UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region8

JUL 20 2017

Ref: 8WP-SUI

Kirk Daehling
Natural Soda LLC
3200 RBC 31
Rifle, Colorado 81650

Re: FINAL – Major Area Permit Modification
EPA UIC Permit CO30358-00000
Rio Blanco County, Colorado

Dear Mr. Daehling:

Enclosed is your copy of the Final Underground Injection Control (UIC) Program Major Modification for the Natural Soda LLC Area Permit CO30358-00000 (Permit). A Statement of Basis that discusses the development of the Permit modification decision is also included. The public comment period ended on May 27, 2017. No comments on the Permit modification were received during the public notice period; therefore, the effective date for this Permit is the date of issuance. All conditions set forth herein refer to Title 40 Parts 124, 144, 146, and 147 of the Code of Federal Regulations (CFR) and are regulations that are in effect as of the Effective Date of this Permit.

Please note that under the terms and conditions of this Final Permit modification, you are authorized only to construct the injection wells listed in this Permit. To include additional wells to this Area Permit, the requirements in the Final Permit modification, Part II Section G must be fulfilled. Prior to commencing injection for all wells, the requirements found in Part II Section B must be fulfilled, including obtaining a written Authorization to Inject from the EPA. It is your responsibility to be familiar with, and to comply with, all provisions of your Permit. The EPA forms referenced in the Permit are available at https://www.epa.gov/uic/underground-injection-control-reporting-forms-owners-or-operators. Guidance documents for Cement Bond Logging, Radioactive Tracer Testing, Step Rate Testing, Mechanical Integrity Demonstration, Procedure in the Event of a Mechanical Integrity Loss and other UIC guidances are available at https://www.epa.gov/uic/underground-injection-control-epa-region-8-co-mt-nd-sd-ut-and-wy#guidance. Upon request, hard copies of the EPA forms and guidances can be provided.

This UIC Permit is issued for the operating life of the well unless terminated (Part III Section B). The EPA may review this Permit at least every five (5) years to determine whether any action is warranted pursuant to 40 CFR § 144.36(a).

If you have any questions on the enclosed Final Permit modification or Statement of Basis, please contact Wendy Cheung at (800) 227-8917, extension 312-6242.

Sincerely,

Darcy O'Connor
Assistant Regional Administrator
Office of Water Protection

Enclosures (2)

cc: Paul Daggett, BLM
Travis Marshall, DMRS
Jerry Daub, Daub & Associates

UNDERGROUND INJECTION CONTROL PROGRAM
AREA PERMIT

Permit No. CO30358-00000

Class III Solution Mining
Rio Blanco County, CO

Issued To

Natural Soda LLC
3200 Rio Blanco County Road 31
Rifle, CO 81650

TABLE OF CONTENTS

PART I. AUTHORIZATION TO CONSTRUCT AND OPERATE

Under the authority of the Safe Drinking Water Act and Underground Injection Control (UIC) Program regulations of the U. S. Environmental Protection Agency (EPA) codified at Title 40 of the Code of Federal Regulations (40 CFR) parts 2, 124, 144, 146, and 147, and according to the terms of this Area Permit,

Natural Soda LLC
3200 Rio Blanco County Road 31
Rifle, CO 81650

hereby referred to as the "Permittee", is authorized to construct and to operate Class III wells within the permitted area which is described by the Permittee's Bureau of Land Management's sodium lease boundary plus an additional ¼ mile perimeter exterior to these leases and described by:

Township 1 South, Range 98 West, 6th P.M.

Section 7, SE1/4 SE1/4; Section 8, S1/2 S1/2; Section 9, S1/2 S1/2; Section 10, S1/2 S1/2; Section 11, S1/2 S1/2; Section 12, S1/2 S1/2; Section 15, N1/2 NW1/4; SW1/4 NW1/4; Section 16, SE1/4 NE1/4; E1/2 SE1/4; SW1/4 SE1/4; Section 18, E1/2 E1/2; Section 19, NE1/4 NE1/4; Section 20, N1/2 NW1/4; W1/2 NE1/4; SE1/4 NE1/4; E1/2 SE1/4; Section 21, NW1/4 NE1/4; E1/2 NW1/4; SW1/4 NW1/4; NW1/4 SW1/4; Section 29, N1/2 NE1/4; SW1/4 NE1/4; NW1/4 SE1/4; N1/2 SW1/4; Section 30, E1/2 SE1/4; Section 31, NE1/4 NE1/4; Section 32, N1/2 N1/2; SE1/4 NE1/4; E1/2 SE1/4; Section 34, W1/2 SW1/4; NE1/4 SW1/4; NW1/4 SE1/4; NE1/4; Section 35, S1/2 N1/2; Section 36, SW1/4 NW1/4; N1/2 N1/2

Township 2 South, Range 98 West, 6th P.M.

Section 5, NE1/4 NE1/4; Section 4, N1/2 N1/2; Section 3, NW1/4 NW1/4

Township 1 South, Range 97 West, 6th P.M.

Section 7, SW1/4 SW1/4; Section 18, W1/2 W1/2; Section 19, W1/2 W1/2; Section 30, W1/2 W1/2; Section 31 NW1/4 NW1/4

The wells and their status that are included in this area permit are:

Well Name	Permit Number	Well Construction	Well Status	Sec	Twp	Rng	Qtr/Qtr
7H-2I	CO30358-06597	Horizontal	Active	26	1S	98W	SWSE
10H-I	CO30358-08414	Horizontal	Active	25	1S	98W	SWSW
11H-I	CO30358-08415	Horizontal	Active	25	1S	98W	SWSW
12H-I	CO30358-08416	Horizontal	Active	25	1S	98W	SWSW
13H-I	CO30358-08417	Horizontal	Active	25	1S	98W	SWSW
14H-I	CO30358-10084	Horizontal	Active	25	1S	98W	SWSW
8H-I	CO30358-10221	Horizontal	Active	35	1S	98W	NWNW
15H-I	CO30358-11004	Horizontal	Active	27	1S	98W	SESE
16H-I	CO30358-11005	Horizontal	Proposed	34	1S	98W	NENE
17H-I	CO30358-11006	Horizontal	Proposed	34	1S	98W	NENE

This Permit is based on representation made by the applicant and on other information contained in the Administrative Record. Misrepresentation of information or failure to fully disclose all relevant information may be cause for termination, revocation and reissuance, or modification of this Permit and/or formal enforcement action. It is the Permittee's responsibility to read and understand all provisions of this Permit.

Where a State or Tribe is not authorized to administer the UIC program under the SDWA, the EPA regulates underground injection of fluids into wells so that injection does not endanger Underground Sources of Drinking Water (USDWs). EPA UIC Permit conditions are based on authorities set forth at 40 CFR parts 144 and 146, and address potential impacts to USDWs. Under 40 CFR part 144, subpart D, certain conditions apply to all UIC Permits and may be incorporated either expressly or by reference. Regulations specific to the State of Colorado injection wells are found at 40 CFR part 147 subpart G.

The Permittee is authorized to engage in underground injection in accordance with the conditions of this Permit. The Permittee shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of a fluid containing any contaminant into USDWs, except as authorized by 40 CFR part 146. Any underground injection activity not authorized by this Permit or by rule is prohibited.

Issuance of this Permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of any other Federal, State or local law or regulations (40 CFR § 144.35). Compliance with the terms of this Permit does not constitute a defense to any enforcement action brought under the provisions of Section 1431 of the SDWA or any other law governing protection of public health or the environment, for any imminent and substantial endangerment to human health or the environment, nor does it serve as a shield to the Permittee's independent obligation to comply with all UIC regulations. Nothing in this Permit relieves the Permittee of any duties under applicable regulations.

This Permit is issued for the operating life of the wells unless modified, revoked and reissued, or terminated under 40 CFR §§ 124.5, 144.12, 144.39, 144.40 or 144.41, and shall be reviewed at least once every five (5) years to determine if action is required under 40 CFR §144.36(a).

Issue Date: July 20, 2017 Effective Date: July 20, 2017

Darcy O'Connor
Assistant Regional Administrator*
Office of Water Protection

*NOTE: Throughout this Permit the term "Director" refers to either the Assistant Regional Administrator for the Office of Water Protection (OWP) or the Assistant Regional Administrator of Environmental Compliance, Enforcement and Justice (ECEJ).

PART II. SPECIFIC PERMIT CONDITIONS

Section A. WELL CONSTRUCTION REQUIREMENTS

These requirements specify the approved minimum construction standards for well casing and cement.

Details of the approved well construction plans are incorporated into this Permit as APPENDIX A and any subsequent modifications. Changes to the approved plan that may occur during construction must be approved in writing by the Director prior to being physically incorporated.

1. Casing and Cement

The well or wells shall be cased and cemented to prevent the movement of fluids into or between USDWs, and in accordance with 40 CFR § 146.32 and other applicable Federal, State or local law or regulation. Remedial construction measures may be required if a well is unable to demonstrate mechanical integrity as described in Part II Section D.

