



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8**

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**UNDERGROUND INJECTION CONTROL PROGRAM
DRAFT PERMIT FOR REAUTHORIZATION**

CO50108-00647

Class V Brine Disposal Well
PARADOX SALINITY CONTROL WELL NO. 1
Montrose County, Colorado

issued to:

U.S. Bureau of Reclamation
Upper Colorado Regional Office
Post Office Box 11568
Salt Lake City, Utah 84147

DATE PREPARED: AUGUST 2021

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PART I - REAUTHORIZATION TO INJECT

Pursuant to the Underground Injection Control Regulations of the U.S. Environmental Protection Agency (EPA) codified at Title 40 of the Code of Federal Regulations (40 CFR), Parts 124, 144, 146 and 147,

**United States Bureau of Reclamation (USBR)
Upper Colorado Regional Office
Post Office Box 11568
Salt Lake City, Utah 84147**

is hereby reauthorized to continue operation of the Class V injection well, commonly known as the Paradox Salinity Control Well No. 1 located in the SE NW SE of Section 30, Township 47 North, Range 18 West of Montrose County, Colorado. Injection is for the purpose of disposing of brine captured from springs near Bedrock, Colorado, presently discharging into the Dolores River. The injection zone is limited to the Leadville Formation, the Ouray Formation, the McCracken Formation, the Ignacio Formation, and the Precambrian fractured granite in accordance with conditions set forth herein. The maximum authorized surface injection pressure is 5,350 pounds per square inch at gauge (psig).

This is the fourth permit issued to the USBR for this injection well. The operator has fulfilled any application requirements for a new Permit. "Transition from Expired Permit to Permit Reauthorization" requirements are set forth in Part II, Section E. 2. of this Permit.

All conditions set forth herein refer to 40 CFR Parts 144, 146, and 147 and are regulations that are in effect on the date that this Permit is effective.

This reauthorized Permit is based upon representations made by the permittee and on other information contained or referenced in the administrative record. Misrepresentation of information or failure to disclose fully all relevant information may be cause for termination, revocation and reissuance, modification of this permit, and/or formal enforcement action. It is the permittee's responsibility to read and understand all provisions of this Permit.

This reauthorized Permit and the authorization to continue injection are issued for ten (10) years from the date this permit becomes effective unless terminated as provided in Part III, Section B. 1.

The Permit shall expire after ten (10) years, or upon delegation of primary enforcement responsibility for the UIC-1422 Program to the State of Colorado, unless Colorado has adequate authority and chooses to adopt and enforce this Permit as a State Permit.

Please be advised that this permit pertains solely to UIC and does **not** preclude any other federal, state, or local regulations that may apply.

Issue Date _____

Effective Date _____

Lisa Kahn
Acting Chief
Drinking Water Branch

PART II. SPECIFIC PERMIT CONDITIONS

A. GENERAL

Copies of all reports and notifications required by this area permit shall be signed and certified in accordance with the requirements under Part III, Section E.9 of this area permit and shall be submitted to EPA:

UIC Enforcement, Mail Code: 8ENF-W-SDW
U.S. Environmental Protection Agency
1595 Wynkoop Street
Denver, Colorado 80202-1129

EPA permit number the UIC Program Director (hereafter referred to as the “Director”) has assigned to this area permit is CO50108-00647. All correspondence should reference the site name, address, and include EPA area permit number.

B. WELL CONSTRUCTION AND INJECTION.

1. Casing and Cementing. The construction details previously submitted are hereby incorporated into this Permit as Appendix A and shall be binding on the permittee unless changes are approved. The permittee has cased and cemented the well to prevent the movement of fluids into or between underground sources of drinking water (USDWs) and into or between formations other than those designated as the injection zone in Part I and Part II, Section E.3. The casing and cementing used in the construction of the well have been designed for the life expectancy of the well and shall be maintained throughout the operating life of the well.
2. Tubing and Packer Specifications. The applicant has submitted details on the tubing, and these are incorporated into the Permit as Appendix A and shall be binding on the permittee. Injection between the outermost casing protecting underground sources of drinking water and the wellbore is prohibited. Injection directly through the long string casing is also prohibited.
3. Monitoring Devices. The permittee has installed continuous recording devices which monitor the operation of the well. These devices shall be maintained for the operating life of the well.
 - a) The well site instruments shall be capable of continuously monitoring the following with an accuracy of 95%, or greater:
 - (i) injection pressure,
 - (ii) flowrate,
 - (iii) cumulative volume, and
 - (iv) casing/tubing annulus pressure.
 - b) The operator shall provide and maintain in good operating condition two (2) ½-inch fittings isolated by a needle valve or equivalent, and located:

- (i) at the wellhead on the tubing and
- (ii) on the tubing/casing annulus.

These valves shall be positioned to allow the attachment of ½-inch maximum injection pressure gauges of an appropriate rating.

- c) USBR operates a 16-station earthquake monitoring network to record both natural and induced earthquakes in the Paradox Valley Area. In addition, USBR operates a 3-station strong-motion accelerograph network to measure strong ground shaking that may occur from induced earthquakes that are large enough to be felt. Historically, injection activity in the Paradox Valley area induces earthquakes in the subsurface in the vicinity of the injection well. These earthquakes are analyzed with respect to date and time of occurrence, focal depth, geographic location, magnitude, type of faulting, and relation to injection operations. A monthly status report on the Paradox Valley Seismic Network is submitted to the operator as required under Part II, Section E.1.

4. Proposed Changes and Workovers.

The permittee shall give advance notice to the Director as soon as possible and no later than thirty (30) days **before** any planned physical alterations or additions to the permitted injection well system. Alterations of the permitted injection system shall meet all conditions as set forth in this permit. An alteration or addition shall be considered any work performed that affects the quantity or quality of the fluid being injected.

After approval by the Director, the permittee shall provide plans, as-built schematics, sketches, or other test data to EPA within sixty (60) days of completion of the alteration or addition that took place.

