UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

First Notice – UIC
Via Email Only

Richard Tremblay
Vice President Operations
Florence Copper, Inc.
1575 W. Hunt Highway
Florence, AZ 85132

RE: Underground Injection Control (UIC) Permit Application No. R9UIC-AZ3-FY19-1 Florence Copper Project, Florence Arizona

Dear Mr. Tremblay,

We received your Florence Copper Class III UIC Permit application on October 4, 2019 and on November 5, 2019 we sent you a letter indicating that your application was administratively complete, as specified at Chapter 40 of the Code of Federal Regulations (40 CFR) §124.3(c). Florence Copper provided a response on March 16, 2020 to an EPA request for additional information dated February 13, 2020. Nancy Rumrill of my staff has spoken to you by phone in weekly updates to discuss additional information needed to clarify, modify, and supplement the previously submitted material. We are unable to continue processing your permit application until we receive this additional information.

Specifically, the information as detailed in the Enclosure is necessary to clarify, modify, and supplement your previously submitted application material. Please submit the information requested as soon as possible and no later than June 15, 2020. If you are unable to provide the information by June 15, 2020, you may withdraw your application until you have all the required information. Once you have all the necessary information, you may resubmit your full permit application at any time.

If, by June 15, 2020, we do not receive the additional information, and if you do not withdraw your application, EPA may consider initiating the process to deny your permit application. See 40 CFR §124.6. Please note that to ensure the protection of underground sources of drinking water, the Safe Drinking Water Act Section 1421 prohibits underground injection which is not authorized by rule or a permit issued by EPA or an authorized State. Safe Drinking Water Act, 42 U.S.C. 300h(b)(1)(A).

Please address all items noted in the Enclosure by submitting a response to the requested information and two copies of a complete revised and supplemented application in hard copy and

in electronic format. Please submit the information requested to the following address and coordinate with Nancy Rumrill to submit an e-copy to EPA.

Attn: Nancy Rumrill
Water Division
U.S. EPA Region IX, (WTR-4-2)
75 Hawthorne Street
San Francisco, CA 94105

Thank you for your attention to this matter. If you have any questions or wish to discuss further, please contact me at (415) 972-3971, or your staff may contact Nancy Rumrill at (415) 972-3293.

Sincerely,

DAVID ALBRIGHT
Digitally signed by DAVID ALBRIGHT
Date: 2020.05.15 14:36:55 -07'00'

David Albright
Manager, Groundwater Protection Section

Enclosure

cc (email): Maribeth Greenslade, ADEQ
Anita Thompkins, EPA Office of Groundwater and Drinking Water

May 15, 2020

ENCLOSURE

Technical Review Comments on the March 16, 2020 Responses for Florence Copper UIC Class III Permit Application

1. The hydraulic conductivity (K) values for the LBFU and UBFU cited in the text of the application are much lower than those based on Brown and Caldwell (1996a; see table below) and ADWR (2010). Please explain the choice of value used. Was the decision-making for the original model considered authoritative for the purposes of modeling this site?

Table comparing hydraulic conductivity values from figures, tables, and text in the revised permit application.

Section/Table		Figures A-4 to A-13	Figures 14A-16 through 14A-25	Page 11 of PDF	Attachment B, Table B-3	Table B-2	Section 14A.3.2.2 of model report (Exhibit A-8)	Table 14A-4 of Exhibit A-8
Content/Notes		Cross sections showing K assigned to model layers	Layer by layer K for model, 2012 model report (as per color code)	Text of application. Described as range for each of the model layers in the original model.	Measured K values for PTF wells in 2018. See Exhibit B-5 for model update report.	Measured K values for MGFU samples. Data from 1995 and 2011 (three data points.)	Original model report (2012). Data sources: ADWR (2010) and Brown & Caldwell (1996a)	Brown and Caldwell (2012) Original model
Page of PDF		49	120-129	11	409	408	84-87	146
Unit	Model Layer	K (ft/day)	K (ft/day)	K (ft/day)	K (ft/day)	K (ft/day)	K (ft/day)	K (ft/day)
UBFU	1	130 (h), 13 (v)	130	0.2 to 2.5	12 (n=1)		20-130	20-130 (h), 2-13 (v)
UBFU	2	130 (h), 13 (v)	130	0.2 to 2.5	12 (n=1)		20-130	20-130 (h), 2-13 (v)
MGFU/UBFU	3	1 (h), 0.01 (v)	1 to 10 (project area) and 130	0.2 to 2.5		Mean = 1.29 x 10^{-5} (n=3)		1-130 (h), 0.01 - 13 (v)
LBFU	4	20 (h), 2 (v)	5 to 25	0.2 to 2.5	2.1 (n=1)		5 - 25	5-25 (h), 0.5 - 2.5 (v)
LBFU	5	20 (h), 2 (v)	5 to 25	0.2 to 2.5	2.1 (n=1)		5 - 25	5-25 (h), 0.5 - 2.5 (v)
Exclusion Zone	6	1 (h), 1 (v)	1	0.2 to 2.5	0.54 (as per table footnote)		0.1 - 2.51	1 (h), 1(v)
Bedrock Oxide	7	0.57 (h), 0.57 (v)	0.57	0.2 to 2.5	0.54 (as per table footnote)		0.1 - 2.51	0.57 (h), 0.57(v)
Bedrock Oxide	8	0.57 (h), 0.57 (v)	0.57	0.2 to 2.5	0.54 (as per table footnote)		0.1 - 2.51	0.57 (h), 0.57(v)
Bedrock	9	0.1 (h), 0.1 (v)	0.1	0.2 to 2.5			0.0055 - 0.05	0.1 (h), 0.1(v)
Bedrock	10	0.1 (h), 0.1 (v)	0.1	0.2 to 2.5			0.0055 - 0.05	0.1 (h), 0.1(v)
Faults	N/A	6 (h), 6 (v)		0.2 to 2.5				2.51 (h), 2.51 (h)

2. The application text on Page A-6 in the application, states "…that the original model used porosity values ranging between 2 and 20 percent." Table 1 does not contain any porosity values as low as 2 percent in the column titled "Range of Modeled Porosity Values."

