Draft

Remedial Action Work Plan
Voluntary Remediation Program

United Verde Soil Program
Clarkdale, AZ
VRP Site Code: 512101-00

Freeport Minerals Corporation

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List of Acronyms

ADEQ	Arizona Department of Environmental Quality
BSA	Backfill Staging Area
CC	Construction Contractor
CHSC	Contractor's Health and Safety Coordinator
CPC	Construction Project Coordinator
EPA	United States Environmental Protection Agency
ESSA	Excavated Soil Staging Area
FDCP	Fugitive Dust Control Plan
FMC	Freeport Minerals Corporation
HASP	Health and Safety Plan
mg/kg	milligrams per kilogram
PCCR	Property Cleanup Completion Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SPLP	Synthetic Precipitation Leaching Procedure
TCLP	Toxicity Characteristic Leaching Procedure
VRP	Voluntary Remediation Program
UVSP	United Verde Soil Program

1. Introduction

This Remedial Action Work Plan (RAWP) presents implementation details for soil remediation (i.e., cleanup) activities to be performed by Freeport Minerals Corporation (FMC) for residential, non-residential, and publicly-owned properties near the former smelter operations in Clarkdale, Arizona as shown on **Figure 1**.

The United Verde Copper Company (United Verde) operated a copper smelter northwest of Clarkdale, Arizona, from 1915 to 1932. The smelter was reopened in 1935 when Phelps Dodge Corporation purchased United Verde and continued to operate until 1953. FMC is the corporate successor to Phelps Dodge Corporation.

Because the copper smelter operated in an era before emissions control equipment was commonly used, historical air emissions from the smelter may have deposited metal-bearing particles on nearby soil. FMC has elected to enter into the Arizona Department of Environmental Quality's (ADEQ) Voluntary Remediation Program (VRP) to address the potential that historical smelter operations may have contributed to elevated metals concentrations in soil on properties near the former smelter operations (Study Area). Under the VRP, FMC will perform a soil characterization and remediation program within the Study Area shown on **Figure 1**. The soil characterization and remediation work performed by FMC under the VRP in Clarkdale is referred to as the United Verde Soil Program (UVSP).

The Study Area includes properties most likely to have been affected by historical air emissions (the primary off-site transport mechanism for metals associated with the United Verde operations) due to the properties' proximity to historical smelter operations. This Study Area was approved by ADEQ as part of FMC's VRP application. Provision is made for adjustments in the Study Area if warranted based on the data collected under the ADEQ-approved Sampling and Analysis Plan (SAP) (GHD, 2015a). The process for evaluating the Study Area data to determine whether the Study Area needs to be expanded is outlined in Section 1.4 of the SAP.

The UVSP will give owners of eligible residential, non-residential (e.g., commercial, etc.), and public properties (e.g., schools, parks, etc.) within the Study Area the opportunity to have the soil on their properties tested for certain smelter-related metals (i.e., target constituents [TCs]) and, if necessary, remediated (i.e., soil removed and replaced, hereinafter referred to as "cleanup").

Soil sampling for the UVSP began in May 2016 and is expected to continue into 2017. Sampling is being performed in accordance with the SAP (GHD, 2015a) and the Quality Assurance Project Plan, United Verde Soil Program (QAPP) (GHD, 2015b), which were approved by ADEQ on October 23, 2015. The sampling is designed to determine representative concentrations of arsenic, copper, lead, tin, zinc and boron for properties in the Study Area for comparison to site-specific cleanup levels that have been established for the UVSP by ADEQ.

1.1 Soil Cleanup Objective

The objective of the UVSP cleanup activities is to excavate and replace soil within individual use or yard areas within a given property where soil concentrations of arsenic, copper, lead, tin, zinc or

boron exceed the cleanup levels approved by ADEQ to ensure that post-cleanup average metals concentrations no longer exceed the cleanup levels. The purpose of this RAWP is to provide the specific implementation details for achieving that objective. The cleanup levels for the UVSP are included in **Table 1.1**.

Table 1.1 Cleanup Levels

Target Constituent	Cleanup Level by Land Use (mg/kg)	
	Residential	Non-Residential
Arsenic (As)	30	30
Copper (Cu)	9,000	41,000
Lead (Pb)	425	800
Tin (Sn)	47,000	610,000
Zinc (Zn)	23,000	310,000
Boron (B)	16,000	200,000

2. Project Administration

The project administration activities for the cleanup program will include:

- Coordination among representatives of FMC, ADEQ, Construction Project Coordinator (CPC), Construction Contractors (CCs), and Town officials
- Technical oversight of project activities
- Administration of the CCs

2.1 Organization

The cleanup program organization will provide consistent management of the cleanup activities and integration with the ongoing sampling program. The key positions for this organization are:

- FMC Project Manager
- CPC
- CCs
- ADEQ

These key positions have been developed to ensure that the organization, objectives, functional activities, quality assurance/quality control (QA/QC) activities, and data reporting are managed and implemented in a manner that meets the requirements of this RAWP. Assignment of the CPC and CCs will be made by FMC with notification to ADEQ.

The FMC Project Manager will have responsibility for coordinating with ADEQ on the overall RAWP project activities. The CPC is responsible for coordinating with FMC, the CCs, the property owner, and ADEQ in the field. The CPC is responsible for ensuring that the CCs implement the cleanup

activities in accordance with this RAWP and the QAPP (GHD, 2015b). The CPC is also responsible for coordinating and documenting the cleanup activities.

2.2 Schedule

The cleanup of individual properties will be prioritized as described in Section 4.1. After the priority of the property is determined, cleanup activities will be scheduled to facilitate logistics and use of equipment. Properties will be scheduled for cleanup after access is received and, when possible, generally grouped into neighborhoods to enable the crews to perform required activities and reduce disruption to the neighborhood. The progress of the cleanup program will be documented in monthly progress reports to ADEQ issued by the FMC Project Manager or the CPC. Specific details regarding progress reporting are described in **Section 5.2**.

3. Cleanup Activities

In general, the UVSP soil cleanup activities will include:

- excavation of soils that have concentrations of arsenic, copper, lead, tin, zinc, or boron in excess of ADEQ approved cleanup levels;
- replacement of those excavated soils with clean backfill;
- replacement of landscaping with materials that, unless otherwise approved by the property owner, are comparable to the pre-existing conditions; and
- temporary and final management of the excavated soils.

Implementation details for the above activities are provided in this section. Properties identified as containing areas with soil exceeding the ADEQ cleanup levels that will not be remediated may include areas that present potentially significant safety or property damage concerns such as deteriorating retaining walls. If future activities/repairs are completed by the property owner to adequately address the concerns, FMC will consider soil remediation at that time.

3.1 Property-Specific Cleanup Activities

This section presents a description of cleanup construction activities to be performed at individual properties. Included in this section are the details for obtaining access, pre-excavation yard preparation, excavation activities, noise control, dust control, maintaining access for the property residents, decontamination procedures, backfill and revegetation procedures, and follow-up activities.

3.1.1 Property Access

Cleanup construction activities at a particular property cannot proceed until a property owner has signed an access agreement for cleanup. If the property is occupied by a tenant instead of the owner, the tenant may also be requested to sign the access agreement. However, FMC will consider moving forward without the tenant access agreement if so directed by the property owner.

The cleanup access agreement is separate and in addition to the soil sampling access agreement previously obtained through the UVSP.

Specific cleanup details will be developed on a property-by-property basis. Individual property cleanup work plans will be prepared for each property to identify the soil removal areas, excavation depth, and revegetation requirements. Cleanup work plans will be reviewed with the property owner and tenant, if applicable, during a pre-excavation property inspection. The inspection will be attended by the property owner (and/or tenant if he/she requests to be present and is available) and the CPC.

The cleanup work plan will document all pertinent details of the cleanup construction activities, including items to be relocated for access, excavation areas, specific areas or landscaping that the owner requests not to be excavated or removed, landscaping that will be removed and replaced, and plants that the owner requests to be replanted.

After the inspection, the property owner will be asked to acknowledge the details of the cleanup by signing the property cleanup work plan.

3.1.2 Town of Clarkdale Permits

Excavation activities located within the Town of Clarkdale municipal limits will meet the requirements of the *Town Code of the Town of Clarkdale, Arizona*, specifically Chapter 7 pertaining to grading and rights-of-way permits. For excavations greater than or equal to 50 cubic feet, a grading permit and rights-of-way permit, if necessary, will be obtained from the Town of Clarkdale by the CPC prior to commencing cleanup activities at a particular property.

3.1.3 Pre-Excavation Area Preparation

The CPC will notify the property owner and tenant of the intended start date at least seven calendar days prior to the start of construction at a particular property. Implementation may proceed at a given property with shorter notice if the property owner or tenant does not object.

Prior to beginning work on a particular property, the CC will mark the lateral excavation limits and set up construction tape or fencing to limit unauthorized access. Excavation will be performed in the accessible portions of the use areas designated for cleanup. Use areas eligible for remediation include grass-covered and bare areas; gardens and flowerbeds (unless the owner requests otherwise); and unpaved driveways and parking areas. Examples of use areas not eligible for remediation include those covered by grouted brick or pavement surfaces (such as concrete pads, patios, paths, and driveways) where permanent structures are present (such as houses, garages, and sheds), areas covered by large landscaping items (such as retaining walls, water features, etc.), and setbacks from structures, large landscaping items, and buried utilities. Appropriate precautions will also be taken to avoid contact with overhead power lines during soil remediation activities by observing proper work activity setbacks, which could also result in some portions of impacted use areas not being remediated.

In addition, the CPC will survey (via photographs and/or video) each property to establish pre-cleanup conditions. The condition of buildings and other fixtures will also be documented,

including the integrity of structures and foundations immediately adjacent to the target excavation areas.

Prior to initiation of cleanup construction activities, the CC will contact the local utility companies to locate the underground electrical, water, sewer, gas, cable, and telephone lines. The owner and tenant will also be asked to provide information on subsurface obstacles such as septic systems, abandoned water lines, and wells. The utility companies will mark the boundary position of the utilities on the ground following their normal convention. The CC will also locate the layout of utilities within the use areas to be excavated. In use areas requiring soil excavation, the CC will confirm locations of subsurface obstacles, including gas lines, by hand digging to trace the orientation of the obstacle and will mark it with spray paint.