C. CORRECTIVE ACTION

No corrective action is required prior to issuance of this permit.

D. MECHANICAL INTEGRITY

The permittee is required to ensure that the injection well maintains mechanical integrity at all times. An injection well has mechanical integrity if:

- a) There is no significant leak in the casing, tubing, or packer (Part I); and
- b) There is no significant fluid movement into an USDW through vertical channels adjacent to the injection well bore (Part II).

1. Continuous Demonstration of Mechanical Integrity

Method of Demonstrating Absence of Casing Leaks. 40 CFR 144.51(8) requires that the well have mechanical integrity at all times. Adherence to all requirements under 40 CFR Parts 144, 146, and 147, including construction, has been verified for this well.

The absence of significant leaks in the casing, tubing, and/or packer has been and shall be demonstrated on a continuing basis by monitoring the pressure on the casing/tubing annulus. This monitoring procedure was formalized in adopting a Standard Operating Procedure (SOP) for the Well Annulus Monitoring System (WAMS) on March 2, 2009 (Appendix C). The permittee shall place sufficient pressure on the annular space such that the range of pressure fluctuations caused by injection operations, such as temperature variations of the injected fluids, shall be maintained in the positive range. Abnormal increases in annulus pressure shall be reported to the Director, and the cause of the increase shall be investigated. If the increase is determined to be related to leaks in either tubing or packer, the well shall be shut-in until repairs have been completed. This test is to be performed every year as part of the requirements of this permit, the results of which will be included in the 3rd quarter report as specified in Section F.4.below.

2. Modification of Mechanical Integrity Requirements. Any new criteria developed during the review for establishing that the well has continuing mechanical integrity shall be made part of this Permit by Minor Modification. No further opportunity for public comment shall be required.
3. Loss of Mechanical Integrity: If the well fails to demonstrate mechanical integrity during a test, or a loss of mechanical integrity as defined by 40 CFR Section 146.8 becomes evident during operation, the permittee shall notify the Director in accordance with Part III, Section E. 10. of this Permit Furthermore, injection activities shall be terminated immediately; and operation shall not be resumed until the permittee has taken necessary actions to restore integrity to the well and has obtained approval to recommence injection from EPA.

E. WELL OPERATION

1. Well Injection and Seismicity.
 - a. Response to Felt Seismicity. Injection activity shall be temporarily halted to inspect for damage, according to the USBR Emergency Action Plan, and the permittee shall notify EPA within twenty-four (24) hours according to Part III, Section E.10, if either of the following occur:
 - i. A seismic event is felt in the Brine Injection Facility Control Room.
 - ii. A seismic event is recorded on the strong-motion instrument located at the Brine Injection Facility, and the instrument measures a peak horizontal acceleration of 0.1 g or greater.
 - b. Response to Other Potentially Significant Seismicity. If a significant seismic event is reported in the Paradox Valley area, but is not felt in the Brine Injection Facility Control Room, then within 72 hours of the report the USBR shall notify EPA and perform an inspection if any of the following occur:
 - i. A seismic event is recorded on the strong-motion instrument located at the Brine Injection Facility, and the instrument measures a peak horizontal acceleration of 0.05 g or greater.

- ii. A magnitude 3 or greater earthquake is recorded by PVSN or the U.S. Geological Survey and is predicted to have produced a median peak horizontal acceleration of 0.05 g or greater at the Brine Injection Facility, based on empirical ground motion attenuation curves.
 - iii. A seismic event is reported by the news media as being widely felt in the Paradox Valley area.
 - c. Seismic Monitoring Monthly Evaluation. A monthly evaluation shall be performed to summarize the operating status of the Paradox Valley Seismic Network (PVSN) and local seismicity recorded during the previous month. The evaluation shall assess induced and natural seismicity located within 30 km of the injection well and its potential relation to injection operations. The evaluation shall also include an assessment of the operation of the seismic instrumentation, data telemetry, and data recording systems. Based on this evaluation, USBR will schedule preventative and remedial maintenance needed to maintain compliance with the Seismic Monitoring Plan. Should immediate maintenance be needed to comply with the minimum standards of the Seismic Monitoring Plan, EPA will be notified within 72 hours. Within two weeks, the needed maintenance shall either be performed or, if circumstances prevent immediate action, a proposed corrective action plan shall be submitted to EPA.
- 2. Transition from Expired Permit to Permit Reauthorization. The Paradox Salinity Control Well No. 1 has been operating by Permit since July 1991. Adherence to all requirements under 40 CFR Parts 144, 146, and 147, including construction, has been verified for this well. Demonstration of mechanical integrity is continuous, as provided in Part II, Section D.1., and no further conditions are required for reauthorization.
- 3. Injection Interval. Injection shall be limited to the gross interval between the top Leadville perforation (14,080 feet) in well casing and the plug back total depth (PBSD) (15,827 feet) in Precambrian granite. The net perforated intervals are:
 - Upper Leadville: 14,080 feet - 14,185 feet
 - Middle Leadville: 14,215 feet - 14,350 feet
 - Lower Leadville/Ouray: 14,380 feet - 14,504 feet
 - McCracken: 14,651 feet - 14,719 feet
 - Ignacio: 15,376 feet - 15,489 feet
 - Precambrian: 15,489 feet - 15,827 feet
- 4. Injection Pressure Limitation.
 - a) Injection pressure, measured at the surface, shall not exceed 5,350 psig.
 - b) The pressure limit in paragraph (a) may be increased by the Director if the fracture pressure of the confining formation shall not be exceeded; and the permittee demonstrates that the proposed increase in surface injection pressure is necessary to overcome friction losses in the injection system, including the reservoir losses. This demonstration shall include:

- (i) an analysis of the adequacy of the injection equipment, well head and downhole tubulars to withstand the proposed maximum allowable surface injection pressure (MASIP);
- (ii) an analysis of the potential for adverse seismic activity if injections pressures are increased;
- (iii) an analysis of the continued adequacy of the confining zones, including information on the potential vertical fracture growth in the confining layers as a result of an increase in injection pressure;
- (v) a demonstration made by performing a step rate injection test, using fluid normally injected, to determine both the instantaneous shut-in pressure and the formation breakdown pressure.

