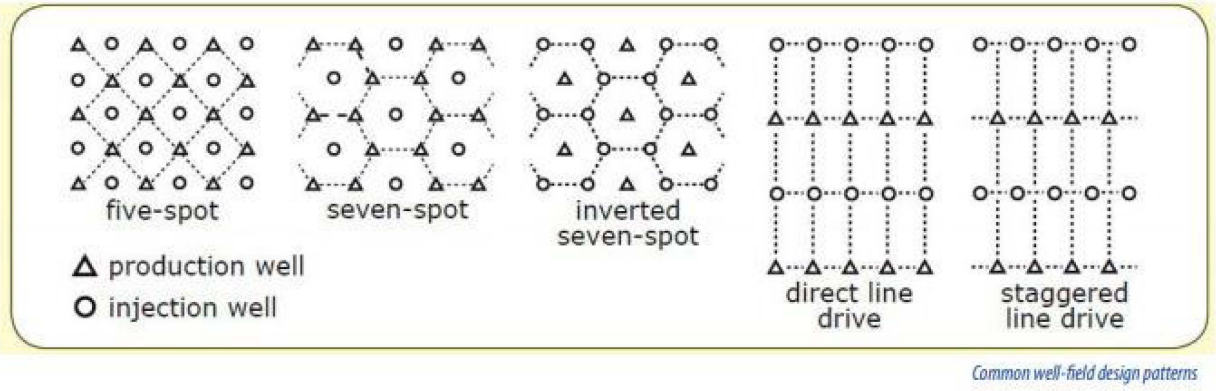

Figure K-2: Typical Vertical Wellfield Configurations for Flooded Leaching
(In-Situ Inc.)

In addition to the vertical pattern options, horizontal drilling and directional drilling for well development are also options for the Fort Cady Project ore body. The mine wellfield development and the pattern will ultimately depend upon recovery and cost benefit analysis of various patterns and options. Directional drilling, as shown in Figure M-2, can be utilized to allow multiple completions from one borehole.

e. Wellfield and Mining Sequence

While the ore body covers 412 acres subsurface, the wellfield will encompass approximately 273 acres of surface disturbance to support the approximate 450 wells required over the life of the mine (LOM). Well recovery rates are estimated to be 75 gallons per minute (gpm) during the PLS recovery phase. Based on well recovery flow rates and PLS boric acid head grade (3.0-5.0% H_3BO_3), of which <0.5% H_3BO_3 is re-injected, each well will produce approximately 1,700 tons of BA per year with each well estimated to have a life of 3 to 8 years.

The ore body has been divided into three (3) mining blocks. Observation and Monitor Wells (both MW and AOR) associated with each block will be installed at least one (1) year prior to the commencement of solution mining within that block to ensure an adequate baseline has been established. Observation and monitor wells associated with Block 1 are: OW 1, 2 and 8; MW 1 and 2; AOR 1 and 2. Block 2 wells are: OW 3, and 7; MW 3a and 3b and 7; AOR 3 and 7. Block 3 wells are: OW 4, 5 and 7; MW 4, and 5; AOR 4 and 5. Note that the group 7 series of wells provide upgradient monitoring for both Blocks 2 and 3. Observation well, OW 6, is located within the ore body. The well will be constructed as an I/R well and will be used to gather groundwater model calibration data until it is converted to I/R use. The blocks and associated wells are depicted in Figure A-3. Based upon the above monitoring data, EPA may require FCCC to install additional monitor wells, such as MW-A and B and AOR A and B.

The first five (5) I/R holes, Wells 149, 153, 154, 178 and 292, will be drilled in Block 2 The initial wells were located by Mr. Fourie, PGeo, to be at least 400 feet from previously drilled holes, identified by the geologic model due to ore grade and ore body thickness, and close to the processing plant.

Each of the I/R wells will initially be operated as injection/recovery (push-pull) to "open" the ore body. When practicable, the well operations will be changed to a more traditional 5-spot pattern of injecting into the center well and recovering from the corner wells, injecting in a corner wells and recovering from the center well, or injecting into a corner well and recovering from a corner well. Infrastructure will be developed in sequence with the wellfield and will consist of main trunk lines and branch lines.