The property owner or tenant will be required to relocate recreational vehicles, lawn furniture, spare lumber/building supplies, boats, vehicles, or other similar items to a location where they will not hinder the cleanup activities. Assistance will be provided if the property owner is not physically capable of performing these activities. The CPC will also request that the property owner or tenant remove and store inside their buildings all yard ornaments, personal possessions, and keepsakes requiring special care. The items to be relocated by the property owner will be noted on the cleanup work plan as well as any concerns or special requests that the property owner or tenant may have in removing surface obstacles or in otherwise preparing their property for cleanup activities.

If practicable, the CC will temporarily relocate woodpiles, walkway stepping-stones, and other miscellaneous small landscape articles on the property; large obstructions such as fences and gates may be removed, if necessary, by the CC to allow for equipment and work crew access. Removed landscape articles and obstructions will be stored on the property and will be replaced by the CC following completion of the cleanup activities.

3.1.4 Excavation Activities

Excavations may be required in a front use area, back use area, separate side use area, or combination thereof. Side use areas that are less than 15 feet wide, but greater than 5 feet wide, will have been sampled as part of either the front yard or back yard as described in the SAP (GHD, 2015a). In this case, the side use area will be excavated only if the front yard or back use area that it was a part of is excavated. In the event that a side use area is less than 5 feet wide (and therefore, not sampled) and accessible, it will be excavated if either the front or back yard requires cleanup. In this case, the entire accessible portion of the side use area will be excavated.

For purposes of the cleanup activities, a use area will be defined as extending to the edge of the adjoining street or alley; property line, or any drainage ditch/wash. Generally a curb or, in the absence of a curb, the edge of the pavement will define the edge of the alley or street.

If a use area is larger than 3,600 square feet, it will have already been subdivided into grids for the purpose of property sampling. In this case, the designated excavation area will be the grid area represented by the composite sample that has soil concentrations above the ADEQ approved cleanup levels for one or more TCs. For areas designated for excavation by discrete sample results, the horizontal limits of excavation will be defined by discrete sample locations with concentrations

less than the cleanup levels or by significant physical obstructions such as foundations, streets, or sidewalks.

The depth of excavation will be determined by sampling in multiple intervals as specified in the SAP and will generally extend to the top of the sample interval where the soil concentrations for arsenic, copper, lead, tin, zinc and boron are below the cleanup levels. Excavations will be performed to a maximum depth of two feet; however, an excavation may be terminated at a shallower depth if full removal is not practical (e.g., encountering bedrock). In such a case, the removal will extend to the deepest depth practicable and the excavation backfilled as described in Section 3.1.10.

The CC will remove soil using a variety of mechanized equipment and hand tools. The primary equipment used will consist of skid steer loaders (e.g., bobcats), small excavators, or other similar equipment. Soil will be removed to the specified depth, taking care to hand excavate next to buildings, sidewalks, fences, and other structures as necessary to achieve an objective of maximizing the extent of soil removal. The potential for damage to structures and utilities will be considered on a case-by-case basis in determining the extent of the excavation. Any nominal amounts of soil that may be left in place as a result of these considerations will not affect the achievement of the primary objective of the cleanup, which is to excavate and replace soils within a designated area of the property, to the extent necessary, to ensure that the post-cleanup average metals concentrations no longer exceed the cleanup levels.

The nominal setbacks that will be considered as guidance in weighing the considerations described above are as follows:

- Horizontal distance of twelve to eighteen inches from permanent structures (house, garage, outbuildings, etc.)
- Horizontal distance of six to twelve inches from other improvements (sidewalks, paved areas, etc.)
- Within the drip line of shrubs
- Within the root line of trees
- Horizontal distance of twenty-four inches from active underground utilities when mechanized equipment is used
- Horizontal distance of six inches from active underground utilities when hand tools are used
- Limit depth of removal to twelve inches within two feet from other permanent appurtenances or improvements (e.g., power poles, light poles)
- Horizontal distance of six to twelve inches around large stationary objects (e.g., sheds, animal shelters, inoperable automobiles)
- Appropriate distance from structures with basements so as not to impact basement walls (to be determined on a case-by-case basis)
- Horizontal distance of six inches from fences that are not removed for access
- Horizontal distance of six to twelve inches from the property line

In addition to a setback, soil excavation will be sloped at a 45 degree angle away from the edges of rock structures, retaining walls, weak concrete foundations, or other supporting structures to prevent loss of support and potential weakening of these features. Utility lines (including water, electric, sewer, gas, cable, and telephone) damaged by cleanup activities will be reinstalled to current building code requirements by the CC as soon as practicable after the damage occurs. Appropriate measures will be taken to provide for the property owner's needs while repair is being performed.

Soil excavation may not be conducted in or near areas with deteriorating or unstable retaining walls which present potentially significant safety or property damage concerns. FMC will consider returning to remediate the areas if the property owner addresses the safety concerns (i.e. repairs or stabilizes the wall).

Excavation by hand will be performed, as necessary, to mitigate damage to structures (e.g., houses, garages, sheds, paved driveways, and sidewalks) and vegetation (e.g., trees, hedges, and large shrubs). The CC will routinely inspect structures during excavation operations and will take reasonable and appropriate corrective action if damage occurs.

Excavation beyond the setback specified above for trees and shrubs will extend to the full designated depth for that area. Excavation within the setback of trees and shrubs will be limited to the removal of existing grass and the immediately underlying soils (three to six inches) to minimize potential damage to the root structure.

If required for access, fences may be removed, salvaged, and replaced upon completion of the backfilling by the CC. Damaged fences or fences that cannot be reinstalled following backfilling will be repaired or replaced with fencing that is equivalent to the existing fence.

The exteriors of structures and buildings will be inspected for evidence of deformation or changes in condition attributable to the cleanup activities based on a review of the pre-excavation photographs/video documentation. The CPC will contact the property owner when conditions are discovered that warrant such notifications.

The CC and CPC will jointly perform the field measurements specified in the QAPP (GHD, 2015b) to confirm that the required excavation extent and depth have been achieved. Once the CPC has verified that an excavation meets the project requirements, the area will be approved for backfilling.

3.1.5 Loading Excavated Materials

Loading of the material excavated from individual properties for transport to the Excavated Soil Staging Area (ESSA) (see **Figure 2**) will be performed in a manner that prevents spillage or spreading of the material. A protective temporary covering, such as polyethylene sheeting (6-mil Visqueen or equivalent) or a CPC-approved geotextile, will be used to protect clean areas situated between the hauling vehicle and the excavation area from cross-contamination due to spillage.

Spilled soil will be isolated by traffic cones as necessary and will be picked up immediately to minimize any subsequent tracking of materials or transport of materials beyond the work site or into local storm drains.

Loading of trucks will be performed to avoid contact with overhead electrical lines and other utilities. Dust control will be maintained during loading in accordance with the Fugitive Dust Control Plan (FDCP) presented in **Appendix A**.

After loading, trucks will be covered with an adequately secured tarp or other device and inspected for loose/spilled material within the loading zone. Loose materials accumulated on the sides, tires, wheels, or dump gates of the trucks will be removed and placed within the truck. Spilled soils in the vicinity of the loading area will be removed (using broom and shovel or other suitable means) and placed in the truck.

3.1.6 Noise Control

Normal working hours will begin no earlier than 7:00 a.m. and will generally extend no later than 7:00 p.m. All equipment shall be maintained in proper condition with exhaust controls to minimize noise levels, and proper driving habits will be enforced. Residents will be provided with the UVSP office telephone number to allow reporting of any noise complaints. If noise complaints are received, the CPC will assess the issue and, if deemed necessary, require the CC to modify equipment or operational procedures, to mitigate the noise.

3.1.7 Dust Control

Dust control requirements and personal monitoring procedures during cleanup activities are described in the FDCP presented in **Appendix A**. Water application will be used as necessary to reduce fugitive dust. Application rates will be regulated to control dust, yet not result in the generation of mud that could be transported from work areas on haul trucks or other mobile equipment or in the generation of runoff to adjacent properties, the adjacent roadway, or storm drains. Dust suppression equipment may consist of standard garden hoses and spray regulators, misters, or other equipment proposed by the CC and acceptable to the CPC.

3.1.8 Access for Property Residents

During construction activities, access to the home will be provided to the residents at all times. Appropriate measures will be taken to ensure that the resident will not have to walk through exposed soil prior to entering their home. Sidewalks will be brushed or washed after each workday to provide as clean an entryway as possible. If there is no sidewalk, a clean pathway will be provided by laying down plywood or other means to prevent exposure and tracking of soils. All residents (especially children) will be requested to stay away from the construction area, which will be demarked with construction tape or fencing. Handicap access and special needs will be addressed as needed.

3.1.9 Decontamination Procedures

Heavy equipment and tools used in the cleanup process will be decontaminated prior to leaving the work area. Decontamination will first involve a brush down of equipment in the work area to remove visible accumulations of materials from the body of the equipment and tires. Limited quantities of water may be used to remove residual visible soil following dry brushing; however, water use will be minimized. If washing is necessary, equipment will be washed while on the premises and the wash

water mixed with the last load of excavated soil prior to transportation to the ESSA. In all instances, the CC will work to minimize the migration of mud and water to the street. Visible accumulations of soil, dust, or debris that are attributable to construction activities found on streets, rights-of-way, and access routes will be cleaned at a minimum of once per day.

3.1.10 Backfill and Revegetation of Excavated Areas

After field measurements, collected in accordance with the QAPP (GHD, 2015b), confirm that the design excavation depths have been achieved, the CPC will approve excavated areas for backfilling with soil. Backfilling will follow excavation as soon as practicable in order to minimize the amount of time excavated areas are left open. In general, the excavated areas will be backfilled to pre-excavation grades. Minor modifications to the pre-excavation grades will be considered if necessary to improve drainage provided that the property owner concurs and such improvement can be accomplished without negatively affecting adjacent properties. In addition, all excavations over 50 cubic feet will require a grading permit approved by the Town of Clarkdale Community Development Department.

Backfill materials will be imported from off-site sources approved by the CPC and either staged in the Backfill Staging Area (BSA) prior to transport to a given property, or direct-hauled from the source to the property. The proposed location of the BSA is provided in **Figure 2**. Samples of the proposed backfill materials will be collected and analyzed to verify that they meet the project requirements identified in the QAPP (GHD, 2015b) before the material sources are approved. Following source approval, QA/QC samples will be collected and analyzed on an ongoing basis to confirm that the backfill materials continue to meet the project requirements. Details of the project QA/QC verification testing of the backfill materials and review by ADEQ are described in the QAPP (GHD, 2015b).

