

**STATEMENT OF BASIS**  
**U.S. Environmental Protection Agency, Region 9**  
**Draft Class III Underground Injection Control Area Permit**  
**Permit Number R9UIC-AZ3-FY11-1**  
**Florence Copper, Inc.**

**Location:**

Florence Copper Project, two miles northwest of the business district of Florence, Arizona  
Well Field Site - Section 28, Township 4 South, Range 9 East, Pinal County, Arizona

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**I. Purpose of the Statement of Basis**

The U.S. Environmental Protection Agency, Region 9 (EPA) has prepared this Statement of Basis for the draft Underground Injection Control (UIC) Class III permit (Draft Permit) to be issued to Florence Copper, Inc. (FC). Pursuant to the UIC regulations in Title 40 of the Code of Federal Regulations (CFR) §124.8, the purpose of this Statement of Basis is to briefly describe the principal facts and the considerations that went into preparing the above referenced Draft Permit. To meet these objectives, this Statement of Basis contains background information on the permit process, a description of the facility, the aquifer exemption for the project, a brief discussion of the specific permit conditions, and the reasons for these permit conditions.

## II. Permit Process

### Application and Review Period

The EPA Water Division Director has authority to issue permits for underground injection activities under 40 CFR §144.31. Florence Copper, Inc. (FCI) (previously known as Curis Resources (Arizona), Inc.) is applying for UIC permit number R9UIC-AZ3-FY11-1 to construct and operate a pilot-scale in-situ copper recovery (ISCR) facility known as the Production Test Facility (PTF) on FCI property near the town of Florence, Arizona. If authorized, the wells will be used to inject dilute sulfuric acid solution into the ore-body and recover copper-laden solution for the purpose of producing copper at the PTF surface facilities and assessing the feasibility of initiating commercial ISCR operations on FCI property surrounding the PTF site.

EPA issued UIC Permit # AZ396000001 to BHP Copper, Inc. in 1997 authorizing BHP to operate an ISCR facility at the Florence property. At the same time, EPA also granted an aquifer exemption for the proposed mining area. BHP Copper drilled four Class III injection wells, nine recovery wells, and seven observation wells into the oxide ore formation and operated a pilot project to demonstrate hydraulic control as required by the UIC permit. However, BHP Copper deferred developing the full-scale facility and later sold the property to Merrill Mining, LLC. In 2010, Curis Resources (Arizona), Inc. (or FCI) acquired the Florence Copper project property, and requested transfer of the existing UIC permit to develop and operate an ISCR facility. Given the lengthy time period since original permit issuance, EPA decided it was appropriate to require submission of a new UIC application, pursuant to 40 CFR §124.5(c)(1), revoke the existing permit and transfer the authorization to operate the Florence ISCR facility to the new owner upon issuance of a new permit under 40 CFR §144.39(b).

FCI initially submitted an application for a Class III UIC Permit in March 2011 to amend and transfer the existing UIC permit AZ396000001. The initial application from FCI was for authority to construct and operate the ISCR project, on both a pilot scale and a commercial basis, within an area approximately 212 acres in size, located on property owned by FCI and leased by FCI as Arizona State Mineral Lease No. 11-26500. In June 2012, FCI revised the application to seek authorization to construct and operate only a pilot PTF operation on 13.8 acres located within the State Mineral Lease. In July 2012, EPA determined that the application for the proposed PTF was incomplete and directed FCI to revise the application and submit supplemental information.

Over approximately two years, FCI provided substantial clarifications and supplemental information to modify and update the permit application. After completing a thorough technical review of all submitted information, EPA has determined that the information provided by FCI is sufficient to complete the Draft Permit. The Draft Permit would provide authorization to construct, test, and inject at the proposed PTF site for 14 months followed by aquifer restoration and closure operations for nine months and a post-closure monitoring period of five (5) years. The total duration of this authorization would be seven (7) years. The Draft Permit contains pre-drilling, construction, operation, maintenance, monitoring, reporting, aquifer restoration, closure, abandonment, and financial responsibility requirements.

Based on the operational standards, monitoring requirements, closure and restoration requirements, and existing geologic setting, EPA believes the activities allowed under the proposed Draft Permit are adequately protective of Underground Sources of Drinking Water (USDWs) as required by the Safe Drinking Water Act (SDWA).

### **Consultation**

As part of the permit process, pursuant to 40 CFR §144.4, EPA is required to consider whether other federal laws, specifically Section 106 of the National Historic Preservation Act (NHPA) and Section 7 of the Endangered Species Act (ESA), apply to the issuance of a UIC permit. EPA determined that these laws are applicable and followed the requirements and procedures of each, as described below.