2. Injection Well Sampling and Monitoring Devices

The Permittee shall install and maintain in good operating condition:

(a) recording devices capable of continuously monitoring, within a certified accuracy of 95% or better, the injection pressure, flow rate, and temperature; and

(b) a fluid sampling point at a conveniently accessible location on the injection flow line, between the plant and the injection well, isolated by shut-off valves, for collection of representative samples of the injected fluid; and

(c) one-half (1/2) inch female iron pipe fitting, isolated by shut-off valves and located at the wellhead at a conveniently accessible location, for the attachment of a pressure gauge capable of monitoring pressures ranging from normal operating pressures up to the Maximum Allowable Injection Pressure (MAIP) on the injection string.

3. Postponement of Construction or Conversion

The Permittee shall complete well construction within two years of the Authorization of the additional well or this permit modification. Authorization to construct and operate shall expire if the well has not been constructed within two years of the Authorization, unless the Permittee has notified the Director and requested an extension prior to expiration. Notification shall be in writing, and shall state the reasons for the delay and provide an estimated completion date.

Section B. REQUIREMENTS PRIOR TO COMMENCING INJECTION

The completion of the well requires fluids to circulate through the injection well and then brought up to the surface in the recovery well to ensure the connection between the injection and recovery wells remains open. This activity is integral to the construction of the well. The commencement of well operation, or well injection, is defined by the recovery of saturated brine delivered to the processing plant. Well operation may commence only after all well construction and pre-operation requirements have been met and a written authorization to commence injection has been obtained from the Director.

In order to obtain written authorization to commence injection,

1. The Permitte shall:

(a) Submit to the Director a notice of completion of construction and a completed

EPA Form 7520-9. The Permittee shall provide a final well diagram and if different than APPENDIX A, a description of the modification to the well construction;

(b) Provide information on the depth to the top of each formation or unit encountered in each new-drill injection well specified in total vertical depth and measured depth. During the drilling of new injection wells the Permittee shall submit any water quality or other pertinent data that is collected and any unexpected difficulties encountered during well construction.

Coring may be performed within the mining interval as needed to obtain pertinent stratigraphic data for mining planning. Core data shall be provided to the EPA and BLM, if requested;

(c) Conduct all logging and testing requirements shown in APPENDIX B and submit required records to the Director. The logging and testing requirements include demonstration of mechanical integrity pursuant to 40 CFR §146.8, in accordance with the conditions found in Part II Section D of this Permit. Well logs and tests shall be performed according to current EPA-approved procedures. The Director may stipulate specific test methods and criteria best suited for a specific well construction and injection operation;

(d) Provide anticipated maximum pressure and flowrate at which the well will operate;

(e) Provide documentation of surface subsidence monument installation;

(f) As needed, provide documentation of subsurface subsidence monitoring well installation, required logs, and estimated production values for the Boies Bed;

(g) As needed, provide documentation of completion of corrective action plan for area of review wells; and

2. The Director has received and reviewed the documentation associated with the requirements in Paragraph 1 of this section and finds it is in compliance with the conditions of the Permit; and

3. The Director has inspected the injection well and finds it is in compliance with the conditions of the Permit. If the Permittee has not received notice from the Director of his or her intent to inspect the injection well within 13 days of the date of the notice in Paragraph 1(a) above, then prior inspection is waived.

Section C. WELL OPERATION

Injection between the outermost casing protecting USDWs and the well bore is prohibited. Injection is approved under the following conditions:

1. Injection Zone and Perforations

Injection zone means "a geological formation, group of formations, or part of a formation receiving fluids through a well." Injection is permitted only within the approved injection zone specified in APPENDIX C.

2. Injection Pressure Limitation

(a) The permitted Maximum Allowable Injection Pressure (MAIP) for the wells included in this Permit, measured at the wellhead, is found in APPENDIX C. Injection pressure shall not exceed the amount the Director determines is appropriate to ensure that injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case shall injection pressure

initiate fractures in the injection zone or cause the movement of injection or formation fluids into a USDW.

(b) The Permittee may request a change of the MAIP, or the MAIP may be decreased by the Director in order to ensure that the requirements in Paragraph (a) above are fulfilled. The Permitee may be required to conduct a step rate injection test or other suitable test to provide information for determining the fracture pressure of the injection zone. Change of the permitted MAIP by the Director shall be by modification of this Permit and APPENDIX C.

3. Injection Temperature Limitation

The maximum allowable temperature for the wells included in this Permit, measured at the wellhead, is found in APPENDIX C.

4. Injection Volume and Operational Fluid Level Limitations

(a) Injection volume is limited to the total volume specified in APPENDIX C.

(b) The cavity fluid levels shall remain at a lower level than the static water levels of the B-Groove aquifer.

5. Injection Fluid Limitation

Injection of any hazardous waste as identified by EPA under 40 CFR § 261.3 is expressly prohibited. The approved injection fluid is a combination of the following fluids having a total volume equal to the quantity needed to produce brine at the rates required by production:

- depleted solution mining production fluid from which the bicarbonate/carbonate content has been mostly removed. This fluid is recycled to the injection wells as part of the solution mining process; and
- fresh water pumped from the A-Groove Aquifer or other fresh water source, used as make-up water;
- make-up water from the process pond;
- injection of recovery solution back into the formation to aid in the stability of the cavity.

6. Workovers and Alterations

Workovers and alterations shall meet all conditions of the Permit. Prior to beginning any workover, addition or physical alteration, the Permittee shall give advance notice to the Director. Additionally, the Director's written approval must be obtained if the addition or physical alteration to the injection well modifies the approved well construction found in APPENDIX A and any subsequent modifications. Substantial alterations may also be cause for modification to the permit. Written approval is not required when a "pull back" occurs, nor is this activity considered an alteration that requires a permit modification. A "pull back" is defined as installing a bridge plug in the horizontal portion of the liner which is located in the production interval. The liner would then be perforated upstream and adjacent to the bridge plug to reestablish injection. The bridge plug may be periodically moved or "pulled back" to target another section of the production interval or a new bridge plug may be used.

The Permittee shall record all workovers and alterations on a Well Rework Record (EPA Form 7520-12) and when appropriate, submit a revised well construction diagram to be incorporated into APPENDIX A. The Permittee shall provide this and any other record of well workover, logging, or test data to EPA within thirty (30) days of completion of the activity.

The Permittee shall complete any well workover or alteration which affects the casing and provide demonstration of internal (Part I) MI within 90 days of beginning the activity. If the Permittee is unable to complete work within the specified time period, the Permittee may provide an alternative schedule and shall obtain Director's written approval. Injection operations shall not resume until the well has successfully demonstrated mechanical integrity and the Director has provided written approval to recommence injection.

7. Well Logging and Testing

Periodic well logging and testing requirements are found in APPENDIX B. The Permittee shall ensure the log and test requirements are performed within the time frames specified in APPENDIX B. Well logs and tests shall be performed according to current EPA approved procedures. The Director may stipulate specific test methods and criteria best suited for a specific well construction and injection operation.

Section D. MECHANICAL INTEGRITY

Injecting into a well that lacks mechanical integrity is prohibited.

An injection well has mechanical integrity if:

(a) There is no significant leak in the casing, if applicable (internal Part I); and

(b) There is no significant fluid movement into a USDW through vertical channels adjacent to the injection well bore (external Part II).

1. Demonstration of Mechanical Integrity (MI)

The conditions under which the Permittee shall conduct the mechanical integrity testing are as follows and detailed in APPENDIX B:

(a) Prior to receiving authorization to inject, after any rework that compromises the internal MI of the well, after a loss of MI, or periodically at the frequency specified in APPENDIX B, the well shall be tested by means of an approved pressure test to demonstrate internal Part I MI.

(b) Within 60 to 90 days of receiving authorization to inject and periodically as specified in APPENDIX B, the Permittee shall demonstrate external Part II MI. Well-specific conditions dictate the methods and the frequency for demonstrating MI and are specified in APPENDIX B.

(c) The Director may require additional or alternative tests if the results presented by the operator are not satisfactory to the Director to demonstrate there is no movement of fluid into or between USDWs resulting from the injection activity.

(d) Results of MI tests required by this Permit shall be submitted to the Director as soon as possible but no later than thirty (30) days after the test is complete.

2. Mechanical Integrity Test Methods and Criteria

EPA approved methods shall be used to demonstrate mechanical integrity. The documents are available from the EPA and include: Ground Water Section Guidance No. 34 "Cement Bond Logging Techniques and Interpretation", Ground Water Section Guidance No. 39, "Pressure Testing Injection Wells for Part I (Internal) Mechanical Integrity", and guidelines for demonstrating Part II (External) Mechanical Integrity, including "Radioactive Tracer Surveys for Evaluating Fluid Channeling Behind Casing near Injection Perforations", and "Temperature Logging For Mechanical Integrity"

The Director may stipulate specific test methods and criteria best suited for a specific well construction and injection operation.

3. Notification Prior to Testing

The Permittee shall notify the Director at least 30 calendar days prior to any mechanical integrity test. The Director may allow a shorter notification period if it would be sufficient to enable EPA to witness the mechanical integrity test or EPA declines to witness the test. Notification may be in the form of a yearly or quarterly schedule of planned mechanical integrity tests, or it may be on an individual basis.

4. Loss of Mechanical Integrity

If the well fails to demonstrate mechanical integrity during a test or a loss of mechanical integrity becomes evident during operation, the Permittee shall notify the Director within 24 hours (see Part III Section D.10(e) of this Permit), cease injection, and shut-in the well within 48 hours unless the Director requires immediate shut-in.

