

TABLE F-1

## FLORENCE COPPER ISCR FACILITY CLOSURE AND POST-CLOSURE COST ESTIMATES

FLORENCE COPPER PROJECT

FLORENCE, ARIZONA

OBJECTIVES	DESCRIPTION OF TASKS	UNIT COST	PER UNIT	NO. OF UNITS	ESTIMATED COST <sup>1</sup>
<b>SECTION 1. ISCR WELLS</b>					
<b>1. Groundwater Restoration</b>					
Restore groundwater to meet AWQS/AQL standards, and neutralize/evaporate rinse solution. (Assumed 9 pore volumes for well rinsing, 24 month period) ISCR wells include 205 injection wells, 217 recovery wells, and 40 perimeter wells).	1. Rinse wells. <sup>10</sup>	\$3,643,000	Project Total	1	\$3,643,000
	2. Operation and maintenance labor (includes rinsing, neutralizing and evaporation for 24 month period). <sup>17</sup>	\$1,752,000	Project Total	1	\$1,752,000
	3. Quicklime Neutralization <sup>15</sup>	\$140	Ton	46,000	\$6,440,000
	4. Evaporate impoundment contents using facility evaporators. <sup>11</sup>	\$0.27	1,000 Gallons	6,900,000	\$1,863,000
	5. Sampling and monitoring during rinsing. Level 1 analysis performed quarterly during 24 month rinsing period. (Assumed system is equipped with a manifold and will require 1 sampling location per event.) <sup>12</sup>	\$800	Sampling Event	8	\$7,000
	6. Sampling, analysis, and reporting to confirm AWQS/AQLs, Level 2 analysis. (Assumed system is equipped with a manifold and will require 1 sampling location per event.) <sup>13</sup>	\$2,000	Sampling Event	1	\$2,000
	7. Includes final sampling, analysis, and reporting. Level 1 analysis performed on each well after AWQS/AQL is confirmed. <sup>12</sup>	\$800	Well	460	\$368,000
<b>Subtotal</b>					<b>\$14,075,000</b>
<b>2. Abandon ISCR Wells</b>					
Abandon 462 ISCR wells plus 20 observation wells in accordance with ADWR regulations. <sup>7</sup>	1. File NOIs with ADWR.	\$150	Well	482	\$73,000
	2. Remove electrical conduit, wellhead assemblies and control boxes.	\$500	Well	472	\$236,000
	3. Remove pumps.	\$1,000	Well	472	\$472,000
	4. Remove monuments and cement pads. Cut off casing 5 feet below land surface and backfill hole. (Two crew hours per well.)	\$250	Crew Hours	964	\$241,000
	5. Dispose of liners, wood, and misc. pipe in off-site landfill (5 cy/well).	\$60	Cubic Yards	2,410	\$145,000
	6. Type V cement (\$450/cy, 0.0073 cy/ft).	\$3.30	Lineal Feet	444,810	\$1,468,000
	7. Tremie Type V cement from TD to 5 feet below land surface.	\$5.00	Lineal Feet	444,810	\$2,225,000
	8. Crew and equipment (per diem, backhoe, 10T smel rig).	\$5,000	Well	472	\$2,360,000
	9. Mobilization/Demobilization.	\$2,000	Project Total	1	\$2,000
	10. File Abandonment Completion Reports with ADWR.	\$100	Well	472	\$48,000
	11. Allowance for unexpected conditions.	\$500	Well	472	\$236,000
<b>Subtotal</b>					<b>\$7,506,000</b>
<b>3. Piping</b>					
Clean and disposal of pipe (20,700 LF, 24-inch diameter).	1. Clean and remove pipes. <sup>2</sup>	\$285	Crew Hour	207	\$59,000
	2. Dispose of pipe in off-site landfill. <sup>5</sup>	\$70	Ton	675	\$48,000
<b>Subtotal</b>					<b>\$107,000</b>
<b>4. Soil and Liner Beneath Piping</b>					
Perform analysis to verify no impacts to soil beneath liner. (Assumed to be non-hazardous.)	1. Perform initial sampling and analysis to verify non-hazardous. (1 sample per 50 feet of trench) <sup>4</sup>	\$270	Sample	138	\$38,000
	2. Remove liner. <sup>5</sup>	\$0.20	Square Foot	414,000	\$83,000
	3. Dispose of liner in off-site landfill. <sup>5</sup>	\$70	Ton	62	\$5,000
	4. Backfill ditch using on-site soil. <sup>6</sup>	\$4	Cubic Yards	30,667	\$123,000
<b>Subtotal</b>					<b>\$249,000</b>
<b>ISCR Wells Total</b>					<b>\$21,937,000</b>