EPA also provided an opportunity for consultation to Indian tribes pursuant to the *EPA Policy on Consultation and Coordination with Indian Tribes* (Policy). The Policy complies with the Presidential Memorandum issued November 5, 2009, directing agencies to develop a plan to implement fully Executive Order 13175, titled “Consultation and Coordination with Indian Tribal Governments.” EPA’s Policy is to consult on a government-to-government basis with federally recognized tribal governments when EPA actions and decisions may affect tribal interests.

### ***Section 106 of the NHPA:***

Section 106 of the [National Historic Preservation Act of 1966 \(NHPA\)](#) requires Federal agencies to take into account the effects of their undertakings on historic properties. Issuance of a federal permit is considered a federal undertaking, therefore, EPA is required to meet the statutory responsibilities under Section 106 of the NHPA. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the federal Advisory Council on Historic Preservation (ACHP) titled, “[Protection of Historic Properties](#)” at 36 CFR Part 800. FCI Property contains known archaeological sites and cultural resources that are eligible for inclusion in the National Register of Historic Places (NRHP), referred to as historic properties. Early on in the review of the proposed project, EPA determined that the undertaking was a type of activity that could affect historic properties. These sites and other cultural resources were the focus of a prior Programmatic Agreement between the Gila River Indian Community, Hopi Tribe, Arizona State Historic Preservation Office (SHPO), Magma Copper Company (subsidiary of former permittee, BHP Copper) and the federal ACHP when EPA issued the existing UIC permit to BHP Copper in 1997. For the new permitting action, EPA has developed a draft memorandum of agreement (MOA) to avoid, minimize, or mitigate potential adverse effects of the proposed activity on historic properties pursuant to 36 CFR §800.6(b-c).

In consultation with the SHPO, EPA determined and documented the Area of Potential Effect (APE) as the entire FCI property, including the State Trust Land. In addition, EPA identified, in coordination with the SHPO, several consulting parties in accordance with 36 CFR § 800.2. The consulting parties includes four federally-recognized tribes - the Gila River Indian Community, the Hopi Tribe, Tohono O’odham Nation, and Yavapai-Prescott Indian Tribe, in addition to the Arizona State Historic Preservation Officer, the Arizona State Land Department (ASLD),

National Park Service, Arizona State Museum, Archaeology Southwest, and the Town of Florence.

Subject to the criteria in 36 CFR §800.5(a), EPA found that the proposed project may have adverse effects on historic properties within the APE because the project may directly or indirectly alter the characteristics of some of the historic properties. EPA notified the ACHP of the finding of adverse effects and ACHP elected to participate in the Section 106 Consultation Process. EPA consulted with all parties to identify historic properties, assess effects, and resolve potential adverse effects to historic properties from this undertaking and to develop the draft MOA referenced above.

During the public comment period for the Draft Permit, EPA is also seeking public comment and input on resolving the potential adverse effects of the proposed project, including measures to avoid, minimize, or mitigate potential adverse effects to historic properties and the draft MOA to resolve such effects (36 CFR §800.2(d) and §800.6(a)(4)). To provide the public with the background documentation required under 36 CFR §800.11(e), EPA is providing detailed information about the project and its effects on historic properties, a summary of views provided by consulting parties, and a copy of the draft MOA for public review. EPA will consider all comments submitted during the public comment period regarding resolution of potential adverse effects of the project on historic properties at the site.

#### ***Section 7 of the ESA:***

Under Section 7 of the ESA, EPA is required to ensure that any action authorized by the Agency does not jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat. EPA consulted with the U.S. Fish and Wildlife Service (USFWS) Tucson office of the Arizona Ecological Services Field Office, who provided technical assistance to determine whether federally listed species occur within the proposed project boundaries. EPA also provided the USFWS a copy of the screening analysis summary prepared by FCI on March 17, 2011, which screened for special-status species at the project area. Based on the USFWS review, there are no areas within the proposed project boundaries that are designated or proposed for designation as critical habitat for federally listed species. Further, the USFWS concurred with the analysis that there is only the potential for candidate species - the Tucson shovel-nosed snake and the Sonoran desert tortoise – to occur in the proposed project area. Therefore, EPA determined that the proposed project is not anticipated to impact a federally listed species or its critical habitat in the area. However, FCI will implement a Wildlife Monitoring Plan (Appendix H of the Draft Permit) to document that the proposed facility does not jeopardize the continued existence of any federally listed endangered or threatened species or adversely affect its critical habitat.

