process. Mixing is increased by steep vertical stacking of spoils in stockpiles, but this results in the least amount of total area of ground disturbance. Mixing is decreased by horizontal stacking of spoils, but this procedure requires a larger stockpile footprint.

Dozers

Dozers are a type of self-propelled, tracked equipment outfitted with a large blade attached to the front for pushing material. The blades are typically 8-12 feet in length. They often have a large “tooth” called a ripper in the rear for disaggregating compacted materials. Dozers may be used for road construction and reclamation, topsoil sorting, overburden removal, and site re-grading after mining. Dozers can operate on relatively steep slopes, up to 70% if ground conditions are suitable and stable. Dozers are extremely heavy pieces of equipment and when outfitted with conventional width tracks can cause considerable compaction of soils and unconsolidated materials when walked across the ground surface. Some dozers are equipped with LGP pads, which reduce ground pressures considerably enabling them to work in soft areas or on wet ground. Other common names for this equipment are cat and swamp cat.

Loaders

Loaders are self-propelled, wheeled and occasionally tracked-vehicles equipped with a large bucket on the front used for short hauling of excavated materials or loading or unloading of materials from dump trucks or stockpiles. They operate by pushing the bucket into existing stockpiled material and lifting it up for transport and loading and unloading. They are typically outfitted with large diameter and wide width rubber tires and bucket volumes ranging from 1.0 to 2.5 cubic yards. Larger bucket loaders are more efficient for large volumes and may be utilized if appropriate and cost efficient. Other names for loaders are front-end loaders or wheel loaders. Loaders typically operate on stable road surfaces or smooth compacted native material surfaces and can operate on grades up to 20%. They become inefficient if haul distances are great or the driving surface is irregular, soft or unstable. Some models of loaders, typical in underground mining operations and known as load haul dumps (LHD) are loaders designed for haulage and transport over longer distances. In some cases LHDs are utilized in surface operations because of their greater haulage capacities compared to typical loaders.

Dump Trucks

Dump trucks are large, multi-axle trucks, sometimes outfitted with an articulated chassis that will be used to haul materials to and from the excavation site or to and from the stockpiles or flume

wash plant site during the excavation or reclamation stages of the operation. These trucks typically have 6 to 12 cubic yard dump boxes and have twin axles to facilitate distribution of the weight of the materials loaded into the dump box. They may be capable of dumping their load from the bottom, rear and side of the dump box. Dump trucks can carry large loads and travel large distances more efficiently than other types of earthmoving equipment. Dumps can typically operate on stable road surfaces or smooth compacted native material surfaces and can operate on grades up to 15%, but typically are used on roads with less than 8%. They become inefficient if haul distances are great or the driving surface is irregular, soft or unstable.

EXCAVATIONS, SEDIMENT CONTROL & STRUCTURES

Flume

A flume is a long, linear, shallow sloped, flat-bottomed trough which is set up for washing garnet-bearing gravels. Running water will be pumped or gravity fed into the upper end of the flume to facilitate recovery of the gem garnets by the public. The silt, sand, and fine gravel matrix will be screened through 3/8-inch nominal diameter screens separating the fine-fractions from the coarser garnet-bearing gravels using the flume's running water. The flume planned to be utilized in the wash plant is approximately 18 inches wide x 10 inches deep and will be approximately 200 feet long. The flume will be constructed in shorter sections to facilitate movement and adjustments to the flume when required. The 200-feet long flume will accommodate up to 50 visitors at a time and will have a capacity of approximately 10 cubic yards per hour provided sufficient water is available. The flume will be set up in upland sites with appropriate water management and sediment control features. The flume size, shape or length may be modified as needed to accommodate additional visitors or wash volumes as required.

Settling/Recycling Ponds

A settling pond is a small excavated depression designed to settle clay, silt and sand out of flume wash plant waste waters to allow the settled waters to be used for recycling. Pond size is determined by the settling characteristics of the washed material, rate of feed and available water supplies. It is estimated that a 20,000 to 30,000 gallon pond will be required to maintain sufficient water supply to allow the 200 feet long flume to operate efficiently. For reference, a pond with 2:1 (horizontal to vertical) side walls with a 20,000 gallon capacity requires an excavation approximately 40 feet x 40 feet x 4 feet deep. For spoils management an additional smaller pond may be placed at the end of the flume to catch and settle coarser-grained materials and facilitate less frequent emptying of the fine materials from the recycling pond. Depending on settling characteristics of the materials being washed or changes in visitor counts, the ponds may need to be enlarged.

Water Make-up Pond

A water make-up pond is an excavated depression or other above-ground storage system typically used to collect or store additional water for a wash plant. It is anticipated that during the driest part of the annual season (August through September) that there occasionally may be a need to store additional water in a water make-up storage system to allow for efficient wash plant operation and to replace the increased water lost to evaporation. Water would be collected and placed into the make-up pond during higher flow conditions to minimize impacts from water withdrawals during seasonal low flow conditions.