The Director shall determine any allowable increase based upon the results of these analyses.

- c) The permittee shall give thirty (30) days advance notice to the Director if an increase of injection pressure shall be sought.
5. Injection Volume-rate Limitation. There shall be no limit on the number of gallons per minute of produced brine wastes that shall be injected into this well provided that in no case shall injection pressure exceed that limit shown in Part II, Section E. 4. of this Permit.
 6. Injection Fluid Limitation. The permittee shall not inject any hazardous wastes, as defined under 40 CFR Part 261, at any time during the operation of the facility. And further, no substances shall be injected other than those noted in the Permit application, such as additives needed to ensure injection fluid compatibility and corrosion control. The applicant has identified that the waste stream is to be brine intercepted from springs near the Dolores River with or without fresh water. The quality of the brine is expected to vary, but the total dissolved solids (TDS) content is stated to be between 250,000 - 260,000 mg/liter. Any additional additives needed to ensure compatibility of injected fluids with those in the reservoir shall be identified for review and approval by EPA. The use of these additives shall be incorporated into the Permit as a Minor Modification. The use of fluids, such as hydrochloric acid (HCL) for acid stimulation, is under Part II, Section B.4. dealing with proposed changes and workovers.
 7. Annular Fluid. The annulus between the tubing (5 ½-inch) and the 9 5/8-inch/10.98-inch casing, from 13,092 feet (below-ground level) to the surface is filled with corrosion inhibited fresh water. Below 13,092 feet to the PBTD (15,827 feet) the annulus is filled with cement.

F. MONITORING, RECORDKEEPING, AND REPORTING OF RESULTS

1. Injection Well Monitoring Program. The description of the planned monitoring indicating the minimum injection parameters to be monitored, which was

submitted by the permittee, is incorporated into this Permit as specified below. Samples and measurements shall be representative of the monitored activity. The permittee shall utilize the applicable analytical methods described in Table I of 40 CFR Part 136.3, or in Appendix III of 40 CFR Part 261, or in certain circumstances, by other methods that have been approved by EPA Administrator. Monitoring shall consist of:

- a) Analyses of the injection fluids shall be performed:
 - (i) annually for TDS, pH, conductivity, and specific gravity; and
 - (ii) whenever there is a change in the source or type of the injection fluids as specified in Part II, E.6. Analysis of the constituents above, plus all major ions and corrosivity, shall be submitted to the Director within thirty (30) days of the change in injection fluids.
- b) Continuous recordings of the injection pressure, flow rate, cumulative volume, and annulus pressure shall be averaged daily. Daily averages shall be averaged monthly. A paired reading of the annulus and injection pressures shall be taken at the same time on a weekly basis. Both daily and monthly averages along with the weekly paired readings shall be reported quarterly to EPA Denver Office as specified in Section F.4.below.
- c) Continuous monitoring of earthquakes potentially induced by well operations. The operator shall provide a yearly report that is due on June 1 as described in Part II, Section F.4. Any abnormal seismic activity that may indicate problems shall be reported within five (5) days. Operations shall follow the Paradox Valley Unit's standard operating procedure for the seismic monitoring.

2. Monitoring Information. Records of any monitoring activity required under this permit shall include:

- a) the date, exact place, the time of sampling or field measurements;
- b) the name of the individual(s) who performed the sampling or measurements;
- c) the exact sampling method(s) used to take samples;
- d) the date(s) laboratory analyses were performed;
- e) the name of the individual(s) who performed the analyses;
- f) the analytical techniques or methods used by laboratory personnel; and
- g) the quality assurance procedures used by the laboratory; and
- h) the result of such analysis.

3. Records to Retain and Retention Time

- a) All data required to complete the Permit Application for this permit for a period of at least five (5) years from the effective date of this permit. This

- period may be extended by request of the Director at any time.
- b) Copies of all reports required by this permit for a period of at least three (3) years after the reports were submitted.
 - c) Records regarding the nature and composition of all injected fluids. The permittee shall continue to retain these records for a period of three (3) years after the closure of the injection well system unless the records are delivered to the Director or written approval to discard the records is obtained from the Director. This period may be extended by request of the Director at any time
 - d) Records of monitoring information as specified under Part II, Section F.2.
4. Reporting of Results. The permittee shall submit a Quarterly Report to the Director summarizing the results of the monitoring information required by Part II, Section F. 1. of this permit. Copies of all records on injected fluids, and any major changes in characteristics or sources of injected fluid shall be included in the Quarterly Report. Quarterly Reports shall cover the periods of January 1 through March 31;
- April 1 through June 30;
 - July 1 through September 30; and,
 - October 1 through December 31.

Each Quarterly Report shall be submitted to the Denver Office by the fifteenth of the following month. EPA form 7520-8 may be used to submit the quarterly summary of monthly averages of monitoring data. Daily and monthly averages shall be submitted in a tabular form developed by the permittee. Also, assurance that the annulus is filled with approved fluid shall be submitted at this date.

The annual report describing all monitored local seismic events, whether induced or not, shall be submitted to EPA by June 1 of the following year.

G. PLUGGING AND ABANDONMENT

The method for plugging and abandonment of any injection well shall not allow the movement of a fluid containing any contaminant into any USDW if the presence of that contaminant may cause a violation of the primary drinking water standards under 40 CFR Part 141, other health based standards, or may otherwise adversely affect the health of persons.

1. Notice of Plugging and Abandonment. The permittee shall notify the Director forty-five (45) days before conversion, workover, or abandonment of the well.
2. Plugging and Abandonment Plan. The permittee shall plug and abandon the well as provided in the Plugging and Abandonment Plan, Appendix C. EPA reserves the right to change the manner in which the well shall be plugged if the well is modified during its permitted life, if the well is not maintained consistently with EPA requirements for construction and mechanical integrity, or if it is deemed

that the designated closure method is not protective of any USDW.

