

## 1.0 INTRODUCTION AND REGULATORY REVIEW

Augusta Resource Corporation (Augusta) proposes to mine and process ores from the Rosemont Copper Project (Project) located 30 miles southeast of Tucson, Arizona. Figure 1 shows the general location of the Project site. Overall, the Project will entail an open pit mine with ore processing consisting of both milling and copper leaching. Conventional heap leach technology will be used at the site along with a “dry stack” tailings storage method associated with the milling process. Details of the mine operation are provided in the Rosemont Project Mine Plan of Operations (July 2007).

The proposed Project facilities will be constrained to Barrel Canyon located upgradient of Davidson Canyon in the Cienega Creek basin. Figure 2 provides a delineation of the watershed basins in the Project area with an overlay of the ultimate facility footprints. The Santa Rita Mountains are also indicated on Figure 2 as well as property lines and the location of Highway 83 . Highway 83 connects with Interstate I-10 to the north and with Sonoita, Arizona to the south.

As a component of Augusta’s overall environmental stewardship vision for the Rosemont Copper Project, this Reclamation and Closure Plan (Plan) has been designed to meet regulatory requirements through a unique concurrent reclamation and closure approach. This approach also provides a template for operational measures that will be employed during the life of the facility.

This Plan developed for the Rosemont Project includes the following sections:

- Section 1.0 – Introduction and Regulatory Review
- Section 2.0 – General Facility Arrangements
- Section 3.0 – Rosemont Reclamation and Closure Concepts
- Section 4.0 – Rosemont Post-Closure Land Uses
- Section 5.0 – Concurrent Reclamation
- Section 6.0 – Other Principal Reclamation Areas
- Section 7.0 – Operating Considerations
- Section 8.0 – Surface Water Hydrology
- Section 9.0 – Groundwater Protection
- Section 10.0 – Sediment and Dust Control
- Section 11.0 – Revegetation Planning and Soil Surveys
- Section 12.0 – Summary of Reclamation and Closure Criteria
- Section 13.0 – Reclamation and Closure Costs
- Section 14.0 – References

An overview of the major facilities associated with the Project, both during operations and post-closure, are provided in Section 2.0. Section 3.0 provides a discussion of the general concepts and philosophy that are the cornerstones of this reclamation and closure plan. Post-mining land use goals and legacies are summarized in Section 4.0. Final reclaimed facility surfaces

considered both ranching and wildlife habitat in their design. Recreational use was considered for the broader area.

One of the major initiatives of the Plan will be to facilitate concurrent reclamation of the outer shell of the waste rock and dry stack tailings areas (Section 5.0). This approach utilizes the development of waste rock buttresses along the eastern and southern sides of the waste rock storage area to lessen the visual impact of the mining operation from points along Highway 83 and other surrounding areas. Waste rock buttresses are also planned for the outer shell of the “dry stack” tailings storage areas. The overall approach to mining, processing, and sequencing of material placed within the footprint of the ultimate waste rock and tailings storage areas, termed the Rosemont Ridge landform, is also addressed in Section 5.0. The other principal reclamation areas are presented in Section 6.0. Protection of the environment via management practices during operations is addressed in Section 7.0.

Closure and reclamation requirements will be guided by the protection of surface water and groundwater resources. Although these measures are addressed in other report volumes associated with the Mine Plan of Operations (June 2007), they are summarized herein to provide a complete picture of the overall environmental protection envisioned for the site. Section 8.0 summarizes the general surface water hydrology plan and Section 9.0 the groundwater protection plan. Sediment and dust control are described in Section 10.0.

To facilitate reclamation at the site, revegetation test work is currently being performed by the University of Arizona, School of Natural Resources. Section 11.0 describes this testing program as well as providing a summary of an area soil survey performed in 2007.