The processing plant is designed to receive approximately 1,120 gpm from the well-field. Therefore, well sets will be added as necessary based upon recovery rates and concentrations. This process will continue throughout Block 2, until the Block has been mined and is ready for rinsing and closure (Attachment Q). It is anticipated that Block 2 will be mined for 7 to 8 years. Status of mining and recovery from each block will be updated in the annual report to EPA. As noted in Attachment R, the reclamation/closure bond will be adjusted prior to drilling new wells.

f. Subsidence Potential

While surface subsidence is possible with any in-situ mining operation, it is not anticipated to occur at the Fort Cady Project. According to the theory of primary one-dimensional consolidation of soils, compaction results from the slow escape of pore water from a stressed deposit, accompanied by a gradual transfer of stress from the pore water to the granular structure of the deposit. Pore water pressure is the pressure of groundwater held within the soil in the gaps between the particles (pores). Dewatering reduces the pore water pressure. The increased effective stress from dewatering compresses the soil (formation) and causes subsidence. (Effective Stress, MGA&I, 2019). FCCC will operate the wellfield to minimize fluid imbalances by tracking the quantities of solution injected and recovered, as discussed in Attachment I

This approach is further validated by the results of the groundwater flow model and the associated subsidence module, which predicts 0.1 to 2.0 feet of subsidence, if more water is produced from the well-field than is injected. (Groundwater Model, MGA&I, 2019). The above results vary from the subsidence contemplated in the 1994 EIS/EIR. However, the above results are based upon the model, and the significant amount of historic and more current data generated at the site used to construct the model and are considered to be more precise.

The results of the groundwater model also indicate that a "cavity" will not form underground, rather, the porosity and permeability will open up with claystone's and non-soluble minerals remaining within the ore body.

In accordance with BLM ROD requirements, FCCC will conduct a subsidence survey at least every two years. The survey will either be conducted by satellite, such as USGS's Interferometric Synthetic Aperture Radar (InSAR) or equivalent, or by a licensed surveyor. All survey points will be tracked in a spreadsheet and plotted on a graph to identify any changes in surface elevations. USGS's InSAR measures changes in land surface altitudes using radar signals from an Earth-orbiting satellite.

g. Earthquake Potential

As discussed in Attachment A, the colemanite ore body is the result of historic volcanic and earthquake activity, and is bounded by two active faults, the Pisgah Fault and Fault B. On October 16, 1999, a 7.2 fault

Attachment P – Monitoring Program

This Attachment P has been prepared in support of an application (Application) by Fort Cady California Corporation (FCCC), to the United States Environmental Protection Agency (USEPA) for issuance of an Underground Injection Control Class III Area Permit (UIC Permit) for FCCC's planned Solution Mining Project (Fort Cady Project or Project) in San Bernardino County, California.

The Fort Cady Project colemanite ore body underlies portions of Sections 25, 26 and 27 of T8N, R5E, in San Bernardino County, California. The Fort Cady Project area is located near the Pisgah Crater, approximately 17 miles east of Newberry Springs, California, and two and one-half (2 ½) miles south of I-40 and the Burlington Northern Santa Fe Railway Pisgah siding in the Mojave Desert. The ore body is located in the central portion of the Project area and is bounded to the west and to the east by two faults. The Pisgah Fault, one of the major northwest-trending faults of the Mojave block, crosses the Project area approximately one-half to one mile southwest of the ore body. Fault B, a smaller, north-south trending fault, runs along the eastern portion of the Project area.

FCCC is proposing to establish a commercial "in-situ" mine to recover boric acid from the 412-acre ore body located an average of 1,400 feet (ft) below ground surface (bgs). The boric acid will be removed from the ground through a process that involves pumping a dilute acid solution into the colemanite to dissolve the borates, forming boric acid which will then be extracted by a reverse-pumping/airlifting process.