The Director may ask the permittee to update the estimated plugging cost periodically. Such estimates shall be based upon costs that a third party would incur to plug the well according to the plan.

3. Cessation of Injection Activities. After a cessation of injection for two (2) years, the permittee shall plug and abandon the well in accordance with the Plugging and Abandonment Plan unless the permittee:
 - a) provides notice to the Director, and
 - b) demonstrates that the well shall be used in the future, and
 - c) describes actions or procedures, satisfactory to the Director that shall be taken to ensure that the well shall not endanger USDWs during the period of temporary abandonment.
4. Plugging and Abandonment Report. Within sixty (60) calendar days after plugging the well, the permittee shall submit a report on Form 7520-13 to the Director. The report shall be certified as accurate by the person who performed the plugging operation and the report shall consist of either: (1) a statement that the well was plugged in accordance with the plan, or (2) where actual plugging differed from the plan, a statement that specifies the different procedures followed.

H. FINANCIAL RESPONSIBILITY

The permittee is required to maintain financial responsibility and resources to operate, close, plug, and abandon the injection well as provided in the Plugging and Abandonment Plan. This demonstration is made by the permittee's participation in the U.S. Budgetary process.

1. The permittee shall provide information annually to demonstrate that sufficient funds are budgeted to adequately operate or abandon the facility.
2. The permittee shall have sufficient contingency funds available in any given year to adequately abandon the facility if operating funds are cut out of the Budget for the following years.

PART III. GENERAL PERMIT CONDITIONS

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The permittee, as authorized by this permit, shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into any USDW, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 141 or otherwise adversely affect the health of persons. Any underground injection activity not authorized in this permit, or otherwise authorized by permit or 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 State or local law or regulations. 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 Safe Drinking Water Act (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.

B. PERMIT ACTIONS

1. Modification, Reissuance, or Termination. This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the permittee) or upon the Director's initiative. However, permits may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR Section 144.39 or 144.40. All requests shall be in writing and shall contain facts or reasons supporting the request. Also, the permit is subject to minor modifications for cause as specified in 40 CFR Section 144.41. The filing of a request for a permit modification, revocation, and reissuance, or 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 permit condition.
2. Transfers. This permit is not transferrable to any person except after notice is provided to the Director and the requirements of 40 CFR Section 144.38 are complied with. The Director may require modification or revocation and reissuance of the Permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

C. 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.

D. CONFIDENTIALITY

In accordance with 40 CFR, Part 2 and 40 CFR, Section 144.5, any information submitted to EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim shall 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 validity of the claim shall be assessed in accordance with the procedures in 40 CFR, Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

- The name and address of the permittee; and
- Information about the existence, absence, or level of contaminants in drinking water.

E. GENERAL DUTIES AND REQUIREMENTS

1. Duty to Comply. The permittee shall comply with all conditions of this permit except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance constitutes a violation of the SDWA and is grounds for termination, revocation and reissuance, modification of this permit, and/or formal enforcement action. Such noncompliance may also be grounds for enforcement action under the Resource Conservation and Recovery Act (RCRA).
2. Continuation of Expiring Permit.
 - a) Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall submit a complete application for a new permit at least one hundred and eighty (180) days before this permit expires.
 - b) Permit Extensions. The conditions of an expired permit may continue in force in accordance with Title 5 of the United States Code (U.S.C.) 558(c) until the effective date of a new permit if:
 - (i) The permittee has submitted a timely application that is a complete application for a new permit; and
 - (ii) The Director, through no fault of the permittee, does not issue a new permit with an effective date on or before the expiration date of the previous permit.
 - c) Enforcement. When the permittee is not in compliance with the conditions of the expiring or expired permit, the Director may choose to do any or all of the following:
 - (i) Initiate enforcement action based upon the permit that has been continued;
 - (ii) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the

- activities authorized by the continued permit or be subject to enforcement action for operating without a permit;
- (iii) Issue a new permit under 40 CFR Part 124 with appropriate conditions; or
 - (iv) Take other actions authorized by these regulations.
- d) State Continuation. An EPA issued permit does not continue in force beyond its expiration date under Federal law if at that time a State has primary enforcement authority. A State authorized to administer the UIC program may continue either EPA or State-issued permits until the effective date of the new permits only if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit.
3. Penalties for Violations of Permit Conditions. Any person who violates any requirement of the UIC Program is subject to enforcement action under Section 1423 of the SDWA (42 U.S.C. Section 300h-2, et seq.). Violations of this permit may be subject to such other actions pursuant to RCRA. If the violation is willful, criminal penalties and/or imprisonment may result in accordance with Title 18 of the U.S.C.
 4. 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.
 5. 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.
 6. 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) that are installed or used by the permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance include 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.
 7. Duty to Provide Information. If at any time the Director issues a written request for information to determine whether cause exists for modifying, or to revoke and reissue, or terminate this permit, or to determine compliance with this permit, the permittee shall furnish the requested information within the time specified. 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 permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Permit;
 - b) Have access to and copy, at reasonable times, any records that shall be kept under the conditions of this Permit;
 - 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 SDWA, any substances or parameters at any location.
9. Signatory Requirements. All reports or other information requested by the Director shall be signed and certified as follows:
- a) All reports required by this permit and other information requested by the Director shall be signed as follows:
 - (i) for a corporation—by a responsible corporate officer, such as a president, secretary treasurer, or vice president of the corporation in charge of principal business function, or any other person who performs similar policy or decision-making functions for the corporation;
 - (ii) for partnership or sole proprietorship—by general partner or the proprietor, respectively; or
 - (iii) for municipality, state, federal, or other public agency—by either a principal executive or a ranking elected official.
 - b) A duly authorized representative of the official designated in paragraph (a) above also may sign only if:
 - (i) the authorization is made in writing by a person described in paragraph (a) above;
 - (ii) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or a position of equivalent responsibility. A duly authorized representative may thus be either a named individual or any individual occupying a named position; and
 - (iii) the written authorization is submitted to the Director.