Where access allows, dump trucks with backfill soil will drive onto the excavation areas and deposit loads while driving slowly to spread the soil. Where access is limited, the trucks will dump loads at an adjacent temporary stockpile from which the CC can transport the material. Written access will be obtained from the owner of any adjoining private property to be used for equipment or material staging during cleanup activities. If the use of the adjoining property entails only access, verbal permission may be obtained.

Some handwork using wheel barrows and shovels may be necessary to backfill areas with difficult access. The backfill soil will be graded and shaped to the approximate original conditions. Compaction of the backfill material will generally be performed by tracking of construction equipment to prevent settlement. Material placed in driveways or alleyways will be compacted using a plate compactor, roller, hand tamping, or other suitable means.

The upper surface of the backfilled area will be refinished with restoration materials that are comparable to the pre-existing conditions (i.e., sod, hydroseed-native grasses, landscape gravel, gravel parking areas, or gravel driveways, etc.). If sod installation or hydroseed application is required, the vegetated area will be watered by the CC as necessary during the first 60 days after installation to facilitate establishment of the vegetation. Property owners/tenants will be provided with instructions for care of the sod and/or hydroseed after the 60 day period. Excavated gravel

driveways, parking areas, and other areas subject to vehicular traffic will be replaced with compacted clean soil and a minimum of four inches of clean gravel top surfacing.

Landscaping that is removed or destroyed as part of the cleanup activities will be replaced with comparable landscaping, if so requested by the owner. Landscaping includes, but is not limited to, trees, sod, native grasses and wildflowers, shrubs, and plantings. As an alternative, in order to reduce water usage, FMC is willing to consider installation of desert landscaping in soil replacement areas if the property owner so desires. Replaced landscaping will be replanted if it does not survive within 60 days, provided that the property owner follows practices recommended by the plant supplier. Plants that have been designated by the owner as requiring replanting will be replanted; however, FMC cannot guarantee the survivability of replanted plants. The CC will also water replaced or replanted landscaping within the first 60 days.

Finally, all materials such as fences that were moved by the CC to allow construction activities will be restored to their original location and any incidental damage to buried sprinkler systems, sidewalks, etc., will be repaired by the CC at that time.

3.1.11 Follow-Up Activities

Follow-up activities will be conducted by the CPC and the CC after cleanup construction activities are complete at a given property to verify that the work has been performed appropriately.

3.1.11.1 Photo Documentation

Photographs and/or video will be used to document post-construction conditions of properties, streets, and sidewalks. Photographs and videos will be taken by the CPC as soon as practicable after completion of landscaping.

3.1.11.2 Repair Work

Cleanup activities will be conducted to minimize damage to permanent features. Any damaged features, such as walkways or utilities, will be repaired or replaced upon discovery and determination that the damage was caused by the cleanup construction activities. Structures such as buildings, sidewalks, and fences that are damaged during property cleanup will be repaired. If doubt exists as to whether damage was caused by the cleanup construction process, video and photographic documentation taken prior to construction will be reviewed on a case-by-case basis. The decision to repair disputed damage will be made by the FMC Project Manager.

3.1.11.3 Property Inspection

Once construction is completed and any necessary repairs are made, the CPC will inspect the property with the property owner and the CC. At this inspection, the property cleanup form will be finalized and the property owner and CPC will sign off that the work performed is consistent with the signed property cleanup work plan. If the property owner fails to attend or declines to sign the property cleanup form, the CPC will inspect the property. If the property has been cleaned up in a manner that is consistent with the pre-construction inspection, the CPC will sign the property cleanup form and it will be included in the residential property completion report.

3.1.11.4 Reporting

Once cleanup activities are complete at a specific property, a Property Cleanup Completion Report (PCCR) will be prepared and submitted to the property owner. The PCCR will document the location of the excavated areas and the depth of the excavations.

3.2 Excavated Soil Staging Area

The ESSA is located approximately one mile east of Clarkdale just outside the Town of Clarkdale limits on FMC property as shown on **Figure 1**. Excavated soils will be transported to the ESSA where they will be temporarily stockpiled and characterized prior to final management as further described in Section 3.3.

Activities at the ESSA are summarized below:

- Excavated soil will be stockpiled, sampled, and managed separately within the ESSA
- Stockpiling will be done on a weekly basis. The soil stockpiles will be sampled and analyzed at a laboratory to determine whether the soils are suitable for final management on FMC property (i.e., on site)
- Treatment of the materials if necessary to allow for final on-site management
- Sampling and analysis to verify the success of any required treatment

Weekly excavated soil stockpiles will be sampled and analyzed separately using the Toxicity Characteristic Leaching Procedure (TCLP) to confirm that the concentrations of lead and arsenic are below the threshold concentrations for identifying a material as a Resource Conservation Recovery Act (RCRA) characteristic waste. The separated weekly samples will also be analyzed using the Synthetic Precipitation Leaching Procedure (SPLP) to determine whether the excavated soils can be classified as “inert material” (i.e., do not have the potential to generate leachate with metals concentrations in excess of Arizona Drinking Water Standards). Details for the TCLP and SPLP testing procedures are provided in the QAPP (GHD, 2015b). Any other testing that may be required by the final excavated soil management options will also be performed within the ESSA.

FMC may, at its own discretion, elect to treat the weekly excavated stockpile as described in Excavated Soil Staging Area Operations Plan (**Appendix B**) if there is a history of untreated weekly excavated stockpiles exceeding the TCLP and/or SPLP threshold concentrations. A weekly excavated stockpile will not be placed permanently in the Soil Repository without confirming that the concentrations are below the threshold concentrations for TCLP and SPLP.

Operational and closure details for the ESSA are presented in **Appendix B**.

3.3 Final Excavated Soil Management

The Soil Repository will be located just south of the ESSA, as indicated in **Figure 2**. Only soils that pass TCLP and SPLP analysis will be placed in the Soil Repository. Operational and closure details for the Soil Repository are presented in **Appendix C** and the Storm Water Management Plan is addressed in **Appendix D**.

3.4 Soil Transportation

Excavated materials will be transported to the ESSA from the cleanup properties where the materials will be temporarily stockpiled and managed prior to final long-term management. Backfill materials will be hauled to the excavated properties either directly from the borrow source or the BSA.

Haul trucks will follow a direct route using major roadways and avoid neighborhood streets to the extent practicable when traveling between the BSA and cleanup properties. The haul routes for each property will be predetermined by the CC and/or the CPC. All truck drivers will be instructed as to the preferred routes between the property, backfill source, and ESSA prior to initiating hauling activities.

The loads of all haul trucks, whether hauling excavated materials or backfill, will be covered with a secured tarp or other device. Any materials spilled during transport will be cleaned up and removed as soon as practicable.

Hauling operations will be performed pursuant to an approved traffic control plan approved by the Town of Clarkdale, and will be conducted in such a manner as to minimize interference with local traffic on city streets to the extent practicable. Flag persons and signage will be used as necessary for public safety. At a minimum, warning signs such as "Construction Area" or "Workers Ahead" will be placed on the streets where cleanup is being performed and haul trucks are being loaded. "Trucks Entering" or "Trucks Turning" signs will be used at primary and secondary street intersections as necessary. Any other signage required by local or state regulations, laws, or ordinances will also be used to provide for public safety.

Haul trucks and drivers for delivery of material to the ESSA will be required to comply with all applicable federal, state, and local regulations. Drivers will be licensed to operate the equipment under their control and will be subject to safety record checks. The material excavated from the cleanup properties that is hauled to the ESSA will not be considered to be hazardous waste pursuant to the applicable regulations of RCRA because it remains within the area of concern; therefore, transporters of this material will not require licensing as hazardous waste transporters.

Haul trucks will pass all required safety, emission, and noise inspections. Trucks will be inspected by the CC for leaks of fluids and fuel and will be checked for potential fire hazards associated with loading equipment and haul trucks. Loaded trucks will not exceed applicable weight restrictions, and the selected transport routes will be checked for weight-restricted bridges or other load limits prior to initiating transport.

All truck drivers will be instructed that they must comply with all posted speed limits and other traffic controls on public roads and that failure to comply will be a basis for removal from the project.

Prior to any materials being transported, truck drivers will be briefed by the CC regarding the loading, inspection, and documentation requirements and any additional safety procedures specified in the CC's Health and Safety Plan (HASP). All haul trucks will contain guidelines regarding emergency procedures and motor vehicle accident report forms. Completed accident report forms will be submitted to FMC’s Safety Personnel and the FMC Project Manager.

4. Construction Management Considerations

This section describes the overall construction management considerations associated with implementing the cleanup, including specific sequences and inter-relationships of activities, logistical requirements of various aspects of the work, and health and safety considerations.

4.1 Scheduling of Cleanup Properties

Prioritizing the cleanup of properties will be based on a three-tiered approach, generally consistent with the United States Environmental Protection Agency (EPA) Superfund Lead-Contaminated Residential Sites Handbook, OSWER 9285.7-50 (EPA, 2003). The application of these guidelines for the soil cleanup activities takes into account the cleanup levels developed for the Study Area.

Tier I properties are residential properties with yard soil lead concentrations greater than 1,200 milligrams per kilogram (mg/kg) and a sensitive population: either a child less than seven years of age or a pregnant woman residing or frequently at the property (i.e., at the property for four or more days a week). Tier II properties are residential properties with yard soil lead concentrations between the remediation level for lead (425 mg/kg) and 1,200 mg/kg and a sensitive population, or lead soil concentrations above 1,200 mg/kg and no sensitive population. Tier III properties are residential properties with yard soil concentrations between 425 mg/kg and 1,200 mg/kg and no sensitive population.

Relevant information on the residents will be solicited during the cleanup access agreement process. This information will be combined with the results of the sampling to assign a Tier status to each property where cleanup is required. In general, properties will be scheduled for cleanup on a neighborhood-by-neighborhood basis considering the higher priority of Tier I and Tier II properties. Non-residential properties will have lower priority than residential and recreational properties.

4.2 Construction Quality Assurance/Quality Control

Construction QA/QC testing and inspection procedures will be implemented to ensure proper construction and compliance with the cleanup construction plans and specifications. Details of the construction QA/QC programs are provided in the QAPP (GHD, 2015b).

4.3 Health and Safety

The CC will prepare a construction HASP that is protective of workers, the public, and the environment. During all construction activities, the CC will have a designated Health and Safety Coordinator on site. The Contractor's Health and Safety Coordinator (CHSC) will have authority over all CC personnel to enforce the HASP requirements.