This Attachment P provides the required information on monitoring programs for the ore body and Area of Review (AOR).

a. Summary of Monitoring and Corrective Action Plan

The Testing, Monitoring and Corrective Action Plan (Plan), summarized in this Attachment, was developed to comply with 40 C.F.R. §§ 144.33, 144.28(b), 144.51(j), 144.54 and 146.33(b). The attached Plan summarizes actions discussed in other Attachments within this Application including: Well Construction and Testing requirements and reporting; Formation Testing and Reporting; Wellfield Injection & Recovery Processes (included below); Process Wellfield Monitoring; Monitoring & Observation Well (included below); Baseline Parameter and Exceedance Determination (included below); Post-closure Restoration & Plugging & Abandonment; Mechanical Integrity testing; and, Corrective Action Plan.

b. Summary of Process/Wellfield Monitoring

The following information will be monitored and reported in quarterly reports, or as otherwise specified in the permit.

1. FCCC will collect samples of the three types of injection solutions quarterly, or as otherwise specified in the permit, for the first year of mining. FCCC will seek authorization to reduce sampling frequency of injectate to semi-annually, based upon results. As described in Attachments H and N, the three types of injection solutions include: initial solution with make-up water and acid; recycled Pregnant Leach Solution (PLS), for PLS that is heated and reinjected into the well prior to processing; and, process recycled water. It is anticipated that after initial start-up, all injection solution will either be recycled PLS or recycled process waters. Therefore, after the first quarter, FCCC will only collect and report the two types of fluids sampled.

As FCCC is applying for an area permit, injection solution samples will be collected from the injection solution header (manifold).

2. The injection solutions will be analyzed for the following constituents:
    a. Organics: The injection solution samples will be analyzed for diesel-range petroleum hydrocarbons (TPH-D), BTEX, naphthalene, and octane on a monthly basis, which may be reduced to quarterly if the constituents do not vary significantly after the first six months of sampling, subject to approval from the permittee. Monitoring for naphthalene and octane may be discontinued if not detected in the first six months of sampling.
    b. Inorganics: The injection solution samples will be analyzed for inorganic constituents listed in the operating permit on a monthly basis, which may be reduced to quarterly if the constituents do not vary significantly after the first six months of sampling, subject to approval of the permittee.
3. Radionuclides:
    a. The injection solution samples will be analyzed for formation related radioactive chemicals as outlined in List 2a of the permit on quarterly basis. The sampling frequency may be reduced, subject to permittee approval, if constituents are not detected in the first four quarters of sampling.

4. Per 40 C.F.R. § 146.33(b)(2), total injection and total recovery volumes will be recorded daily and adjusted to maintain a minimum 0.5% over extraction volume on a monthly basis.

5. Visual Inspections - All wellfield fluid distribution piping, tanks, pumps, valves and fittings will be inspected weekly to observe for signs of leakage. Completion of the inspection and any findings will be noted in a weekly maintenance inspection log. If leakage is observed, operation of the leaky system will cease until repairs are made.

6. The UIC regulations were established to prevent contamination of USDW's from mining related solutions during solution mining. While there are no know USDWs in or around the colemanite ore body, the ZEI was established just beyond the point where the Numerical Groundwater Model indicates that injection pressures may push mining related solutions at the end of mine life (25 years) and assumed no mining and no rinsing. FCCC will generally operate with an inward hydraulic gradient, but due to the low transmissivity of the ore body, that there will be occasions when a 0.5% overproduction may not be possible. Should no USDW be identified within the AOR during installation of the initial 12 wells, FCCC may request a change to the hydraulic control requirements.

Table P-1 – Injection and Recovery Well Monitoring Parameters			
Parameter	**Units**	**Frequency**	**Instrument**
Injection rate (gpm)	gpm	Continuous	Digital recorder
Daily injection volume	gallons	Daily	Digital totalizer
Total cumulative injection volume	gallons	Continuous	Digital totalizer
Injection pressure, measured at the header manifold	psig	Daily	Digital recorder
Injection fluid temperature, measured at the header manifold	°F	Daily	Digital recorder
Production rate	gpm	Continuous	Digital recorder
Daily produced fluid volume	gallons	Daily	Digital totalizer
Total cumulative produced fluid volume	gallons	Continuous	Digital totalizer
Produced fluid temperature	°F	Daily	Digital recorder
Specific Conductance	mmhos/cm	Continuous	Digital recorder