Siltation Berm

Siltation berm structures may be installed around the active excavation panels to capture and contain all surface runoff within the active excavation area. They will be designed to keep overbank flows from 25-year flood events from entering the active excavation panels where feasible, but given the small-scale and short-term disturbance of individual panels in most cases the berms will not be designed to prevent overbank flood flows from entering the panel. Berms will be constructed with compacted fine-grained materials and be relatively impermeable to minimize the amount of water leaving the active excavation unit. All berms will remain in place through the earth moving excavation and reclamation activities and will be removed prior to final site mulching, seeding and replanting.

Channels and Water Routing

Excavation of the valley bottoms in 281 Gulch and Garnet Gulch to recover garnet gravels requires routing of surface water around the site. The following descriptions are possible methods for routing water around the excavation site and for returning surface flow to a new channel in the reclaimed area.

Culvert-like System

Flow may be diverted around the site using a culvert or some other conveyance structure (irrigation pipe, corrugated plastic pipe, etc.). A diversion dike (BMP III.1, PF: SW-62) or some other structure and stream channel alteration (BMP III.8, PF: SW-62; Stream Channel Alteration Rules, PF: SW-63) are necessary to remove water from existing channel and divert it to the conveyance structure.

Diversion Channel, Plastic-Lined or Vegetated

Diversion channels may be constructed upstream of the active excavation panels to collect and convey it around the area of active ground disturbance. In some locations, an interceptor channel will be merged into a diversion channel to prevent construction of multiple channels along the edge of the panel. In most cases the diversion will consist of a small, hand-excavated diversion channel slightly larger (approximately 20%) than the existing channel. It would be used to divert water from the excavation site. The vegetative cover and topsoil from this new channel would be placed separately next to the excavated subsoil material and all would be placed in linear stockpiles about five to ten feet away with a sediment barrier installed to prevent sediment movement. The newly constructed channel would be lined with plastic secured to the floodplain and possibly armored with gravels or coarser materials as appropriate. Both the ingress and egress of the diversion channel would have low angles relative to the existing channel. The ingress to the new channel would be the last portion constructed. Once the diversion channel is complete plastic sheeting would be placed within the old stream channel to divert the flow into the new channel that was completely lined with plastic. The diverting plastic sheet area within the existing channel would be secured with small logs, both inside and outside the plastic at the entrance to the new channel to secure the plastic and to ensure complete diversion. Slash filters or other biofiltration methods may be installed near the downstream end of the diversion channel to slow water velocities for sediment removal In some cases. Once the diversion channel is no longer needed it would be backfilled and covered with the stockpiled vegetation.

Where possible and practical, the diversion may be hand excavated the season prior to the expected diversion time frame and the diversion channel lined with coir fabric or other biodegradable geotextiles and seeded or planted to allow for a vegetated diversion channel when water is turned into the diversion the following season.

Reconstructed Channel

A channel would be reconstructed on the surface of the excavated panel that mimics the pre-disturbed existing channel in both size and shape (unless an alternative design is agreed to for habitat improvement). Valley and stream channel cross-sections and stream longitudinal profile survey data (PF: SW-4, SW-24, SW-26 and Figures on pp. 18-20 below) collected in 2002-2005 would be used to configure and locate the reconstructed channel. The streambanks would be stabilized using wraps of coir fabric or other biodegradable geo-textile. One or two wraps of the fabric may be used depending on existing channel depth, each lift about 12 inches high (See FEIS Figure 18). Fabric or geo-textile and perhaps two to three or up to eight inches of gravel may be placed in the reconstructed stream bottom. Also logs and/or large cobbles to small boulders may be used for bank material to provide aquatic habitat and stream bank and channel stability. The proposed reconstruction of 745 feet of stream channel, disturbed by past mining activities in 281 Gulch would employ the same practices as those described above. In addition the proposed reconstructed channels will be monitored for stability and streambank vegetative cover (FEIS Appendix C, Monitoring Plan).

Sediment Catch Basins

Sediment catch basins are small, temporary, excavated depressions used at the downstream end of interceptor and diversion channels to detain runoff from rain or surface sheet flows. Catch basins in floodplains will be constructed only if necessary and if excavated will be capable of handling 25-year, 24-hour storm events for the upstream watershed catchment area. The basins will be designed to allow settling of suspended sediments and to allow trapping of organic debris. Overflow water will be discharged onto a minimum 30-foot vegetated biofilter strip of undisturbed, native vegetation on the existing floodplain where further settling of sediments will occur.