5. Reporting

This section provides a summary of reporting procedures. Submittals to ADEQ will include one hard copy original and one electronic version of all reports.

5.1 Cleanup Reporting

PCCRs will be prepared for each property where cleanup was performed. The PCCRs for properties that have been cleaned up will be forwarded to the property owner.

5.2 Data Reporting

Within two weeks of commencement of the soil remediation activities, monthly reports will be submitted to ADEQ. The monthly report will include base project statistics including the compiled results of Weekly Documentation.

5.2.1 Weekly Documentation

The following documentation will be collected weekly.

- The week ending
- Total number of parcels in the Study Area
- Total number of parcels sampled and will include subdivisions such as:
  - Sampled and no exceedances
  - Sampled and contains exceedances
  - Not sampled
- Percentage of parcels with completed sampling
- Total number of parcels to be sampled
- Total number of parcels with one or more use area impacted
- Percentage of parcels with one or more use area impacted
- Total number of parcels with no use area impacted
- Total number of parcels with remediation in progress or complete
- Percentage of total estimated parcels where remediation is in progress or complete
- Soil remediation statistics including the volume of soil generated, stockpiled, moved, staged, sampled, treated, and completed including TCLP and SPLP analytical results and expected number of impacted parcels to date

5.2.2 Monthly Reporting

The Monthly Progress Report will describe the significant developments during the preceding period, including actions performed and problems encountered, the activities anticipated over the next month, schedule of anticipated actions, and anticipated problems and planned resolution of

past or anticipated problems. Figures identifying the current status (i.e., sampled, remediation pending, remediation complete, etc.) of properties within the Study Area will be included with the Monthly Progress Report. In addition, the Monthly Progress Report will include the soil sampling analytical results for parcels sampled during the month.

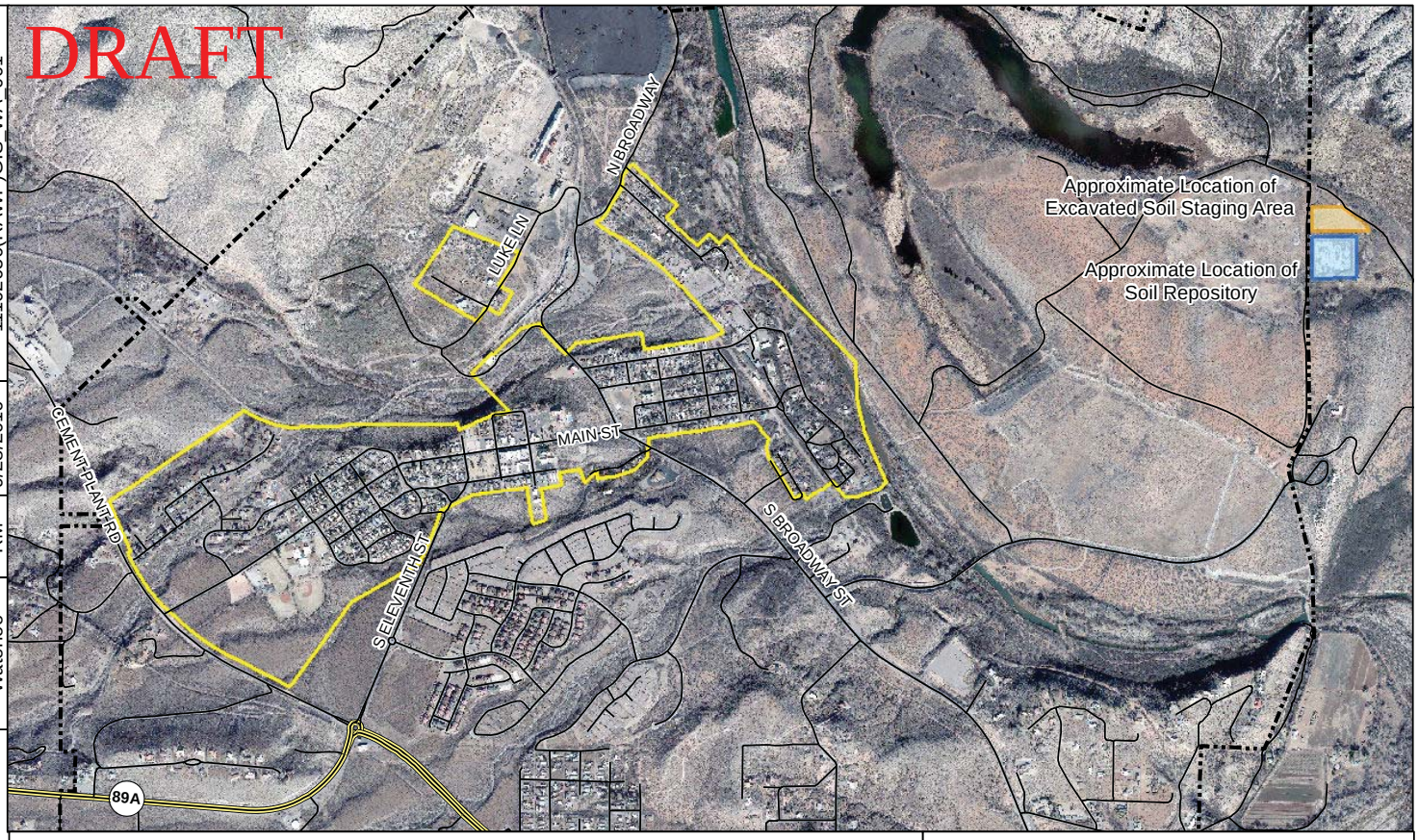
5.3 Final Report

After completion of all work, a final report summarizing the actions taken (soil sampling and cleanup activities) will be submitted to ADEQ.

6. References

- International Society of Arboriculture. 2001. Avoiding Tree Damage During Construction
- Arizona Department of Environmental Quality, 2009 Arizona Administrative Code, Title 18. Environmental Quality, Chapter 7, Department of Environmental Quality Remedial Action, January
- GHD, 2015a, Sampling and Analysis Plan, United Verde Soil Program, Clarkdale, Arizona, October
- GHD, 2015b. Quality Assurance Project Plan, United Verde Soil Program, Clarkdale, Arizona, July
- Town of Clarkdale, Town Code of the Town of Clarkdale, Arizona, Chapter 7: Building.
- United States Environmental Protection Agency (EPA). 2003. *Superfund Lead-Contaminated Residential Sites Handbook.* (OSWER Directive 9285.7-50)

Figures



File Name:	Revised By		Office
11102656(RAWP)GIS_WA_001	9/28/2016	RM	Waterloo

Legend

- Highway
- Road
- Study Area
- Town of Clarkdale Limits
- Excavated Soil Staging Area
- Soil Repository

United Verde Soil Program

Figure 1

STUDY AREA LOCATION

REMEDIAL ACTION WORK PLAN

CLARKDALE, ARIZONA

Office	Revised By		File Name:
Waterloo	RM	9/28/2016	11102656(RAWP)GIS_WA_002

Legend

- Highway
- Road
- Town of Clarkdale Limits
- Excavated Soil Staging Area
- Soil Repository

United Verde
Soil Program

Figure 2

ESSA AND SOIL REPOSITORY LOCATIONS

REMEDIAL ACTION WORK PLAN

CLARKDALE, ARIZONA

Appendix A
Fugitive Dust Control Plan

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List of Acronyms

CC	Construction Contractor
CPC	Construction Project Coordinator
ESSA	Excavated Soil Staging Area
FMC	Freeport Minerals Corporation
OSHA	Occupational Safety and Health Administration
RAWP	Remedial Action Work Plan
UVSP	United Verde Soil Program

1. Introduction

This document presents the Fugitive Dust Control Plan for the soil cleanup activities associated with the United Verde Soil Program (UVSP) in Clarkdale, Arizona. This plan establishes the procedures to be implemented in order to control potential worksite contaminants from impacting public and worker safety. This plan supports and is an appendix to the Remedial Action Work Plan (RAWP).

During the course of cleanup activities, the operation of earth moving equipment and vehicles in work areas may cause the generation of dust, particularly in dry and windy weather conditions. Dust control measures will be implemented as a routine measure during the work activities to protect nearby residents and workers from unacceptable levels of dust and lead particulate. Upon visual observations of dust by the Construction Project Coordinator (CPC), the CPC's designee, or the Construction Contractor (CC), additional dust control measures will be immediately implemented.

The effectiveness of dust control measures will also be confirmed by using personal worker monitors. The monitors directly measure total dust and metals, which can be compared to appropriate 8-hour time-weighted average Occupational Safety and Health Administration (OSHA) occupational exposure limits. Dust control measures may include wetting of soil, slowing work activities, and other designated methods specified in the RAWP.

2. Dust Control Measures

This section outlines the dust control practices that will be followed during project activities. Controls will be implemented to minimize fugitive dust generation from excavation activities. Visual observations will be used to evaluate the effectiveness of the controls.

Dust control measures will be a high priority for project personnel. Dust control will be achieved primarily by watering down work areas and vehicle traffic routes. According to *Section 7-11-12 Part Q of the Town Code of the Town of Clarkdale*, either a dust palliative or reclaimed water shall be used for the alleviation or prevention of dust. Use of fresh water for dust control is prohibited.

The water source for dust suppression will be from Peck's Lake located on Freeport Minerals Corporation (FMC) property or from the Town of Clarkdale reclaimed water source. Each water source will need to be sampled and analyzed for UVSP target constituents per the Quality Assurance Project Plan (GHD, 2015) prior to use. Watering at properties undergoing soil excavation and at soil stockpiles and haul roads within the Excavated Soil Staging Area (ESSA) and Soil Repository will be provided on an as-needed basis, as follows:

- During soil excavation activities (by heavy equipment and by hand crews),
- During stockpiling and/or loading of soils for transport,
- During soil backfill activities, and
- Wetting down truck loads to control visible emissions during transport (truck loads will also be covered when traveling public roads).

Additional dust control measures will be aggressively implemented under windy conditions (measured wind speed greater than 10 miles per hour), whenever dust plumes are observed leaving an active soil excavation or the ESSA, or as needed based on real-time soil particulate measurements. Dust-generating activities will be stopped when sustained wind speeds exceed 25 miles per hour.