FCCC will use the following monitoring activities to ensure that mining related solutions stay within the ZEI:

a. Install transducers in the observation and monitor wells (MW and AOR) to continuously read pH, specific conductivity and temperature measurements, all of which are indicators of the possible encroachment of mining related solutions. The transducers will also read water levels, which will raise and lower in relation to the injection pressures. It should be noted that pressures will be elevated in the ore body for 2/3 of the time for each well, i.e. during injection and reaction phases of mining. This information will be reported quarterly and used annually to update the groundwater model.
b. Track injection and production volumes on a daily basis to track the target of overproducing by 0.5% to prevent migration of mining related solutions outside of the ZEI.
c. The following activities may be taken if there is evidence of mining related solutions at the ZEI boundary: additional samples will be collected; additional transducer readings will be used to immediately update the model to provide additional information; injection may be reduced, or moved to alternate portions of the ore body; production will be increased to "pull" mining related solutions back into the wellfield; additional monitor wells may be drilled to gain additional information.
d. Based upon the established monitoring data, EPA may require FCCC to install additional monitor wells, such as MW-A and B and AOR A and B.

c. Establishing Baseline Parameters and Alert Levels

The natural background (pre-operation baseline) water quality of injection zone formation water was previously measured to have a TDS concentration between 23,300 mg/L to 31,200 mg/L, as documented in Mann, 1981. Additional background formation water samples will be collected following the installation of new wells in areas where it is evident that native groundwater exists.

The natural background water quality at monitoring wells (MW and AOR) will be determined from six monthly samples from the new wells, assuming little or no variability in the analytical results. Should the results vary significantly, a report providing an alternative sampling scenario will be prepared and

submitted to EPA for their review and approval. Baseline parameters for the observation wells will be established from at least one quarter of continuous multiparameter sonde measurements in each observation well prior to initiation of mining. Natural background values and exceedance action levels based on natural variability in background values (described below) may be updated with additional data as ongoing background monitoring data becomes available.

Exceedance action levels for each constituent with a background value that is below the maximum contaminant level (MCL) will be set to the EPA MCL.

For those constituents in each well with background concentrations that are above the MCL the action level for defining an exceedance will be set by a basic statistical determination using the observed natural variability of the baseline data (the standard deviation) and the corresponding elevated concentration at which there is 95% confidence that the elevated concentration does not fall within the range of the natural background variability. The formula for determining the action level is AL = M + KS, where AL is the action level, M is the mean concentration, S is the standard deviation, and K is the one-sided normal tolerance interval with a 95% confidence level.

It is recommended that the background and action level determination for the constituents with natural background concentrations above MCLs be based on at least six groundwater samples for proper statistical representation. The 95% confidence level (γ = 0.95) K value for a sample set with eight measurements is 3.707 (Table 1, Lieberman, G.J., 1958, Tables for one-sided statistical tolerance limits: Industrial water control, Vol XIV, No. 10). K values for sample population sizes less than or greater than eight can be found in the Lieberman Table 1, which is readily available online. Obvious outliers will be excluded from the data used in the AL calculation. The sampling, baseline, and action level determination should be performed with data from an individual well for proper statistical representation and should not incorporate inter-well variability.

Time series plots of the data from the monitoring wells will be provided in quarterly and annual monitoring reports which will be submitted according to permit conditions. During report preparation, the plots will be observed for upward or downward trends in the data, and any observed trends will be called out in the text of the report, and the magnitude of the trend relative to the established action levels will be noted.