Vegetated Biofilter Strip

Vegetated biofilter strips are naturally vegetated or specially planted zones of dense vegetation used to slow storm waters, trap sediments, and filter any surface flow before it enters a stream or river. Vegetated biofilter strips or other features with similar functions may be placed at the potential outflow points of all water management structures within or with the capacity to enter floodplains.

Sediment Filters

Silt fencing, straw bales or mulch, slash bales (variety of small diameter slash bound in bundles), erosion control blankets or nets, geotextiles, and vegetative lining sediment filters are potential sediment control methods that will be used in various combinations. They may be installed to prevent sediment from entering a specific area or body of water. The structures will be constructed to create a physical barrier that allows sediment to deposit, and water to flow through or over the structure. These structures, plus large woody debris (LWD) and slash bale filter windrows will also be placed intermittently across the reclaimed floodplain, adjacent to steep slopes to slow flood flows and trap sediments until natural vegetation is well established and capable of sustaining water flows from normal run-off conditions and storm-related events.

Interceptor Channels

Interceptor channel structures may be constructed upslope of areas of active ground disturbance where appropriate to collect overland runoff and convey it around the active disturbance. A sediment filtration system will be installed near the end of the interceptor channel for sediment removal.

MATERIAL BALANCE

Volumetric information outlining the material balance calculations are given below. These are approximate estimates and are subject to revision as subsurface site conditions and grade control dictate. Changes may be needed to these predicted amounts because of unexpected subsurface conditions, excavation activities, public visitor counts or gravel consumption. Additional excavation and ground-disturbing activity will not occur until the responsible official reviews the proposed changes and the Forest Service obtains any necessary approvals and/or permits from third-party permitting agencies if changes to these volumes are likely to result in significant increases in excavated material, disturbance, or impacts to resource areas.

Estimated gem garnet-bearing gravel volume is shown in the table below. An average panel's dimensions are approximately 70 feet x 70 feet equating to approximately 4,900 square feet (a little over 0.1 acre). The ore-bearing gravels are typically about three feet thick. Total in placer volume for each panel will be approximately 545 bank cubic yards (bcy) per panel. A total of 49 individual panels are proposed to be excavated totaling approximately 29,430 bcy. Assuming the material has 125% swell factor, then 545 bcy is equivalent to ~680 loose cubic yards (lcy). Assuming a dump truck capacity of approximately 12 lcy and a fill factor of 85% then a single 545 bcy panel will require approximately 67 dump loads to transport.

Each panel would be excavated and backfilled in a series of sequential cuts from top to bottom. A typical cut within a panel would be 8-10 feet wide x 30-70 feet long. Overburden thickness varies but ranges from a minimum of about three feet to as much as ten feet. Current plans are to avoid excavating garnet-bearing gravels greater than approximately ten feet below ground surface due to the higher costs, increased disturbance and larger equipment requirements associated with excavation operations below that depth. This depth cutoff screen reduces the amount of recoverable resource considerably, but is considered a reasonable depth for operations given the current design parameters. Future operations may be planned to extract garnets at depths greater than the 10 feet cutoff, but will require additional review, planning and possibly permitting prior to any potential implementation.

The estimated total life-of-project excavation area disturbances are summarized in the table below.

Site	Acres	Ore Volume	Waste Volume
281 Gulch (6 upland panels)	0.78 acres	3,166 bcy	4,845 bcy
281 Gulch (8 wetland panels)	0.87 acres	4,906 bcy	6,093 bcy
281 Gulch (14 total panels)	1.65 acres	8,072 bcy	10,938 bcy
Garnet Gulch (17 upland panels)	2.01 acres	6,361 bcy	17,215 bcy
Garnet Gulch (18 wetland panels)	2.21 acres	9,100 bcy	9,281 bcy
Garnet Gulch (35 total panels)	4.22 acres	15,461 bcy	26,496 bcy
Total all upland panels	2.79 acres	9,527 bcy	22,060 bcy
Total all wetland panels	3.08 acres	14,006 bcy	15,375 bcy
Total all panels	5.87 acres	23,533 bcy	37,435 bcy

PRODUCTION RATES

It was necessary to estimate the amount of garnet-bearing gravel that would be needed annually to determine size of excavation panels, stockpiles and the flume system. The discussion and figures below rely on certain assumptions. These assumptions are essentially based on estimates derived from observations or the best available data and are subject to change once the system is fully constructed, functional and public comments are received during on-going operations.