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## FLORENCE COPPER ISCR FACILITY CLOSURE AND POST-CLOSURE COST ESTIMATES

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SECTION 2. TANK FARM					
<b>1. Tank Farm</b>					
Empty tanks of contents, rinse and decommission for re-use. Remove concrete and liner.	1. Neutralize contents of acid and sodium hydroxide tanks and place in impoundment for evaporation.	\$2,000	Lump sum	1	\$2,000
	2. Triple rinse tanks and dispose of rinsate in water impoundment. <sup>14</sup>	\$285	Crew Hour	48	\$14,000
	3. Relocate tanks. <sup>14</sup>	\$285	Crew hour	32	\$10,000
	4. Sample concrete. <sup>9</sup>	\$300	Sample	20	\$6,000
	5. Analyze concrete. <sup>9</sup>	\$750	Sample	20	\$15,000
	6. Demo and remove concrete liner. <sup>8</sup>	\$8.00	Square foot	7,200	\$58,000
	7. Transport and disposal concrete at off-site landfill. <sup>3</sup>	\$70	Ton	1,000	\$70,000
	8. Remove pipe and dispose in off-site landfill. <sup>3</sup>	\$70	Ton	8	\$1,000
	<b>Subtotal</b>				<b>\$176,000</b>
<b>2. Soil Beneath Aboveground Storage Tanks and Piping</b>					
Characterize and appropriately dispose, as necessary.	1. Collect and analyze soil samples for characterization. <sup>4</sup>	\$270	Sample	14	\$4,000
	<b>Subtotal</b>				<b>\$4,000</b>
<b>Tank Farm Total</b>					<b>\$180,000</b>
SECTION 3. SEPTIC TANK CLOSURE					
1. Close septic tanks that serve the administration building and SX/EW.	Pump out (2) 1,000-gallon septic tank and close in place.	\$12,000	Lump sum	1	\$12,000
SECTION 4. MISCELLANEOUS COSTS					
<b>1. Daily Monitoring and Observations</b>					
Perform facility inspections and monitoring required by permit.	Included in Operation and Maintenance Labor item in Section 1.				\$0
<b>2. Quarterly Well Monitoring (POC &amp; Supplemental Wells)</b>					
Perform quarterly monitoring of 32 POC and 16 supplemental wells (during closure).	Monitoring per Level 1 Event.	\$36,000	Lump sum	8	\$288,000
<b>Total Miscellaneous Costs</b>					<b>\$288,000</b>
<b>Closure Cost Subtotal</b>					<b>\$22,417,000</b>
<b>Contingency (15%)</b>					<b>\$3,362,550</b>
<b>Administrative and Miscellaneous Expenses (10%)<sup>16</sup></b>					<b>\$2,241,700</b>
<b>Closure Cost Total</b>					<b>\$28,021,250</b>
SECTION 5. POST-CLOSURE MONITORING					
<b>1. Initial Monitoring</b>					
	1. One biennial Level 2 event. <sup>20</sup>	\$82,500	Event	1	\$83,000
	2. Seven quarterly Level 1 events. <sup>20</sup>	\$34,500	Event	7	\$242,000
	<b>Subtotal</b>				<b>\$325,000</b>
<b>2. Biennial Monitoring</b>					
	Fourteen biennial Level 2 events. <sup>20</sup>	\$82,500	Event	14	\$1,155,000
<b>3. Maintenance</b>					
	Maintenance of pumps and wells. Perform visual inspection of surface facilities. <sup>19</sup>	\$43,500	Event	15	\$653,000
<b>4. AQL Exceedance Contingency Per UIC Permit (Part II.H.2.b)</b>					
	1. Notify director and collect verification sample.	\$7,000	Event	1	\$7,000
	2. Notify director of verification results.	\$600	Event	1	\$1,000
	3. If verification sample indicates exceedance, submit report to ADEQ and USEPA.	\$12,000	Event	1	\$12,000
	<b>Subtotal</b>				<b>\$20,000</b>
<b>Post-Closure Monitoring Total</b>					<b>\$2,153,000</b>