Section 12.0 summarizes the overall reclamation/closure elements and design criteria proposed for the Project. As previously stated, Augusta will, to the extent practicable, employ concurrent reclamation of the facilities. Therefore, reclamation costs will be expended as the operation progresses. Estimated reclamation costs are provided in Section 13.0. Reclamation costs were estimated not only for the ultimate scenario, i.e., after year 19, but for incremental years should operations be discontinued before the proposed ultimate facility configuration is reached. This incremental estimate is required per Forest Service bonding requirements.

In addition to the requirements set forth by Augusta, the major elements of this Plan are dictated by regulatory requirements contained in the Arizona Mined Land Reclamation Act, the U.S. Department of Agriculture Forest Service Plan of Operations regulations, and the Arizona Aquifer Protection Program. Although other regulatory requirements may contribute to other mitigation elements, these three regulatory programs form the framework for the Plan. A short summary of the reclamation and closure requirements from these three regulatory programs is provided for contextual reference.

## **1.1 Arizona Mined Land Reclamation Requirements**

The Arizona Mined Land Reclamation Act (AMLRA) was designed to provide a mechanism to require the reclamation of mined land in Arizona. The State Mine Inspector’s Office approves plans and sets requirements; the primary function is to leave a mining operation in a safe and stable condition that is appropriate for a specified post-mining land use (PMLU).

PMLUs are determined based on the opportunities afforded for future use of the land while still ensuring public safety. These land use determinations are based in part on the type, density, and diversity of vegetation that is appropriate and technically and economically practicable given the site specific characteristics.

In addition to the PMLU, the reclamation plan must include topographic information of the site including regrading of disturbed areas, surface water routing and impoundments, and information on structures left at the site. The Arizona Revised Statutes (A.R.S.) §27-971(B)(9) requires the following information:

9. *The proposed reclamation measures that are necessary to achieve the post-mining land use including information concerning:*
  - (a) *The measures that will be taken to restrict public access to pits, adits, shafts and other surface features that may be a hazard to public safety.*
  - (b) *The measures that will be taken to address erosion control and stability.*
  - (c) *The measures that will be taken to address revegetation, conservation and the care and monitoring of revegetated areas as provided in this chapter.*
  - (d) *For surface disturbances where the proposed post-mining land use objective is designated as grazing, fish or wildlife habitat, forestry or recreation, the type of wildlife or fish habitat to be encouraged, including measures that will be taken to encourage that type of wildlife or fish habitat, and that those measures will not be incompatible with the fish or wildlife habitat on adjacent lands.*

The AMLRA requires that annual reports be filed to address the on-going reclamation activities that are performed at the site and which also illustrate disturbed areas.

The AMLRA is designed to work with federal reclamation and bonding programs to eliminate duplicative inspection, bonding, enforcement, and planning requirements. If plans administered by a federal agency are consistent with the requirements in the AMLRA, the federal requirements and bonding supersede the AMLRA.

### **1.1.1 Arizona Mined Land Reclamation Act Standards**

There are several standards set forth in the AMLRA for reclamation. These standards are itemized below:

**Public safety standards.** Reclamation activities must be designed to reduce hazards to public safety by removing the hazard or restricting public access.

**Erosion Control and Topographic Contouring.** The reclamation activities shall result in stable conditions for erosion and seismic activity. Grading should be conducted to establish stable, suitable landforms for the PMLU. Permanent piles of mining materials should not restrict surface drainages or contribute to excessive erosion.

**Roads.** Road reclamation should begin once the road is no longer necessary. Traffic should be controlled on the reclamation area; appropriate drainage should be established; bridges and culverts shall be removed or protected; and roadbeds shall be ripped, plowed, scarified, and reseeded as necessary to achieve the PMLU.

**Revegetation.** The plan must describe the revegetation planned as well as the techniques, methods, controls, or measures to be used. Surfaces must be prepared to produce a suitable root zone in preparation for planting which should be completed during favorable times of the year. Plant species must be chosen to support the PMLU.