The amount of material needed on an annual basis was estimated from several sources. We talked with operators of other recreational rockhound flume systems located in the Cowee Valley corundum district in North Carolina and at the Yago Sapphire Mine in Montana about flume parameters and amounts of gravel consumption. Rockhounds at these operations typically wash between 8 to 10 5-gallon buckets of loose gem-bearing gravel per day. Estimates based on observations of past public garnet recovery in the Emerald Creek recreational site during the past three years suggests the average digger was digging and washing somewhere between 0.05 and 0.15 bank cubic yards of in-place material. Since these estimates were made from operations washing different materials and under different conditions a short pre-operational bench-scale test of the proposed flume system was completed during the fall of 2005 using material from the proposed panels in 281 Gulch. This test indicated that an average washer will process approximately 0.25 loose cubic yards (lcy) per 6-hour day. Assuming 30 visitors per day a total of 7.5 lcy will be required daily. Based on estimates from screening and washing of 10 large bulk samples, this material typically will be composed of approximately 3% cobbles, 7% gravel, 85% sand and the remaining 5% made up of silt- and clay-sized material. In the past, the operating season for the Forest Service-managed garnet recovery operations has ranged from around 70 to over 120 days per season. Visitor counts from annual records indicate that an average of 30 visitors per day.

WATER SOURCE AND CONSUMPTION

Original estimates of potential water needs were derived from standard mining engineering texts, Bureau of Land Management Placer Claim Validity Examination texts, and texts from the former Bureau Mines and other sources. Water is needed to flume and flush the fine-grained materials that pass through the screens into the settling pond system. Additional water may be needed during dry season operations for dust abatement as well as for irrigation of freshly planted vegetation. These estimates indicate up to 200 gallons per minute of flowing water would be required to keep the flume flushed of sediment for the expected number of daily visitors. Tests of scaled down version of the flume system during the fall of 2005 suggest a more realistic estimate may be in the range of 50-100 gallons per minute.

Because the local streams typically do not flow at the rates required for flume operation it was recognized that recycling would be required. However, a source of water to periodically recharge the system will be necessary to account for water losses due to spillage, evaporation and percolation through ponds and raceways. Several different sources of water were considered in the design phase of the operation. These sources included recovering water from a well, direct removal from active stream channels via pumping or gravity flow, construction of floodplain water collection ponds, pumping of water from the East Fork Emerald Creek and use of water trucks to truck in water from outside sources.

Factors considered in the analysis included quantity of water available, potential impacts of the water withdrawals on the water source's flow volumes and associated aquatic habitats and ecology, capital and operating costs to transport water to the wash plant site from the water

source, rate of water output and recovery from the source, logistical requirements for water source infrastructure operations and maintenance, ease of operation, ground disturbance, pumping requirements, and noise issues.

An analysis of these factors indicate it would be possible to utilize water from the local drainages without significant impacts to the riparian habitats and stream flow discharges provided rates of withdrawal are kept to a minimum and appropriate recycling methods are utilized. The State of Idaho Department Water Resources has granted the Forest Service water rights to 281 Gulch and Garnet Gulch at the rate of 0.5 to 1.0 cubic foot per second (from 3.7 to 7.5 gallons per second) and additional water rights may be requested from the State for water recovery from the East Fork Emerald Creek to provide a water source.

Plans call for water to be fed by gravity flow from a withdrawal point in the upper end of the East Fork of 281 Gulch into the pond system located in the upland area near the flume site. A similar set-up would be utilized in Garnet Gulch. No digging or filling to accommodate water withdrawals is anticipated. To initially fill the water storage ponds, the system will be charged slowly with water from the drainage using flexible hose or rigid pipe outfitted with a small diameter screen to prevent inadvertent entrapment of fish or small aquatic invertebrates. Both the recycle and water storage ponds will be initially filled during periods of high flows. A pump system at the sluice will then pump water from the storage/settling ponds into the flume at the required rate where the water will be used by the public to screen gem-bearing gravels. The sediment-laden wash water will be fed down the flume, then through a rock-lined raceway back into the lined settling/recycling pond system. Periodically when the water in the system becomes too low for effective sluicing due to losses from evaporation, spillage and percolation, the system will be recharged by addition of water from the stream source possibly from a make-up pond. Additional water may become available from active excavation areas, should they become wet. This water would be pumped into the pond system where possible and practical to reduce the need for active water withdrawals and facilitate equipment operations in the wetlands areas. Additional water could also be obtained with water trucks if needed.

ENVIRONMENTAL PROTECTION MEASURES

AIR QUALITY

Water misting, mulching and/or tarps may be utilized on topsoil, overburden and stockpiled garnet-bearing gravels during periods of extremely dry weather or any time there is the potential to produce a decrease in air quality due to fugitive dust emissions. If loads are dry and the potential exists for fugitive dust emissions during transport, haulage vehicles may be tarped or wetted down. All internal combustion equipment utilized on site will have appropriate functional muffler systems installed. Equipment will not be left idling for significant periods of time when not in use. Slash burning, if it becomes necessary, will be conducted only when favorable weather and wind conditions exist. Appropriate notifications to local authorities will be made and any local, state or federal permits necessary will be obtained prior to any slash burning.