Dust control actions will primarily include application of water sprays to restrict dust generation in vehicle traffic routes (via water truck spray bars) and work areas (via hose/spray system fed from a portable water tank). Soil stockpiles at the ESSA may be covered during non-work hours or will be moistened using the side-bar sprayer on a water truck or hose/spray system fed from a water truck. In instances where application of water spray is not sufficient to prevent generation of visible dust, other dust control measures that may be used are as follows:

- Increased frequency of water spray applications,
- Regulation of vehicle speed,
- Placement of additional clean gravel as a ground cover in high dust generation areas,
- Application of surfactant, or
- Other appropriate measures.

Care will be taken to avoid application of excessive amounts of water that may cause unacceptable working conditions or increase the possibility of surface water run-off. If additional dust control measures do not eliminate visible dust or result in action levels being met, construction activities will be temporarily suspended until additional dust control measures have been implemented, or until adverse weather conditions abate. Dust control alternatives may be re-evaluated on an as-needed basis.

3. References

- GHD, 2015. Quality Assurance Project Plan, United Verde Soil Program, Clarkdale, Arizona, July
- Town of Clarkdale, Town Code of the Town of Clarkdale, Arizona, Chapter 7: Building.

Appendix B
Excavated Soil Staging Area Operations Plan

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Figure B-1 ESSA and Soil Repository Locations

List of Acronyms

ADEQ	Arizona Department of Environmental Quality
CaO	Quicklime
CC	Construction Contractor
CL	Cleanup level
ESSA	Excavated Soil Staging Area
FDCP	Fugitive Dust Control Plan
FMC	Freeport Minerals Corporation
HDPE	High Density Polyethylene
mg/L	milligram per liter
Na_2S	sodium sulfide
QAPP	Quality Assurance Project Plan
RAWP	Remedial Action Work Plan
SPLP	Synthetic Precipitation Leaching Procedure
TCLP	Toxicity Characteristic Leaching Procedure
UVSP	United Verde Soil Program

1. Introduction

This document presents the Excavated Soil Staging Area (ESSA) Operations Plan for the cleanup activities associated with the United Verde Soil Program (UVSP) in Clarkdale, Arizona. The ESSA will be located approximately one mile east of Clarkdale on Freeport Minerals Corporation (FMC) property as shown on **Figure B-1**.

This plan establishes the procedures to be implemented and documented to manage the receiving, placement, characterization, movement, and, if necessary, treatment of excavated soil and various debris (i.e., concrete, vegetation, etc.) within the ESSA. These materials will be generated as a result of property soil remediation activities that will be conducted as part of the Soil Program within the Study Area over the next year(s). This ESSA Operations Plan supports and is an appendix to the Remedial Action Work Plan (RAWP).

2. Site Work

The objective of the ESSA Operations Plan is to identify and describe the various features of the ESSA, along with a description of the procedures required for handling materials within the ESSA.

2.1 Preparing the ESSA

Prior to beginning operations within the ESSA, erosion control measures will be established consistent with Soil Repository Operation Plan as shown in Appendix C of the RAWP.

2.1.1 Clearing, Grubbing and Grading

Some clearing, grubbing, and/or grading will be conducted prior to initiating construction and/or staging activities within the ESSA. Clearing will consist of cutting brush to ground level. Grubbing will consist of the removal of stumps, vegetation, and roots three inches in diameter or larger from below ground level. Grading will consist of leveling and compacting soils to establish haul roads and to provide level working surfaces for earthmoving equipment. All materials to be cleared and grubbed within the ESSA will be transported off site to a permitted disposal facility.

2.1.2 Erosion Control

The objective of erosion control is to effectively implement erosion and storm water management controls to minimize erosion of disturbed areas and the areal impact of any potential soil spills. Essential components of the erosion and sediment control methods will be installed and will be fully functional before commencement of any soil disturbance activities. Erosion control measures will be implemented within the ESSA for the duration of the Soil Program cleanup activities. Appendix C of the RAWP provides additional details related to erosion control requirements.

2.1.3 Dust Control

Water sprinklers or water trucks will be used to control dust during site activities as needed. The various soil stockpiles will be moistened as necessary to control the generation of fugitive dust during material handling, placement, and storage. **Appendix A** of the RAWP provides additional details related to the dust control plan for this program.

2.1.4 Security

The ESSA will have a perimeter fence with a lockable entrance gate. The entrance gate is to remain locked after operating hours and during periods of inactivity to prevent unauthorized access. The ESSA will be manned by project personnel during working hours. No casual visitors or unauthorized personnel will be permitted to enter the ESSA without prior approval.

2.2 ESSA Operations

The ESSA will be used for receiving and managing materials excavated from individual properties as part of the Soil Program cleanup activities. Primary features of the ESSA will include the Weekly Soil Accumulation Area, Soil Treatment Area, Soil Consolidation Area, and a Debris Storage Area. General activities within each of these areas are described below. The erosion and storm water management controls described in Section 2.1.2 apply to each of these four areas.

2.2.1 Movement of Material within the ESSA

Entrance/exit ways into and out of the ESSA will be prepared and maintained using six inches of suitable aggregate placed on top of a geotextile fabric in order to reduce transport of mud by motor vehicles onto public rights-of-way. Access ways will extend from the public access road to at least the exit point of the equipment decontamination pad.

2.2.2 Initial Material Segregation and Soil Characterization

Excavated soil and debris (concrete, vegetation, etc.) initially delivered to the ESSA will be managed separately. Management of debris will occur within the Debris Storage Area. Once a sufficient volume of debris is generated, this material will be transported to and disposed of at a nearby solid waste landfill.

Excavated soil from within the Study Area delivered to the Weekly Soil Accumulation Area will be placed separately as individual stockpiles for each week. Each stockpile will accumulate soil generated over the course of one week (i.e., Tuesday through the following Monday). Stockpiles will be sampled separately for subsequent Toxicity Characteristic Leaching Procedure (TCLP) and Synthetic Precipitation Leaching Procedure (SPLP) analysis at an Arizona Department of Environmental Quality (ADEQ) -certified laboratory. Additional soil brought into this area will be staged in separate stockpiles for each week, ensuring that no stockpile accumulates soil for more than one week.

TCLP and SPLP sampling and analysis of the soil stockpiles in the Weekly Soil Accumulation Area will be conducted as follows:

- For stockpiles of less than 500 cubic yards, a five-point grab sample will be collected from the stockpile; a nine-point grab sample will be collected for stockpiles of greater than 500 cubic yards
- The grab samples will be composited to create one representative sample (composite sample) for the soil stockpile. Grab samples will be spaced equidistant to one another
- The grab samples will be collected using a decontaminated shovel or trowel and placed into a mixing container where they will be homogenized (mixed with a decontaminated spoon or trowel), placed into an appropriately labeled sample container, packaged, and shipped (using Chain of Custody procedures outlined in the Quality Assurance Project Plan [QAPP]) to the laboratory for analysis
- Composite soil samples will undergo TCLP and SPLP analysis for lead and arsenic. The analyses will follow the procedures presented in the QAPP (GHD, 2015)
- Laboratory results will be obtained within seven days of sampling each weekly soil stockpile

2.2.3 Soil Management, Treatment and Storage

Depending on the results of TCLP and/or SPLP analysis for a stockpile within the Weekly Soil Accumulation Area, the entire weekly stockpile will be removed to the Soil Consolidation Area, Soil Repository, or the Soil Treatment Area. The location of the Soil Repository is shown on **Figure B-1**.

If TCLP and SPLP results for a given stockpile are below regulatory levels (both lead and arsenic have TCLP regulatory thresholds of 5 milligrams per liter [mg/L]), the entire weekly stockpile will be moved to the Soil Consolidation Area within the ESSA or directly transported outside the ESSA for disposal into the Soil Repository. FMC understands that management of excavated soil within the ESSA will be on a temporary basis, and soil may only be managed at this location for a maximum of one year from the time the soil was first placed in the ESSA until the soils can be placed into the Soil Repository.

If TCLP and/or SPLP results for a given stockpile exceed regulatory levels, the entire weekly stockpile will be moved to the soil treatment pad at the Soil Treatment Area where the soils will be stabilized.

Soil Stabilization Process

The Soil Treatment Area will include a working pad surrounded by a berm to prevent storm water run-on/run-off. The working pad will be constructed by compacting the sub-grade soil, which will be overlain with a 30-mil High-Density Polyethylene (HDPE) liner extending to the top of the surrounding storm water diversion berms. The HDPE liner will then be overlain with 18 inches of compacted soil. Stabilization will occur in batches (weekly soil stockpiles will be stabilized and subsequently sampled and analyzed individually). Soil will be stabilized with quicklime (CaO) and sodium sulfide (Na_2S), or other suitable reagents, to chemically bind the metals and reduce the potential for leaching of metals. The reagents will be applied directly to the soil stockpiles by

spreading the material evenly over the surface area of the stockpile and mixing with the bucket of an excavator. The excavator or other construction equipment will knead the reagent into the soil stockpile working from the toe of the soil stockpile to the top until the reagent is mixed equally throughout the pile.

The reagent and soil will be thoroughly mixed within a backhoe bucket, pug mill, disc, or other suitable means.

After stabilization, each stockpile will be re-sampled for TCLP and/or SPLP analysis according to Section 2.2.2. Stabilized soil that continues to exceed the regulatory criteria will be re-stabilized and re-tested until the material does not exceed the criteria. Stabilized soils that do not exceed the regulatory criteria will either be moved to the Soil Consolidation Area or the Soil Repository.

2.2.4 Equipment Decontamination

An equipment decontamination pad will be constructed and all visible soil and other materials will be removed from vehicles and equipment prior to exiting the ESSA onto public roads. Decontamination shall first involve a brush down of equipment in a designated decontamination area to remove visible accumulations of soil from machinery, tires, and shovels, etc. Use of water shall be avoided whenever possible, and shall only be used if visible amounts of soil are evident after dry brushing. In these cases, equipment shall be washed on the equipment decontamination pad to minimize the migration of mud and water to the streets. Material removed during equipment decontamination shall be contained and placed on the stockpile of soil being generated at that time within the Weekly Soil Accumulation Area. In addition, the bed of haul trucks used to transport excavated materials from the cleanup properties shall be decontaminated prior to use of the same haul truck for transport of backfill materials.

2.2.5 ESSA Decommissioning

The ESSA will be decommissioned once the remediation activities within the Study Area are completed and all excavated soils have been sampled and moved from the ESSA. Details associated with the decommissioning of the ESSA are outlined below.