- c) If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section shall be submitted to the Director prior to, or together with, any reports, information, or applications to be signed by an authorized representative.
- d) Any person signing a document under paragraph (b) of this section shall make the following certification:
I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments. Additionally, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment.

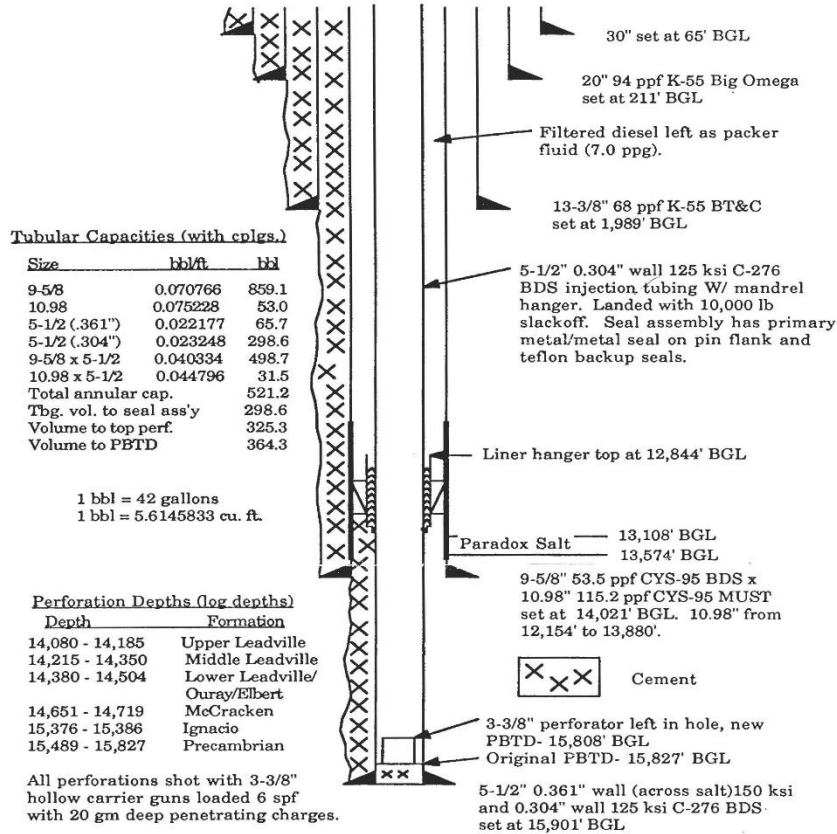
10. Reporting of Noncompliance.

- a) Anticipated Noncompliance. The permittee shall give advanced notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with Permit requirements.
- b) 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 thirty (30) days following each scheduled date. The permittee shall be notified by EPA in writing upon being subject to such a compliance schedule.
- c) Twenty-four (24) Hour Reporting.
- (i) **The permittee shall report to the Director any noncompliance that may endanger health or the environment.** Information shall be provided, either orally or by leaving a message, within twenty-four (24) hours from the time the permittee becomes aware of the circumstances by telephoning **303.312.6704 and asking for EPA Region 8 UIC Program Compliance and Enforcement Director (during normal business hours)**, or by contacting **EPA Region 8 Emergency Operations Center at 303.293.1788 (for reporting at all other times)**. The following information shall be included in the verbal report:
- Any monitoring or other information which indicates that any contaminant may cause endangerment to a USDW.
 - Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

- (ii) Written notice of any noncompliance that may endanger health or the environment **shall be provided to the Director within five (5) calendar days** of the time the permittee becomes aware of the noncompliance. The written notice shall contain a description of the noncompliance and its cause; the period of noncompliance including exact dates and times; if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to prevent or reduce recurrence of the noncompliance.
 - d) Other Noncompliance. The permittee shall report all other instances of noncompliance not otherwise reported at the time of analysis submission. The reports shall contain the information listed in Part III, Section E.10.c. of this permit.
 - e) Other Information. When the permittee becomes aware that any relevant facts were not submitted in the permit application, or incorrect information was submitted in a permit application, or in any report to the Director, the permittee shall submit such correct facts or information within fourteen (14) calendar days of the time such information becomes known.
11. Oil Spill and Chemical Release Reporting. The operator shall comply with all other reporting requirements related to oil spills and chemical releases or other potential impacts to human health or the environment by contacting the National Response Center (NRC) at 1.800.424.8802 or 202.267.2675, or through the NRC website at <http://www.nrc.uscg.mil/nrchp.html>.

APPENDIX A

**Figure 1- Wellbore Schematic
Paradox Valley Injection Test #1
Montrose County, Colorado**



* The 20", 13-3/8", 9-5/8", and 10.98" were made by Mannesman of West Germany. The 5-1/2" C-276 was made by INCO Alloys of Huntington, West Virginia. The wellhead equipment was made by Cameron Iron Works of Houston, Texas. The liner hanger/seal assembly were made by Texas Iron Works of Houston, Texas.

** Casing caliper indicated 9-5/8" to have even ID wear from drilling. Minimum remaining wall thickness is 0.45". Maximum recommended working pressure of 9-5/8" is 7,400 psi (1.2 SFB) based on this minimum remaining wall.