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SECTION 6. POC AND SUPPLEMENTAL WELLS					
Abandon 32 POC and 16 supplemental wells in accordance with ADWR and UIC regulations. <sup>7</sup>	1. File NOIs with ADWR.	\$150	Well	48	\$8,000
	2. Remove electrical conduit, wellhead assemblies and control boxes.	\$500	Well	48	\$24,000
	3. Remove pumps.	\$600	Well	48	\$29,000
	4. Remove monuments and cement pads. Cut off casing 5 feet below land surface and backfill hole. (Two crew hours per well.) <sup>18</sup>	\$180	Crew Hours	96	\$18,000
	5. Dispose of liners, wood, and misc. pipe in off-site landfill (5 cy/well).	\$60	Cubic Yards	240	\$15,000
	6. Type V cement (\$450/cy, 0.0073 cy/ft).	\$3.30	Lineal Feet	30,000	\$99,000
	7. Tremie Type V cement from TD to 5 feet below land surface.	\$5.00	Lineal Feet	30,000	\$150,000
	8. Crew and equipment (per diem, backhoe, 10T smel rig).	\$5,000	Well	48	\$240,000
	9. Mobilization/Demobilization	\$2,000	Lump Sum	1	\$2,000
	10. File Abandonment Completion Reports with ADWR.	\$100	Well	48	\$5,000
	11. Allowance for unexpected conditions.	\$500	Well	48	\$24,000
	12. Hydro-seed areas around the wells located in the State Mineral lease area.	\$3,000	Acre	2	\$5,000
<b>POC and Supplemental Wells Total</b>					<b>\$619,000</b>
SECTION 7. ACD CONTINGENCY MONITORING WELLS					
Abandon 51 ACD monitoring wells in accordance with ADWR and UIC regulations. <sup>7</sup>	1. File NOIs with ADWR.	\$150	Well	51	\$8,000
	2. Remove electrical conduit, wellhead assemblies and control boxes.	\$500	Well	51	\$26,000
	3. Remove pumps.	\$600	Well	51	\$31,000
	4. Remove monuments and cement pads. Cut off casing 5 feet below land surface and backfill hole. (Two crew hours per well.) <sup>18</sup>	\$180	Crew Hours	102	\$19,000
	5. Dispose of liners, wood, and misc. pipe in off-site landfill (5 cy/well).	\$60	Cubic Yards	255	\$16,000
	6. Type V cement (\$450/cy, 0.0073 cy/ft).	\$3.30	Lineal Feet	20,400	\$68,000
	7. Tremie Type V cement from TD to 5 feet below land surface.	\$5.00	Lineal Feet	20,400	\$102,000
	8. Crew and equipment (per diem, backhoe, 10T smel rig).	\$5,000	Well	51	\$255,000
	9. Mobilization/Demobilization	\$2,000	Lump Sum	1	\$2,000
	10. File Abandonment Completion Reports with ADWR.	\$100	Well	51	\$6,000
	11. Allowance for unexpected conditions.	\$500	Well	51	\$26,000
	12. Hydro-seed areas around the wells located in the State Mineral lease area.	\$3,000	Acre	2	\$5,000
<b>ACD CONTINGENCY MONITORING WELLS</b>					<b>\$564,000</b>
<b>POST-CLOSURE TOTAL</b>					<b>\$3,336,000</b>
<b>TOTAL CLOSURE AND POST-CLOSURE COST</b>					<b>\$31,357,250</b>

**Notes:**

% = percent

ACD = Annular Conductivity Device

ADEQ = Arizona Department of Environmental Quality

ADWR = Arizona Department of Water Resources

AQL = aquifer quality limit

AWQS = Aquifer Water Quality Standard

cy = cubic yard

cy/ft = cubic yard per foot

ISCR = in-situ copper recovery

LF = linear foot

NOI = Notice of Intent

POC = Point of Compliance

SX/EW = solvent extraction and electrowinning

UIC = Underground Injection Control

USEPA = U.S. Environmental Protection Agency

**TABLE F-1 NOTES:**

**General Notes:** In preparing this estimate, Haley & Aldrich has relied on information and direction provided by Florence Copper and other parties and, unless otherwise expressly indicated, Haley & Aldrich has made no independent investigation as to the validity, completeness, or accuracy of such information. As with any estimate of this nature, Haley & Aldrich recommends that critical assumptions as well as the basis of estimate, be verified before proceeding with detailed project design or implementation.