#### ***Consultations with Indian Tribes:***

In May 2012, EPA sent a notification letter to federally-recognized Indian tribes in Arizona regarding the UIC permit application for the proposed Florence Copper PTF. EPA's letter provided tribes the opportunity to consult on a government-to-government basis under EPA's Policy for Consultation and Coordination with Indian Tribes. In reply to our notification letter,

the Gila River Indian Community (Community) provided a letter to express concerns about the proposed project and request information regarding potential impacts to water resources in the area of the proposed project. Over the past two years, EPA and the Community have continued consultation through correspondence, phone conferences and in-person meetings, apart from consultation under Section 106, to receive and discuss input regarding the proposed project and EPA's review of the UIC permit application. EPA has considered the Community's concerns and input on the proposed project to date and anticipates further consultation with the Community prior to making a final UIC permitting decision.

### **Public Participation**

Pursuant to 40 CFR §124.10, the public shall be given at least thirty (30) days to review and comment on draft UIC permits and at least thirty (30) days advance notice of any public hearing for a UIC permit. Pursuant to 40 CFR §124.10(b)(2), the draft permit and public hearing notices may be combined.

For this Draft Permit, EPA is providing a fifty (50) day public comment period. In addition, EPA has scheduled a public hearing during the public comment period. (40 CFR §§124.11 and 124.12). The public hearing is scheduled for 7 pm to 10 pm on January 22, 2015 at the Gym of the Florence High School, 1000 South Main Street, Florence, Arizona. At the hearing, any person may submit oral or written statements and data concerning the Draft Permit. EPA is also convening a public open-house meeting at 4 pm to 6 pm on January 22, 2015 at the same location to provide information to the public and answer questions prior to the public hearing. All persons, including the applicant, who object to any condition of the Draft Permit or EPA's decision to prepare a Draft Permit must raise all reasonably ascertainable issues and submit all reasonable arguments supporting their position by the close of the comment period on January 30, 2015 (40 CFR §124.13). EPA is providing notice to the public of the comment period and the public hearing by publication in the Casa Grande Dispatch and the Tri Valley Central newspapers.

### **Final Decision-Making Process**

After the close of the public comment period, EPA will review and consider all written comments and oral testimony relevant to the Draft Permit and application. EPA will prepare and send a response to comments to the applicant and each person who has submitted written comments or requested notice of the final permit decision. EPA will also post a transcript of the hearing and the response to comments document on our website. The response to comments document will contain a response to all significant comments on the Draft Permit, EPA's final permitting decision, any permit conditions that are changed and the reasons for the changes, and procedures for appealing the final permitting decision. The final decision shall be to either revoke the existing permit and reissue the new permit or deny reissuance of the permit. The final decision shall become effective no sooner than thirty (30) days after EPA's service of the notice of decision. Within thirty (30) days after the final permit decision has been issued, any person who filed comments on the Draft Permit, participated in any public hearing on this matter or takes issue with any changes from the draft to the final permit decision, may petition the Environmental Appeals Board to review any condition of the permit decision. Commenters are referred to 40 CFR §124.19 for procedural requirements of the appeal process. If no comments

request a change in the Draft Permit, the permit shall become effective immediately upon issuance (40 CFR §124.15).

### **III. Description of the Project**

#### **The Ore Body and the In-Situ Copper Recovery Method**

The copper ore body is centered 2.5 miles northwest of the Town of Florence, Arizona and is approximately 250 acres in areal extent. The recoverable copper below the PTF site is located between 450 and 1,200 feet below ground surface in a highly fractured, igneous, copper oxide bedrock formation. The overlying strata are composed of alluvial basin-fill sediments derived from erosion of the surrounding, primarily igneous rock formations and deposition over the Precambrian bedrock surface. The ore body is located in the saturated zone below the water table, which is at approximately 130 feet below ground surface. The saturated geologic formations are comprised of three distinct water bearing hydro-stratigraphic units referred to as the Upper Basin Fill Unit (UBFU), Lower Basin Fill Unit (LBFU), and the Bedrock Oxide Unit. The UBFU and LBFU are separated by a thin, regionally extensive aquitard referred to as the Middle Fine Grained Unit (MFGU).