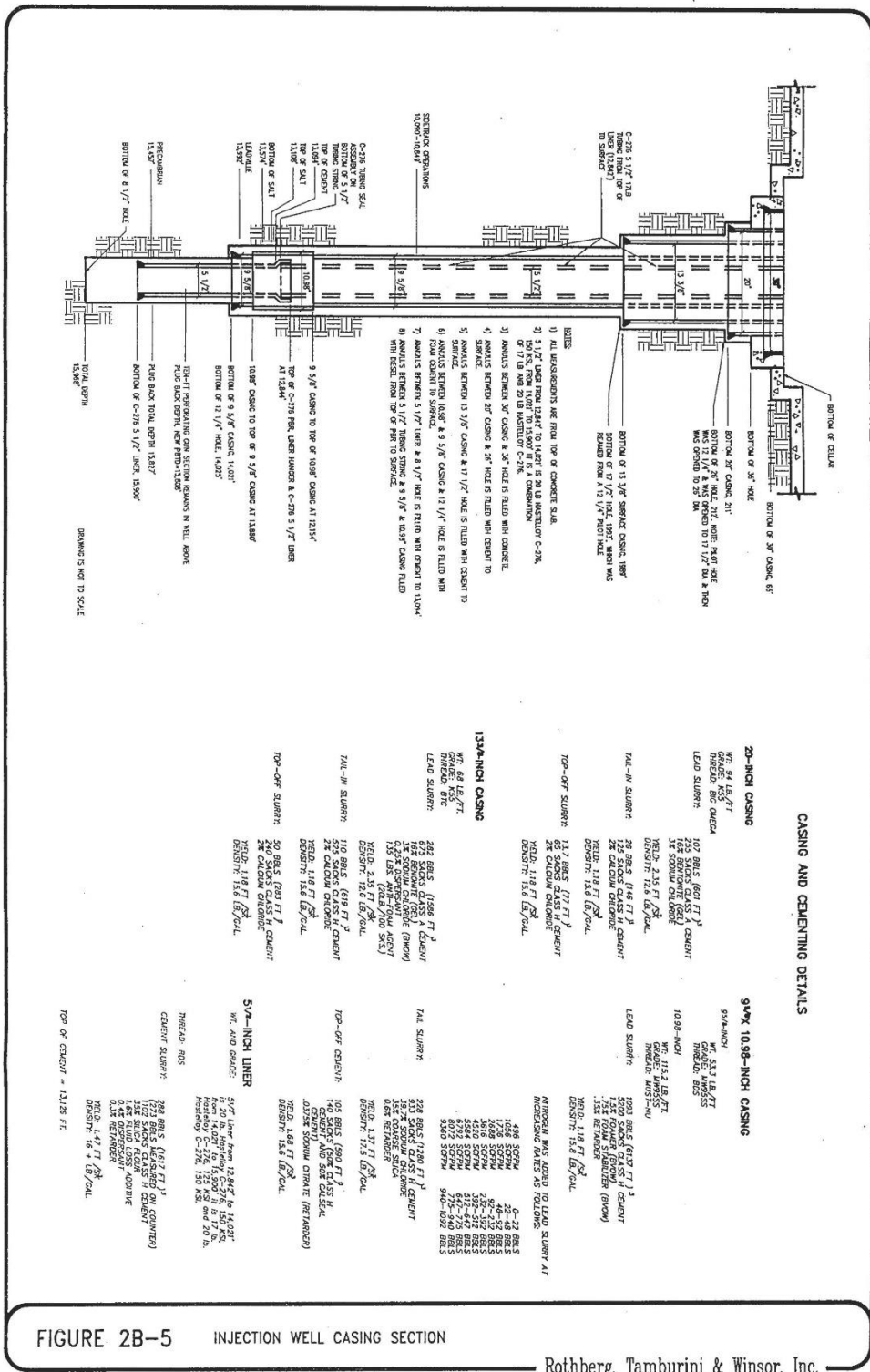


FIGURE 2B-5 INJECTION WELL CASING SECTION

Rothberg, Tamburini & Winsor, Inc.

APPENDIX B

PLUGGING AND ABANDONMENT PLAN

The UIC Director has determined that this well plugging and abandonment plan adequately protects the USDWs. The plan is incorporated into the permit and shall be binding on the permittee.

After receiving approval from the appropriate Regional EPA office, the permitted injection well will be plugged in accordance with the Plugging and Abandonment Plan as follows:

PLUG NO. 1: Install a bridge plug 14,080 feet to 14,185 feet below ground level (BGL).

PLUG NO. 2: Unlatch polished bore receptacle/liner at 12,884 feet (BGL) and recover the 5-1/2 inch 0.0304 wall 125ski C-276 BDS injection tubing.


PLUG NO. 3: Cement tubing from bridge plug to 12,900 feet (BGL).

PLUG NO. 4: Bentonite slurry to fill annulus casing to 1000 feet (BGL).

PLUG NO. 5: Cement annulus casing to surface and provide surface marker.

APPENDIX C

WAMS SOP

	Standard Operating Procedure		
	Pressurizing the Well Annulus Monitoring System (WAMS)	Revision: 05	Revision Date: 06 May 2021

Purpose:

When injection well pressure increases and / or the Well Annulus System (WAMS) pressure decreases, the WAMS pressure must be increased to maintain the annulus / well differential pressure within specified limits.

Description:

The annulus / well differential pressure is maintained at 1100 PSI ± 50 PSI. If well pressure increases or WAMS pressure decreases, the WAMS pressure must be increased to maintain the differential within limits.

Control:

The Stationary Engineer directs the operation of the WAMS system and monitors differential pressure from the BIF Control Room SCADA computer. Differential pressure may also be monitored locally on gages PI-400 and PI-205 to verify system conditions and adjustments.

Procedure:

1. Verify WAMS T400 tank level is at least 7'.
2. When directed to increase WAMS pressure ("Pump the WAMS"), maintain communications with the Stationary Engineer IAW the "Site Communications" Standard Operating Procedure.
3. Check shut VB-413.
4. Open/check open VB-412.
5. Notify the Stationary Engineer that the system is lined up for pumping operations. When directed by the Stationary Engineer start Triplex Pump P-404 by placing the ON/OFF switch to ON to pump additional fluid into the WAMS and increase annulus pressure. The Stationary Engineer monitors differential pressure during the pumping operation.
6. When directed by the Stationary Engineer, stop Triplex Pump P-404. The Stationary Engineer will verify differential pressure is within the desired range. The Stationary Engineer may direct additional pumping to obtain the desired differential pressure.
7. Check open drain valve VB-416. Note any indication of PSV-413 leakage. Some accumulation of condensation near the drain valve is normal however, a significant presence of water may indicate the WAMS pressure relief valve (PRV) is leaking by. Notify the Operations and Safety Supervisor (O&SS) if PRV leakage is suspected.
8. Stationary Engineer note and record the initial and final pressures in the Operator's Log Book.
9. Stationary Engineer record the date, before and after meter readings and the number of gallons pumped in the WAMS log book located in the BIF Control Room.