Within 30 days, the Permittee shall submit a follow-up written report that documents circumstances that resulted in the MI loss and how it was addressed. If the MI loss has not been resolved, the Permittee shall provide a report with the proposed plan and schedule to reestablish MI. A demonstration of mechanical integrity shall be re-established within 90 days of any loss of mechanical integrity unless written approval of an alternate time period has been given by the Director.

Injection operations shall not resume until after the MI loss has been resolved, the well has demonstrated mechanical integrity pursuant to 40 CFR §146.8, and the Director has provided written approval to resume injection.

Section E. MONITORING, RECORDKEEPING, AND REPORTING OF RESULTS

1. Monitoring Parameters and Frequency

Monitoring parameters are specified in APPENDIX D. The listed parameters are to be monitored, recorded and reported at the frequency indicated in APPENDIX D even when the well is not operating.

Monitoring records must include:

(a) the date, time, location and the results of the observation, sampling, measurement, or analysis;

(b) the name of the individual(s) who performed the observation, sampling, measurement, or analysis;

(c) the analytical techniques or methods used for analysis; and

(d) the results of such analysis.

2. Monitoring Methods

Monitoring observations, measurements, samples, etc. taken for the purpose of complying with these requirements shall be representative of the activity or condition being monitored. The *"Environmental Monitoring Plan"* (*EMP*) and the *Groundwater Sampling and Analysis Plan* (*SAP*) are two documents that are part of the Permittee's Mine Plan. All or sections of these documents are incorporated by reference in this Permit as described in APPENDIX D. Any revisions to these documents require EPA written approval to be accepted as a condition of this Permit. The referenced monitoring plan and sampling protocol will be conducted

according to the most current approved version.

(a) Temperature, Pressure, and Flow rates. Injection temperature, pressure and flow rate measurements shall be monitored at the wellhead of the injection well. Recovery flow rate will be measured at the production well. These parameters shall be monitored continuously, recorded at 10 minute intervals. A weekly maximum/minimum and average value will be provided graphically.

(b) Injection Fluid Characteristics.

1. Methods used to monitor the nature of the injected fluids must comply with analytical methods cited and described in Table 1 of 40 CFR § 136.3 or Appendix III of 40 CFR § 261, or analytical methods described in the SAP.

2. The individual recovery flow lines from each cavity shall be equipped with sampling ports to facilitate collection of samples for specific gravity, pH, total dissolved solids (mg/L) and specific conductivity, major and minor analytes listed in the SAP.

(c) Mining Interval Monitoring. Material balances of the volumetric fluid flow rates into and out of the solution mining cavities shall be performed to calculate mass of nahcolite extracted. The Permittee shall utilize this data to perform a mass balance of inflow and outflow from the cavity at least weekly on each well to provide an indication of fluids migration from the solution mining cavity.

3. *Subsurface Subsidence Monitoring Well*

A subsurface subsidence well shall be required for every two cavities mined. Prior to authorization to inject into the first of the two cavities, the subsurface subsidence monitoring well shall be constructed within 90 days after authorization to inject is received. Monitoring of these wells shall be conducted during operation and continue until 3 years after cessation of mining.

The subsurface subsidence monitoring wells shall be sited directly over the cavity. For recovery well configurations that include a horizontally drilled injection and recovery well, the well shall be proximally located at the intersection of the injection and recovery wells. In the event the location is inaccessible or a different injection and recovery well configuration is proposed, the Permittee shall propose the location of the subsidence monitoring well for EPA's approval and justification for the alternative location (see Section G.1.g). At a minimum, the subsurface subsidence wells shall be drilled to the base of the confining zone, R-6.

APPENDIX D describes the monitoring parameters for subsidence. If ground movement is detected, the Permittee will notify the EPA. After verification, the Permittee will provide remedial actions taken to slow or arrest further caving, including cease injection.

(a) Two wells with Time Domain Reflectometry (TDR) cables are currently in use: 4A-5M south of the plant and 3M-TDR south and east of the plant. TDR cables shall be capable of continuously monitoring. Measurements from these devices will be collected monthly by the Permittee, and quarterly by a third party, during active mining and for three years after cessation of mining within the areas south, and south and east of the plant.

Should these TDR subsurface subsidence wells fail prior to 3 years after

cessation of mining, the Permittee shall install a new geophysical well or convert an existing well within the Permit area to continue monitoring subsurface subsidence.

(b) Existing borehole geophysical logs shall be run periodically in subsurface subsidence monitoring wells. These geophysical logs will be compared to an original baseline geophysical log. A natural gamma ray (GR) and casing collar locator (CCL) log will be used to detect subsurface movement. Future cavity development will utilize geophysical logs for monitoring.

A gamma ray log shall be run: a) following completion of the well to establish baseline and prior to authorization to inject for the injection well associated with the first cavity; b) after 50% of planned nahcolite recovery of the first cavity; c) after 75% of planned nahcolite recovery of the first cavity d) following cessation of the first and second cavities; and e) after 3 years of cessation of mining of the second cavity.

(c) Other subsurface monitoring techniques may be employed, provided the operator submit, sufficient information to demonstrate that the alternative will provide equivalent subsidence monitoring to that of the existing monitoring technique, and the alternative monitoring technique is approved by the Director. If approved, the Permit will be changed to include the new alternative by issuance of a Minor Modification.

4. Surface Subsidence Monument Monitoring

A surface subsidence monument shall be required for each new well drilled and shall be proximally located at the intersection of the injection and recovery wells. These monuments shall be installed on undisturbed ground. In the event the location is inaccessible or a different injection and recovery well configuration is proposed, the Permittee shall propose the location of the subsidence monitoring well for EPA's approval and justification for the alternative location (see Section G.1.g).

Monuments shall be monitored biennually and a deviation of 0.2 feet will require notification to the EPA as described in APPENDIX D. The Director may require greater monitoring frequency or additional surface monuments, as appropriate.

5. Groundwater Monitoring Program

The Ground Water Monitoring Program found in the *EMP* is incorporated into this Permit. This monitoring plan describes the location and aquifer monitored for each dedicated monitoring wells, sampling procedure, constituents sampled, monitoring frequency and duration. The results of this monitoring program will be provided annually along with an analysis of the results.

If a deviation from baseline trend for hydraulic head or water quality occurs, EPA shall be notified within 10 days of discovery and provided with a proposed action plan. The Director may require greater monitoring frequency or additional monitoring wells, as appropriate.

6. Records Retention

The Permittee shall retain records of all monitoring information, including the following:

(a) Calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for this Permit, for a period

of at least (3) years from the date of the sample, measurement, report, or application. This period may be extended any time prior to its expiration by request of the Director.

(b) Nature and composition of all injected fluids until three (3) years after the completion of any plugging and abandonment (P&A) procedures specified under 40 CFR §144.52(a)(6). The Permittee shall continue to retain the records after the three year retention period unless the Permittee delivers the records to the Director or obtains written approval from the Director to discard the records.

7. Quarterly and Annual Reports

Regardless of whether or not the well is operating, the Permittee shall submit a Quarterly Report to the Director that summarizes the results of the monitoring required by Part II Section D and APPENDIX D. The report shall also include a summary of any major changes in characteristics or sources of injected fluid.

The Quarterly Report shall cover the period from the January 1 through March 31, April 1 through June 30, July 1 through September 30, and October 1 through December 31. Quarterly Reports shall be submitted within 30 days following the end of the data collection period. Form 7520-8 may be used or adapted to submit the Quarterly Report. An electronic form may also be obtained from EPA to satisfy reporting requirements.

The subsidence and groundwater monitoring report shall be submitted to the EPA annually. The report will contain data from surface monument surveys, TDR, and borehole geophysical data. The annual subsidence report shall also include a map of surface monument locations, locations of wells where any borehole geophysics were conducted, and a summary of pertinent observations during the reporting period. The report will also include results of the fieldwide groundwater monitoring program as described in APPENDIX D.

Whenever possible, results are to be abstracted and submitted to the Director in a graphical format designed to facilitate accurate conveyance of the information being presented.

Section F. PLUGGING AND ABANDONMENT

1. Notification of Well Abandonment, Conversion or Closure

The Permittee shall notify the Director in writing at least thirty (30) days prior to: 1) plugging and abandoning an injection well and 2) converting to a non-injection well.

2. Well Plugging Requirements

Prior to abandonment, the injection well shall be plugged with cement in a manner which isolates the injection zone and will not allow the movement of fluids into or between USDWs, and in accordance with 40 CFR § 146.10 and other applicable Federal, State or local law or regulations.

3. Approved Plugging and Abandonment Plan

The approved plugging and abandonment plans and required tests are incorporated into this Permit as APPENDIX E. Changes to the approved plugging and abandonment plan must be approved by the Director prior to beginning plugging operations. The Director also may require revision of the approved plugging and abandonment plan at any time prior to plugging the well.

4. Plugging and Abandonment Report

Within thirty (30) days after plugging a well, the Permittee shall submit a report (EPA Form

7520-14) to the Director. The plugging report shall be certified as accurate by the person who performed the plugging operation. Such report shall consist of either:

(a) A statement that the well was plugged in accordance with the approved plugging and abandonment plan; or

(b) Where actual plugging differed from the approved plugging and abandonment plan found in APPENDIX E, an updated version of the plan, specifying the differences.