2.2.5.1 Sampling

Each of the working areas of the ESSA (Debris Storage Area, Weekly Accumulation Area, Consolidation Area, and Soil Treatment Area) will be divided into 5,000 square foot grids and sampled for arsenic, copper, lead, tin, zinc and boron. Each grid will be sampled by collecting nine equally-spaced grab samples from within the grid. The samples will be collected from 0 to 6 inches below ground surface. The grab samples will be collected using a decontaminated shovel or trowel and placed into a mixing container where they will be homogenized (mixed with a decontaminated spoon or trowel), placed into an appropriately labeled sample container, packaged, and shipped (using Chain of Custody procedures outlined in the QAPP) to the laboratory for analysis. The grab locations within a grid will be composited to create one representative sample (composite sample) for the soils. Composite samples will be analyzed for arsenic, copper, lead, tin, zinc and boron. The analyses will follow the procedures presented in the QAPP (GHD, 2015). If laboratory analytical results for a given grid are below the site-specific cleanup levels (CLs) for commercial

land use, the soils within the grid will be eligible to remain in place or be used as restoration material (e.g., soil associated with storm water diversion berms).

If laboratory analytical results for a given grid are greater than the site-specific CLs for commercial land use, the soil within the grid will be targeted for excavation, stockpiling, and TCLP and SPLP analysis as outlined in Section 2.2.3. The next deeper soil interval in that grid (i.e. 6 to 12 inches below ground surface) will be sampled as outlined in this section. This process will be repeated until the soil analytical results within the grid have analytical results below the site-specific CLs for commercial land use.

If the TCLP and SPLP analysis does not exceed regulatory levels, the material will be moved to the Soil Repository. If the material exceeds the regulatory levels, the soils will be stabilized and analyzed as outlined in Section 2.2.3 of this Appendix. When the stabilized soil TCLP and/or SPLP analytical results no longer exceed the regulatory criteria, the soils will be moved to the Soil Repository.

2.2.5.2 Removal

Composite grids with laboratory analytical results exceeding the site-specific CLs for commercial land use will be excavated and managed as outlined above. The Soil Treatment Area will be the last portion of the ESSA to be removed. The HDPE liner will be removed and disposed at an ADEQ-approved off-site landfill.

Earthen materials such as crushed rock and soils will be included with the materials placed at the Soil Repository. Non-earthen materials such as liners, timbers, silt fence, and straw waddle will be disposed at an off-site solid waste landfill. The Construction Contractor (CC) will remove all temporary facilities (office trailers, tool trailers, etc.) from the ESSA.

2.2.5.3 Restoration

Restoration of the ESSA will include backfilling composite soil grids that were excavated, grading the site to ensure positive drainage, and vegetating the surface with native grasses. The CC will install storm water erosion controls (diversion berms, ditches, silt fence, and/or hay bales) to prevent erosion. The CC will remove all remaining tools and equipment from the ESSA upon completion of the restoration.

2.2.6 Material Tracking

The tracking of material testing for TCLP and SPLP analysis and stabilization will be performed by assigning unique numbers and dates to material stockpiles.

2.3 Storm Water Management

A Storm Water Management Plan for the ESSA is provided in Appendix C of the RAWP. The plan will describe the engineering and operational controls that will be used throughout the duration of the Soil Program cleanup activities for management of storm water. Procedures are also described for inspection and maintenance of the storm water controls.

2.4 Dust Control

Dust control practices shall be followed at the ESSA during periods of material handling and placement. The Fugitive Dust Control Plan (FDCP) included in Appendix A of the RAWP presents the detailed procedures for dust control.

2.5 Reporting

Reports documenting the soil moving activities will be prepared and submitted to ADEQ on a monthly basis. Reports will include at a minimum:

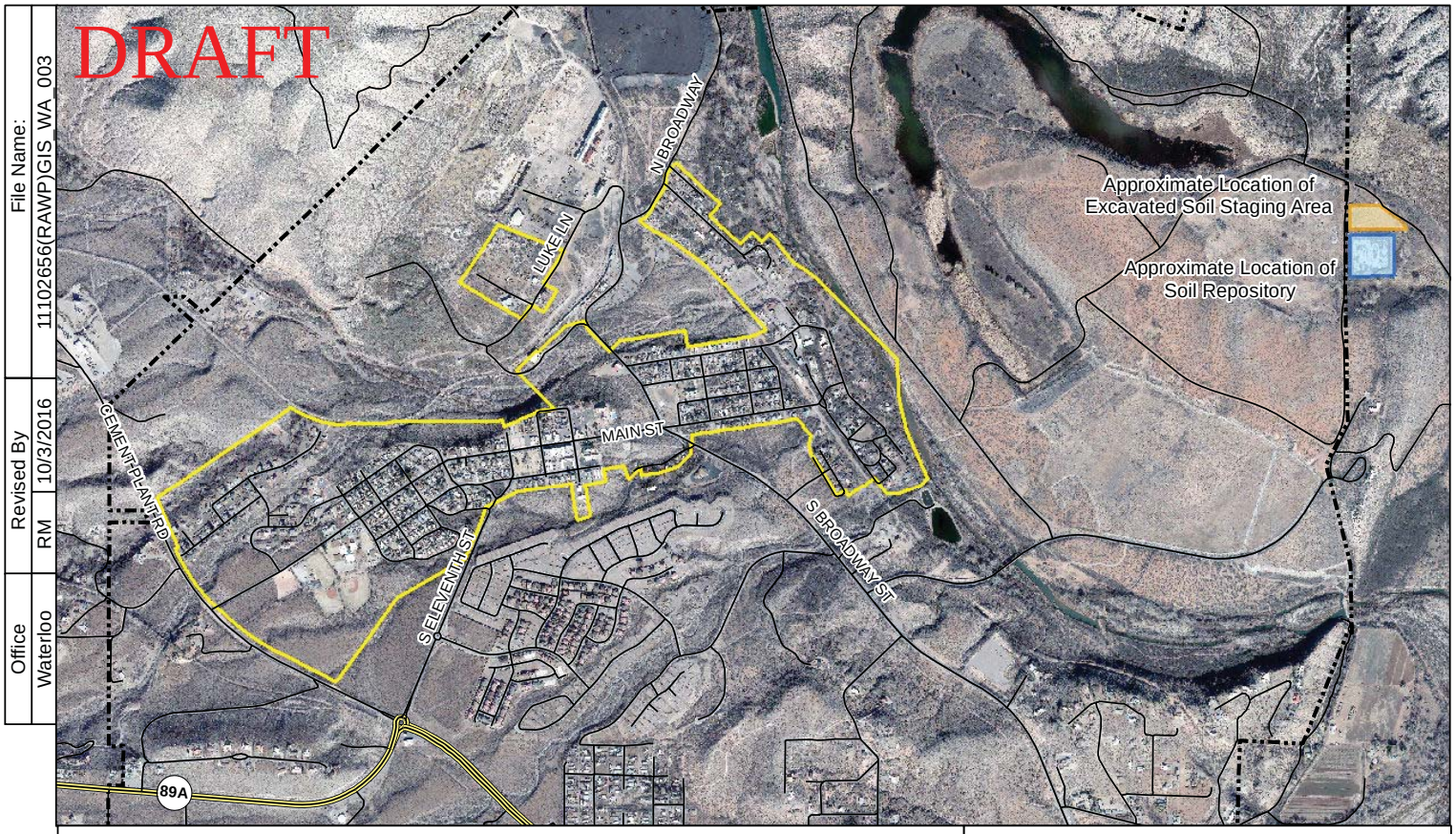
- Records of material tracking for the ESSA,
- Records of TCLP and SPLP results, and
- Inspection records.

3. References

GHD, 2015. Quality Assurance Project Plan, United Verde Soil Program, Clarkdale, Arizona, July

Figure B-1
ESSA and Soil Repository Locations

Draft



Legend

- Highway
- Road
- Study Area
- Town of Clarkdale Limits
- Excavated Soil Staging Area
- Soil Repository

United Verde Soil Program

Figure B-1

ESSA AND SOIL REPOSITORY LOCATIONS

REMEDIAL ACTION WORK PLAN

CLARKDALE, ARIZONA

Appendix C
Soil Repository Operations Plan

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Figure C-1 ESSA and Soil Repository Locations

List of Acronyms

ADEQ	Arizona Department of Environmental Quality
ESSA	Excavated Soil Staging Area
DEUR	Declaration of Environmental Use Restriction
FMC	Freeport Minerals Corporation
RAWP	Remedial Action Work Plan
SPLP	Synthetic Precipitation Leaching Procedure
TCLP	Toxicity Characteristic Leaching Procedure
UVSP	United Verde Soil Program

1. Introduction

This document presents the Soil Repository Operations Plan for the cleanup activities associated with the United Verde Soil Program (UVSP) in Clarkdale, Arizona. The Soil Repository will be located approximately one mile east of Clarkdale on Freeport Minerals Corporation (FMC) property as shown on **Figure C-1**.

This plan establishes the procedures to be implemented and documented to manage the movement and placement of soil from the Excavated Soil Staging Area (ESSA) to the Soil Repository. The soils to be placed in the Soil Repository will be from soil remediation activities planned to be conducted as part of the Soil Program within the Study Area. This Soil Repository Operations Plan supports and is an appendix to the Remedial Action Work Plan (RAWP).

2. Site Work

The objective of the Soil Repository Operations Plan is to identify and describe the various features of the Soil Repository, along with a description of the procedures required for handling materials within the Soil Repository.

2.1 Preparing the Soil Repository

Prior to beginning operations within the Soil Repository, erosion control measures will be established consistent with Storm Water Management Plan as discussed in Appendix D of the RAWP.

2.1.1 Clearing, Grubbing and Grading

Clearing, grubbing, and/or grading is not anticipated to be conducted prior to initiating construction activities within the Soil Repository as an existing lined pond previously constructed by FMC will be utilized as the Soil Repository.

If required, clearing will consist of cutting brush to ground level; grubbing will consist of the removal of stumps, vegetation, and roots three inches in diameter or larger from below ground level. Grading will consist of leveling and compacting soils to establish haul roads and to provide level working surfaces for earthmoving equipment. All materials cleared and grubbed within the Soil Repository will be transported off site to an authorized disposal facility.

2.1.2 Erosion Control

The objective of erosion control is to effectively implement erosion and storm water management controls to minimize erosion of disturbed areas. Essential components of the erosion and sediment control methods will be installed and will be fully functional before commencement of any soil disturbance activities. Erosion control measures will be implemented within the Soil Repository for the duration of the construction activities. A Storm Water Management Plan for the Soil Repository

is provided in Appendix D of this RAWP provides additional details related to erosion control requirements.