**Soil Conservation.** Soil conservation is required and all stockpiles shall be marked and stabilized. Land should be treated to eliminate excess compaction and to reduce the potential

for slippage of placed soil. If off-site soil is used, it must be suitable for the vegetation and provide a stable growing surface.

### **1.1.2 Financial Assurance**

Financial assurance is required in a sufficient amount for the implementation and execution of the reclamation plan. This must include earthmoving activities; revegetation; demolition; maintenance; equipment mobilization and demobilization; contractor profit and administrative overhead.

There are several mechanisms for financial assurance in the rules including bonds, blanket financial assurances, certificates of deposit, trust funds, letters of credit, insurances, certificates of self-insurance, cash deposits, and annuities. Incremental financial assurance based on the proposed surface disturbance is allowable.

## **1.2 Forest Service Requirements**

The Forest Service requirements are not as clear-cut as in the AMLRA. The Code of Federal Regulations (CFR) states in 36 CFR 228.4 that the plan of operations include provisions for reclamation. This inclusion is found specifically in the statement:

*“The plan of operations shall include.....measures to be taken to meet the requirements for environmental protection in Sec. 228.8.”*

Section 228.8 addresses specific resources and facilities like roads and includes a general section on reclamation in (g) of that section. Forest Service regulations contain no specific requirement for reclamation plans. However, there is a requirement for reclamation bonds. This is found in 36 CFR 228.13(a):

*“Any operator required to file a plan of operations shall, when required by the authorized officer, furnish a bond conditioned upon compliance with 228.8(g), prior to approval of such plan of operations.”*

The requirement for a bond under the plan of operations, one that is conditioned upon compliance with measures for reclamation, make a reclamation plan necessary in order to determine the required bond.

The Forest Service bond requirements differ from the AMLRA requirements in one significant respect. AMLRA bonds address surface disturbance and focus on making a site safe and stable. Forest Service bonds address the reclamation of the facility and include surface disturbances as well as the treatment of on-site materials, including water management issues. As such, the Forest Service bonds are targeted to an amount necessary to cover the peak costs associated with an operation.

The Forest Service also allows incremental bonding that can be based on any period that can be clearly understood in the reclamation planning process from one year up through the entire mine life. This requires planning that gives a full appreciation of how the operation will progress and encourages concurrent reclamation. These steps in turn lay the groundwork for incremental bonding and phased bond release.

Initial bonding estimates are generally based on conceptual design narratives, drawings, and maps. As more detailed designs, or “as built,” information becomes available, bonds are recalculated to either confirm original estimates or to update bonding requirements.

### **1.2.1 Forest Service Reclamation Standards**

As stated, the Forest Service does not have specific technical requirements related to reclamation plans. However, there are a number of standards used in the bond estimate to insure that the reclamation objectives and requirements provided in the plan of operations have been achieved. These reclamation objectives and requirements, and any other requirements developed during the National Environmental Policy Act (NEPA) analysis, are often based on planning documents for the forest or for other state and federal permits. This requires that reclamation plans and bonding receive input from interested parties before implementation.

Additional standards can be developed during the bond estimation process and are typically developed to address the mechanics of performing the reclamation work. As such, these standards do not create any additional impacts that need to be investigated under the NEPA process. Once the standards and the bond estimates are included in an approved plan of operations, they become legally binding.

Typically, the following issues are addressed in the reclamation and bonding packages:

**Interim Operations and Maintenance.** The plan must include any operations and maintenance needed to ensure the integrity of the project facilities and systems whose failure could potentially endanger human health and the environment in the unlikely event that there is no operator, and the Forest Service is responsible for the site.

**Hazmat.** Isolation, removal, treatment, or control of hazardous or toxic materials.

**Demolition.** Removal/disposal of non-contaminated facilities, equipment, and materials.

**Facility Design.** All engineered facilities that will be left, or constructed for reclamation/closure will have design standards such as covers, caps, water diversions, dams, etc.

**Water Quality.** Water quality standards that should be met by project discharges and any applicable water treatment activities.