Notes:

1. In the event of a **FIRE** in or around the WAMS building. Immediately notify the Stationary Engineer and request the power be cut to the building utilizing the WAMS main disconnect located on the south electrical panel wall in the BIF control room.
2. In the event of a **power loss** when temperatures are at or below **30° for 30 minutes** or more, power the heat tapes using the generator stored in the WAMS building. Move the generator outdoors and, using the supplied extension cords and pigtail, connect the heat tapes to the generator. Operate the generator until normal power is restored.

Summary of Revisions & Changes

Effective Date	Revision or Minor Change	Revision Number	Reason for Revision or Change	Person Making / Entering Change
03 Sept 2014	Revision	01	Logo change, fire language added and add document revision recommendation page.	John Thomas
14 Jan 2016	Revision	02	Remove requirement to check shut VB-401. Change position of and procedures for and VB-416 to normally open from normally closed and remove cycling procedure (Step 8). Addition of power loss procedures.	John Thomas
02 Jun 2016	Revision	03	Language change to allow VB-412 to remain open during normal operations and closed at weekly shutdown.	John Thomas
07 Nov 2017	Minor Change	04	Changed VB-412 language.	John Thomas
06 May 2021	Minor Change	05	Added SCADA, Added T400 level check.	Joe Bird

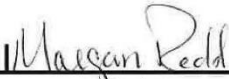
Review and Approval:

AUTHOR

Joe Bird		Operations & Safety	5/6/2021
<small>Printed Name of Author</small>	<small>Signature</small>	<small>Department</small>	<small>Date</small>

REVIEWS AND CONCURRENCE

Concur
YES NO

Maegan Redd		Stationary Engineer	5/9/2021	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<small>Printed Name of Reviewer</small>	<small>Signature</small>	<small>Title</small>	<small>Date</small>		

Mike Rutter		Maintenance	5/12/2021	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<small>Printed Name of Reviewer</small>	<small>Signature</small>	<small>Department</small>	<small>Date</small>		

FINAL APPROVAL

Approved
YES NO

John Adams		Project Manager	5/12/2021	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<small>Printed Name of Approver</small>	<small>Signature</small>	<small>Title</small>	<small>Date</small>		

Document Revision Recommendation:

DOCUMENT/PROCEDURE			
Name:	Number:	Revision:	Effective date:
Recommended Revision:			
Reason for the Revision:			
Person Recommending the Revision	Date	Submitted to:	
REVISION RECOMMENDATION DISPOSITION			
Revision Recommendation Form Received by:	Title:	Date:	
Revision Recommendation Reviewed by:	Title:	Date:	
Is the Recommendation Value Added/Necessary	Yes/No	If Yes, establish action item below	
		If No, detail in comment section below	
Comments:			
REVISION RECOMMENDATION ACTION ITEM			
Action Item Assigned to:	Title:	Date:	
Action Completion Date:	Assigned By:	Title:	
REVISION RECOMMENDATION FOLLOW-UP/CLOSURE			
Revision was completed:	Verified by:	Date:	
Revision was reviewed and approved:	Verified by:	Date:	
Staff Trained on Revision:	Verified by:	Date:	
Revision was implemented:	Verified by:	Date:	
Revision was effective:	Verified by:	Date:	
REVISION RECOMMENDATION CLOSURE			
Closed by	Title	Date	

	Standard Operating Procedure		
	Bleeding Pressure From the Well Annulus Monitoring System (WAMS)	Revision: 03	Revision Date: 06 May 2021

Purpose:

When injection well pressure drops off due to plant shutdown or reduced injection rate, pressure must be bled from the WAMS to maintain the annulus / well differential pressure within specified limits.

Description:

The annulus / well differential pressure is maintained at 1100 PSI \pm 50 PSI. If well pressure drops, pressure must be bled from the annulus to maintain the differential within limits.

Control:

The Stationary Engineer directs the operation of the WAMS system and monitors differential pressure from the BIF Control Room SCADA computer screen. Differential pressure may also be monitored locally using gages PI-400 and PI-205 during bleeding operations to verify system conditions and adjustments.

Procedure:

1. When directed to bleed the WAMS, maintain communications with the Stationary Engineer in accordance with the "Site Communications" Standard Operating Procedure.
2. Check open VB-412.
3. Check/Verify Open VB-401.
4. When directed by the Stationary Engineer, crack open VB-413 to commence the bleeding operation. The Stationary Engineer monitors differential pressure during the bleeding operation.
5. When directed by the Stationary Engineer, shut VB-413 to stop bleeding operations. The Stationary Engineer will verify differential pressure is within the desired range. The Stationary Engineer may direct additional bleeding to obtain the desired differential pressure.
6. When directed by the Stationary Engineer, torque shut VB-413 to 70 ft-lb.
7. Verify open VB-416 and inspect below valve for presence of water in the WAMS pressure relief line. Some accumulation of condensation in the line is normal however, a significant presence of water may indicate the WAMS pressure relief valve (PSV-413) is leaking by. Notify the Operations and Safety Supervisor (O&SS) if PRV leakage is suspected.
8. Stationary Engineer note and record the initial and final pressures in the Operator's Log Book.
9. Stationary Engineer record the date and approximate number of gallons bled from the WAMS in the WAMS log book located in the BIF Control Room.

NOTE: In case of electrical fire in/around the WAMS building. Immediately notify the Stationary Engineer. The Stationary Engineer will cut power to the building utilizing the main disconnect to the WAMS building located on the south electrical panel wall in the BIF control room.