WATER QUALITY

Erosion Control Plan (See FEIS Chapter 2 Design Features and Mitigation Measures)

A Storm Water Pollution Prevention Plan (SWPPP) will be developed for the site by qualified erosion control specialist once design parameters and site layout are finalized for wetland panel excavation. Appropriate notifications to state (IDWR and IDEQ) and Federal (EPA) authorities will be made.

Erosion control structures will be utilized to prevent excessive run-off and erosion. Structures will be constructed in accordance with the Idaho Department of Environmental Quality Catalog of Stormwater Best Management Practices for Idaho Cities and Counties, 2nd Edition, April 2001, the U.S. Environmental Protection Agency's Storm Water Management of Construction Activities; Developing Pollution Prevention Plans and Best Management Practices, September 1992; and the Idaho Department Best Management Practices for Mining in Idaho, November 1992. Erosion control systems will be established as appropriate for the site.

Sediment control devices will be installed prior to surface disturbing activity, inspected regularly, and be cleaned to maintain at least 60 percent of their volume capacity in sediment. It is expected that there will be minor increases in sediment yield from the site during wetland excavation operations immediately following stream diversions, but implementation of BMPs and the design features and criteria described elsewhere in this document should keep those releases to a minimum. Please see the hydrology section for discussions on the details of the sediment loading modeling for site operations.

Should it become evident that an erosion control component is not performing in the manner necessary to minimize erosion and runoff, garnet extraction and washing operations producing the problem will be stopped and corrective measures will be initiated to correct any deficiencies. Concurrent reclamation will reduce the amount of material exposed at any given time and will reduce the possibility of excessive sedimentation issues.

Specific methods that will be utilized for each extraction panel will be dependent on the block's location relative to the adjacent riparian zones and upland areas, but they will typically consist of a barrier around the perimeter of all the cuts and areas of open ground disturbance (Placer Mining BMPs Chapter Section VI). In addition temporary swales or sedimentation traps may be necessary and will be placed where appropriate and in conformance with Idaho Construction Stormwater Best Management Practices procedures (Chapter IV). Construction of such sedimentation traps will be consistent with state and federal regulations and the siting will be reviewed and approved by the Authorized Official or their designated representative prior to their construction. Sediment traps and barrier systems will be inspected weekly and more often as necessary during periods of inclement weather. Accumulated sediment will be periodically removed and buried in existing open cuts or stockpiled in a secure location for later disposal as needed. Brush sediment barriers will be constructed from slash and material removed from decked trees (as per Placer Mining BMP Section V) and utilized in areas where there is more likelihood of erosion and rilling.

Temporary access trails will be constructed with rolling dips where required, and may be armored with minus 3-inch wash rock to minimize rutting if needed. During periods of high precipitation or runoff earth-disturbing operations will be curtailed to prevent excessive erosion and sedimentation. During interim shutdown periods regular inspections of the site's erosion control system will be preformed by qualified personnel. These inspections will be at least monthly during interim shutdowns. If there is a prolonged period of inactivity (> 30 days) on the site, all open cuts will be stabilized by backfilling to the angle of repose and disturbed areas covered with an appropriate soil stabilization method (weed-free mulch, slash, or topsoil and seed).

Disturbance will be kept to the smallest practicable area at any one time during the extractive operations through concurrent and progressive backfilling, grading, and prompt revegetation. All backfilled material will be stabilizing to promote a reduction of the rate and volume of runoff.

Systems will be designed to retain sediment within disturbed areas and divert runoff away from disturbed areas.

Occasionally active stream channels may be temporarily diverted or altered during this operation. When such diversions become necessary as part of the operations they will be constructed as per appropriate guidelines in the Idaho Best Management Practices for Placer Mining guide. Diversions will not be constructed without prior approval from the responsible official. Such activities will be reviewed by Forest hydrology and engineering staff and will have the necessary Idaho DWR Stream Alteration Permit, Idaho DEQ 401 certification, and USACE 404 wetlands permit.

Sediment traps and sediment control devices for surface drainage shall be maintained until disturbed areas have been restored and revegetation requirements have been met. When no longer needed to achieve the purpose for which they are authorized, all temporary erosion control systems will be removed and the affected land regraded and revegetated. Prior to removal of any permanent erosion control structures the site will be evaluated to insure the structure is no longer needed and that the hydrologic system will not be impaired by the structures removal.

Ponds will be located away from live water out of possible runoff channels and areas with seasonally high water tables as much as practically possible and will be constructed so that sediment laden water cannot become a point source of pollution to any water resource. Impermeable liners may be used where needed to maintain established water quality standards. Pollution in this sense means any change in ambient water quality in excess of that allowed under the State of Idaho Water Quality Standards.