1. The values of this column have been rounded to the nearest thousand.
2. Clean and remove pipes - crew hour assumes (1 equipment operator \$75/hr, 1 laborer \$60/hr, 1 water pump \$150/day). Crew hour includes contractor overhead and profit. Assumes crew can clean and remove 100 LF per hour.
3. Disposal of non-hazardous waste - assumes \$70 per ton and includes loading, transport, and disposal. The unit cost is based on one transport vehicle making a round trip from Phoenix to Florence to Apache Junction Landfill and back to Phoenix at a cost of \$350 (3.5 hrs x \$100 per hr), loading cost of \$200 (\$10 per ton x 20 tons), and disposal cost of \$800 (20 tons x \$40 per ton), which totals \$1,350 or ≈\$70 per ton.
4. Initial Mine Block soil sampling and analysis (S&A) will be performed in areas potentially affected by spills and leaks to verify that contamination does, or does not, exist. Follow-up S&A may be required in order to determine the extent of contamination or effectiveness of remediation efforts. Costs are estimated to be less than \$140 per sample for sample collection and less than \$130 for sample analysis. Thus, the total S&A cost is \$270 per sample.

Parameters for analysis were selected on the basis of their concentrations in solutions processed on site. Sulfate, sodium, and pH were selected because sulfuric acid and sodium hydroxide were used respectively to prepare solutions for injection and to neutralize acidic groundwater pumped from the recovery wells in the mine block to the evaporation pond. Sodium and copper were also selected as indicators of potential contamination because they are expected to have higher concentrations than other metals in the solutions pumped to and from the mine block.

Cost of sampling is estimated to be no more than \$140 per sample. That would include costs for actual sample collection, for sample and sampler(s) transportation, for sample preparation, and for report preparation. Cost of analyses were estimated thusly: metals digestion, \$41; pH, \$22; sulfate, \$25; copper, \$15; and sodium, \$15; for a total cost of \$118 (\$130 to include a 10% contingency). Thus, the total S&A cost is \$270 per sample.

5. Liner Removal costs are based on recent similar projects performed by Haley & Aldrich in 2019.
6. Ponds will be filled to within 3 feet of their crests with process sediments from the facility evaporators and will be covered with 3 feet of fill.<sup>14</sup>
7. Well abandonment unit costs based on recent similar projects performed by Haley & Aldrich in 2019.
8. Concrete demo cost based on recent similar projects performed by Haley & Aldrich in 2019.
9. Sample and analyze concrete - sample unit costs assume not to exceed \$750 per sample, analytical cost assume \$270 for S&A plus \$480 for sample preparation and TCLP analysis.
10. Well rinsing unit costs assume 205 injection wells, 217 recovery wells and 40 perimeter wells. Assuming a mine block of 500 feet long, 500 feet wide, and 640 feet thick; porosity of 8%; well density of 61 wells per block; and 9 pore volumes, the total volume of rinse water is 6,900,000,000 gallons. Pumps' annual operation cost is \$3,942/pump; assumes 462 pumps for 2 years. Assumed on-site water source is provided.

11. *Evaporation Unit Costs - assumes \$0.27/1,000 gallons to evaporate. Evaporation rate of 6,600 gallons per hour and electricity cost of \$1.76/hr. Purchase of evaporator not included.*
12. *Level 1 sampling & analysis unit costs include sampling, lab analysis, and reporting. Costs based on recent similar projects. Lab analysis costs are \$59 per sample.*
13. *Level 2 sampling & analysis unit costs include sampling, lab analysis, and reporting. Costs based on recent similar projects. Lab analysis costs are \$910 per sample.*
14. *Triple rinse tanks - crew hour assumes (1 equipment operator \$75/hr, 1 laborer \$60/hr, 1 water pump \$150/day), crew hour includes contractor overhead and profit.  
Assumes crew can triple rinse tanks in 6 days.*
15. *Quicklime Neutralization assumes 0.0133 pounds of lime per gallon of water to be neutralized, \$140/ton lime unit cost.*
16. *Administrative support and expenses includes utilities and communications cost, miscellaneous equipment and site maintenance, and site management during closure.*
17. *Operation and maintenance labor crew assumes 3 day laborers \$60/hr, 8 hours per day and 1 night laborer \$60/hr, 16 hours a day; \$2,400/day for 2 years.*
18. *Assumes 3 laborers at \$60/hr each.*
19. *Operation and maintenance labor crew assumes 2, day-laborers at \$60/hr, 8 hours per day (\$960/day) working 10 day, with a truck, tools, and parts totaling (\$19,400) to conduct inspection, operation, and maintenance of equipment.*
20. *Monitoring unit costs are based on recent similar projects performed by Haley & Aldrich in 2019.*