5. Inactive Wells

After any period of two years during which there is no injection, the Permittee shall plug and abandon the well in accordance with Part II Section E.2 and APPENDIX E of this Permit unless the Permittee:

(a) Provides written notice to the Director prior to the two year period; and

(b) Describes the actions or procedures the Permittee will take to assure that the well will not endanger USDWs during the period of temporary abandonment (or period of inactivity). These actions and procedures shall include compliance with mechanical integrity demonstration, Financial Responsibility, and all other permit requirements designed to protect USDWs; and

(c) Receives written notice by the Director to temporarily waive plugging and abandonment requirements.

Section G. REQUIREMENTS FOR ADDITIONAL WELLS

The Permittee may convert and/or construct and operate additional wells within the permitted area, provided that all additional wells meet all conditions as set forth in the permit. All sections of this Permit apply to each additional well approved for injection. Additional requirements beyond those described in this Permit may be required for the additional injection well.

1. Conversion/Construction Notification Requirements

The Permittee shall submit a plan consisting of:

(a) A completed EPA Form 7520-6 injection well application;
(b) If different from the approved well construction plan in APPENDIX A, a well schematic and construction details of the additional well to meet the well construction requirements described in Section A of this Permit;
(c) A remedial plan for addressing the repair and use of any injection well found not to be properly cemented or completed as required by Section A.1 of this Permit. The EPA shall evaluate this information and determine if remediation or well closure of any injection well is warranted;
(d) If a converted well, a well schematic and construction details of the well to meet the well construction requirements described in Section A of this Permit shall be provided. This information shall also include casing and cementing details (cement evaluation log, if available), depths to top and bottom of USDWs, confining zone, and injection zone, and formation depths;
(e) A topographic map extending to at least ¼-mile radius Area of Review (AOR) from the well and information on all wells within a 1/4 mile of the injection well location. If an AOR review well penetrates the confining zone and has not been previously identified, this information shall also include the completion report including casing and cementing details, CBL (if available), depths to top and bottom of any USDWs, formation depths, and P&A record (if applicable);

(f) For wells in the AOR which are improperly sealed, completed, or abandoned, the Permittee shall develop a corrective action plan consisting of the steps or modifications that are necessary to prevent movement of fluid into USDWs;

(g) As required in Section E.3 and E.4 of this Part, site location and construction details of the proposed subsurface subsidence monitoring well and surface subsidence monument. If the location is different than at the intersection of the injection and recovery well, justification for the alternative location shall be provided.

(h) A completed EPA Form 7520-14 injection well plugging and abandonment plan. If different from the approved plugging and abandonment plan in APPENDIX E, submit a plan for plugging and abandonment that includes a well schematic and description of type, number, and placement of the plugs and method used to place the plugs. The plan should demonstrate adequate protection of USDWs; and

(i) Demonstration of financial responsibility and resources to close, plug, and abandon the well.

The plan must first be approved by the Director and the Permittee shall not begin construction or conversion of the well until after receiving written authorization from the Director.

2. Requirements Prior to Commencing Injection for Additional Wells

Wells added to permit after the final issuance of the program shall follow the requirements found in Section B. *Requirements Prior to Commencing Injection.* Injection shall not commence until the receipt of the written Authorization to Inject from the Director.

3. Cumulative Effects

Pursuant to 40 CFR §144.33, the Director shall periodically review the cumulative effects of additional wells and shall advise the Permittee of any required changes to the Permit or mining operations.

PART III. CONDITIONS APPLICABLE TO ALL PERMITS

Section A. CHANGES TO PERMIT CONDITIONS

1. Modification, Revocation and Reissuance, or Termination

The Director may, for cause or upon a request from the Permittee, modify, revoke and reissue, or terminate this Permit in accordance with 40 CFR §§ 124.5, 144.12, 144.39, and 144.40. Also, this Permit is subject to minor modification for causes as specified in 40 CFR § 144.41. The filing of a request for modification, revocation and reissuance, termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any condition of this Permit.

2. Conversions

The Director may, for cause or upon a written request from the Permittee, allow conversion of the well from a Class III injection well to a non-UIC well or another UIC well class. Conversion may not proceed until the Permittee receives written approval from the Director. Conditions of such conversion may include but are not limited to, approval of the proposed well rework, follow up demonstration of mechanical integrity, well-specific monitoring and reporting following the conversion, and demonstration of practical use of the converted configuration.

3. Transfer of Permit

Under 40 CFR § 144.38, this Permit may be transferred by the Permittee to a new owner or operator only if:

(a) the Permit has been modified or revoked and reissued (under § 144.39(b)(2)), or a minor modification made (under § 144.41(d)), to identify the new permittee and incorporate such other requirements as may be necessary under the SDWA, or

(b) the Permittee provides written notification (EPA Form 7520-7) to the Director at least 30 days in advance of the proposed transfer date and submits a written agreement between the existing and new permittees containing a specific date for transfer or permit responsibility, coverage, and liability between them, and demonstrates that the financial responsibility requirements of § 144.52(a)(7) will be met by the new permittee. If the Director does not notify the Permittee and the proposed new permittee of his or her intent to modify or revoke and reissue, or modify, the transfer is effective on the date specified in the written agreement. A modification under this paragraph may also be a minor modification under § 144.41.

4. *Permittee Change of Address*

Upon the Permittee's change of address, or whenever the operator changes the address where monitoring records are kept, the Permittee must provide written notice to the Director within 30 days.

Section B. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit shall not be affected thereby.

Section C. CONFIDENTIALITY

In accordance with 40 CFR part 2 and 40 CFR § 144.5, information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR part 2 (Public Information). Claims of confidentiality for the following information will be denied:

1. The name and address of the Permittee; and

2. Information which deals with the existence, absence or level of contaminants in drinking water.

Section D. ADDITIONAL PERMIT REQUIREMENTS

1. Duty to Comply

The Permittee must comply with all conditions of this Permit. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application; except that the Permittee need not comply with the provisions of this Permit to the extent and for the duration such noncompliance is authorized in an emergency permit under 40 CFR § 144.34. All violations of the SDWA may subject the Permittee to penalties and/or criminal prosecution as specified in Section 1423 of the SDWA.

2. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

3. Duty to Mitigate

The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Permit.

4. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Permit.

5. Permit Actions

This Permit may be modified, revoked and reissued or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Property Rights

This Permit does not convey any property rights of any sort, or any exclusive privilege.

7. Duty to Provide Information

The Permittee shall furnish to the Director, within a time specified, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this Permit.

8. Inspection and Entry

The Permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

(a) Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit; and

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit; and

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

(d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any location.

9. Signatory Requirements

All applications, reports or other information submitted to the Director shall be signed and certified according to 40 CFR §144.32. This Section explains the requirements for persons duly authorized to sign documents, and provides wording for required certification.

10. Reporting Requirements

Copies of all reports and notifications required by this Permit shall be signed and certified in accordance with the requirements under Part III D.10 of this Permit and shall be submitted to the EPA:

UIC Enforcement Coordinator, 8ENF-W-SDW
1595 Wynkoop Street
Denver, CO 80202-1129

All correspondence should reference the well name and location and include the EPA Permit number.

(a) *Monitoring Reports.* Monitoring results shall be reported at the intervals specified elsewhere in this Permit.

(b) *Planned changes.* The Permittee shall give notice to the Director as soon as possible of any planned changes, physical alterations or additions to the permitted well, and prior to commencing such changes.

(c) *Anticipated noncompliance.* The Permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(d) *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Permit shall be submitted no later than 30 days following each schedule date.

(e) *Twenty-four hour reporting.* The Permittee shall report to the Director any noncompliance which may endanger human health or the environment, including:

(i) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; or

(ii) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

Information shall be provided, either directly or by leaving a message, within twenty-four (24) hours from the time the Permittee becomes aware of the circumstances by telephoning (800) 227-8917 and requesting EPA Region VIII UIC Program Compliance and Technical Enforcement Director, or by contacting the EPA Region VIII Emergency Operations Center at (303) 293-1788.

In addition, a follow up written report shall be provided to the Director within five (5) days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(f) *Other Noncompliance.* The Permittee shall report all instances of noncompliance not reported under Paragraphs 11(a), 11(b), 11(d), or 11(e) of this Section at the time the monitoring reports are submitted. The reports shall contain the information listed in Paragraph 11(e) of this Section.

(g) *Other information.* Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, the Permittee shall promptly submit such facts or information to the Director.

(h) *Oil Spill and Chemical Release Reporting.* The Permittee shall comply with all reporting requirements related to the occurrence of oil spills and chemical releases by contacting the National Response Center (NRC) at (800) 424-8802, (202) 267-2675, or through the NRC website http://www.nrc.uscg.mil/index.htm.

Section E. FINANCIAL RESPONSIBILITY

1. Method of Providing Financial Responsibility

The Permittee shall demonstrate and maintain continuous compliance with the requirement to maintain financial responsibility and resources to close, plug, and abandon the underground injection well(s) covered by this Permit. The Director may, on a periodic basis, require the holder of a permit to revise the estimate of the resources needed to plug and abandon the well to reflect changes in such costs and may require the Permittee to provide a revised demonstration of financial responsibility. No substitution of a demonstration of financial

responsibility shall become effective until the Permittee receives written notification from the Director that the alternative demonstration of financial responsibility is acceptable.