FCI proposes to recover copper by an in-situ recovery method using injection and recovery wells at the PTF site. This method involves injecting a dilute sulfuric acid-based solution (lixiviant) into the Bedrock Oxide Unit ore body, dissolving copper oxide minerals, and recovering the copper in solution. The copper-laden pregnant leach solution (PLS) is pumped out through surrounding recovery wells, followed by treatment at the surface to extract the copper from the PLS by means of a solvent extraction/electrowinning (SX/EW) process. The PTF well field would include four injection wells, nine recovery wells, seven observation wells, and four multi-level sampling wells. A total of eight monitoring wells are required around and within the PTF well field to ensure that formation water quality is not degraded at and beyond the perimeter of the monitoring well locations and within the overlying basin-fill formations during PTF operation. The monitoring wells are also intended to ensure that PTF area water quality is maintained at the required levels during the five-year post-closure monitoring period.

#### **Surface Facilities and Impoundments**

In addition to the well field and required monitoring wells, the proposed PTF project includes the construction, operation, and eventual closure of surface facilities and impoundments. The project surface facilities would include the SX/EW plant, process water impoundment, runoff pond, tank farm, and other ancillary facilities according to FCI's design and operation plans. The surface facilities and impoundments would occupy approximately 13.8 acres, including 2.2 acres occupied by the PTF well field.

#### **In-situ Copper Recovery Operations and Closure Plans**

All PTF facilities shall be constructed to prevent unauthorized discharges. The PTF test well block will be bermed to protect against storm water run-on and each well will be located in a containment sump. A pipeline will connect the test well block to tanks located at the SX/EW plant. The tanks will serve to temporarily store solutions in preparation for injection, circulation

to the SX/EW plant or to portable water treatment units for reuse, or neutralization prior to being placed in the PTF water impoundment.

Injection is proposed to occur in the Bedrock Oxide Zone, which is located approximately 450 feet to 1,200 feet below ground surface at the PTF site. To prevent vertical excursion of injected fluids, the uppermost 40 feet of the oxide zone will be excluded from injection. The 700-foot injection interval will be divided and screened into multiple intervals to focus injection into targeted areas of the oxide zone. Packers will be used to focus injection into selected intervals. The maximum aggregate injection rate proposed for PTF operations is 240 gallons per minute (gpm), and the maximum extraction rate is limited by the capacity of the planned SX/EW plant to 300 gpm. At the maximum injection rate and maximum recovery rate, extraction will exceed injection by 25 percent.

Hydraulic control of PTF operations will be maintained from the time that injection of lixiviant begins until the time that groundwater quality is restored to a level that meets the criteria specified in the UIC Permit. Hydraulic control will be maintained by increasing the recovery rate in the extraction wells and/or reducing the injection rates in the injection wells to maintain or increase the inward hydraulic gradient between observation wells and recovery wells. The volume of lixiviant injected and ISCR fluids recovered will be recorded and compared at least once every 24 hours.

Hydraulic control will also be monitored by comparing groundwater levels in the paired observation and recovery wells. In addition, electrical conductivity of the groundwater will be monitored in the observation and recovery wells to detect any unusual increases in the observation wells and verify maintenance of hydraulic control. Hydraulic control shall be maintained at all times until PTF closure is successfully completed, including during periods when groundwater or other rinse water solutions are injected during aquifer restoration and closure operations.

Existing coreholes and wells located within the Area of Review (AOR) of the PTF operation (defined as 500 feet from the PTF well field perimeter) will be plugged and abandoned before injection commences in PTF wells and in accordance with the Plugging and Abandonment Plan. At the end of PTF operations, all constituents of concern in the groundwater must be restored to maximum contaminant levels (MCL) or pre-operational background concentrations if those concentrations exceed the MCLs. After aquifer restoration, all PTF wells, the monitoring wells, and the existing BHP Test wells will be abandoned in accordance with the Plugging and Abandonment Plan in Appendix C of the permit and ADWR regulations. Plugging and Abandonment plans may be modified, subject to EPA approval.

#### **IV. Brief Summary of Specific Permit Conditions**

The purpose of EPA's UIC Program is to protect drinking water aquifers, referred to as "underground sources of drinking water" or "USDWs," from contamination due to injection activities, as mandated under the SDWA. In order to protect public health and USDWs, EPA is proposing permit conditions and requirements for pre-drilling, construction, corrective actions, operation, monitoring and reporting, restoration and closure, plugging and abandonment, permit

duration, and financial responsibility in the Draft Permit. The sections below summarize the proposed conditions, requirements and other permit considerations.

**Requirements Prior to Drilling, Testing, Constructing, or Operating (Part II, Section A of the Draft Permit)**

The Draft Permit requires FCI to provide evidence of financial assurance prior to starting injection well drilling and construction. In addition, the permit calls for adequate notification of activities to construct, test, and operate the proposed facility and timely reporting of those activities.