Table 1. Porosity in model compared to porosity measured by neutron logging (Table B-4 in the UIC application, page 100).

Model Layer or Unit	Range of Modeled Porosity Values	Average Porosity Measured by Neutron Logging (I-01, I-02, I-03, I-04, and R-01)
Model Layers 1 and 2 (UBFU)	0.13 - 0.2	0.12
Model Layer 3 (MFGU/UBFU)	0.15 - 0.2	0.12
Model Layer 4 and 5 (LBFU)	0.2	0.12
Model Layers 6-10 (Bedrock Oxide)	0.08 for Model Layers 6-8 0.05 for Model Layers 9-10	0.08

Please clarify the difference between the application text and Table 1.

3. In FCI's March 16, 2020 response to EPA comment 10, Section B.4.2 of the Application has been revised to include discussion of potential for the dissolution of mineral material to change formation permeability and porosity.

   The application does not discuss the potential for changes in the porosity and permeability in the formation due to removal of material from fractures during ISCR operations. EPA's question in comment 10 is focused specifically on dissolution of materials in fractures (not the matrix). FCI's response does not answer the question regarding whether enough material will be dissolved out of the fractures to change the associated permeability. According to the response, FCI anticipates that the volume of material removed from the fractures (and possible precipitation of authigenic minerals) will not affect porosity and permeability and that precipitation would compensate in part.

   Please provide details about the characteristics of the formation related to this occurring. How much ore material is present in the faults and fractures that is expected to be dissolved? What is the possible effect on permeability and porosity from dissolution of material within the fractures? How much precipitation of new mineral phases is anticipated?

4. In the March 16, 2020 response to EPA comment 16, Section A.3.1.2. of Attachment A has been updated to describe sensitivity analyses conducted to evaluate the effects of hydraulic conductivity and porosity on potential preferential groundwater flow pathways. Please explain why the 20% porosity decrease was chosen for the sensitivity analysis.

5. It is possible for ISR fluids to migrate upward into the LBFU within the pressure influence of the injection wells regardless of the drawdown caused by offsetting recovery wells. The application proposes installing just one Annular Conductivity Device (ACD) within 10 feet of the top of the MFGU or no more than 200 feet above the top of bedrock where bedrock is separated from the MFGU by more than 200 feet. That could allow ISR fluids to potentially migrate into the USDW before being detected, especially where injection wells are screened in a fault zone. Please revise

the proposed placement of ACDs to include locations above and below the LBFU/MFGU contact and closer than 200 feet from the top of bedrock where separated from the MFGU by more than 200 feet to provide early detection of vertical migration.

The balance of injection and recovery of fluids may be maintained in the active wellfield but may vary from a balance at various five-spot patterns within the wellfield due to localized faulting and fractures that could cause preferential flow in a lateral or vertical direction. Please identify strategic locations for placement of monitoring wells in the LBFU and UBFU that will allow early detection of vertical fluid migration in the direction of the non-exempt portion of the LBFU and UBFU above the orebody and lateral to the bedrock oxide unit within the AoR. Provide justification for the proposed locations. Place monitoring wells to monitor above fault zones where they terminate at the bedrock/LBFU contact.

6. The March 16, 2020 response to EPA comment 24 describes the monitoring results confirming that no migration of injected fluid has occurred at the well casing/cement seal interface. The PTF's ACD data were provided in Exhibit C-1 of the Attachment C of the Application. Please provide a discussion of the criteria by which the ACD data indicates an absence of injected fluid, both in absolute magnitude and decrease/increase in resistance at the ACD.

7. In FCI's March 16, 2020 response to EPA comment 29, Section D.3.5 of Attachment D of the Application has been revised to include discussion of the planned project duration relative to laboratory analysis of site-specific formation material and PTF derived ISCR solutions. The response does not adequately explain how the laboratory data and geochemical modeling support 4 years for extraction followed by 2 years of rinsing. Please describe more fully how the experimental data and geochemical modeling support the 4 years of leaching and 2 years of rinsing. As referenced in Exhibit D-7, please provide Exhibit 10-1, which is described as the 2019 geochemical modeling update.

8. In FCI's March 16, 2020 response to EPA comment 32, Section D.2.2 of Attachment D of the Application has been revised to include discussion of scalability of the hydraulic control method applied at the PTF to the planned commercial ISCR wellfield. However, the application does not describe how a loss of hydraulic control in a small subset of the wellfield could impact nearby portions of the wellfield. Please explain whether a loss of hydraulic control in one part of the wellfield would necessitate an adjustment in operations (e.g., injection or withdrawal) in adjacent parts of the wellfield (other five-spots) to compensate for increased net injection.

9. In FCI's March 16, 2020 response to EPA comment 39, a draft of the financial assurance mechanism was added to Attachment F of the Application under Exhibit F-3. The complete list of wells to be plugged and abandoned after cessation of ISCR operations is listed in the Application under Exhibit F-4. These exhibits are not in the right order. Please switch the exhibits F-3 and F-4 to the correct sheet identifying each of them.