2. Types of Adequate Financial Responsibility

Adequate financial responsibility to properly plug and abandon injection wells under the Federal UIC requirements must include completed original versions of one of the following:

(a) a surety bond with a standby trust agreement,
(b) a letter of credit with a standby trust agreement,
(c) a fully funded trust agreement, OR
(d) an independently audited financial statement with a Chief Financial Officer's letter.

A surety bond acceptable to the Director shall contain wording identical to EPA's model language and shall be issued by a surety bonding company found to be acceptable to the U.S. Department of Treasury, which can be determined by review of that department's Circular #570, currently available on the internet at http://fms.treas.gov/c570/c570.html.

A letter of credit acceptable to the Director shall contain wording identical to EPA's model language and be issued by a bank or other institution whose operations are regulated and examined by a State or Federal agency.

A fully funded trust agreement acceptable to the Director shall contain wording identical to EPA's model language. Annual reports from the financial institution managing the trust account shall be submitted to the Director showing the available account balance.

An independently audited financial statement with Chief Financial Officer's letter acceptable to the Director shall contain wording identical to EPA's model language and shall demonstrate the Permittee meets or exceeds certain financial ratios. If this financial instrument is used, it must be resubmitted annually, within 90 days after the close of the Permittee's fiscal year, using the financial data available from the most recent fiscal year.

A standby trust agreement acceptable to the Director shall contain wording identical to EPA's model language. Annual reports from the financial institution managing the standby trust account shall be submitted to the Director showing the available account balance.

3. Determining How Much Coverage is Needed

The Permittee when periodically requested to revise the plugging and abandonment cost estimate discussed above must submit 3 current independent plugging and abandonment cost estimates for EPA to accurately determine the likely cost to plug the well(s).

4. Insolvency

In the event of:

(a) the bankruptcy of the trustee or issuing institution of the financial mechanism; or

(b) suspension or revocation of the authority of the trustee institution to act as trustee; or

(c) the institution issuing the financial mechanism losing its authority to issue such an instrument,

the Permittee must notify the Director in writing, within ten (10) business days, and the Permittee must establish other financial assurance or liability coverage acceptable to the

Director within sixty (60) days after any event specified in (a), (b), or (c) above.

The Permittee must also notify the Director by certified mail of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code naming the owner or operator as debtor, within ten (10) business days after the commencement of the proceeding. A guarantor, if named as debtor of a corporate guarantee, must make such a notification as required under the terms of the guarantee.

APPENDIX A

WELL CONSTRUCTION REQUIREMENTS

The well or wells shall be cased and cemented to prevent the movement of fluids into or between USDWs, and in accordance with 40 CFR § 146.32 and other applicable federal, state or local laws or regulations. General requirements include:

- The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well and able to withstand the temperature and corrosiveness of injected and formation fluids.
- Surface casing shall be cemented to surface. Open annulus at the top can be filled with cement. If cementing to surface is not accomplished with initial cementing attempt, remedial cementing techniques shall be employed to get cement to surface.

Surface (Conductor) casing requirements. 9-5/8 to 19 inch steel casing shall be set in a 12-1/4 to 24 inch diameter hole drilled into competent bedrock (approximate depth between 80-160 feet (measured depth ground level (MD GL)) and grouted with cement (Class G or other equivalent cement) to surface.

Long string (Intermediate) casing requirements. 7 to 9-5/8 inch, steel casing shall be set in an 8-3/4 to 12-1/4 inch diameter hole. At approximately 1,100-1600 feet MD GL (Parachute Creek Member), directional drilling will begin a build rate of approximately 10 to 11 degrees per 100 feet MD. Drilling will continue to a casing shoe location within or proximal to the Boies Bed injection zone (lower portion of the L-5 Zone). Drilling may be done with an air hammer dry or rotary using low solids, low density or low solids, non-dispersed mud, aerating if necessary and using normal circulation. Cementing back deviated holes or following severe loss of circulation or junk in the hole is permitted. The Permittee may elect to use a differential valve (DV) cementing tool inserted into the intermediate casing string.

Cement can range from light (nitrogen foamed) to heavier weight cement slurries. After sufficient time for cement to set, the appropriate cement evaluation tool/log must be selected depending upon the cement characteristics (i.e. light or heavy cement), to characterize the annular cement bond.

Directionally drilled horizontal boreholes of diameter 4-1/4 to 8-3/4 inch will extend along or within the floor of the Upper or Lower Boies Bed.

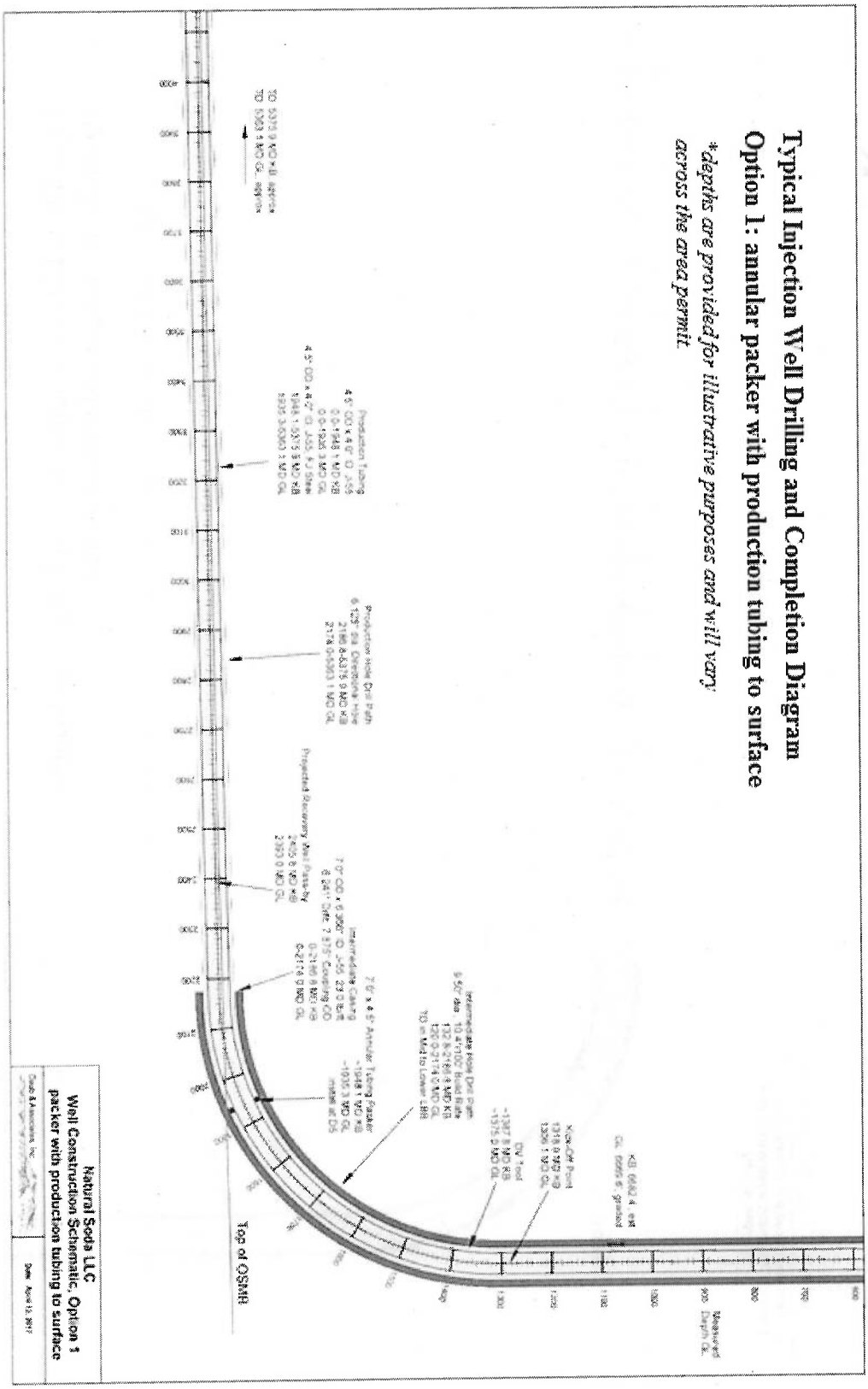
Production casing/liner requirements.
Option 1: 3-1/2 to 8-5/8 inch production liner/tubing will be installed from the production zone to surface. A packer or annular cement will be installed above the intermediate casing shoe, at a depth corresponding to the Dissolution Surface. The annular space between the tubing and casing may or may not be cemented in place.

Option 2: 3-1/2 to 8-5/8 inch production liner will be installed and attached to the intermediate casing of the injection well, at a depth corresponding to the Dissolution Surface and extend to the end of the horizontally drilled well section. This section of production liner will be suspended by a liner hanger or by other appropriate means and may be cemented in place.