d. Monitoring & Observation Well

Based upon the results of the Numerical Groundwater Model, (MGA, 2019), FCCC currently plans to drill 13 monitor wells (7 MWs & 6 AORs) and eight (8) observation wells (OWs) over the life of the mine. The ore body has been divided into three (3) mining blocks. Observation and Monitor Wells (both MW and AOR) associated with each block will be installed at least one (1) year prior to the commencement of solution mining within that block to ensure an adequate baseline has been established. Observation and Monitor wells associated with Block 1 are: OW 1, 2 and 8; MW 1 and 2; AOR 1 and 2. Block 2 wells are: OW 3, and 7; MW 3a and 3b and 7; AOR 3 and 7. Block 3 wells are: OW 4, 5 and 7; MW 4, and 5; AOR 4 and 5. Note that the group 7 series of wells provide upgradient monitoring for both Blocks 2 and 3. Observation well, OW 6, is located within the ore body. The well will be constructed as an I/R well and will be used to gather groundwater model calibration data until it is converted to I/R use. The blocks and associated wells are depicted in Figure A-3. Based upon the above monitoring data, EPA may require FCCC to install additional monitor wells, such as MW-A and B and AOR A and B. The blocks and associated wells

are depicted in Figure A-3. Based upon the established monitoring data, EPA may require FCCC to install additional monitor wells, such as MW-A and B and AOR A and B.

All wells will be constructed in compliance with Attachments L and M, including completion of geophysical logging. After logging and well development is complete, and the well has been allowed to stabilize, a sample of formation water will be collected from the middle of the screened interval, or approximately 1,400 ft bgs by a low flow sampler, such as a HydraSleeve™. Standard sampling protocol using non-low-flow samplers, require removing three times the well volume prior to sampling. As historic documentation indicates that flows within the Wedge are less than 0.5 gpm, it would take months for the well to recover between each evacuation prior to collecting a sample. Thus, standard sampling protocol is not considered practical.

The sampling frequency and the constituents to be measured are included in Table P-2, below. Previous owner/operators conducted pilot scale testing under Water Board permits since 1988, FCCC therefore has most of the quarterly reports submitted to the Water Board from 1988 through 2019. Samples were analyzed for eC, pH, TDS, B, Cl, Ca, Mg and Na. Based upon the background formation water sample (before mining activities) collected from SMT-1 in 1981 and the post-mining sample collected from SMT-93-2 collected in 2018, FCCC has identified the analytes in List 1 of Table P-2, below, as being the constituents most indicative of mining solution. If any analytical result is reported as non-detect for four (4) consecutive samples, then FCCC will request that the analyte be dropped from either List 1 or List 2. Additionally, FCCC may request a reduction in frequency in sampling if there are no exceedances for four (4) consecutive sampling.

A sample will be collected from each well quarterly until mining begins to further assess seasonal fluctuations in water levels and possible changes in water quality prior to initiation of mining activities. While there is no evidence of the presence of radionuclides, FCCC will sample for radionuclides quarterly for the first year. Should radionuclides be detected, they will be added to List 2. Should radionuclides not be detected, they will be removed from List 2.

Table P-2 - Sampling Frequency and Constituents to be Measured

Well Class	Parameters	Frequency
Monitoring Wells Quarterly List 1	pH, eC, TDS, As, B, Ca, Cl, Cr, Na, SO_4, Se, Mg, F	Quarterly
	Temperature, Specific Conductance, pH	Quarterly
Monitoring Wells Initial List 2	Alkalinity, Bicarbonate (CaCO3), Alkalinity Total (as CaCO3), Al, Sb, As, Ba, Be, Cd, Ca, Cl, Cr, Cu, Fl, Fe, Pb, Mg, Mn, Hg, Nitrate + Nitrite (as N), Nitrogen, Total (as N), pH, K, Se, Ag, Si, Na, SO4, Tl, TDS, Z, TPH, BTEX, Naphthalene, Octane; radionuclides –	First 6 Monthly Samples, then semi-annually. Radionuclides will be sampled for the first four (4) quarters.

	radium 226 and radium 228 (combined), radon, uranium isotopes	
Observation Wells	Hydrostatic Pressure (water level) Temperature, Specific Conductance, pH	Continuous, except for periods of maintenance; Monthly data downloads
Rinse Verification/Post-closure Wells	Monitoring Wells Quarterly List 1	Quarterly
	Temperature, Specific Conductance, pH	Quarterly

e. Non-Compliance Reporting

a. Should any exceedance of the background levels, or MCL's, whichever is higher, occur during mining, List 2 will be used for all future sampling events until the analyte drops below the exceedance level for four (4) consecutive sampling events, or four (4) quarters.