Native vegetative buffers will be maintained along all surface waters to ensure bank stability and provide a filter strip for sediment until it becomes necessary to excavate those areas. The size of this buffer will vary with the slope of the land, quantity of surface and ground water, type of clearing or depth of excavation. In addition to the filter or buffer strips described above steps will be taken to ensure that there is room between these strips and the clearing or excavation in which to implement sediment control measures to prevent or stop sediment or other contaminants from reaching the stream.

To minimize the risk of failure, ponds will be excavated rather than enclosed by berms, where conditions permit. Ponds with embankments which exceed 10 feet from the toe of the fill to the crest of the bank, will be reviewed and approved by the Idaho Department of Water Resources as required by IDAPA regulations.

No permanent or long-term diversion structures or channels are planned at this time. If they become necessary they will be designed to handle seasonal high flows without damage to the structure or stream channel. The combination of channel, bank, and flood plain configurations shall be adequate to safely pass the peak runoff of a 10-year, 24-hour precipitation event for temporary diversions; and a 100-year, 24-hour precipitation event or larger for permanent diversions. However, the capacity of channel will be at least 20 percent larger than the capacity of the unmodified stream channel immediately upstream and downstream of the diversion.

Temporary diversions will be removed prior to high flows in the spring unless stabilized and outfitted with appropriate sediment retention structures. When no longer needed to achieve the purpose for which they are authorized, all temporary stream channel diversions shall be removed and the affected land will be regraded and revegetated.

When diversions are constructed or stream channels restored after temporary diversions, reclamation will be conducted in a manner to restore, maintain and enhance where practicable natural riparian vegetation on the banks of the stream; establish or restore the stream to a natural meandering shape of an environmentally acceptable gradient; establish or restore the stream to a longitudinal profile and cross section, including aquatic habitats (usually a pattern of riffles, pools, and drops rather than uniform depth) that approximate natural stream channel characteristics.

ARCHEOLOGICAL RESOURCES

Qualified Forest Service archeologists conducted a detailed site survey and inventory in the affected area in the summer of 2005 to determine if prehistoric or cultural-historic resources are present as per the requirements of the Antiquities Act of 1909 and the National Historic Preservation Act of 1966.

Several minor sites likely related to historic former logging operations were located within the project area. The Forest service archeologist determined the project, as currently designed will have no adverse effects on these resources. The Idaho State Historic Preservation Office (SHPO) and local tribal representatives reviewed and concurred with the findings of the archeological surveys. The sites did not warrant listing on the National Register of Historic Places. The Coeur d'Alene Tribe will be notified before excavations begin each year.

If during operations any object of antiquity, historic structure or feature is discovered, operations will immediately be suspended and the Forest Service archeologist or designated representative will be notified for site clearance prior to restarting operations.

PUBLIC ACCESS, SAFETY AND TRAFFIC CONTROL

An Emergency Response Plan (ERP) has been developed by district staff and approved by the District Ranger (PF: R-45). The primary purpose of this Emergency Response Plan (ERP) is to provide an emergency operational handbook to be utilized in the event of an accidental spill of oil/petroleum/hazardous material in transport to the project sites, fire event threatening the project site or a medical emergency. It should be emphasized that the ERP is subject to amendment, as operating experience provides better ways to accomplish acceptable operational management objectives. Responsibility and liability protection required for emergency response actions involving hazardous materials as required by the Occupational Health and Safety Administration (OSHA) regulations described in 29 CFR 1910.12 must be known before using this plan. Copies of this ERP will be distributed to all project suppliers and site contractors. These copies shall be kept in delivery vehicles so that response instructions are available at all times during deliveries. The information for fire and medical emergencies is only a general guideline, which is subject to individual company and contractor safety policy. This Emergency Plan is designed to primarily cover hazardous material transportation incidents through the National Forest areas. Suppliers and manufacturers meet all training requirements of USDOT, OSHA, and State regulatory agencies.

The ERP incorporates standard Spill Prevention Control and Countermeasure (SPCC) procedures and will be maintained at the project site.

OPERATING SEASON

The normal operating season for clearing and excavation and earth construction operations will be in the fall after operations cease and the public washing operations have ceased. Flume operations are initially planned to operate for 5 days per week normally from Memorial Day to Labor Day annually. The number of operating days and opening and closure dates may change if public demand dictates and changes in the operating season can be accomplished without a significant increase in site impacts.