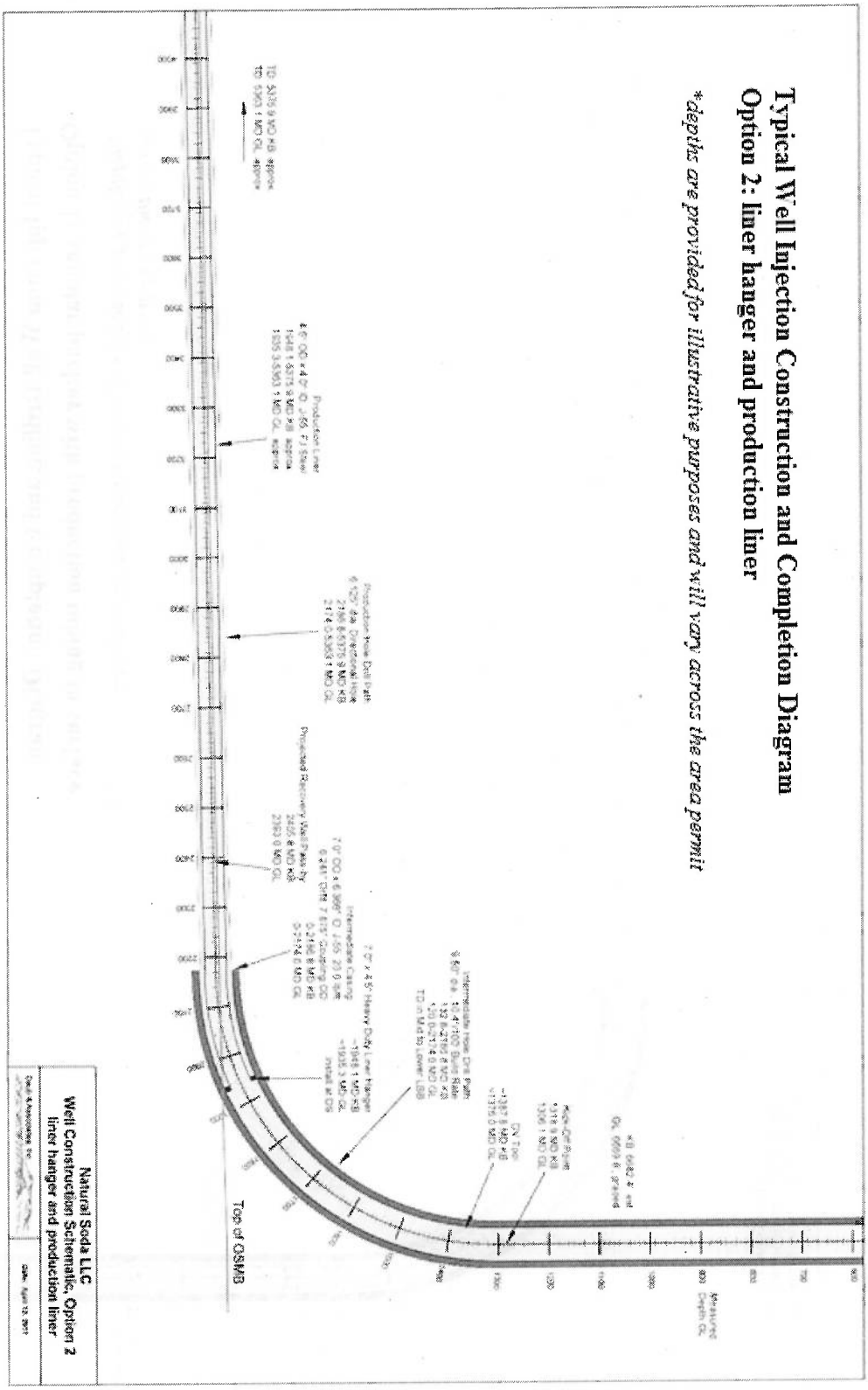
As the cavity is mined, "retreat mining" will occur whereby the injection point will be relocated by plugging and perforating the liner casing at designated locations. This retreat mining method is meant to ensure the cavity is developed symmetrically along the length of the production liner.

Note: The well construction diagrams provided provide are generalized depiction of the constructed well.

INJECTION WELL CONSTRUCTION DIAGRAM – Option 1



INJECTION WELL CONSTRUCTION DIAGRAM – Option 2



APPENDIX B

INJECTION WELL LOGGING AND TESTING REQUIREMENTS

Well log and tests shall be performed according to EPA approved procedures. It is the responsibility of the Permittee to obtain and use guidance prior to conducting any well log or test required as a condition of this Permit. These procedures can be obtained from Region 8 EPA UIC staff or found on the Region 8 EPA website.

Well log and test results shall be submitted to the Director within thirty (30) days of completion of the logging or testing activity, and shall include a report describing the methods used during logging or testing and an interpretation of the results. When applicable, the report shall include a descriptive report prepared by a knowledgeable log analyst, interpreting the results of that portion of those logs and tests which specifically relate to (1) a USDW and the confining zone adjacent to it, and (2) the injection and adjacent formations.

LOG OR TEST REQUIREMENTS	
INJECTION WELLS	**DATE DUE**
Resistivity Log	Prior to receiving Authorization to Inject.
Compensated Density Neutron Log	Prior to receiving Authorization to Inject.
Caliper Log	Prior to receiving Authorization to Inject.
Gamma Ray Log	Prior to receiving Authorization to Inject.
Cement Evaluation Log (Selection of log or tool shall be appropriate for the type of cement used)	Prior to receiving Authorization to Inject.
Cement Records	Prior to receiving Authorization to Inject.
Directional Survey Details	Prior to receiving Authorization to Inject.
Part I MI Casing Pressure Test (well constructed without annulus) During the test, the Bridge Plug shall be placed at the top of L-5 zone or deeper. Standard Annulus Pressure Test (well constructed with open annulus)	1. Prior to installation of production liner or tubing, a casing pressure test is required on the intermediate casing. 2. Prior to authorization to inject, a pressure test is required for wells constructed with an open annulus. 3. Part I MI will be repeated at least every five years after the last successful MIT demonstration.
Part II MI Temperature Log	1. Baseline temperature log will be required prior to authorization to inject. 2. First temperature log will be conducted between 60 to 90 days of authorization to inject. 3. Temperature Log shall be repeated at least every five years after the last successful Part II MI demonstration.

SUBSURFACE SUBSIDENCE WELLS	DATE DUE
Gamma Ray Log	See APPENDIX D Subsurface Subsidence Monitoring

APPENDIX C

OPERATING REQUIREMENTS

INJECTION ZONE:
Injection is permitted only within the approved injection zones listed below.

APPROVED INJECTION ZONE (BGS, ft, true vertical depth)		
STRATIGRAPHIC UNIT	**TOP***	**BOTTOM***
L-5	1800	1960

*approximate top and base of formation and will vary across Area Permit

MAXIMUM ALLOWABLE INJECTION PRESSURE:
Maximum Allowable Injection Pressure (MAIP) as measured at the surface shall not exceed the pressure listed below for all wells permitted under this area permit.

MAXIMUM ALLOWED INJECTION PRESSURE (PSIG): 300

MAXIMUM ALLOWABLE INJECTION TEMPERATURE:
Maximum Allowable Injection Temperature as measured at the surface shall not exceed the temperature listed below for all wells permitted under this area permit.

MAXIMUM ALLOWED INJECTION TEMPERATURE (DEGREE F): 300

MAXIMUM INJECTION VOLUME:
There is no specific limitation value on the volume (barrels) of fluid per day that may be injected into the solution mining wells, except that the injection volume shall not be greater than the produced volume, plus the estimated cavern volume of nahcolite removed.

If for any reason recovery pumping is interrupted, injection must cease immediately and cannot resume until recovery pumping is re-established.

APPENDIX D

MONITORING, AND REPORTING PARAMETERS

Quarterly Reporting of all parameters are required as described in Part II, Section E.7. Parameters recorded annually will be reported in the quarter that the data was collected. When applicable, the report shall include a descriptive report prepared by a knowledgeable log analyst, interpreting the results of that portion of those logs and tests.

In addition to these items, additional logging and testing results may be required periodically. For a list of those items and their due dates, please refer to APPENDIX B – LOGGING AND TESTING REQUIREMENTS.

Injection Well				
Parameter	**Method**	**Permit Condition***	**Record Frequency**	**Quarterly Report**
Injectate Fluid Temperatures (degrees F)	Wellhead	At or below 300 deg F	10 minute intervals	Weekly averaged, minimum, and maximum temperatures, pressures, flow rates, provided in tabular and graphical form.
Injection Pressure (psig)		At or below MAIP		
Injection and Recovery Flow rates (gal/min and bbl/day)		If recovery well is interrupted, injection activities must immediately cease		
Operational Fluid Level	Manual measurement or transducer	Cavity fluid level shall remain at lower level than static water levels of B-Groove aquifer.	Monthly	Monthly comparison of cavity fluid level with B- Groove and Dissolution Surface aquifers, provided in tabular and graphical form.
Mining Interval Development	Mass Balance Calculation		Weekly	Weekly mass balance calculations provided in tabular and graphical form. A summary description of cavity growth.
Injection Fluid Sampling				
Specific Gravity	SAP or EPA approved method		Quarterly	Quarterly
pH			Quarterly	Quarterly
Total Dissolved Solids (mg/L)			Quarterly	Quarterly
Specific Conductivity (umhos/cm)			Quarterly	Quarterly
Major and Minor Analytes listed in the SAP			Quarterly	Quarterly