**Well Construction (Part II, Section C of the Draft Permit)**

The Draft Permit requires FCI to notify EPA of the location of the wells constructed under the permit, including all monitoring wells and point of compliance (POC) wells.

Geophysical logs and other tests conducted during drilling and construction must include open-hole logs, casing logs, and injection formation tests. Open-hole logs must be conducted over the entire open-hole sequence below the conductor casing for the purpose of formation evaluation, depth control, and detection of borehole anomalies. FCI is required to conduct formation evaluation wireline logging operations and to provide and use those results to estimate and report values for porosity, permeability, lithology, formation water resistivity, total dissolved solids (TDS) concentrations, and rock mechanical properties for both the injection and confining zones identified within the permitted geological sequence.

Drilling, work-over, and plugging procedures must comply with the applicable portions of the Arizona Oil and Gas Conservation Commission regulations of the Arizona Administrative Code. FCI is required to case and cement the wells to prevent the movement of fluids into or between USDWs. The injection well steel casing string shall be cemented to at least 40 feet below the top of the Bedrock Oxide Unit to minimize the potential for migration of ISCR fluids into the LBFU, while in injection and recovery operations. Fiberglass reinforced plastic casing shall be installed and cemented inside of the steel casing of injection and recovery wells to isolate the steel casing from corrosive injectate and ISCR fluids. Proposed drilling, workover, and plugging procedures must be submitted to EPA for approval.

The Draft Permit also requires installation and maintenance of monitoring devices in injection and recovery wells necessary to continuously measure and record injection pressure, annulus pressure, injection and flow rates, and injection and production volumes. The injection wells must have downhole and wellhead pressure transducers to monitor and prevent exceedance of the maximum allowable injection pressure as well as for monitoring mechanical integrity. Each observation and multi-level sampling well shall be equipped with an annular conductivity device (ACD) to detect any fluid movement in vertical channels within the cemented casing/wellbore annulus. Conductivity sensors (CS) shall be strapped to the well screens of recovery, observation, and multi-level sampling wells at regular intervals to facilitate electrical resistivity profiling of the formation during injection and recovery operations.



FCI shall perform aquifer pump tests prior to injection in order to evaluate subsurface characteristics of the Bedrock Oxide Zone. Results of the aquifer tests shall be compared to parameters used in the groundwater flow model, and the model parameters will be revised accordingly if the resulting test parameters are significantly different from those used in the original model.

A Final Well Construction Report and a Completion of Construction Notice must be submitted to EPA within sixty (60) days after completion of all PTF and monitoring wells. FCI must give advance notice to EPA of planned physical alterations or additions to the permitted injection wells.

**Corrective Actions (Part II, Section D of Draft Permit)**

Before injection and recovery wells are placed in service, all existing non-Class III wells and coreholes within the PTF Project AOR shall be abandoned according to the Plugging and Abandonment Plan and Exhibit Q-3 in Appendix C of the permit. Several additional wells in the AOR may require remedial cementing in the casing/wellbore annulus to ensure protection of the upper USDW, subject to EPA review and approval. EPA shall be notified and final Plugging and Abandonment plans and procedures shall be submitted to EPA for approval at least 30 days in advance of abandonment operations.

**Well Operation (Part II, Section E of the Draft Permit)**

The Operations Plan submitted with the permit application is included in Appendix E of the Draft Permit. Planned maximum PTF injection and recovery rates are approximately 240 gpm and 300 gpm, respectively. Injection rates will not be allowed to exceed 240 gpm, and extraction will not be allowed to fall below 110 percent of the injection rate on a daily average basis without prior written approval from EPA. An inward hydraulic gradient of at least one foot between paired observation and recovery wells must be maintained for demonstrating hydraulic control. In addition, electrical conductivity measurements in the recovery wells should exceed those readings in the paired observation well to verify hydraulic control. Actions are required to be taken by FCI to restore hydraulic control within 24 hours if the extraction to injection ratio falls below 110 percent, the inward gradient at any well pair is less than one foot, or the electrical conductivity data indicate a possible loss of hydraulic control.

Prior to injection, FCI must demonstrate that the PTF wells will maintain proper mechanical integrity. The Draft Permit requires periodic mechanical integrity tests (MITs) via casing/tubing annular pressure tests, continuous pressure monitoring in injection wells, radioactive tracer and/or temperature surveys, and cement evaluation analysis to ensure protection of USDWs. ACDs will be installed in the casing/wellbore annulus of observation and multi-level sampling wells to verify the absence of significant fluid movement into the upper USDW through vertical channels adjacent to the wellbore. Loss of mechanical integrity requires notification of EPA and action to restore mechanical integrity or plug and abandon the well. A demonstration of mechanical integrity is required within thirty (30) days following the installation of a new PTF or monitoring well. Injection wells are required to be pressure-tested at least once every 12 months while active and every two years while inactive until closure and abandonment of the well.