Summary of Revisions & Changes

Effective Date	Revision or Minor Change	Revision Number	Reason for Revision or Change	Person Making / Entering Change
03 Sep 2014	Revision	01	Change logo, add fire procedure language.	John Thomas
07 Nov 2017	Minor Change	02	Changed VB-412 language.	John Thomas
06 May 2021	Minor Change	03	Transition from WAI to VNSFS, enter SCADA changes, implement VB-401 to remain open language.	Joe Bird

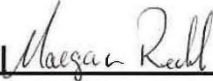
Review and Approval:

AUTHOR

Joe Bird		Operations & Safety	5/6/2021
Printed Name of Author	Signature	Department	Date

REVIEWS AND CONCURRENCE


Concur
YES NO

Maegan Redd		Stationary Engineer	5/4/2021	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Printed Name of Reviewer	Signature	Title	Date		

Mike Rutter		Maintenance	5/12/2021	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Printed Name of Reviewer	Signature	Department	Date		

FINAL APPROVAL

Approved
YES NO

John Adams		Project Manager	5/12/2021	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Printed Name of Approver	Signature	Title	Date		

Document Revision Recommendation:

DOCUMENT/PROCEDURE			
Name:	Number:	Revision:	Effective date:
Recommended Revision:			
Reason for the Revision:			
Person Recommending the Revision	Date	Submitted to:	
REVISION RECOMMENDATION DISPOSITION			
Revision Recommendation Form Received by:	Title:	Date:	
Revision Recommendation Reviewed by:	Title:	Date:	
Is the Recommendation Value Added/Necessary	Yes/No	If Yes, establish action item below	
		If No, detail in comment section below	
Comments:			
REVISION RECOMMENDATION ACTION ITEM			
Action Item Assigned to:	Title:	Date:	
Action Completion Date:	Assigned By:	Title:	
REVISION RECOMMENDATION FOLLOW-UP/CLOSURE			
Revision was completed:	Verified by:	Date:	
Revision was reviewed and approved:	Verified by:	Date:	
Staff Trained on Revision:	Verified by:	Date:	
Revision was implemented:	Verified by:	Date:	
Revision was effective:	Verified by:	Date:	
REVISION RECOMMENDATION CLOSURE			
Closed by	Title	Date	

Appendix D
Bureau of Reclamation
Paradox Valley Seismic Network
Monitoring Plan
June 21, 20011

In compliance with the permit issued by the Environmental Protection Agency (EPA) for the Paradox Valley Unit's (PVU's) deep injection well, the Bureau of Reclamation (Reclamation) will operate a multi-station seismic monitoring network in the vicinity of Paradox Valley, Colorado. The purpose of the network, named the Paradox Valley Seismic Network (PVSN), is to monitor earthquakes induced by the deep injection of brine, as well as any naturally-occurring earthquakes in the Paradox Valley region.

PVSN will consist of two complimentary seismic monitoring components:

1. High-gain seismic array

The high-gain seismic array will consist of a multi-station, continuously recorded array of stations. The array will be sufficient to reliably detect earthquakes down to magnitude **M** 0.5 that may occur within 10 km of the injection well, and determine their characteristics. In addition, the array will be capable of detecting earthquakes of magnitude **M** 1.0 or larger occurring in the broader Paradox Valley region, out to a distance of at least 30 km from the well.

The density of high-gain seismic array stations will be sufficient to locate earthquakes occurring within 10 km of the injection well to within 1.5 km accuracy, and events occurring within the perimeter of the network to within 3 km accuracy. Because the spatial distribution of seismicity is not expected to be uniform, the density of seismic stations will vary. In general, stations will be spaced closer together near the injection well and in other seismically active areas, with a sparser station spacing in less active regions.

Each high-gain seismic station will measure ground motions in either one or three directions. Stations that measure motion in a single direction will consist of a vertically-oriented, single-component seismometer. Stations that measure motion in three directions will have a three-component seismometer aligned vertically and in the north-south and east-west directions. Because three-component stations provide additional information that enables more accurate estimates of earthquake depths compared to single-component stations, three-component stations should be used whenever feasible.

The high-gain array will be designed so that seismic data recorded by each station will be continuously transmitted to a centralized data processing center where seismic events will be automatically detected and recorded.

2. Strong-motion array

The strong-motion array will consist of a small number of event-triggered stations located in or near populated areas subject to shaking from induced earthquakes, or at critical project facilities such as the injection well. The strong-motion array will be designed to measure ground motions from events that are large enough to be felt or cause damage, and which would tend to saturate the high-gain array. The strong-motion array may operate in either a continuously transmitted mode, or in an event-triggered mode such that waveform data from discrete earthquakes is stored locally until it can be downloaded. If an event-triggered mode is used, communications will be provided so that data can be downloaded automatically to a centralized data processing center within 1 hour of the occurrence of an earthquake.

The configuration of the high-gain seismic array and the locations of strong motion instruments may change over time, as needed to adapt to any evolution in the spatial distribution of seismicity or major modifications to PVU's infrastructure.

Reclamation will keep PVSN's data acquisition systems operating as continuously as practical, with a goal of achieving an annual uptime of 95% or higher. The operational status of the network will be evaluated on a regular basis, and maintenance and upgrades to the network components will be performed as needed to maintain the desired monitoring capabilities and as resources and field conditions allow.

In addition to the automatic processing of each seismic event discussed above, Reclamation personnel will manually review and process each detected seismic event in a timely manner. Individual characteristics of the earthquakes will be determined, such as location, magnitude, and time of occurrence, as well as their cumulative characteristics, such as their distribution in time. A database of all local earthquakes detected by PVSN will be maintained by Reclamation. The earthquake data will be used to identify and evaluate relationships between seismicity, geology, tectonics, and injection operations. Reports concerning network operations and recorded seismicity will be prepared as deemed appropriate by Reclamation project managers.