Subsurface Subsidence Well Monitoring*			
Method	**Permit Condition**	**Record Frequency**	**Reporting**
TDR	If TDR (6" or more) or Gamma Log (2' or more) indicates subsidence has occurred, EPA must be notified within 10 days of discovery & provided an action plan. Part II, Section E.3 provides siting requirements.	Monthly	The annual report will provide the quarterly analysis of TDR data and the all gamma ray logs that were conducted within 60 days. Gamma-ray logs: A side-by-side graphical comparison of the baseline log and all subsequent logs, indicating the location of the L-5 and R-6 interval. A summary analysis will also be provided.
Gamma Ray Log		1. Prior to authorization to inject of first cavity (baseline) 2. After 50 % of planned recovery of first cavity 3. After 75 % of planned recovery of first cavity 4. After mining cessation of first and second cavity 5. 3 years of cessation of mining of second cavity	

* Equivalent Approved Technology is also acceptable (see PART II Section E.3)

Surface Subsidence Monitoring				
Parameter	**Method**	**Permit Condition**	**Record Frequency**	**Reporting**
Surface Monuments	Part II, Section E.4 provides siting requirements.	If any surface monument shows a verified change 0.2 feet or more, notification must be provided to EPA within 10 days of discovery along with an action plan.	Biennial	A summary report will be provided in the annual report in which data collection occurs.
Groundwater Monitoring				
Parameter	**Method**	**Permit Condition**	**Record Frequency**	**Reporting**
Groundwater Levels Hydraulic Head (ft water)	Current EMP (Groundwater Monitoring Program)	If any monitoring well shows a verified deviation from baseline trend, EPA must be notified within 10 days of discovery along with an action plan.	Current EMP (Groundwater Monitoring Program)	A summary report will be provided in the annual report in which data collection occurs.
Groundwater Quality Fluid Sampling	Current EMP (Groundwater Monitoring Program)	If any monitoring well shows a verified deviation from baseline trend, EPA must be notified within 15 days of discovery along with an action plan.	Current EMP (Groundwater Monitoring Program) and SAP	A summary report will be provided in the annual report in which data collection occurs.

*The Permittee's *"Environmental Monitoring Plan"* (EMP) is a monitoring plan required and approved by the Bureau of Land Management (BLM) and the State of Colorado, Division of Mining, Reclamation and Safety (DMRS). Portions of this document are incorporated in this appendix. Both the EMP and the Groundwater Sampling and Analysis Plan (SAP) will be periodically revised and the referenced monitoring plan and sampling protocol will be conducted according to the most current version. The 2015 EMP and SAP are the current version of these documents as of the effective date of this Permit Modification.

APPENDIX E

PLUGGING AND ABANDONMENT (P&A) REQUIREMENTS

The well shall be plugged with cement in a manner which isolates the injection zone and will not allow the movement of fluids either into or between USDWs, and in accordance with 40 CFR § 146.10 and other applicable Federal, State or local law or regulations. General requirements applicable to all wells include:

- Brine will be left in the hole in order to help stabilize the solution mined interval.
- A cast iron bridge plug (CIBP) shall be placed at a depth corresponding to the Dissolution Surface. The CIBP shall be set in the production liner or the intermediate casing, if the injection liner is removed at this depth. The entire well shall be fully cemented from the Dissolution Surface to the surface.

  Option 1a: The production tubing will be cut at a depth corresponding to the Dissolution Surface and removed. Cement to the surface by using one or more of the approved methods described in 40 CFR §146.10.

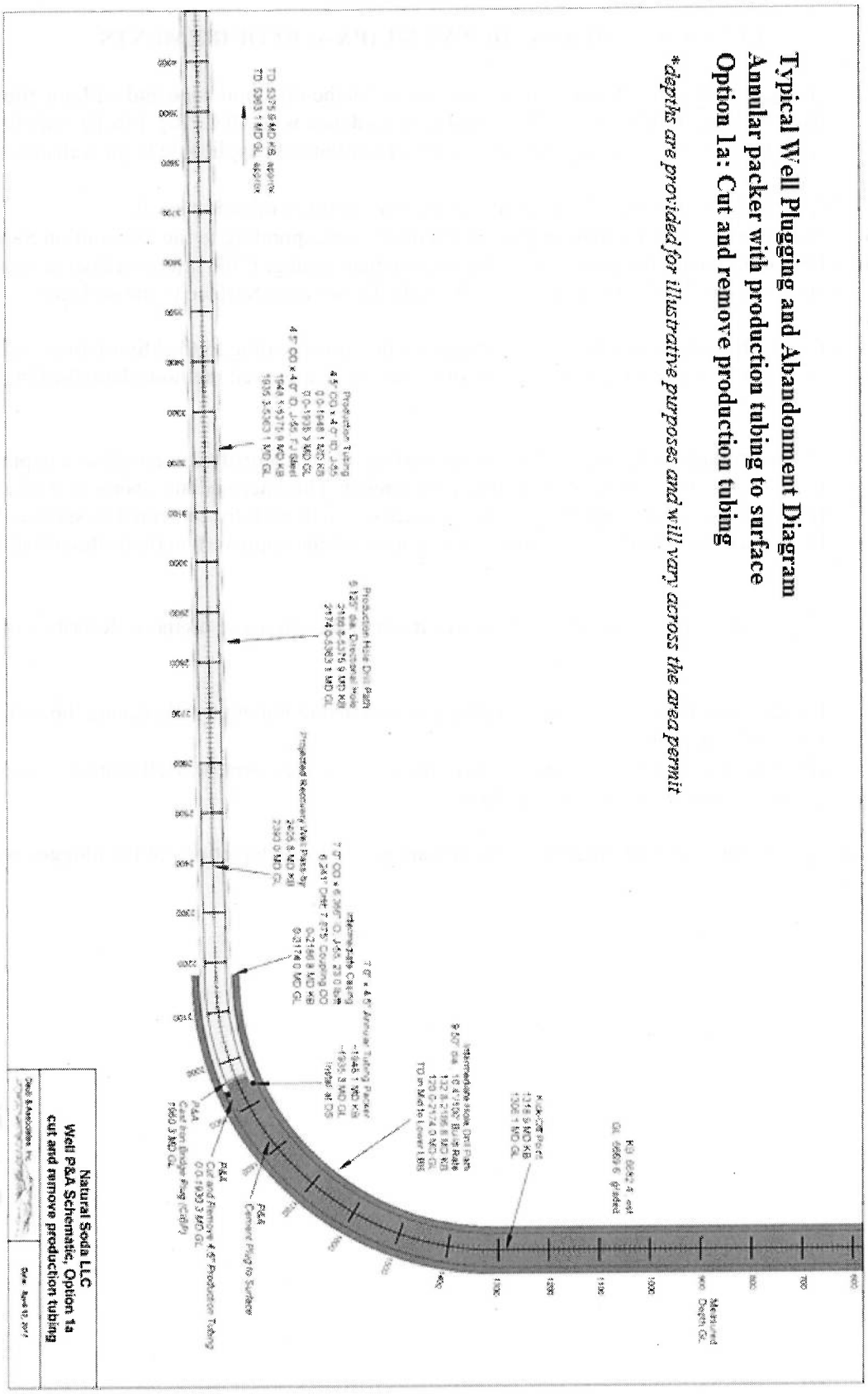
  Option 1b: The production tubing shall be perforated (if it is not already cemented) at a depth corresponding to the Dissolution Surface above the packer. The intermediate casing as well as the annular space between the tubing and intermediate casing shall be fully cemented to surface. Cement plugs to the surface shall be placed by using one or more of the approved methods described in 40 CFR §146.10.

  Option 2a: Cement to the surface by using one or more of the approved methods described in 40 CFR §146.10.