Injection pressure limitations are based upon the results of 14 step-rate tests (SRTs) performed in four coreholes during well testing operations conducted by BHP Copper in 1995. Injection wells shall be operated at pressures less than the fracturing pressure of the Bedrock Oxide Zone. The Draft Permit also requires that FCI operate their injection wells in such a manner as to not initiate or propagate fractures in the injection formation or the confining zone, nor to cause migration of fluids into or between the surrounding USDWs.

Injection fluids shall be limited to only fluids authorized by this permit and generated by the PTF operation. Fresh water may be injected to assess the hydraulics of the injection and recovery patterns in the PTF and to assess the performance of related surface facilities. The estimated composition of the injectate as submitted with the application is incorporated into the permit and shall be binding on FCI unless revised and approved by EPA. During closure operations, fresh groundwater may be injected to restore the PTF injection and recovery zone to permit standards to ensure adequate protection of the surrounding USDWs.

**Monitoring, Record Keeping, and Reporting of Results (Part II, Sections F and G of Draft Permit)**

The Draft Permit requires continuous monitoring of injection and recovery rates, total cumulative volume of injectate and produced fluids, wellhead and down-hole injection pressures, annular pressure, and injection and produced fluid temperatures, as well as daily monitoring of injection and recovered fluid volumes.

In addition to any state-authorized POC wells at the site, eight (8) supplemental monitoring wells will be installed to serve as water quality monitoring wells during PTF operations and post-closure monitoring periods. Monitored parameters include expected constituents of ISCR solutions that will be monitored at quarterly or semiannual intervals. Alert Levels (ALs) shall be established for specific analytes approved by the Director, and Aquifer Quality Limits (AQLs) shall be established for parameters with primary MCLs. Prior to the commencement of injection, baseline water quality samples for all required parameters shall be collected such that accepted statistical methods can be applied to assign ALs and AQLs at all POC and monitoring wells.

Hydraulic control monitoring of the oxide injection zone shall be performed using seven observation wells at the perimeter of the PTF well field. In addition, electrical conductivity shall be monitored in the recovery and observation well pairs on a daily basis to verify that hydraulic control is maintained.

FCI is required to maintain all operational and monitoring records, and to submit quarterly summary reports of operations and monitoring activities to EPA during the PTF operational, closure, and post-closure monitoring periods.

**Contingency Plans (Part II, Section H of the Draft Permit)**

The permit includes contingency plans to address any loss of hydraulic control during PTF and closure operations and for groundwater quality exceedances detected at POC and other monitoring wells during the life of the PTF project, including groundwater quality monitoring

during the post-closure monitoring period. Corrective actions are required to be initiated by FCI within 24 hours of their awareness of a loss of hydraulic control.

The permit includes provisions for verification and corrective actions to be initiated when groundwater quality exceedances are detected in the POC and other monitoring wells. Written reports to EPA are required within 30 days of verification of an exceedance, which provide an evaluation of the cause, impacts, and potential mitigation of the discharge responsible for the exceedance.

### **Restoration and Plugging and Abandonment (Part II, Section I of the Draft Permit)**

Aquifer restoration and closure activities shall commence within 60 days after completing copper recovery operations in the injection and recovery zone of the PTF. The groundwater quality shall be restored to concentrations which are less than or equal to primary MCLs, or pre-operational background concentrations if the pre-operational background concentrations exceed MCLs. FCI is required to ensure that constituents without primary MCLs shall not impact surrounding USDWs in a way that could adversely affect the health of persons. FCI shall maintain hydraulic control of the PTF zone fluids during rinsing operations, which can include injection/recovery or only recovery operations.

Rinsing progress will be monitored by analyzing sulfate concentrations in the water recovered from well-field manifolds. FCI will document the results of restoration/closure operations in a subsequent quarterly report and notify EPA of the schedule for commencement of plugging and abandonment operations.

FCI will be required to plug and abandon the wells as provided in the Plugging and Abandonment Plan in Appendix C of the Draft Permit. After cessation of injection operations for two (2) years, FCI must plug and abandon the inactive well(s) regulated by this Draft Permit in accordance with the Plugging and Abandonment Plans, unless FCI provides notice to EPA. EPA reserves the right to change the manner in which a well will be plugged if the well is modified during its permitted life or if the well is not consistent with EPA requirements for construction or mechanical integrity.