**Landform.** Acceptable post-mining land slopes, drainages, and contours.

**Stability.** Standards for physical and chemical stability.

**Revegetation.** Acceptable vegetative communities and ground cover requirements. The activities for this section include subsoil preparation, topsoil or other growth media, seedbed preparation and amendments, sediment control measures, seeding, or planting. Bonding should include provision for retreatment or noxious weed control.

**Mitigation.** Mitigation required to compensate for damage which cannot be avoided. This can include stream channels, wildlife habitat, recreation, etc.

**Monitoring/Maintenance.** Reclamation protection and monitoring requirements.

**Safety.** All public safety requirements including fencing, signs, berms, etc.

**Permitting.** Any Federal or State requirements that must be met if the Forest Service is forced to assume closure and reclamation of the site.

### **1.2.2 Forest Service Bonding Requirements**

The procedure suggested for approving, administering, and releasing reclamation bonds includes the following steps:

- Reclamation requirements, performance standards for bond release, and a schedule for periodic review and update of bond calculations should be identified in the NEPA analysis and required in the plan of operations.
- Bond calculations can begin after the Forest Service has finished the NEPA disclosure document and begins drafting the decision on the proposed plan of operations.
- Bond calculations should be sufficiently detailed<sup>1</sup> to support partial bond release for each project facility, activity, material, and associated surface disturbance. They should be sufficient to cover the estimated cost to cover the contract work needed to complete the work.
- Following NEPA analysis and issuance of the decision, the operator should be notified of the any changes needed for plan approval.
- The operator then sends updated plan and bond information to the authorized officer who has the authority to approve the bond.
- The authorized officer has the responsibility for approving a partial or final bond release after the minerals specialist inspects the site and documents that the requirements have been met. Similarly, the authorized officer has the authority to enforce reclamation requirements that are itemized in the plan of operations and specify work that needs to be completed for compliance.

There are a number of bonding instruments that can be used for reclamation bonds, including but not limited to: surety bonds; treasury bills, notes, and bonds; cash bonds; letter of credit; or assignment of savings accounts or certificates of deposit. The use of the FS6500-7 Reclamation Performance Bond Form is required for all bonds.

### **1.3 Aquifer Protection Permit (APP) Requirements**

The Arizona Revised Statutes (A.R.S.) §49-252 Closure Notification and Approval requires that:

- A. The Director must be notified if a facility will permanently cease an activity for which the facility, or portion of the facility, was designed or operated.
- B. Within ninety days of the notification, the owner/operator shall submit a closure plan to the Director.
- C. If the Director determines that the closure plan is for a clean closure, the director shall send a letter of approval to the owner/operator and no aquifer protection permit shall be required.

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<sup>1</sup> According to the Forest Service Handbook, this detail should include: 1) Narrative descriptions; 2) Calculations of area and material; 3) Road and facility surface grades; 4) Accurate scale contour maps and figures showing facility arrangement; 5) Accurate scale drawings including plan and profile views and cross sections; 6) Schedule of construction; 7) Reclamation standards; 8) Reclamation activities and materials, equipment, administrative costs used to achieve standards on schedule; and 9) Kinds and volume of hazardous materials stored onsite including kind and volume of containers.

- D. If the Director determines that the proposed closure plan achieves a closure condition other than clean closure, the owner/operator shall submit an application for an APP or request to modify a current APP to address closure activities and post-closure monitoring and maintenance at the facility.

From the statutory requirements, regulatory requirements specifying closure notification information and financial assurance have been developed as outlined below.