INTERIM SHUTDOWN PROCEDURES

During the course of the operations if it becomes apparent that erosion control BMPs are insufficient due to the effects of weather, operations will be curtailed until operational problems can be corrected. Steps will be taken to minimize earth-disturbing activities during periods of high runoff and to avoid damage to the soil and water resources due to severe rutting, puddling or compaction of soils, incorporation of snow into earth materials. The site operations plan incorporates the following avoidance and minimization mitigation and mining operation safeguards intended to reduce potential high rain and meltwater runoff-related impacts:

> Short-term hydrologic conditions and other climatic factors may necessitate a temporary suspension of excavation operations if during the course of the operations it becomes apparent that erosion control BMPs are insufficient or are not operating correctly. The determination to temporarily suspend operations will be based on proper functioning of BMPs, and on real-time storm and flood forecasting. Storm and flood forecasting will be used to determine implementation of shutdown protocol. Excavation operations will remain suspended until surface runoff and stream flow return to manageable conditions, and all BMPs are functioning within their capacities.

RECLAMATION PLAN

Appendix C includes a reclamation plan for the historically disturbed sites within the project area. Some of the disturbance occurred prior to Forest Service acquisition of the lands in the project area and will be addressed where applicable in the reclamation plan.

Topsoil Sustainability

Topsoil or suitable growing medium will be removed and stockpiled from areas to be affected by surface disturbance in quantities sufficient to allow a minimum of 12 inches of topsoil or combination of topsoil and subsoil to be redistributed over all disturbed areas. This does not include areas disturbed by low impact roads or other activities which do not involve earthen excavation or fill operations. Other growth mediums may be used where there is a lack of suitable topsoil present.

Revegetation (grasses, shrubs and forbs)

A seed mixture designed to promote rapid ground cover and long-term stability will be formulated based on site specific conditions. Seed mixtures will contain grasses, forbs and shrubs consistent with site climatic, soil-type and hydrologic conditions and will be designed to bring the disturbed areas in line with historic native species. Seed mixes proposed for use in reclamation projects will consist of certified noxious weed-free materials. If recommended by the District Botanist, fertilizer may be applied at the time of seeding or later provided the fertilization will not impact negatively other resources (e.g., water quality).

Seed will be broadcast in most cases, but where erosion is expected to be a problem, drilling or hydro-mulching may be required. Use of coir fabric or other biodegradable geo-textiles may be utilized in areas where erosion or slope instability are deemed a possibility. The timing of reseeding will normally be immediately following excavation or ground-disturbing activities, typically in the fall following backfilling, recontouring, and topsoil placement. Revegetation efforts shall be considered successful if it results in at least 70 percent of the ground cover of the pre-mined or adjacent reference area for a period of two years, is effective in controlling on site erosion, and is self regenerating. A number of preventive and control measures would be taken to reduce the risk of noxious weed spread in accordance with the St. Joe Weed EIS (ROD, 10/12/99).

Replanting (trees)

To reestablish long-term slope and soil stability and recover habitat, the District specialists will develop and implement a tree replanting program after final re-grading and seeding. Stocking for trees and/or shrub species will be evaluated using standard survival surveys as used by the Forest Service timber staff. Replanting will be conducted with District-approved tree stock and will consist of planting densities and species appropriate to the site.

Final Reclamation and Monitoring Plans

To insure site erosion control and water management features operate as designed a site monitoring plan will be developed. Proposed water quality monitoring is outlined in the Monitoring section of Chapter 2 and the monitoring plan in Appendix C.

Final reclamation activities and the normal sequence in which they occur are documented in A-H below. Exceptions to this normal sequence would be for those facilities which would be used for the following year's operations. Normally all areas disturbed by an operation will, at a minimum, be stabilized with erosion/sediment control measures and revegetated in the fall of the year in which the disturbance occurred.

A. Removal or disposal of all equipment and facilities: This includes disposal of waste materials and draining of ponds. All such work will be accomplished in such a way to ensure long-term stability of the site and to prevent contamination of ground or surface waters. If necessary, waste water may be treated with non-toxic flocculants to reduce risk of water pollution from suspended sediment. Flagging or other markers will be removed unless otherwise needed for long-term site reclamation monitoring.

B. Backfilling: In placer operations this involves replacing graded waste so that course gravels are covered by successively finer materials. Backfilled materials will be selectively hauled or conveyed and compacted wherever necessary to ensure stability of the backfilled materials. The method and design specifications of compacting material will be performed to mimic pre-mined substrate compaction conditions. As backfilling progresses, materials must be compacted and graded to the desired contour and slope.

C. Recontouring: After backfill of materials and before the addition of topsoil, disturbed areas will be shaped to minimize erosion on-site, ensure long-term stability and productivity, and create habitat diversity. Any earth-moving operations will be conducted with appropriate runoff controls and the use of sediment control measures where necessary.

D. Topsoil Spreading: Topsoil or other acceptable growing medium will be spread and final grading will be on the contour.