2.1.3 Dust Control

Water sprinklers or water trucks will be used to control dust during site activities as needed. The soils delivered from the ESSA into the Soil Repository will be moistened as necessary to control the generation of fugitive dust during material handling and placement. The Fugitive Dust Control Plan included in Appendix A of this RAWP presents the detailed procedures for dust control for this program.

2.1.4 Security

The Soil Repository lies within an area owned by FMC and has a perimeter fence with a lockable entrance gate. The entrance gate will remain locked after operating hours and during periods of inactivity to prevent unauthorized access. The Soil Repository will be manned by project personnel during working hours. No casual visitors or unauthorized personnel will be permitted to enter the Soil Repository without prior approval.

2.2 Soil Repository Operations

The Soil Repository will serve as the final resting place for soils currently originating from the ESSA (Weekly Accumulation Area, Consolidation Area and Soil Treatment Area) which have been tested and laboratory results indicate Toxicity Characteristic Leaching Procedure (TCLP) and Synthetic Precipitation Leaching Procedure (SPLP) results below regulatory levels. Soil testing is described in Appendix B of this RAWP. The erosion and storm water management controls described in **Section 2.1.2** applies to this area.

2.2.1 Movement of Material within the Soil Repository

Entrance/exit ways into and out of the Soil Repository will be prepared and maintained using six inches of suitable aggregate placed on top of a geotextile fabric in order to reduce transport of mud by motor vehicles. Access ways will extend from the public access road to at least the exit point of the equipment decontamination pad.

2.2.2 Soil Placement

Soils from the ESSA with TCLP and SPLP results below regulatory levels will be moved to the Soil Repository by dump truck. The soils will be delivered to the Soil Repository, dumped and then spread with a bulldozer. The soil will be installed in one foot lifts and will be compacted by construction equipment such as a bulldozer. The soil will be graded to ensure positive drainage.

2.2.3 Equipment Decontamination

An equipment decontamination pad will be constructed and all visible soil will be removed from vehicles and equipment prior to exiting the Soil Repository. Decontamination will first involve a brush down of equipment in the designated decontamination area to remove visible accumulations

of soil from machinery, tires, and shovels, etc. Use of water will be avoided whenever possible, and will only be used if visible amounts of soil are evident after dry brushing. In these cases, equipment will be washed on the equipment decontamination pad to minimize the migration of mud and water. Material removed during equipment decontamination will be contained and placed in the Soil Repository.

2.2.4 Restoration

Restoration of the Soil Repository will include installation of a two-foot thick soil cap capable of supporting vegetation. The cap will be graded to ensure positive drainage, and a final topographic survey of the capped surface will be collected. Then the capped surface will be hydroseeded with native grasses or covered with oversize rock. The construction contractor will install storm water erosion controls (diversion berms, ditches, silt fence, and/or hay bales) to prevent erosion and will remove all remaining tools and equipment from the Soil Repository upon completion of the restoration.

2.3 Storm Water Management

A Storm Water Management Plan for the Soil Repository is provided in Appendix D of the RAWP. The plan will describe the engineering and operational controls that will be used throughout the duration of the soil placement activities for management of storm water. Procedures are also described for inspection and maintenance of the storm water controls.

2.4 Dust Control

Dust control practices shall be followed at the Soil Repository during periods of material handling and placement. The Fugitive Dust Control Plan included in Appendix A of the RAWP presents the detailed procedures for dust control.

2.5 Reporting

Information related to the construction activities will be prepared and submitted with the final report as outlined in Section 5.3 of the RAWP. The information will include at a minimum:

- Records of the soil volume placed material tracking for the ESSA
- Initial and final topographic survey information
- Construction inspection records

2.6 Long-Term Operation and Maintenance

For a period of ten years after restoration of the Soil Repository, it will be inspected annually by an individual with experience in evaluating capping systems, and, when appropriate, slope stability. The purpose of the inspection will be to determine whether the soil cap is functioning as intended. The inspector will identify the need for any repairs, changes in site use, or other significant information related to the soil cap that may have occurred in the previous 12 months. Examples of such conditions include cracks in the soil cap or sloped areas, soil movement, rivulets, erosions

resulting from run-on and run-off, poor vegetation and presence of animal burrows. An inspection checklist will be generated prior to performing the first annual inspection. Upon completion of the inspection, the checklist will be reviewed and signed by the inspector. The inspection report will also include photographs to document the findings during the inspection.

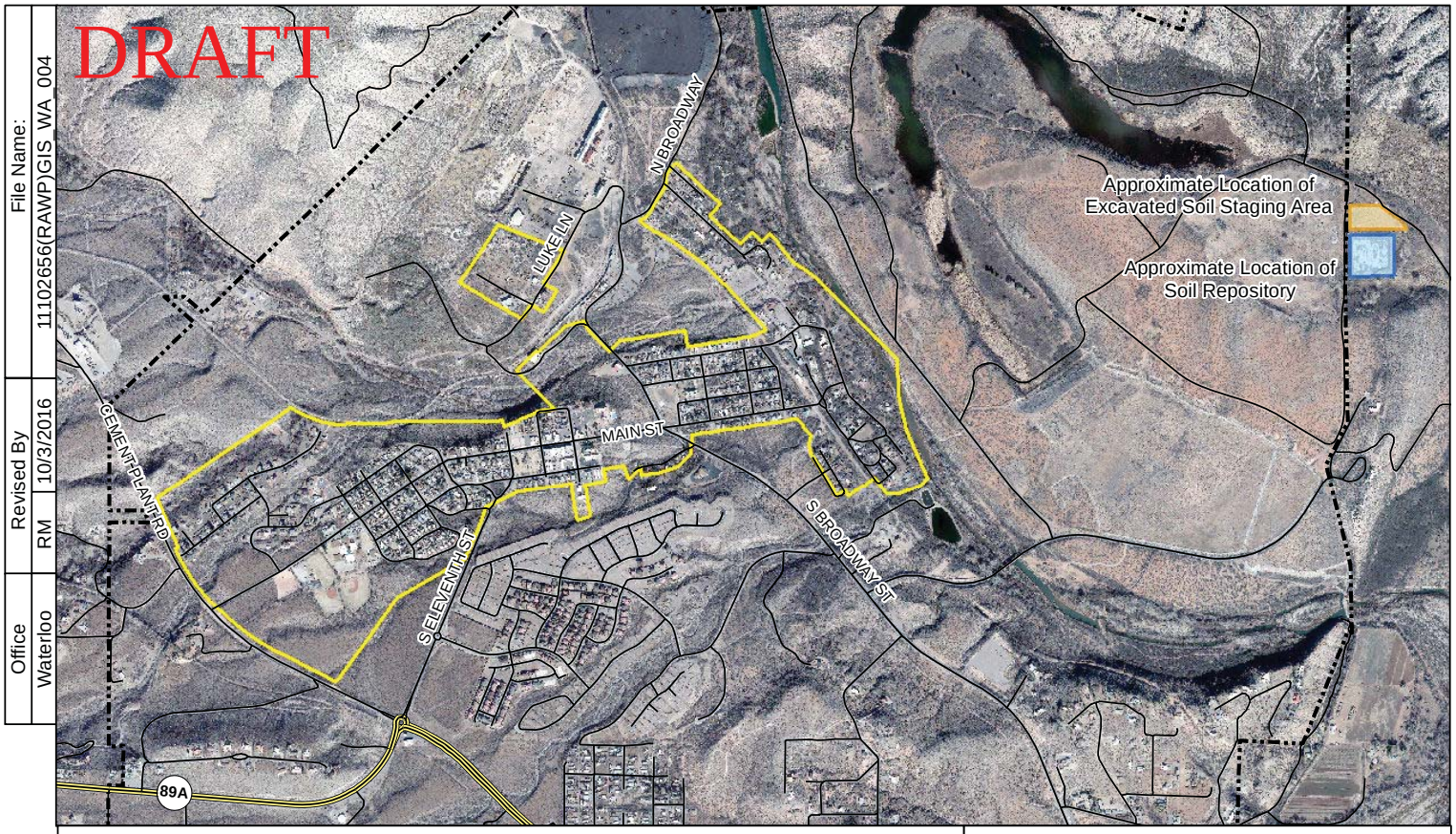
The Annual Inspection Summary Report will be submitted to Arizona Department of Environmental Quality (ADEQ) within 60 days after completion of the annual inspection. In addition to the inspection, the letter report will include the following:

- Copy of the signed annual inspection checklist
- Summary of the findings from the annual inspection
- Description of actions taken since completion of the previous annual inspection, including:
  - Any repairs to the installed cap that were identified and carried out
  - Any other significant information that may relate to the installed engineering control or impact their function
  - Description of recommendations for inspection modifications
  - Recommendations concerning any repairs to the installed cap
  - Photographs depicting site conditions with brief identifying captions or descriptions, and
  - Conclusions regarding the ongoing effectiveness of the cap system.

In addition, similar inspections will be conducted during or immediately following unplanned events, such as fires, floods and/or heavy rain, seismic events, etc. where the soil cap may be compromised and underlying soils may be exposed. For the purposes of the inspection, a "heavy" rain event requiring immediate follow-up is defined as a rainfall event exceeding 4 inches in any 24 hour period. The inspector will document all inspections and required repairs or maintenance, and incorporate such documents into the Annual Inspection Summary Report.

At the completion of the UVSP, a declaration of environmental use restriction (DEUR) will be added to the property where the soil repository will be located.

Figure C-1
ESSA and Soil Repository Locations



Legend

- Highway
- Road
- Study Area
- Town of Clarkdale Limits
- Excavated Soil Staging Area
- Soil Repository

United Verde Soil Program

Figure C-1

ESSA AND SOIL REPOSITORY LOCATIONS

REMEDIAL ACTION WORK PLAN

CLARKDALE, ARIZONA

Appendix D
Storm Water Management Plan for the Excavated Soil Staging Area and Soil Repository

Table of Contents

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3. Best Management Practices and Erosion Control 1
   3.1 Evaluation of Excavated Soil Staging Area and Soil Repository 1
   3.2 Erosion Control Measures 2
4. Inspection and Maintenance 3
5. Monitoring Program Review and Modification 3
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Figure Index

Figure D-1 Excavated Soil Staging Area Storm Water Management Plan Details

Attachment Index

Attachment 1 Storm Water Best Management Practices (BMPs) Inspection Form

List of Acronyms

ADEQ	Arizona Department of Environmental Quality
BMP	Best Management Practice
BSA	Backfill Staging Area
CGP	Construction General Permit
CPC	Construction Project Coordinator
ESSA	Excavated Soil Staging Area
QAPP	Quality Assurance Project Plan
RAWP	Remedial Action Work Plan
SWMP	Storm Water Management Plan

1. Introduction

This Storm Water Management Plan (SWMP) describes the basis, procedures, and documentation to be used for storm water management at the Excavated Soil Staging Area (ESSA) during soil remediation activities in Clarkdale, Arizona. This SWMP supports and is an appendix to the Remedial Action Work Plan (RAWP).