### **1.3.1 APP Closure Notification Requirements**

A closure/post-closure strategy must be drafted and submitted to the Arizona Department of Environmental Quality (ADEQ) for preliminary approval. The closure strategy must eliminate, to the greatest extent practicable, any reasonable probability of further discharge from the facility and of exceeding Aquifer Water Quality Standards at the applicable point of compliance. At closure, different facilities will have different management strategies. Those prescriptive strategies include:

- Tailings facilities shall be stabilized and allowed to dry to permit safe access by heavy equipment. The surface should be recontoured to eliminate ponding, thereby limiting infiltration. An appropriately designed cover system should be installed. Contained solutions should be disposed of by removal or by containment and evaporation.
- The closure strategy for leach pads shall include characterization and neutralization of spent ore residues; elimination of free liquids; recontouring of leach facilities as necessary to eliminate ponding; and capping if necessary. Measures to provide long-term physical stability are part of ADEQ's Best Available Demonstrated Control Technology (BADCT) Guidance Manual to the extent that aquifer loading may be affected. In addition, it may be necessary to stabilize the leach pad to be resistant to water and wind erosion and to eliminate the potential for physical instability or sediment transport. These physical stabilization measures may include upgradient drainage controls, vegetation, or the placement of durable rock on the leach pile slopes.
- Process ponds will require the removal or evaporation of contained solutions. In addition, removal and appropriate disposal of the solid residues on the upper liner will be required. The lower liner and underlying soils should be inspected for visual signs of liner damage, defects, or leakage through the liner. If visual signs of leakage are found, additional investigation and soil remediation may be required. Once the underliner is determined to be clean, the liner can be placed back into the excavation (or removed) and the area backfilled. The area should be graded to drain surface runoff and minimize precipitation infiltration and the pond area capped with a low permeability cover as necessary. If the pond was bermed rather than excavated, the liner should be disposed of at a separate location.
- Non-stormwater, non-process ponds should be closed in a manner similar to the process ponds listed above.

Arizona Administrative Code (A.A.C.) R18-9-A208.B. requires that a complete closure plan for a facility include the following elements:

- A site investigation plan that includes a summary of relevant site studies already conducted and a proposed scope of work for any additional site investigations necessary to define the following:
  - Lateral and vertical extent of contamination in soils and groundwater;

- Approximate quantity and chemical, biological, and physical characteristics of each waste, contaminated water, or contaminated soil that will remain at the facility; and
- Information regarding site conditions related to pollutant fate and transport that may influence the scope of sampling necessary to characterize the site for closure.
- A summary describing the results of site investigations and any other applicable information.
- A closure design that identifies any of the following applicable elements:
  - The method used to treat any material remaining at the facility;
  - The method used to control the discharge of pollutants from the facility;
  - Any limitation on future land or water uses created as a result of the facility's operations or closure activities and a Declaration of Environmental Use Restriction; and
  - The methods used to secure the facility.
- An estimate of the cost of closure.
- A schedule for the implementation of the closure plan and submission of a post-closure plan if clean closure is not achieved.
- A summary report detailing the results of the site investigation performed during closure activities, including confirmation and verification sampling.

If ADEQ determines that the closure plan achieves clean closure, the Director shall send the facility a Permit Release Notice. If the facility does not achieve clean closure, the facility shall submit a post-closure plan along with either an individual permit application or a request to modify an existing individual permit that addresses closure activities and post-closure monitoring and maintenance at the facility. Once all post-closure monitoring and maintenance activities are fulfilled under the permit or permit amendment, a summary report shall be issued and the Director shall issue a Permit Release Notice.

### **1.3.2 APP Financial Assurance Requirements**

Financial assurance for the APP permit program are spelled out in AAC R18-9-A203 which requires that a person applying for an individual APP permit shall demonstrate financial capability to construct, operate, *close, and ensure proper post-closure care of the facility* [emphasis added]. Financial assurance mechanisms are specifically spelled out in the regulations and may include, but are not limited to, self assurance, performance surety bonds, certificate of deposit, letter of credit, insurance policy, or cash deposit.

### **1.4 Other**

Other state and federal permits and approvals may also be required that complement or add to those in the reclamation plan. Examples of these types of permits include, but are not limited to, the Section 404 individual permit for discharge of fill into waters of the United States, stormwater discharge permits under the Arizona Pollutant Discharge Elimination System, and protection requirements for endangered, threatened, or species of concern.