FCI will be required to comply with the Post-Closure Monitoring Program at Part II.F and the AQL exceedance contingency plan established in Part II.2.b of the permit to ensure that restoration operations were successful in returning the groundwater quality in the PTF injection zone to the required levels.

### **Post-Closure Audits (Part II, Section J of the Draft Permit)**

During the third, fifth, and seventh years after commencement of PTF operations, FCI shall conduct a post-closure audit of the computer modeling to update the predicted fate and transport of pollutants produced by the PTF operations. FCI shall submit reports to EPA describing the post-closure audits as well as any changes in the conceptual model, any model redesign, and any changes in predicted post-closure conditions.

### **Duration of Permit (Part II, Section K of the Draft Permit)**

EPA proposes to issue the permit and the authorization to inject and conduct restoration and closure activities at the PTF site for a period of two (2) years with five additional (5) years for post-closure monitoring unless terminated under the conditions set forth in Part III, Section B.1 of the Draft Permit.

### **Financial Responsibility (Part II, Section L of the Draft Permit)**

FCI must demonstrate adequate financial responsibility to plug and abandon all wells associated with the proposed permit, and to ensure proper closure of site operations. Authorization to construct, inject, and operate the wells under the authority of this permit will be granted only after such financial assurance is in place and approved by EPA. The financial responsibility mechanism and amount will be reviewed and updated periodically, as required by EPA. EPA may require FCI to change to an alternate method for demonstrating financial responsibility.

## **V. Aquifer Exemption**

In recognition of the broad definition of USDWs and the commercial use of underground injection, EPA's regulations stipulate that an aquifer may be designated as an "exempted aquifer" if it meets specified criteria at 40 CFR §146.4. Such aquifers would otherwise qualify as a USDW and protected but are not currently used as a drinking water source and have no real potential to be used as drinking water sources in the future based on specific criteria. The effect of EPA's approval of an aquifer exemption is that the portion of the aquifer covered by the exemption is no longer protected as a USDW.

### **Historical Activity at the Site and the Existing Aquifer Exemption (Part II, Section B of the Draft Permit):**

The Draft Permit describes the lateral and vertical boundaries of an existing aquifer exemption, which was approved by EPA pursuant to the procedures in 40 CFR §144.7. EPA approved the aquifer exemption in May 1997 for UIC Class III permit # AZ396000001, issued to BHP Copper to conduct in-situ copper mining at the Property. EPA based the aquifer exemption approval on BHP Copper's demonstration that the aquifer in question was not a current source of drinking water and could not serve as a source of drinking water in the future because it contains minerals that are expected to be commercially producible (criteria at 40 CFR §146.4(a) and (b)(1)).

In accordance with the provisions of 40 CFR 144.7(b)(1), the aquifer exemption approved by EPA has specific lateral and vertical limits. The exempted zone is located in the subsurface interval of approximately 400 feet to 1600 feet below ground surface. Specifically described in the existing aquifer exemption, the upper aquifer exemption boundary is defined as 200 feet above the oxide zone, or the base of the Middle Fine-Grained Unit (MFGU), whichever is further below ground surface. In addition, the lower aquifer exemption boundary is defined as the base of the reactive interval amenable to copper leach solutions, encompassing the oxide zone, which contains an economical amount of copper, and copper in the sulfide zone that is leachable. The outer lateral limits are a 500-foot circumscribed area around the original mine zone boundary (also known as the In-Situ Copper Recovery (ISCR) Area) of 212-acres and further specified by

coordinate system points connected together forming a definite boundary line (see the Aquifer Exemption dated May 1, 1997 in Appendix B of the Draft Permit).

BHP Copper utilized the exemption to operate for a short time to inject into their permitted Class III wells. BHP's injection occurred within the boundaries of the exempted aquifer from November 1997 to February 1998 for the principal purpose of demonstrating hydraulic control on the copper test mine block.

***Aquifer Exemption Consideration for the Proposed PTF:***

FCI's PTF project is proposed for in-situ copper recovery within the same ore body as the BHP Copper project. The targeted copper oxide zone and area of review (AOR) for the proposed PTF is a relatively small lateral area well within the boundaries of the existing aquifer exemption. For the PTF, the AOR is a circumscribed area of 500 feet from the PTF well field and the existing aquifer exemption boundary is an additional 500 feet and more beyond the PTF's AOR. At the proposed PTF well field, the upper exemption boundary is at the base of the MFGU.

FCI has demonstrated in the UIC application that the injection and in-situ copper recovery fluids of the proposed PTF operations will remain within the AOR and, thus, well within the previously approved aquifer exemption boundaries.