2. Regulatory Basis

This SWMP is prepared in accordance with the requirements of the Arizona Department of Environmental Quality (ADEQ), Water Quality Division, Arizona Pollutant Discharge Elimination System General Permit for Discharge from Construction Activities to Waters of the United States, also known as the Construction General Permit (CGP), Permit Number AZG2008-001.

This SWMP is consistent with all applicable federal, state, county, and local requirements for soil and erosion control and storm water management. This SWMP was prepared in accordance with accepted engineering, hydrologic, and pollution control practices. Changes or additions may be required to address changes in conditions at the overall project site.

3. Best Management Practices and Erosion Control

3.1 Evaluation of Excavated Soil Staging Area and Soil Repository

Storm water will be managed at the ESSA, Backfill Staging Area (BSA), and Soil Repository to minimize transport of suspended sediment from work areas by implementing Best Management Practices (BMPs) and engineering controls consistent with the substantive requirements of applicable national pollutant discharge elimination system permits for storm water described above. Planned physical engineering controls will include:

- Installing surface water diversion berms around the soil stockpiles and work areas to prevent storm water run-on and to direct run-off to a natural low spot for detention. At a minimum, a silt fence shall be installed along the full down-gradient perimeter of disturbed areas.
- Installing silt fences and hay bales to filter sediment from storm water run-off
- Placing hay bales and/or rock check dams at the surface water discharge point(s) to reduce storm water flow velocities and further filter residual sediment in run-off and minimize erosion
- Constructing an equipment decontamination pad to remove soil from vehicles and equipment before they leave the soil disposal and staging areas
- Defining work areas to reduce the area of disturbance. In addition, the following operational BMPs will be implemented:
    - Good housekeeping practices including removal of any soil spilled on the adjacent roads

- Decontamination of soil handling equipment and trucks working within the excavated soils stockpile area
- Control of traffic patterns within the soil disposal and staging areas
- Minimization of site activities during rainy conditions

3.2 Erosion Control Measures

The objective of erosion control is to effectively implement erosion and storm water management controls, along with a phased construction sequence to minimize erosion of disturbed areas and minimize the impact of any potential spills. The specific types of erosion control devices to be installed will include silt fence, temporary diversion dike/berm, erosion control matting, revegetation, and rock riprap. The truck entrance, staging areas, and haul road will be installed and stabilized as needed. One or more types of erosion and sediment control devices will be employed at the ESSA, BSA, and Soil Repository. Essential components of the erosion and sediment control methods will be fully functional before commencement of any soil disturbance activities. Erosion control measures will be implemented for the duration of the voluntary soil cleanup operations in the ESSA, BSA, and Soil Repository. **Figure D-1** provides typical installation details for erosion control measures.

Erosion control measures that will be implemented at the ESSA, BSA, and Soil Repository are briefly described below.

Silt Fence

A silt fence consists of a geosynthetic fabric material, suspended between wooden or metal support posts properly anchored in the ground. To intercept run-off occurring as overland flow, the silt fence may be installed in the down-slope/downstream side of soil excavation areas, temporary soil stockpile areas, the truck haul routes, and roadside ditch areas. The silt fence will be installed parallel to area contours and perpendicular to the direction of incoming flow. The lower edge of the fabric will be buried at least 4 inches below ground surface (bgs) to prevent undercutting. The ends of the fence will be curved uphill to the extent necessary to prevent flow around the end of the fence.

Erosion Control Matting

Temporary erosion control matting will be used as a means of preventing erosion of the exposed areas between the time when they are seeded and when vegetative growth becomes established. The temporary erosion control mat/blanket may consist of either natural or synthetic materials, North American Green C125BN or equivalent material, and will be employed for covering all exposed areas of soil. The erosion control mat/ blanket will need to be able to handle a maximum flow velocity of 9 feet per second. Surface preparation and installation of the erosion control mat/blanket will follow the product manufacturer's instructions.

Rock Riprap

In areas of high velocity water flow, riprap sized for the appropriate water velocity will be used to prevent erosion. A geotextile layer will be laid down on top of the slope or channel, with six inches of appropriately sized rock riprap placed by hand or with mechanical equipment to further protect the surface.

4. Inspection and Maintenance

Maintenance and inspection procedures will be performed to ensure effective implementation and maintenance of BMPs. All engineering control features will be inspected by the Construction Project Coordinator (CPC) once per month and as soon as practicable following a rainfall of ¾ of an inch in 24 hours at the nearest rainfall monitoring station. An example inspection form is provided in **Attachment 1**. To the extent practicable, defects or deficiencies will be promptly corrected within 72 hours. Inspections and any follow-up actions will be documented and provided to ADEQ on a periodic basis.

- Silt fences will be inspected for depth of sediment, for tears, to confirm that the fabric is securely attached to the fence posts, and to confirm that the fence posts are securely imbedded in the ground.
- Hay bales will be inspected for accumulation of sediment, for absence of gaps between the bales, to confirm the bales are firmly staked in the ground, and to determine the condition/integrity of individual bales.
- Interceptor dikes will be inspected to confirm their structural integrity.
- Stabilized entrance/exit ways will be inspected to confirm presence/maintenance of sufficient aggregate and possible exposure of underlying geotextile.
- The equipment decontamination pad will be inspected to confirm the structural integrity and the proper operation of the collection sump.
- The established monitoring point(s) will be inspected to determine if there is any presence/evidence of sediment run-off from the active work area.

5. Monitoring Program Review and Modification

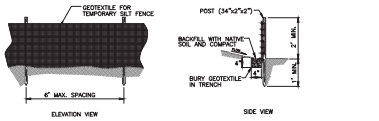
It is expected that storm water discharge from the ESSA, BSA, and Soil Repository will be infrequent; however, if such discharge occurs, the receiving stream will be sampled up-gradient and down-gradient of the discharge location. Sampling will occur at a minimum frequency of once every six months that discharge occurs and samples will be analyzed for pH, total suspended solids, and total arsenic, cadmium, and lead.

Procedures for sample handling and analysis methods are specified in the Quality Assurance Project Plan, United Verde Soil Program (QAPP) (GHD, 2015).

6. References

GHD, 2015b. Quality Assurance Project Plan, United Verde Soil Program, Clarkdale, Arizona, July

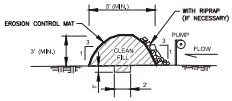
Figure D-1
Excavated Soil Staging Area Stormwater Management Plan Details



DETAIL A

SILT FENCE INSTALLATION

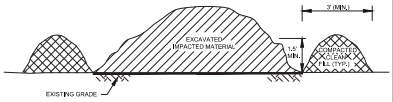
NOT TO SCALE



DETAIL C

TEMPORARY EARTHEN DIKE/BERM WITH EROSION MAT

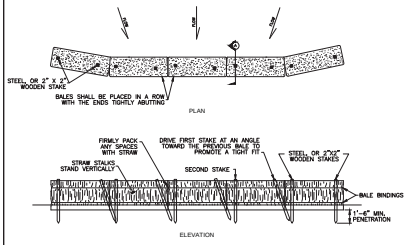
NOT TO SCALE



DETAIL E

TYPICAL SECTION OF TEMPORARY DIVERSION BERM ENCLOSING SOIL STOCKPILE

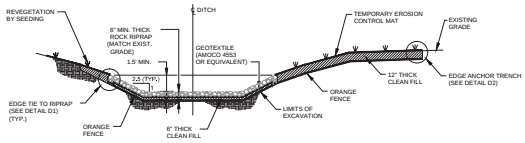
NOT TO SCALE



DETAIL B

STRAW HAY BALE INSTALLATION

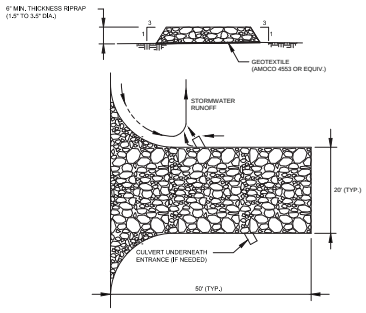
NOT TO SCALE



DETAIL D

TYPICAL CROSS-SECTION OF DRAINAGE DITCH

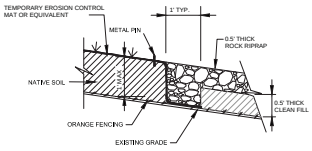
NOT TO SCALE



DETAIL F

STABILIZATION OF CONSTRUCTION ENTRANCE

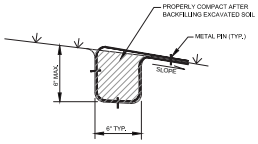
NOT TO SCALE



DETAIL D1

EDGE SECURE AND TIE TO RIPRAP (OR SOIL/ROCK MIXTURE)

NOT TO SCALE



DETAIL D2

ANCHOR TRENCH

NOT TO SCALE

NOTES:

1. EROSION CONTROL MEASURES TO BE INSTALLED PER SPECIFICATIONS.

figure D-1

ESSA AND SOIL REPOSITORY STORMWATER MANAGEMENT PLAN DETAILS
VOLUNTARY REMEDIATION PROGRAM
UNITED VERDE SOIL PROGRAM
Clarkdale, Arizona

11102656-00(RAWP)GN-WA001 AUG 11, 2016

Draft

Attachment 1
Storm Water Best Management Practices (BMPs) Inspection Form

Storm Water BMPs Inspection Form

Inspector Name: _____

Type of Inspection*: _____

Rainfall Amount (previous 24- hours): _____

Summary of Corrective Actions	
Actions	**Date Completed**

Summary of Corrective Actions	
Actions	**Date Completed**

Inspector Signature: _____

*Monthly or after significant rainfall event.

Date: _____

Draft