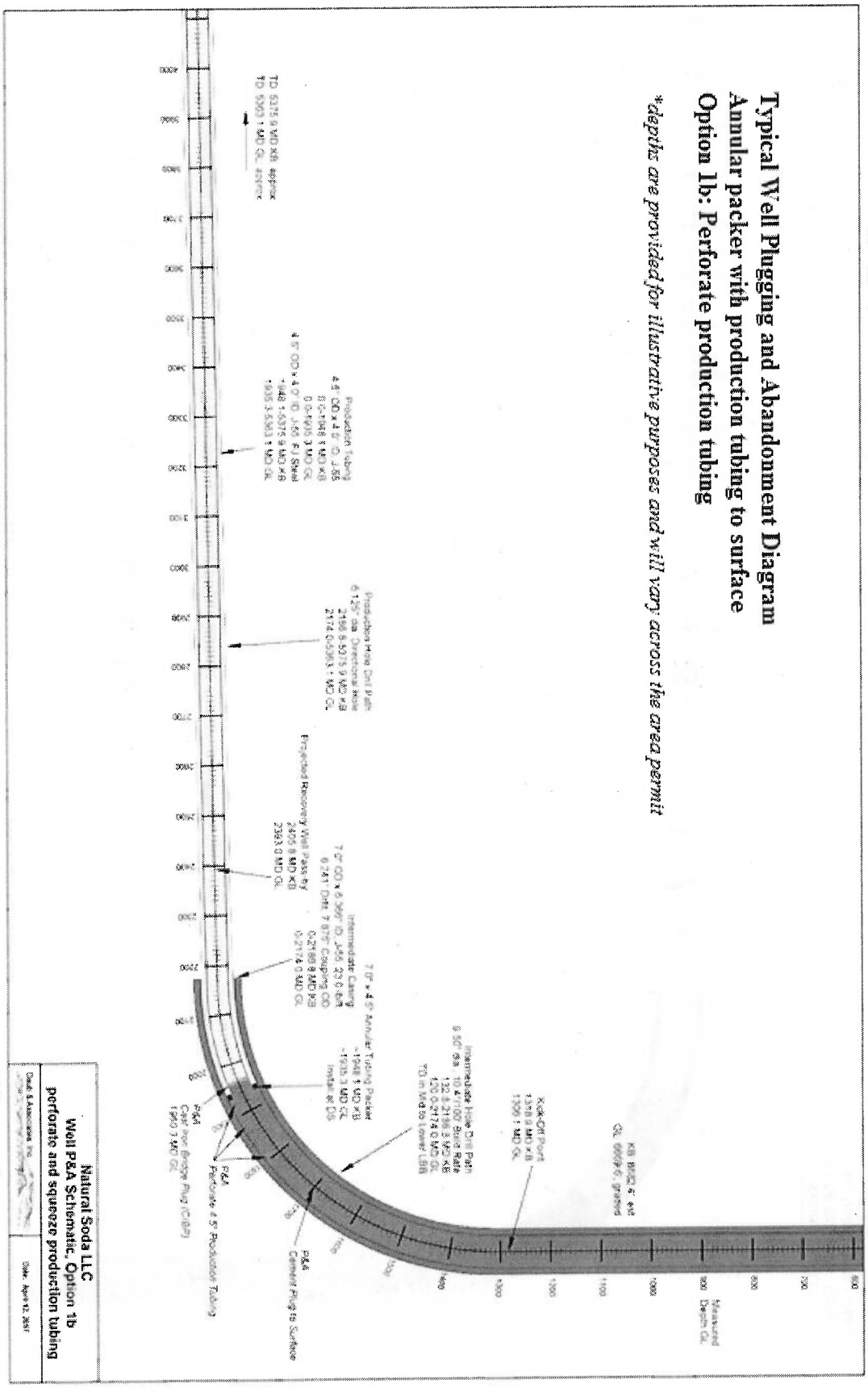
- The injection casing will be conditioned for plugging and abandonment by displacing the nahcolite brine above the CIBP with freshwater.
- A P&A marker shall be installed which will have the name of the operator, well number, lease number and the legal description welded on the surface.

Note: The plugging and abandonment diagrams provided are generalized depictions of the plugged well.

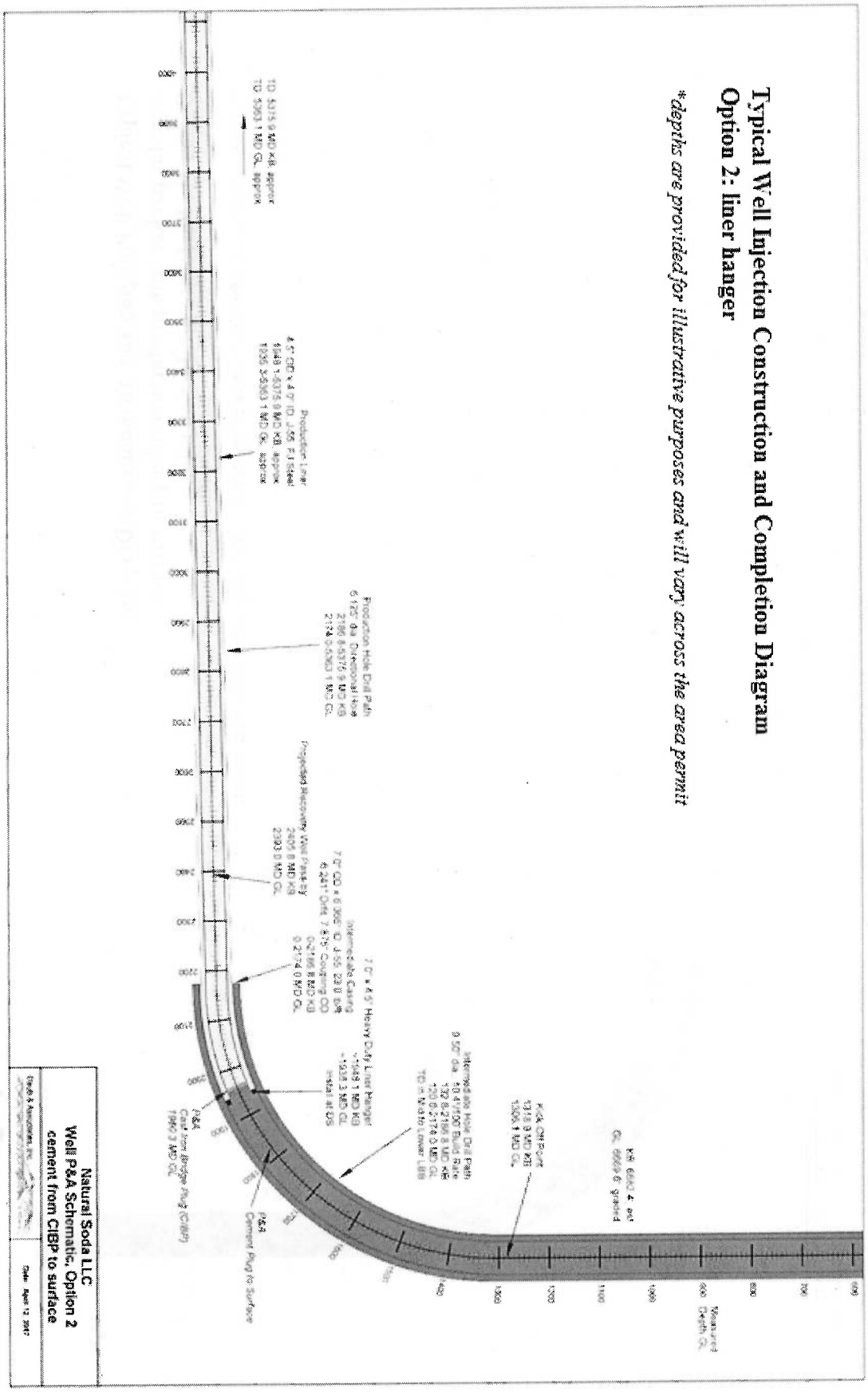
INJECTION WELL P&A DIAGRAM – Option 1a



INJECTION WELL P&A DIAGRAM – Option 1b



INJECTION WELL P&A DIAGRAM – Option 2



MAJOR PERMIT MODIFICATION
ADDENDUM TO
THE STATEMENT OF BASIS

NATURAL SODA LLC
CLASS III SOLUTION MINING
RIO BLANCO COUNTY, CO
EPA AREA PERMIT NO. CO30358-00000

Natural Soda LLC (NS) solution mines sodium minerals within the Boies Bed at locations authorized by their federally approved Sodium Mineral Leases. NS has been actively mining since 1988 under the UIC permit CO30358-00000.

NS has requested the flexibility to include an alternative well construction plan to their previously approved plan. The existing plan delivers fluids through a hanging liner at depth, near the production zone. The proposed plan will extend the production liner to the surface, providing an additional layer of protection to adjacent aquifers. As a result of this request, the plugging and abandonment plan and mechanical integrity test requirements are also proposed for modification to accommodate the new well construction plan.

The proposed permit modifications include a new well construction plan and two options for plugging and abandoning the well. Both these two plans require the well bore to be fully cemented to surface and meet plugging and abandonment standards. It should be noted that since these plans provide flexibility and allow for a range of well construction parameters for NS to operate under, the well construction and plugging and abandonment diagrams found in Appendices A and E are typical well schematics. The final schematic will be provided after well construction or well abandonment.

In the newly proposed well construction plan, the production tubing may be cemented to surface or if left uncemented, a tubing-intermediate casing annulus will be created. As a result, the internal mechanical integrity testing requirements have been modified to permit a standard annulus pressure test in addition to the casing pressure test with a bridge plug.

NS has also requested more time to construct the subsurface subsidence wells after the recovery and injection wells have been drilled. The existing permit requires the subsidence wells to be constructed prior to authorization to inject. NS has requested an additional 90 days after the authorization to inject to allow operations to immediately start after the recovery and injection wells are constructed. The well placement of the subsurface subsidence wells is at the junction of the recovery and injection wells and as such is constructed after the recovery and injection well pair have been constructed and this junction has been determined. After 90 days of operation, the minimal dissolution would not raise subsidence concerns.

The permit has also been modified to correct for typographical errors, update references, remove redundant language, and provide clarification to the permit. Additionally, these modifications have been included:

- Part I - 9H-I has been removed in the table of authorized wells. The well was not constructed within one year of it authorization date and has expired since the permit was initially issued.
- Part II, Section A.4 titled "Postponement of Construction or Conversion" has been added. In this section, additional wells that have not been constructed that are either included in the permit or to be proposed at a future date, will expire 2 years after their authorization date unless an extension is requested.
- Part II, Section E.4 Surface Subsidence – The incorporation of the Environmental Monitoring Plan has been removed and the requirements are included in the permit itself. The location of future Surface Subsidence monuments have been clarified and are sited above the area where the greatest dissolution and removal of material is expected to occur, at the junction of the injection and recovery wells.

No comments were received during the public comment period.

There were minor edits and clarifications made to the draft. Additionally, Appendix A and E well diagrams were simplified to provide consistency between the permit text and diagrams.