b. While there is currently no known USDW within the project area, should a USDW be identified during drilling associated with the mining program, in accordance with 40 C.F.R. § 144.51(l)(6), FCCC will notify EPA by phone within 24 hours of having knowledge that "(1) Any monitoring or other information indicates that any contaminate may cause an endangerment to a USDW; or (2) Any noncompliance or malfunction of the injection system which may cause fluid migration into or between USDWs." A follow-up written submission will be submitted within five days of the verbal notification. The written submission will include:

- A description of the noncompliance and its cause.
- The date(s) and time(s) the noncompliance began and ended.
- Corrective actions taken, or why actions have not been completed.
- Corrective Action Plan to prevent a reoccurrence.

b. The Groundwater Flow Model (MGA, 2020) indicates that due to the low transmissivity of the ore body, that there may not be sufficient naturally occurring groundwater to allow overproduction. Hydraulic control will be demonstrated by measuring injection versus recovery volumes and, measuring hydrostatic pressure and SC in OWs, MWs and AORs. Should FCCC be unable to recover at least 0.5% more fluids than injected, the model will be used to assess potential impacts to the surrounding formations. The report will be submitted to EPA for review and approval.

f. Mechanical Integrity Testing

Mechanical Integrity testing will be conducted on injection wells at least every 5 years as discussed in Attachment O. Mechanical Integrity will be maintained consistent with 40 C.F.R. §§ 144.51(q), 146.8 and demonstrated as required in 146.33(b)(3). Reports will be submitted with the quarterly reports.

Mechanical Integrity Testing (MIT) Parts I and II as defined by 40 C.F.R. 146.8 are summarized below:

a) An injection well has mechanical integrity if there is not a significant leak in the well or into USDW's.

b) Mechanical Integrity must be demonstrated before a well, permitted under the Class III Area UIC permit, can be put in use. This includes Observation, Monitoring and Solution Mining Wells.

c) MIT is required for any well that is in use five (5) years after construction, and every five years thereafter, or if the casing has been repaired.
d) MIT includes two (2) parts:
    a. Part I
        - Pressure Testing –
        - Remove all tubing from well bore,
        - install packer immediately above the highest injection interval,
        - fill wellbore with clean water (for worker safety),
        - apply and hold a pressure equal to the maximum allowable injection pressure, but not less than 100 psi, for 30 minutes.
        - If the pressure falls off by 5% or less, then the well has mechanical integrity.
    b. Part II
        - Run temperature log to evaluate the presence/absence of mining solution behind the casing.
        - If the temperature log indicates the potential presence of mining solution behind the casing, then a radioactive tracer survey will be run.
b) A MIT Plan must be submitted to EPA for review and comment prior to conducting MIT. The EPA must be notified at least 30 days prior to testing.

g. Reporting

In accordance with 40 C.F.R. §§ 144.51(j), (k), and (l) and 146.33(c), FCCC will submit monitoring reports quarterly, or as otherwise specified in the permit, to include:

- Monitoring Results, including the information required in 40 C.F.R. § 144.51(j)(3);
- Table of wells with the date drilled, date placed in service and date for initial Mechanical Integrity testing and every 5 years after placed in service;
- Nature and composition of all injected fluids, including chemical composition;
- Any noncompliance during the reporting period;
- Mechanical Integrity testing results; and
- Daily injection flow rates and quantity and pressures and recovery flow rate and quantity averaged over the month and submitted in the quarterly report.

Monitoring will be reported on a project basis rather than individual well basis through use of manifold monitoring, consistent with 40 C.F.R. § 144.33(c)(3). Each report will be signed and certified as required by 40 C.F.R. § 144.51(k).

h. Recordkeeping

Per 40 C.F.R. § 144.51(j), FCCC will keep the following records for three (3) years:

- Calibration and maintenance records; and
- All original strip chart recordings for continuous monitoring instrumentation.

FCCC is applying for an area permit, therefore the analytical results will be kept until three years after closure of the mine.