E. Seedbed Preparation: Where compacted layers would inhibit vegetative growth, the topsoil will be ripped or harrowed on the contour. Where erosion is expected to be a problem, mulch and/or terracing will be used. Where soil fertility is expected to be a limiting factor, a fertilizer or other amendment may be required. Fertilizer will normally be applied in the spring after a successful fall seeding results in germination.

F. Reseeding: A seed mixture designed to promote rapid ground cover and long-term stability will be formulated based on site specific conditions. Seed mixtures may contain grasses, forbs and shrubs and trees. Stocking for trees and/or shrub species will be evaluated using standard survival surveys as used by the Forest Service botany and timber staff.

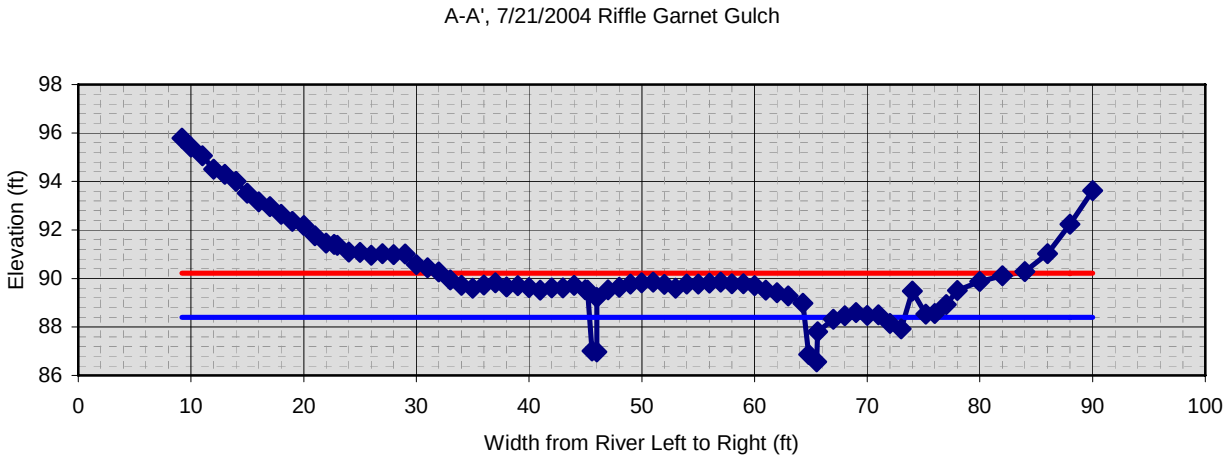
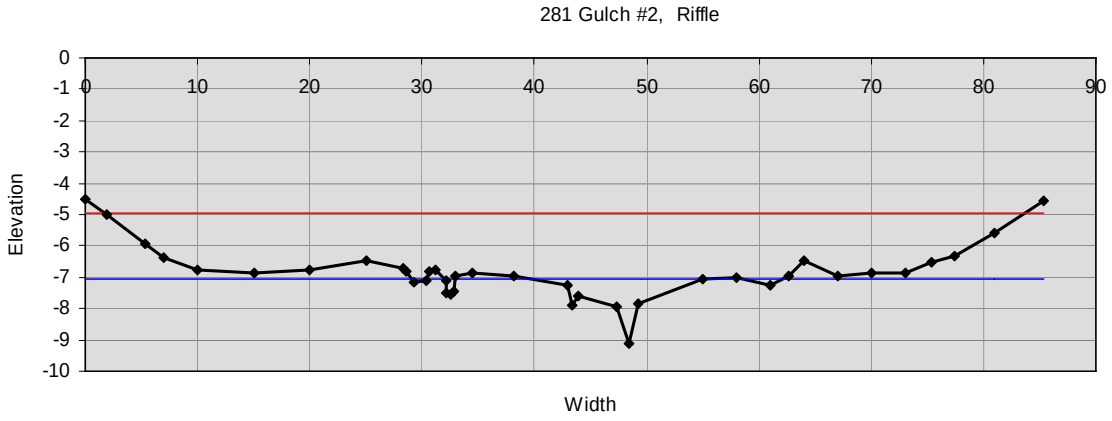
G. Channel Reconstruction: Where stream channels and/or floodplain and riparian areas will be reconstructed, sound engineering and hydrologic design will ensure replacement of the original function and values of the stream system including:

1) Width to depth ratios;
2) Sinuosity;
3) Stream gradient;
4) Channel substrate;
5) Floodplain/riparian area shape and vegetative composition. Reconstructed channels and associated floodplains will be monitored and corrective measures taken as necessary until fully functioning and stable.

H. Reclamation Protection: Reclaimed areas will be protected as necessary with fencing, road closures, or other means until such time as minimum stocking levels have been achieved.

Examples of Cross-sections and Photos

Garnet Gulch Cross-section A-A’



281 Gulch Cross-Section 2