Although the existing aquifer exemption granted by EPA in 1997 is still in effect, EPA has reviewed whether the portion of the exempted aquifer that will be impacted by the proposed PTF operations continues to meet the regulatory criteria in 40 CFR §146.4(a) and (b)(1). Based on this review, EPA concluded that the portion of the aquifer that would be impacted by PTF operations continues to meet the criteria for the aquifer exemption because: 1) it does not currently serve as a source of drinking water; and 2) it cannot now and will not in the future serve as a source of drinking water because it contains minerals that are expected to be commercially producible. Additional detail about EPA's aquifer exemption review and conclusions are provided below.

***Review of the Regulatory Criteria:***

***1. Evaluation of the aquifer as a source of drinking water:***

Under 40 CFR § 146.4(a), an aquifer or portion thereof in the exempted area must not currently serve as a source of drinking water. Information provided in FCI's UIC application indicates that the exempted portion of the aquifer that will be impacted by the PTF does not currently serve as a source of drinking water. To make this determination, EPA first confirmed that there are no drinking water or other producing water wells within the AOR. In addition, EPA reviewed, as described below, whether any existing drinking water wells would produce water from the PTF-impacted portion of the existing exempted area over the lifetime of the wells.

All of the Town of Florence's existing public water supply wells to the east and southeast of the Florence Copper property boundary are upgradient of the FCP property in Florence, Arizona.

The nearest down-gradient public water supply wells exist for Anthem at the Merrill Ranch residential development within two to three miles west to northwest of the proposed Florence Copper in-situ leaching project. Those wells are screened in the LBFU aquifer. The LBFU is located just above and in contact with the Bedrock Oxide Zone, the source of the copper to be recovered at the FCI facility.

The natural ground water flow gradient in the proposed project area is toward the north-northwest, which is generally in the direction of the drinking water wells that supply homes in Merrill Ranch. The ground water flow model results in FCI's application indicate that the transport distance and areal distribution of sulfate in the Bedrock Oxide Unit would extend 300 feet northward and down gradient along the trend of the Sidewinder Fault Zone five years after PTF project closure, for an average groundwater flow velocity of 60 feet per year. The Sidewinder Fault and other faults located at the PTF project area are oriented in a north-south direction and do not extend upward into the basin-fill sediments or to the area in which the Merrill Ranch wells are located. Downgradient and upward movement of ground water in the Bedrock Oxide Unit is predicted by the model to be extremely limited due to very low hydraulic conductivity outside of the fault zones. The fault zones provide a preferential flow path that bypasses the Merrill ranch wells.

In the PTF model, sulfate migrates from the Bedrock Oxide Unit into the lower layer of the LBFU, however, sulfate concentrations in the LBFU were simulated at less than 10 mg/L above background in a relatively small area centered approximately 200 feet west of the center of the PTF well field five years after closure. That equates to groundwater flow velocity of 40 feet per year. Therefore, based on these groundwater flow model simulations presented in the application and other calculations, groundwater migration from the LBFU above the proposed PTF mine zone, representing the exempted portion of the LBFU aquifer, has a travel time to the location of the closest Merrill Ranch well in excess of 200 years, which would exceed the reasonable lifetime of any public drinking water wells.

## ***2. Evaluation of potential future source of drinking water:***

To meet the requirements of 40 CFR § 146.4(b)(1) for an aquifer exemption, it must be shown that the formation will not be a potential future source of drinking water due to the presence of minerals or hydrocarbons in a commercially producible quantity. Documentation provided to EPA indicates that the portion of the exempted aquifer that will be impacted by the proposed PTF operations cannot now and will not in the future serve as a source of drinking water because it contains minerals that are expected to be commercially producible. In the application for the original aquifer exemption, BHP Copper demonstrated that the aquifer for which they were seeking exemption, which includes the portion of the aquifer that would be impacted by the proposed PTF operations, contains commercially producible quantities of mineralized copper. That demonstration was supported by BHP Copper's operation of in-situ copper recovery from the mineralized copper zone, although that operation did not progress to full commercial development. More recently, Florence Copper provided a report entitled "NI 43-101 Florence Copper Project, Technical Report, Pre-Feasibility Study," which provides further data confirming the aquifer's potential for economic mineral development. Based on the original demonstration, BHP's limited production/recovery, and FCI's more recent documentation, EPA

has determined that the current pilot project area under review contains commercially producible copper and would, therefore, not serve as a future source of drinking water (40 CFR § 146.4(b)(1)).